BUREAU OF RECLAMATION

# LTO Action 5

## Exhibit 4, Endangered Species Act Section 7 (a)(2) Compliance

U.S. Department of the Interior

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# 1. Endangered Species Act Section 7 (a)(2) Compliance

On November 9, 2023, Reclamation submitted its Biological Assessment to USFWS and NMFS and met several times during their sufficiency review to facilitate development of the biological opinions. The USFWS 2024 LTO Biological Opinion (2022-0059509) was issued on November 8, 2024. The NMFS 2024 LTO Biological Opinion (WCRO-2024-02917) was issued December 6, 2024. Reclamation considered the 2024 Biological Opinions in reaching its 2024 Record of Decision. Action 5 mainly modifies Delta operations in the Proposed Action considered in the NMFS 2024 LTO Biological Opinion to comply with EO14181. Modifications to the Proposed Action under Action 5 focus on Delta operations. Effects for species outside the Sacramento River and the Delta remain unchanged.

Reinitiation of ESA Section 7 consultation is required and shall be requested by the Federal agency, where discretionary Federal involvement or control over the action has been retained or is authorized by law and:

1) If the amount or extent of taking specified in the incidental take statement is exceeded;

2) If new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered;

3) If the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in the biological opinion or written concurrence; or

4) If a new species is listed or critical habitat designated that may be affected by the identified action.

Coordination with NMFS and USFWS on the analysis necessary for determining if Action 5 is within the range of effects evaluated in the 2024 LTO Biological Opinions began in June 2025. Lines of evidence developed with input from NMFS and USFWS include: Delta Passage Model, CVPIA SIT Decision Support Model, Salvage Density Model, Negative Binomial Salvage Model, ECO-PTM, Winter-run Chinook Salmon Coded Wire Tag Salvage Model, Redd Dewatering Analysis, Particle Tracking Fate Modeling, Delta Smelt Lifecycle Modeling, Longfin Abundance Analysis, Delta Export Zone of Influence (ZOI) Analysis.

## 1.1 Review for the National Marine Fisheries Service Biological Opinion

The Proposed Action in Reclamation’s 2023 LTO Biological Assessment and NMFS 2024 LTO Biological Opinion considered all four phases of Alternative 2 (the Preferred Alternative in the 2024 LTO Final EIS). The review below has been conducted to determine whether

implementation of Action 5 would cause an effect to listed species or critical habitat not previously analyzed in the NMFS 2024 LTO Biological Opinion. As a result of this review, Reclamation has determined that implementation of Action 5 would be within the range of effects analyzed in the NMFS 2024 LTO Biological Opinion.

### 1.1.1 Sacramento River Winter-Run Chinook Salmon Species and Critical Habitat

Effects to winter-run Chinook salmon under Action 5 are within the range of effects analyzed in the NMFS 2024 LTO Biological Opinion. Although less restrictive operation of Delta exports associated with Action 5 may result in more frequently reaching winter-run Chinook salmon seasonal and weekly salvage thresholds, real-time assessments, continued monitoring to estimate a juvenile production estimate (JPE) under Action 5, and an unchanged incidental take statement will inform export restrictions to avoid population level impacts. Tagging studies indicate a small fraction of winter-run smolts approach the South Delta regardless of OMR flows within the range allowed by the NMFS 2024 LTO Biological Opinion. Biological models based on acoustic tagging studies show through-Delta survival remains the same. For winter-run that do reach the South Delta, Action 5 may reduce mortality by more rapidly drawing fish into export facilities for salvage instead of leaving them exposed to severely altered hydrodynamics and poor survival conditions in the south Delta. Once juvenile salmon are near the export facility intakes, acoustic tagging studies have shown that CVP entrainment and salvage provide for the highest survival outcomes.

Under Action 5, modeled survival of winter-run Chinook salmon through the Delta to Chipps Island is similar to the 2024 Proposed Action for all water year types (Table I.6-10 in *Attachment I6 Delta Passage Model*.)

Table I.1-1. Mean predicted winter-run Chinook salmon survival to Chipps Island averaged by water year type for Alt2 phases, Act5, EXP 1, EXP 3, and NAA.

| Water Year Type | Run | EXP1 | EXP3 | NAA | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Act5 |
|---|---|---|---|---|---|---|---|---|---|
| Above Normal | Winter | 0.32 | 0.3 | 0.26 | 0.26 | 0.26 | 0.26 | 0.26 | 0.26 |
| Below Normal | Winter | 0.25 | 0.23 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 |
| Critical | Winter | 0.17 | 0.15 | 0.14 | 0.14 | 0.15 | 0.15 | 0.15 | 0.14 |
| Dry | Winter | 0.22 | 0.2 | 0.17 | 0.17 | 0.17 | 0.17 | 0.18 | 0.18 |
| Wet | Winter | 0.39 | 0.37 | 0.33 | 0.33 | 0.33 | 0.33 | 0.33 | 0.33 |

Similarly, predicted spawner abundance for both natural- and hatchery-origin winter-run Chinook salmon under Action 5 is similar to the 2024 Proposed Action (Table F.2-6 in *Attachment F2 CVPIA SIT Winter run Lifecycle Model*).

Table F.2-6. Predicted terminal lambda ($N_{t=19}/N_{t=1}$) for total winter-run spawner abundance in the Upper Sacramento River, including both natural- and hatchery-origin fish, from deterministic model runs.

| EXP1 | EXP3 | NAA | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | Act5 |
|---|---|---|---|---|---|---|---|
| 0.048 | 0.668 | 0.679 | 0.678 | 0.669 | 0.668 | 0.668 | 0.678 |

Predicted losses of genetic winter-run Chinook salmon under Action 5 would increase (8-32% dependent on water year type) compared to the 2024 Proposed Action (*Attachment I2 Salvage Density Model Loss Simulation*). The 8% increase is 78 fish (Action 5 is 1,018 fish, Alt2woTUCPDeltaVA is 940 fish, wet water year type) and the 32% increase is a difference of 171 fish (Action 5 is 704 fish, Alt2woTUCPDeltaVA is 533 fish, below normal water year type). This increase would not lead to population level impacts because through-Delta survival does not decrease.

Predicted average monthly salvage for juvenile winter-run Chinook salmon at the Delta fish collection facilities under Action 5 would be similar to the 2024 Proposed Action in all water year type and month combinations (see Table I.1-7 in *Attachment I1 Negative Binomial Estimated Total Salvage*). The biggest increase in estimated salvage under Action 5 would occur in March of wet years, where an estimated 51 fish would be salvaged compared to 39-43 fish under the Proposed Action. This increase is relatively minimal compared to the Proposed Action and would not lead to population level impacts because through-Delta survival does not decrease.

The annual estimated proportion of winter-run Chinook salmon salvaged under Action 5 would increase under all water year types compared to the 2024 Proposed Action (see Table I.9-8 in *Attachment I9 Winter-run Chinook Salmon Coded Wire Tag Salvage Model*). The largest increase in estimated proportion of winter-run Chinook salmon salvaged would occur in above normal water years (2024 Proposed Action proportion ranges between 0.0028 – 0.0034; Action 5 proportion is 0.0037). This increase is relatively minimal compared to the Proposed Action and real-time assessments and continued monitoring to estimate a winter-run Chinook salmon JPE under Action 5 will inform export restrictions to avoid population level impacts.

The Delta zone influence analyses evaluated the spatial extent of hydrologic alterations due to OMR flow conditions. These hydrologic alterations change velocity distributions throughout the Delta and may affect the fate of fishes associated with the Delta. Compared to the 2024 Proposed Action, under low inflow conditions, Action 5 resulted in lower hydrologic alterations. Under higher inflow conditions, Action 5 resulted in more hydrologic alterations, but the overall area of influence was small (*Attachment I3 Zone of Influence*).

The expected percentage of redds dewatered for winter-run Chinook salmon in the Sacramento River would be similar under Action 5 as in the Proposed Action (Table L.4-11 in *Attachment L4 Sacramento Redd Dewatering Analysis*). The magnitude of change for all water year types would be less than 5%.

Given the information provided above, including the use of assessments to determine the need for export restrictions and the lack of expected population level effects, Reclamation has determined that Action 5 has not modified the Proposed Action in a manner that causes an effect to winter-run Chinook salmon or its critical habitat that was not considered in the NMFS 2024 LTO Biological Opinion.

### 1.1.2 Central Valley Spring-Run Chinook Salmon Species and Critical Habitat

Effects to spring-run Chinook salmon under Action 5 are within the range of effects analyzed in the NMFS 2024 LTO Biological Opinion. Tagging studies indicate few Sacramento River basin spring-run Chinook salmon reach the South Delta and biological models show through-Delta survival is unaffected by exports analyzed within the range of the NMFS 2024 LTO Biological Opinion. For spring-run Chinook salmon that do reach the South Delta, Action 5 may reduce mortality by more rapidly drawing fish into export facilities for salvage instead of leaving them exposed to severely altered hydrodynamics and poor survival conditions in the south Delta. Once juvenile salmon are near the export facility intakes, acoustic tagging studies have shown that CVP entrainment and salvage provide for the highest survival outcomes.

Under Action 5, modeled survival of spring-run Chinook salmon survival through the Delta to Chipps Island is similar to the 2024 Proposed Action (see Table I.611 in *Attachment I6 Delta Passage Model* and Table 113 in section 7.5.1.3.3. Delta Passage Model on page 547 of the NMFS 2024 LTO Biological Opinion) for all water years. The small differences indicate that Action 5 has a minimal effect on through-Delta survival across hydrologic conditions. Predicted spawner abundance also is similar to the 2024 Proposed Action. (see Table F.3-6 in *Attachment F3 CVPIA SIT Spring-Run Life Cyle Model* and Section 7.7.3.2 Central Valley Project Improvement Act Spring-Run Life Cycle Model Results on pg 718-721 of the NMFS 2024 LTO Biological Opinion).

For the ZOI analysis under low flow conditions, Action 5 resulted in lower hydrologic alterations compared to the 2024 Proposed Action. Under higher inflow conditions, Action 5 resulted in more hydrologic alterations, but the overall area of influence was small.

Predicted losses of Length-At-Date (LAD) spring-run Chinook salmon under Action 5 would increase in most water years and for all years combined compared to the 2024 Proposed Action with the exception of wet water years where losses decreased by 0.1%. The increases in loss (1-7% dependent on water year type) are relatively minimal and would not lead to population level impacts (*Salvage Density Model Loss Simulation; Attachment I.2*) The 1% increase is 44 fish (Action 5 is 5,224 fish, the Proposed Action is 5,180 fish, dry water year type) and the 7% increase is a difference of 732 fish (Action 5 is 10,685 fish, the Proposed Action is 9,953 fish, below normal water year type). The general conclusions of the salvage density analysis described in the NMFS 2024 LTO Biological Opinion (section 7.5.1.3.9 Salvage Density, pg. 557) are similar under Action 5 for spring-run Chinook salmon. Estimated juvenile salvage of spring-run Chinook salmon increases and decreases under Action 5 relative to the 2024 Proposed Action dependent on month and water year types. For all month and water year combinations, the difference between Action 5 and the Proposed Action is 10% or less with the exception of March in all year types where the model predicts increases in monthly salvage for juvenile spring run ranging from 22-43 % (see Table I.1-9 in Negative Binomial Estimated Total Salvage and section 7.5.1.3.10 Negative Binomial Salvage Model of the NMFS 2024 LTO Biological

Opinion on pages 559-560). The biggest increase in estimated salvage under Action 5 would occur in March of above normal years, where an estimated 90 fish would be salvaged compared to 51 fish under the Proposed Action. Although less restrictive operation of Delta exports associated with Action 5 may result in more frequently reaching seasonal and weekly salvage thresholds, real-time assessments under Action 5 may trigger necessary export restrictions to avoid population level impacts. Action 5 therefore functions within the existing regulatory framework, with assessment and coordination ensuring that potential localized increases in risk are addressed through adaptive management and operational controls.

Given the information provided above, including the use of assessments to determine the need for export restrictions and the lack of expected population level effects, Reclamation has determined that Action 5 has not modified the Proposed Action in a manner that causes an effect to spring-run Chinook salmon or its critical habitat that was not considered in NMFS 2024 LTO Biological Opinion.

### 1.1.3 California Central Valley Steelhead Species and Critical Habitat

Effects to steelhead under Action 5 are within the range of effects analyzed in the NMFS 2024 LTO Biological Opinion.

For the ZOI analysis under low flow conditions, Action 5 resulted in lower hydrologic alterations compared to the 2024 Proposed Action. Under higher inflow conditions, Action 5 resulted in more hydrologic alterations, but the overall area of influence was small.

Predicted losses of steelhead under Action 5 would increase slightly in all water years and for all years combined compared to the 2024 Proposed Action with the exception of dry years where losses would decrease up to 7% (Salvage Density Model Loss Simulation). The greatest increases in loss (7%) occur in below normal water years and are within the historical and modeled ranges considered in the NMFS 2024 LTO Biological Opinion (section 7.5.1.3.9 Salvage Density, page 559). A 7% increase in loss is 34 fish (Action 5 is 491 fish, the 2024 Proposed Action is 457 below normal year type) and therefore would have an overall, minimal effect on the steelhead population. Modeled through-Delta survival is anticipated to remain the same as 2024 Proposed Action. Within the range of exports allowed under the NMFS 2024 LTO Biological Opinion, acoustic tagging studies—of both juvenile steelhead and juvenile salmon—have not shown that higher exports increase the proportion of fish reaching the South Delta. For steelhead smolts that do reach the South Delta, Action 5 may reduce mortality by more rapidly drawing fish into export facilities for salvage instead of leaving them exposed to severely altered hydrodynamics and poor survival conditions in the south Delta. As with juvenile Chinook, steelhead smolts in the South Delta may experience the highest survival as a result of entrainment and salvage at the CVP.

Estimated salvage for juvenile steelhead would increase in all water years and for all years combined compared to the 2024 Proposed Action, with the largest increases of 48% occurring in above normal years (Negative Binomial Estimated Total Salvage Line of Evidence [LOE]). The increases in juvenile salvage (10–44%) fall within the historical and modeled ranges across all water years considered in the NMFS 2024 LTO Biological Opinion (section 7.5.1.3.10 Negative Binomial Salvage Model, pg. 560). A 44% increase in loss is a difference of 9,539 mean steelhead under Action 5 compared to 6,631 mean steelhead under the Proposed Action in above

normal years. Although less restrictive modeled operation of Delta exports associated with Action 5 may result in more frequently reaching seasonal and weekly salvage thresholds, real-time assessments and continued monitoring to estimate a steelhead juvenile production estimate under Action 5 will inform export restrictions to avoid population level impacts. Action 5, therefore, functions within the existing regulatory framework, with built-in safeguards ensuring that localized increases in risk are addressed through adaptive management and realtime operational controls.

Given the information provided above, including the use of assessments to determine the need for export restrictions and the lack of expected population level effects, Reclamation has determined that Action 5 has not modified the Proposed Action in a manner that causes an effect to steelhead or its critical habitat that was not considered in NMFS 2024 LTO Biological Opinion.

### 1.1.4 Green Sturgeon Species and Critical Habitat

Effects to green sturgeon under Action 5 are within the range of effects analyzed in the NMFS 2024 LTO Biological Opinion.

Predicted losses of green sturgeon were increased under Action 5 compared to the 2024 Proposed Action by 20% in above normal years and 7% when all years were combined (Salvage Density Model Loss Simulation). The increase in loss was relatively minimal; one fish accounted for the increase in loss for both water year types. Compared to the 2024 Proposed Action, losses were unchanged in wet, below normal, dry, and critical years. These results indicate that Action 5 slightly increased losses in some years, while losses in most water year types remained unchanged. However, the magnitude of these changes falls within the natural variability accounted for in NMFS modeling and within the range of effects evaluated in the NMFS 2024 LTO Biological Opinion (section 7.5.1.3.9 Salvage Density, page 557). Predicted salvage shows only minor variability across water year types, with increases in some years, but these remain within historical and modeled ranges considered in the NMFS 2024 LTO Biological Opinion. Although less restrictive operation of Delta exports associated with Action 5 may result in more frequently exceeding seasonal and weekly salvage thresholds, real-time assessments under Action 5 may trigger necessary export restrictions to avoid population level impacts. Action 5 functions within the existing regulatory framework, with built-in safeguards ensuring that any localized increases in risk are addressed through adaptive management and real-time operational controls.

Given the information provided above, including the use of assessments to determine the need for export restrictions and the lack of expected population level effects, Reclamation has determined that Action 5 has not modified the 2024 Proposed Action in a manner that causes effects to green sturgeon or its' critical habitat that was not considered in NMFS 2024 LTO Biological Opinion.

### 1.1.5 Southern Resident Killer Whale

Effects to killer whale under Action 5 are within the range analyzed in the NMFS 2024 LTO Biological Opinion. For the LTO, potential impacts to killer whale have been evaluated through changes in the availability of fall-run Chinook salmon, a key prey source. Action 5 results in

slightly higher average survival of fall-run Chinook salmon through the Delta compared to the 2024 Proposed Action, with increases of 2.4% in above normal years, 4.1% in below normal years, 2.6% in dry years, and 0.4% in wet years. The exception is critical years, where survival decreases by 3.9%.

Sacramento River winter-run Chinook salmon and Central Valley spring-run Chinook salmon are also food sources for the killer whales that were included in the evaluation within the NMFS 2024 LTO Biological Opinion. The water-year-type averaged survival of winter-run and spring-run Chinook salmon through the Delta compared to the Proposed Action increases in all water year types with the exception of critical where minor decreases of 0.7% and 1.1% as projected for winter-run Chinook salmon and spring-run Chinook salmon, respectively.

The minor decrease in prey availability in critical years is not anticipated to impact killer whale foraging success or lead to measurable changes in population dynamics. In fact, there may be some beneficial effects to killer whale under Action 5 associated with increased survival during most water year types relative to the 2024 Proposed Action. However, this beneficial change does not change the analysis in the NMFS 2024 LTO Biological Opinion. Reclamation has determined that Action 5 has not modified the 2024 Proposed Action in a manner that causes effects to killer whale not considered in the NMFS 2024 LTO Biological Opinion

## 1.2 Review for the U.S. Fish and Wildlife Service Biological Opinion

The Proposed Action in Reclamation's 2023 LTO Biological Assessment and USFWS 2024 LTO Biological Opinion considered all four phases of Alternative 2 (the Preferred Alternative in the 2024 LTO Final EIS). The review below has been conducted to determine whether implementation of Action 5 would cause an effect to listed species or critical habitat not previously analyzed in the USFWS 2024 LTO Biological Opinion. As a result of this review, Reclamation has determined that implementation of Action 5 would be within the range of effects analyzed in the USFWS 2024 LTO Biological Opinion.

### 1.2.1 Delta Smelt Species and Critical Habitat

Effects to Delta smelt under Action 5 are within the range of effects analyzed in the USFWS 2024 LTO Biological Opinion.

For the ZOI analysis under low flow conditions, Action 5 resulted in lower hydrologic alterations compared to the 2024 Proposed Action. Under higher inflow conditions, Action 5 resulted in more hydrologic alterations, but the overall area of influence was small.

On average, Action 5 modeled mean population growth rate of Delta smelt is predicted to be reduced by 7% during wet years compared to the Proposed Action in the USFWS 2024 LTO Biological Opinion. This decrease in mean population growth rate of Delta smelt falls within the modeled ranges across water years considered in the USFWS 2024 LTO Biological Opinion (see *Appendix F, Modeling* [Delta Smelt Life Cycle Model with Entrainment], Table [F.4-4ID], PDF page [F.4-16]).

Larval Delta smelt entrainment was estimated using Particle Tracking/Fate Modeling. During the March through June period, reflective of timing of larval Delta smelt, particles injected in the Sacramento River region were entrained at facilities under Action 5, at a range of 0% to 12%, compared to the 2024 Proposed Action at a range of 0% to 14%. Under Action 5, particles injected in the San Joaquin River region were entrained at facilities at a range of 49% to 84%, compared to the 2024 Proposed Action at a range of 45% to 85%.

Under Action 5, the Sacramento and San Joaquin rivers particle tracking fate was similar or reduced relative to the 2024 Proposed Action, and falls within the modeled ranges across water years considered in the USFWS 2024 LTO Biological Opinion (*see Appendix I.8 Particle Tracking Fate Modeling of Larval Smelt Entrainment*). Under Action 5, remaining within the inflow-export conditions modeled will avoid larval Delta smelt effects having a population level impact.

Given the information provided above, Reclamation has determined that Action 5 has not modified the Proposed Action in a manner that causes effects to Delta smelt not considered in USFWS 2024 LTO Biological Opinion.

### 1.2.2 Longfin smelt

Action 5 is expected to result in benefits to longfin smelt relative to the Proposed Action analyzed in the USFWS 2024 LTO Biological Opinion.

For the ZOI analysis under low flow conditions, Action 5 resulted in lower hydrologic alterations compared to the 2024 Proposed Action. Under higher inflow conditions, Action 5 resulted in more hydrologic alterations, but the overall area of influence was small.

Reclamation predicted longfin smelt abundance from Delta outflow under Action 5 was greater than the 2024 Proposed Action (wet years by +11%, above normal years by +10%, below normal years by +7%, dry years – by 4%, and critical years – by 1 %). Action 5 is anticipated to be more beneficial than the 2024 Proposed Action for longfin abundance.

Larval longfin smelt entrainment was estimated using Particle Tracking/Fate Modeling. During the December through March period, reflective of the timing for larval longfin smelt, particles injected in the Sacramento River region are entrained at facilities under Action 5 at the same rate as the 2024 Proposed Action (1% to 15%). Under Action 5, particles injected in the San Joaquin River region are entrained at facilities at a range of 62% to 92%, compared to 58% to 91% under the 2024 Proposed Action.

The slight net decrease in entrainment modeled under Action 5 does not represent the distribution of the population, only particles in the San Joaquin River, and does not result in effects outside the USFWS 2024 LTO Biological Opinion (see *Appendix I.8 Particle Tracking Fate Modeling of Larval Smelt Entrainment)*. Although it is possible that less restrictive operation of Delta exports associated with Action 5 may result in more frequently reaching seasonal and weekly salvage thresholds, real-time assessments under Action 5 may trigger necessary export restrictions to avoid population level impacts.

Given the information provided above, including the use of assessments to determine the need for export restrictions and the lack of expected population level effects, Reclamation has determined that Action 5 has not modified the 2024 Proposed Action in a manner that causes effects to longfin smelt not considered in USFWS 2024 LTO Biological Opinion.

### 1.2.3 Giant Garter Snake

Effects to giant garter snake under Action 5 are within the range of effects analyzed in the USFWS 2024 LTO Biological Opinion. Reclamation entered into an Agreement with the CVP Settlement Contractors for the Drought Protection Program, that includes reductions in water supply applicable under both the 2024 Proposed Action and Action 5. Effects are now addressed by environmental compliance for that agreement and Action 5 does not change that analysis.

### 1.2.4 Northwestern Pond Turtle

Effects to Northwestern pond turtle under Action 5 are within the range of effects analyzed in the USFWS 2024 LTO Biological Opinion.

Northwestern pond turtle is present on the Sacramento River. Changes in hydrology or dewatering have the potential to strand individuals or alter habitat. Average flows in the Sacramento River below Keswick under Action 5 (8427 cfs) are slightly less than the average flows under the 2024 Proposed Action (8,442 cfs). For dry and critically dry years, flows under Action 5 (6,837 cfs) are slightly less than average flows under the 2024 Proposed Action (6,903 cfs). Overall, Action 5 flow changes in the Sacramento River are anticipated to be similar to the 2024 Proposed Action, and within the range of effects in the USFWS 2024 LTO Biological Opinion.

### 1.2.5 California Least Tern, California Ridgeway's Rail, Salt Marsh Harvest Mouse, Soft Bird's Beak (and Critical Habitat), and Suisun Thistle (and Critical Habitat)

Action 5 would not result in additional construction and restoration, or changes in Suisun Marsh Salinity Control Gate operations; therefore, no additional potential effects to California Least Tern, California Ridgeway's Rail, Salt Marsh Harvest Mouse, Soft Bird's Beak and associated critical habitat, or Suisun Thistle and associated critical habitat are expected.

### 1.2.6 Riparian Brush Rabbit and Riparian Woodrat

Action 5 is not expected to alter the Stanislaus or San Joaquin River watersheds where Riparian Brush Rabbit or Riparian Woodrat occur; therefore, no additional potential effects to Riparian Brush Rabbit or Riparian Woodrat are expected.

### 1.2.7 Western Snowy Plover

Action 5 would not result in additional changes in Suisun Marsh Salinity Control Gate operations; therefore, no additional potential effects to western snowy plover are expected.

Appendix F, Modeling

# Attachment F.2 CVPIA SIT Winter-run LCM

## F.2.1 Model Overview

USFWS and Reclamation have been working to develop lifecycle models for use in structured decision making for CVPIA. Through a participatory process, the Science Integration Team (SIT) has developed a winter-run Chinook Salmon decision support model, or DSM. This model has been peer-reviewed and is publicly available. The participatory team's model proposals and meeting notes, background, documentation, and code for the model are available at: Resources - CVPIA Science Integration Team. Reclamation used the SIT DSM in the LTO lifecycle analyses.

## F.2.2 Methods

### F.2.2.1 Model Development

The CVPIA SIT DSM models were developed by the CVPIA Science Integration Team (SIT) as part of a Structured Decision-Making (SDM) process. The SIT is a collaborative team of stakeholders and scientists. The resulting decision support models (DSMs) are open source and publicly available (DSM R Packages - CVPIA Science Integration Team). An early version of the DSMs has been published in a peer-reviewed publication (Peterson and Duarte 2020). The models were parameterized and calibrated using a combination of empirical data, existing models, analysis of existing data, and expert opinion.

DSMs were created for fall-, winter-, and spring-run Chinook salmon to compare how habitat restoration actions might improve natural production of each run. The DSMs are stochastic or deterministic stage-based life cycle models (LCMs) that track the number of Chinook salmon across juvenile size classes and adult stages of natural and hatchery origin. The transitions between stages are estimated with survival, growth, and movement submodels. Model inputs include existing habitat areas, fish harvest rates, water diversions, flows, and temperatures. Original flow information was obtained from CalSim II outputs. Temperature data are primarily obtained from HEC-5Q outputs. Some areas for which HEC-5Q data were unavailable have temperatures modeled based on measured water temperatures, statistical models relating water temperature to air temperature, or matching of tributaries with similar hydrology and geomorphology. Habitat inputs are primarily based on previously published flow-habitat relationships. Where flow-habitat relationship information is not available, relationships were assumed to be similar to those of nearby, geomorphically similar watersheds (Available in Attachment O.2). All other inputs except for predator prevalence are obtained from previously published sources.

For the purposes of LTO analyses, Reclamation used the model structure from the peer-reviewed, published version of the DSMs, instead of more recent versions with updated model processes and calibrations, based on recommendations from model developers and an emphasis on peer-reviewed model processes. The winter-run and spring-run DSMs were cloned by Reclamation staff from GitHub at the following URLs: https://github.com/CVPIA-OSC/winterRunDSM/tree/main and https://github.com/CVPIA-OSC/springRunDSM/tree/v1.0. These models required Reclamation to download the following data repositories from the FlowWest GitHub site: cvpiaHabitat (https://github.com/FlowWest/ cvpiaHabitat), cvpiaFlow (https://github.com/FlowWest/cvpiaFlow), cvpiaTemperature (https://github.com/FlowWest/cvpiaTemperature), and cvpiaData (https://github.com/FlowWest/cvpiaData).

Reclamation updated the calculation of flow inputs to the DSM to use CalSim 3 data for alternatives of interest. CalSim 3 data was used in place of the original CalSim II data for the following reasons: 1) the original DSMs, as well as all subsequent versions, used CalSim II data and variable definitions because that was the most recent available version, 2) Reclamation has developed a new CalSim model, CalSim 3, for current application in LTO modeling and future modeling needs, and 3) base model structures, assumptions, and definitions differ between CalSim II and CalSim 3 (sometime substantially). A detailed description of this conversion is provided in Section F.2.2.3, *Assumptions / Uncertainty*.

Reclamation also identified two issues in the published versions of the SIT DSMs (i.e., those used in Peterson and Duarte 2020) that merited recalibration of core model parameters. First, values for total diversions in the Upper Sacramento, which influence expected rearing survival, were incorrectly calculated as proportional diversions. Second, when the model is run in the deterministic mode, size class-specific survival terms are incorrectly applied for fish rearing in migratory corridors (e.g., Upper-mid, Lower-mid, Lower Sacramento River); because deterministic model runs serve as the basis for model calibration, this issue was especially problematic for comparing old and new model outputs. Both of these concerns led Reclamation staff to recalibrate the winter-run DSM for application in LTO modeling efforts. Details on model recalibration are provided in Section F.2.2.3, *Assumptions / Uncertainty*.

### F.2.2.2 Model Application

Reclamation ran the winter-run Chinook salmon DSM, both deterministically (i.e., no variability in parameters) and stochastically, to estimate demographic parameters, spawner abundances, and population trends for the period from 1980-1999 using updated flow and temperature inputs for each modeled alternative. The stochastic model was run for 100 iterations for each alternative, in which variability is simulated around select demographic parameters and abundances using random draws from statistical distributions. Stochastic model runs allow visualization of the implications of variability in life history parameters and processes on population demographic rates. Reclamation modified the model to output demographic parameters, in addition to previous reporting of juvenile and adult abundances; output demographic parameters hypothesized to be important to population trends included rearing survival in the Upper Sacramento River and smolt migratory survival through the Sacramento River and Delta. Reclamation only presents model outputs for demographic parameters that are sensitive to modified flow and temperature inputs. As noted in Section F.2.2.3, *Assumptions / Uncertainty*, Reclamation did not update

habitat inputs due to the complexity and inconsistent documentation associated with updating these values; thus, differences in scenario results reflect differences in flow and temperature only.

### F.2.2.3 Assumptions / Uncertainty

#### *F.2.2.3.1 Assumptions related to model calibration and re-calibration*

As noted above, Reclamation applied the same model structure described and implemented in Peterson and Duarte (2020), but with re-calibrated parameters that addressed corrections to faulty model functions and inputs. The methods and results of the re-calibration efforts are described below for completeness.

**Re-calibration methods**

Reclamation first modified the following functions to accurately apply rearing survival across age classes and watersheds: Delt.rearfunc() and rearfunc() (in the R scripts 'Delta juvenile growth n survival.R' and 'Survive and grow.R', respectively). Reclamation staff also generated accurate values for total diversions in the Upper Sacramento River using the original CalSim II input data and the R script 'Create new t.diver for calibration.R'. Finally, Reclamation also removed previous scalar adjustments to spawning and rearing habitat quantities for all watersheds.

Reclamation staff conducted recalibration using the GA package in R (v4.2.0). Reclamation used the same calibration model inputs used in the original calibration effort using the cvpiaCalibration package (FlowWest/cvpiaCalibration (github.com)), with two exceptions: staff used updated spawner abundance data from the Upper Sacramento River for brood years 1998-2017 and applied the updated total diversion values for the Upper Sacramento River watershed. Calibration model inputs were generated for 1998-2017 by constructing a synthetic time series of water years – see Peterson and Duarte (2020) for additional details. A total of 16 model parameters were estimated (Table F.2-1). Reclamation ran the calibration-version of the model for the simulated period 1998-2016 (i.e., 19 years of spawner abundance data). Estimated model fit was calculated as the sum of squared differences between observed and model-estimated spawner abundance data over the modeled time series; staff set the GA optimization to maximize the negative sum of squared differences.

Following exploratory rounds of calibrations with different optimization parameters and parameter constraints, Reclamation staff applied the following GA optimization parameters for the final calibration, drawing from recommendations from: Winter Run Calibration 2021 • winterRunDSM (cvpia-osc.github.io): popSize=100, maxiter=10000, run=50, pmutation=0.4. Staff used the original calibrated parameter values as starting values during optimization and set some informed constraints on possible values parameters. The adult en route survival parameter was bounded on the lower end at 0 to prevent unrealistically low survival values. Similarly, the last four parameters were bounded on the lower end at 0 based on expectations for the direction of covariate effects (e.g., survival should decrease with increased diversions). Staff bounded logit-transformed ocean survival to a maximum of -2 (i.e., experts would not reasonably expect total marine survival, from ocean entry to freshwater return as spawners, to exceed 12%). All other parameter values were constrained with a default of -3.5 and 3.5 because all were expressed as logit-transformed values. Recalibration efforts were informed in part by

consultation with the researchers who conducted the original calibration efforts (J. Peterson and A. Duarte, personal communication).

To assess the robustness and reliability of calibration results, Reclamation conducted multiple rounds of calibration runs for each set of calibration parameters and compared both convergence model fit (i.e., the negative sum of squared differences) and parameter values among runs. The intent of this step is to investigate the possibility for local minima in optimization, evaluate whether parameter values were running up against constraints, and assess consistency in parameter estimates; ideally, most to all parameters should be generally similar among runs and should not be close to parameter constraints. If this assessment did not reveal obvious issues, Reclamation then used the parameter estimates from the calibration run with the best (highest) model fit as the final selected parameter values.

Reclamation also performed post-hoc tests for goodness of fit with the selected parameter values by generating model estimates of natural spawners for both the new and original parameter values and comparing these model estimates to historical estimates of spawner abundance used to calibrate the model.

Table F.2-1. Parameters recalibrated for the winter-run Chinook salmon SIT DSM.

| Parameter ID | Description | Notes |
|---|---|---|
| 1 | Juvenile in-channel and floodplain rearing survival intercept | - |
| 2 | Juvenile bypass rearing survival intercept | - |
| 3 | Juvenile Delta rearing survival intercept | Might expect negative covariance with Parameter 16 (Delta diversions effect on rearing survival) |
| 4 | Juvenile San Joaquin migratory survival intercept | Not relevant to winter-run - expect no consistent values among runs |
| 5 | Juvenile Sacramento River migratory survival intercept (temperature model) | Expect parameters 5 and 6 to covary |
| 6 | Juvenile Sacramento River migratory survival intercept (discharge model) | Expect parameters 5 and 6 to covary |
| 7 | Juvenile Delta migratory survival intercept (flow model) | Expect parameters 7, 8 and 9 to covary |
| 8 | Juvenile Delta migratory survival intercept (temperature model) | Expect parameters 7, 8 and 9 to covary |
| 9 | Juvenile Delta migratory survival intercept (diversion model) | Expect parameters 7, 8 and 9 to covary |
| 10 | Juvenile ocean entry survival intercept | Expect this one to be < -2 (max of 0.12 overall marine survival) |

| Parameter ID | Description | Notes |
|---|---|---|
| 11 | Adult en route survival intercept | - |
| 12 | Egg-to-fry survival intercept | - |
| 13 | Effect of contact points on juvenile rearing survival | - |
| 14 | Effect of proportion flow diverted on juvenile rearing/migratory survival | - |
| 15 | Effect of total flow diverted on juvenile rearing/migratory survival | - |
| 16 | Effect of Delta diversions on juvenile rearing survival | - |

- = not applicable

## Re-calibration results

*Overview*

The results are separated into sections by the optimization settings, parameter constraints, and length of data time series; most calibration runs were used to finalize calibration methods or validate selected parameter constraints. Based on these results and the criteria for calibration success, Reclamation staff selected the parameters from 'run 3' from the final set of calibration runs (i.e., long time series, standard marine survival constraint) as the new parameters for the winter-run DSM and for future use in comparing the effects of competing alternatives on the winter-run population.

*Preliminary calibration results, short time series (1998-2010), no marine survival constraints*

Before settling on the parameterization for the GA optimization discussed above, Reclamation conducted several rounds of exploratory calibration to identify potential issues. First, staff ran the calibration with all described parameter constraints except that for marine survival (i.e., parameter 10, Table F.2-1). For marine survival intercept, staff applied the default constraints of -3.5 and 3.5. With these constraints, Reclamation ran three calibrations with a popSize=10 and two calibrations with a popSize=100. For these calibration runs, staff used a short time series of spawner abundances from 1998-2010. Reclamation obtained the following takeaways from these efforts:

- Model fit values varied widely among runs, both with a popSize=10 and a popSize=100; greater popSize values are expected to produce less variability and improved calibration performance (Figure F.2-1). Variability in observed model fit suggests optimization routines are finding numerous, different local minima.
- Calibrated parameter values varied widely among runs, both with a popSize=10 and a popSize=100 (Figure F.2-2).

- The parameter for juvenile ocean entry survival intercept (Parameter ID = 10) both varied widely and was estimated to have implausibly high values (Figure F.2-2). Recent estimates of marine survival, encompassing ocean entry as smolts to age-2, were 0.23 or lower for late-fall-run Chinook salmon (Michel 2019); these values suggest survival from ocean entry to spawning as age-3 or age-4 fish is even lower, as annual natural mortality rates for age-3 fish are assumed to be 0.2 in winter-run Chinook salmon cohort reconstructions and forecasts (O'Farrell et al. 2016). Given most winter-run Chinook salmon spawn at age-3, Reclamation staff expected the expected maximum marine survival to be in the ballpark of 0.184 (0.23 * 0.8) and average marine survival to be lower; these calculations do not account for any additional fishing mortality. With some runs, the marine survival parameter value was as high as 1.31, which translated to baseline marine survival of 0.79.

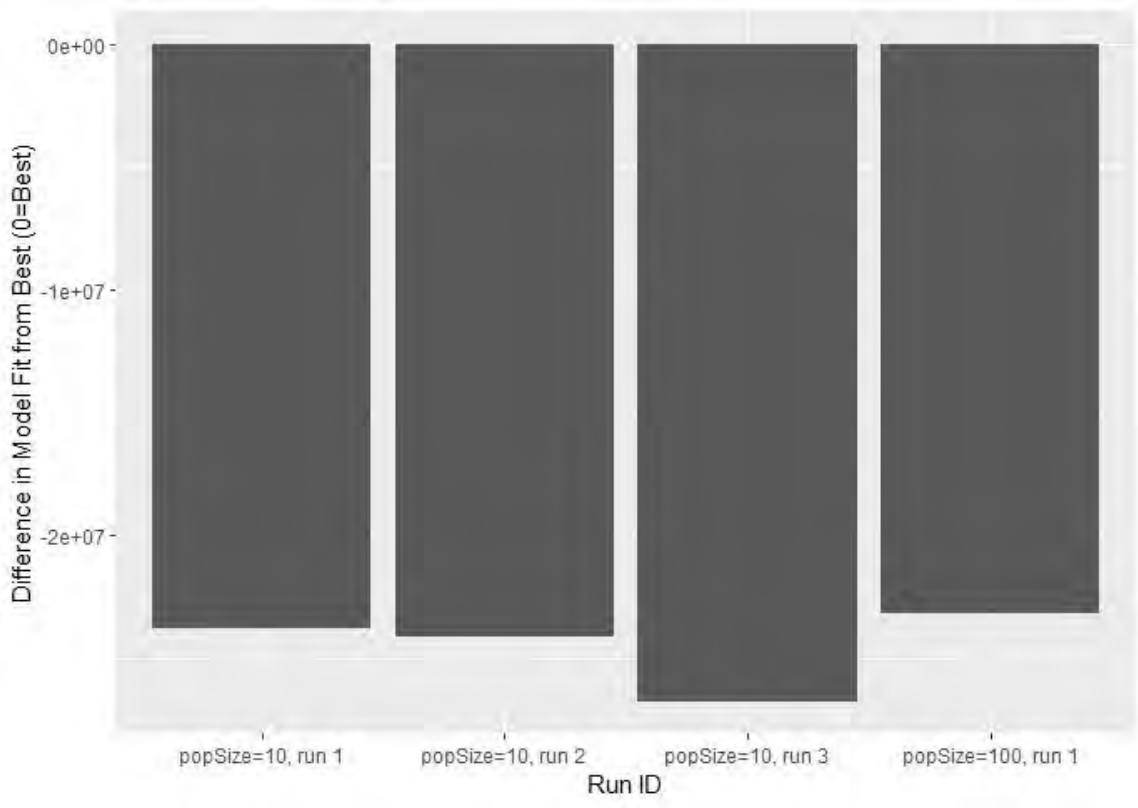



Figure F.2-1. Comparison of differences in model fit for all sub-optimal models from the best model. The best model was *popSize*=100, *run*=2 and had a model fit of -146618423, or -1.47e8.

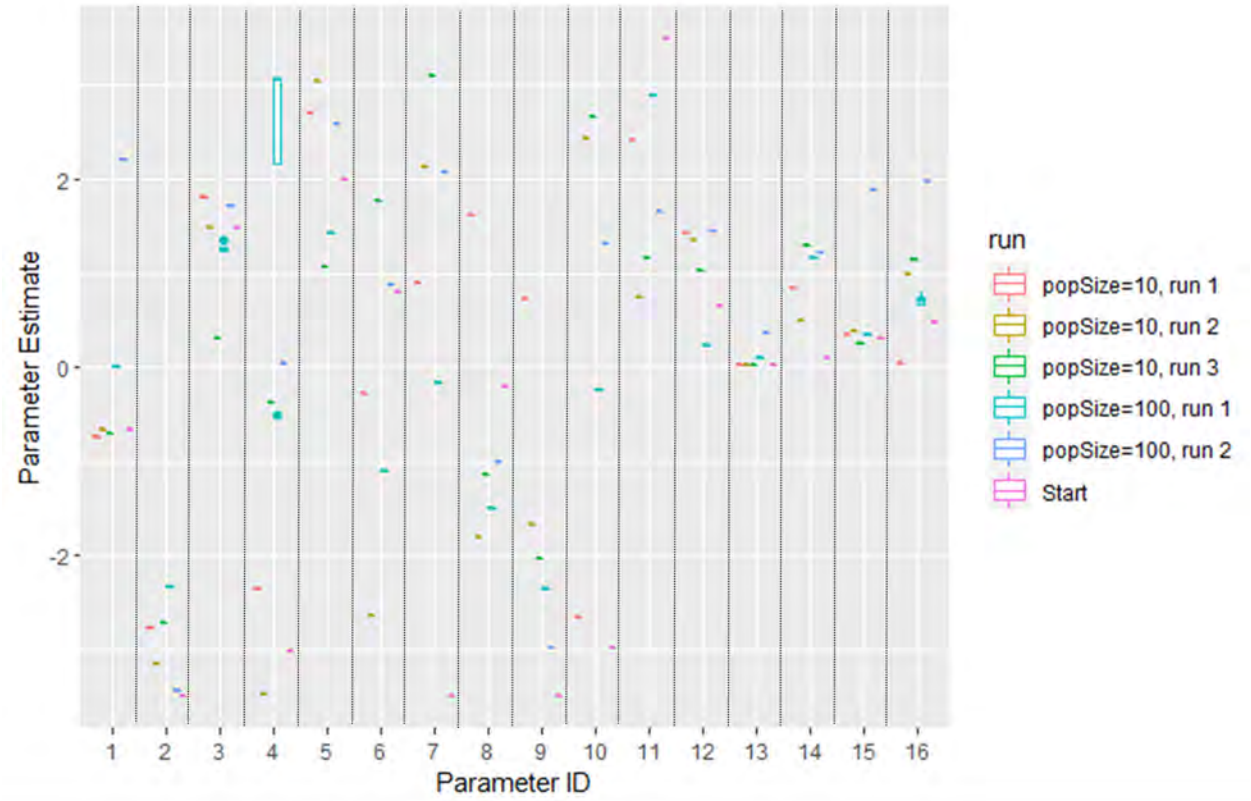



Figure F.2-2. Plot of parameter estimates for 5 exploratory runs without constraints on marine survival intercept and a short calibration time series, as well the starting values drawn from the parameter values from the original calibration. Ranges of parameter estimates for a given parameter and run indicate multiple parameter values produced the same measure of model fit.

*Preliminary calibration results, short time series (1998-2010), marine survival constraints*

Reclamation conducted another round of preliminary calibrations with the short time series of historical, or 'known', abundances after constraining marine survival to be less than 0.119 (logit-transformed value of -2); this value was based on a maximum observed marine survival to age-2 of 0.23 and expected natural mortality values for age-3 fish (see above text; O'Farrell et al. 2016; Michel 2019). With this new constraint, staff ran three calibrations with a popSize=100. These efforts resulted in the following observations:

- Although there was still variability in metrics of model fit among model runs, the total difference was an order of magnitude smaller than that observed without constraints on marine survival (Figure F.2-3)

- Staff observed reasonably consistent estimates for most parameters among the three calibration runs (Figure F.2-4). In particular, logit-transformed estimates of marine survival were broadly similar without running into upper or lower boundaries. Some parameters, notably parameter estimates for San Joaquin River migratory survival and juvenile Delta migratory survival (i.e., parameters 4, 7-9) were highly variable among runs; however, San Joaquin River survival is expected to have no effect on population dynamics for winter-run Chinook salmon, given the lack of spawning in the San Joaquin River or its tributaries, and the Delta survival parameters are expected to covary strongly because the three covariate hypotheses are equally weighted.
- Reclamation selected the parameters from 'run 2' and generated model estimates of spawner abundance to compare with 'known' spawners (Figure F.2-5). Although the newly calibrated parameter values provide better estimates of spawner abundance than the original values, the combination of the model structure and parameter values does not meaningfully account for observed variability in 'known' abundances.

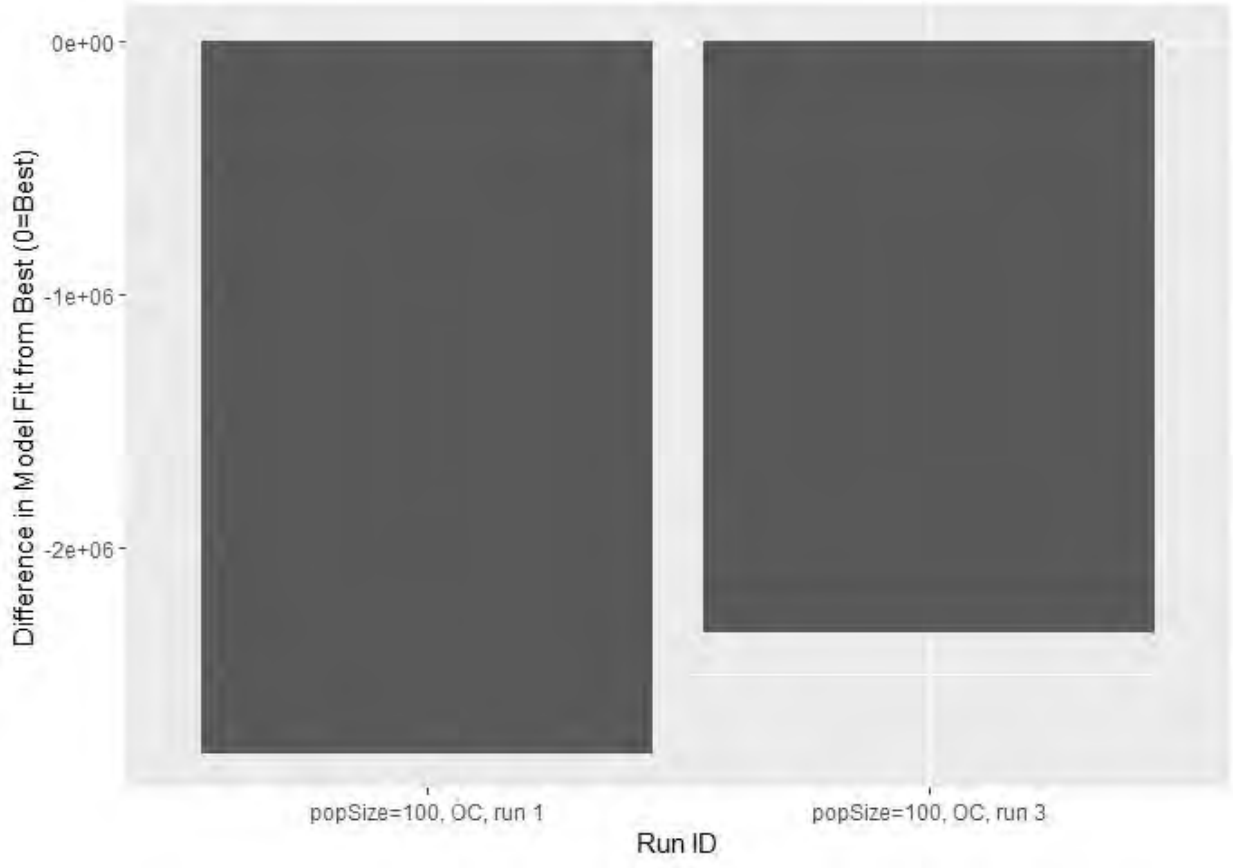



Figure F.2-3. Comparison of differences in model fit for all sub-optimal models from the best model. The best model was *popSize*=100, *OC, run*=2 and had a model fit of -171165739, or -1.71e8.

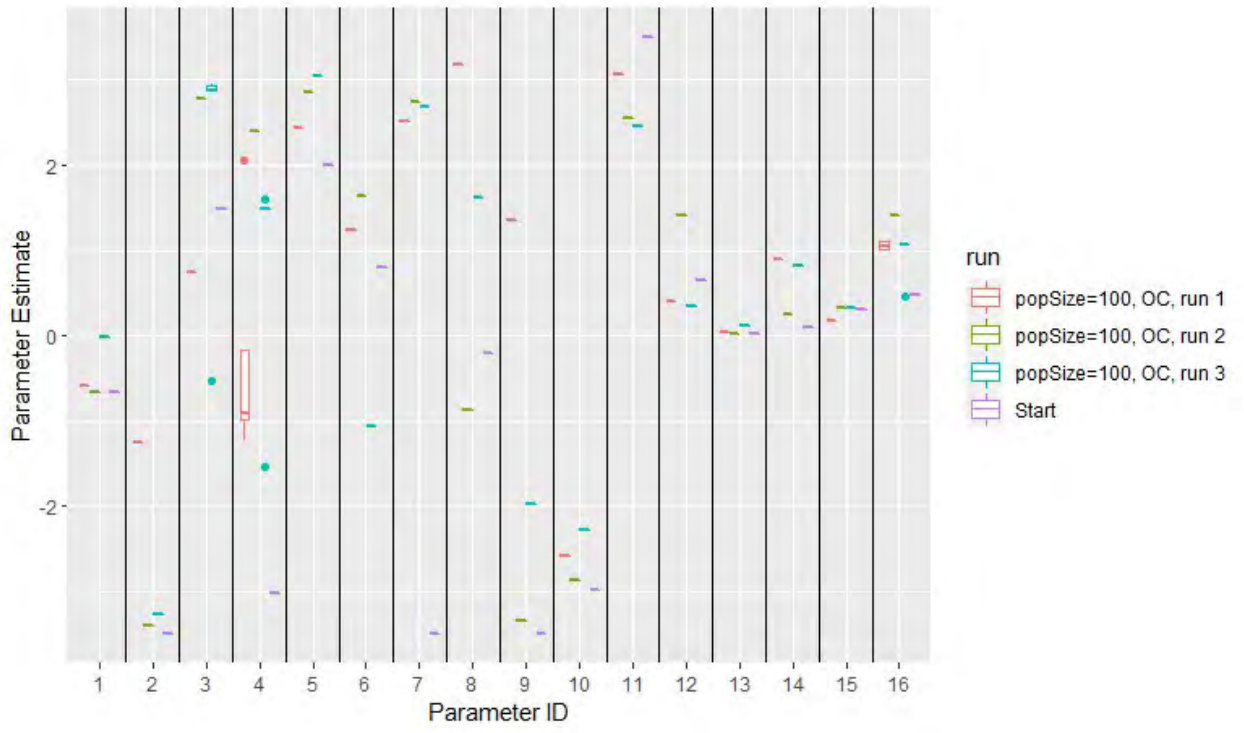



Figure F.2-4. Plot of parameter estimates for 3 calibration runs with constraints on marine survival intercept and the short calibration time series, as well the starting values drawn from the parameter values from the original calibration. Ranges of parameter estimates for a given parameter and run indicate multiple parameter values produced the same measure of model fit.

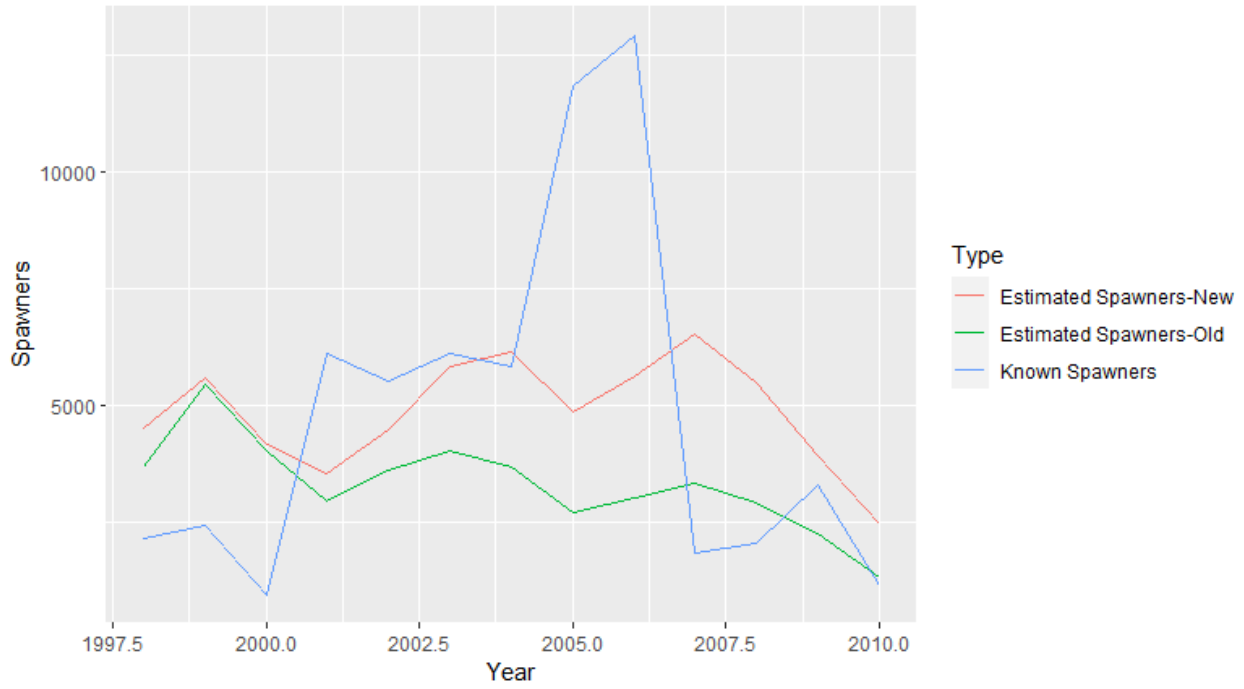



Figure F.2-5. Plot of estimated spawners, both with original and newly calibrated parameter estimates, and known spawner abundances with the short time series of calibration data and informed constraints on marine survival.

*Final calibration results, long time series (1998-2016), marine survival constraints*

Reclamation staff conducted a final round of three calibration runs with informed constraints on marine survival and the full time series of 'known' abundances. From this round of calibration runs, Reclamation obtained the following conclusions:

- Although there was still variability in metrics of model fit among model runs, the total difference was an order of magnitude smaller than that observed without constraints on marine survival and less than half that observed with the short calibration data time series (Figure F.2-6).
- Staff observed reasonably consistent estimates for most parameters among the three calibration runs (Figure F.2-7). Logit-transformed estimates of marine survival were again broadly similar without running into upper or lower boundaries. Some parameters, including parameter estimates for San Joaquin River migratory survival and juvenile Delta migratory survival (i.e., parameters 4, 7-9) continued to be highly variable among runs as expected.
- Finally, staff were assured that the specified upper bound for marine survival (logit-value = -2) was not overly restrictive in model fitting, as Reclamation performed three additional validation calibrations with a less restrictive upper bound (logit-value = -1, proportional marine survival = 0.27). None of the estimated marine survival terms exceeded the previous boundary (Figure F.2-8).

- Reclamation selected the parameters from 'run 3' as our best model (i.e., see Figure F.2-6, Figure F.2-7) and generated model estimates of spawner abundance to compare with 'known' spawners (Figure F.2-9, Figure F.2-10). The newly calibrated parameter values provide better estimates of spawner abundance than the original values, and the combination of model structure and newly calibrated parameter values do a reasonable job of approximating trends in 'known' spawners. The $R^2$ for known and newly model estimated abundances is 0.188.
- Based on these results and the criteria for calibration success, Reclamation selected the parameters from 'run 3' as the new parameters for the winter-run DSM and applied these values to compare the effects of competing alternatives on the winter-run population. The parameter values are presented in Table F.2-2.

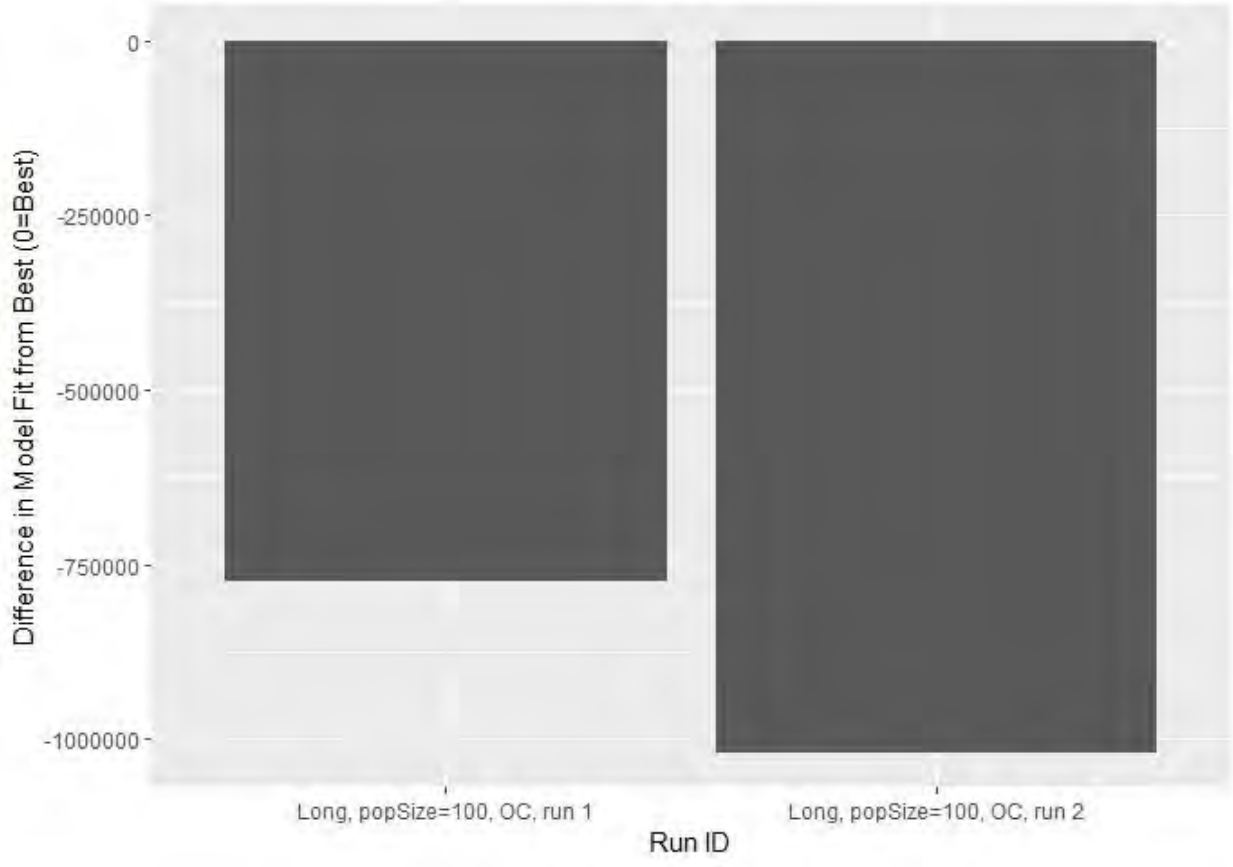



Figure F.2-6. Comparison of differences in model fit for all sub-optimal models from the best model. The best model was *Long, popSize*=100, *OC, run*=3 and had a model fit of -179222734, or -1.79e8.

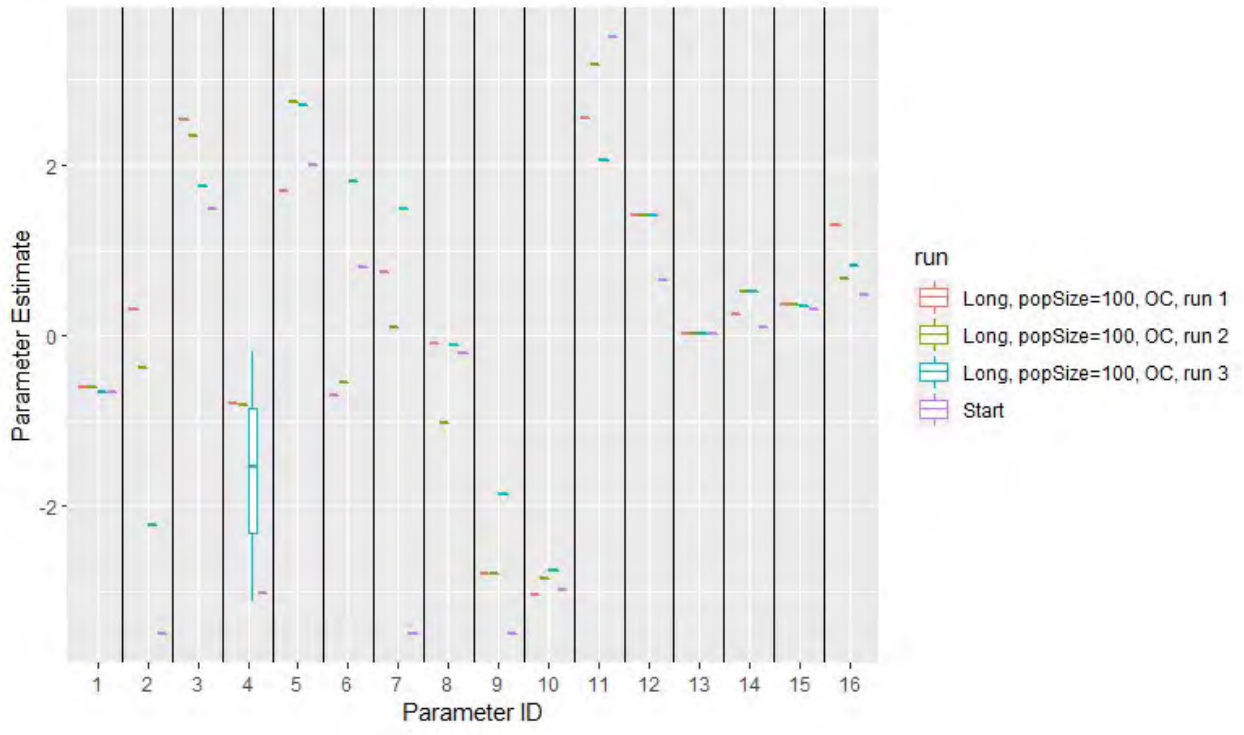



Figure F.2-7. Plot of parameter estimates for 3 calibration runs with constraints on marine survival intercept and the full calibration time series, as well the starting values drawn from the parameter values from the original calibration. Ranges of parameter estimates for a given parameter and run indicate multiple parameter values produced the same measure of model fit.

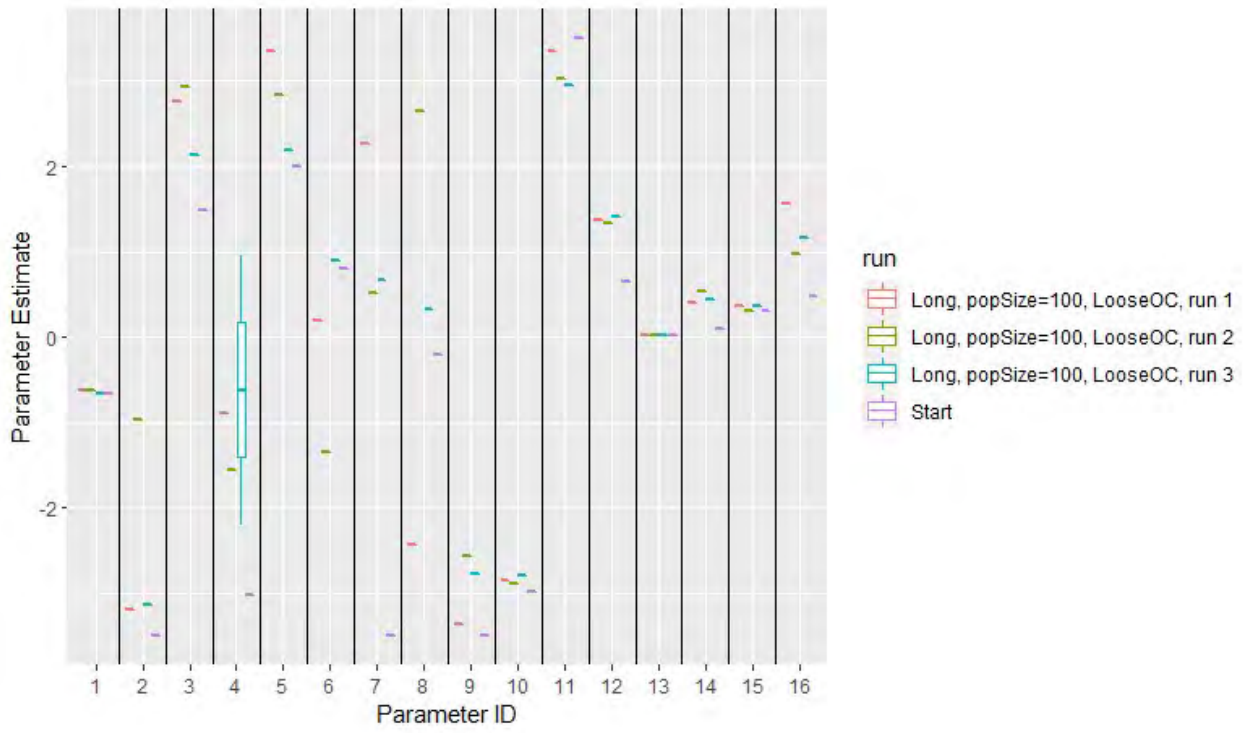



Figure F.2-8. Plot of parameter estimates for 3 calibration runs with looser constraints on marine survival intercept (logit-transformed upper boundary = -1) and the full calibration time series, as well as the starting values drawn from the parameter values from the original calibration. Ranges of parameter estimates for a given parameter and run indicate multiple parameter values produced the same measure of model fit.

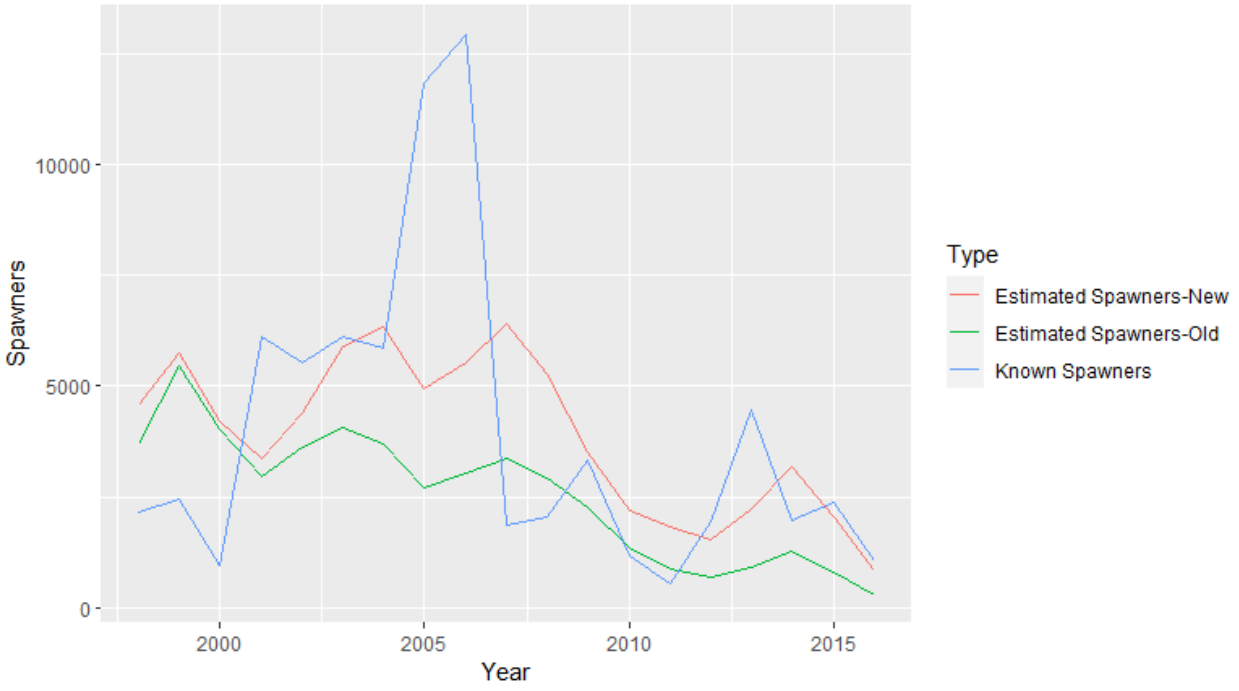



Figure F.2-9. Plot of estimated spawners, both with original and newly calibrated parameter estimates, and known spawner abundances with the full time series of calibration data and informed constraints on marine survival.

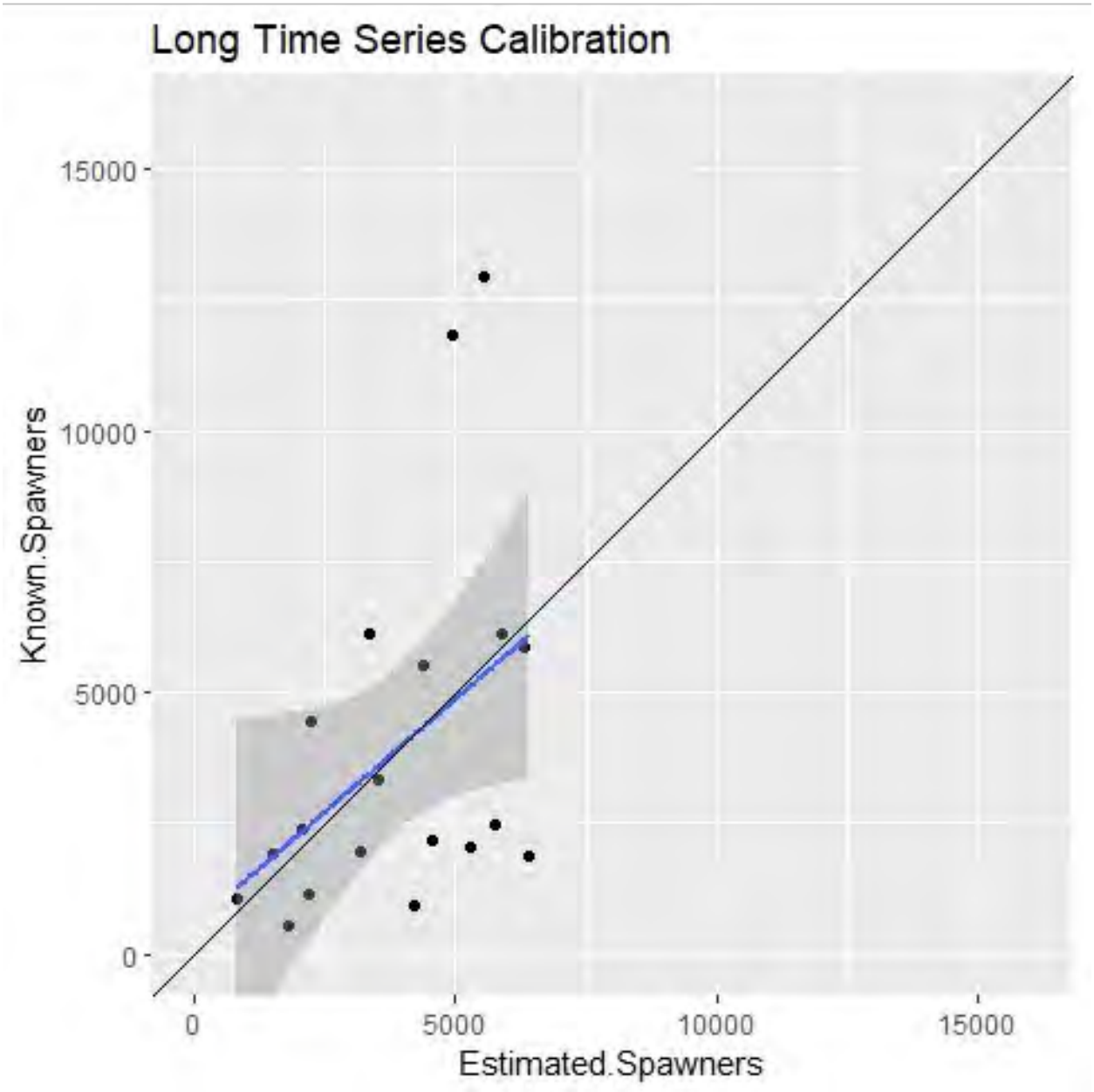



Figure F.2-10. Scatterplot of estimated spawners with the newly calibrated parameter estimates and known spawner abundances with the full time series of calibration data and informed constraints on marine survival. A 1:1 line (black) is provided for reference, in addition to the fit of a linear regression to the scatterplot points (blue).

Table F.2-2. Original and new parameter values for the winter-run DSM.

| Parameter ID | Description | Original Calibration Value | New Calibration Value |
|---|---|---|---|
| 1 | Juvenile in-channel and floodplain rearing survival intercept | -0.66 | -0.67 |
| 2 | Juvenile bypass rearing survival intercept | -3.5 | -2.23 |
| 3 | Juvenile Delta rearing survival intercept | 1.49 | 1.76 |
| 4 | Juvenile San Joaquin migratory survival intercept | -3.02 | -1.53 |
| 5 | Juvenile Sacramento River migratory survival intercept (temperature model) | 2.0 | 2.70 |
| 6 | Juvenile Sacramento River migratory survival intercept (discharge model) | 0.80 | 1.80 |
| 7 | Juvenile Delta migratory survival intercept (flow model) | -3.5 | 1.49 |
| 8 | Juvenile Delta migratory survival intercept (temperature model) | -0.2 | -0.11 |
| 9 | Juvenile Delta migratory survival intercept (diversion model) | -3.5 | -1.87 |
| 10 | Juvenile ocean entry survival intercept | -2.98 | -2.76 |
| 11 | Adult en route survival intercept | 3.5 | 2.06 |
| 12 | Egg-to-fry survival intercept | 0.65 | 1.41 |
| 13 | Effect of contact points on juvenile rearing survival | 0.02 | 0.02 |
| 14 | Effect of proportion flow diverted on juvenile rearing/migratory survival | 0.1 | 0.52 |
| 15 | Effect of total flow diverted on juvenile rearing/migratory survival | 0.3 | 0.35 |
| 16 | Effect of Delta diversions on juvenile rearing survival | 0.48 | 0.81 |

#### *F.2.2.3.2 Assumptions related to model structure and parameterization*

There are numerous additional model assumptions that bear mentioning. First, to seed the starting number of returning adults from the ocean (i.e., necessary to calculate numbers of returning spawners), the model is run for 5 preliminary years using a fixed number of spawners (2787 for winter-run) in each of those five years, as well as original CalSim II-based flow inputs for the first five years of the simulated time period. Additionally for winter-run, in each of the 20 tracked model years, a specified number of hatchery fish is added to the pool of spawners based

on past CWT reports; this number is either 565 if the model is run deterministically or a randomly selected number based on the uniform distribution bounded by 355 and 755 if the model is run stochastically. Finally, for winter-run Chinook salmon only, the model assumes returning adults only spawn in the Upper Sacramento River, with no straying to other watersheds.

Additionally, some demographic rates are not constructed to vary as a function of changing flow and temperature inputs in this model version, despite potential expectations to the contrary; an incomplete list of examples is provided below:

- Timing of adult arrival to the spawning grounds and subsequent spawning
- Egg-to-fry survival
    - Egg-to-fry survival is estimated as a function of the annual proportion of natural-origin spawners for each watershed and constant watershed-specific effects of temperature and scour
    - Neither temperature nor scour effects are constructed to be responsive to model estimates of flow or temperature from CalSim or HEC-5Q models, respectively
- Juvenile growth rates

Finally, Reclamation staff note that that expected spawner abundances from model runs with and without stochasticity (i.e., stochastic and deterministic model runs) sometimes differ due to asymmetrical effects of adding variability. Specifically, stochasticity in model parameters (e.g., rearing survival) is implemented by drawing covariate effects from a statistical distribution (e.g., the effect of stranding is drawn from a Bernoulli distribution, in which the expected proportion of the population affected by stranding is the probability of stranding occurrence) and then obtaining parameter estimates by conducting inverse-logit transformations of these effect values. In isolation, drawing covariate effects from statistical distributions should produce variable but unbiased parameters relative the deterministic parameters. However, drawing covariate effects from statistical distributions and then applying non-linear transformations biases the expected values of the stochastic parameters relative to deterministic values, and can subsequently change expected spawner abundances. This phenomenon is documented in the R script, 'Proof of Biased Parameters with Stochasticity and Inverse-Logit Transformations.R'.

#### *F.2.2.3.3 Assumptions related to construction of new flow inputs*

Reclamation constructed new model inputs for flow using updated results from new CalSim 3 runs for each scenario. Using a combination of R annotation associated with the cvpiaData package, R scripts shared from the cvpiaFlow GitHub repository, and discussions with CalSim modelers, Reclamation generated all the model flow inputs using updated CalSim 3 results by pulling directly from the raw .dss output files. We note that updating flow inputs using CalSim 3 runs was markedly more complex than using CalSim II runs, as CalSim 3 operates under different assumptions and at a finer resolution than CalSim II.

The following flow variables used by the DSMs were updated with data from alternative-specific CalSim 3 runs:

- Monthly flows, variability in flow, and proportion of natal flow (relative to larger watersheds) for each of 31 watersheds in the Sacramento-San Joaquin River basin
- Monthly flows at Freeport, Vernalis, and Stockton
- Monthly total exports from the Central Valley Project and State Water Project
- Diverted flows in each of the 31 watersheds in the Sacramento-San-Joaquin River basin (expressed both as total diversions and diversions relative to total flow)
- Proportion of Sacramento River flow into the Sutter and Yolo Bypasses
- Indications for whether gates downstream of Sutter and Yolo Bypasses are overtopped
- Monthly operations of the Delta Cross Channel gates
- Inflow into the North and South Delta
- Diverted flows in the North and South Delta (expressed both as total diversions and diversions relative to inflow)

Reclamation conducted internal validation to ensure updates to flow inputs using new CalSim 3 runs did not result in unexpectedly large changes in flow values (i.e., resulting from user error). For each of the above inputs to the DSMs, staff visualized and compared input values among the original DSM inputs and those based on the LTO NAA alternative. Reclamation did not find any issues except where there was not 1:1 matching between CalSim II and CalSim 3 nodes. Input diagnostic plots are available for review in the cvpiaFlow folder in the shared Code and Data repository.

The following demographic parameters are expected to be influenced by the updated flow inputs based on CalSim 3 runs reflecting LTO alternatives:

- Adult straying rates among spawning tributaries (spring-run only)
- Adult en route survival
- Juvenile river rearing survival
- Juvenile movement as a function of pulse flows
- Juvenile river migratory survival
- Juvenile entrainment into the South Delta from the Sacramento River
- Juvenile routing and survival in the South Delta, following entrainment
- Juvenile routing and survival in the North Delta

Reclamation also changed the implementation of the flow input for the number of days the Delta Cross Channel is closed each month. In the published model, this input is based on prescribed

operations from the 2009 NMFS BiOp, with no interannual variability. Reclamation currently has access to a CalSim 3 node that provides estimated gate operations for each month and year in the model time series, and therefore modified this variable in LTO analyses to use expected month- and year-specific operations from alternative-specific CalSim 3 runs.

There was another potential inconsistency between model documentation and model implementation that needed to be addressed while updating flow inputs. Model documentation, as interpreted by Reclamation, suggested multiple CalSim II diversion variables may be used when calculating proportion of Sacramento River flow diverted into the Sutter Bypass (D117, D124, D125, D126), but only one diversion term that only infrequently exceeds 0 cfs was used in the original R code that produced the final model input (D117). Due to uncertainty in the intent of this flow input (i.e., whether the higher or lower diversion flow should be used), staff retained the previously implemented diversion calculation. Therefore, differences in the neglected diversion terms among LTO alternatives will not translate to different model outcomes.

Reclamation staff again emphasize that updating flow inputs using CalSim 3 runs was markedly more complex than using CalSim II runs, as CalSim 3 operates under different assumptions and at a finer resolution than CalSim II. Extensive modifications and numerous judgment calls were required with these modifications, and the conversions were made in close consultation with the Bureau of Reclamation Bay-Delta Office's Modeling Division, which is partly responsible for developing and applying CalSim 3 (C. Koizumi, personal comm.). The conversions from CalSim II to CalSim 3 for all updated flow inputs to the v2019 SIT DSMs (i.e., Peterson and Duarte 2020) are summarized in the sections below, in which each section is a different data object, typically contained within the repositories cvpiaData (FlowWest/cvpiaData (github.com)) or cvpiaFlow (FlowWest/cvpiaFlow: Flow Data for use with CVPIA SIT DSM (github.com)). For additional details, refer to the R script 'DSS workflow_cvpiaFlow_clean_CalSim3.R', which generates modified data inputs to the SIT DSM from raw CalSim 3 outputs, or the supplemental Excel file 'CalSim Mapping Document_2.28.23.xlsx', which presents expected relationships between individual CalSim II and CalSim 3 variables, in the Code and Data repository. If inputs are not listed or described here, no change was required going from CalSim II to 3. Reclamation recommends future model users interested in running these models with new CalSim 3 runs carefully examine and revise, as necessary, the model documentation and annotation.

***dlt_divers_tot:*** **Total diverted of delta inflow in cms from 1980-2000.**

The following is a comparison of CalSim II and CalSim 3 variables and calculations for total diversions in the North and South Delta. For example, variables proceeded by 'D' and 'C' typically indicate diversion- and flow-based terms, with proceeding numbers and letters reflecting different locations or processes.

- CalSim II:
    - North Delta: D403A + D403B + D403C + D403D + D404
    - South Delta: D418 + D419 + D412 + D410 + D413 + D409B + D416 + D408_OR + D408_VC
- CalSim 3:

    - North Delta: C_CSL004B + DD_SAC017_SACS
    - South Delta: D_OMR028_DMC000 + D_OMR027_CAA000 + DD_SJR026_SJRE + DD_SJR013_SJRW + DD_MOK004_MOK + DD_OMR027_OMR + D_RSL004_CCC004 + D_OMR021_ORP000 + D_VCT002_ORP000
- Important caveats or concerns:
    - There is a meaningful difference in how North Delta diversions are handled between CalSim II and 3. Replacing D404 with DD_SAC017_SACS adds ~200 TAF annually due to differences in assumptions regarding consumptive use.

***dlt_inflow:*** **Delta inflow in cms from 1980-2000.**

The following is a comparison of CalSim II and CalSim 3 variables and calculations for inflow to the North and South Delta.

- CalSim II:
    - North Delta: C400 + C157
    - South Delta: C401B + C504 + C508 + C644
- CalSim 3:
    - North Delta: C_SAC041 + C_CSL005
    - South Delta: C_SAC029B + D_SAC030_MOK014 + C_MOK022 + C_CLV004 + C_SJR056
- Important caveats or concerns:
    - None

The *dlt_inflow* and *dlt_divers_tot* objects are used in conjunction to calculate the *dlt_divers* object, which represents the proportion of Delta diversions relative to inflow.

***flows_cfs:*** **Average monthly flows in all 31 modeled watersheds from 1980-2000**

- CalSim II:
    - Upper Sacramento River: C104
    - Antelope Creek: C11307
    - Battle Creek: C10803
    - Bear Creek: C11001
    - Big Chico Creek: C11501
    - Butte Creek: C217A
    - Clear Creek: C3

- Cottonwood Creek: C10802
- Cow Creek: C10801
- Deer Creek: C11309
- Elder Creek: C11303
- Mill Creek: C11308
- Paynes Creek: C11001
- Stony Creek: C142A
- Thomes Creek: C11304
- Upper-mid Sacramento River: C115
- Bear River: C285
- Feather River: C203
- Yuba River: C230
- Lower-mid Sacramento River: C134*35.6/58 + C160*22.4/58
- American River: C9
- Lower Sacramento River: C166
- Calaveras River: C92
- Cosumnes River: C501
- Mokelumne River: *NA*
- Merced River: C561
- Stanislaus River: C520
- Tuolumne River: C540
- San Joaquin River: C630

- CalSim 3:
  - Upper Sacramento River: C_SAC273
  - Antelope Creek: C_ANT010
  - Battle Creek: C_BTL006
  - Bear Creek: C_BCN005
  - Big Chico Creek: C_BCC004

- Butte Creek: C_BTC012
- Clear Creek: C_CLR009
- Cottonwood Creek: C_CWD003
- Cow Creek: C_COW003
- Deer Creek: C_DRC005
- Elder Creek: C_ELD005
- Mill Creek: C_MLC004
- Paynes Creek: C_PYN001
- Stony Creek: C_STN004
- Thomes Creek: C_THM005
- Upper-mid Sacramento River: C_SAC193
- Bear River: C_CMPFW
- Feather River: C_FTR059
- Yuba River: C_YUB002
- Lower-mid Sacramento River: C_SAC093*35.6/58 + C_SAC048*22.4/58
- American River: C_NTOMA
- Lower Sacramento River: C_SAC063
- Calaveras River: C_NHGAN
- Cosumnes River: C_CSM005
- Mokelumne River: C_CMCHE
- Merced River: C_MCD050
- Stanislaus River: C_STS059
- Tuolumne River: C_TUO054
- San Joaquin River: C_SJR081

- Important caveats or concerns:
  - In CalSim II, the same variable (C11001) previously included both Bear Creek and Paynes Creek. In Calsim 3, the two watersheds have unique flow values.
  - CalSim 3 includes flow values for the Mokelumne River.

- For several tributaries near the Upper Sacramento River (e.g., Deer Creek, Thomes Creek, Antelope Creek, Mill Creek, Big Chico Creek, Cow Creek, Cottonwood Creek, Battle Creek), there are new Surface Runoff terms included in CalSim 3 that are not present in CalSim II and could influence flow values.

The *flows_cfs* object is used to calculate both the expected intra-annual variability in flow, or *prop.pulse* (i.e., as a proxy for pulse flow effects), and the flow signal for returning adults as a determinant of straying rates, or *returnQ*.

***upsac_flow:*** **Flow at Bend Bridge in cms from 1980-2000.**

- CalSim II:
  - C109
- CalSim 3:
  - C_SAC257
- Important caveats or concerns:
  - None

***freeportQcms:*** **Inflow at Freeport in cms from 1980-2000.**

- CalSim II:
  - C400
- CalSim 3:
  - C_SAC041
- Important caveats or concerns:
  - None

***Q_vern:*** **Flow in cms at Vernalis from 1980-1999.**

- CalSim II:
  - C639
- CalSim 3:
  - C_SJR070
- Important caveats or concerns:
  - None

***Q_stck:*** **Flow in cms at Stockton from 1980-1999.**

- CalSim II:
  - C417A

- CalSim 3:
    - C_SJR053A
- Important caveats or concerns:
    - None

***CVP_exp:*** **Total exports for CVP in cms.**

- CalSim II:
    - DEL_CVP_TOTAL
- CalSim 3:
    - DEL_CVP_TOTAL_N + DEL_CVP_TOTAL_s
- Important caveats or concerns:
    - Recommend replacing previous variables from both CalSim II and CalSim 3 with D418 (CalSim II) and D_OMR028_DMC000 (CalSim 3) to reflect realized diversions from the Jones pumping facility (C. Koizumi, personal comm.).

***SWP_exp:*** **Total exports for SWP in cms.**

- CalSim II:
    - DEL_SWP_TOTAL
- CalSim 3:
    - DEL_SWP_PMI + DEL_SWP_PAG + DEL_SWP_PIN
- Important caveats or concerns:
    - Recommend replacing previous variables from both CalSim II and CalSim 3 with D419 (CalSim II) and D_OMR027_CAA000 (CalSim 3) to reflect realized diversions from the Banks pumping facility (C. Koizumi, personal comm.).

***prop_diversion:*** **Proportion of flow diverted for each watershed every month of every year in the simulation (1980-200).**

- CalSim II:
    - Upper Sacramento River: D104 / C104
    - Antelope Creek: (C11307 / (C11307 + C11308 + C11309) * D11305) / C11307
    - Battle Creek: *NA*
    - Bear Creek: *NA*
    - Big Chico Creek: *NA*
    - Butte Creek: (C217B + D217) / (C217B + D217 + C217A)

- Clear Creek: *NA*
- Cottonwood Creek: *NA*
- Cow Creek: *NA*
- Deer Creek: (C11309 / (C11307 + C11308 + C11309) * D11305) / C11309
- Elder Creek: (C11303 / (C11303 + C11304) * D11301) / C11303
- Mill Creek: (C11308 / (C11307 + C11308 + C11309) * D11305) / C11308
- Paynes Creek: *NA*
- Stony Creek: D17301 / C41
- Thomes Creek: (C11304 / (C11303 + C11304) * D11301) / C11304
- Upper-mid Sacramento River: (D109 + D112 + D113A + D113B + D114 + D118 + D122A + D122B + D123 + D124A + D128_WTS + D128) / C110
- Bear River: D285 / (C285 + D285)
- Feather River: (D201 + D202 + D7A + D7B) / C6
- Yuba River: D230 / (C230 + D230)
- Lower-mid Sacramento River: (D129A + D134 + D162 + D165) / C128
- American River: D302 / C9
- Lower Sacramento River: (D167 + D168 + D168A_WTS) / C166
- Calaveras River: (D506A + D506B + D506C + D507) / C92
- Cosumnes River: *NA*
- Mokelumne River: *NA*
- Merced River: (D562 + D566) / C561
- Stanislaus River: D528 / C520
- Tuolumne River: D545 / C540
- San Joaquin River: (D637 + D630B + D630A + D620B) / (D637 + D630B + D630A + D620B + C637)

- CalSim 3:
  - Upper Sacramento River: (D_SAC296_WTPFTH + D_SAC296_02_SA + D_SAC294_WTPBLV + D_SAC294_03_PA + D_SAC289_03_PA + D_SAC281_02_NA + D_SAC273_03_NA) / C_SAC273
  - Antelope Creek: D_ANT010_05_NA / C_ANT010

- Battle Creek: *NA*
- Bear Creek: *NA*
- Big Chico Creek: *NA*
- Butte Creek: (D_BTC045_ESL008 + D_BTC043_10_NA + D_BTC036_10_NA + DBTC012_09_SA2 + D_BTC012_CRK005) / (D_BTC045_ESL008 + D_BTC043_10_NA + D_BTC036_10_NA + DBTC012_09_SA2 + D_BTC012_CRK005 + C_BTC012)
- Clear Creek: *NA*
- Cottonwood Creek: *NA*
- Cow Creek: *NA*
- Deer Creek: (D_DRC010_05_NA + D_DRC005_05_NA) / C_DRC005
- Elder Creek: D_ELD012_04_NA / C_ELD005
- Mill Creek: D_MLC006_05_NA / C_MLC004
- Paynes Creek: *NA*
- Stony Creek: D_STN021_06_PA / C_STN026
- Thomes Creek: D_THM012_04_NA / C_THM005
- Upper-mid Sacramento River: (D_SAC240_TCC001 + D_SAC240_05_NA + D_SAC224_04_NA + D_SAC196_MTC000 + D_SAC185_08N_NA + D_SAC185_09_NA + D_SAC178_08N_SA1 + D_SAC162_09_SA2 + D_SAC159_08S_SA1 + D_SAC159_08N_SA1 + D_SAC146_08S_NA1 + D_SAC136_18_NA + D_SAC136_18_SA + D_SAC129_08S_NA2 + D_SAC122_19_SA) / C_SAC247
- Bear River: D_BRR017_23_NA / C_CMPFW
- Feather River: (D_THRMF_12_NU1 + D_THRMF_11_NU1 + D_THRMA_WEC000 + D_THRMA_RVC000 + D_THRMA_JBC000) / C_OROVL
- Yuba River: D_YUB011_15S_NA2 / (D_YUB011_15S_NA2 + C_YUB002)
- Lower-mid Sacramento River: (D_SAC121_08S_SA3 + D_SAC115_19_SA + D_SAC109_08S_SA3 + D_SAC109_19_SA + D_SAC099_19_SA + D_SAC091_19_SA + D_SAC083_21_SA + D_SAC082_22_SA1 + D_SAC081_21_NA + D_SAC078_22_SA1 + D_SAC075_22_NA + D_SAC074_21_SA + D_SAC065_WTPBTB) / C_SAC120
- American River: D_AMR007_WTPFBN / C_NTOMA
- Lower Sacramento River: (D_SAC050_FPT013 + D_SAC062_WTPSAC) / C_SAC120

- Calaveras River: (D_LJC022_60S_PA1 + D_CLV037_CACWD + D_CLV026_60S_PA1 + D_CLV026_WTPWDH) / C_NHGAN
- Cosumnes River: *NA*
- Mokelumne River: (D_MOK050_60N_NA3 + D_MOK050_60N_NA5 + D_MOK039_60N_NA5 + D_MOK035_60N_NA4 + D_MOK035_60N_NU1 + D_MOK035_WTPDWS + D_MOK033_60N_NA5) / C_CMCHE
- Merced River: (D_MC042_63_NA2 + D_MCD021_63_NA4) / C_MCD050
- Stanislaus River: (D_STS030_61_NA4 + D_STS004_61_NA6) / C_STS059
- Tuolumne River: (D_TUO047_61_NA3 + D_TUO047_62_NA4 + D_TUO015_61_NA3 + D_TUO015_62_NA4) / C_TUO054
- San Joaquin River: (D_SJR062_50_PA1 + D_SJR090_71_NA2 + D_SJR081_61_NA5 + D_SJR116_72_NA1) / (D_SJR062_50_PA1 + D_SJR090_71_NA2 + D_SJR081_61_NA5 + D_SJR116_72_NA1 + C_SJR072)

- Important caveats or concerns:
  - Watersheds with *NA* are assumed to have no diversions.
  - Some of the diversion terms in CalSim II corresponded to 'Depletion' terms that have no direct analogue in Calsim 3 (i.e., Calsim 3 uses 'Closure-Terms' that aggregate both accretion and depletion influences). These flow variables are therefore not accounted for in the CalSim 3 conversion.
  - In CalSim II, diversions for Antelope Creek, Deer Creek, Elder Creek, Mill Creek, and Thomes Creek were calculated by partitioning aggregate, multi-watershed diversion terms based on watershed-specific flows. Some of these aggregate diversion terms also encompassed diversions from the Sacramento River. This partitioning is not necessary in CalSim 3 due to finer resolution in diversion terms.
  - CalSim 3 includes flow and diversion values for the Mokelumne River.
  - Reclamation used CalSim II diversion variables for the 4 watershed regions along the Sacramento River to identify functional splits among regions, and then identified CalSim 3 diversion terms for each region based on these splits.

The numerator for each watershed was used to calculate the total diversions for each watershed every month of every year, or *total_diversion*.

***bypass_prop_Q:*** **Proportion of Lower Sacramento River flow at each bypass weir.**

- CalSim II:
  - Sutter Bypass: D117 / C116
  - Yolo Bypass: D160 / (D160 + C160)

- CalSim 3:
    - Sutter Bypass: (SP_SAC193_BTC003 + SP_SAC188_BTC003 + SP_SAC178_BTC003) / C_SAC195
    - Yolo Bypass: SP_SAC083_YBP037 / (SP_SAC083_YBP037 + C_SAC048)
- Notes:
    - A potentially better characterization of proportional flow diverted into the Sutter Bypass, and the characterization that is used in more recent versions of the SIT DSMs (e.g., v2021, v2023) is expressed in CalSim II and CalSim 3 as the following:
        - CalSim II: (D117 + D124 + D125 + D126) / C116
        - CalSim 3: (SP_SAC193_BTC003 + SP_SAC188_BTC003 + SP_SAC178_BTC003 + SP_SAC159_BTC003 + SP_SAC148_BTC003 + SP_SAC122_SBP021) / C_SAC195
    - The conversion of C116 to C_SAC195 in CalSim 3 represents the best judgment of the Modeling Division.

***bypass_over:*** **Binary (yes/no) monthly record of the bypasses over topped**

- CalSim II:
    - Sutter Bypass: TRUE if (D117 + D124 + D125 + D126 + C137) >= 100
    - Yolo Bypass: TRUE if (D160 + C157) >= 100
- CalSim 3:
    - Sutter Bypass: TRUE if (SP_SAC193_BTC003 + SP_SAC188_BTC003 + SP_SAC178_BTC003 + SP_SAC159_BTC003 + SP_SAC148_BTC003 + SP_SAC122_SBP021 + C_SSL001) >= 100
    - Yolo Bypass: TRUE if (SP_SAC083_YBP037 + C_CSL005) >= 100
- Notes:
    - The conversion of C137 in CalSim II to a CalSim 3 equivalent is problematic, as CalSim 3 changes the number and nature of connections among the Sacramento River, Sutter Bypass, Feather River, and Butte Creek. In fact, the best proposed replacement variable (C_SSL001) results in constant overtopping of Sutter Bypass in the model with the current flow threshold of 100 cfs.
        - Modeling also questions why C137 is included in the flow threshold in the first place, as the diversions terms should be sufficient by themselves.

#### *F.2.2.3.4 Assumptions related to construction of new temperature inputs*

Reclamation generated new monthly temperature inputs using alternative-specific HEC-5Q model results, which in turn used alternative-specific CalSim 3 model results, for the following watersheds: Upper Sacramento River, Clear Creek, Cottonwood Creek. Temperature updates were restricted to these watersheds based the limited spatial coverage of HEC-5Q modeling to watersheds utilized by winter-run and spring-run Chinook salmon for spawning and rearing. Reclamation also observed that model documentation for the original HEC-5Q variables used in the Upper Sacramento River temperature inputs was inconsistent with their actual application in the published DSMs: specifically, temperature inputs for both Cottonwood Creek and the Upper Sacramento were reportedly derived from the same HEC-5Q variable, but actual inputs differed between watersheds without clear explanation. In light of this uncertainty, Reclamation used the average of monthly temperatures from the HEC-5Q variables corresponding to the Sacramento River just below Keswick Dam (BLW KESWICK) and at Red Bluff Diversion Dam (RED BLUFF DAM) to characterize expected temperature conditions in the Upper Sacramento River, the temperatures at the IGO node to characterize temperatures in Clear Creek, and temperatures at the COTTONWOOD CR node to characterize temperatures in Cottonwood Creek.

The following temperature inputs were updated with this modification:

- Monthly average temperature for the Upper Sacramento River, Clear Creek, and Cottonwood Creek
- Monthly degree day accumulation (i.e., the sum of daily average temperatures for each month) for the Upper Sacramento River, Clear Creek, and Cottonwood Creek

Reclamation conducted internal validation to ensure updates to temperature inputs using new HEC-5Q runs did not result in unexpectedly large changes in values (i.e., resulting from user error). For each of the above inputs to the DSMs, staff visualized and compared input values among the original DSM inputs and those based on the LTO NAA alternative. Reclamation observed generally similar ranges in temperature input values for the Upper Sacramento River and Clear Creek, albeit with lower extremes observed for the LTO NAA alternative relative to original DSM inputs, but a much more muted range of temperature values for the LTO NAA alternative in Cottonwood Creek. Input diagnostic plots are available for upon request.

The following demographic parameters are expected to be influenced by the updated temperature inputs:

- In-channel and floodplain juvenile rearing survival in the Upper Sacramento River
- Adult pre-spawn survival during holding in the Upper Sacramento River

#### *F.2.2.3.5 Assumptions related to construction of new habitat inputs*

Model habitat inputs for the Peterson and Duarte (2020) version of the DSMs were based on a combination of expert judgment and flow to habitat relationships specific to both watershed and run type. Due to the considerable complexity associated in updating these values using new CalSim runs, Reclamation left the base habitat inputs unchanged from the published version of the DSMs. However, Reclamation reset a vector of habitat modifiers (i.e., values used to adjust expected habitat quantities via multiplication) to values of one during recalibration of the DSM, such that habitat quantities were equal to those values based on expert judgment and flow alone. Original calibration efforts for the Peterson and Duarte (2020) models used calibration to obtain both parameter values and new habitat modifiers, but Reclamation staff achieved sufficient model fit without needing to secondarily modify habitat quantities.

#### *F.2.2.3.6 Assumptions related to selection of habitat restoration strategies*

Model users must select a habitat restoration scenario when running the SIT DSMs, including no action (i.e., availability of spawning and rearing habitat will decrease over time without intervention) or some form habitat restoration (i.e., select watersheds are prioritized for additions of spawning and/or rearing habitat). Reclamation staff ran all DSM models with the no action habitat restoration scenario to avoid any possible interactions between flow, temperature, and habitat differences.

### F.2.2.4 Code and Data Repository

All R scripts and model inputs necessary to re-calibrate and run the model are available upon request.

## F.2.3 Results

The EIS results include comparisons among the No Action Alternative (NAA) and all other management alternatives (Alt1 – Alt4), including the Proposed Action (PA, or Alt2). The BA results include results for the NAA, the EXP1 and EXP3 baseline alternatives, Act5 and the PA.

### F.2.3.1 BA

Results for the BA are summarized in Table F.2-3 through Table F.2-6 and Figure F.2-11 through Figure F.2-22.

Predicted total and natural-origin-only spawner abundances in the Upper Sacramento River for deterministic model runs generally peaked in 1986, decreased steadily until 1994, and then generally increased steadily through 1999 (Table F.2-3, Table F.2-4; Figure F.2-11). The range of natural-origin-only spawner abundances across alternatives at the end of the time series was narrow, ranging from a low of 5,461 (Alt2woTUCPDeltaVA) to a high of 5,558 (NAA); over the entire time series predicted natural-origin-spawner abundances ranged from 1,575 (Alt2woTUCPwoVA) to 14,738 (Alt2woTUCPAllVA; Table F.2-4). Predicted natural-origin-only spawner abundances varied more widely across stochastic model runs, from a low of approximately 0 to a high of approximately 30,000 spawners (Figure F.2-12).

For deterministic model runs, population change over time, defined by mean (i.e., geometric) lambda values ($N_t/N_{t+1}$), over the entire 1980-1999 time series ranged from only 0.979 to 0.980, and terminal lambda values ($N_{t=19}/N_{t=1}$) ranged from 0.668 (Alt2woTUCP with either DeltaVa or AllVA) to 0.679 (NAA); these values indicated that predicted spawner abundances declined over the course of the time series (Table F.2-5, Table F.2-6). Annual lambda values from deterministic model runs ranged from approximately 0.5 to 1.55, excluding baseline runs; both occurred for Alt2woTUCPwoVA (Figure F.2-13). Wet water years had the highest mean annual lambdas (>1.1 for all Alternatives) and Dry water years also had a mean annual lambda greater than 1, indicating that the population grew in Wet or Dry years (Table F.2-5). Mean lambdas were less than 1 in Critical and Above normal water years, indicating that populations declined. Across stochastic model runs, mean lambda values over individual stochastic iterations ranged from approximately 0.91 to 1.03 (Figure F.2-14) and Critical water years had a lower mean lambda value than other water year types (Figure F.2-15). Terminal lambda values ranged from approximately 0.2 to 1.75 (Figure F.2-16), suggesting some model runs resulted in expected population growth over the time series.

Population trends may be explained by differences in life stage-specific demographic parameters. It is worth emphasizing again that the egg-to-fry survival life stage transition in the DSM is not sensitive to alternative-dependent flow or temperature values, and thus will be constant across alternatives. Across deterministic runs, monthly rearing survival for small juveniles (i.e., <42 mm) in the Upper Sacramento River varied from a low of approximately 0.01 to a high of approximately 0.2; rearing survival also varied across months, peaking in November and December (Figure F.2-17). Model-estimated migratory survival for very large fish (i.e., smolt size, >110 mm) in the Upper-mid, Lower-mid, and Lower Sacramento River was very close to 1, with slight variations across months and water year types (WYTs) (Figure F.2-18 through Figure F.2-20). In the Upper-mid and Lower-mid Sacramento River, expected survival was consistently lower and more variable in May than other migratory months; no such patterns were observed in the Lower Sacramento River. Migratory survival for very large fish also varied across months and WYT in the North and South Delta (Figure F.2-21, Figure F.2-22). Migratory survival often increased moving from a Critical to Dry to Above Normal to Wet WYT. Expected Delta migratory survival was greatest in February and March in the North Delta (0.847-0.860, multiple alternatives) and lowest in September, October, and May in the South Delta (approximately 0.2 – 0.55). With migratory survival in the mainstem Sacramento River high across the alternatives, rearing survival and migratory survival in the Delta likely act as drivers of lambda, creating a negative feedback loop with winter-run spawner abundance.

#### *F.2.3.1.1 Population abundance, trends*

Table F.2-3. Predicted annual total winter-run spawner abundance in the Upper Sacramento River, including both natural- and hatchery-origin fish, from deterministic model runs.

| Year | EXP1 | EXP3 | NAA | Alt2wTUCPwoVA | Alt2woTUCPwo VA | Alt2woTUCPDeltaVA | Alt2woTUCPAllVA | Act5 |
|---|---|---|---|---|---|---|---|---|
| 1980 | 8762 | 8762 | 8762 | 8762 | 8762 | 8762 | 8762 | 8762 |
| 1981 | 9376 | 9376 | 9376 | 9376 | 9376 | 9376 | 9376 | 9376 |
| 1982 | 6456 | 8235 | 8156 | 8147 | 8146 | 8177 | 8215 | 8159 |
| 1983 | 2542 | 8632 | 8371 | 8367 | 8366 | 8375 | 8523 | 8449 |
| 1984 | 2022 | 11570 | 11391 | 11411 | 11410 | 11339 | 11540 | 11536 |
| 1985 | 3374 | 13951 | 14384 | 14403 | 14402 | 14350 | 14526 | 14484 |
| 1986 | 3069 | 14195 | 14884 | 14931 | 14929 | 14915 | 15125 | 14863 |
| 1987 | 1454 | 13383 | 13350 | 13454 | 13451 | 13381 | 13708 | 13259 |
| 1988 | 585 | 13647 | 13113 | 13232 | 13230 | 13118 | 13558 | 13035 |
| 1989 | 483 | 12730 | 12314 | 12336 | 12336 | 12284 | 12627 | 12137 |
| 1990 | 427 | 9123 | 8234 | 8141 | 8140 | 8114 | 8325 | 8016 |
| 1991 | 392 | 8116 | 6230 | 6201 | 6196 | 6154 | 6484 | 6188 |
| 1992 | 391 | 8057 | 6089 | 6160 | 6169 | 6140 | 6504 | 6098 |
| 1993 | 390 | 5103 | 4015 | 4161 | 4148 | 4155 | 4288 | 3947 |
| 1994 | 389 | 3178 | 2777 | 2754 | 2021 | 2231 | 2243 | 2323 |
| 1995 | 391 | 3975 | 3657 | 3338 | 1962 | 2297 | 2352 | 2845 |
| 1996 | 392 | 4535 | 4052 | 3856 | 3066 | 3220 | 3295 | 3668 |

| Year | EXP1 | EXP3 | NAA | Alt2wTUCPwoVA | Alt2woTUCPwo VA | Alt2woTUCPDeltaVA | Alt2woTUCPAllVA | Act5 |
|---|---|---|---|---|---|---|---|---|
| 1997 | 394 | 4119 | 3735 | 3700 | 3390 | 3421 | 3474 | 3745 |
| 1998 | 403 | 4793 | 4698 | 4661 | 4395 | 4413 | 4436 | 4739 |
| 1999 | 421 | 5855 | 5946 | 5941 | 5859 | 5848 | 5853 | 5937 |

Table F.2-4. Predicted annual natural-origin winter-run spawner abundance in the Upper Sacramento River from deterministic model runs.

| Year | EXP1 | EXP3 | NAA | Alt2wTUCPwoVA | Alt2woTUCPwoVA | Alt2woTUCPDeltaVA | Alt2woTUCPAllVA | Act5 |
|---|---|---|---|---|---|---|---|---|
| 1980 | 8374 | 8374 | 8374 | 8374 | 8374 | 8374 | 8374 | 8374 |
| 1981 | 8989 | 8989 | 8989 | 8989 | 8989 | 8989 | 8989 | 8989 |
| 1982 | 6069 | 7847 | 7769 | 7760 | 7759 | 7790 | 7827 | 7772 |
| 1983 | 2155 | 8245 | 7984 | 7980 | 7978 | 7987 | 8136 | 8061 |
| 1984 | 1634 | 11183 | 11004 | 11024 | 11022 | 10951 | 11152 | 11148 |
| 1985 | 2987 | 13563 | 13997 | 14016 | 14014 | 13962 | 14138 | 14097 |
| 1986 | 2682 | 13808 | 14497 | 14544 | 14542 | 14528 | 14738 | 14475 |
| 1987 | 1066 | 12995 | 12962 | 13066 | 13064 | 12993 | 13321 | 12871 |
| 1988 | 198 | 13259 | 12726 | 12845 | 12843 | 12731 | 13171 | 12648 |
| 1989 | 96 | 12343 | 11927 | 11949 | 11948 | 11897 | 12240 | 11750 |
| 1990 | 40 | 8735 | 7847 | 7754 | 7752 | 7727 | 7938 | 7629 |
| 1991 | 5 | 7729 | 5842 | 5814 | 5809 | 5766 | 6097 | 5801 |
| 1992 | 4 | 7670 | 5702 | 5773 | 5782 | 5753 | 6117 | 5710 |
| 1993 | 3 | 4716 | 3627 | 3774 | 3761 | 3768 | 3901 | 3559 |

| Year | EXP1 | EXP3 | NAA | Alt2wTUCPwoVA | Alt2woTUCPwoVA | Alt2woTUCPDeltaVA | Alt2woTUCPAllVA | Act5 |
|---|---|---|---|---|---|---|---|---|
| 1994 | 2 | 2791 | 2390 | 2367 | 1634 | 1844 | 1856 | 1936 |
| 1995 | 3 | 3588 | 3270 | 2951 | 1575 | 1909 | 1965 | 2458 |
| 1996 | 5 | 4148 | 3665 | 3469 | 2679 | 2833 | 2908 | 3281 |
| 1997 | 7 | 3732 | 3348 | 3313 | 3002 | 3033 | 3087 | 3358 |
| 1998 | 16 | 4405 | 4311 | 4273 | 4008 | 4026 | 4049 | 4352 |
| 1999 | 33 | 5467 | 5558 | 5554 | 5471 | 5461 | 5466 | 5550 |

Table F.2-5. Predicted mean lambda ($N_{t+1}/N_t$) for total winter-run spawner abundance in the Upper Sacramento River, including both natural- and hatchery-origin fish, from deterministic model runs.

| WYT | EXP1 | EXP3 | NAA | Alt2wTUCPwoVA | Alt2woTUCPwoVA | Alt2woTUCPDeltaVA | Alt2woTUCPAllVA | Act5 |
|---|---|---|---|---|---|---|---|---|
| C | 0.840 | 0.848 | 0.815 | 0.812 | 0.778 | 0.787 | 0.791 | 0.798 |
| D | 1.010 | 1.038 | 1.042 | 1.041 | 1.041 | 1.042 | 1.042 | 1.037 |
| AN | 0.998 | 0.633 | 0.659 | 0.676 | 0.672 | 0.677 | 0.659 | 0.647 |
| W | 0.874 | 1.108 | 1.129 | 1.129 | 1.174 | 1.155 | 1.157 | 1.150 |
| All | 0.852 | 0.979 | 0.980 | 0.980 | 0.979 | 0.979 | 0.979 | 0.980 |

Table F.2-6. Predicted terminal lambda ($N_{t=19}/N_{t=1}$) for total winter-run spawner abundance in the Upper Sacramento River, including both natural- and hatchery-origin fish, from deterministic model runs.

| EXP1 | EXP3 | NAA | Alt2wTUCPwoVA | Alt2woTUCPwoVA | Alt2woTUCPDeltaVA | Alt2woTUCPAllVA | Act5 |
|---|---|---|---|---|---|---|---|
| 0.048 | 0.668 | 0.679 | 0.678 | 0.669 | 0.668 | 0.668 | 0.678 |

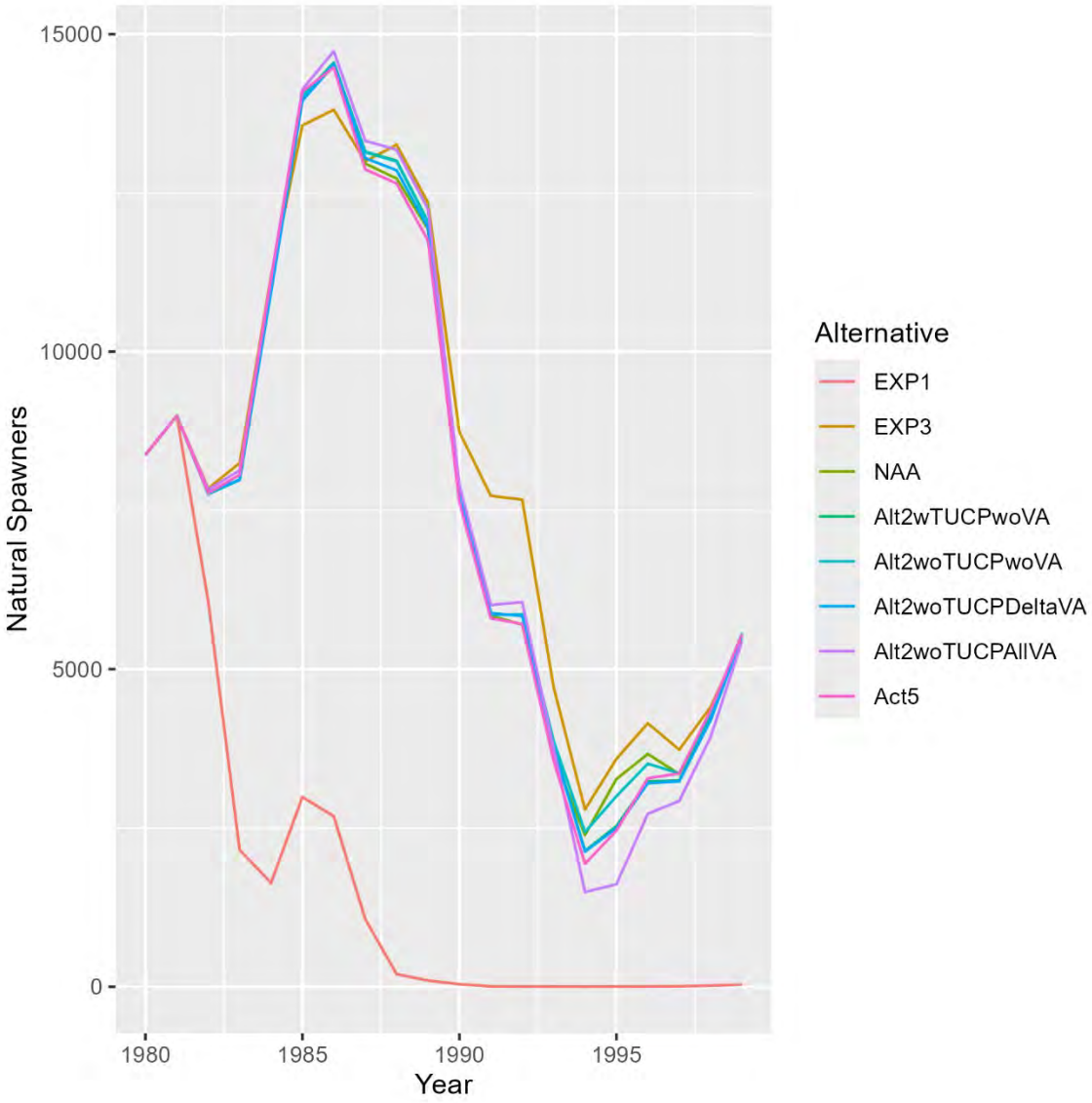



Figure F.2-11. Expected annual abundances of natural-origin winter-run Chinook salmon spawners in the Upper Sacramento River from deterministic model runs.

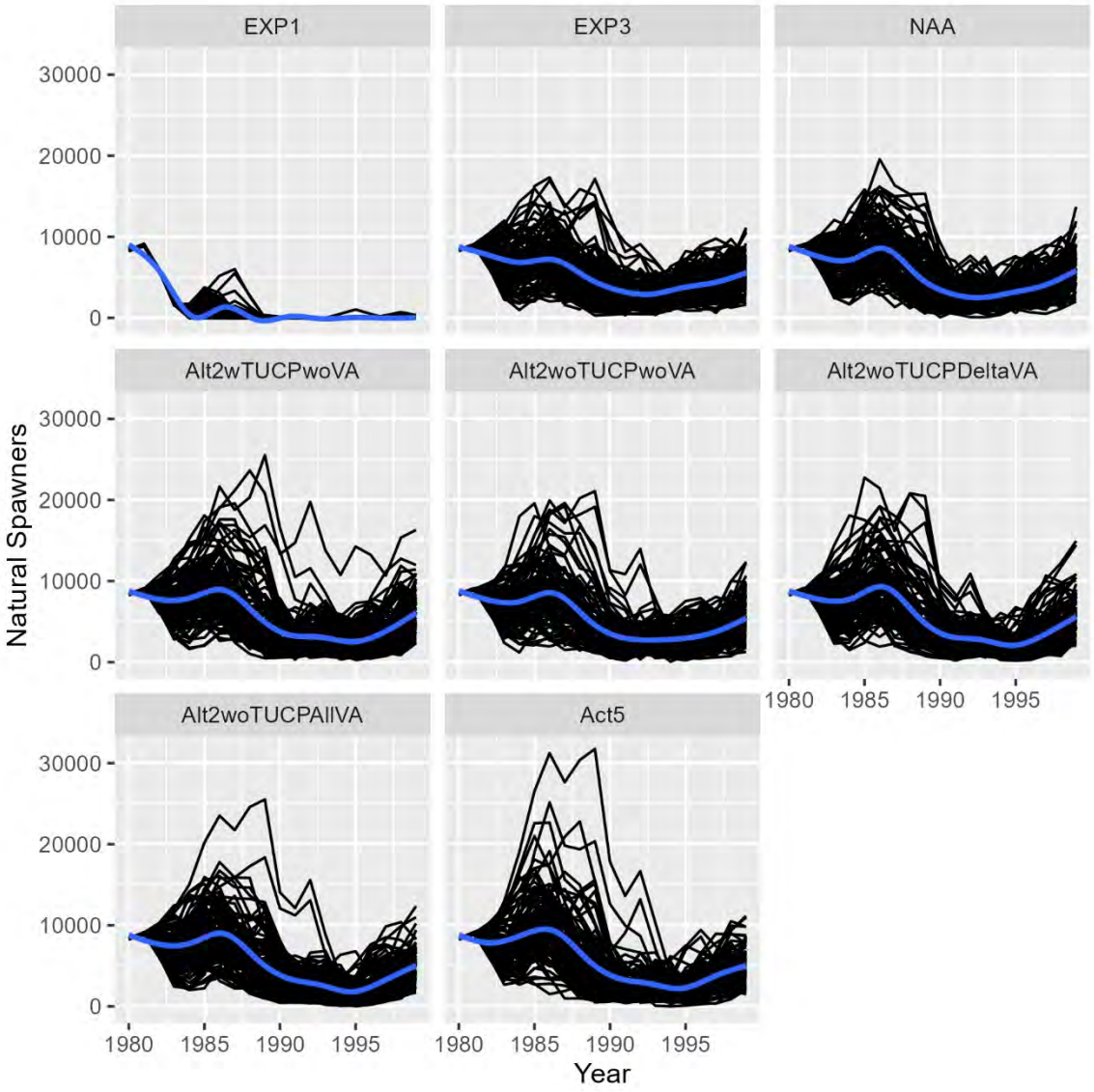



Figure F.2-12. Expected annual abundances of natural-origin winter-run Chinook salmon spawners in the Upper Sacramento River from stochastic model runs. Black lines represent iteration-specific abundances over time and the blue line represents an expected trend obtained by 'gam' smoothing in ggplot2.

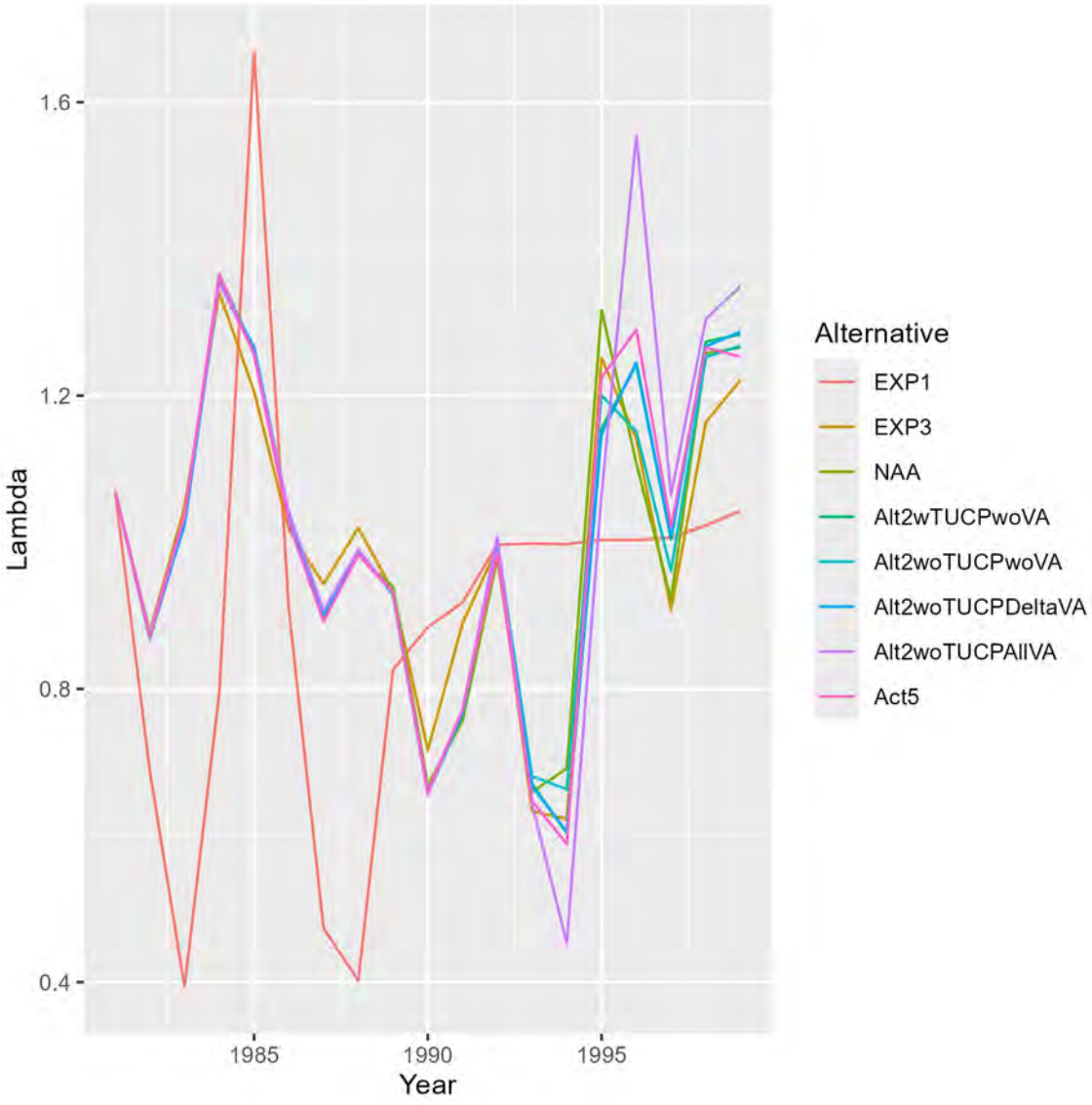



Figure F.2-13. Predicted annual lambda values ($N_{t+1}/N_t$) for total winter-run spawner abundance in the Upper Sacramento River, including both natural- and hatchery-origin fish, from deterministic model runs.

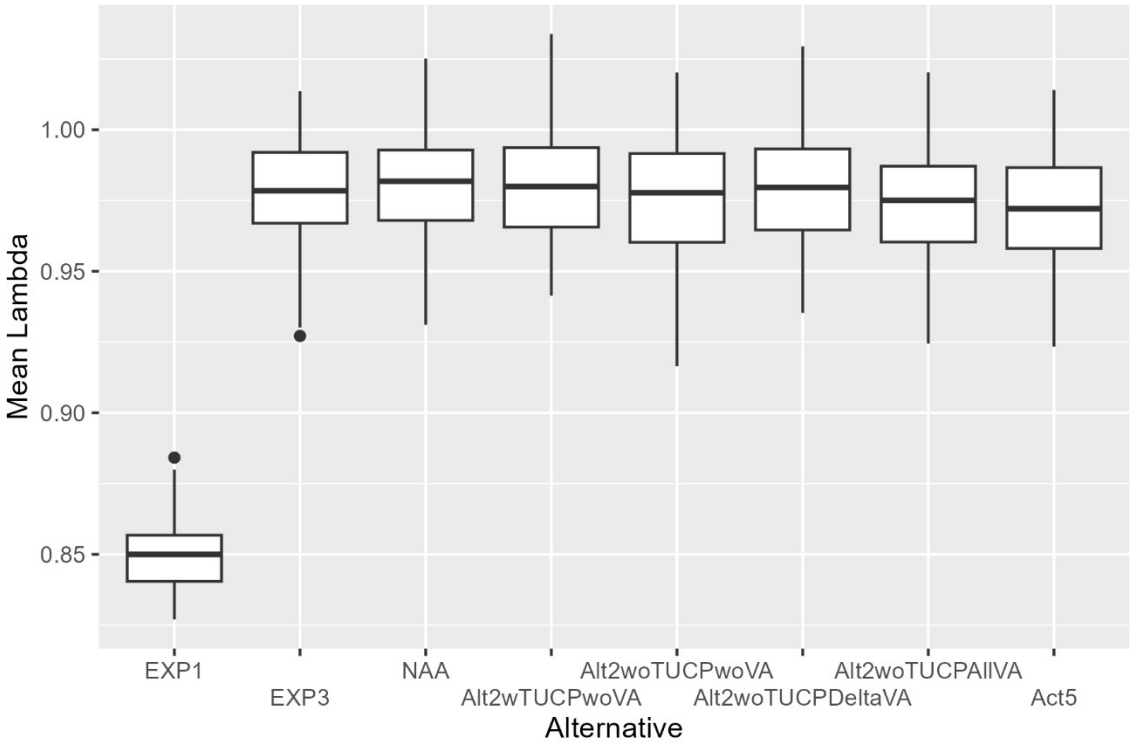



Figure F.2-14. Predicted mean lambda values ($N_{t+1}/N_t$) for total winter-run spawner abundance in the Upper Sacramento River, including both natural- and hatchery-origin fish, across 100 stochastic model iterations.

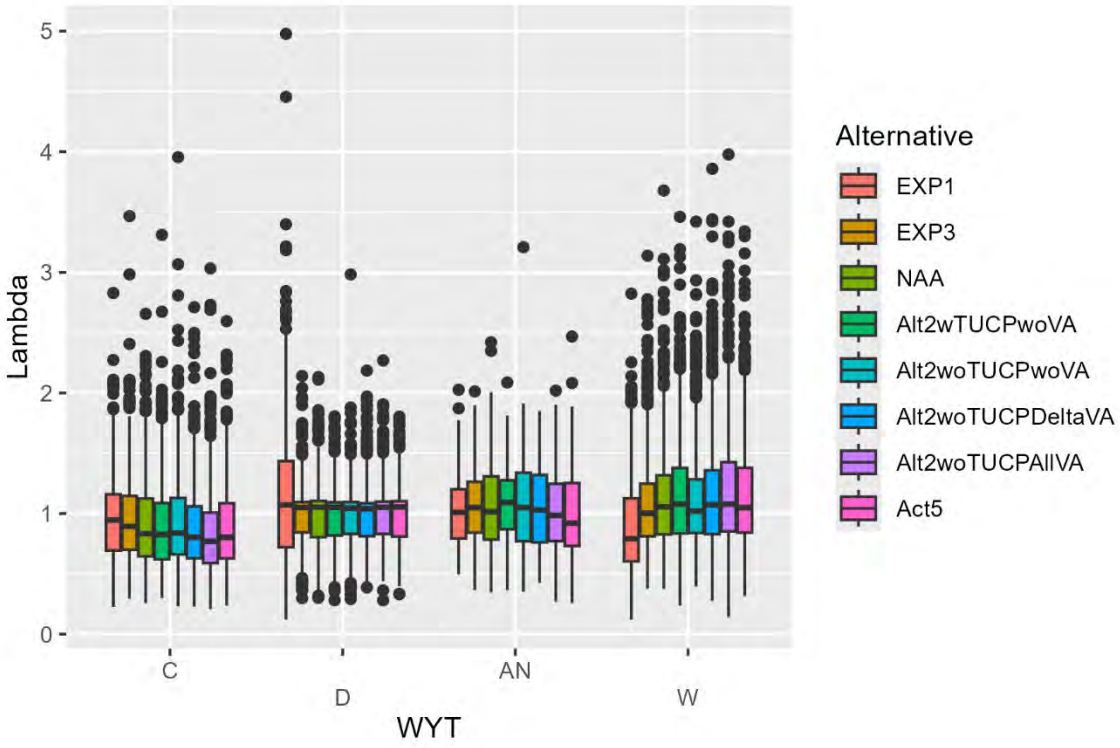



Figure F.2-15. Predicted lambda values for each water year type ($N_{t+1}/N_t$) for total winter-run spawner abundance in the Upper Sacramento River, including both natural- and hatchery-origin fish, across 100 stochastic model iterations.

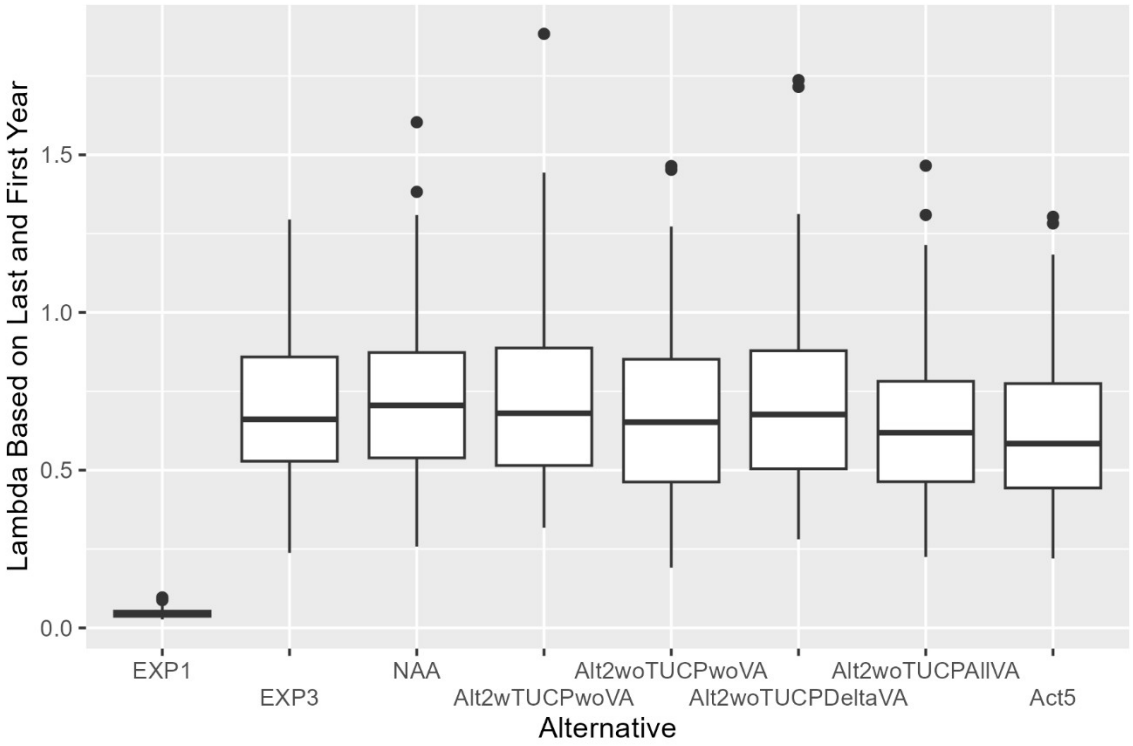



Figure F.2-16. Predicted terminal lambda values ($N_{t=19}/N_{t=1}$) for total winter-run spawner abundance in the Upper Sacramento River, including both natural- and hatchery-origin fish, across 100 stochastic model iterations.

#### *F.2.3.1.2 Life stage-specific demographic parameters*

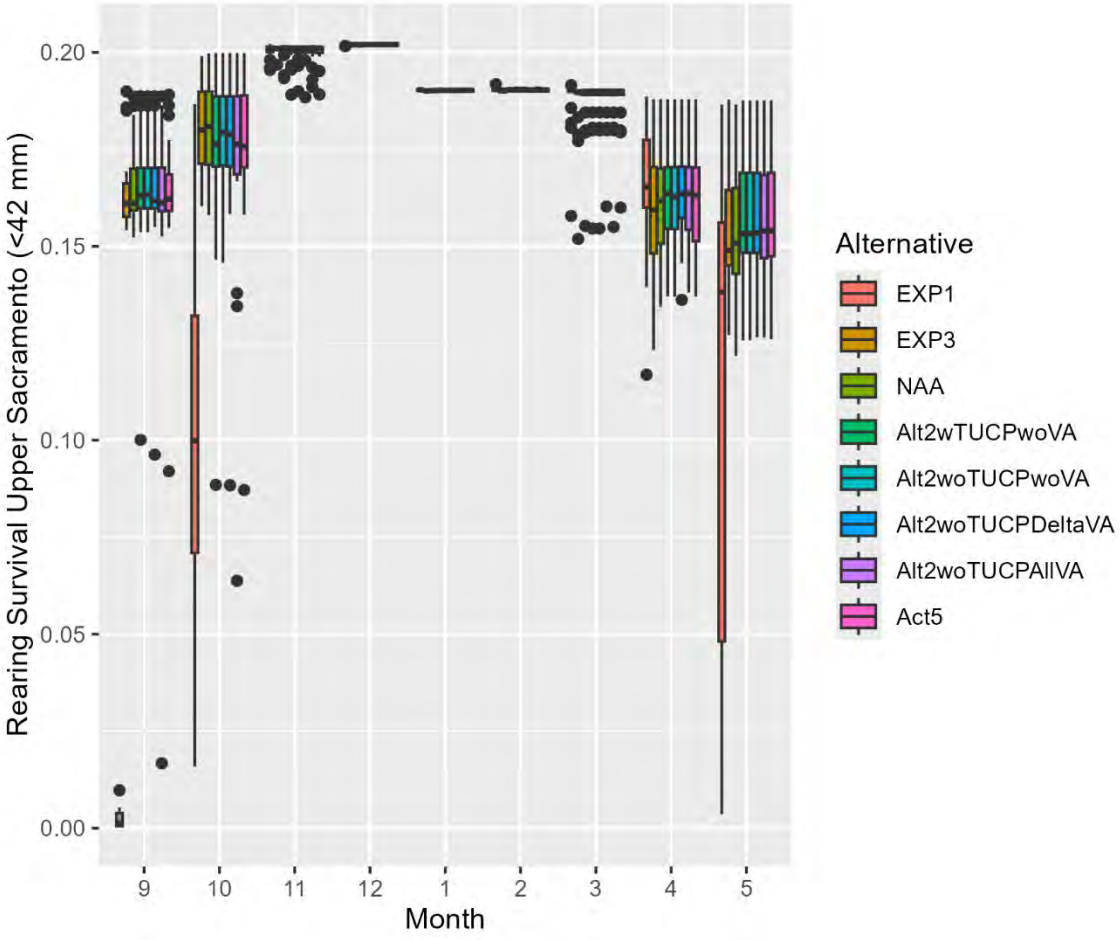



Figure F.2-17. Predicted small juvenile rearing survival for winter-run Chinook salmon in the Upper Sacramento River from deterministic model runs across the 20 year timeseries.

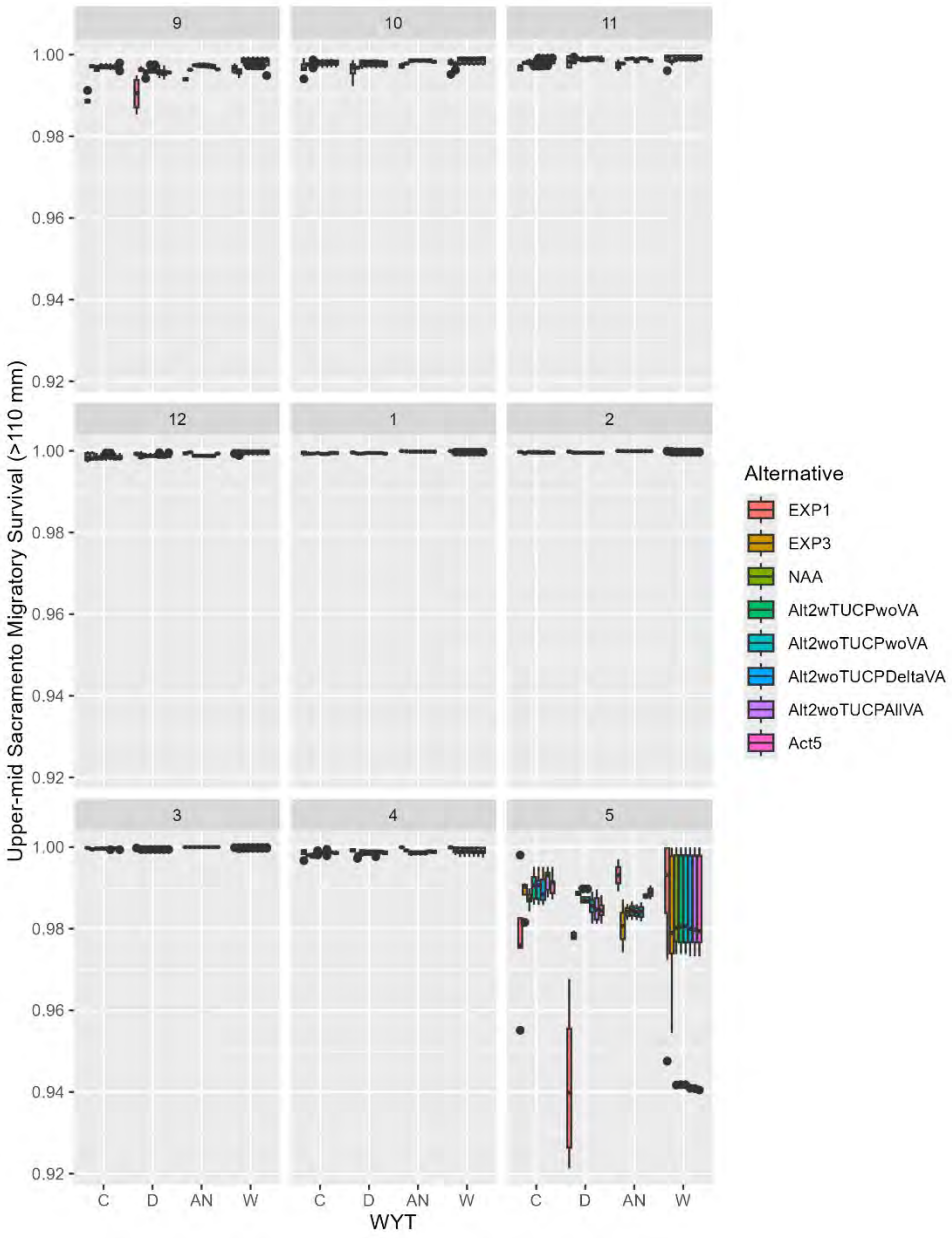



Figure F.2-18. Predicted smolt migratory survival for winter-run Chinook salmon in the Upper-mid Sacramento River from deterministic model runs across the 20 year timeseries, faceted by month.

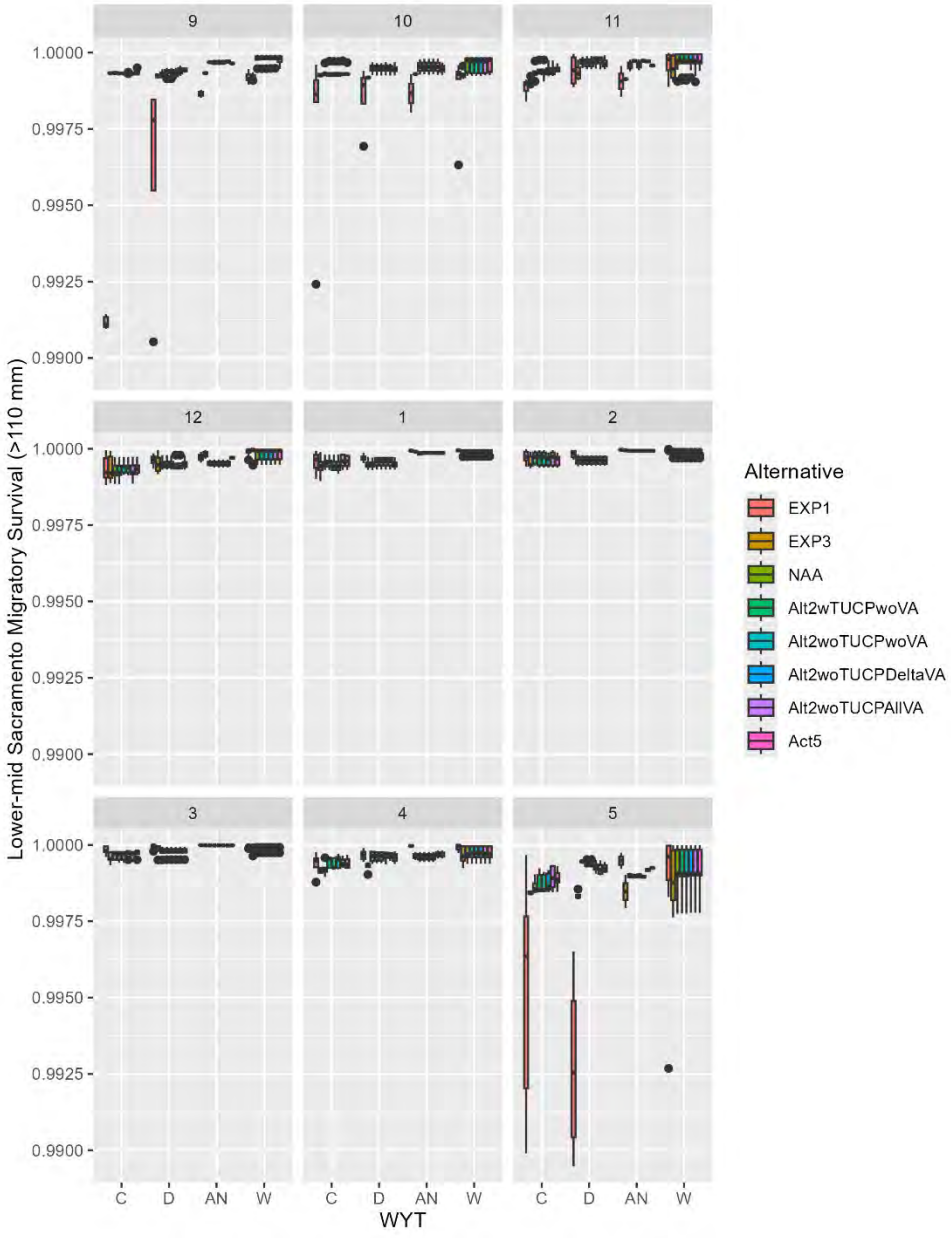



Figure F.2-19. Predicted smolt migratory survival for winter-run Chinook salmon in the Lower-mid Sacramento River from deterministic model runs across the 20 year timeseries, faceted by month.

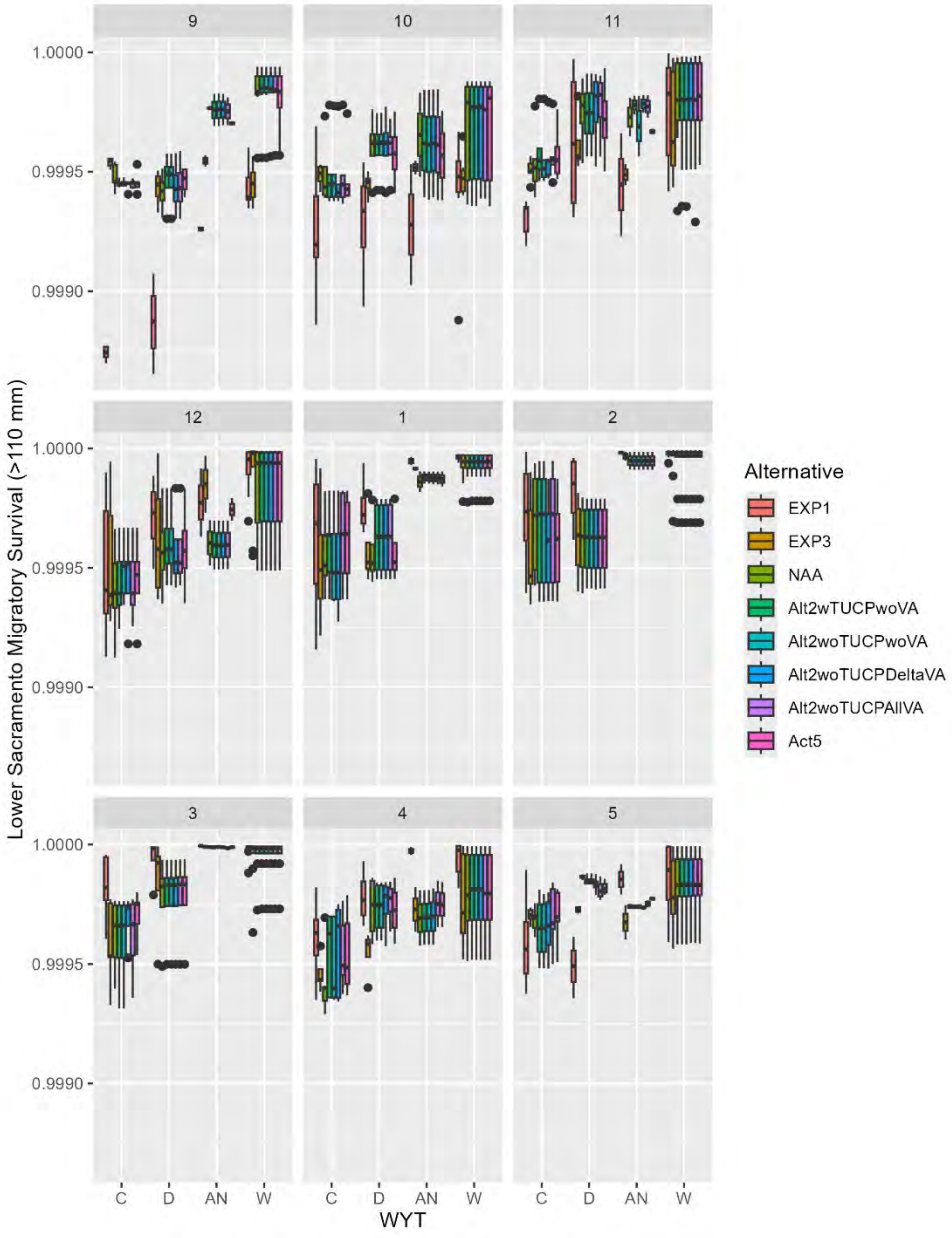



Figure F.2-20. Predicted smolt migratory survival for winter-run Chinook salmon in the Lower Sacramento River from deterministic model runs across the 20 year timeseries, faceted by month.

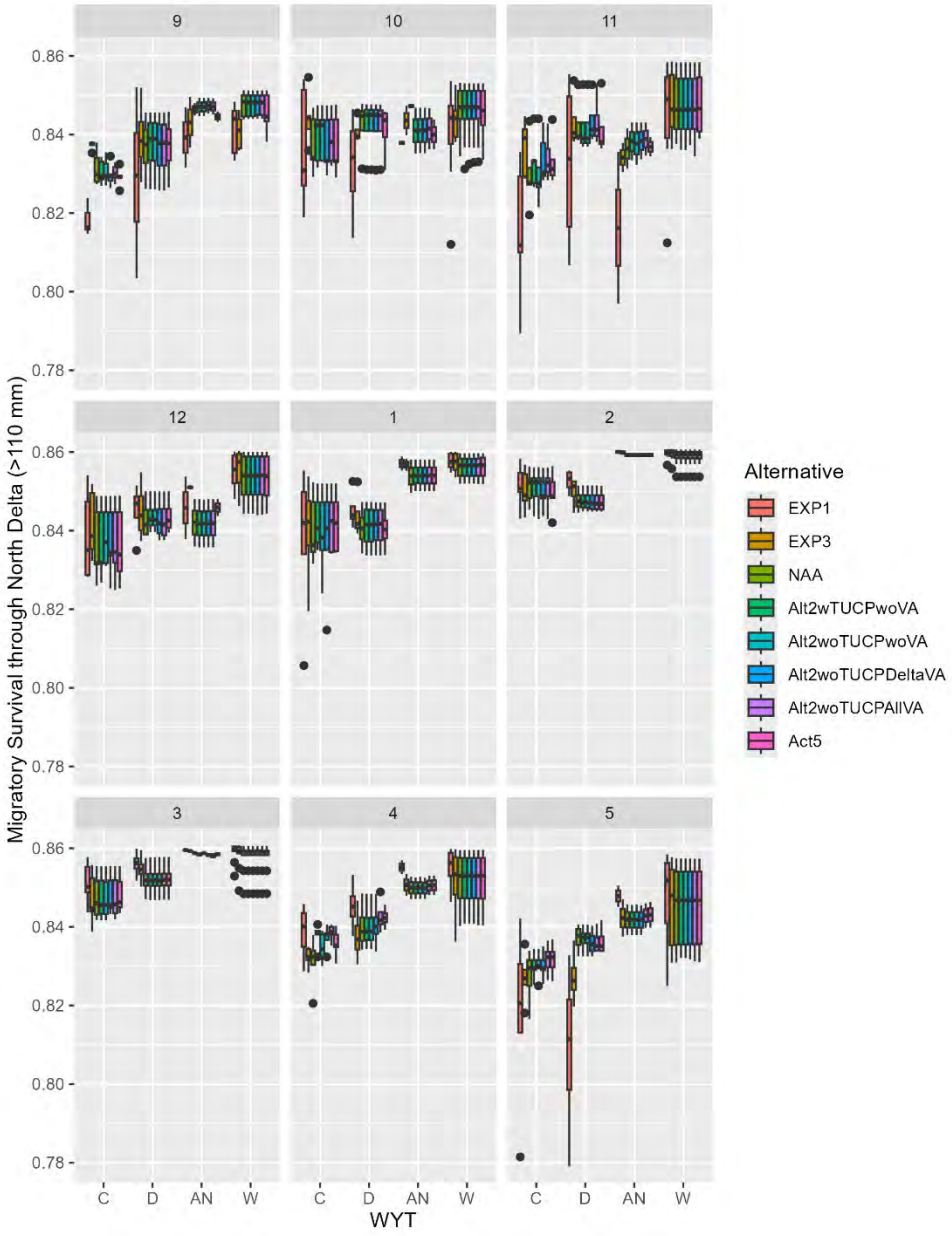



Figure F.2-21. Predicted smolt migratory survival for winter-run Chinook salmon in the North Delta from deterministic model runs across the 20 year timeseries, faceted by month.

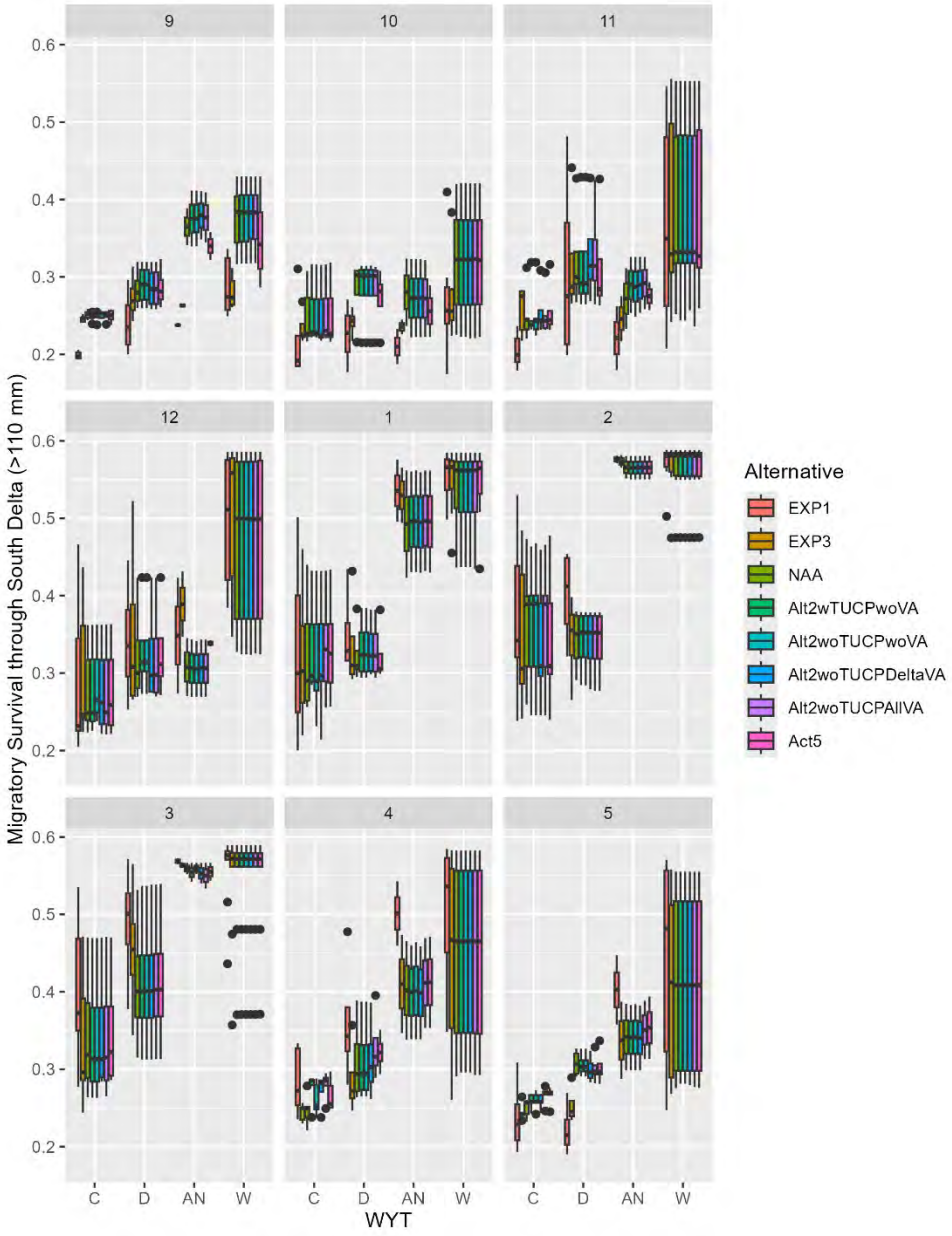



Figure F.2-22. Predicted smolt migratory survival for winter-run Chinook salmon in the South Delta from deterministic model runs across the 20 year timeseries, faceted by month.

### F.2.3.2 EIS

Results for the EIS are summarized in Table F.2-7 through Table F.2-10 and Figure F.2-23 through Figure F.2-35.

Predicted total and natural-origin-only spawner abundances in the Upper Sacramento River for deterministic model runs generally peaked in 1986, decreased steadily until 1994, and then generally increased steadily through 1999 (Table F.2-7, Table F.2-8; Figure F.2-23). The range of

natural-origin-only spawner abundances across alternatives at the end of the time series was narrow, ranging from a low of 5,441 (Alt2woTUCPAllVA) to a high of 5,606 (Alt3); over the entire time series predicted natural-origin-spawner abundances ranged from 1,490 (Alt2woTUCPAllVA) to 14,730 (Alt2woTUCPAllVA; Table F.2-8). The alternatives Alt1, Alt 3, and Alt4 generally resulted in reduced spawner abundances relative to NAA over the modeled time series (Figure F.224;) -. The four components of Alt2 generally resulted in small increases in spawner abundance for the years 1980-1993 but decreases in spawner abundance for 1994-1999. The model generally predicted small decreases in spawner abundance after 1985 for Action 5. Predicted natural-origin-only spawner abundances varied more widely across stochastic model runs, from a low of approximately 0 to a high of approximately 30,000 spawners (Figure F.2-25).

For deterministic model runs, population change over time, defined by mean (i.e., geometric) lambda values ($N_t/N_{t+1}$), over the entire 1980-1999 time series ranged from only 0.979 to 0.980 (Table F.29), and terminal lambda values ($N_{t=19}/N_{t=1}$) ranged from 0.665 (Alt2woTUCPAllVA) to 0.684 (Alt3; Table F.210); these values indicated that predicted spawner abundances declined over the course of the time series \- -. Mean lambda values across all WYs either did not change relative to NAA or declined slightly for all alternatives (i.e., -0.1% to 0.0% difference; Table F.2-9). All alternatives except Alt2woTUCPAllVA resulted in an increase in terminal lambda relative to NAA (i.e., -2.1% to -0.1% difference for all other alternatives; Table F.2-10).

Annual lambda values from deterministic model runs ranged from approximately 0.45 to 1.55 (Figure F.2-26). Wet water years had the highest mean annual lambdas (>1.1 for all Alternatives) and Dry water years also had a mean annual lambda greater than 1 for all alternatives, indicating that the population grew in Wet or Dry years (Table F.2-9). Mean lambdas were less than 1 in Critical and Above normal water years, indicating that populations declined. Reclamation staff emphasize that analyzing population growth rate by WYT in this manner does not account for the effects of spawning abundances and environmental conditions during spawning and rearing in previous years, which is an important consideration for the multi-year life histories of Chinook Salmon. Across stochastic model runs, mean lambda values over individual stochastic iterations ranged from approximately 0.92 to 1.03 (Figure F.2-27) and Critical water years had a lower mean lambda value than other water year types (Figure F.2-28). Terminal lambda values ranged from approximately 0.2 to 1.8 (Figure F.2-29), suggesting some model runs resulted in expected population growth over the time series.

Population trends may be explained by differences in life stage-specific demographic parameters. It is worth emphasizing again that the egg-to-fry survival life stage transition in the DSM is not sensitive to alternative-dependent flow or temperature values, and thus will be constant across alternatives. Across deterministic runs, monthly rearing survival for small juveniles (i.e., <42 mm) in the Upper Sacramento River varied from a low of approximately 0.01 to a high of approximately 0.2; rearing survival also varied across months, peaking in November and December (Figure F.2-30). Model-estimated migratory survival for very large fish (i.e., smolt size, >110 mm) in the Upper-mid, Lower-mid, and Lower Sacramento River was very close to 1, with slight variations across months and water year types (WYTs) (Figure F.2-31 through Figure F.2-33). In the Upper-mid and Lower-mid Sacramento River, expected survival was consistently lower in May than other migratory months; no such patterns were observed in the Lower Sacramento River. Migratory survival for very large fish also varied across months and WYT in

the North and South Delta (Figure F.2-34, Figure F.2-35). Migratory survival often increased moving from a Critical to Dry to Above Normal to Wet WYT. Expected migratory survival in the North Delta was greatest in February and March and lowest in September, October, and May. Expected migratory survival in the South Delta was greatest in Wet and Above Normal Years in February and March and lowest in Critical Years in September, November, April, and May. With migratory survival in the mainstem Sacramento River high across the alternatives, rearing survival and migratory survival in the Delta likely act as drivers of lambda, creating a negative feedback loop with winter-run spawner abundance.

#### *F.2.3.2.1 Population abundance, trends*

Table F.2-7. Predicted annual total winter-run spawner abundance in the Upper Sacramento River, including both natural- and hatchery-origin fish, from deterministic model runs. Parentheses indicate percent difference from NAA (negative values indicate a decrease in annual spawner abundance).

| Year | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action5 |
|---|---|---|---|---|---|---|---|---|---|
| 1980 | 8762 | 8762 (0.0) | 8762 (0) | 8762 (0) | 8762 (0) | 8762 (0) | 8762 (0) | 8762 (0) | 8762 (0) |
| 1981 | 9376 | 9376 (0.0) | 9376 (0) | 9376 (0) | 9376 (0) | 9376 (0) | 9376 (0) | 9376 (0) | 9376 (0) |
| 1982 | 8156 | 8035 (-1.5) | 8147 (-0.1) | 8144 (-0.1) | 8177 (0.3) | 8214 (0.7) | 8151 (-0.1) | 8098 (-0.7) | 8159 (0) |
| 1983 | 8371 | 8143 (-2.7) | 8374 (0) | 8367 (0) | 8368 (0) | 8518 (1.8) | 8345 (-0.3) | 8306 (-0.8) | 8449 (0.9) |
| 1984 | 11391 | 11246 (-1.3) | 11423 (0.3) | 11416 (0.2) | 11325 (-0.6) | 11532 (1.2) | 11338 (-0.5) | 11407 (0.1) | 11536 (1.3) |
| 1985 | 14384 | 14178 (-1.4) | 14410 (0.2) | 14402 (0.1) | 14340 (-0.3) | 14519 (0.9) | 14331 (-0.4) | 14348 (-0.3) | 14484 (0.7) |
| 1986 | 14884 | 14491 (-2.6) | 14940 (0.4) | 14930 (0.3) | 14906 (0.1) | 15117 (1.6) | 14790 (-0.6) | 14644 (-1.6) | 14863 (-0.1) |
| 1987 | 13350 | 12817 (-4.0) | 13537 (1.4) | 13527 (1.3) | 13436 (0.6) | 13707 (2.7) | 13128 (-1.7) | 13032 (-2.4) | 13259 (-0.7) |
| 1988 | 13113 | 12260 (-6.5) | 13393 (2.1) | 13382 (2.1) | 13241 (1) | 13566 (3.5) | 12744 (-2.8) | 12780 (-2.5) | 13035 (-0.6) |
| 1989 | 12314 | 11354 (-7.8) | 12434 (1) | 12424 (0.9) | 12340 (0.2) | 12633 (2.6) | 11928 (-3.1) | 11896 (-3.4) | 12137 (-1.4) |
| 1990 | 8234 | 7513 (-8.8) | 8166 (-0.8) | 8158 (-0.9) | 8153 (-1) | 8285 (0.6) | 7982 (-3.1) | 7924 (-3.8) | 8016 (-2.6) |
| 1991 | 6230 | 5382 (-13.6) | 6257 (0.4) | 6245 (0.2) | 6270 (0.6) | 6397 (2.7) | 5971 (-4.2) | 5942 (-4.6) | 6188 (-0.7) |
| 1992 | 6089 | 5170 (-15.1) | 6237 (2.4) | 6251 (2.7) | 6224 (2.2) | 6444 (5.8) | 5812 (-4.5) | 5778 (-5.1) | 6098 (0.1) |
| 1993 | 4015 | 3564 (-11.2) | 4183 (4.2) | 4257 (6) | 4154 (3.5) | 4144 (3.2) | 3971 (-1.1) | 3988 (-0.7) | 3947 (-1.7) |
| 1994 | 2777 | 2431 (-12.5) | 2524 (-9.1) | 2823 (1.7) | 2514 (-9.5) | 1878 (-32.4) | 2673 (-3.7) | 2861 (3) | 2323 (-16.3) |
| 1995 | 3657 | 3110 (-15.0) | 2915 (-20.3) | 3387 (-7.4) | 2885 (-21.1) | 2001 (-45.3) | 3252 (-11.1) | 3649 (-0.2) | 2845 (-22.2) |

| Year | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action5 |
|---|---|---|---|---|---|---|---|---|---|
| 1996 | 4052 | 3704 (-8.6) | 3621 (-10.6) | 3899 (-3.8) | 3593 (-11.3) | 3110 (-23.2) | 3782 (-6.7) | 4128 (1.9) | 3668 (-9.5) |
| 1997 | 3735 | 3663 (-1.9) | 3635 (-2.7) | 3747 (0.3) | 3619 (-3.1) | 3311 (-11.4) | 3775 (1.1) | 3845 (2.9) | 3745 (0.3) |
| 1998 | 4698 | 4752 (1.2) | 4628 (-1.5) | 4693 (-0.1) | 4584 (-2.4) | 4319 (-8.1) | 4831 (2.8) | 4724 (0.6) | 4739 (0.9) |
| 1999 | 5946 | 5870 (-1.3) | 5941 (-0.1) | 5950 (0.1) | 5902 (-0.7) | 5829 (-2) | 5994 (0.8) | 5920 (-0.4) | 5937 (-0.2) |

Table F.2-8. Predicted annual natural-origin winter-run spawner abundance in the Upper Sacramento River from deterministic model runs. Parentheses indicate percent difference from NAA (negative values indicate a decrease in annual spawner abundance).

| Year | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action5 |
|---|---|---|---|---|---|---|---|---|---|
| 1980 | 8374 | 8374 (0.0) | 8374 (0) | 8374 (0) | 8374 (0) | 8374 (0) | 8374 (0) | 8374 (0) | 8374 (0) |
| 1981 | 8989 | 8989 (0.0) | 8989 (0) | 8989 (0) | 8989 (0) | 8989 (0) | 8989 (0) | 8989 (0) | 8989 (0) |
| 1982 | 7769 | 7648 (-1.6) | 7760 (-0.1) | 7757 (-0.2) | 7790 (0.3) | 7826 (0.7) | 7764 (-0.1) | 7711 (-0.7) | 7772 (0) |
| 1983 | 7984 | 7756 (-2.9) | 7987 (0) | 7979 (-0.1) | 7981 (0) | 8131 (1.8) | 7958 (-0.3) | 7919 (-0.8) | 8061 (1) |
| 1984 | 11004 | 10859 (-1.3) | 11036 (0.3) | 11029 (0.2) | 10937 (-0.6) | 11145 (1.3) | 10951 (-0.5) | 11020 (0.1) | 11148 (1.3) |
| 1985 | 13997 | 13790 (-1.5) | 14023 (0.2) | 14015 (0.1) | 13952 (-0.3) | 14131 (1) | 13943 (-0.4) | 13961 (-0.3) | 14097 (0.7) |
| 1986 | 14497 | 14104 (-2.7) | 14553 (0.4) | 14543 (0.3) | 14519 (0.2) | 14730 (1.6) | 14403 (-0.6) | 14257 (-1.7) | 14475 (-0.2) |
| 1987 | 12962 | 12430 (-4.1) | 13150 (1.5) | 13140 (1.4) | 13049 (0.7) | 13320 (2.8) | 12740 (-1.7) | 12644 (-2.5) | 12871 (-0.7) |
| 1988 | 12726 | 11873 (-6.7) | 13006 (2.2) | 12995 (2.1) | 12854 (1) | 13179 (3.6) | 12357 (-2.9) | 12393 (-2.6) | 12648 (-0.6) |
| 1989 | 11927 | 10967 (-8.1) | 12047 (1) | 12036 (0.9) | 11953 (0.2) | 12246 (2.7) | 11541 (-3.2) | 11509 (-3.5) | 11750 (-1.5) |
| 1990 | 7847 | 7125 (-9.2) | 7779 (-0.9) | 7770 (-1) | 7766 (-1) | 7898 (0.6) | 7595 (-3.2) | 7537 (-4) | 7629 (-2.8) |
| 1991 | 5842 | 4995 (-14.5) | 5870 (0.5) | 5857 (0.3) | 5882 (0.7) | 6010 (2.9) | 5583 (-4.4) | 5555 (-4.9) | 5801 (-0.7) |
| 1992 | 5702 | 4783 (-16.1) | 5849 (2.6) | 5864 (2.8) | 5837 (2.4) | 6057 (6.2) | 5425 (-4.9) | 5391 (-5.5) | 5710 (0.1) |
| 1993 | 3627 | 3177 (-12.4) | 3796 (4.7) | 3869 (6.7) | 3767 (3.9) | 3756 (3.6) | 3583 (-1.2) | 3601 (-0.7) | 3559 (-1.9) |
| 1994 | 2390 | 2044 (-14.5) | 2137 (-10.6) | 2435 (1.9) | 2126 (-11) | 1490 (-37.7) | 2286 (-4.4) | 2474 (3.5) | 1936 (-19) |
| 1995 | 3270 | 2723 (-16.7) | 2528 (-22.7) | 3000 (-8.3) | 2498 (-23.6) | 1613 (-50.7) | 2865 (-12.4) | 3262 (-0.2) | 2458 (-24.8) |

| Year | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action5 |
|---|---|---|---|---|---|---|---|---|---|
| 1996 | 3665 | 3316 (-9.5) | 3233 (-11.8) | 3512 (-4.2) | 3205 (-12.6) | 2723 (-25.7) | 3395 (-7.4) | 3741 (2.1) | 3281 (-10.5) |
| 1997 | 3348 | 3276 (-2.2) | 3247 (-3) | 3360 (0.4) | 3231 (-3.5) | 2924 (-12.7) | 3387 (1.2) | 3457 (3.3) | 3358 (0.3) |
| 1998 | 4311 | 4364 (1.2) | 4241 (-1.6) | 4306 (-0.1) | 4197 (-2.6) | 3932 (-8.8) | 4444 (3.1) | 4337 (0.6) | 4352 (1) |
| 1999 | 5558 | 5482 (-1.4) | 5553 (-0.1) | 5563 (0.1) | 5515 (-0.8) | 5441 (-2.1) | 5606 (0.9) | 5532 (-0.5) | 5550 (-0.1) |

Table F.2-9. Predicted mean lambda ($N_{t+1}/N_t$) for total winter-run spawner abundance in the Upper Sacramento River, including both natural- and hatchery-origin fish, from deterministic model runs. Parentheses indicate percent difference from NAA (negative values indicate a decrease in annual spawner abundance).

| WYT | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action5 |
|---|---|---|---|---|---|---|---|---|---|
| C | 0.815 | 0.795 (-2.4) | 0.802 (-1.6) | 0.815 (0) | 0.803 (-1.5) | 0.776 (-4.8) | 0.807 (-1.0) | 0.817 (0.2) | 0.798 (-2.1) |
| D | 1.042 | 1.035 (-0.7) | 1.042 (0) | 1.042 (0) | 1.042 (0) | 1.042 (0) | 1.039 (-0.3) | 1.037 (-0.5) | 1.037 (-0.5) |
| AN | 0.659 | 0.689 (4.5) | 0.671 (1.8) | 0.681 (3.3) | 0.667 (1.2) | 0.643 (-2.4) | 0.683 (3.6) | 0.69 (4.7) | 0.647 (-1.8) |
| W | 1.129 | 1.141 (1.0) | 1.139 (0.9) | 1.126 (-0.3) | 1.138 (0.8) | 1.183 (4.8) | 1.131 (0.2) | 1.123 (-0.5) | 1.15 (1.9) |
| All | 0.980 | 0.979 (-0.1) | 0.980 (0) | 0.980 (0) | 0.979 (-0.1) | 0.979 (-0.1) | 0.980 (0) | 0.980 (0) | 0.98 (0) |

Table F.2-10. Predicted terminal lambda ($N_{t=19}/N_{t=1}$) for total winter-run spawner abundance in the Upper Sacramento River, including both natural- and hatchery-origin fish, from deterministic model runs. Parentheses indicate percent difference from NAA (negative values indicate a decrease in annual spawner abundance).

| NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action5 |
|---|---|---|---|---|---|---|---|---|
| 0.679 | 0.670 (-1.3) | 0.678 (-0.1) | 0.679 (0) | 0.674 (-0.7) | 0.665 (-2.1) | 0.684 (0.7) | 0.676 (-0.4) | 0.678 (1.2) |

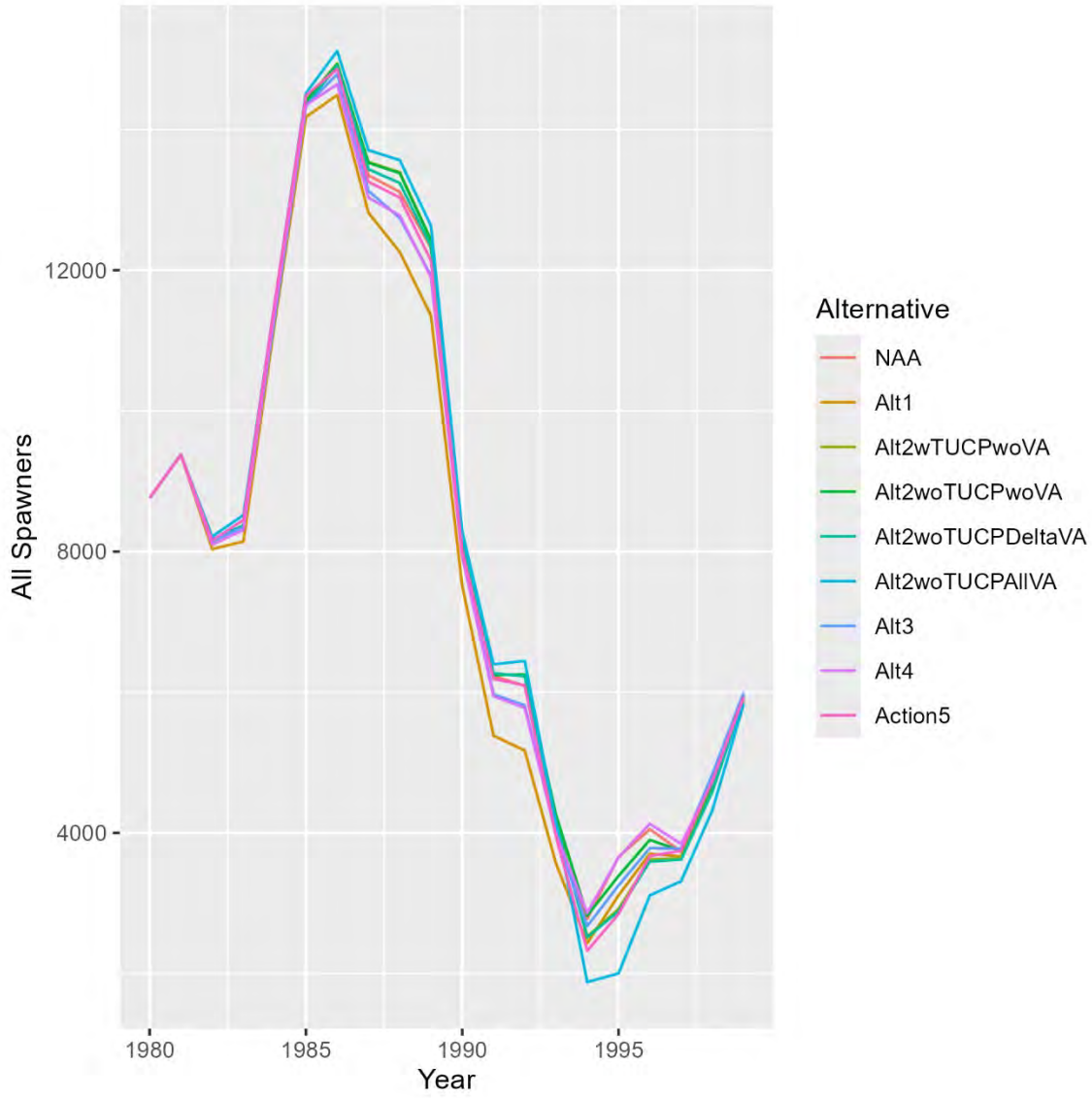



Figure F.2-23. Expected annual abundances of natural-origin winter-run Chinook salmon spawners in the Upper Sacramento River from deterministic model runs.

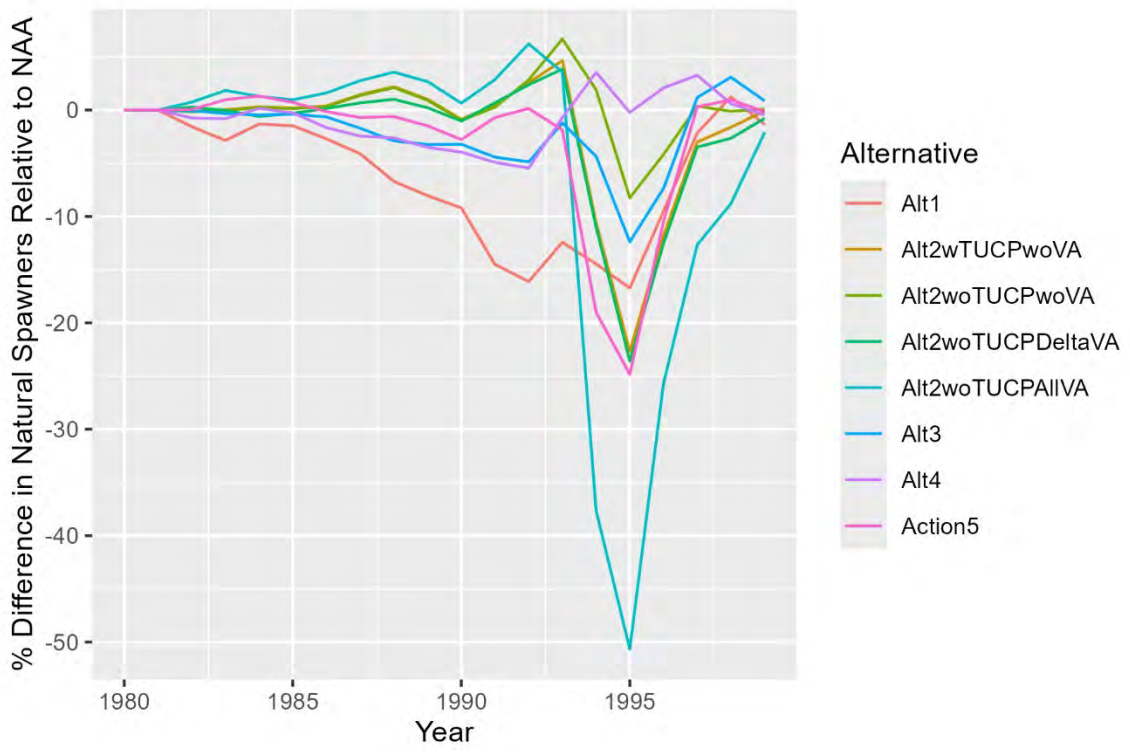



Figure F.2-24. Expected percent differences in annual abundances of natural-origin winter-run Chinook salmon spawners in the Upper Sacramento River from deterministic model runs.

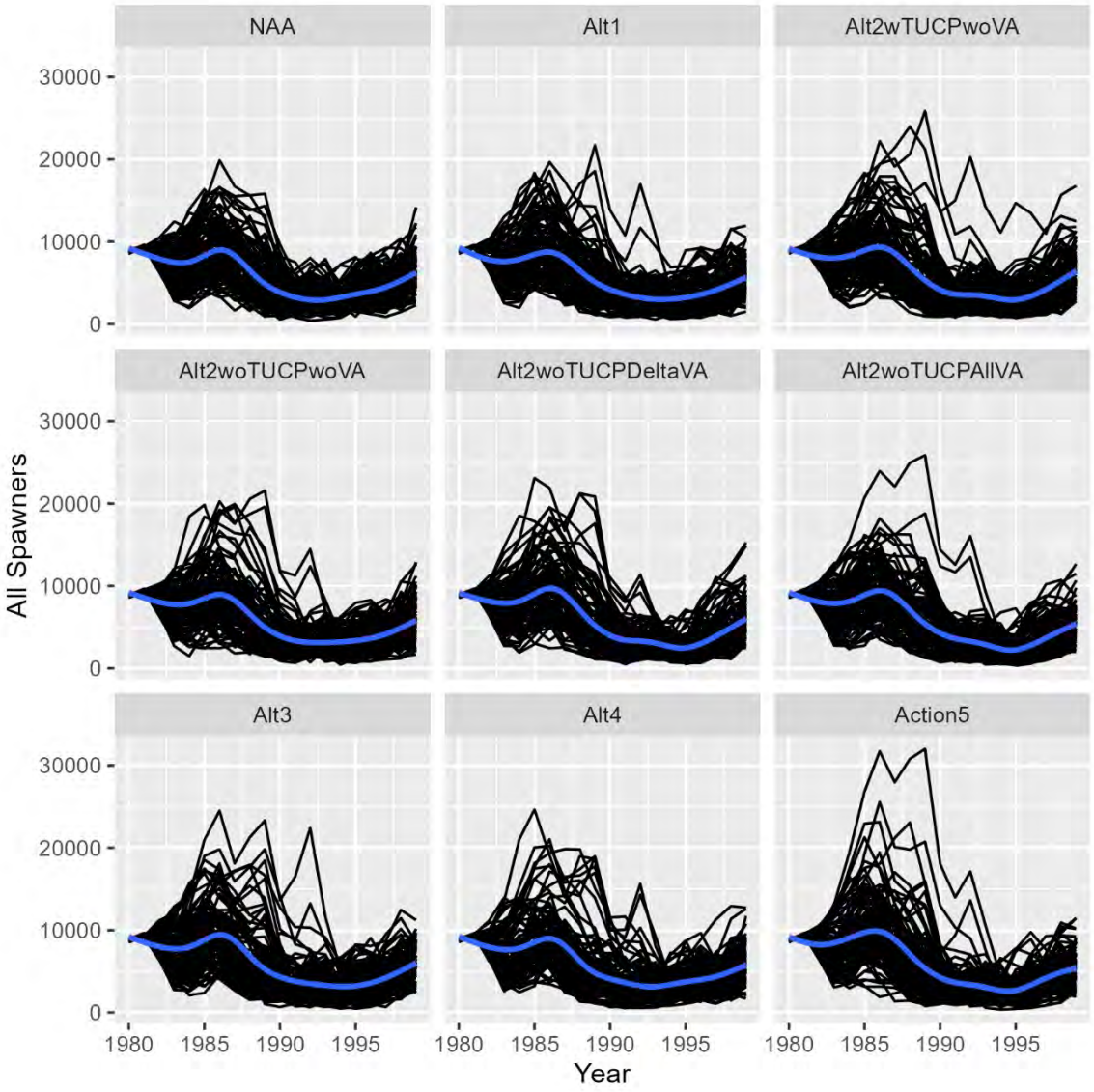



Figure F.2-25. Expected annual abundances of natural-origin winter-run Chinook salmon spawners in the Upper Sacramento River from stochastic model runs. Black lines represent iteration-specific abundances over time and the blue line represents an expected trend obtained by 'gam' smoothing in ggplot2.

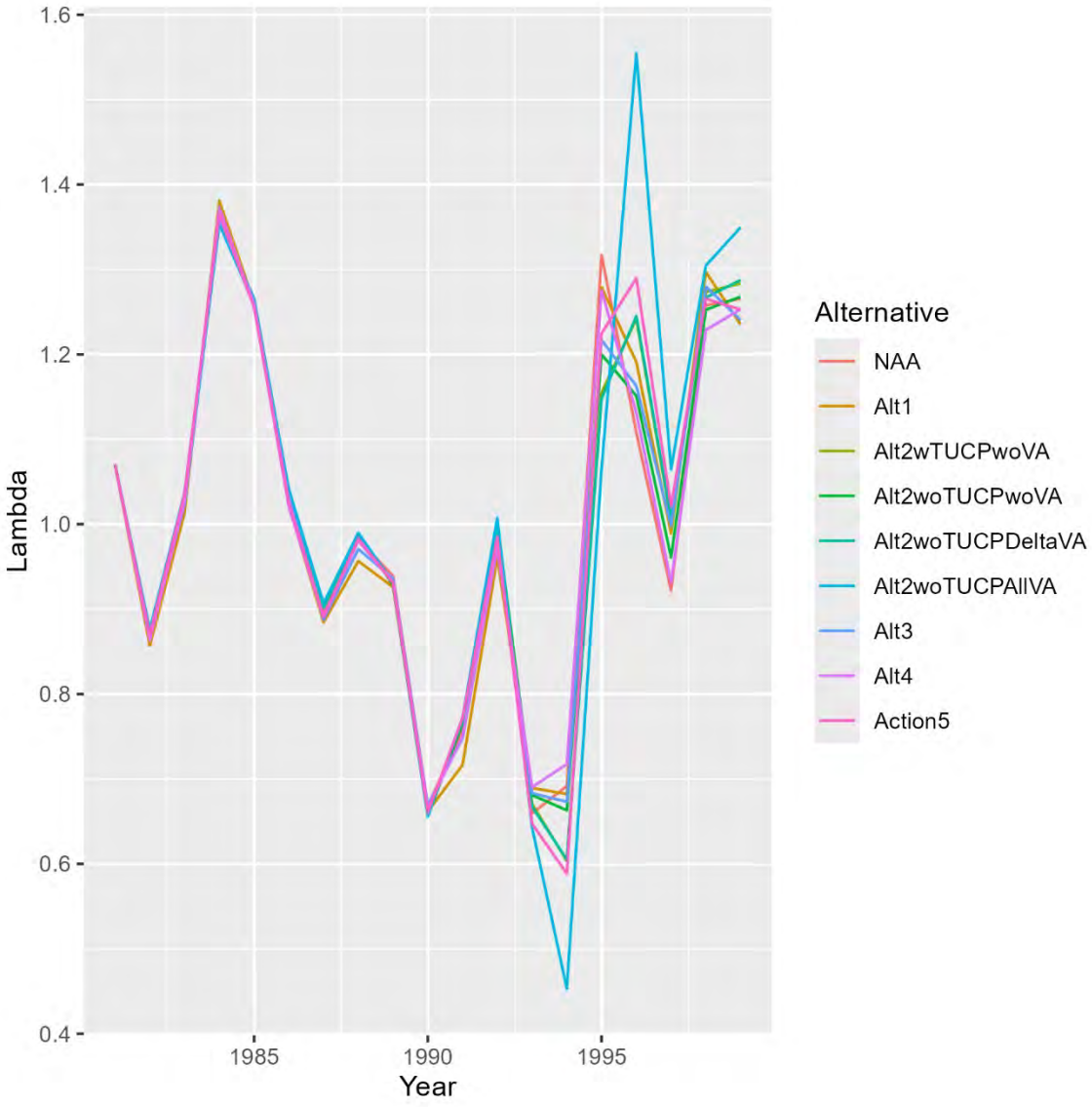



Figure F.2-26. Predicted annual lambda values ($N_{t+1}/N_t$) for total winter-run spawner abundance in the Upper Sacramento River, including both natural- and hatchery-origin fish, from deterministic model runs.

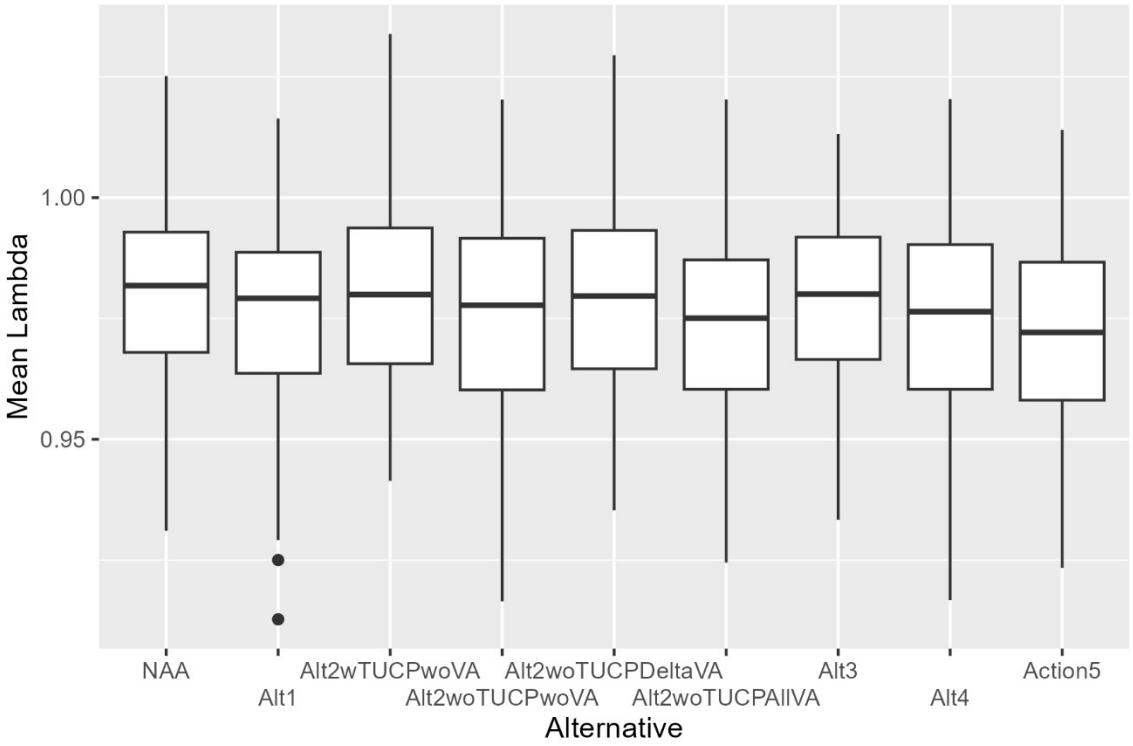



Figure F.2-27. Predicted mean lambda values ($N_{t+1}/N_t$) for total winter-run spawner abundance in the Upper Sacramento River, including both natural- and hatchery-origin fish, across stochastic model iterations.

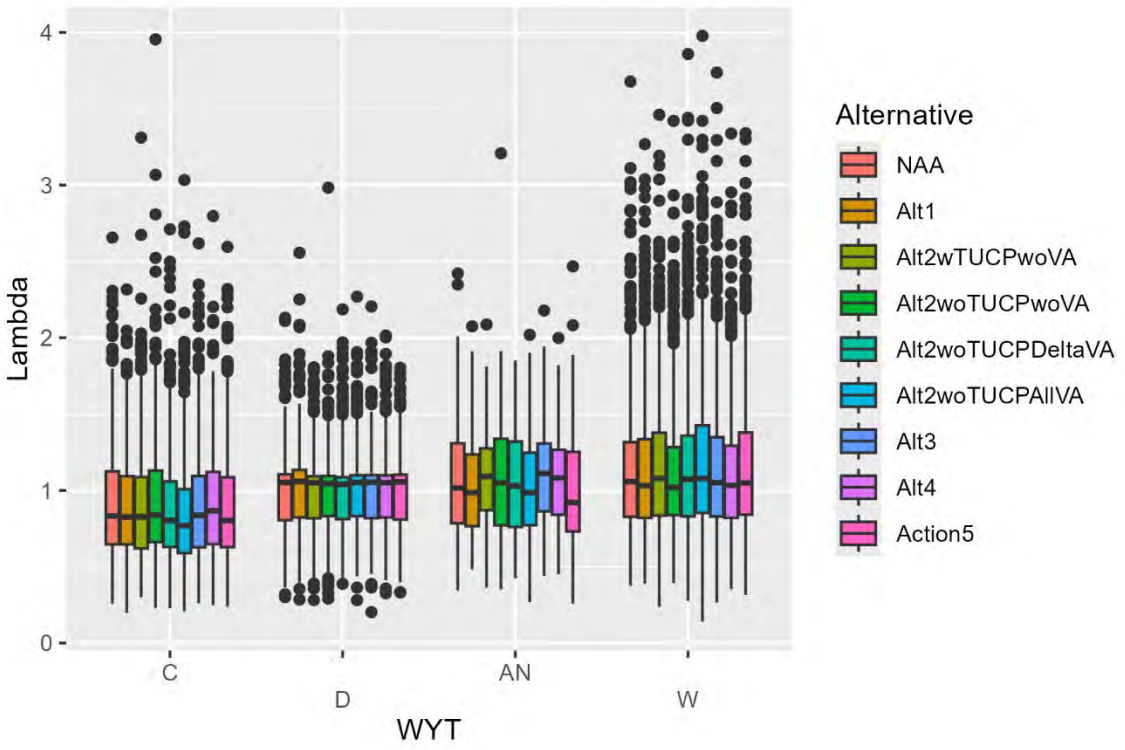



Figure F.2-28. Predicted lambda values for each water year type ($N_{t+1}/N_t$) for total winter-run spawner abundance in the Upper Sacramento River, including both natural- and hatchery-origin fish, across 100 stochastic model iterations.

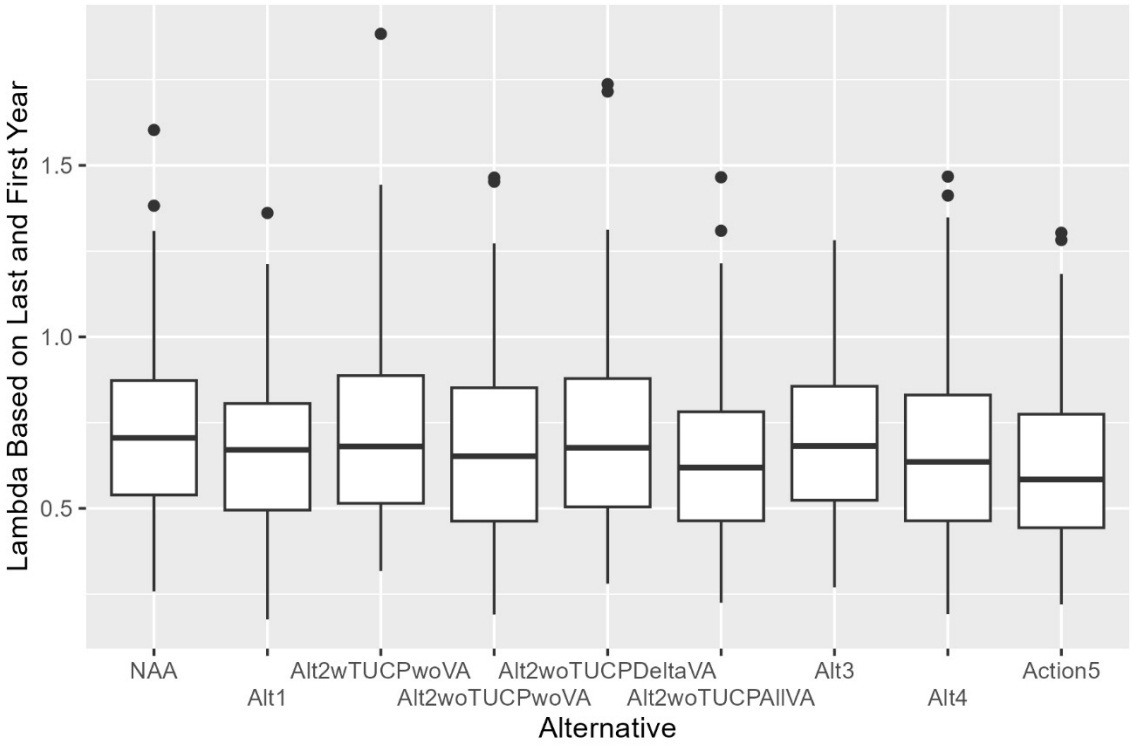



Figure F.2-29. Predicted terminal lambda values ($N_{t=19}/N_{t=1}$) for total winter-run spawner abundance in the Upper Sacramento River, including both natural- and hatchery-origin fish, across stochastic model iterations.

#### *F.2.3.2.2 Life stage-specific demographic parameters*

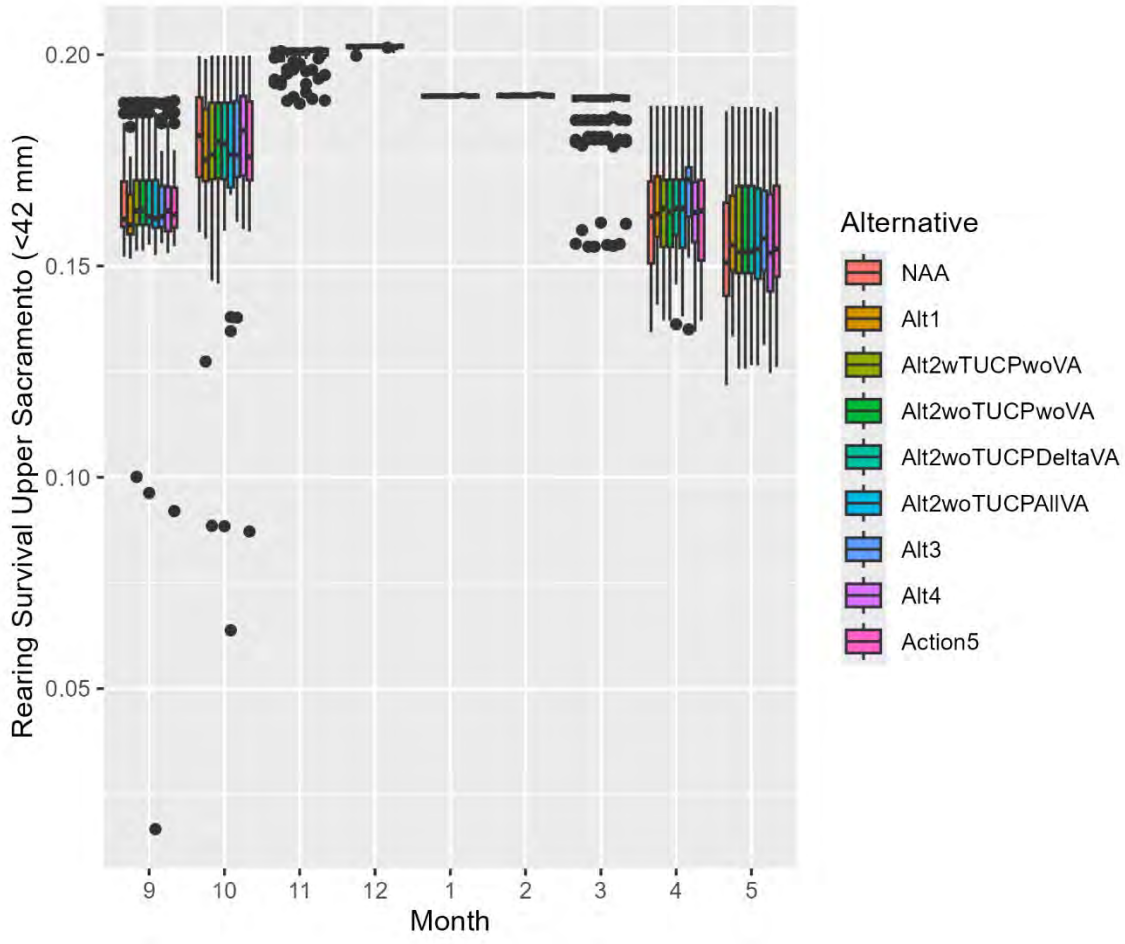



Figure F.2-30. Predicted small juvenile rearing survival for winter-run Chinook salmon in the Upper Sacramento River from deterministic model runs.

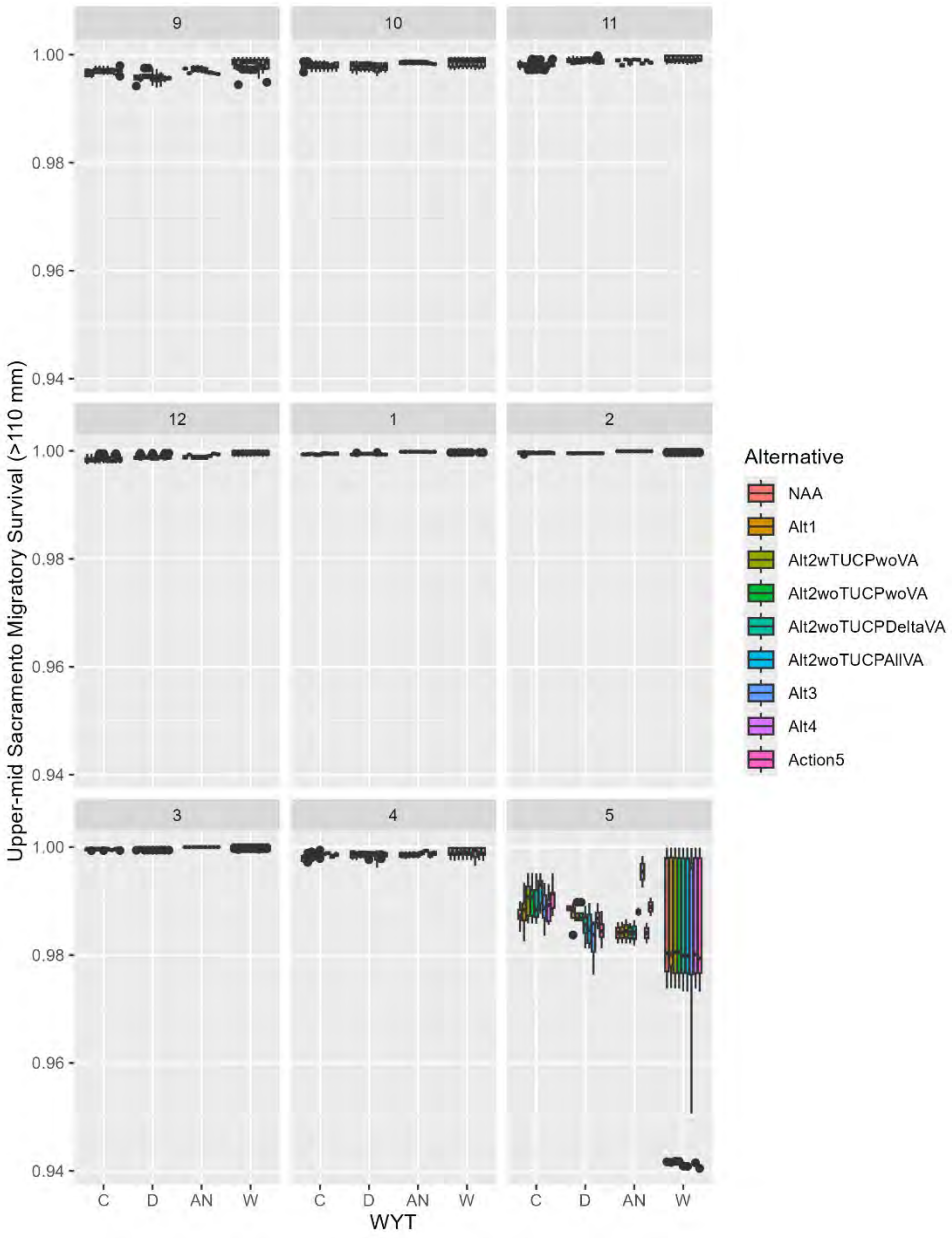



Figure F.2-31. Predicted smolt migratory survival for winter-run Chinook salmon in the Upper-mid Sacramento River from deterministic model runs, faceted by month.

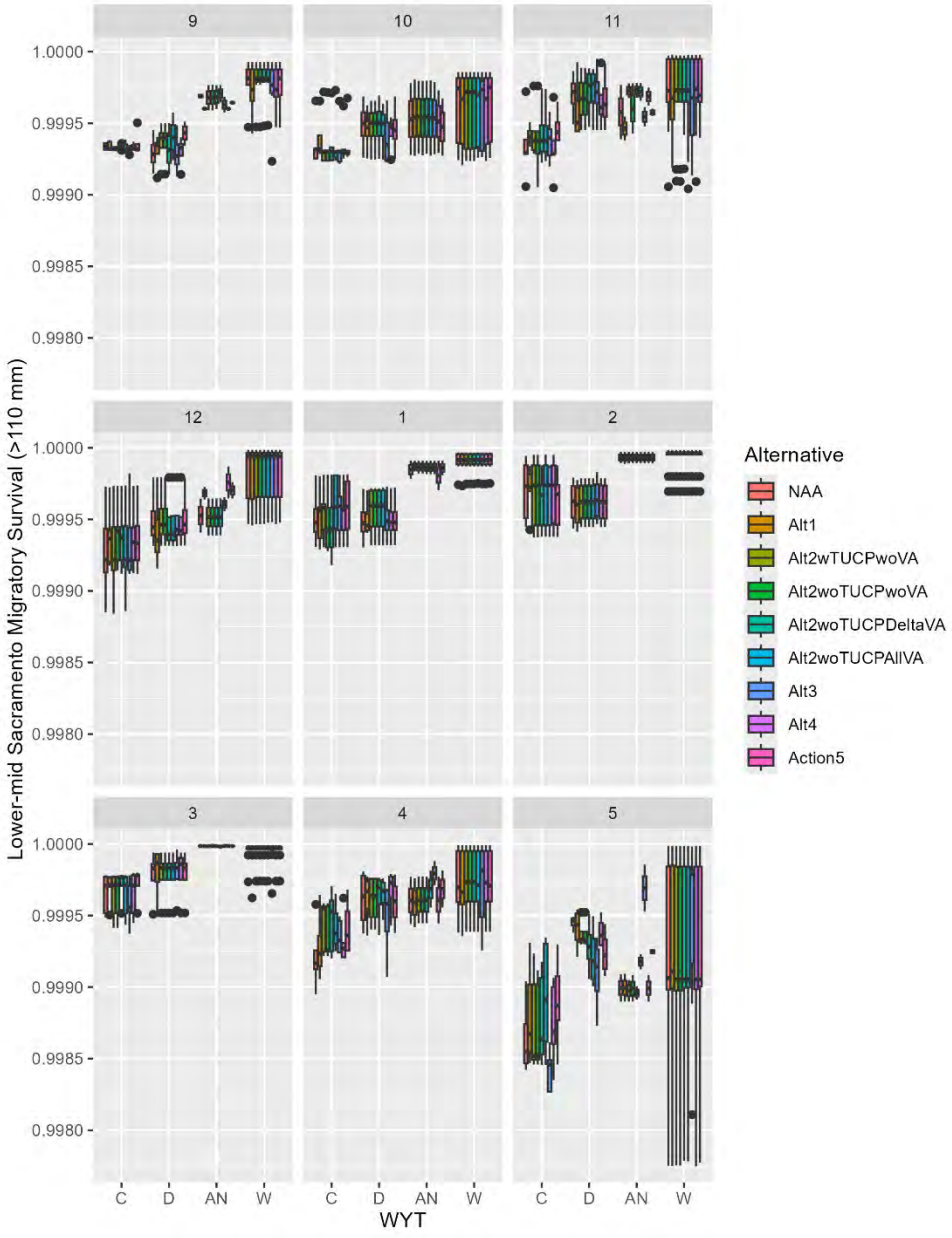



Figure F.2-32. Predicted smolt migratory survival for winter-run Chinook salmon in the Lower-mid Sacramento River from deterministic model runs, faceted by month.

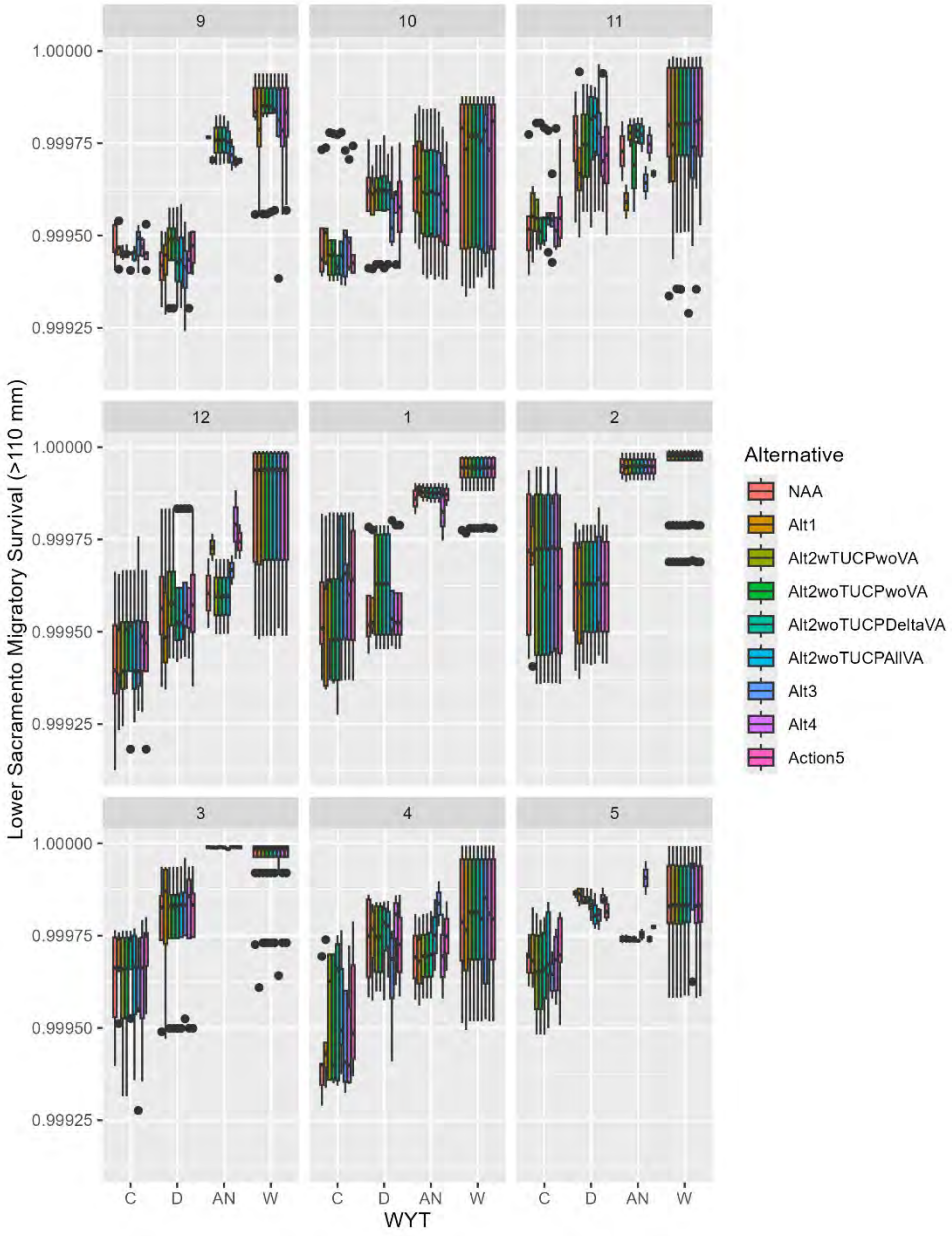



Figure F.2-33. Predicted smolt migratory survival for winter-run Chinook salmon in the Lower Sacramento River from deterministic model runs, faceted by month.

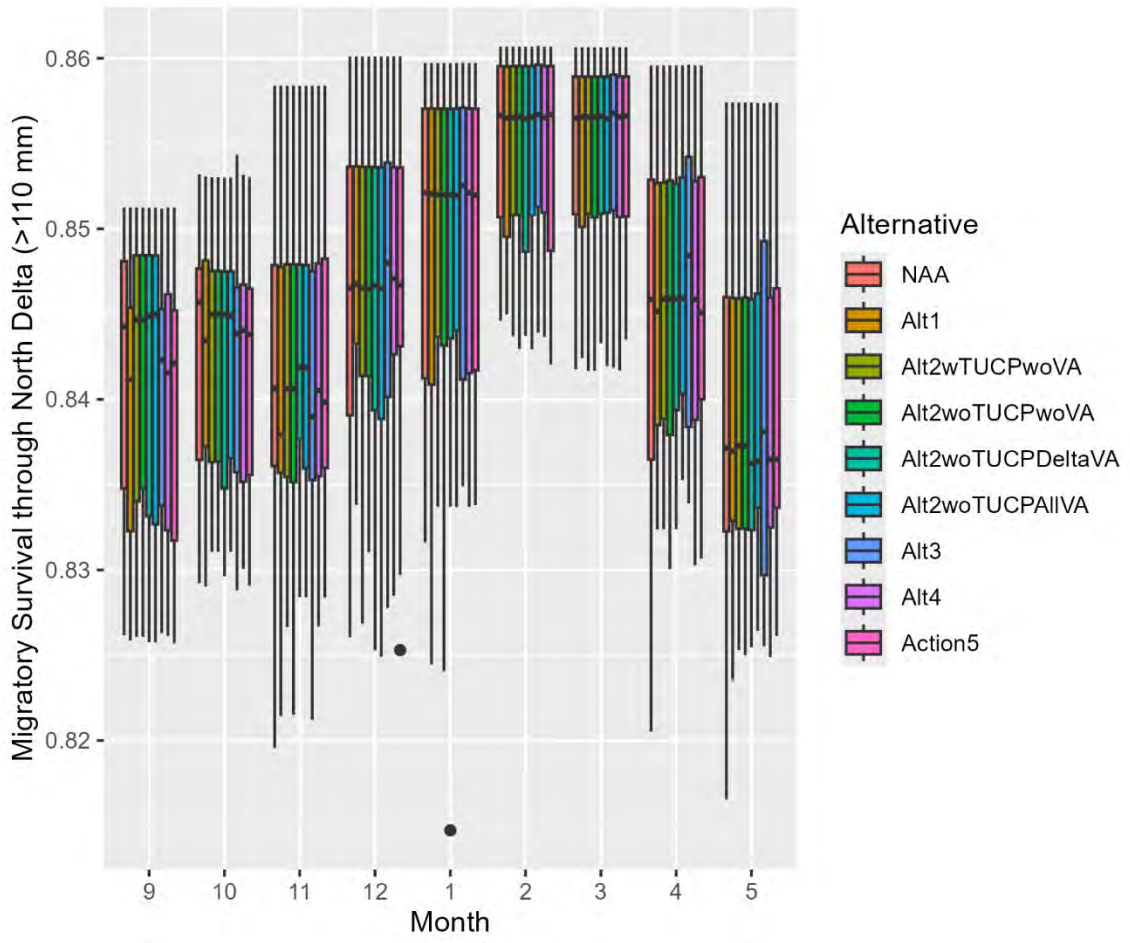



Figure F.2-34. Predicted smolt migratory survival for winter-run Chinook salmon in the North Delta from deterministic model runs, faceted by month.

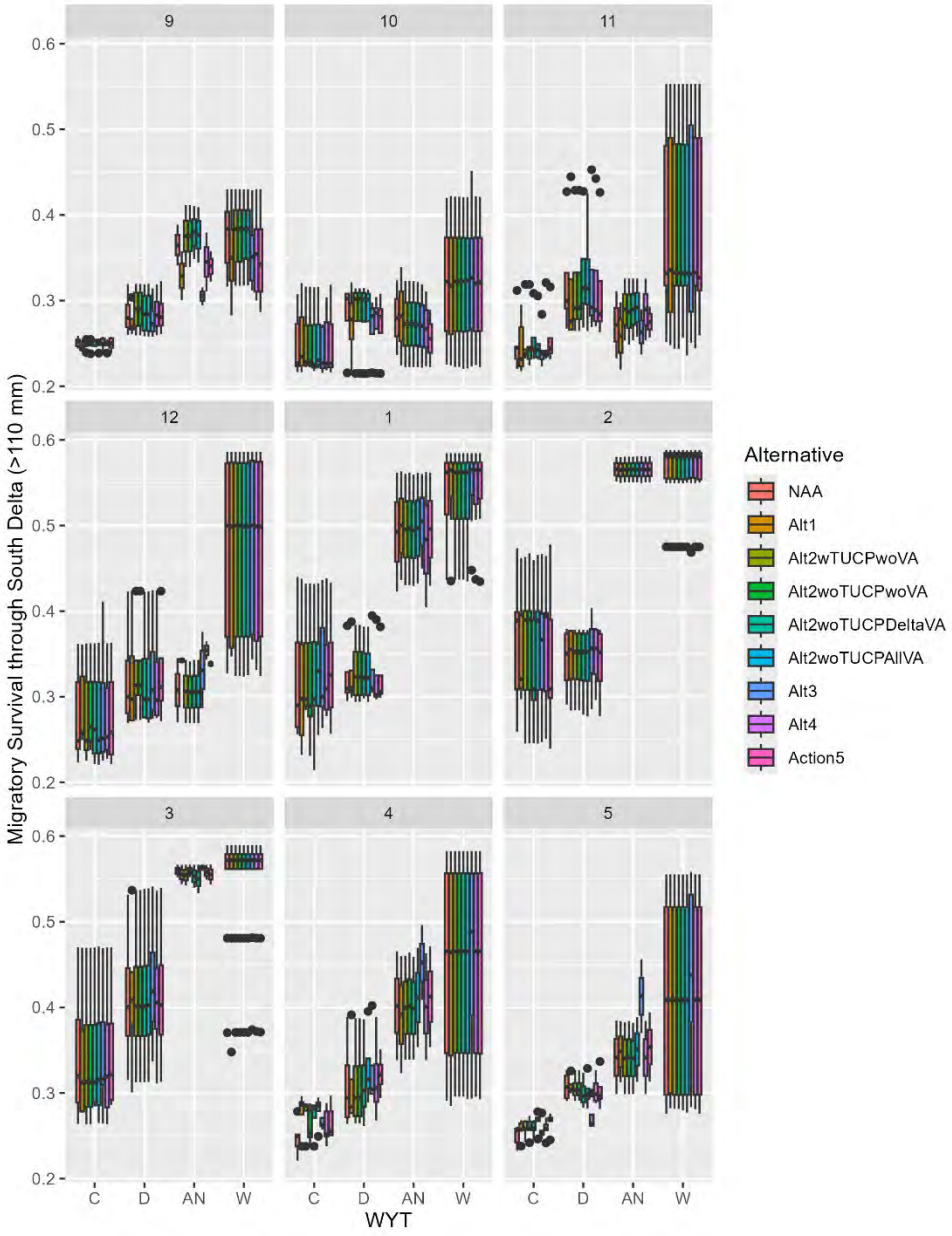



Figure F.2-35. Predicted smolt migratory survival for winter-run Chinook salmon in the South Delta from deterministic model runs, faceted by month.

## F.2.4 References

Michel, C.J. 2019. Decoupling outmigration from marine survival indicates outsized influence of streamflow on cohort success for California's Chinook salmon populations. *Canadian Journal of Fisheries and Aquatic Sciences* 76: 1398-1410.

National Marine Fisheries Service. 2019. *Biological Opinion on Long-Term Operation of the Central Valley Project and the State Water Project.* National Marine Fisheries Service, National Oceanic and Atmospheric Administration, U.S. Department of Commerce. WCRO-2016-00069

O'Farrell, M., Hendrix, N., and Mohr, M. 2016. *An Evaluation of preseason abundance forecasts for Sacramento River winter Chinook salmon.* Agenda Item D.2., Attachment 1.

Peterson, J.T., and Duarte, A. 2020. Decision analysis for greater insights into the development and evaluation of Chinook salmon restoration strategies in California's Central Valley. *Restoration Ecology* 28(6): 1596-1609.

Appendix F, Modeling

# Attachment F.3 CVPIA SIT Spring-run LCM

## F.3.1 Model Overview

USFWS and Reclamation have been working to develop lifecycle models for use in structured decision making for CVPIA. Through a participatory process, the Science Integration Team (SIT) has developed a spring-run Chinook Salmon decision support model, or DSM. This model has been peer-reviewed and is publicly available. The participatory team's model proposals and meeting notes, background, documentation, and code for the model are available at: Resources - CVPIA Science Integration Team. Reclamation used the SIT DSM in the LTO lifecycle analyses.

## F.3.2 Methods

### F.3.2.1 Model Development

The CVPIA SIT DSM models were developed by the CVPIA Science Integration Team (SIT) as part of a Structured Decision-Making (SDM) process. The SIT is a collaborative team of stakeholders and scientists. The resulting decision support models (DSMs) are open source and publicly available (DSM R Packages - CVPIA Science Integration Team). An early version of the DSMs has been published in a peer-reviewed publication (Peterson and Duarte 2020). The models were parameterized and calibrated using a combination of empirical data, existing models, analysis of existing data, and expert opinion.

DSMs were created for fall-, winter-, and spring-run Chinook salmon to compare how habitat restoration actions might improve natural production of each run. The DSMs are stochastic or deterministic stage-based life cycle models (LCMs) that track the number of Chinook salmon across juvenile size classes and adult stages of natural and hatchery origin. The transitions between stages are estimated with survival, growth, and movement submodels. Model inputs include existing habitat areas, fish harvest rates, water diversions, flows, and temperatures. Flow information was obtained from CalSim II outputs. Temperature data are primarily obtained from HEC-5Q outputs. Some areas for which HEC-5Q data were unavailable have temperatures modeled based on measured water temperatures, statistical models relating water temperature to air temperature, or matching of tributaries with similar hydrology and geomorphology. Habitat inputs are primarily based on previously published flow-habitat relationships. Where flow-habitat relationship information is not available, relationships were assumed to be similar to those of nearby, geomorphically similar watersheds. All other inputs except for predator prevalence are obtained from previously published sources.

For the purposes of LTO analyses, Reclamation used the model structure from the peer-reviewed, published version of the DSMs, instead of more recent versions with updated model processes

and calibrations, based on recommendations from model developers and an emphasis on peer-reviewed model processes. The winter-run and spring-run DSMs were cloned by Reclamation staff from GitHub at the following URLs: https://github.com/CVPIA-OSC/winterRunDSM/tree/main and https://github.com/CVPIA-OSC/springRunDSM/tree/v1.0. These models required Reclamation to download the following data repositories from the FlowWest GitHub site: cvpiaHabitat (https://github.com/FlowWest/ cvpiaHabitat), cvpiaFlow (https://github.com/FlowWest/cvpiaFlow), cvpiaTemperature (https://github.com/FlowWest/cvpiaTemperature), and cvpiaData (https://github.com/FlowWest/cvpiaData).

Reclamation updated the calculation of flow inputs to the DSM to use CalSim 3 data for alternatives of interest. CalSim 3 data was used in place of the original CalSim II data for the following reasons: 1) the original DSMs, as well as all subsequent versions, used CalSim II data and variable definitions because that was the most recent available version, 2) Reclamation has developed a new CalSim model, CalSim 3, for current application in LTO modeling and future modeling needs, and 3) base model structures, assumptions, and definitions differ between CalSim II and CalSim 3 (sometime substantially). A detailed description of this conversion is provided in Section F.3.2.3, *Assumptions / Uncertainty*.

Reclamation also identified two primary concerns in the published versions in the SIT DSMs (i.e., those used in Peterson and Duarte 2020) that merited recalibration of core model parameters. First, values for total diversions in the Upper Sacramento, which influence expected rearing survival, were incorrectly calculated as proportional diversions. Second, when the model is run in the deterministic mode, size class-specific survival terms are incorrectly applied for fish rearing in migratory corridors (e.g., Upper-mid, Lower-mid, Lower Sacramento River); because deterministic model runs serve as the basis for model calibration, this issue was especially problematic for comparing old and new model outputs. Both of these concerns led Reclamation staff to recalibrate the spring-run DSM for application in LTO modeling efforts. Details on model recalibration are provided in Section F.3.2.3, *Assumptions / Uncertainty*.

### F.3.2.2 Model Application

Reclamation ran the spring-run Chinook salmon DSM, both deterministically (i.e., no variability in parameters) and stochastically, to estimate demographic parameters, spawner abundances, and population trends for the period from 1980-1999 using updated flow and temperature inputs for each modeled alternative. The stochastic model was run for 100 iterations for each alternative, in which variability is simulated around select demographic parameters and abundances using random draws from statistical distributions. Stochastic model runs allow visualization of the implications of variability in life history parameters and processes on population demographic rates. Reclamation modified the model to output demographic parameters, in addition to previous reporting of juvenile and adult abundances; output demographic parameters hypothesized to be important to population trends included rearing survival in natal tributaries and smolt migratory survival through the Sacramento River and Delta. Reclamation only presents model outputs for demographic parameters that are sensitive to modified flow and temperature inputs. As noted in Section F.3.2.3, *Assumptions / Uncertainty*, Reclamation did not update habitat inputs due to the complexity and inconsistent documentation associated with updating these values; thus, differences in scenarios reflect differences in flow and temperature only.

### F.3.2.3 Assumptions / Uncertainty

#### *F.3.2.3.1 Assumptions related to model calibration and re-calibration*

As noted above, Reclamation applied the same model structure described and implemented in Peterson and Duarte (2020), but with re-calibrated parameters that addressed corrections to faulty model functions and inputs. The methods and results of the re-calibration efforts are described below for completeness.

**Re-calibration methods**

Reclamation first modified the following functions to accurately apply rearing survival across age classes and watersheds: Delt.rearfunc() and rearfunc() (in the R scripts 'Delta juvenile growth n survival.R' and 'Survive and grow.R', respectively). Reclamation staff also generated accurate values for total diversions in the Upper Sacramento River using the original CalSim II input data and the R script 'Create new t.diver for calibration.R'. Finally, Reclamation also removed previous scalar adjustments to spawning and rearing habitat quantities for all watersheds.

Reclamation staff conducted recalibration using the GA package in R (4.2.0). Reclamation used the same calibration model inputs used in the original calibration effort using the cvpiaCalibration package (FlowWest/cvpiaCalibration (github.com)), with two exceptions: 1) staff included spawner abundance data from Battle Creek in calibration efforts, and 2) applied the updated total diversion values for the Upper Sacramento River watershed. Calibration model inputs were generated for 1998-2017 by constructing a synthetic time series of water years – see Peterson and Duarte (2020) for additional details. A total of 29 model parameters were estimated (Table F.3-1). Reclamation ran the calibration-version of the model for the simulated period 1998-2011 (i.e., 14 years of spawner abundance data). Estimated model fit was calculated as the sum of squared differences between observed and model-estimated spawner abundance data over the modeled time series for each of the following watersheds: Antelope Creek, Battle Creek, Butte Creek, Clear Creek, Deer Creek, Mill Creek, Feather River, and Yuba River. Only observed spawner abundance greater than 100 were included due to low count precision at small spawner abundances. The sum of squared differences for each watershed was then weighted by data availability (i.e., the number of years of acceptable spawner abundance data) and normalized by mean spawner abundance. Staff set the GA optimization to maximize the negative sum of squared differences, weighted and normalized, across all watersheds.

Following exploratory rounds of calibrations with different optimization parameters and parameter constraints, Reclamation staff applied the following GA optimization parameters for the final calibration effort, drawing from recommendations from: Calibration • springRunDSM (cvpia-osc.github.io): popSize=100, maxiter=10000, run=50, pmutation=0.4. Staff used the original calibrated parameter values as starting values during optimization with one exception: for Feather River marine survival, staff set the initial value to 0 to fall within the specified parameter constraints. Staff also set informed constraints on possible values parameters. The adult en route survival parameter was bounded on the lower end at 0 to prevent unrealistically low survival values. Similarly, the last four parameters were bounded on the lower end at 0 based on expectations for the direction of covariate effects (e.g., survival should decrease with increased diversions). Staff bounded logit-transformed ocean survival for all watersheds to a

maximum of 0 (i.e., experts would not reasonably expect total marine survival, from ocean entry to freshwater return as spawners, to exceed 50%); this value differed from the constraint on winter-run Chinook salmon to account for the yearling life history of spring-run and the high logit-transformed marine survival values for some watersheds in the original calibration (e.g., as high as logit-transformed value of 2.5, or proportional survival of 0.92). All other parameter values were constrained with a default of -3.5 and 3.5 because all were expressed as logit-transformed values. Recalibration efforts were informed in part by consultation with the researchers who conducted the original calibration efforts (J. Peterson and A. Duarte, personal communication).

To assess the robustness and reliability of calibration results, Reclamation conducted multiple rounds calibration runs for each set of calibration parameters and compared both convergence model fit (i.e., the negative sum of squared differences) and parameter values among runs. The intent of this step is to investigate the possibility for local minima in optimization, evaluate whether parameter values were running up against constraints, and assess consistency in parameter estimates; ideally, most to all parameters should be generally similar among runs and should not be close to parameter constraints. If this assessment did not reveal obvious issues, Reclamation then used the parameter estimates from the calibration run with the best (highest) model fit as the final selected parameter values.

Reclamation also performed post-hoc tests for goodness of fit with the selected parameter values by generating model estimates of natural spawners for both the new and original parameter values and comparing these model estimates to historical estimates of spawner abundance used to calibrate the model.

Table F.3-1. Parameters recalibrated for the spring-run Chinook salmon SIT DSM.

| Parameter ID | Description | Notes |
|---|---|---|
| 1 | Juvenile in-channel and floodplain rearing survival intercept, Antelope Creek and other tributaries | - |
| 2 | Juvenile in-channel and floodplain rearing survival intercept, Deer Creek | - |
| 3 | Juvenile in-channel and floodplain rearing survival intercept, Mill Creek | - |
| 4 | Juvenile in-channel and floodplain rearing survival intercept, Feather River | - |
| 5 | Juvenile in-channel and floodplain rearing survival intercept, Yuba River | - |
| 6 | Juvenile in-channel and floodplain rearing survival intercept, Upper-mid/ Lower-mid/Lower Sacramento River | - |
| 7 | Juvenile in-channel and floodplain rearing survival intercept, Butte Creek | - |
| 8 | Juvenile in-channel and floodplain rearing survival intercept, San Joaquin River | - |

| Parameter ID | Description | Notes |
|---|---|---|
| 9 | Juvenile in-channel and floodplain rearing survival intercept, Battle, Clear Creek | - |
| 10 | Juvenile bypass rearing survival intercept | - |
| 11 | Juvenile Delta rearing survival intercept | Might expect negative covariance with Parameter 16 (Delta diversions effect on rearing survival) |
| 12 | Juvenile San Joaquin migratory survival intercept | - |
| 13 | Juvenile Sacramento River migratory survival intercept (discharge model) | Expect parameters 13 and 14 to covary |
| 14 | Juvenile Sacramento River migratory survival intercept (temperature model) | Expect parameters 13 and 14 to covary |
| 15 | Juvenile Delta migratory survival intercept (flow model) | Expect parameters 15, 16, and 17 to covary |
| 16 | Juvenile Delta migratory survival intercept (temperature model) | Expect parameters 15, 16, and 17 to covary |
| 17 | Juvenile Delta migratory survival intercept (diversion model) | Expect parameters 15, 16, and 17 to covary |
| 18 | Adult enroute survival intercept | - |
| 19 | Juvenile ocean entry survival intercept - Antelope Creek and other tributaries | Expect this one to be < 0 (max of 0.5 overall marine survival) |
| 20 | Juvenile ocean entry survival intercept - Deer Creek | Expect this one to be < 0 (max of 0.5 overall marine survival) |
| 21 | Juvenile ocean entry survival intercept – Mill Creek | Expect this one to be < 0 (max of 0.5 overall marine survival) |
| 22 | Juvenile ocean entry survival intercept – Feather, Bear River | Expect this one to be < 0 (max of 0.5 overall marine survival) |
| 23 | Juvenile ocean entry survival intercept – Yuba River | Expect this one to be < 0 (max of 0.5 overall marine survival) |
| 24 | Juvenile ocean entry survival intercept – Butte Creek | Expect this one to be < 0 (max of 0.5 overall marine survival) |
| 25 | Juvenile ocean entry survival intercept – Battle, Clear Creek | Expect this one to be < 0 (max of 0.5 overall marine survival) |
| 26 | Effect of contact points on juvenile rearing survival | - |
| 27 | Effect of proportion flow diverted on juvenile rearing/migratory survival | - |
| 28 | Effect of total flow diverted on juvenile rearing/migratory survival | - |
| 29 | Effect of Delta diversions on juvenile rearing survival | - |

- = Not Applicable

**Re-calibration results**

*Overview*

The results are separated into sections by the optimization settings, parameter constraints, and length of data time series; only the last set of calibration runs was used to finalize calibration methods. Based on these results and the criteria for calibration success, Reclamation staff selected the parameters from 'run 3' from the final set of calibration runs (i.e., marine survival constrained to be no greater than 0.5) as the new parameters for the spring-run DSM and using these values to compare the effects of competing alternatives on the spring-run population.

*Preliminary calibration results, marine survival <0.5*

Reclamation conducted a round of preliminary calibrations with a popSize=10 and marine survival constrained to be less than 0.5. Staff wanted to evaluate behavior of the calibrations with the proposed survival constraints before committing to a full-scale calibration with popSize=100. These efforts resulted in the following observations:

- There was noticeable variability in metrics of model fit among model runs, but it is difficult to interpret the magnitude of this variability without comparing to another set of similar calibration runs (Figure F.3-1).
- Staff observed somewhat consistent estimates for most parameters among the three calibration runs (Figure F.3-2). Logit-transformed estimates of marine survival for each watershed were broadly similar among runs and did not appear to run into upper or lower bounds.
- Some parameters, notably parameter estimates for juvenile Delta and Sacramento River migratory survival (i.e., parameters 10-12, 14) were highly variable among runs; however, migratory survival parameters can be expected to covary strongly because multiple covariate hypotheses are equally weighted for both the Delta and Sacramento River.
- Reclamation staff selected the parameters from 'run 3' and generated model estimates of spawner abundance to compare with 'known' spawners (Figure F.3-3). Model estimates of spawner abundance appear to closely match observed spawner abundances from Butte Creek but more poorly reflect observed abundances from other systems. Given the greater spawner abundance from this system, this result is not unexpected. Estimates abundances were particularly biased low for Feather River and Yuba River; however, spawner estimates for these systems are based on combined spring- and fall-run counts separated using CWT data from 2010-2012, while estimates for all other systems were for spring-run only. The correlation between all estimated and observed abundances for 1998-2011 was 0.757, which compares favorably with the correlation of 0.8 reported in Peterson and Duarte (2020).

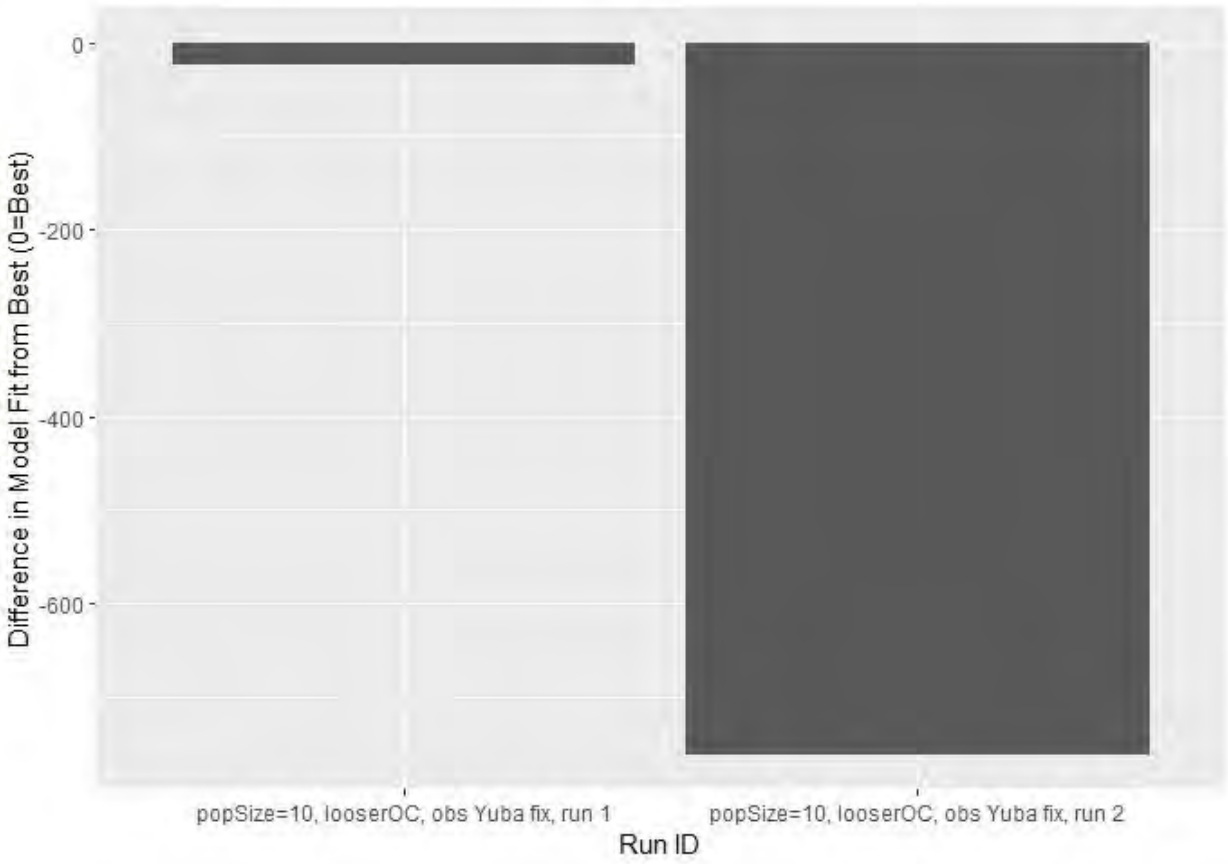



Figure F.3-1. Comparison of differences in model fit for all sub-optimal models from the best model. The best model was *popSize*=10, *run*=3 and had a model fit of -10,404.

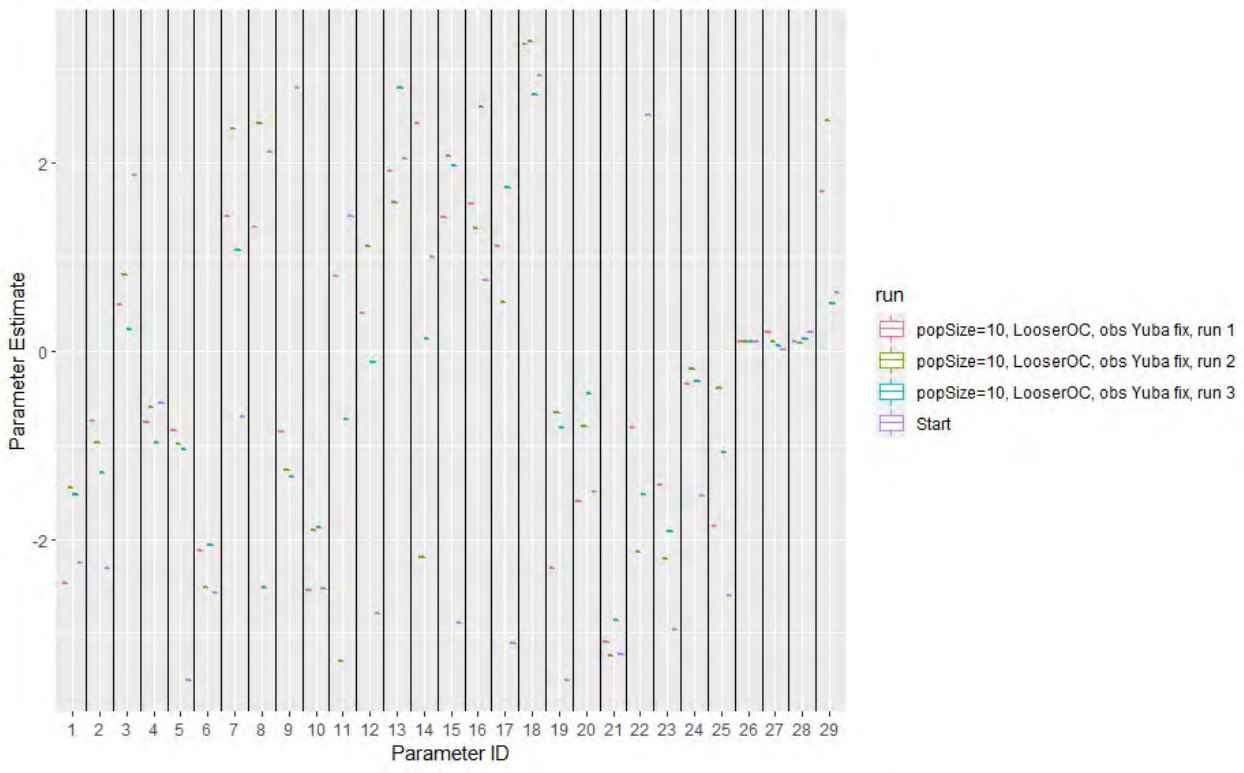



Figure F.3-2. Plot of parameter estimates for 3 exploratory runs with popSize=10, as well the starting values drawn from the parameter values from the original calibration.




Figure F.3-3. Plot of estimated spawners, both with original and newly calibrated parameter estimates, and known spawner abundances for the best preliminary calibration effort for spring-run Chinook salmon, presented for all watersheds that provided data to model calibration.

*Final calibration, marine survival < 0.5*

Reclamation conducted a final round of three calibration runs with a popSize=100 and marine survival constrained to be less than 0.5. From this final round of calibration runs, staff reached the following conclusions:

- The variability in metrics of model fit among model runs was similar to that observed for preliminary calibration runs with popSize=10 (Figure F.3-4).
- Staff observed reasonably consistent estimates for most parameters among the three calibration runs (Figure F.3-5). Logit-transformed estimates of marine survival for each watershed were broadly similar among runs. In contrast to model runs with popSize=10, estimates of marine survival did not run into either upper or lower bounds.
- Some parameters, notably parameter estimates for juvenile rearing survival in the San Joaquin River (parameter 8) and Delta (parameter 11) and migratory survival in the Sacramento River (parameter 15) were more variable among runs; migratory survival parameters can be expected to covary strongly because multiple covariate hypotheses are equally weighted for the Sacramento River.

- Staff selected the parameters from 'run 3' as the best model and generated model estimates of spawner abundance to compare with 'known' spawners (Figure F.3-6, Figure F.3-7). Model estimates of spawner abundance again appear to closely match observed spawner abundances from Butte Creek but more poorly reflect observed abundances from other systems. Estimates abundances were particularly biased low for Feather River and Yuba River. The correlation between all estimated and observed abundances for 1998-2011 was 0.763, which again compares favorably with the correlation of 0.8 reported in Peterson and Duarte (2020); staff note that this correlation was achieved without modifying habitat quantity scalars (i.e., artificially decreasing or increasing habitat quantity).
- Based on these results and the criteria for calibration success, Reclamation selected the parameters from 'run 3' as the new parameters for the spring-run DSM and applied these values to compare the effects of competing alternatives on the spring-run population. The parameter values are presented in Table F.3-2.

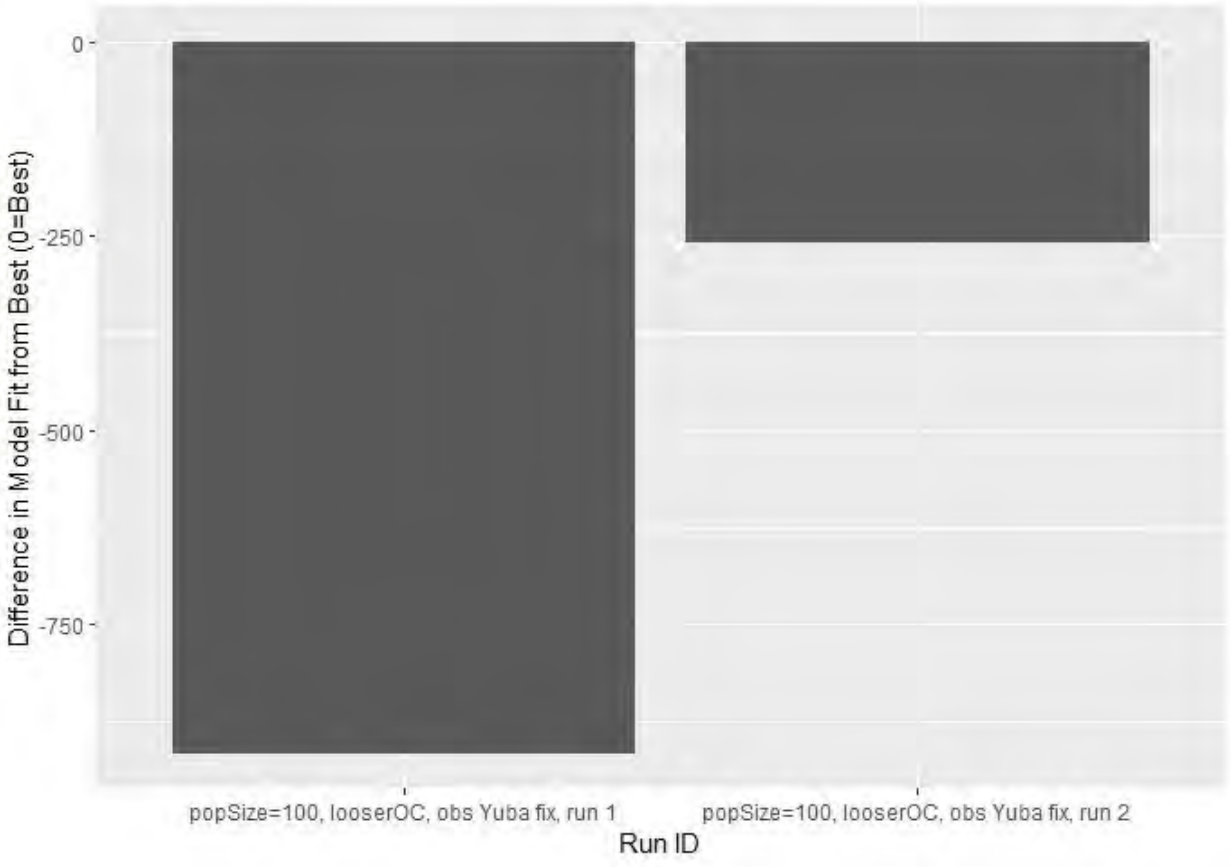



Figure F.3-4. Comparison of differences in model fit for all sub-optimal models from the best model with *popSize*=100. The best model was *popSize*=100, *run*=3 and had a model fit of -9,981.

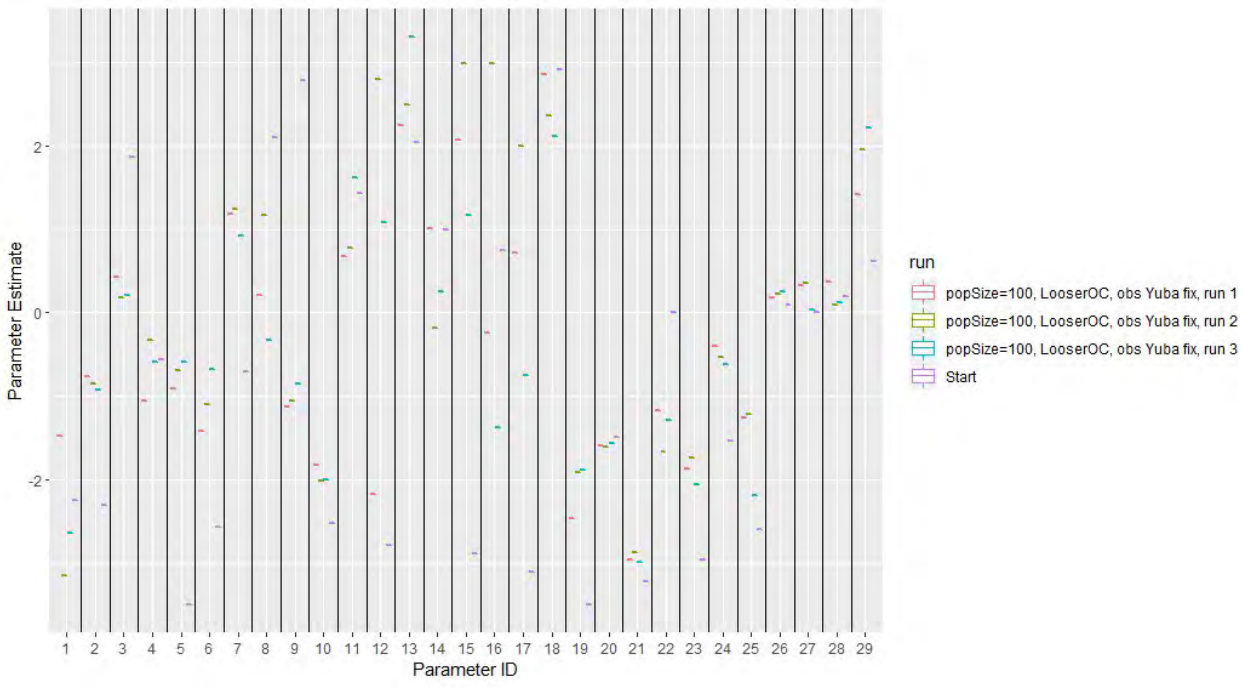



Figure F.3-5. Plot of parameter estimates for 3 calibration runs with popSize=100, as well the starting values drawn from the parameter values from the original calibration.




Figure F.3-6. Plot of estimated spawners, both with original and newly calibrated parameter estimates, and known spawner abundances for the best final calibration effort for spring-run Chinook salmon, presented for all watersheds that provided data to model calibration.

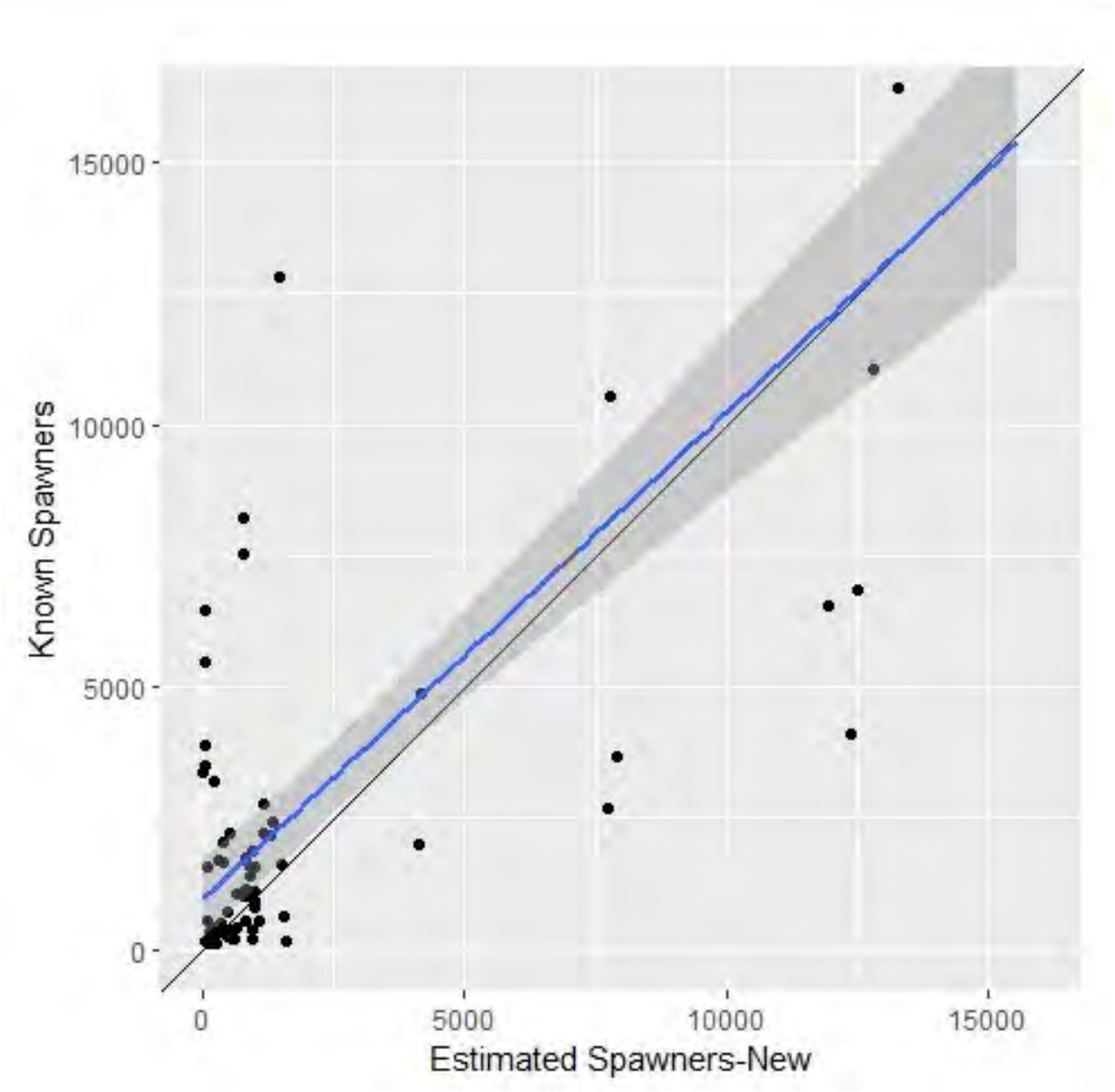



Figure F.3-7. Scatterplot of estimated spring-run spawners with the newly calibrated parameter estimates and known spawner abundances for the selected parameter values from the final calibration efforts. A 1:1 line (black) is provided for reference, in addition to the fit of a linear regression to the scatterplot points (blue).

Table F.3-2. Original and new parameter values for the spring-run DSM.

| Parameter ID | Description | Original Calibration Value | New Calibration Value |
|---|---|---|---|
| 1 | Juvenile in-channel and floodplain rearing survival intercept, Antelope Creek and other tributaries | -2.25 | -2.65 |

| Parameter ID | Description | Original Calibration Value | New Calibration Value |
|---|---|---|---|
| 2 | Juvenile in-channel and floodplain rearing survival intercept, Deer Creek | -2.31 | -0.93 |
| 3 | Juvenile in-channel and floodplain rearing survival intercept, Mill Creek | 1.87 | 0.21 |
| 4 | Juvenile in-channel and floodplain rearing survival intercept, Feather River | -0.55 | -0.59 |
| 5 | Juvenile in-channel and floodplain rearing survival intercept, Yuba River | -3.5 | -0.60 |
| 6 | Juvenile in-channel and floodplain rearing survival intercept, Upper-mid/ Lower-mid/Lower Sacramento River | -2.57 | -0.67 |
| 7 | Juvenile in-channel and floodplain rearing survival intercept, Butte Creek | -0.71 | 0.93 |
| 8 | Juvenile in-channel and floodplain rearing survival intercept, San Joaquin River | 2.1 | -0.32 |
| 9 | Juvenile in-channel and floodplain rearing survival intercept, Battle, Clear Creek | 2.79 | -0.85 |
| 10 | Juvenile bypass rearing survival intercept | -2.52 | -2.00 |
| 11 | Juvenile Delta rearing survival intercept | 1.43 | 1.62 |
| 12 | Juvenile San Joaquin migratory survival intercept | -2.79 | 1.08 |
| 13 | Juvenile Sacramento River migratory survival intercept (discharge model) | 2.04 | 3.31 |
| 14 | Juvenile Sacramento River migratory survival intercept (temperature model) | 1 | 0.26 |
| 15 | Juvenile Delta migratory survival intercept (flow model) | -2.89 | 1.17 |
| 16 | Juvenile Delta migratory survival intercept (temperature model) | 0.75 | -1.37 |
| 17 | Juvenile Delta migratory survival intercept (diversion model) | -3.1 | -0.75 |
| 18 | Adult en route survival intercept | 2.92 | 2.12 |
| 19 | Juvenile ocean entry survival intercept - Antelope Creek and other tributaries | -3.5 | -1.88 |
| 20 | Juvenile ocean entry survival intercept - Deer Creek | -1.5 | -1.56 |
| 21 | Juvenile ocean entry survival intercept – Mill Creek | -3.23 | -3.00 |
| 22 | Juvenile ocean entry survival intercept – Feather, Bear River | 2.5 | -1.29 |
| 23 | Juvenile ocean entry survival intercept – Yuba River | -2.96 | -2.06 |
| 24 | Juvenile ocean entry survival intercept – Butte Creek | -1.54 | -0.62 |

| Parameter ID | Description | Original Calibration Value | New Calibration Value |
|---|---|---|---|
| 25 | Juvenile ocean entry survival intercept – Battle, Clear Creek | -2.59 | -2.19 |
| 26 | Effect of contact points on juvenile rearing survival | 0.1 | 0.26 |
| 27 | Effect of proportion flow diverted on juvenile rearing/migratory survival | 0.01 | 0.03 |
| 28 | Effect of total flow diverted on juvenile rearing/migratory survival | 0.19 | 0.12 |
| 29 | Effect of Delta diversions on juvenile rearing survival | 0.61 | 2.22 |

#### *F.3.2.3.2 Assumptions related to model structure and parameterization*

There are numerous additional model assumptions that bear mentioning. First, to seed the starting number of returning adults from the ocean (i.e., necessary to calculate numbers of returning spawners), the model is run for 5 preliminary years using a fixed number of spawners in each of those five years for focal watersheds (i.e., Antelope Creek=4, Battle Creek=440, Butte Creek=8897, Clear Creek=180, Deer Creek=575, Mill Creek=479, Feather River=4812, Yuba River=642), as well as original CalSim II-based flow inputs for the first five years of the simulated time period. Additionally, in each of the 20 tracked model years, a specified number of hatchery fish is allocated among watersheds based on past CWT reports; this number is either 6036 if the model is run deterministically or a randomly selected number based on the uniform distribution bounded by 5489 and 8690 if the model is run stochastically. Proportional allocations of hatchery fish are as follows: Antelope Creek=0.01%, Battle Creek=0.45%, Big Chico Creek=0.08%, Butte Creek=0.29%, Clear Creek=0.04%, Cottonwood Creek=0.01%, Deer Creek=0.54%, Feather River=86.53%, Yuba River=12.07%.

Additionally, some demographic rates are not constructed to vary as a function of changing flow and temperature inputs in this model version, despite potential expectations to the contrary; an incomplete list of examples is provided below:

- Timing of adult arrival to the spawning grounds and subsequent spawning
- Egg-to-fry survival
    - Egg-to-fry survival is estimated as a function of the annual proportion of natural-origin spawners for each watershed and constant watershed-specific effects of temperature and scour
    - Neither temperature nor scour effects are constructed to be responsive to model estimates of flow or temperature from CalSim or HEC-5Q models, respectively
- Juvenile growth rates

Finally, Reclamation staff note that that expected spawner abundances from model runs with and without stochasticity (i.e., stochastic and deterministic model runs) sometimes differ due to asymmetrical effects of adding variability. Specifically, stochasticity in model parameters (e.g., rearing survival) is implemented by drawing covariate effects from a statistical distribution (e.g.,

the effect of stranding is drawn from a Bernoulli distribution, in which the expected proportion of the population affected by stranding is the probability of stranding occurrence) and then obtaining parameter estimates by conducting inverse-logit transformations of these effect values. In isolation, drawing covariate effects from statistical distributions should produce variable but unbiased parameters relative the deterministic parameters. However, drawing covariate effects from statistical distributions and then applying non-linear transformations biases the expected values of the stochastic parameters relative to deterministic values, and can subsequently change expected spawner abundances. This phenomenon is documented in the R script, 'Proof of Biased Parameters with Stochasticity and Inverse-Logit Transformations.R'.

#### *F.3.2.3.3 Assumptions related to construction of new flow inputs*

Reclamation constructed new model inputs for flow using updated results from new CalSim 3 runs for each scenario. Using a combination of R annotation associated with the cvpiaData package, R scripts shared from the cvpiaFlow GitHub repository, and discussions with CalSim modelers, Reclamation generated all the model flow inputs using updated CalSim 3 results by pulling directly from the raw .dss output files. We note that updating flow inputs using CalSim 3 runs was markedly more complex than using CalSim II runs, as CalSim 3 operates under different assumptions and at a finer resolution than CalSim II.

The following flow variables used by the DSMs were updated with data from alternative-specific CalSim 3 runs:

- Monthly flows, variability in flow, and proportion of natal flow (relative to larger watersheds) for each of 31 watersheds in the Sacramento-San Joaquin River basin
- Monthly flows at Freeport, Vernalis, and Stockton
- Monthly total exports from the Central Valley Project and State Water Project
- Diverted flows in each of the 31 watersheds in the Sacramento-San-Joaquin River basin (expressed both as total diversions and diversions relative to total flow)
- Proportion of Sacramento River flow into the Sutter and Yolo Bypasses
- Indications for whether gates downstream of Sutter and Yolo Bypasses are overtopped
- Monthly operations of the Delta Cross Channel gates
- Inflow into the North and South Delta
- Diverted flows in the North and South Delta (expressed both as total diversions and diversions relative to inflow)

Reclamation conducted internal validation to ensure updates to flow inputs using new CalSim 3 runs did not result in unexpectedly large changes in flow values (i.e., resulting from user error). For each of the above inputs to the DSMs, staff visualized and compared input values among the original DSM inputs and those based on the LTO NAA alternative. Reclamation did not find any issues except where there was not 1:1 matching between CalSim II and CalSim 3 nodes. Input diagnostic plots are available for review in the cvpiaFlow shared Code and Data repository.

The following demographic parameters are expected to be influenced by the updated flow inputs based on CalSim 3 runs reflecting LTO alternatives:

- Adult straying rates among spawning tributaries (spring-run only)
- Adult en route survival
- Juvenile river rearing survival
- Juvenile movement as a function of pulse flows
- Juvenile river migratory survival
- Juvenile entrainment into the South Delta from the Sacramento River
- Juvenile routing and survival in the South Delta, following entrainment
- Juvenile routing and survival in the North Delta

Reclamation also changed the implementation of the flow input for the number of days the Delta Cross Channel is closed each month. In the published model, this input is based on prescribed operations from the 2009 NMFS BiOp, with no interannual variability. Reclamation currently has access to a CalSim 3 node that provides estimated gate operations for each month and year in the model time series, and therefore modified this variable in LTO analyses to use expected month- and year-specific operations from alternative-specific CalSim 3 runs.

There was another potential inconsistency between model documentation and model implementation that needed to be addressed while updating flow inputs. Model documentation, as interpreted by Reclamation, suggested multiple CalSim II diversion variables may be used when calculating proportion of Sacramento River flow diverted into the Sutter Bypass (D117, D124, D125, D126), but only one diversion term that only infrequently exceeds 0 cfs was used in the original R code that produced the final model input (D117). Due to uncertainty in the intent of this flow input (i.e., whether the higher or lower diversion flow should be used), staff retained the previously implemented diversion calculation. Therefore, differences in the neglected diversion terms among LTO alternatives will not translate to different model outcomes.

Reclamation staff again emphasize that updating flow inputs using CalSim 3 runs was markedly more complex than using CalSim II runs, as CalSim 3 operates under different assumptions and at a finer resolution than CalSim II. Extensive modifications and numerous judgment calls were required with these modifications, and the conversions were made in close consultation with the Bureau of Reclamation Bay-Delta Office's Modeling Division, which is partly responsible for developing and applying CalSim 3 (C. Koizumi, personal comm.). The conversions from CalSim II to CalSim 3 for all updated flow inputs to the v2019 SIT DSMs (i.e., Peterson and Duarte 2020) are summarized in the sections below, in which each section is a different data object, typically contained within the repositories cvpiaData (FlowWest/cvpiaData (github.com)) or cvpiaFlow (FlowWest/cvpiaFlow: Flow Data for use with CVPIA SIT DSM (github.com)). For additional details, refer to the R script 'DSS workflow_cvpiaFlow_clean_CalSim3.R', which generates modified data inputs to the SIT DSM from raw CalSim 3 outputs which presents expected relationships between individual CalSim II and CalSim 3 variables, in the Code and Data repository. If inputs are not listed or described here, no change was required going from

CalSim II to 3. Reclamation recommends future model users interested in running these models with new CalSim 3 runs carefully examine and revise, as necessary, the model documentation and annotation.

***dlt_divers_tot:*** **Total diverted of delta inflow in cms from 1980-2000.**

The following is a comparison of CalSim II and CalSim 3 variables and calculations for total diversions in the North and South Delta. For example, variables proceeded by 'D' and 'C' typically indicate diversion- and flow-based terms, with proceeding numbers and letters reflecting different locations or processes.

- CalSim II:
  - North Delta: D403A + D403B + D403C + D403D + D404
  - South Delta: D418 + D419 + D412 + D410 + D413 + D409B + D416 + D408_OR + D408_VC
- CalSim 3:
  - North Delta: C_CSL004B + DD_SAC017_SACS
  - South Delta: D_OMR028_DMC000 + D_OMR027_CAA000 + DD_SJR026_SJRE + DD_SJR013_SJRW + DD_MOK004_MOK + DD_OMR027_OMR + D_RSL004_CCC004 + D_OMR021_ORP000 + D_VCT002_ORP000
- Important caveats or concerns:
  - There is a meaningful difference in how North Delta diversions are handled between CalSim II and 3. Replacing D404 with DD_SAC017_SACS adds ~200 TAF annually due to differences in assumptions regarding consumptive use.

***dlt_inflow:*** **Delta inflow in cms from 1980-2000.**

The following is a comparison of CalSim II and CalSim 3 variables and calculations for inflow to the North and South Delta.

- CalSim II:
  - North Delta: C400 + C157
  - South Delta: C401B + C504 + C508 + C644
- CalSim 3:
  - North Delta: C_SAC041 + C_CSL005
  - South Delta: C_SAC029B + D_SAC030_MOK014 + C_MOK022 + C_CLV004 + C_SJR056
- Important caveats or concerns:
  - None

The *dlt_inflow* and *dlt_divers_tot* objects are used in conjunction to calculate the *dlt_divers* object, which represents the proportion of Delta diversions relative to inflow.

***flows_cfs:*** **Average monthly flows in all 31 modeled watersheds from 1980-2000**

- CalSim II:
    - Upper Sacramento River: C104
    - Antelope Creek: C11307
    - Battle Creek: C10803
    - Bear Creek: C11001
    - Big Chico Creek: C11501
    - Butte Creek: C217A
    - Clear Creek: C3
    - Cottonwood Creek: C10802
    - Cow Creek: C10801
    - Deer Creek: C11309
    - Elder Creek: C11303
    - Mill Creek: C11308
    - Paynes Creek: C11001
    - Stony Creek: C142A
    - Thomes Creek: C11304
    - Upper-mid Sacramento River: C115
    - Bear River: C285
    - Feather River: C203
    - Yuba River: C230
    - Lower-mid Sacramento River: C134*35.6/58 + C160*22.4/58
    - American River: C9
    - Lower Sacramento River: C166
    - Calaveras River: C92
    - Cosumnes River: C501
    - Mokelumne River: *NA*

    - Merced River: C561
    - Stanislaus River: C520
    - Tuolumne River: C540
    - San Joaquin River: C630
- CalSim 3:
    - Upper Sacramento River: C_SAC273
    - Antelope Creek: C_ANT010
    - Battle Creek: C_BTL006
    - Bear Creek: C_BCN005
    - Big Chico Creek: C_BCC004
    - Butte Creek: C_BTC012
    - Clear Creek: C_CLR009
    - Cottonwood Creek: C_CWD003
    - Cow Creek: C_COW003
    - Deer Creek: C_DRC005
    - Elder Creek: C_ELD005
    - Mill Creek: C_MLC004
    - Paynes Creek: C_PYN001
    - Stony Creek: C_STN004
    - Thomes Creek: C_THM005
    - Upper-mid Sacramento River: C_SAC193
    - Bear River: C_CMPFW
    - Feather River: C_FTR059
    - Yuba River: C_YUB002
    - Lower-mid Sacramento River: C_SAC093*35.6/58 + C_SAC048*22.4/58
    - American River: C_NTOMA
    - Lower Sacramento River: C_SAC063
    - Calaveras River: C_NHGAN

- Cosumnes River: C_CSM005
- Mokelumne River: C_CMCHE
- Merced River: C_MCD050
- Stanislaus River: C_STS059
- Tuolumne River: C_TUO054
- San Joaquin River: C_SJR081

- Important caveats or concerns:
  - In CalSim II, the same variable (C11001) previously included both Bear Creek and Paynes Creek. In Calsim 3, the two watersheds have unique flow values.
  - CalSim 3 includes flow values for the Mokelumne River.
  - For several tributaries near the Upper Sacramento River (e.g., Deer Creek, Thomes Creek, Antelope Creek, Mill Creek, Big Chico Creek, Cow Creek, Cottonwood Creek, Battle Creek), there are new Surface Runoff terms included in CalSim 3 that are not present in CalSim II and could influence flow values.

The *flows_cfs* object is used to calculate both the expected intra-annual variability in flow, or *prop.pulse* (i.e., as a proxy for pulse flow effects), and the flow signal for returning adults as a determinant of straying rates, or *returnQ*.

***upsac_flow:*** **Flow at Bend Bridge in cms from 1980-2000.**

- CalSim II:
  - C109
- CalSim 3:
  - C_SAC257
- Important caveats or concerns:
  - None

***freeportQcms:*** **Inflow at Freeport in cms from 1980-2000.**

- CalSim II:
  - C400
- CalSim 3:
  - C_SAC041
- Important caveats or concerns:
  - None

***Q_vern:*** **Flow in cms at Vernalis from 1980-1999.**

- CalSim II:
  - C639
- CalSim 3:
  - C_SJR070
- Important caveats or concerns:
  - None

***Q_stck:*** **Flow in cms at Stockton from 1980-1999.**

- CalSim II:
  - C417A
- CalSim 3:
  - C_SJR053A
- Important caveats or concerns:
  - None

***CVP_exp:*** **Total exports for CVP in cms.**

- CalSim II:
  - DEL_CVP_TOTAL
- CalSim 3:
  - DEL_CVP_TOTAL_N + DEL_CVP_TOTAL_s
- Important caveats or concerns:
  - Recommend replacing previous variables from both CalSim II and CalSim 3 with D418 (CalSim II) and D_OMR028_DMC000 (CalSim 3) to reflect realized diversions from the Jones pumping facility (C. Koizumi, personal comm.).

***SWP_exp:*** **Total exports for SWP in cms.**

- CalSim II:
  - DEL_SWP_TOTAL
- CalSim 3:
  - DEL_SWP_PMI + DEL_SWP_PAG + DEL_SWP_PIN
- Important caveats or concerns:

- Recommend replacing previous variables from both CalSim II and CalSim 3 with D419 (CalSim II) and D_OMR027_CAA000 (CalSim 3) to reflect realized diversions from the Banks pumping facility (C. Koizumi, personal comm.).

***prop_diversion:*** **Proportion of flow diverted for each watershed every month of every year in the simulation (1980-200).**

- CalSim II:
  - Upper Sacramento River: D104 / C104
  - Antelope Creek: (C11307 / (C11307 + C11308 + C11309) * D11305) / C11307
  - Battle Creek: *NA*
  - Bear Creek: *NA*
  - Big Chico Creek: *NA*
  - Butte Creek: (C217B + D217) / (C217B + D217 + C217A)
  - Clear Creek: *NA*
  - Cottonwood Creek: *NA*
  - Cow Creek: *NA*
  - Deer Creek: (C11309 / (C11307 + C11308 + C11309) * D11305) / C11309
  - Elder Creek: (C11303 / (C11303 + C11304) * D11301) / C11303
  - Mill Creek: (C11308 / (C11307 + C11308 + C11309) * D11305) / C11308
  - Paynes Creek: *NA*
  - Stony Creek: D17301 / C41
  - Thomes Creek: (C11304 / (C11303 + C11304) * D11301) / C11304
  - Upper-mid Sacramento River: (D109 + D112 + D113A + D113B + D114 + D118 + D122A + D122B + D123 + D124A + D128_WTS + D128) / C110
  - Bear River: D285 / (C285 + D285)
  - Feather River: (D201 + D202 + D7A + D7B) / C6
  - Yuba River: D230 / (C230 + D230)
  - Lower-mid Sacramento River: (D129A + D134 + D162 + D165) / C128
  - American River: D302 / C9
  - Lower Sacramento River: (D167 + D168 + D168A_WTS) / C166
  - Calaveras River: (D506A + D506B + D506C + D507) / C92

- Cosumnes River: *NA*
- Mokelumne River: *NA*
- Merced River: (D562 + D566) / C561
- Stanislaus River: D528 / C520
- Tuolumne River: D545 / C540
- San Joaquin River: (D637 + D630B + D630A + D620B) / (D637 + D630B + D630A + D620B + C637)

- CalSim 3:
  - Upper Sacramento River: (D_SAC296_WTPFTH + D_SAC296_02_SA + D_SAC294_WTPBLV + D_SAC294_03_PA + D_SAC289_03_PA + D_SAC281_02_NA + D_SAC273_03_NA) / C_SAC273
  - Antelope Creek: D_ANT010_05_NA / C_ANT010
  - Battle Creek: *NA*
  - Bear Creek: *NA*
  - Big Chico Creek: *NA*
  - Butte Creek: (D_BTC045_ESL008 + D_BTC043_10_NA + D_BTC036_10_NA + DBTC012_09_SA2 + D_BTC012_CRK005) / (D_BTC045_ESL008 + D_BTC043_10_NA + D_BTC036_10_NA + DBTC012_09_SA2 + D_BTC012_CRK005 + C_BTC012)
  - Clear Creek: *NA*
  - Cottonwood Creek: *NA*
  - Cow Creek: *NA*
  - Deer Creek: (D_DRC010_05_NA + D_DRC005_05_NA) / C_DRC005
  - Elder Creek: D_ELD012_04_NA / C_ELD005
  - Mill Creek: D_MLC006_05_NA / C_MLC004
  - Paynes Creek: *NA*
  - Stony Creek: D_STN021_06_PA / C_STN026
  - Thomes Creek: D_THM012_04_NA / C_THM005
  - Upper-mid Sacramento River: (D_SAC240_TCC001 + D_SAC240_05_NA + D_SAC224_04_NA + D_SAC196_MTC000 + D_SAC185_08N_NA + D_SAC185_09_NA + D_SAC178_08N_SA1 + D_SAC162_09_SA2 + D_SAC159_08S_SA1 + D_SAC159_08N_SA1 + D_SAC146_08S_NA1 +

D_SAC136_18_NA + D_SAC136_18_SA + D_SAC129_08S_NA2 + D_SAC122_19_SA) / C_SAC247

- Bear River: D_BRR017_23_NA / C_CMPFW
- Feather River: (D_THRMF_12_NU1 + D_THRMF_11_NU1 + D_THRMA_WEC000 + D_THRMA_RVC000 + D_THRMA_JBC000) / C_OROVL
- Yuba River: D_YUB011_15S_NA2 / (D_YUB011_15S_NA2 + C_YUB002)
- Lower-mid Sacramento River: (D_SAC121_08S_SA3 + D_SAC115_19_SA + D_SAC109_08S_SA3 + D_SAC109_19_SA + D_SAC099_19_SA + D_SAC091_19_SA + D_SAC083_21_SA + D_SAC082_22_SA1 + D_SAC081_21_NA + D_SAC078_22_SA1 + D_SAC075_22_NA + D_SAC074_21_SA + D_SAC065_WTPBTB) / C_SAC120
- American River: D_AMR007_WTPFBN / C_NTOMA
- Lower Sacramento River: (D_SAC050_FPT013 + D_SAC062_WTPSAC) / C_SAC120
- Calaveras River: (D_LJC022_60S_PA1 + D_CLV037_CACWD + D_CLV026_60S_PA1 + D_CLV026_WTPWDH) / C_NHGAN
- Cosumnes River: *NA*
- Mokelumne River: (D_MOK050_60N_NA3 + D_MOK050_60N_NA5 + D_MOK039_60N_NA5 + D_MOK035_60N_NA4 + D_MOK035_60N_NU1 + D_MOK035_WTPDWS + D_MOK033_60N_NA5) / C_CMCHE
- Merced River: (D_MC042_63_NA2 + D_MCD021_63_NA4) / C_MCD050
- Stanislaus River: (D_STS030_61_NA4 + D_STS004_61_NA6) / C_STS059
- Tuolumne River: (D_TUO047_61_NA3 + D_TUO047_62_NA4 + D_TUO015_61_NA3 + D_TUO015_62_NA4) / C_TUO054
- San Joaquin River: (D_SJR062_50_PA1 + D_SJR090_71_NA2 + D_SJR081_61_NA5 + D_SJR116_72_NA1) / (D_SJR062_50_PA1 + D_SJR090_71_NA2 + D_SJR081_61_NA5 + D_SJR116_72_NA1 + C_SJR072)

- Important caveats or concerns:
  - Watersheds with *NA* are assumed to have no diversions.
  - Some of the diversion terms in CalSim II corresponded to ‘Depletion’ terms that have no direct analogue in Calsim 3 (i.e., Calsim 3 uses ‘Closure-Terms’ that aggregate both accretion and depletion influences). These flow variables are therefore not accounted for in the CalSim 3 conversion.
  - In CalSim II, diversions for Antelope Creek, Deer Creek, Elder Creek, Mill Creek, and Thomes Creek were calculated by partitioning aggregate, multi-watershed diversion terms based on watershed-specific flows. Some of these aggregate diversion

terms also encompassed diversions from the Sacramento River. This partitioning is not necessary in CalSim 3 due to finer resolution in diversion terms.

- CalSim 3 includes flow and diversion values for the Mokelumne River.
- Reclamation used CalSim II diversion variables for the 4 watershed regions along the Sacramento River to identify functional splits among regions, and then identified CalSim 3 diversion terms for each region based on these splits.

The numerator for each watershed was used to calculate the total diversions for each watershed every month of every year, or *total_diversion*.

***bypass_prop_Q:*** **Proportion of Lower Sacramento River flow at each bypass weir.**

- CalSim II:
  - Sutter Bypass: D117 / C116
  - Yolo Bypass: D160 / (D160 + C160)
- CalSim 3:
  - Sutter Bypass: (SP_SAC193_BTC003 + SP_SAC188_BTC003 + SP_SAC178_BTC003) / C_SAC195
  - Yolo Bypass: SP_SAC083_YBP037 / (SP_SAC083_YBP037 + C_SAC048)
- Notes:
  - A potentially better characterization of proportional flow diverted into the Sutter Bypass, and the characterization that is used in more recent versions of the SIT DSMs (e.g., v2021, v2023) is expressed in CalSim II and CalSim 3 as the following:
    - CalSim II: (D117 + D124 + D125 + D126) / C116
    - CalSim 3: (SP_SAC193_BTC003 + SP_SAC188_BTC003 + SP_SAC178_BTC003 + SP_SAC159_BTC003 + SP_SAC148_BTC003 + SP_SAC122_SBP021) / C_SAC195
  - The conversion of C116 to C_SAC195 in CalSim 3 represents the best judgment of the Modeling Division.

***bypass_over:*** **Binary (yes/no) monthly record of the bypasses over topped**

- CalSim II:
  - Sutter Bypass: TRUE if (D117 + D124 + D125 + D126 + C137) >= 100
  - Yolo Bypass: TRUE if (D160 + C157) >= 100
- CalSim 3:
  - Sutter Bypass: TRUE if (SP_SAC193_BTC003 + SP_SAC188_BTC003 + SP_SAC178_BTC003 + SP_SAC159_BTC003 + SP_SAC148_BTC003 + SP_SAC122_SBP021 + C_SSL001) >= 100

- Yolo Bypass: TRUE if (SP_SAC083_YBP037 + C_CSL005) >= 100

- Notes:
  - The conversion of C137 in CalSim II to a CalSim 3 equivalent is problematic, as CalSim 3 changes the number and nature of connections among the Sacramento River, Sutter Bypass, Feather River, and Butte Creek. In fact, the best proposed replacement variable (C_SSL001) results in constant overtopping of Sutter Bypass in the model with the current flow threshold of 100 cfs.
    - Modeling also questions why C137 is included in the flow threshold in the first place, as the diversions terms should be sufficient by themselves.

#### *F.3.2.3.4 Assumptions related to construction of new temperature inputs*

Reclamation generated new monthly temperature inputs using alternative-specific HEC-5Q model results, which in turn used alternative-specific CalSim 3 model results, for the following watersheds: Upper Sacramento River, Clear Creek, Cottonwood Creek. Temperature updates were restricted to these watersheds based the limited spatial coverage of HEC-5Q modeling to watersheds utilized by winter-run and spring-run Chinook salmon for spawning and rearing. Reclamation also observed that model documentation for the original HEC-5Q variables used in the Upper Sacramento River temperature inputs was inconsistent with their actual application in the published DSMs: specifically, temperature inputs for both Cottonwood Creek and the Upper Sacramento were reportedly derived from the same HEC-5Q variable, but actual inputs differed between watersheds without clear explanation. In light of this uncertainty, Reclamation used the average of monthly temperatures from the HEC-5Q variables corresponding to the Sacramento River just below Keswick Dam (BLW KESWICK) and at Red Bluff Diversion Dam (RED BLUFF DAM) to characterize expected temperature conditions in the Upper Sacramento River, the temperatures at the IGO node to characterize temperatures in Clear Creek, and temperatures at the COTTONWOOD CR node to characterize temperatures in Cottonwood Creek.

The following temperature inputs were updated with this modification:

- Monthly average temperature for the Upper Sacramento River, Clear Creek, and Cottonwood Creek
- Monthly degree day accumulation (i.e., the sum of daily average temperatures for each month) for the Upper Sacramento River, Clear Creek, and Cottonwood Creek

Reclamation conducted internal validation to ensure updates to temperature inputs using new HEC-5Q runs did not result in unexpectedly large changes in values (i.e., resulting from user error). For each of the above inputs to the DSMs, staff visualized and compared input values among the original DSM inputs and those based on the LTO NAA alternative. Reclamation observed generally similar ranges in temperature input values for the Upper Sacramento River and Clear Creek, albeit with lower extremes observed for the LTO NAA alternative relative to original DSM inputs, but a much more muted range of temperature values for the LTO NAA alternative in Cottonwood Creek. Input diagnostic plots are available for review upon request.

The following demographic parameters are expected to be influenced by the updated temperature inputs:

- In-channel and floodplain juvenile rearing survival in the Upper Sacramento River
- Adult pre-spawn survival during holding in the Upper Sacramento River

#### *F.3.2.3.5 Assumptions related to construction of new habitat inputs*

Model habitat inputs for the Peterson and Duarte (2020) version of the DSMs were based on a combination of expert judgment and flow to habitat relationships specific to both watershed and run type. Due to the considerable complexity associated in updating these values using new CalSim runs, Reclamation left the base habitat inputs unchanged from the published version of the DSMs. However, Reclamation reset a vector of habitat modifiers (i.e., values used to adjust expected habitat quantities via multiplication) to values of one during recalibration of the DSM, such that habitat quantities were equal to those values based on expert judgment and flow alone. Original calibration efforts for the Peterson and Duarte (2020) models used calibration to obtain both parameter values and new habitat modifiers, but Reclamation staff achieved sufficient model fit without needing to secondarily modify habitat quantities.

#### *F.3.2.3.6 Assumptions related to selection of habitat restoration strategies*

Model users must select a habitat restoration scenario when running the SIT DSMs, including no action (i.e., availability of spawning and rearing habitat will decrease over time without intervention) or some form habitat restoration (i.e., select watersheds are prioritized for additions of spawning and/or rearing habitat). Reclamation staff ran all DSM models with the no action habitat restoration scenario to avoid any possible interactions between flow, temperature, and habitat differences.

### F.3.2.4 Code and Data Repository

All R scripts and model inputs necessary to re-calibrate and run the model, with the exception of the raw CalSim 3 .dss files (due to file size concerns), are available upon request.

## F.3.3 Results

The EIS results include comparisons among the No Action Alternative (NAA) and all other management alternatives (Alt1 – Action 5), including the Proposed Action (PA, or Alt2). The BA results include results for the NAA, the EXP1 and EXP3 baseline alternatives, Act5 and the PA.

### F.3.3.1 EIS

Results for the EIS are summarized in Table F.3-3 through Table F.3-6 and Figure F.3-8 through Figure F.3-21.

Predicted total and natural-origin-only spawner abundances in the Central Valley for the deterministic model runs generally fluctuated between 1980 and 1999. The population as a whole and in the Upper Sacramento River reached a low in the early 1980s and peaked in 1988, decreased until 1990 and then generally trended upward (Table F.3-3, Table F.3-4; Figure F.3-8, Figure F.3-9). The Clear Creek natural spawner abundances peaked in 1980 and reached a low in 1990 (Figure F.3-8). The range of natural-origin spawner abundances across alternatives at the end of the time series was narrow, ranging from a low of 12,611 to a high of 12,724; over the

entire time series predicted natural-origin-spawner abundances ranged from 7,531 to 14,517 (Table F.3-4). The alternatives Alt1, Alt3, and Alt4 generally resulted in increased spawner abundances relative to NAA over the modeled time series. The four components of Alt2 generally resulted in small increases in spawner abundance over the time series. The model generally predicted small increases in spawner abundance for Action 5 (Table F.34; Figure F.310). The greatest increases in natural-origin spawner abundance relative to NAA occurred between 1990 and 1995. Predicted natural-origin spawner abundances in the Central Valley varied more widely across stochastic model runs, from a low of approximately 0 to a high of approximately 100,000 spawners (Figure F.3-11).

For deterministic model runs, population change over time, defined by mean (i.e., geometric) lambda values ($N_t/N_{t+1}$), over the entire 1980-1999 time series ranged from 0.96 to 1.07 across all alternatives (Table F.3-5), and terminal lambda values ($N_{t=19}/N_{t=1}$) were all approximately 1.21 (Table F.3-6). These values indicated that predicted spawner abundances increased over the course of the time series. Annual lambda values from deterministic model runs ranged from approximately 0.75 to 1.37 (Figure F.3-12). Critical water years had the highest mean annual lambdas (>=1.07), followed by Above Normal Years (>=1.04); Dry water years were the only WYT to produce an apparent decline in abundance, with a mean lambda less than 1 (Table F.3-5). Reclamation staff note that spawner abundances in any given year (or water year type) reflect a multitude of influences over time (e.g., previous spawner abundances and rearing conditions), and not just flow and temperature conditions during the spawning year. Mean lambda values across stochastic model iterations ranged from approximately 0.96 to 1.11 (Figure F.3-13). Terminal lambda values from stochastic models ranged from approximately 0.5 to 7.5 (Figure F.3-14), suggesting most model runs resulted in expected population growth over the time series. For stochastic model runs, Dry water years had a lower mean lambda value than other water year type (Figure F.3-15).

Population trends may be explained by differences in life stage-specific demographic parameters. It is worth emphasizing again that the egg-to-fry survival life stage transition in the DSM is not sensitive to alternative-dependent flow or temperature values, and thus will be constant across alternatives. Across deterministic runs, monthly rearing survival for small juveniles (i.e., <42 mm) in the Upper Sacramento River varied from a low of approximately 0.016 to a high of approximately 0.022 (Figure F.3-16); rearing survival in the Upper Sacramento River also varied across months, peaking in December and January, and showing greater variation across water years in April and May. In Clear Creek, monthly rearing survival for small juveniles (i.e., <42 mm) and varied across deterministic runs from approximately 0.16 to 0.18; rearing survival in Clear Creek also varied across months, with greater survival in February-May and lower survival in November-January.

Model-estimated migratory survival for very large fish (i.e., smolt size, >110 mm) in the Upper-mid, Lower-mid, and Lower Sacramento River was very close to 1, with slight variations across months and water year types (WYTs) (Figure F.3-17 through Figure F.3-19). In the Upper-mid and Lower-mid, and Lower Sacramento River, expected survival was consistently highest in Wet years. Migratory survival for very large fish also varied across months and WYT in the North and South Delta (Figure F.3-20, Figure F.3-21). Migratory survival often increased moving from a Critical to Dry to Above Normal to Wet WYT. In the North Delta, migratory survival was relatively high, ranging from approximately 0.90 – 0.935, and lower in the South Delta, ranging

from 0.21 – 0.58. In the South Delta, expected migratory survival was greatest in February and March and lowest in November. With migratory survival in the mainstem Sacramento River and North Delta high across the alternatives, rearing survival in natal tributaries and migratory survival in the South Delta likely act as drivers of lambda.

#### *F.3.3.1.1 Population abundance, trends*

Table F.3-3. Predicted annual total spring-run spawner abundance in the Central Valley, including both natural- and hatchery-origin fish, from deterministic model runs. Parentheses indicate percent difference from NAA (negative values indicate a decrease in annual spawner abundance).

| Year | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|
| 1980 | 14888 | 14882 (0.0) | 14889 (0) | 14889 (0) | 14888 (0) | 14888 (0) | 14890 (0) | 14881 (0) | 14888 (0) |
| 1981 | 13045 | 13048 (0.0) | 13046 (0) | 13046 (0) | 13046 (0) | 13046 (0) | 13043 (0) | 13046 (0) | 13046 (0) |
| 1982 | 13095 | 13118 (0.2) | 13097 (0) | 13097 (0) | 13108 (0.1) | 13134 (0.3) | 13114 (0.1) | 13125 (0.2) | 13132 (0.3) |
| 1983 | 15807 | 15867 (0.4) | 15817 (0.1) | 15817 (0.1) | 15837 (0.2) | 15886 (0.5) | 15888 (0.5) | 15876 (0.4) | 15883 (0.5) |
| 1984 | 15748 | 15788 (0.3) | 15758 (0.1) | 15758 (0.1) | 15765 (0.1) | 15778 (0.2) | 15823 (0.5) | 15787 (0.2) | 15783 (0.2) |
| 1985 | 14598 | 14609 (0.1) | 14602 (0) | 14602 (0) | 14600 (0) | 14594 (0) | 14660 (0.4) | 14608 (0.1) | 14595 (0) |
| 1986 | 12859 | 12860 (0.0) | 12859 (0) | 12859 (0) | 12854 (0) | 12864 (0) | 12917 (0.5) | 12855 (0) | 12853 (0) |
| 1987 | 14295 | 14325 (0.2) | 14337 (0.3) | 14337 (0.3) | 14330 (0.2) | 14364 (0.5) | 14434 (1) | 14271 (-0.2) | 14288 (0) |
| 1988 | 19578 | 19605 (0.1) | 19665 (0.4) | 19665 (0.4) | 19667 (0.5) | 19722 (0.7) | 19850 (1.4) | 19548 (-0.2) | 19603 (0.1) |
| 1989 | 18233 | 18176 (-0.3) | 18287 (0.3) | 18287 (0.3) | 18303 (0.4) | 18357 (0.7) | 18452 (1.2) | 18225 (0) | 18305 (0.4) |
| 1990 | 13540 | 13512 (-0.2) | 13554 (0.1) | 13555 (0.1) | 13596 (0.4) | 13607 (0.5) | 13631 (0.7) | 13569 (0.2) | 13660 (0.9) |
| 1991 | 13973 | 14029 (0.4) | 14019 (0.3) | 14018 (0.3) | 14070 (0.7) | 14078 (0.8) | 14210 (1.7) | 14055 (0.6) | 14175 (1.4) |
| 1992 | 15275 | 15379 (0.7) | 15454 (1.2) | 15401 (0.8) | 15458 (1.2) | 15495 (1.4) | 15731 (3) | 15395 (0.8) | 15507 (1.5) |
| 1993 | 16087 | 16256 (1.1) | 16381 (1.8) | 16236 (0.9) | 16316 (1.4) | 16334 (1.5) | 16459 (2.3) | 16194 (0.7) | 16246 (1) |
| 1994 | 18042 | 18148 (0.6) | 18217 (1) | 18117 (0.4) | 18116 (0.4) | 18117 (0.4) | 18209 (0.9) | 18088 (0.3) | 18081 (0.2) |
| 1995 | 16889 | 16874 (-0.1) | 16891 (0) | 16903 (0.1) | 16836 (-0.3) | 16841 (-0.3) | 16995 (0.6) | 16878 (-0.1) | 16871 (-0.1) |
| 1996 | 14759 | 14726 (-0.2) | 14747 (-0.1) | 14769 (0.1) | 14727 (-0.2) | 14745 (-0.1) | 14871 (0.8) | 14741 (-0.1) | 14758 (0) |
| 1997 | 18116 | 18135 (0.1) | 18123 (0) | 18120 (0) | 18113 (0) | 18124 (0) | 18249 (0.7) | 18123 (0) | 18136 (0.1) |
| 1998 | 19405 | 19435 (0.2) | 19402 (0) | 19405 (0) | 19401 (0) | 19398 (0) | 19547 (0.7) | 19424 (0.1) | 19435 (0.2) |
| 1999 | 17937 | 17934 (0.0) | 17940 (0) | 17940 (0) | 17942 (0) | 17940 (0) | 18048 (0.6) | 17956 (0.1) | 17962 (0.1) |

Table F.3-4. Predicted annual natural-origin spring-run spawner abundance in the Central Valley from deterministic model runs. Parentheses indicate percent difference from NAA (negative values indicate a decrease in annual spawner abundance).

| Year | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|
| 1980 | 9562 | 9557 (-0.1) | 9566 (0) | 9566 (0) | 9562 (0) | 9563 (0) | 9566 (0) | 9559 (0) | 9562 (0) |
| 1981 | 7713 | 7714 (0.0) | 7713 (0) | 7713 (0) | 7714 (0) | 7713 (0) | 7711 (0) | 7713 (0) | 7713 (0) |
| 1982 | 7773 | 7796 (0.3) | 7776 (0) | 7776 (0) | 7786 (0.2) | 7811 (0.5) | 7792 (0.2) | 7802 (0.4) | 7809 (0.5) |
| 1983 | 10483 | 10544 (0.6) | 10494 (0.1) | 10494 (0.1) | 10515 (0.3) | 10565 (0.8) | 10564 (0.8) | 10555 (0.7) | 10562 (0.8) |
| 1984 | 10424 | 10465 (0.4) | 10433 (0.1) | 10433 (0.1) | 10440 (0.2) | 10453 (0.3) | 10498 (0.7) | 10460 (0.3) | 10459 (0.3) |
| 1985 | 9263 | 9275 (0.1) | 9268 (0.1) | 9268 (0.1) | 9267 (0) | 9261 (0) | 9329 (0.7) | 9274 (0.1) | 9263 (0) |
| 1986 | 7536 | 7539 (0.0) | 7535 (0) | 7535 (0) | 7531 (-0.1) | 7541 (0.1) | 7595 (0.8) | 7533 (0) | 7532 (-0.1) |
| 1987 | 8961 | 8991 (0.3) | 9004 (0.5) | 9004 (0.5) | 8996 (0.4) | 9029 (0.8) | 9102 (1.6) | 8938 (-0.3) | 8955 (-0.1) |
| 1988 | 14247 | 14272 (0.2) | 14330 (0.6) | 14330 (0.6) | 14332 (0.6) | 14388 (1) | 14517 (1.9) | 14215 (-0.2) | 14272 (0.2) |
| 1989 | 12898 | 12843 (-0.4) | 12953 (0.4) | 12953 (0.4) | 12969 (0.6) | 13021 (1) | 13119 (1.7) | 12891 (-0.1) | 12972 (0.6) |
| 1990 | 8210 | 8182 (-0.3) | 8225 (0.2) | 8226 (0.2) | 8266 (0.7) | 8278 (0.8) | 8301 (1.1) | 8238 (0.3) | 8329 (1.4) |
| 1991 | 8639 | 8695 (0.7) | 8688 (0.6) | 8688 (0.6) | 8738 (1.1) | 8745 (1.2) | 8874 (2.7) | 8721 (0.9) | 8841 (2.3) |
| 1992 | 9941 | 10047 (1.1) | 10123 (1.8) | 10067 (1.3) | 10127 (1.9) | 10161 (2.2) | 10399 (4.6) | 10060 (1.2) | 10174 (2.3) |
| 1993 | 10764 | 10930 (1.5) | 11058 (2.7) | 10909 (1.3) | 10990 (2.1) | 11011 (2.3) | 11134 (3.4) | 10869 (1) | 10923 (1.5) |
| 1994 | 12707 | 12816 (0.9) | 12885 (1.4) | 12784 (0.6) | 12782 (0.6) | 12784 (0.6) | 12876 (1.3) | 12754 (0.4) | 12747 (0.3) |
| 1995 | 11564 | 11550 (-0.1) | 11567 (0) | 11579 (0.1) | 11514 (-0.4) | 11518 (-0.4) | 11673 (0.9) | 11556 (-0.1) | 11547 (-0.1) |
| 1996 | 9436 | 9405 (-0.3) | 9426 (-0.1) | 9446 (0.1) | 9405 (-0.3) | 9425 (-0.1) | 9548 (1.2) | 9419 (-0.2) | 9436 (0) |
| 1997 | 12791 | 12811 (0.2) | 12798 (0.1) | 12796 (0) | 12788 (0) | 12801 (0.1) | 12924 (1) | 12799 (0.1) | 12813 (0.2) |
| 1998 | 14081 | 14110 (0.2) | 14081 (0) | 14081 (0) | 14078 (0) | 14075 (0) | 14222 (1) | 14103 (0.2) | 14112 (0.2) |
| 1999 | 12613 | 12611 (0.0) | 12617 (0) | 12616 (0) | 12618 (0) | 12615 (0) | 12724 (0.9) | 12631 (0.1) | 12634 (0.2) |

Table F.3-5. Predicted mean lambda ($N_t/N_{t+1}$) for total spring-run spawner abundance in the Central Valley, including both natural- and hatchery-origin fish, from deterministic model runs. Parentheses indicate percent difference from NAA (negative values indicate a decrease in annual spawner abundance).

| WYT | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|
| C | 1.072 | 1.072 (0.07) | 1.072 (0) | 1.072 (0) | 1.072 (0) | 1.072 (0) | 1.074 (0.2) | 1.072 (0) | 1.073 (0.1) |

| WYT | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|
| D | 0.962 | 0.961 (-0.09) | 0.962 (0) | 0.962 (0) | 0.962 (0) | 0.962 (0) | 0.962 (0) | 0.961 (-0.1) | 0.962 (0) |
| AN | 1.053 | 1.057 (0.4) | 1.06 (0.7) | 1.055 (0.2) | 1.055 (0.2) | 1.054 (0.1) | 1.047 (-0.6) | 1.052 (-0.1) | 1.048 (-0.5) |
| W | 1.013 | 1.013 (-0.03) | 1.013 (0) | 1.013 (0) | 1.013 (0) | 1.013 (0) | 1.014 (0.1) | 1.014 (0.1) | 1.014 (0.1) |
| All | 1.010 | 1.010 (0.0) | 1.01 (0) | 1.01 (0) | 1.01 (0) | 1.01 (0) | 1.01 (0) | 1.01 (0) | 1.01 (0) |

Table F.3-6. Predicted terminal lambda ($N_{t=19}/N_{t=1}$) for total spring-run spawner abundance in the Central Valley, including both natural- and hatchery-origin fish, from deterministic model runs. Parentheses indicate percent difference from NAA (negative values indicate a decrease in annual spawner abundance).

| NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|
| 1.205 | 1.205 (0) | 1.205 (0) | 1.205 (0) | 1.205 (0) | 1.205 (0) | 1.212 (0.6) | 1.206 (0.1) | 1.207 (0.2) |

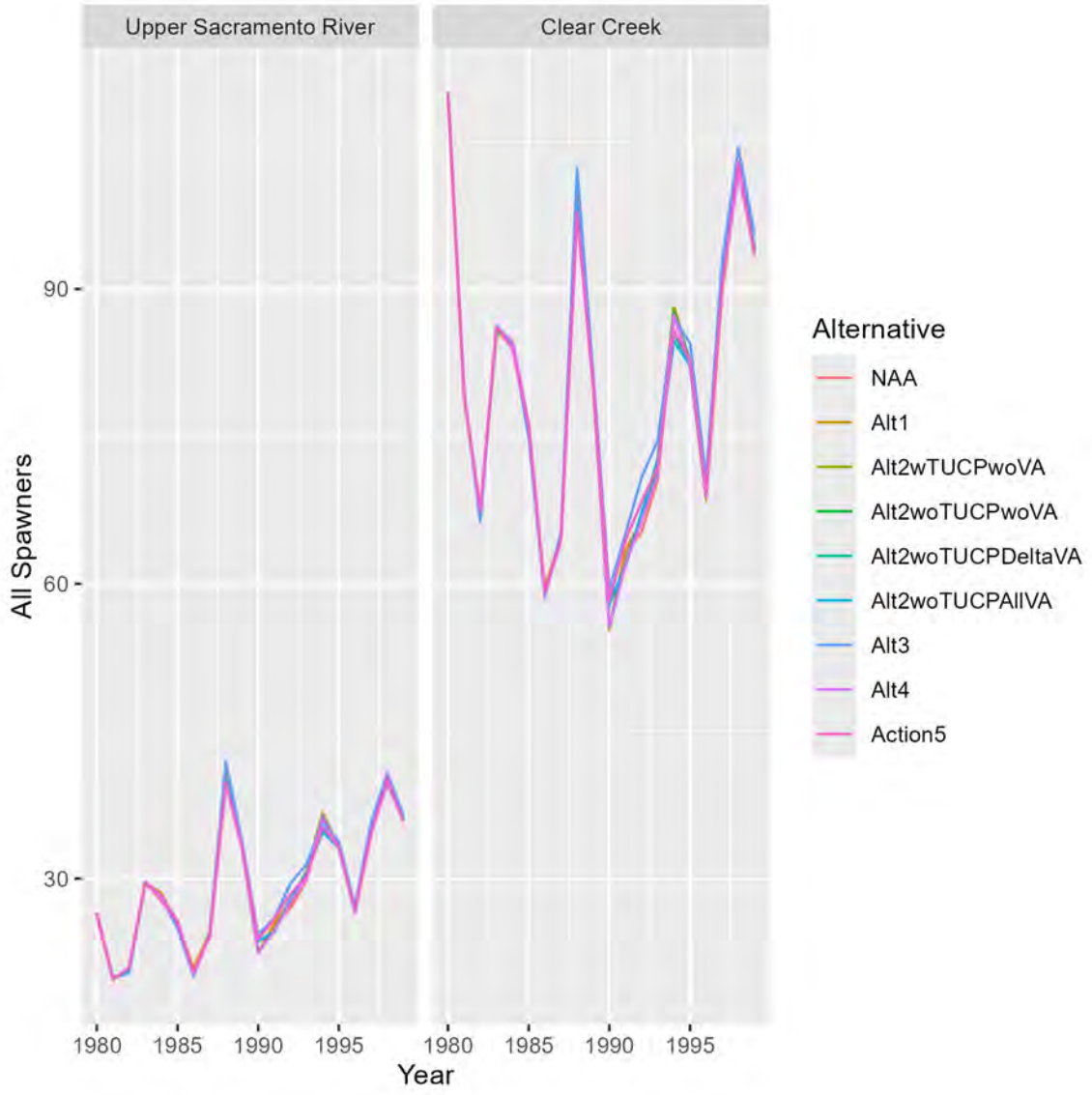



Figure F.3-8. Expected annual abundances of natural-origin spring-run Chinook salmon spawners in the Upper Sacramento River and Clear Creek from deterministic model runs.

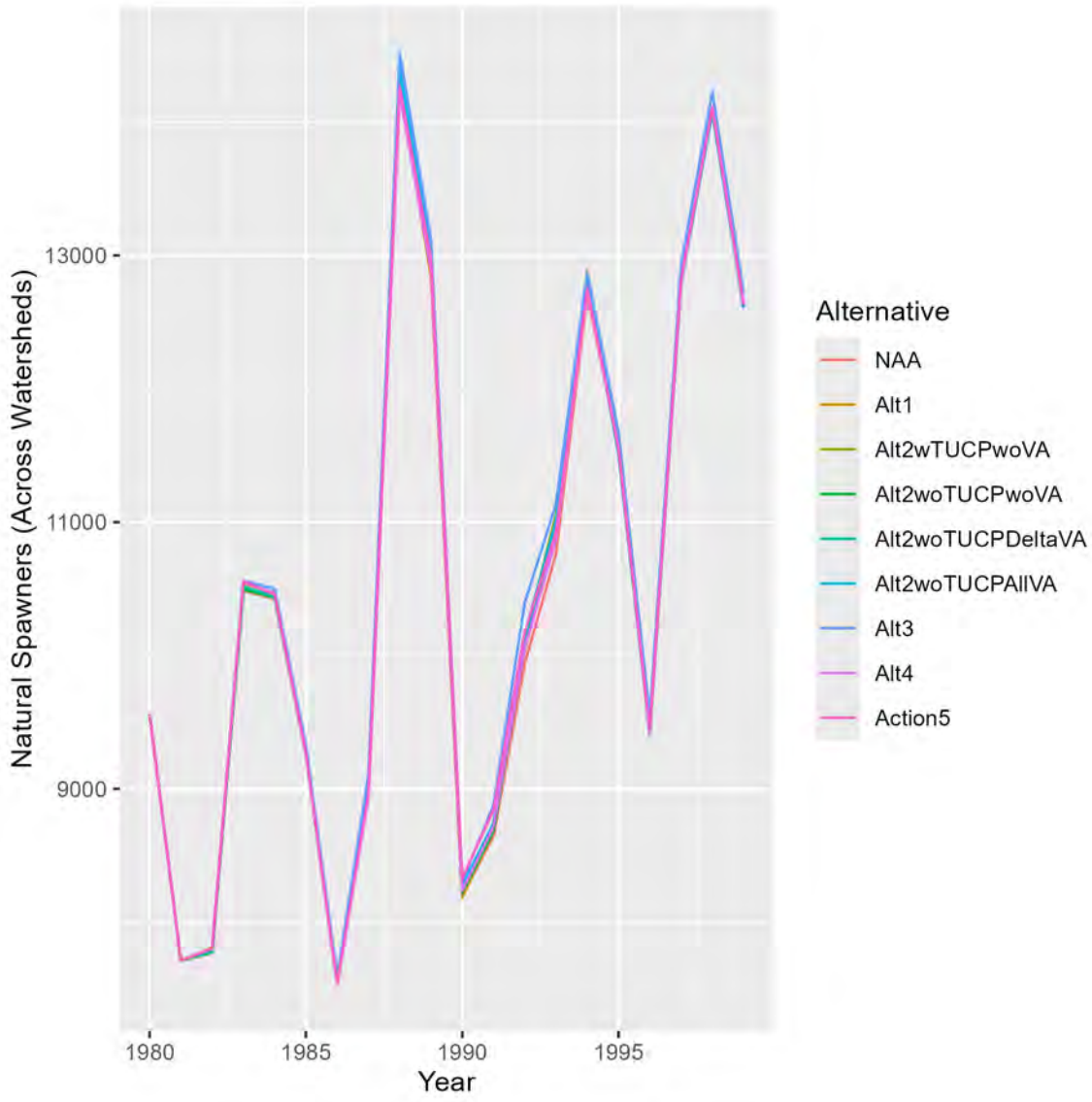



Figure F.3-9. Expected annual abundances of natural-origin spring-run Chinook salmon spawners in the Central Valley from deterministic model runs.

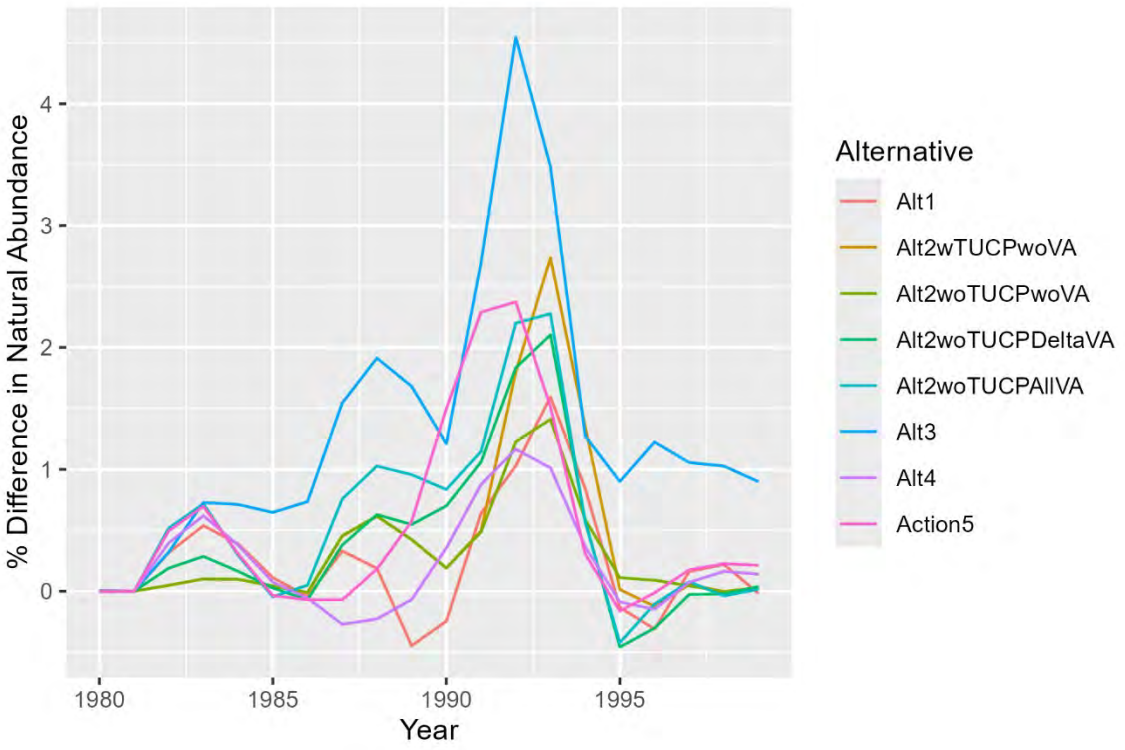



Figure F.3-10. Expected percent differences in annual abundances of natural-origin spring-run Chinook salmon spawners in the Central Valley, relative to the NAA alternative, from deterministic model runs.

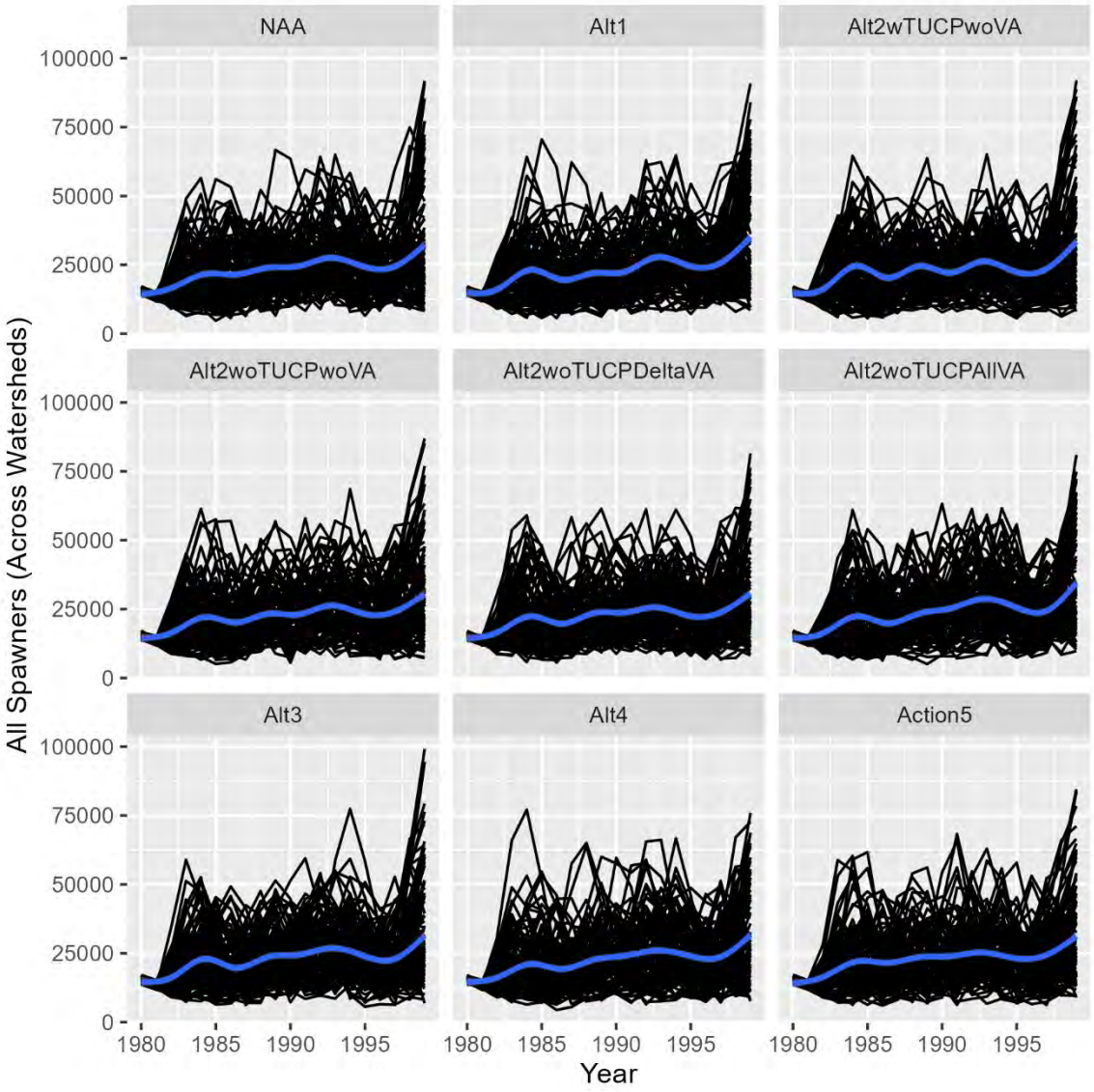



Figure F.3-11. Expected annual abundances of natural-origin spring-run Chinook salmon spawners in the Central Valley from stochastic model runs. Black lines represent iteration-specific abundances over time and the blue line represents an expected trend obtained by 'gam' smoothing in ggplot2.

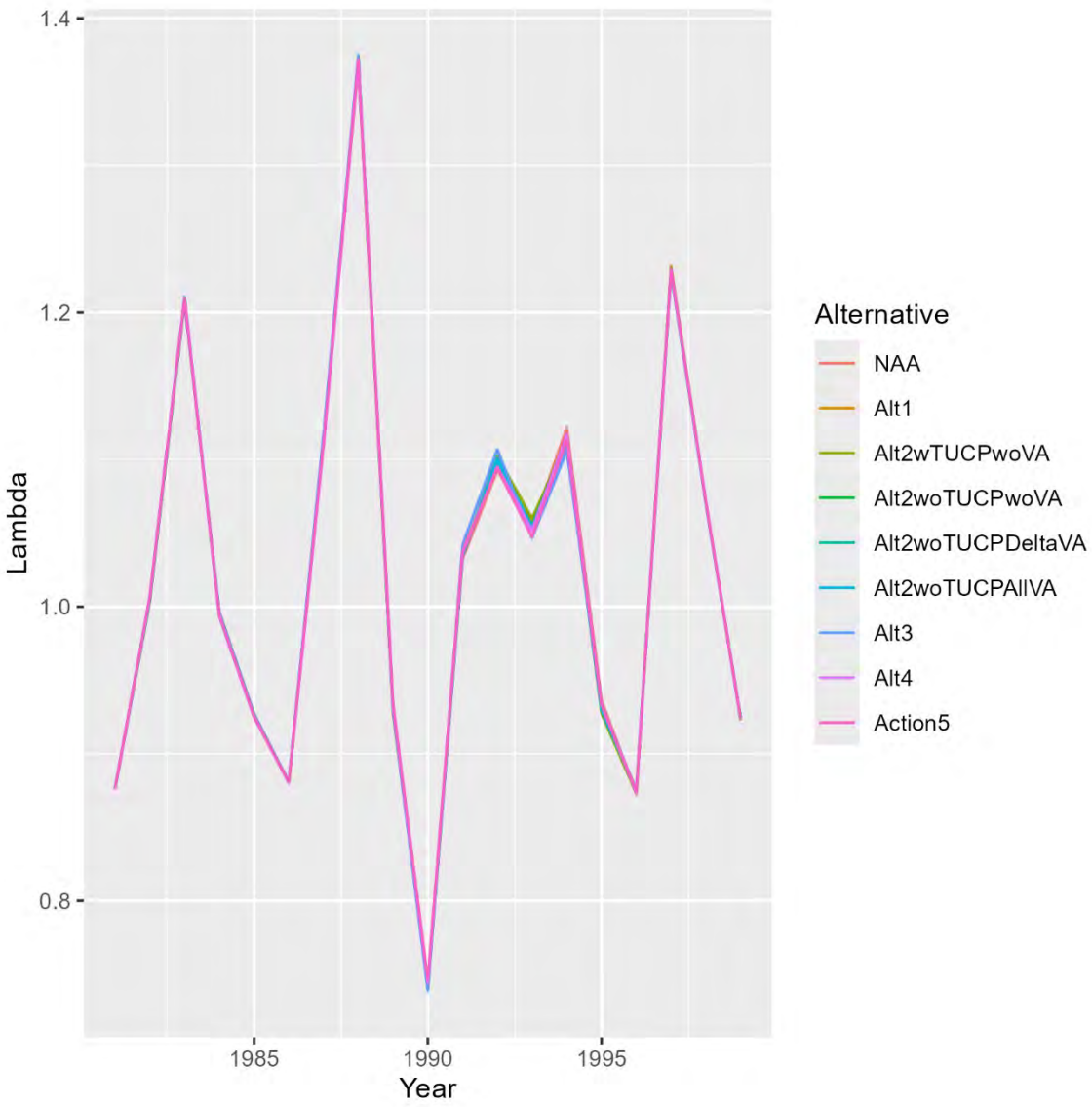



Figure F.3-12. Predicted annual lambda values ($N_t/N_{t+1}$) for total spring-run spawner abundance in the Central Valley, including both natural- and hatchery-origin fish, from deterministic model runs.

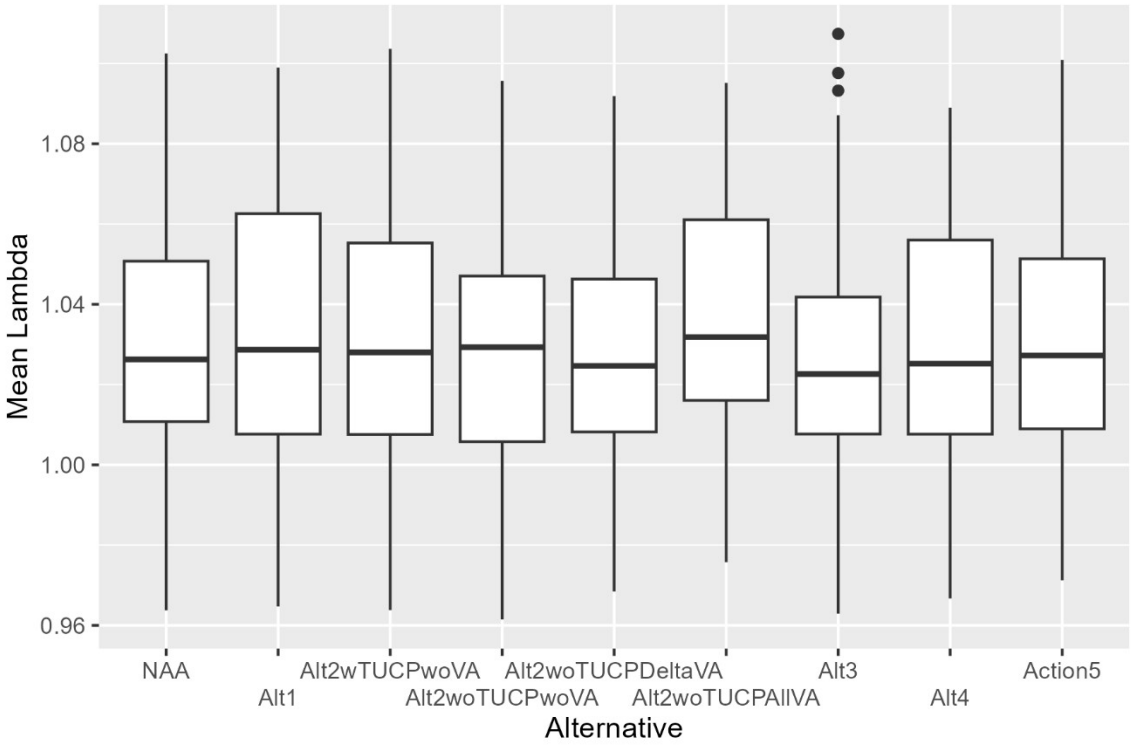



Figure F.3-13. Predicted mean lambda values ($N_t/N_{t+1}$) for total spring-run spawner abundance in the Central Valley, including both natural- and hatchery-origin fish, across stochastic model iterations.

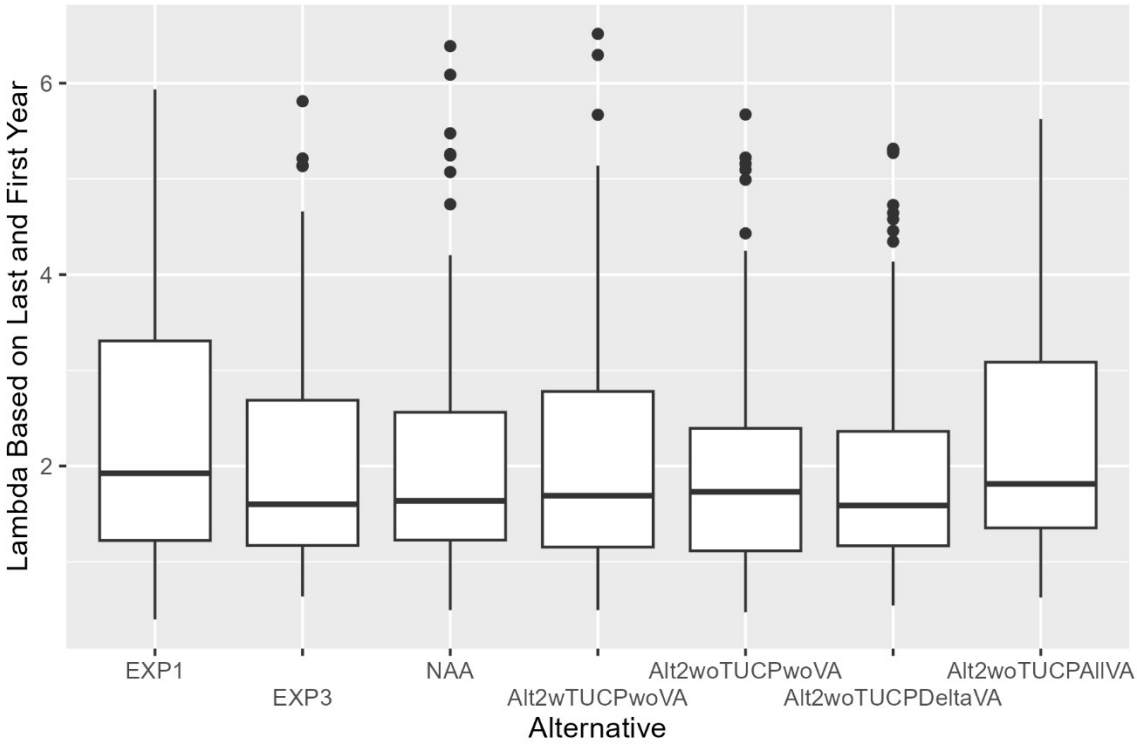



Figure F.3-14. Predicted end lambda values ($N_{t=19}/N_{t=1}$) for total spring-run spawner abundance in the Central Valley, including both natural- and hatchery-origin fish, across stochastic model iterations.

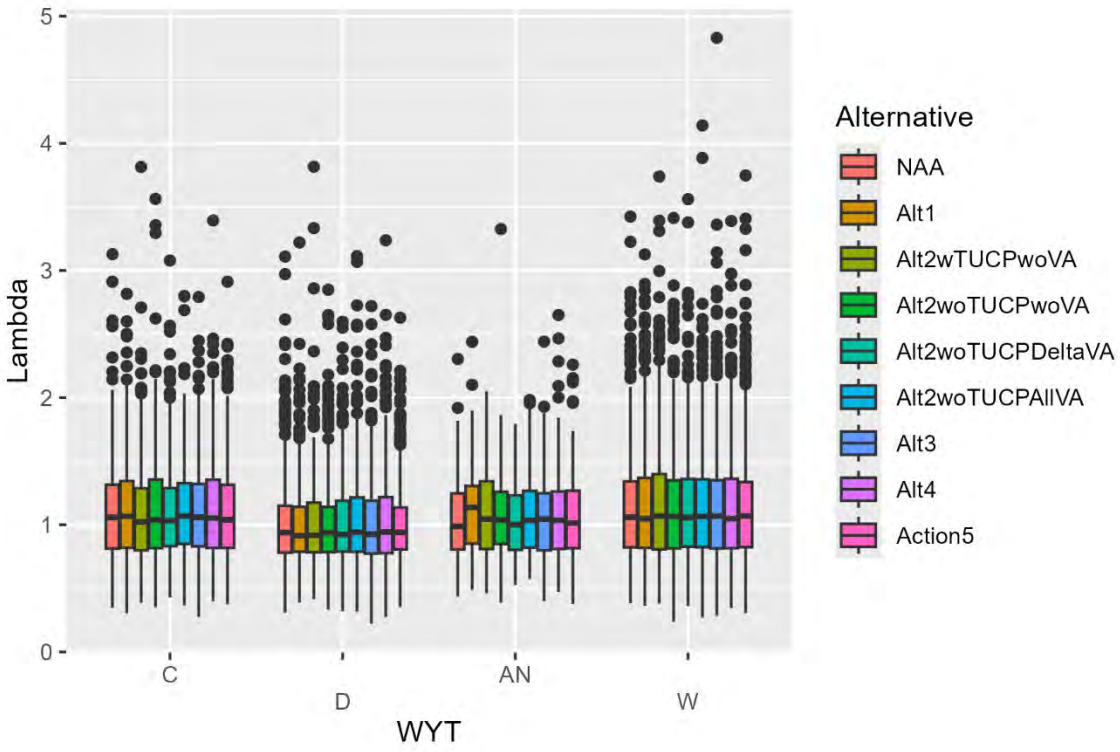



Figure F.3-15. Predicted lambda values across water year types ($N_{t+1}/N_t$) for total spring-run spawner abundance in the Central Valley, including both natural- and hatchery-origin fish, across 100 stochastic model iterations.

#### *F.3.3.1.2 Life stage-specific demographic parameters*

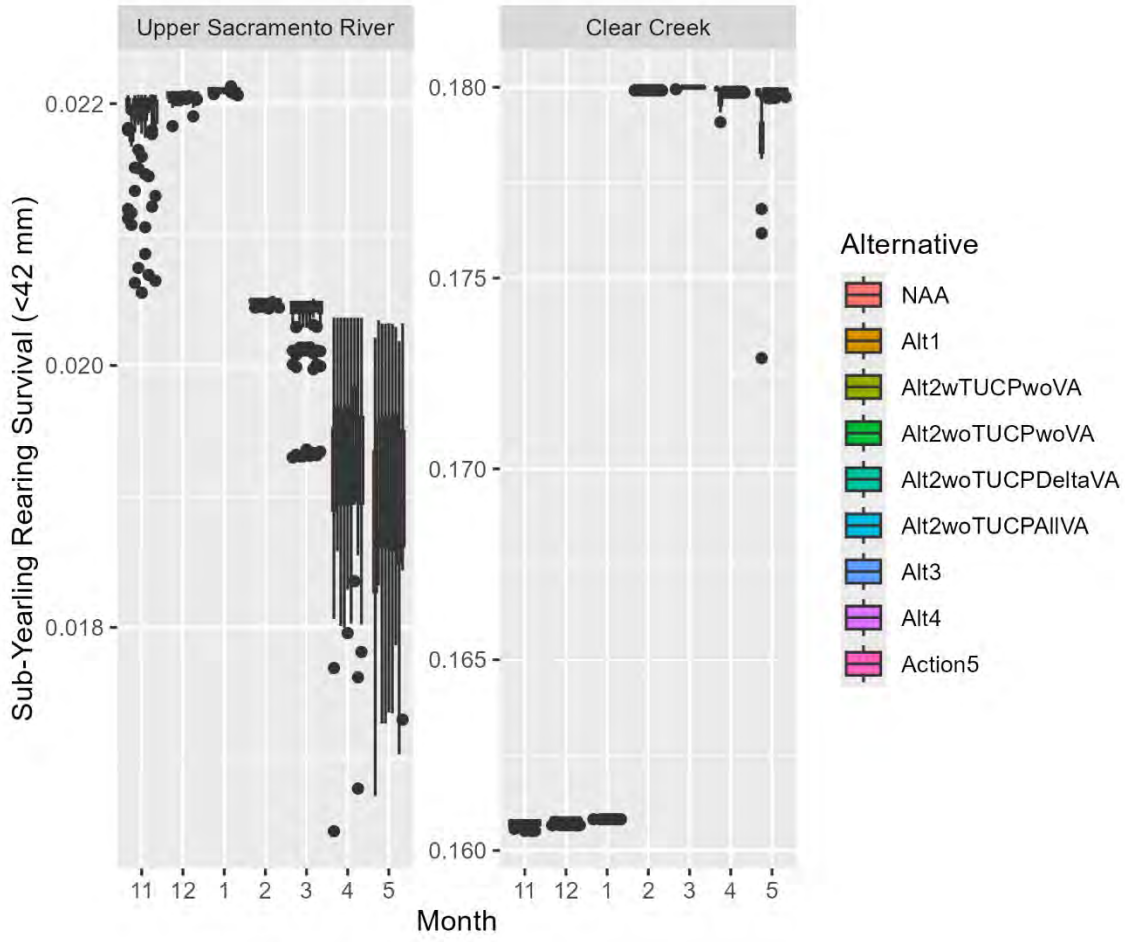



Figure F.3-16. Predicted small, young-of-year, juvenile rearing survival for spring-run Chinook salmon in the Upper Sacramento River and Clear Creek from deterministic model runs.

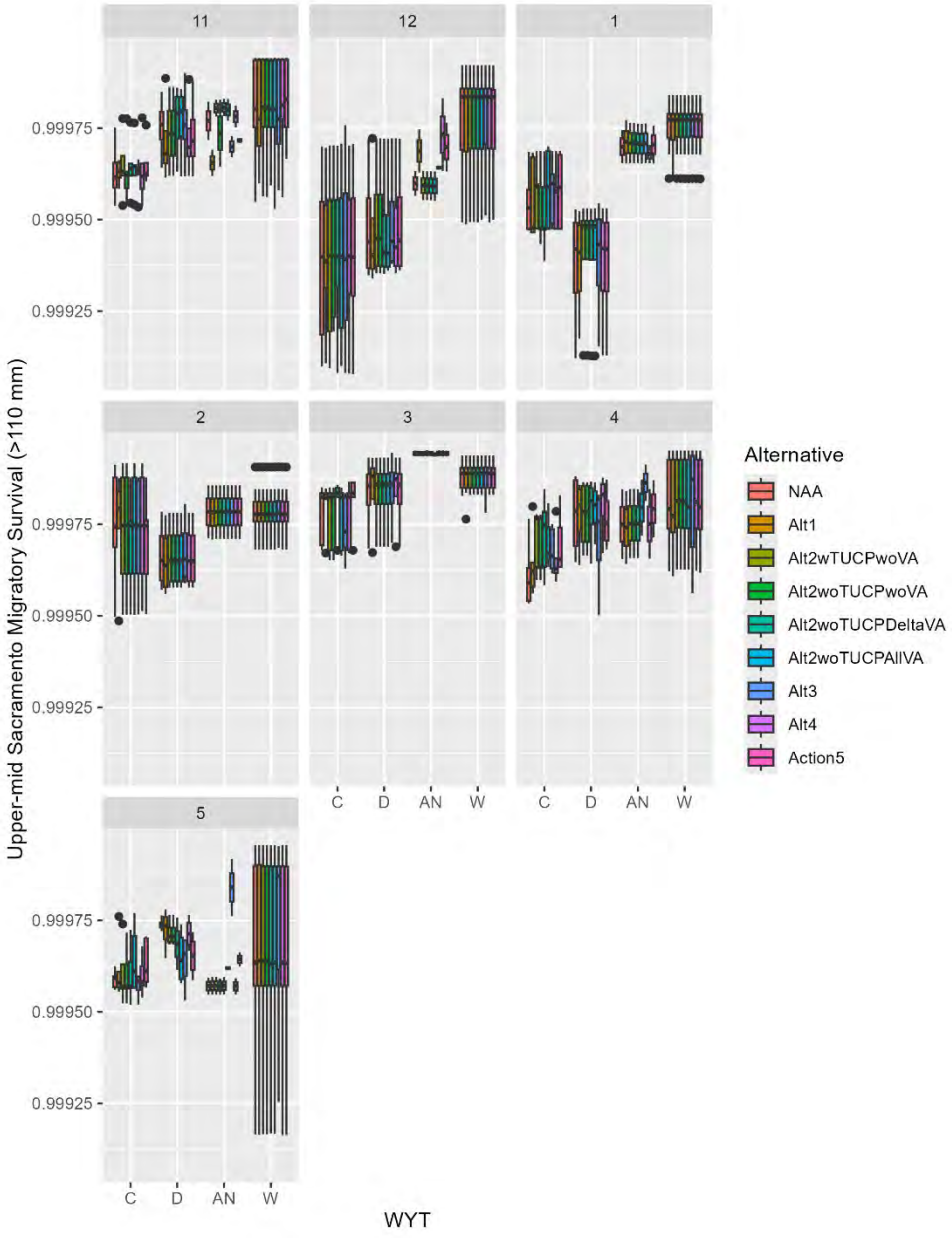



Figure F.3-17. Predicted smolt migratory survival for spring-run Chinook salmon in the Upper-mid Sacramento River from deterministic model runs, faceted by month.

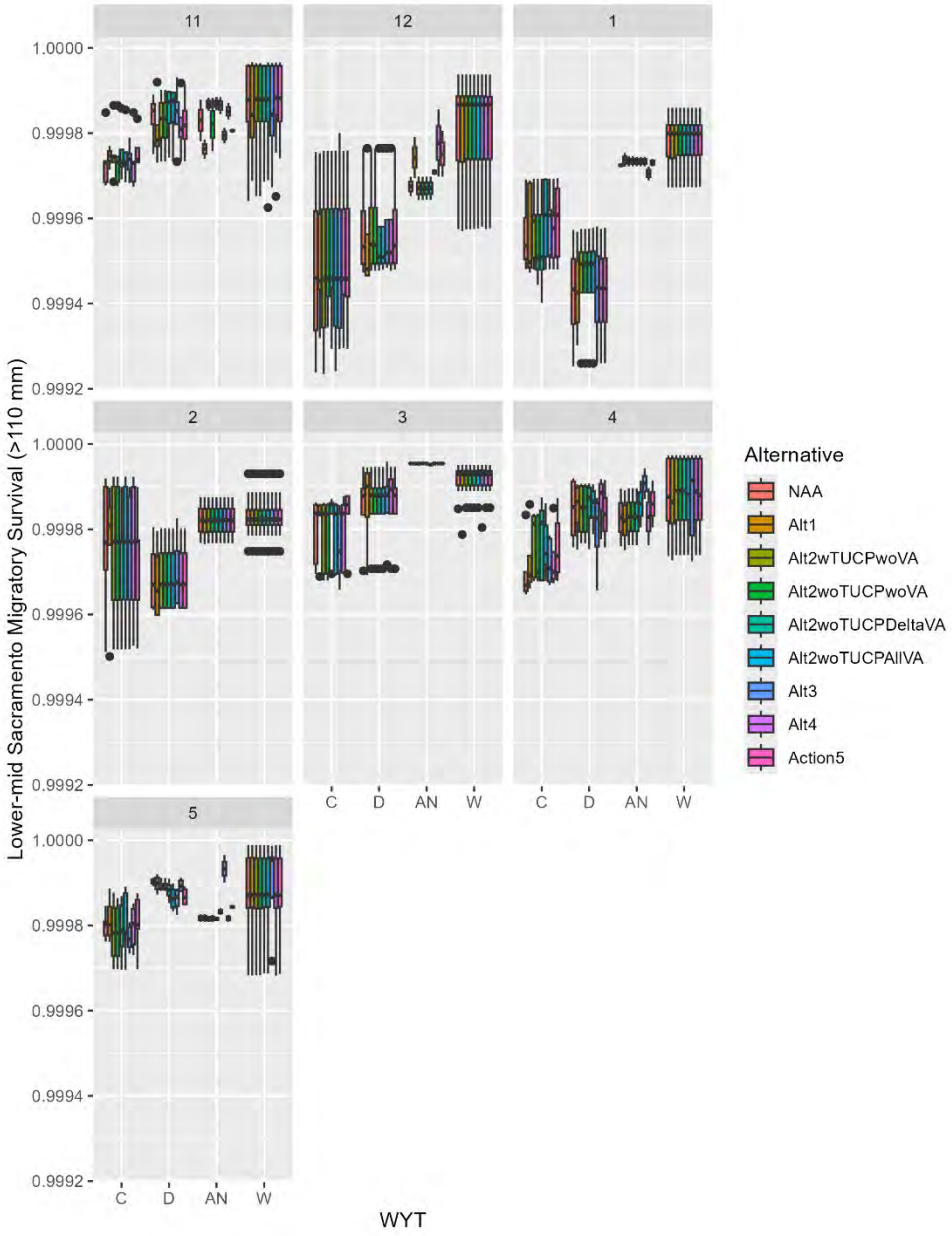



Figure F.3-18. Predicted smolt migratory survival for spring-run Chinook salmon in the Lower-mid Sacramento River from deterministic model runs, faceted by month.

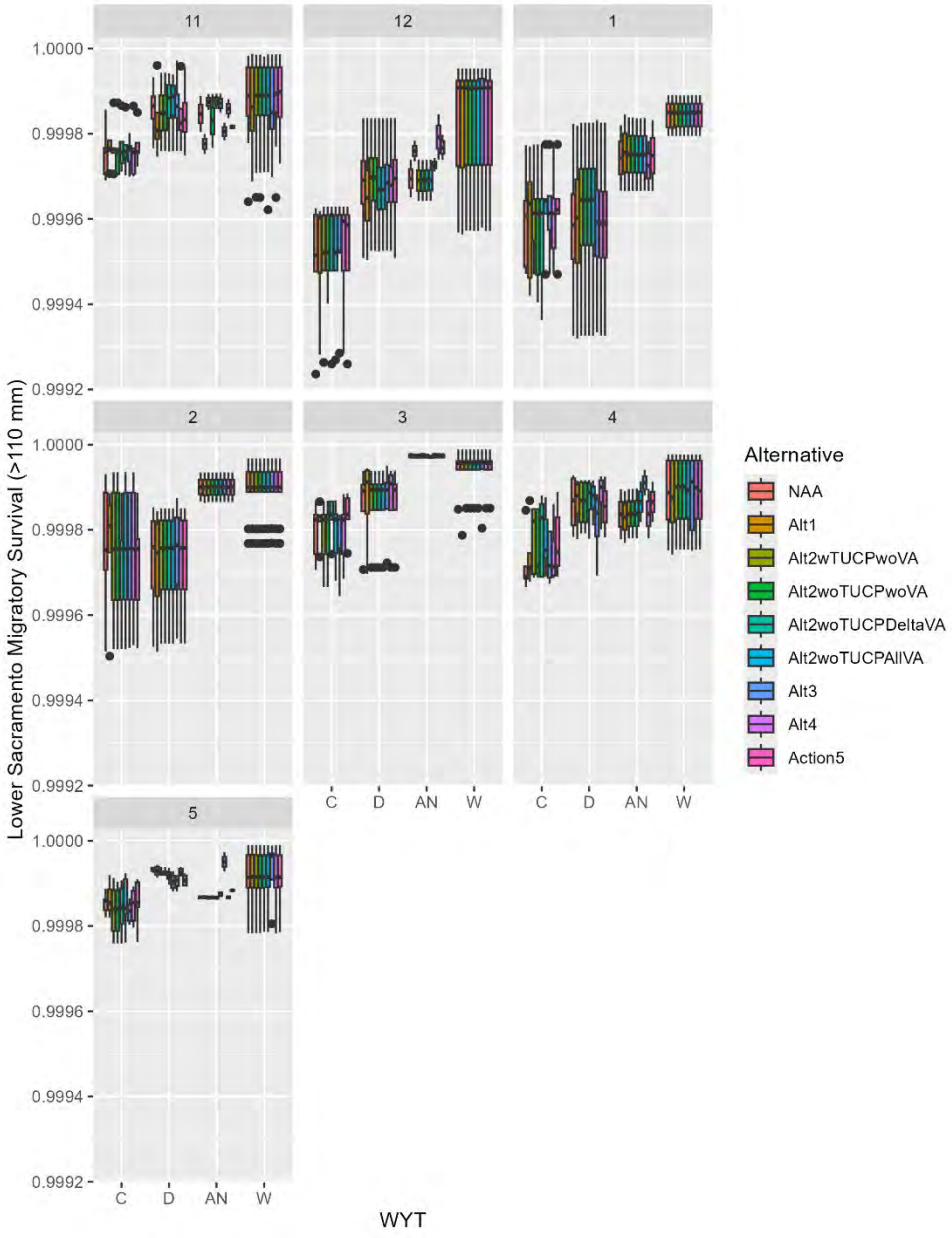



Figure F.3-19. Predicted smolt migratory survival for spring-run Chinook salmon in the Lower Sacramento River from deterministic model runs, faceted by month.

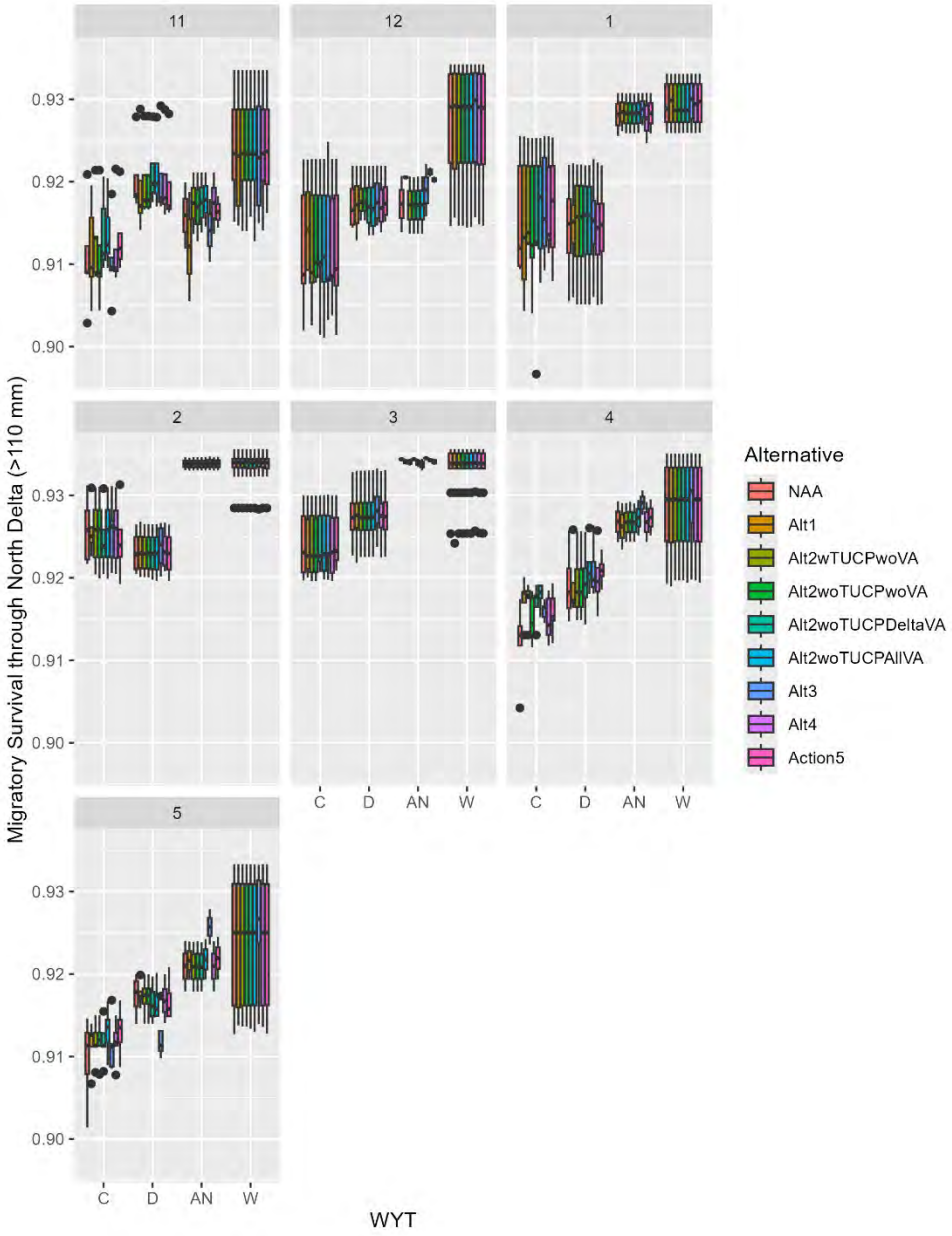



Figure F.3-20. Predicted smolt migratory survival for spring-run Chinook salmon in the North Delta from deterministic model runs, faceted by month.

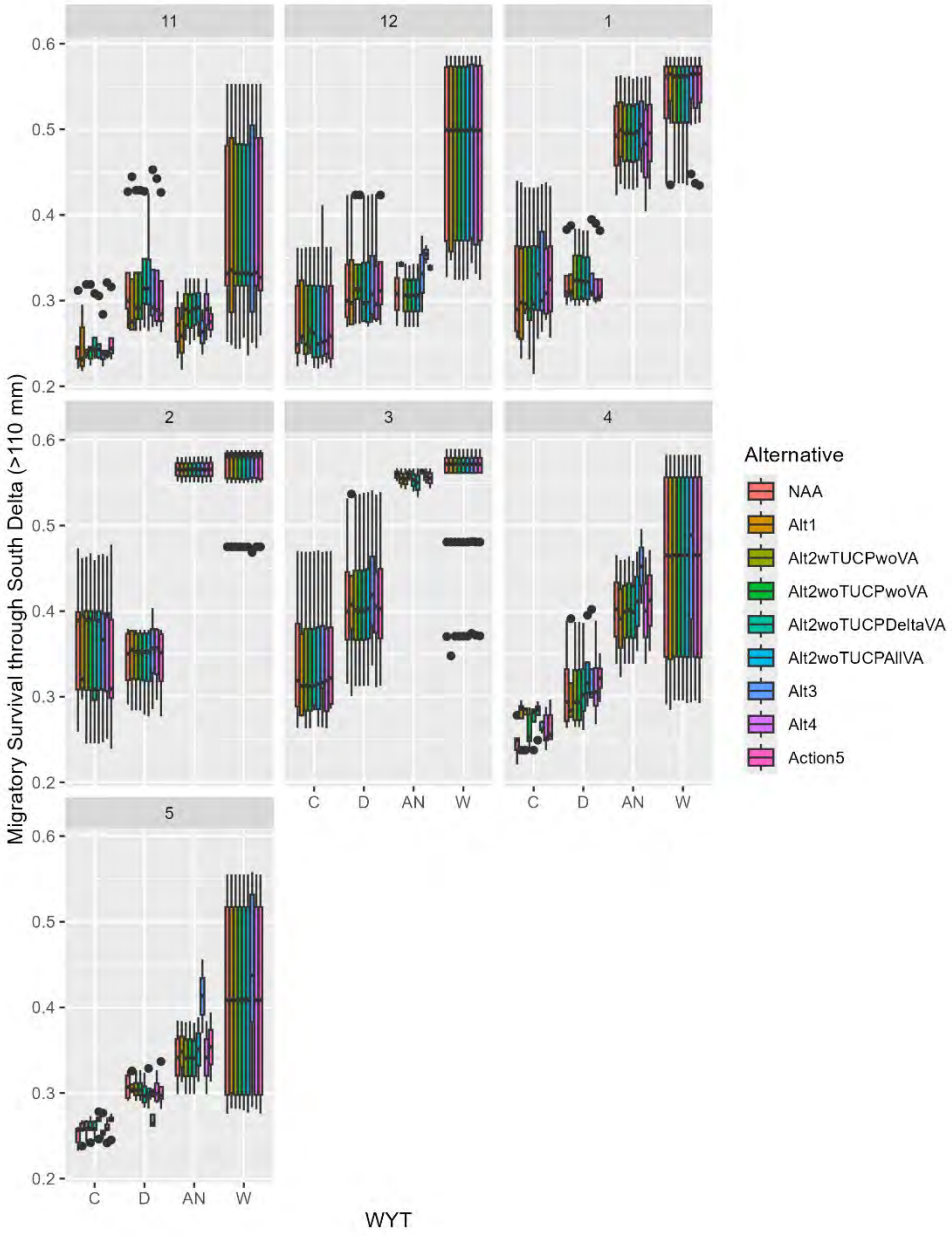



Figure F.3-21. Predicted smolt migratory survival for spring-run Chinook salmon in the South Delta from deterministic model runs, faceted by month.

### F.3.3.2 BA

Results for the BA are summarized in Table F.3-7 through Table F.3-10 and Figure F.3-22 through Figure F.3-34.

Predicted total and natural-origin-only spawner abundances in the Central Valley for the deterministic model runs generally fluctuated between 1980 and 1999. The population as a whole and in the Upper Sacramento River reached a low in the early 1980s and peaked in 1988, decreased steadily until 1990 and then generally trended upward (Table F.3-7, Table F.3-8;

Figure F.3-22, Figure F.3-23). The Clear Creek natural spawner abundances peaked in 1980 and reached a low in 1990 (Figure F.3-22). The range of natural-origin-only spawner abundances across alternatives at the end of the time series was narrow, ranging from a low of 12,611 (Alt2wTUCPwoVA) to a high of 12,614 (Alt2woTUCPDeltaVA), excluding baseline alternatives (Table F.3-8); over the entire time series predicted natural-origin-spawner abundances ranged from 7,531 to 14,379 (Table F.3-8). Predicted natural-origin-only spawner abundances in the Central Valley varied more widely across stochastic model runs, from a low of approximately 0 to a high of approximately 100,000 spawners (Figure F.3-24).

For deterministic model runs, population change over time, defined by mean (i.e., geometric) lambda values ($N_t/N_{t+1}$), over the entire 1980-1999 time series was consistently at 1.01 across all alternatives (Table F.3-9), and terminal lambda values ($N_{t=19}/N_{t=1}$) were consistently 1.205 (Table F.3-10). These values indicated that predicted spawner abundances increased over the course of the time series (Table F.3-9, Table F.3-10). Annual lambda values from deterministic model runs ranged from approximately 0.75 to 1.37 (Figure F.3-25). Mean lambda values across stochastic model iterations ranged from approximately 0.96 to 1.11 (Figure F.3-26). Terminal lambda values from stochastic models ranged from approximately 0.5 to 7.5 (Figure F.3-27), suggesting some model runs resulted in expected population growth over the time series. Under deterministic models, Critical water years had the highest mean annual lambdas (>1.07) and Above Normal and Wet water years also had a mean annual lambda greater than 1, indicating that the population grew in both wetter and drier conditions, just not under Dry water year types (Table F.3-9). Mean lambdas were less than 1 in Dry water years, indicating that populations declined. Likewise, across stochastic model runs, Dry water years had a lower mean lambda value than other water year types (Figure F.3-28). Reclamation staff note that spawner abundances in any given year (or water year type) reflect a multitude of influences over time (e.g., previous spawner abundances and rearing conditions), and not just flow and temperature conditions during the spawning year.

Population trends may be explained by differences in life stage-specific demographic parameters. It is worth emphasizing again that the egg-to-fry survival life stage transition in the DSM is not sensitive to alternative-dependent flow or temperature values, and thus will be constant across alternatives. Across deterministic runs, monthly rearing survival for small juveniles (i.e., <42 mm) in the Upper Sacramento River varied from a low of approximately 0.016 to a high of approximately 0.024, excluding baseline alternatives (Figure F.3-29); rearing survival in the Upper Sacramento River also varied across months, peaking in December and January, and showing greater variation across water years in April and May. In Clear Creek, monthly rearing survival for small juveniles (i.e., <42 mm) and varied across deterministic runs from approximately 0.12 to 0.18; rearing survival in Clear Creek also varied across months, with greater survival in February-May and lower survival in November-January.

Model-estimated migratory survival for very large fish (i.e., smolt size, >110 mm) in the Upper-mid, Lower-mid, and Lower Sacramento River was very close to 1, with slight variations across months and water year types (WYTs) (Figure F.3-30 through Figure F.3-32). In the Upper-mid and Lower-mid, and Lower Sacramento River, expected survival was consistently highest in Wet years. Migratory survival for very large fish also varied across months and WYT in the North and South Delta (Figure F.3-33, Figure F.3-34). Migratory survival often increased moving from a Critical to Dry to Above Normal to Wet WYT. In the North Delta, migratory survival was

relatively high, ranging from 0.894 – 0.935, and lower in the South Delta, ranging from 0.205 – 0.576. In the South Delta, expected migratory survival was greatest in February and March (0.467-0.505 across all water year types) and lowest in November (0.301 – 0.333 across all water year types). With migratory survival in the mainstem Sacramento River and North Delta high across the alternatives, rearing survival and migratory survival in the South Delta likely act as drivers of lambda.

#### *F.3.3.2.1 Population abundance, trends*

Table F.3-7. Predicted annual total spring-run spawner abundance in the Central Valley, including both natural- and hatchery-origin fish, from deterministic model runs.

| Year | EXP1 | EXP3 | NAA | Alt2wTUCPwoVA | Alt2woTUCPwoVA | Alt2woTUCPDeltaVA | Alt2woTUCPAllVA | Act5 |
|---|---|---|---|---|---|---|---|---|
| 1980 | 14889 | 14887 | 14886 | 14886 | 14886 | 14886 | 14886 | 14886 |
| 1981 | 13041 | 13045 | 13045 | 13045 | 13045 | 13045 | 13045 | 13045 |
| 1982 | 13242 | 13139 | 13094 | 13098 | 13098 | 13109 | 13134 | 13132 |
| 1983 | 16213 | 15968 | 15808 | 15819 | 15819 | 15837 | 15881 | 15881 |
| 1984 | 16135 | 15952 | 15749 | 15759 | 15759 | 15764 | 15777 | 15781 |
| 1985 | 14933 | 14816 | 14600 | 14604 | 14604 | 14601 | 14595 | 14597 |
| 1986 | 13255 | 13111 | 12862 | 12858 | 12859 | 12854 | 12863 | 12856 |
| 1987 | 14743 | 14676 | 14297 | 14320 | 14320 | 14314 | 14356 | 14291 |
| 1988 | 20008 | 19998 | 19576 | 19637 | 19637 | 19640 | 19713 | 19602 |
| 1989 | 18408 | 18325 | 18234 | 18277 | 18277 | 18283 | 18354 | 18308 |
| 1990 | 13716 | 13517 | 13536 | 13552 | 13553 | 13575 | 13602 | 13659 |
| 1991 | 14492 | 14127 | 13976 | 14025 | 14027 | 14068 | 14081 | 14174 |
| 1992 | 15958 | 15444 | 15275 | 15425 | 15476 | 15465 | 15528 | 15511 |
| 1993 | 16758 | 16202 | 16086 | 16275 | 16412 | 16299 | 16374 | 16249 |
| 1994 | 18607 | 18142 | 18044 | 18126 | 18218 | 18099 | 18143 | 18083 |
| 1995 | 17255 | 16976 | 16891 | 16890 | 16860 | 16828 | 16862 | 16872 |
| 1996 | 15057 | 14826 | 14757 | 14762 | 14728 | 14731 | 14760 | 14756 |
| 1997 | 18618 | 18270 | 18116 | 18121 | 18122 | 18116 | 18128 | 18138 |
| 1998 | 19919 | 19592 | 19404 | 19400 | 19401 | 19399 | 19397 | 19436 |
| 1999 | 18239 | 18032 | 17936 | 17936 | 17938 | 17938 | 17937 | 17963 |

Table F.3-8. Predicted annual natural-origin spring-run spawner abundance in the Central Valley from deterministic model runs.

| Year | EXP1 | EXP3 | NAA | Alt2wTUCPwoVA | Alt2woTUCPwoVA | Alt2woTUCPDeltaVA | Alt2woTUCPAllVA | Act5 |
|---|---|---|---|---|---|---|---|---|
| 1980 | 9565 | 9563 | 9561 | 9562 | 9562 | 9562 | 9562 | 9561 |
| 1981 | 7709 | 7711 | 7712 | 7712 | 7712 | 7712 | 7712 | 7712 |
| 1982 | 7919 | 7816 | 7771 | 7775 | 7775 | 7786 | 7811 | 7809 |
| 1983 | 10890 | 10645 | 10485 | 10496 | 10496 | 10514 | 10558 | 10558 |
| 1984 | 10811 | 10628 | 10424 | 10434 | 10434 | 10439 | 10452 | 10456 |
| 1985 | 9600 | 9483 | 9267 | 9270 | 9270 | 9268 | 9261 | 9263 |
| 1986 | 7932 | 7788 | 7539 | 7535 | 7536 | 7531 | 7540 | 7533 |
| 1987 | 9411 | 9342 | 8964 | 8987 | 8987 | 8981 | 9023 | 8958 |
| 1988 | 14674 | 14664 | 14243 | 14303 | 14303 | 14306 | 14379 | 14269 |
| 1989 | 13075 | 12991 | 12901 | 12944 | 12944 | 12950 | 13020 | 12975 |
| 1990 | 8387 | 8187 | 8206 | 8222 | 8223 | 8245 | 8272 | 8329 |
| 1991 | 9159 | 8794 | 8643 | 8692 | 8694 | 8735 | 8748 | 8841 |
| 1992 | 10625 | 10111 | 9942 | 10092 | 10143 | 10131 | 10195 | 10178 |
| 1993 | 11433 | 10878 | 10762 | 10950 | 11088 | 10975 | 11049 | 10924 |
| 1994 | 13274 | 12807 | 12710 | 12792 | 12885 | 12766 | 12810 | 12749 |
| 1995 | 11932 | 11653 | 11568 | 11567 | 11537 | 11505 | 11539 | 11549 |
| 1996 | 9734 | 9501 | 9434 | 9439 | 9405 | 9408 | 9437 | 9433 |
| 1997 | 13289 | 12945 | 12791 | 12796 | 12797 | 12792 | 12804 | 12813 |
| 1998 | 14596 | 14269 | 14081 | 14077 | 14078 | 14076 | 14074 | 14113 |
| 1999 | 12915 | 12707 | 12611 | 12611 | 12613 | 12614 | 12613 | 12638 |

Table F.3-9. Predicted mean lambda ($N_t/N_{t+1}$) for total spring-run spawner abundance in the Central Valley, including both natural- and hatchery-origin fish, from deterministic model runs.

| WYT | EXP1 | EXP3 | NAA | Alt2wTUCPwoVA | Alt2woTUCPwoVA | Alt2woTUCPDeltaVA | Alt2woTUCPAllVA | Act5 |
|---|---|---|---|---|---|---|---|---|
| C | 1.074 | 1.072 | 1.072 | 1.072 | 1.072 | 1.072 | 1.072 | 1.073 |
| D | 0.958 | 0.960 | 0.962 | 0.962 | 0.962 | 0.962 | 0.962 | 0.962 |
| AN | 1.050 | 1.049 | 1.053 | 1.055 | 1.060 | 1.054 | 1.054 | 1.048 |

| WYT | EXP1 | EXP3 | NAA | Alt2wTUCPwoVA | Alt2woTUCPwoVA | Alt2woTUCPDeltaVA | Alt2woTUCPAllVA | Act5 |
|---|---|---|---|---|---|---|---|---|
| W | 1.016 | 1.016 | 1.013 | 1.013 | 1.013 | 1.013 | 1.013 | 1.014 |
| All | 1.011 | 1.010 | 1.010 | 1.010 | 1.010 | 1.010 | 1.010 | 1.010 |

Table F.3-10. Predicted terminal lambda ($N_{t=19}/N_{t=1}$) for total spring-run spawner abundance in the Central Valley, including both natural- and hatchery-origin fish, from deterministic model runs.

| EXP1 | EXP3 | NAA | Alt2wTUCPwoVA | Alt2woTUCPwoVA | Alt2woTUCPDeltaVA | Alt2woTUCPAllVA | Act5 |
|---|---|---|---|---|---|---|---|
| 1.225 | 1.211 | 1.205 | 1.205 | 1.205 | 1.205 | 1.205 | 1.207 |

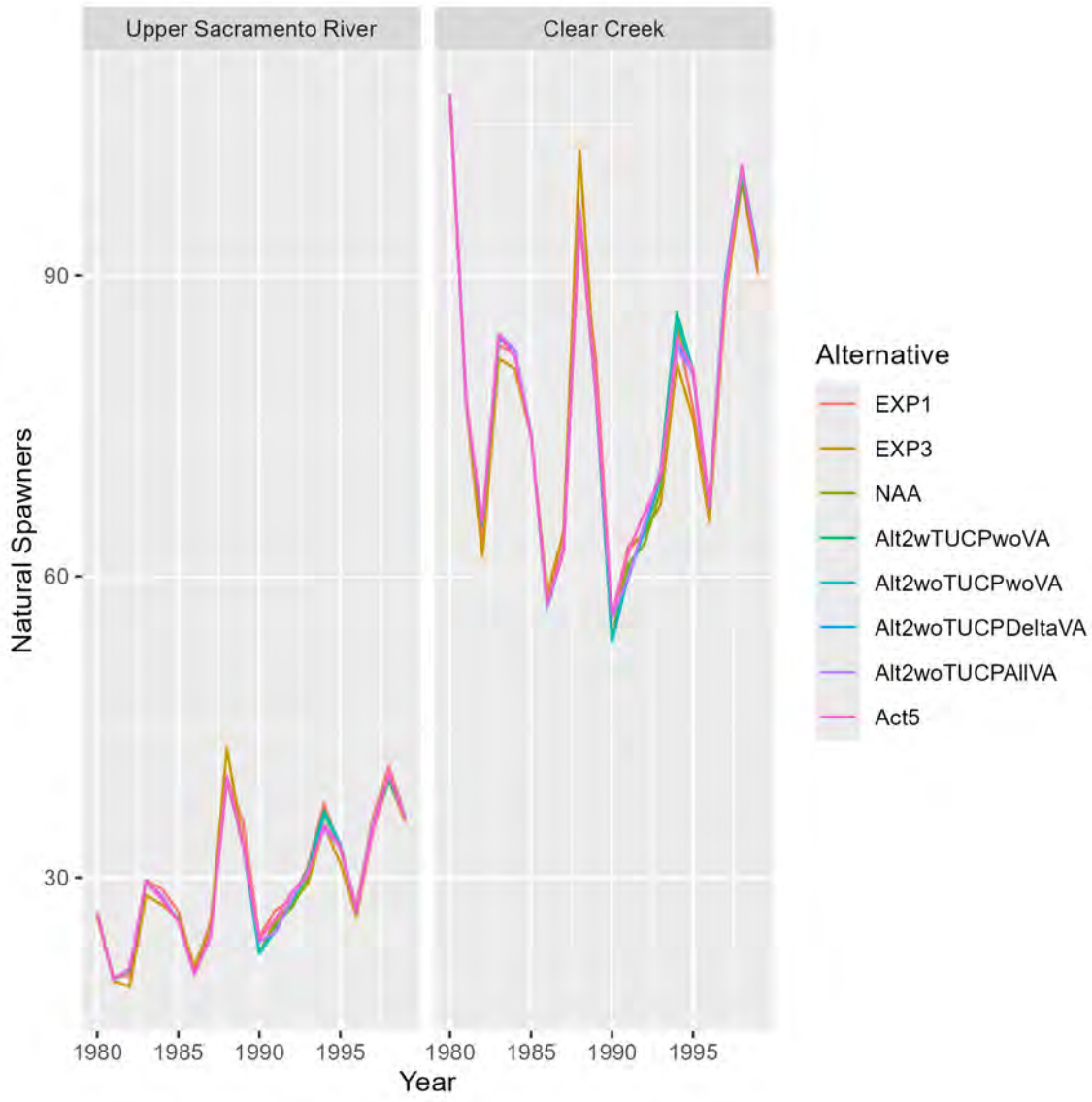



Figure F.3-22. Expected annual abundances of natural-origin spring-run Chinook salmon spawners in the Upper Sacramento River and Clear Creek from deterministic model runs.

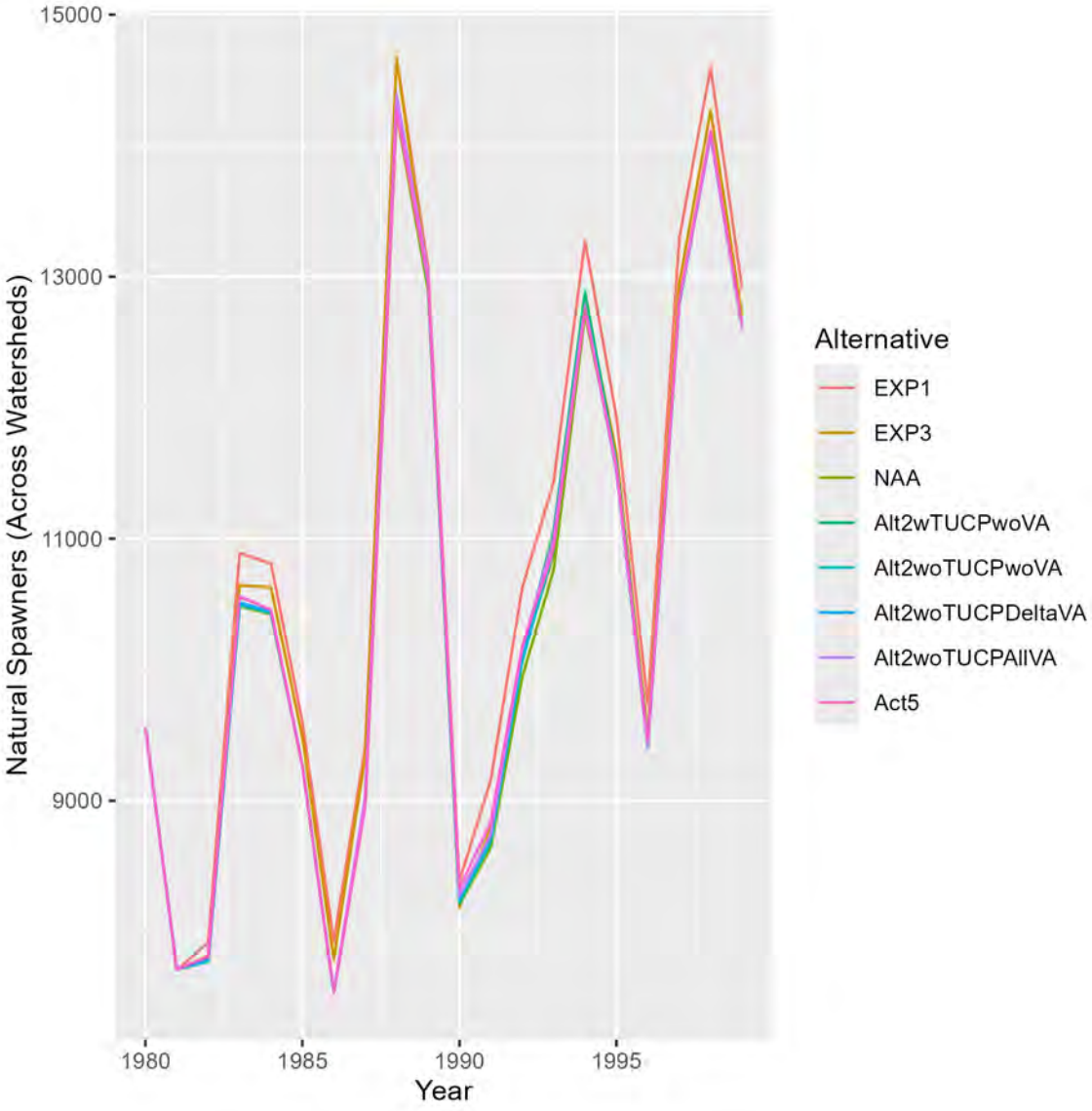



Figure F.3-23. Expected annual abundances of natural-origin spring-run Chinook salmon spawners in the Central Valley from deterministic model runs.

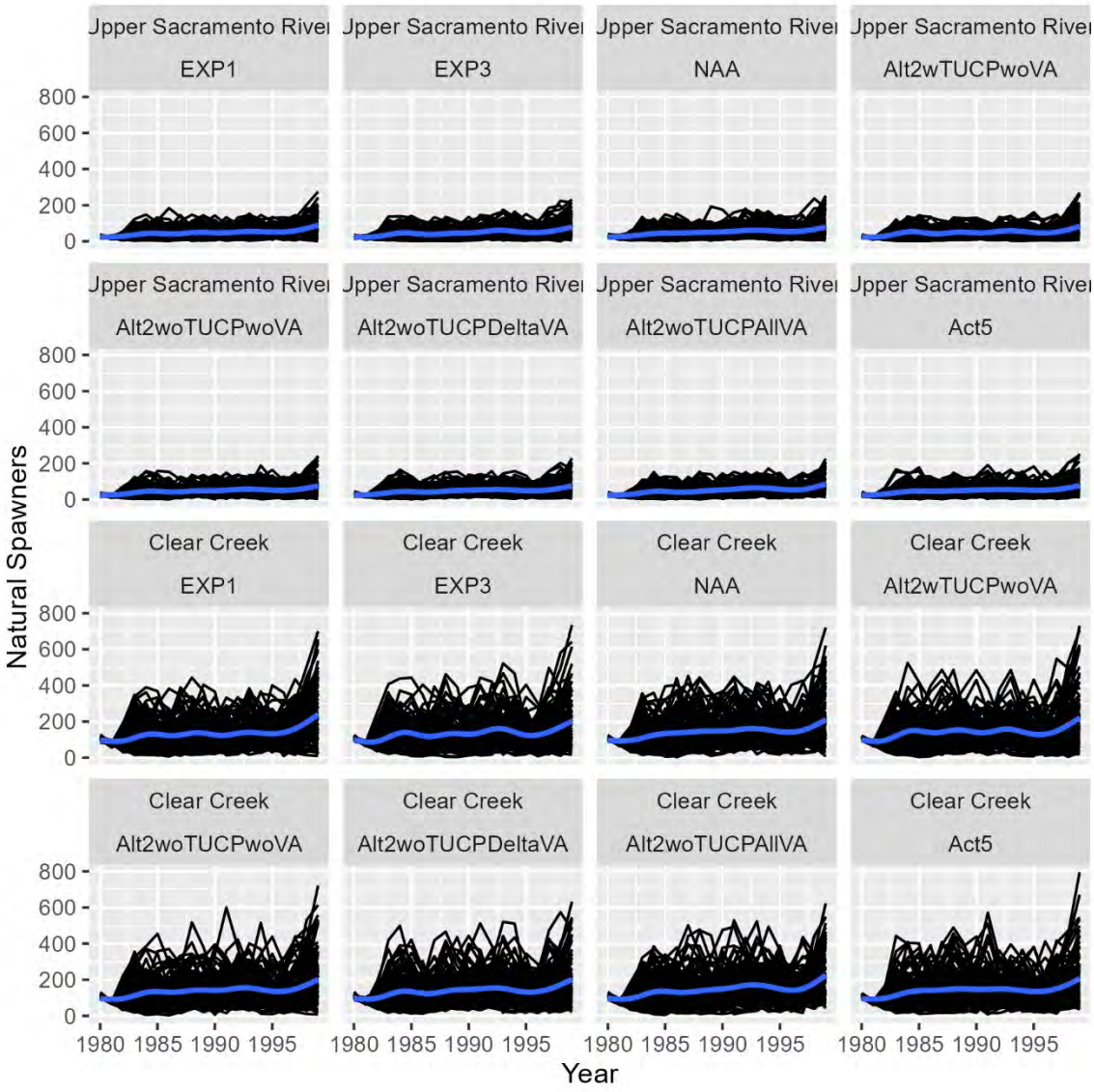



Figure F.3-24. Expected annual abundances of natural-origin spring-run Chinook salmon spawners in the Central Valley from stochastic model runs. Black lines represent iteration-specific abundances over time and the blue line represents an expected trend obtained by 'gam' smoothing in ggplot2.

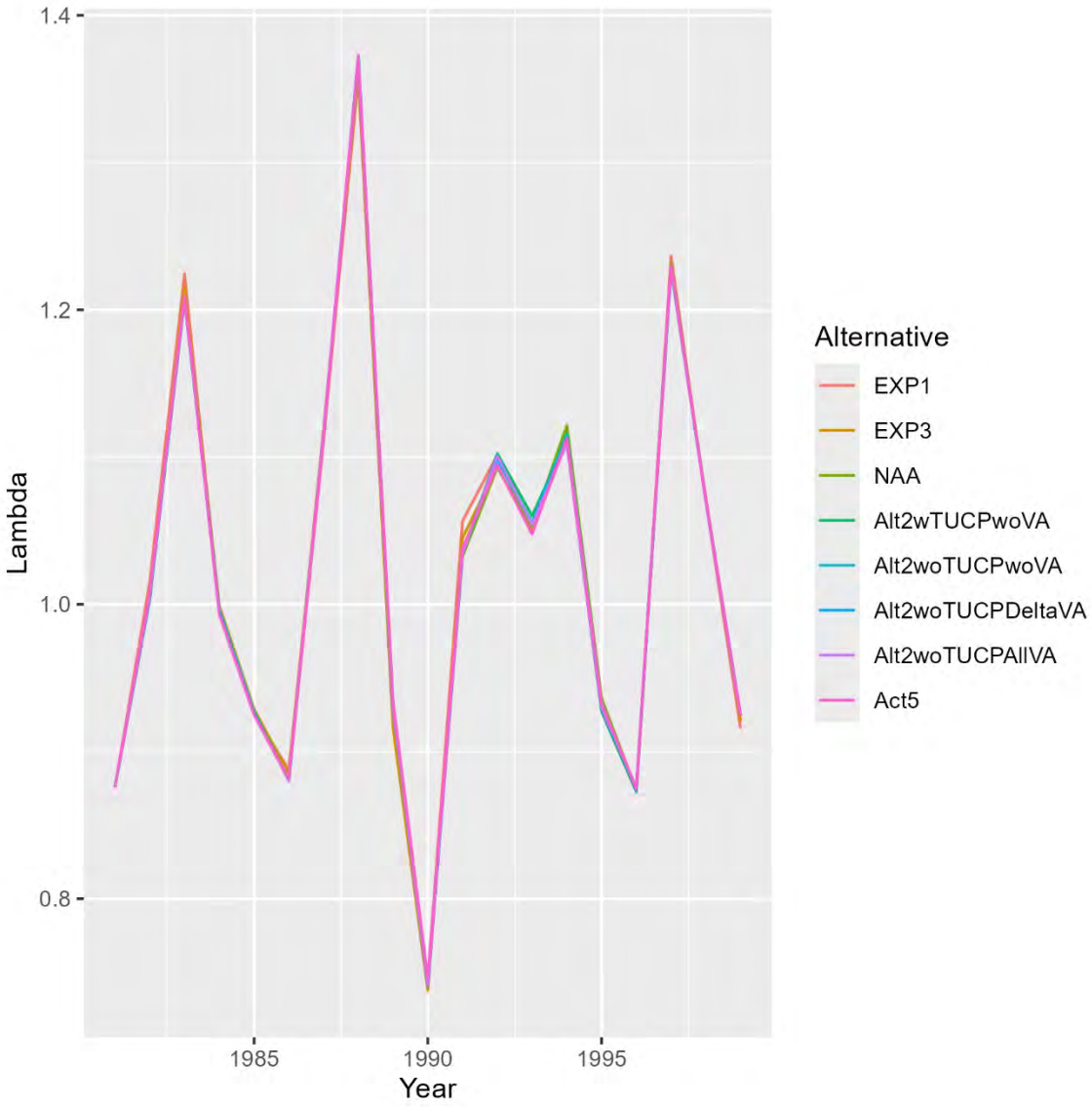



Figure F.3-25. Predicted annual lambda values ($N_t/N_{t+1}$) for total spring-run spawner abundance in the Central Valley, including both natural- and hatchery-origin fish, from deterministic model runs.

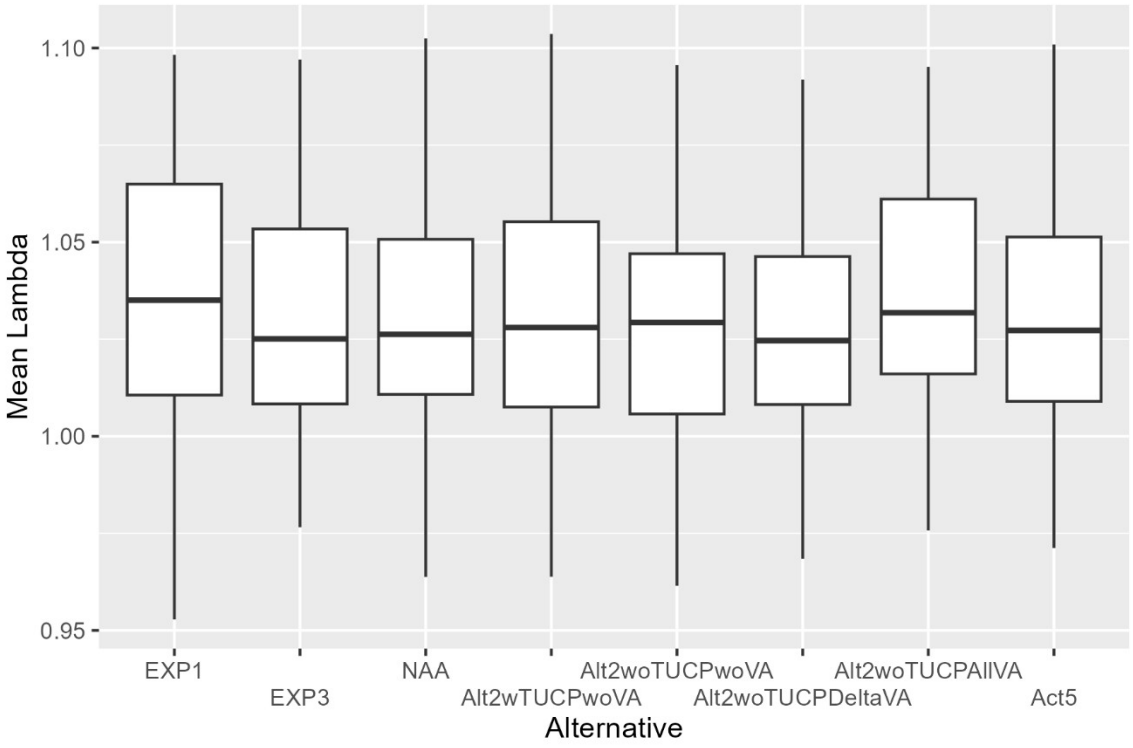



Figure F.3-26. Predicted mean lambda values ($N_t/N_{t+1}$) for total spring-run spawner abundance in the Central Valley, including both natural- and hatchery-origin fish, across stochastic model iterations.

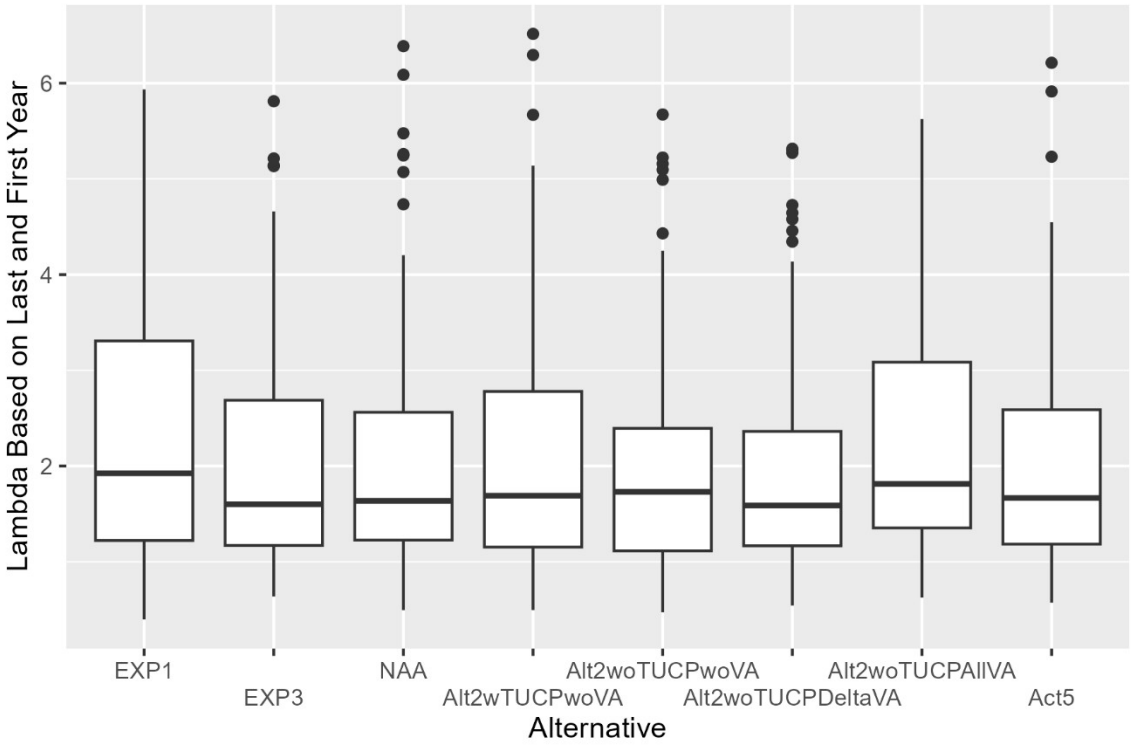



Figure F.3-27. Predicted end lambda values ($N_{t=19}/N_{t=1}$) for total spring-run spawner abundance in the Central Valley, including both natural- and hatchery-origin fish, across stochastic model iterations.

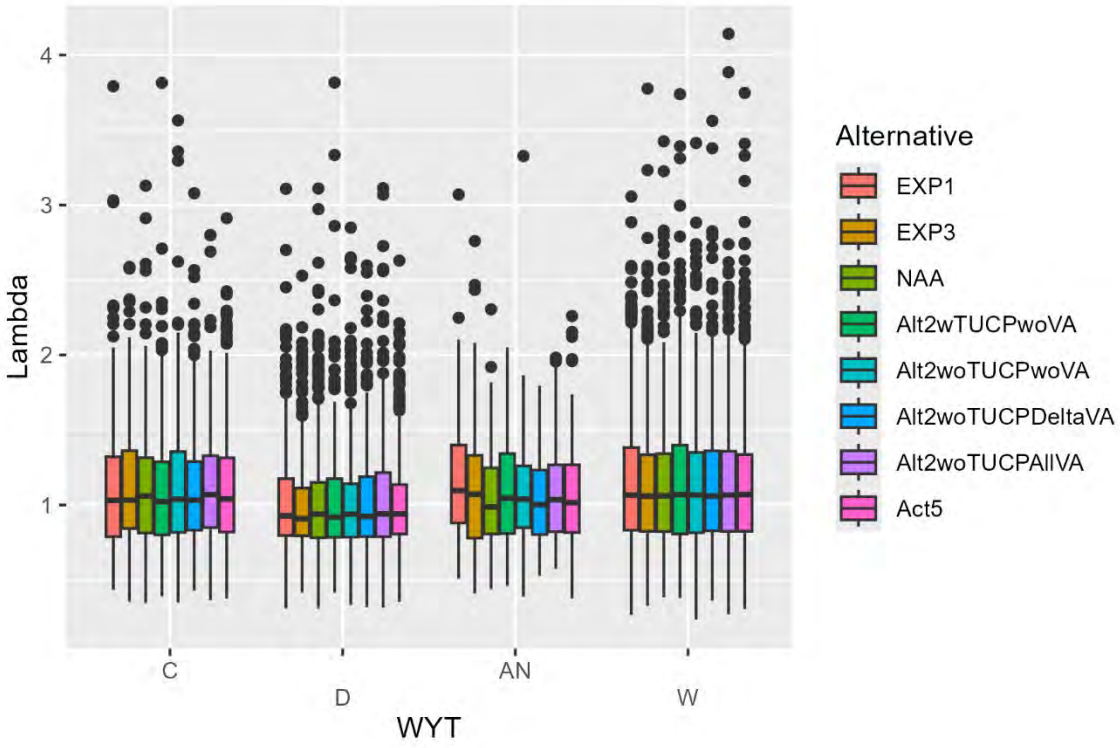



Figure F.3-28. Predicted lambda values across water year types ($N_{t+1}/N_t$) for total spring-run spawner abundance in the Central Valley, including both natural- and hatchery-origin fish, across 100 stochastic model iterations.

#### *F.3.3.2.2 Life stage-specific demographic parameters*

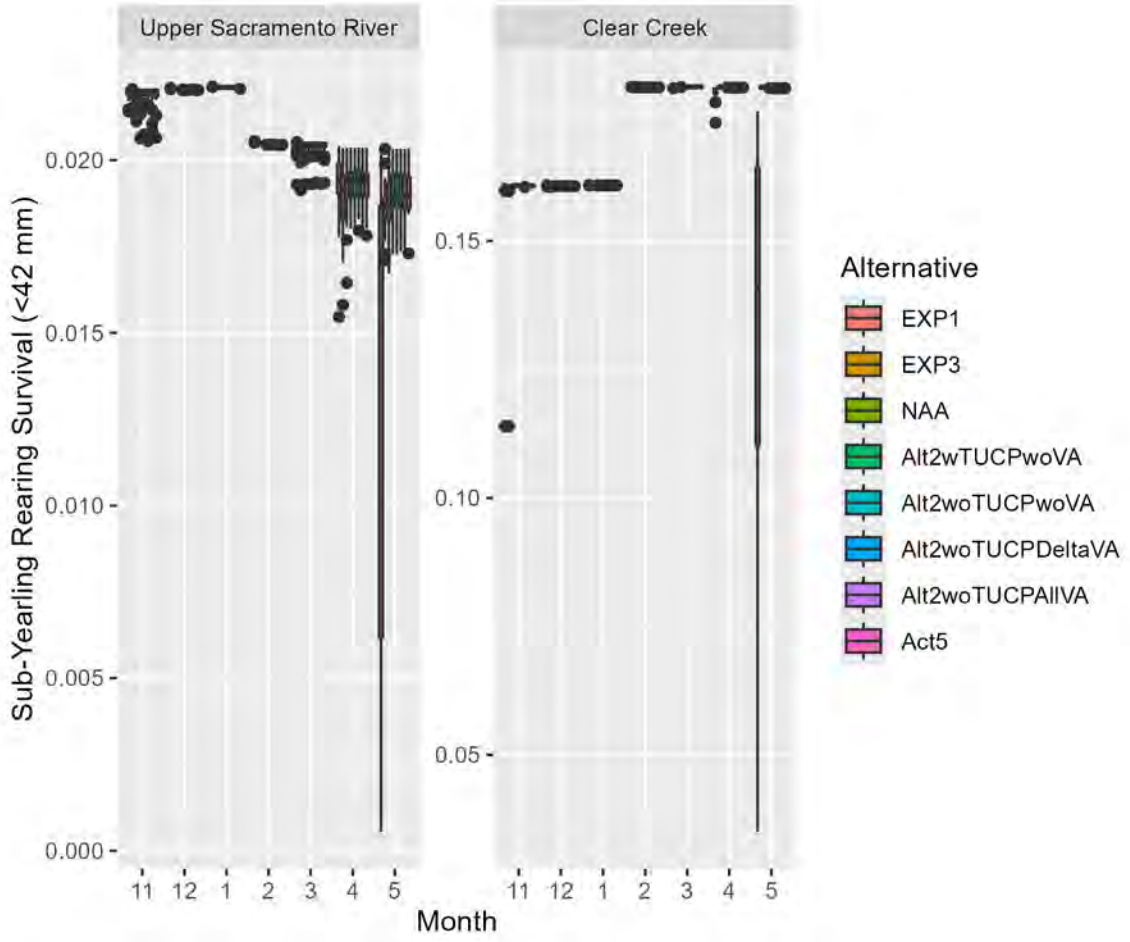



Figure F.3-29. Predicted small, young-of-year, juvenile rearing survival for spring-run Chinook salmon in the Upper Sacramento River and Clear Creek from deterministic model runs.

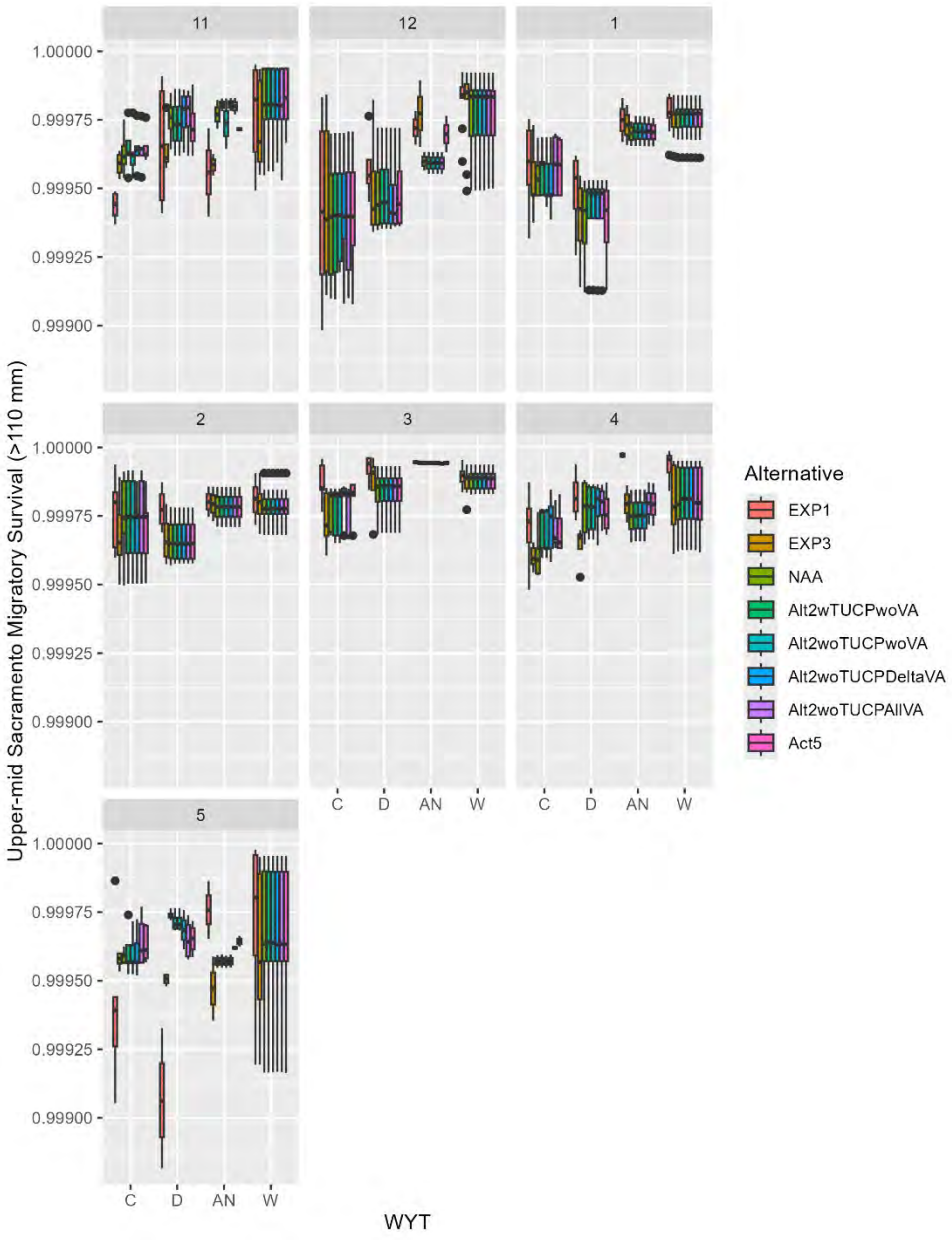



Figure F.3-30. Predicted smolt migratory survival for spring-run Chinook salmon in the Upper-mid Sacramento River from deterministic model runs, faceted by month.

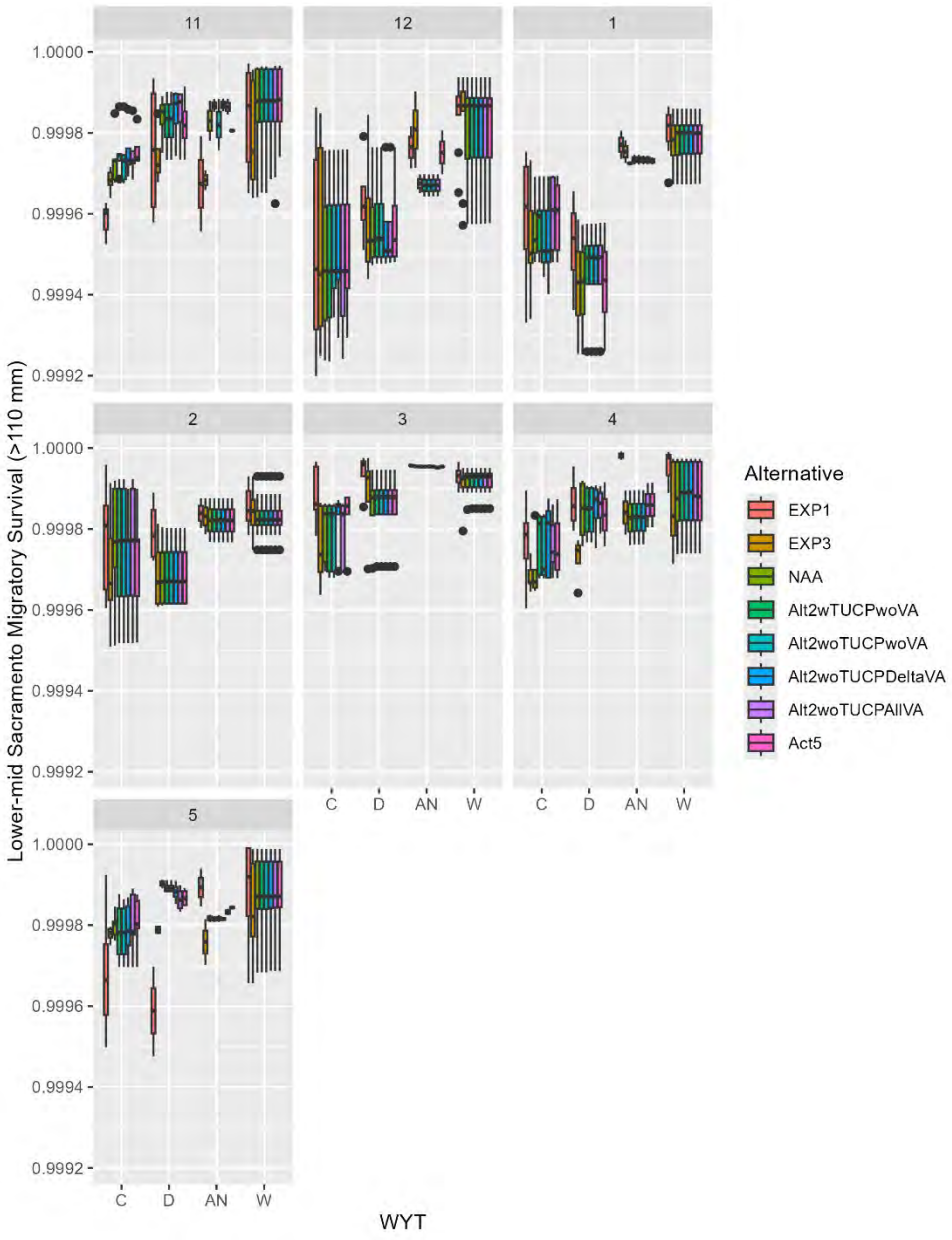



Figure F.3-31. Predicted smolt migratory survival for spring-run Chinook salmon in the Lower-mid Sacramento River from deterministic model runs, faceted by month.

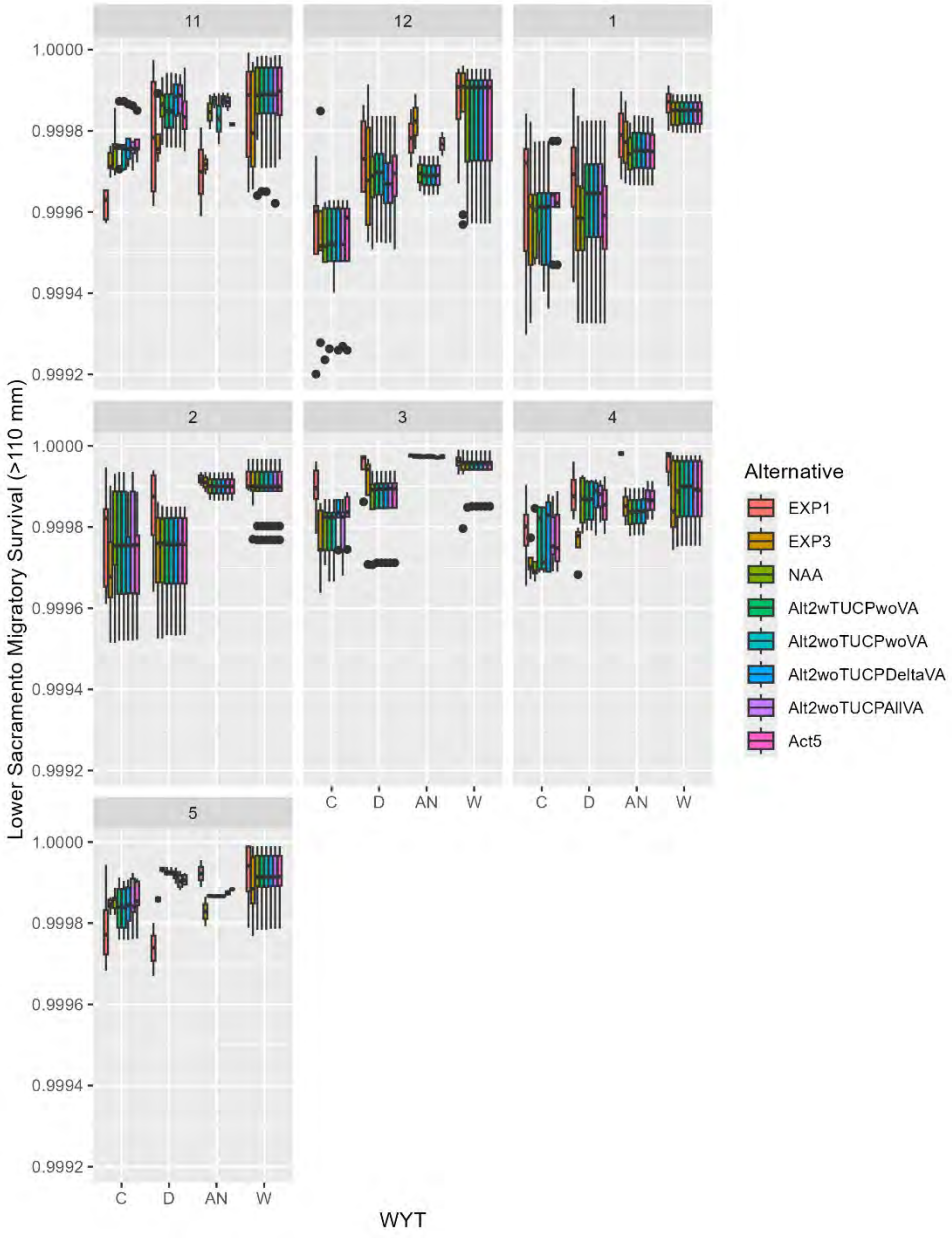



Figure F.3-32. Predicted smolt migratory survival for spring-run Chinook salmon in the Lower Sacramento River from deterministic model runs, faceted by month.

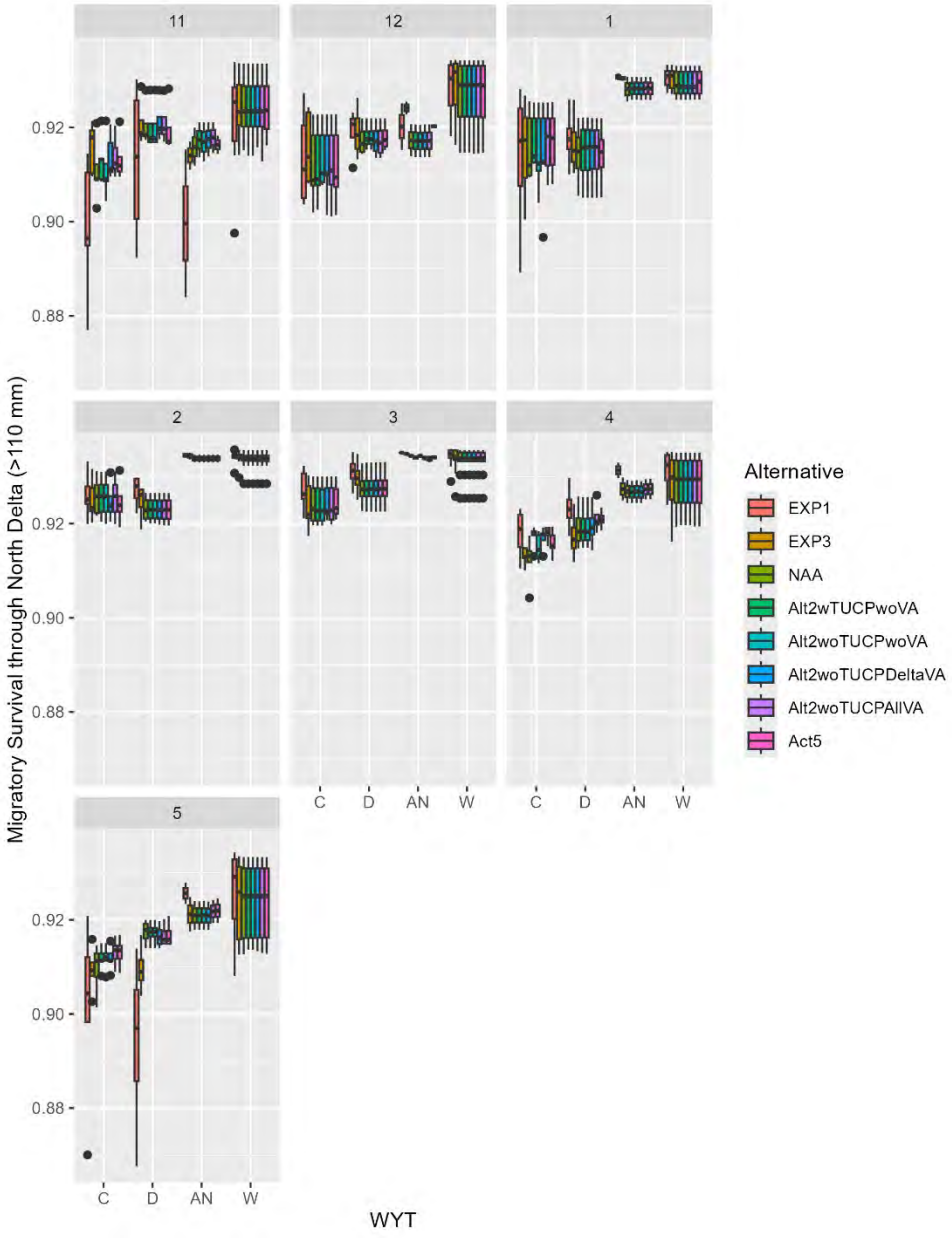



Figure F.3-33. Predicted smolt migratory survival for spring-run Chinook salmon in the North Delta from deterministic model runs, faceted by month.

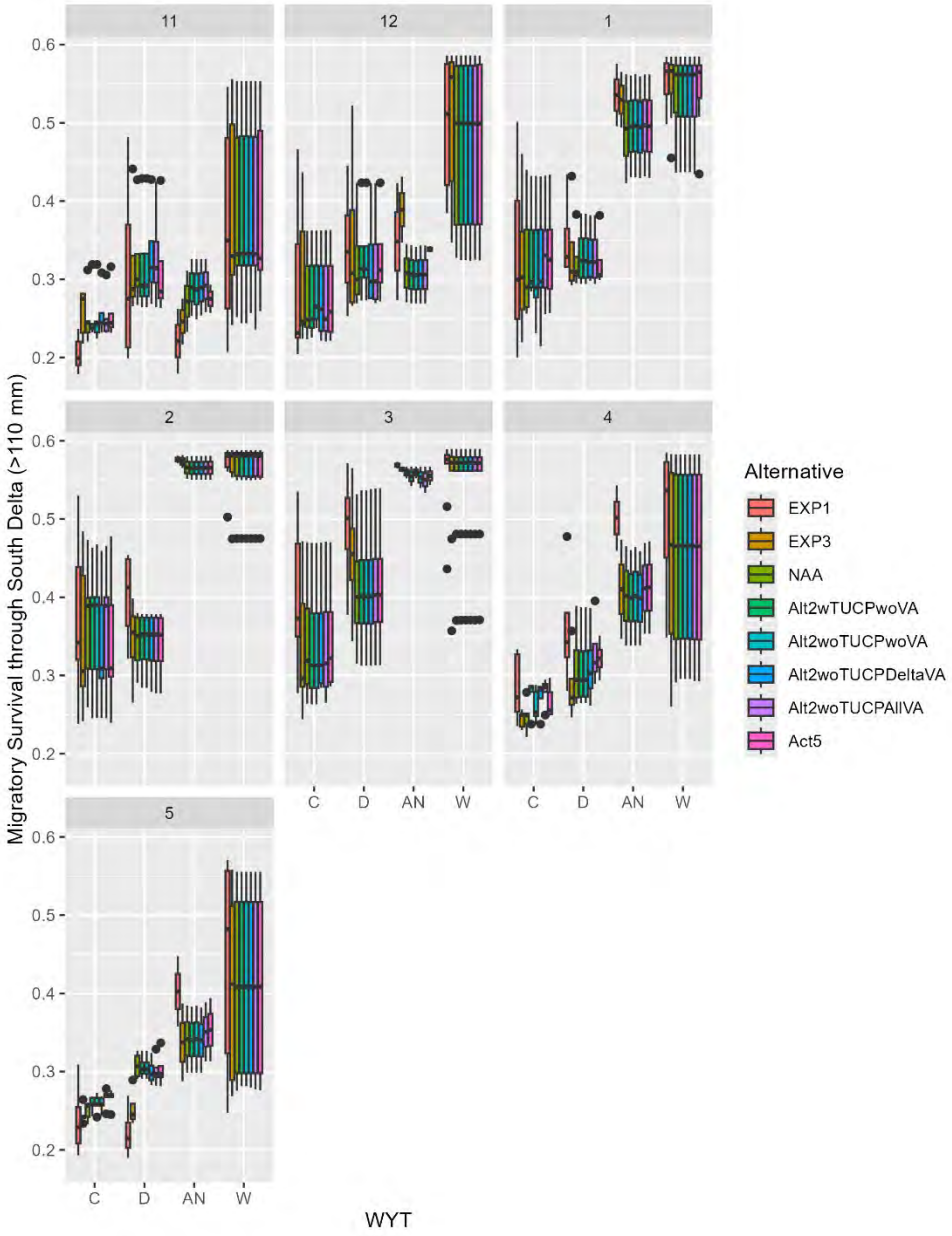



Figure F.3-34. Predicted smolt migratory survival for spring-run Chinook salmon in the South Delta from deterministic model runs, faceted by month.

## F.3.4 References

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Appendix F, Modeling

# Attachment F.4 Delta Smelt Life Cycle Model with Entrainment

## F.4.1 Model Overview

Polansky et al. (2021) developed a hierarchical stage-structured state-space life cycle model for Delta Smelt to identify factors with the strongest statistical support for having influence on the species' recruitment and survival. This modeling approach is useful as an ecological modeling tool because it can separate descriptions of state and observation processes and permit the integration of disparate data sets. This Delta Smelt life cycle model was later expanded from four to seven life stages with a component that separately describes the entrainment process at the Delta export facilities (Smith et al. 2021). This model produces expected values for larval recruitment and survival at the subsequent life stages. The most statistically supported model variant in Smith et al. (2021) used means of December-June Old and Middle River (OMR) values and June-August outflow aggregated from monthly values or longer timescales; therefore, CalSim output for the scenarios/alternatives can be directly incorporated into the model framework. The most statistically supported model in Smith et al. (2021) also included a food/prey metric term during the months of January to March. By using the relationship between zooplankton density and salinity, CalSim-predicted X2 values were then used to estimate the expected change in the food/prey metric for January-March months across alternatives. Reclamation used this model to calculate expected annual population growth rate ($\lambda$; the abundance of current year divided by abundance from previous year) for alternative flow scenarios by using CalSim outputs and the subsequent zooplankton model. The metric of interest will be the geometric mean of $\lambda$ for a specified time frame (e.g., 1995-2015), which will be compared across alternatives. For the purpose of this text, Smith et al.'s (2021) model will be referred to as the Delta Smelt Life Cycle Model with Entrainment (LCME).

## F.4.2 Methods, assumptions

The Delta Smelt LCME was run based on flow inputs from CalSim 3. The approach followed the Collaborative Science and Adaptive Management Program (CSAMP) Delta Smelt Structured Decision Making (SDM) process, where historical years (1995-2015) were adjusted according to a CalSim 3 scenario and the geometric mean $\lambda$ was calculated for each scenario. There is an expectation that zooplankton abundance (i.e., the prey item for Delta Smelt) would change based on flow (Kimmerer and Rose 2018), and as such, a zooplankton submodel constructed for the Delta Coordination Group and CSAMP Delta Smelt SDM was applied to the CalSim 3 scenarios. For the zooplankton term, upper and lower 95% confidence intervals were calculated and applied to the analysis to better understand the sensitivity of the model output to variation in zooplankton

abundance. We did not update any other model inputs (turbidity, temperature, and predators) due to the complexity and lack of predictive models associated with the other values. Furthermore, it is unclear whether flow changes at a project operations scale meaningfully affect the functioning of the Bay-Delta food web. What is of interest in this analysis is to determine how much the expected long-term abundance of Delta Smelt might change based on the proposed changes in water management.

### F.4.2.1 Main model

Monthly flow data were pulled from CalSim 3 dss files through R and were summed or averaged depending on the variables for the LCME. Old and Middle River flow variables were either extracted directly from CalSim 3 as monthly average value in cfs, or averaged if the timespan covered two months (Table F.4-1). Sum of Delta outflow from June to August was calculated by multiplying the CalSim 3 predicted monthly Net Delta Outflow Index (NDOI-ADD + NDOI-MIN) by the number of days for each month and then added together. The total values in cfs per day were then converted to acre-feet (1 cfs = 1.983 acre-feet per day). Methods and findings of the original application of LCME can be found in Smith et al. (2021). The list of LCME flow variables that were acquired from the CalSim 3 runs can be found in Table F.4-1. R script and data used for the model can be found at (https://github.com/BDO-Science/DeltaSmelt_LCM).

Table F.4-1. List of covariates used in LCME that were replaced with values from CalSim 3 for each alternative. The Old and Middle River covariates imply entrainment as the mortality mechanism (Smith 2019; Smith et al. 2020). The Delta outflow covariate implies foraging habitat suitability as a suite of mechanisms that align better when outflow is elevated (Smith and Nobriga 2023). The covariates are listed in the order they affect a given cohort in the model.

| Life stage | Covariate | Unit | Covariate summary details |
|---|---|---|---|
| Early post-larval (May) | April-May Old and Middle river flow | cfs | Mean of the daily sum of tidally filtered flows in the Old and Middle rivers during April to May |
| Late post-larval (June) | June-August Outflow | Acre-foot | Sum of the volume of water moving past a point near the confluence of the Sacramento and San Joaquin rivers, near Pittsburg, California, during June to August |
| Late post-larval (June) | June Old and Middle river flow | cfs | Mean of the daily sum of tidally filtered flows in the Old and Middle rivers during June |
| Early subadult (October-November) | December-January Old and Middle river flow | cfs | Mean of the daily sum of tidally filtered flows in the Old and Middle rivers during December to January |
| Late subadult (January-February) | February Old and Middle river flow | cfs | Mean of the daily sum of tidally filtered flows in the Old and Middle rivers during February |

| Life stage | Covariate | Unit | Covariate summary details |
|---|---|---|---|
| Early adult (March) | March Old and Middle river flow | cfs | Mean of the daily sum of tidally filtered flows in the Old and Middle rivers during March |

#### *F.4.2.1.1 Assumptions related to the model calibration and new flow inputs*

- The LCME was parameterized using Old and Middle River (OMR) flow values derived from the USGS gages and Delta Outflow estimates from DAYFLOW (https://data.cnra.ca.gov/dataset/dayflow), which may differ to some extent with how CalSim 3 calculates these values (OMR and Delta Outflow).
- The LCME separately accounts for the influence of OMR and turbidity on delta smelt entrainment. However, the CalSim 3 runs had assumptions built into them about how frequently turbidity triggers that affect OMR would occur. This confounds the turbidity effect on entrainment with the OMR effect in a way that the LCME cannot account for. This may lead to a negative bias in the predicted effect of entrainment; in other words, it may be underestimated somewhat.
- The only flow data included in the published LCME (Smith et al. 2021) are OMR and June-August Delta Outflow. In essence, the LCME assumes that these are the most influential flow variables associated with Delta Smelt recruitment and survival. This assumption was supported by Polansky et al. (2021), which is why these flow variables were carried forward and re-tested in the Smith et al. (2021) model.
- This analysis consisted of the years 1995 to 2015, so it is unclear how representative model predictions of Delta Smelt population trajectory will be when simulating scenarios that include environmental conditions outside the range of observations the model was fit to. In addition, it is unclear how model parameter estimates and predictions of Delta Smelt population may be affected by climate change impacts and the ongoing and proposed supplementation efforts.

### F.4.2.2 Zooplankton model

To calculate zooplankton abundance/density changes related to changes in flow associated with the CalSim 3 scenarios, Reclamation leveraged the zooplankton abundance estimation process used in the CSAMP Delta Smelt SDM group. To replicate the zooplankton abundance calculation used in the CSAMP Delta Smelt SDM process, estimated X2 values for each month were first retrieved from CalSim 3 dss files. These monthly X2 values were then converted into salinity values for each region defined in the Delta Smelt Individual-Based Model (IBM) (Rose et al. 2013) using a generalized linear model developed by Compass (see Attachment 1).

Similar to the CSAMP Delta Smelt SDM process, Generalized Additive Models (GAMs) were constructed to predict the zooplankton density Delta Smelt were expected to spatially overlap with given a salinity level for each IBM region and zooplankton taxon (see Attachment 2). Predictor variables for each GAM were the tensor product smooth of the interaction between salinity and day of year, as well as random effects for year and station (when more than one station exists in the dataset). To produce the monthly model output, the 15th of each month was used as the data input.

Once salinity values were calculated for each Delta Smelt IBM region, month, and scenario, expected zooplankton densities were then estimated for every zooplankton taxon, month, region, and scenario using output from the GAMs. Upper and lower 95% confidence intervals from these predictions were calculated through 1,000 independent draws from the model distribution, similar to a bootstrapping process. Just as was done in the CSAMP Delta Smelt SDM process, for each alternative, the initial output was scalar values of the taxa-specific zooplankton density under the particular management conditions divided by the same prediction under baseline/historical conditions. However, because 0 values were present in the baseline, it resulted in infinite values for the scalar calculations. These infinite values were replaced with the maximum finite scalar calculated from model predictions for a specific alternative, taxon, region, and month (across years). When this step still yielded no finite scalar value, the maximum finite scalar value from a given alternative, taxon, and month was used instead.

Because the Delta Smelt IBM and LCME differ in how regions are defined and how zooplankton taxa are grouped, additional conversions were needed. The Delta will continue to be managed as a freshwater ecosystem (i.e., not expected to vary much in terms of salinity) in the near future, and as such, any IBM regions upstream of the Confluence were ignored, and likewise LCME North and South regions were left as is (Figure F.4-1). The Far West LCME region only overlapped with the SW Suisun IBM region and thus, the SW Suisun IBM region results were used to define zooplankton changes in the Far West LCME region. To calculate zooplankton changes in the West LCME region, the following IBM regions were used: NW Suisun, NE Suisun, SE Suisun, Suisun Marsh, and the Confluence. Results from the five IBM regions within the West LCME region were aggregated by multiplying each IBM region's value with the proportion of the region's water volume relative to the total water volume across all five regions. The calculations were as follows:

- Far West LCME region: SW Suisun IBM region (Figure F.4-1)
- West LCME region: (Confluence IBM region x 0.233) + (Suisun Marsh IBM region x 0.174) + (NE Suisun IBM region x 0.110) + (SE Suisun IBM region x 0.220) + (NW Suisun IBM region x 0.264)

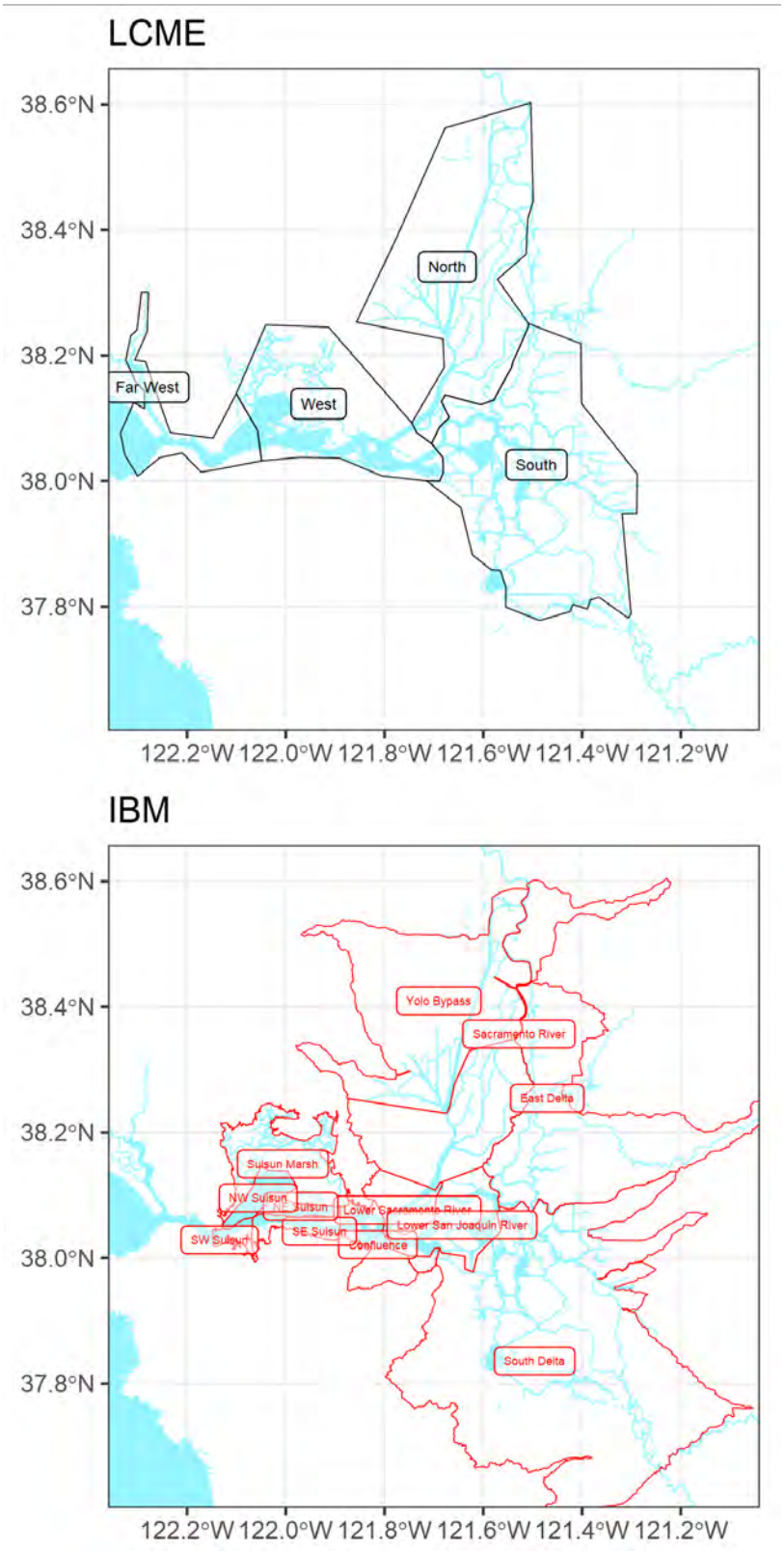



Figure F.4-1. Map of the San Francisco Bay-Delta with LCME regions shown in black (top) and IBM regions shown in red (bottom).

The LCME uses aggregate zooplankton biomass per volume values calculated by summing a number of different zooplankton species and life stages (see Attachment 3), whereas IBM taxa were more specific, often down to species. Therefore, the proportion of each zooplankton taxa that make up the aggregate zooplankton groups in the LCME data input had to be first estimated for each month and LCME region using raw data provided by the primary authors of the LCME ("ZooMysid_74_19_df.csv"). Using these proportions, the final scalar multiplier values were acquired for the Far West and West LCME regions and zooplankton aggregate groups. In other words, the multiplier scalar values were applied based on the proportion of the particular taxon that make up the prey biomass for a given month and LCME region. For example, if *Pseudodiaptomus forbesi* adults are expected to be twice as abundant and *Eurytemora affinis* adults are expected to be three times as abundant under an alternative, and the two species make up 50% of the biomass each, the final multiplier scalar values will be 2.5 (i.e., [2 x 0.5] + [3 x 0.5]).

These final scalar multipliers were then applied to the LCME aggregated zooplankton dataset ("ZooMysid_74_19_df_median.csv") for the median estimate and the lower and upper 95% confidence interval values (Figure F.4-2). These predictions were then capped at the maximum value that was observed in the LCME aggregated zooplankton dataset ("ZooMysid_74_19_df_median.csv") for the region and month using only data from 1995 to 2019. Lastly, the prey covariates (see Table F.4-3) were acquired by calculating the mean across the four LCME regions.

Table F.4-2. List of taxa analyzed using GAM and the equivalent LCME taxa used to calculate the proportion of each taxon that make up the prey biomass at a given month and LCME region.

| **GAM response variable** | **Taxon definition** | **LCME taxon used to calculate proportion of prey biomass for each month and LCME region** |
|---|---|---|
| acartela | *Acartiella sinensis* (copepod) adults | *Acartiella sinensis* (copepod) adults |
| eurytem | *Eurytemora affinis* (copepod) adults | *Eurytemora affinis* (copepod) adults |
| pdiapfor | *Pseudodiaptomus forbesi* (copepod) adults | *Pseudodiaptomus forbesi* (copepod) adults |
| othcalad | Other calanoid copepod adults | Other calanoid adults + *Sinocalanus doerrii* (copepod) adults |
| othcaljuv | Other calanoid copepodites | Calanoid copepodids + Other calanoid copepodids + *Eurytemora affinis* copepodids + *Sinocalanus doerrii* copepodids + *Pseudodiaptomus* spp. Copepodids + *Acartiella sinensis* copepodids + *Acartia* spp. Copepodids + Diaptomidae copepodids + *Tortanus* spp. copepodids |

| GAM response variable | Taxon definition | LCME taxon used to calculate proportion of prey biomass for each month and LCME region |
|---|---|---|
| limno | *Limnoithona* spp. copepods (all stages) | *Limnoithona* spp. + *Limnoithona sinensis* + *Limnoithona tetraspina* |
| othcyc | Other cyclopoid copepods (all stages) | *Acanthocyclops vernalis* |
| allcopnaup | Copepod nauplii (all spp.) | Copepod nauplii + Other copepod nauplii + *Eurytemora affinis* nauplii + *Sinocalanus doerrii* nauplii + *Pseudodiaptomus* spp. nauplii |
| daphnia | *Daphnia* spp. (cladocerans) | *Daphnia* spp. (cladocerans) |
| othclad | Other cladocerans | *Bosmina longirostris* + *Diaphanosoma* spp. + Other cladocera |
| other | All other taxa | N/A (model was not used) |
| mysid | *Hyperacanthomysis longirostris* | *Hyperacanthomysis longirostris* + *Neomysis mercedis* |

As zooplankton covariates for natural mortality were only supported for adult life stages (Smith et al. 2021), only zooplankton modeling results from the months of February and March were used as data input for the LCME (Table F.4-3). In other words, a flow effect on delta smelt's food supply is only supported statistically in February-March. The most parsimonious mechanistic explanation is that prey available to adult fish early in the spawning season had a population-scale effect, perhaps by affecting how many eggs could be produced or affecting how many adults survived to spawn a second time. R script and data used for the salinity and zooplankton models can be found at https://github.com/BDO-Science/DeltaSmelt_LCM.

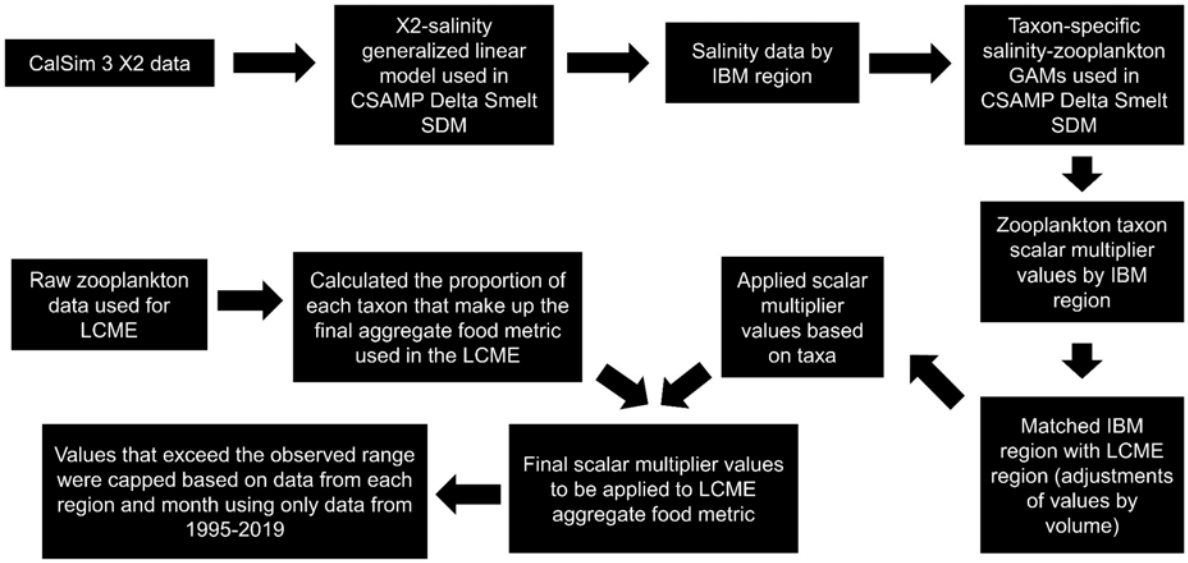



Figure F.4-2. Summary of steps taken to generate estimates of the zooplankton prey density metric for each alternative.

Table F.4-3. List of covariates used in LCME that were replaced with new values based on CalSim 3 and zooplankton model for each alternative. The mechanism implied by these prey density covariates is related to food limitation of adult spawners that may affect the number or quality of eggs produced or the number of repeat spawns the fish are able to complete before dying.

| Life stage | Covariate | Unit | Covariate summary details |
|---|---|---|---|
| Late subadult (January-February) | Food metric for February | Microgram carbon per meter$^3$ | Mean carbon-weighted density of adult calanoid copepods, cyclopoid copepods, cladocerans, and mysid shrimp observed during February zooplankton surveys |
| Early adult (March) | Food metric for March | Microgram carbon per meter$^3$ | Mean carbon-weighted density of adult calanoid copepods, cyclopoid copepods, cladocerans, and mysid shrimp observed during March zooplankton surveys |

#### *F.4.2.2.1 Assumptions related to the model calibration and new flow inputs*

The zooplankton modeling workflow used salinity to estimate changes in zooplankton biomass related to flow. There are several mechanisms by which a correlation between flow and zooplankton biomass may arise that are not based on salinity per se such as transport from upstream, estuarine circulation, etc.

The use of salinity as a covariate also meant that predicted zooplankton biomass at a particular region is static anywhere and everywhere salinity is ≤0.1 ppt salinity, even with additional Delta outflow.

The original purpose of the salinity and zooplankton modeling was to adjust zooplankton data input for the Delta Smelt IBM (Rose et al. 2013; Kimmerer and Rose 2018). As such, there were limitations when the data were converted for the purpose of Delta Smelt LCME (e.g., some missing species and/or life stages in the aggregate LCME zooplankton groups).

## F.4.3 Results

The general statistical prohibition against extrapolation suggests that model predictions are more uncertain when explanatory variables are outside the range of observations to which the model was fit. To visually inspect when the predicted flows and food were outside the observed/empirical range for the LCME, output from CalSim 3 and the zooplankton model were plotted against the empirical data (i.e., data used to estimate parameters in the LCME). See Figure F.4-3 through Figure F.4-5 below. Most CalSim-predicted flows and zooplankton predictions were not outside the range of observations to which LCME was fit, but some alternatives did include out-of-range values. EXP1 included much lower June-August Delta Outflows than observed and higher (more positive) OMR values than observed in some years. EXP3 OMR values were, similarly to EXP1, higher than observed, but EXP3 June-August Delta Outflows were within the observed range. Alt3 included higher OMR values than observed in many years between December-May. Meanwhile, Action 5, Alt1, the components of Alt2, and Alt4 contained some April-May OMR values that were more negative than the observed range. Alt1 also contained OMR values more negative than the observed data for the months of December- March. Overall, CalSim-predicted June-August Outflow values were lower than the DAYFLOW estimates under Wet or Above Normal years (Figure F.4-3, Figure F.4-6). Predicted prey biomass for all alternatives was within the observed range (Figure F.4-5). However, for certain years higher prey biomass than the empirical data were predicted for all alternatives (Figure F.4-3). As a result, mean predicted prey biomass across all alternatives were also higher than the observed data, particularly in February (Figure F.4-5 through Figure F.4-7).

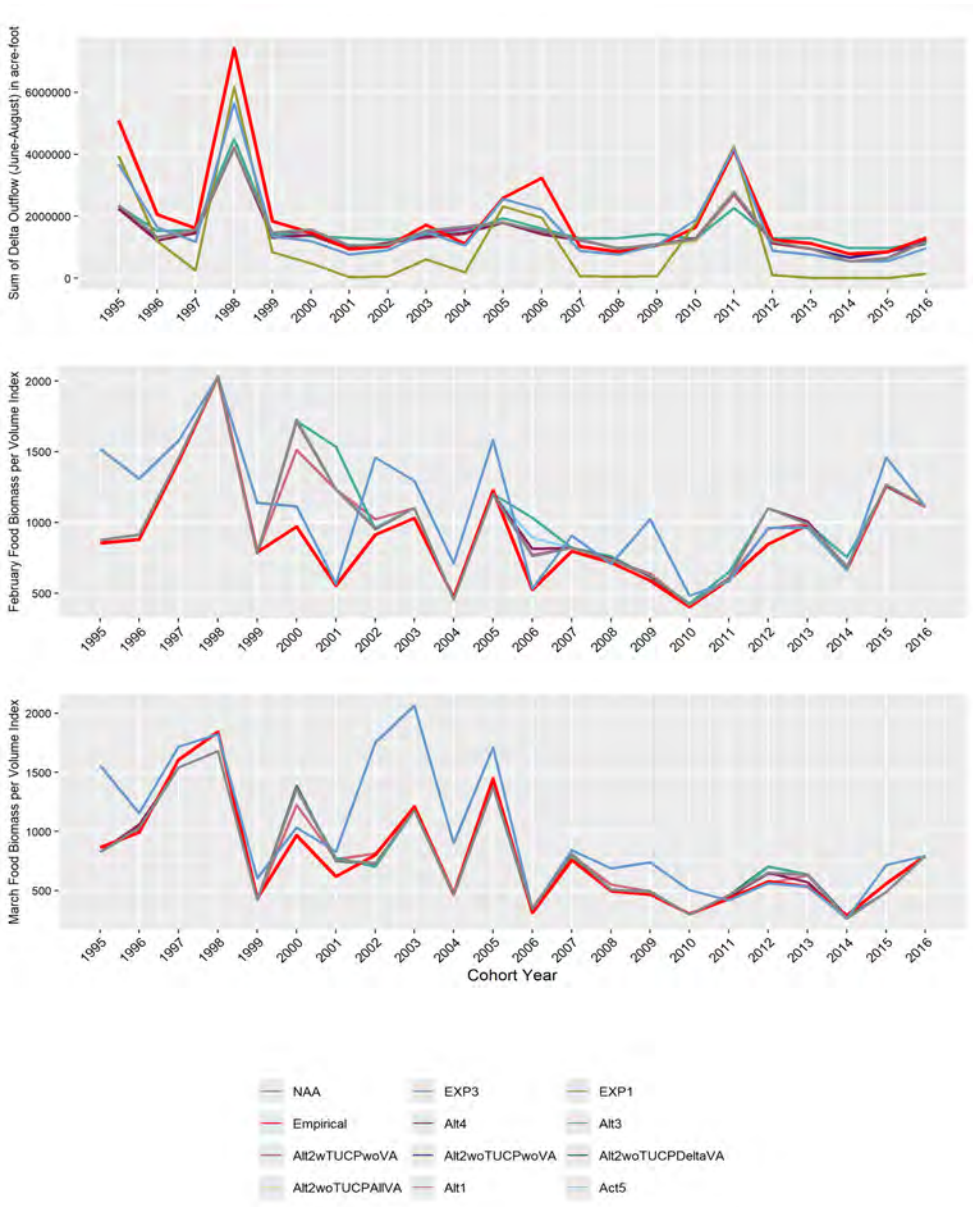



Figure F.4-3. Annual time series of outflow and prey metric data based on CalSim3 data and salinity-zooplankton model relative to the original dataset used to build the Delta Smelt LCME (labeled as "Empirical"). From top to bottom: June-August sum of Delta outflow, February, and March prey metric (biomass per volume) data composed of adult copepods, cladocerans, and mysids. Note that the x-axis represents Delta Smelt cohort year (e.g., February and March prey metric for cohort year 2012 represents data for February and March of 2013).

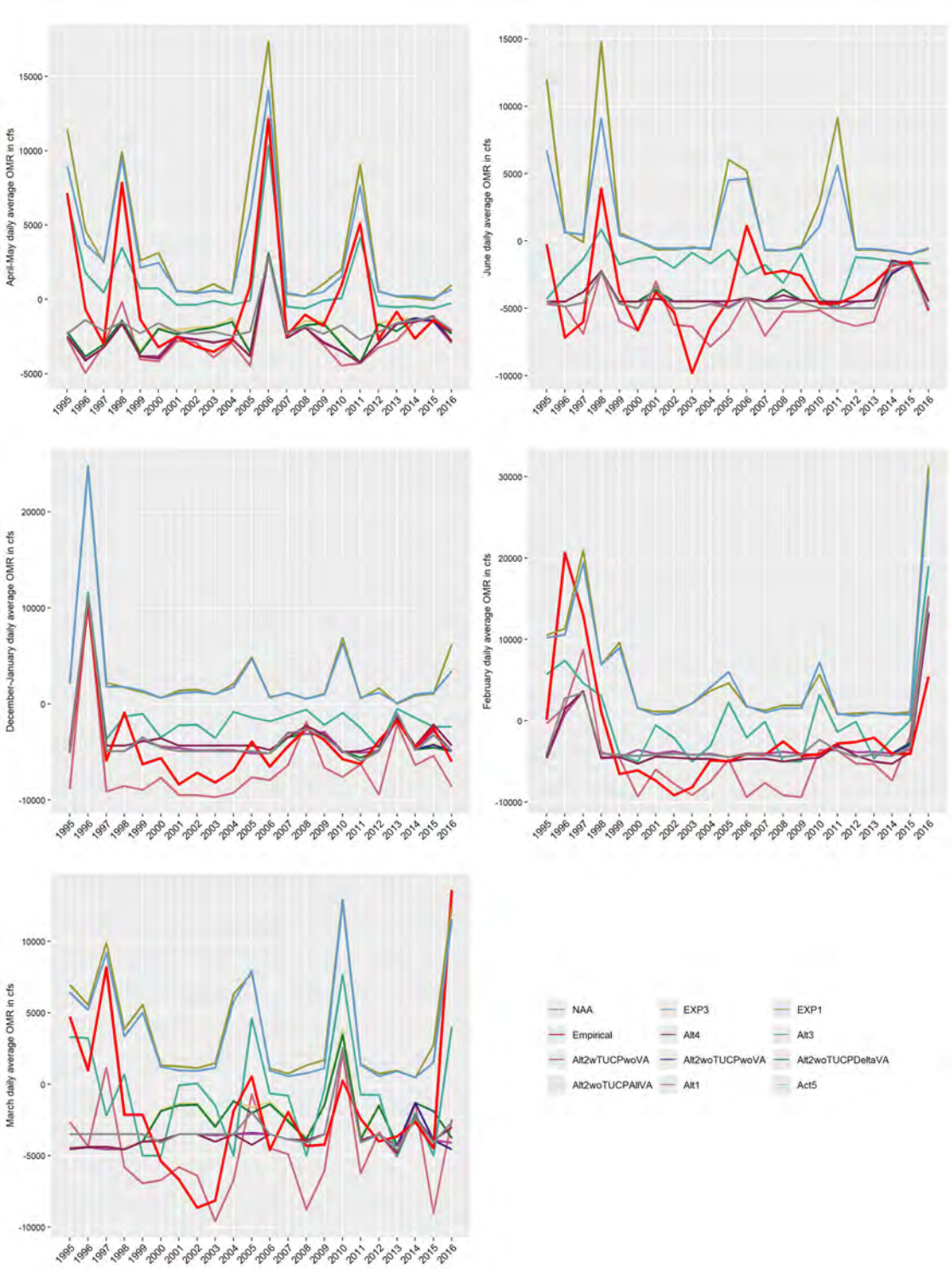



Figure F.4-4. Annual time series of monthly average OMR flow data for input to the LCME produced from CalSim3 relative to the original LCME dataset (labeled as "Empirical"). (e.g., February and March OMR values for cohort year 2012 represents data for February and March of 2013).

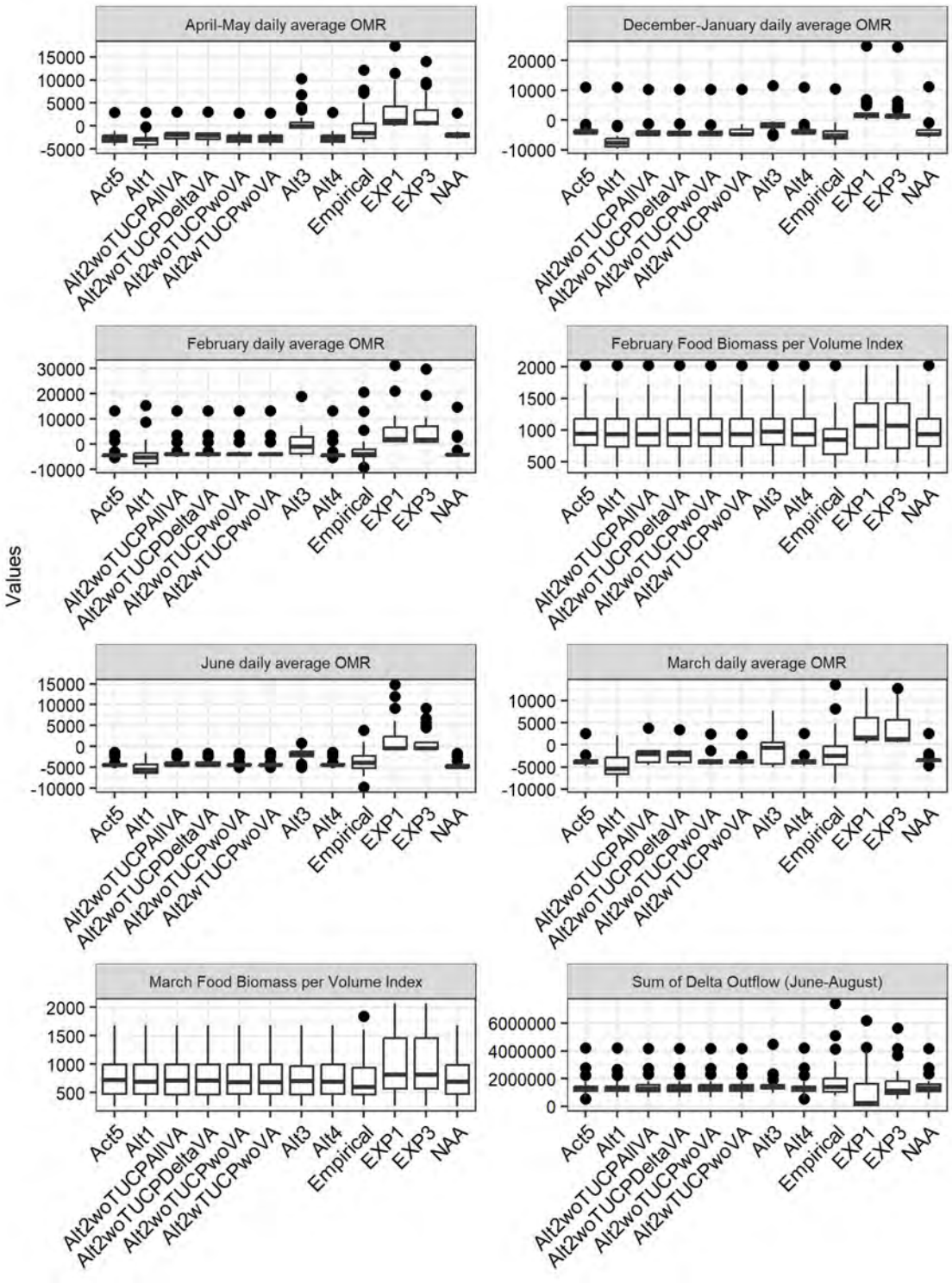



Figure F.4-5. Box plot of covariate values for cohort year 1995 to 2015 sorted by alternative.

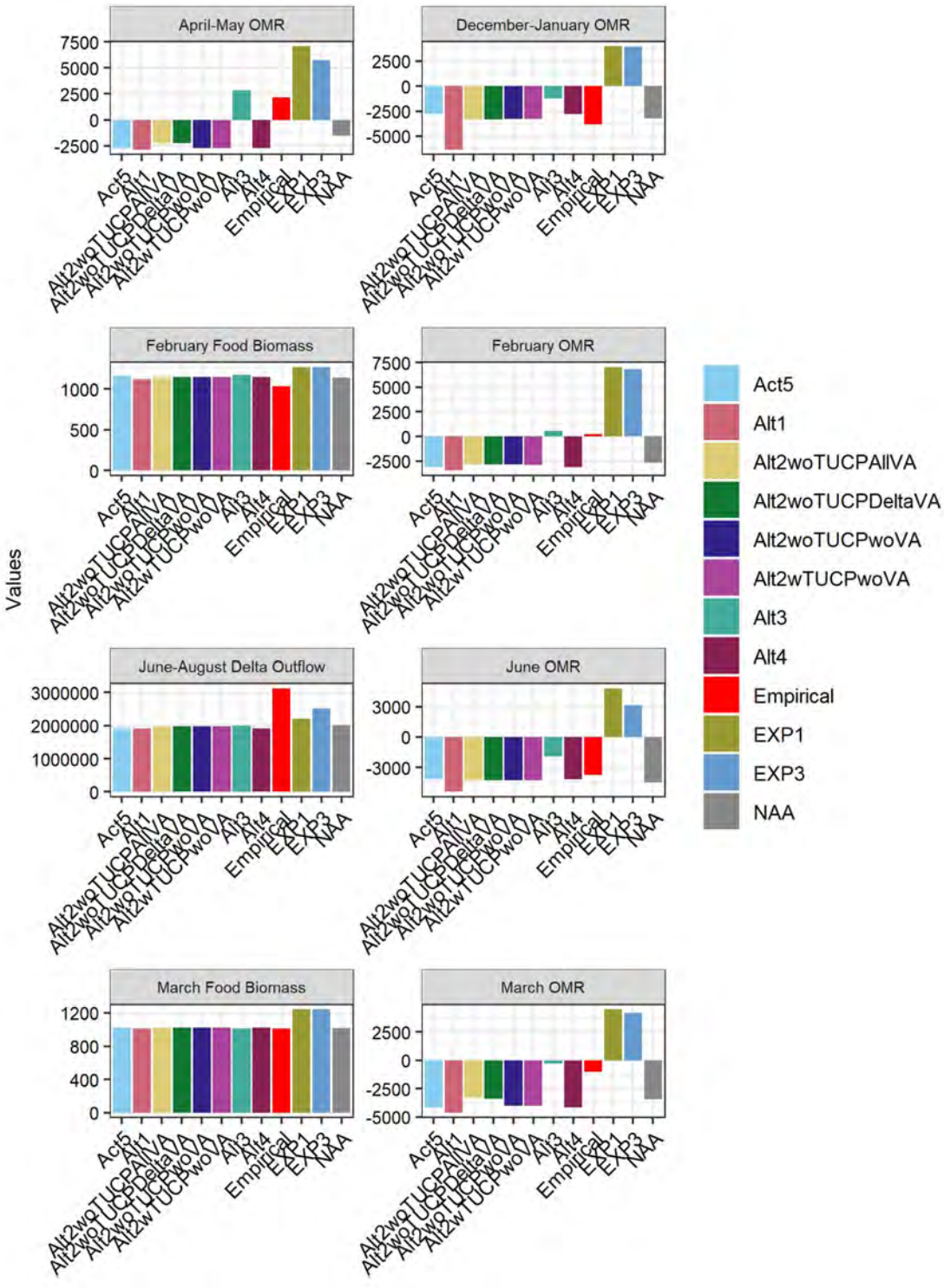



Figure F.4-6. Mean covariate values used in the LCME for Wet and Above Normal year types. Note that cohort year was matched with the water year that the cohort was born in (e.g., cohort year 1995 = water year 1995).

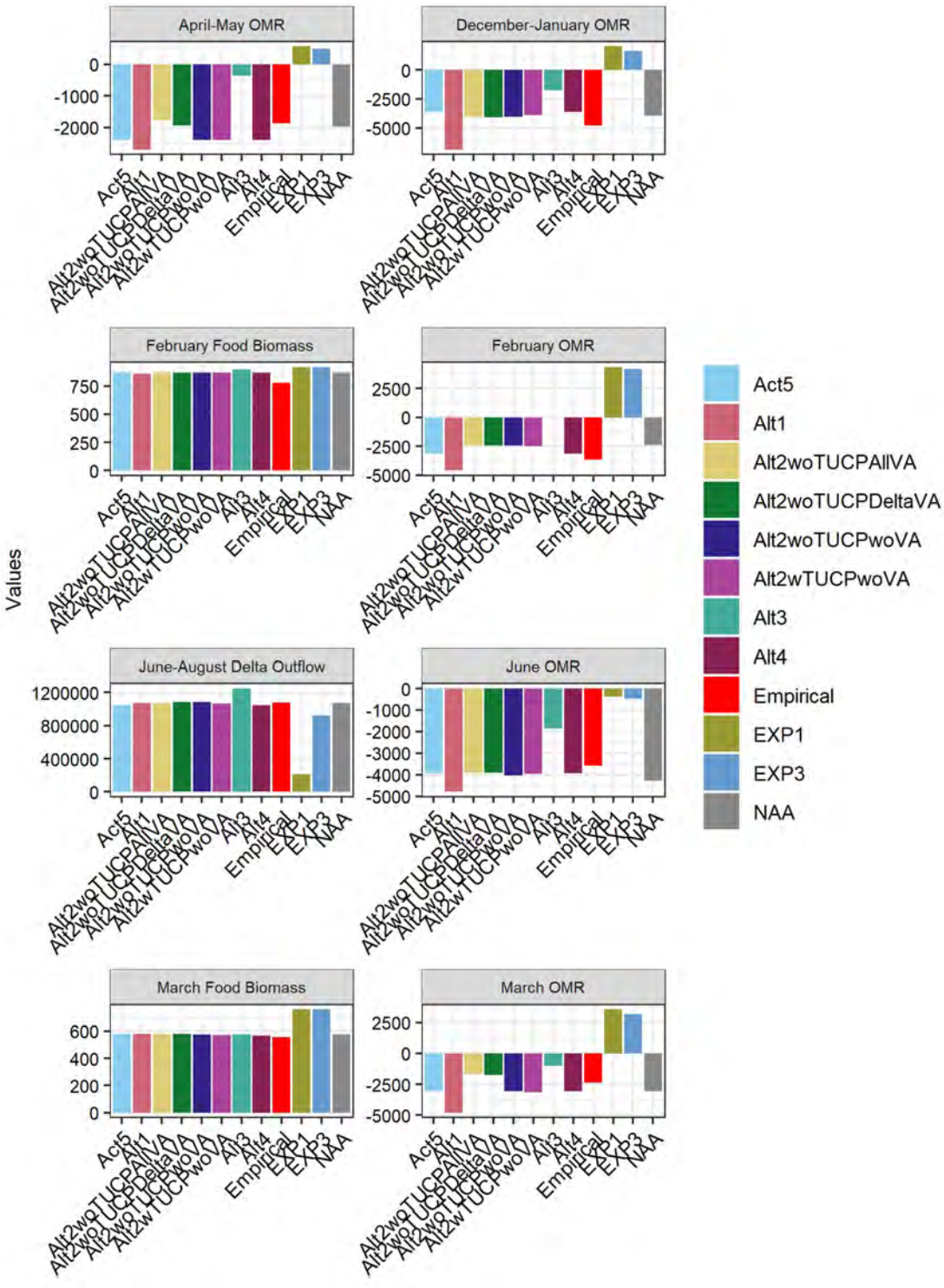



Figure F.4-7. Mean covariate values used in the LCME for Below Normal, Dry, or Critically Dry year Note that cohort year was matched with the water year that the cohort was born in (e.g., cohort year 1995 = water year 1995).

Estimates of population growth rate ($\lambda$; the abundance of current year divided by abundance from previous year) are provided for each cohort year and alternative (Table F.4-4; Figure F.4-8). Generally, dry years showed lower geometric mean $\lambda$ than wet years (Table F.4-5), and wet years occurred with greater frequency at the beginning of the time series (1995-1999) compared to the end of the time series (2006-2015).

Summarized across all years by calculating the geometric mean of $\lambda$ for the full 21-year time series (1995-2015), predicted flow and zooplankton conditions associated with EXP3 resulted in the highest mean $\lambda$, followed by Alt3 (Figure F.4-9). Meanwhile predicted conditions associated with Alt1 resulted in the lowest value of mean $\lambda$. All other alternatives resulted in mean $\lambda$ between 0.90 and 1.02 (Table F.4-5). Relative to the no action alternative (NAA), Alt3 and EXP3 mean projected $\lambda$ were the highest among all alternatives, and Alt1 was the lowest (Figure F.4-9). Decomposition of mean $\lambda$ into time series plots of % change of population growth rate for a given alternative divided by the population growth rate of NAA demonstrated that EXP3- and Alt3-projected $\lambda$ were greater than NAA in most years (Figure F.4-8). EXP1-projected $\lambda$ were relatively greater than NAA in some wet years, but less than NAA-projected $\lambda$ in all other years (Table F.4-5, Figure F.4-8).

NAA, Action 5, the various versions of Alt2, and Alt4 performed similarly to the empirical data (Figure F.4-9). While these CalSim-generated scenarios/alternatives resulted in higher $\lambda$ than the empirical data during drier years, they also resulted in lower $\lambda$ than the empirical data during wetter years (Table F.4-5). The CalSim-generated scenarios/alternatives (NAA, Action 5, the various versions of Alt2, and Alt4) may have produced higher $\lambda$ during dry years due to the more positive OMR values for multiple months and higher zooplankton estimates in February and March (Figure F.4-6, Figure F.4-7). Meanwhile, these same CalSim-generated scenarios/alternatives (NAA, Action 5, the various versions of Alt2, and Alt4) may have produced lower $\lambda$ than the empirical data during wet years because of the lower June-August Delta Outflow values and more negative OMR values for certain months (Figure F.4-7).

Table F.4-4. Predicted population growth rate ($\lambda$; abundance of current year divided by abundance from previous year) for each cohort year by alternatives. $\lambda$ for cohort year 1995 was calculated by using a static abundance estimate for cohort year 1994. Empirical indicates the observed data used by the LCME.

| Year | Empirical | Alt1 | Alt2woTUCPAllVA | Alt2woTUCPDeltaVA | Alt2woTUCPwoVA | Alt2wTUCPwoVA | Alt3 | Alt4 | Action 5 | EXP1 | EXP3 | NAA | Sacramento Valley Water Year Index |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1995 | 3.56 | 1.66 | 1.80 | 1.81 | 1.86 | 1.80 | 2.28 | 1.81 | 1.83 | 4.58 | 4.33 | 1.90 | Wet |
| 1996 | 1.37 | 0.66 | 0.63 | 0.63 | 0.64 | 0.64 | 1.07 | 0.62 | 0.62 | 1.21 | 1.46 | 0.74 | Wet |
| 1997 | 0.68 | 0.38 | 0.57 | 0.58 | 0.58 | 0.58 | 0.79 | 0.57 | 0.57 | 0.60 | 0.99 | 0.61 | Wet |
| 1998 | 4.78 | 1.73 | 1.67 | 1.65 | 1.66 | 1.65 | 3.01 | 1.73 | 1.74 | 5.15 | 4.91 | 1.81 | Wet |
| 1999 | 0.79 | 0.56 | 0.69 | 0.69 | 0.68 | 0.70 | 0.88 | 0.65 | 0.64 | 1.01 | 1.36 | 0.78 | Wet |
| 2000 | 0.69 | 0.42 | 0.79 | 0.79 | 0.84 | 0.86 | 0.78 | 0.72 | 0.72 | 0.77 | 1.14 | 0.86 | Above Normal |
| 2001 | 0.11 | 0.14 | 0.35 | 0.35 | 0.39 | 0.40 | 0.59 | 0.35 | 0.36 | 0.29 | 0.47 | 0.36 | Dry |
| 2002 | 0.55 | 0.69 | 0.91 | 0.93 | 1.00 | 1.00 | 1.20 | 0.92 | 0.93 | 0.73 | 1.25 | 0.91 | Dry |
| 2003 | 0.87 | 0.73 | 1.45 | 1.46 | 1.53 | 1.54 | 1.56 | 1.36 | 1.37 | 1.62 | 2.55 | 1.50 | Above Normal |
| 2004 | 0.44 | 0.43 | 0.79 | 0.79 | 0.82 | 0.82 | 0.91 | 0.74 | 0.74 | 0.65 | 1.12 | 0.81 | Below Normal |
| 2005 | 1.94 | 1.05 | 1.28 | 1.28 | 1.34 | 1.37 | 1.59 | 1.29 | 1.28 | 2.95 | 3.20 | 1.32 | Above Normal |
| 2006 | 3.37 | 2.09 | 2.36 | 2.39 | 2.46 | 2.51 | 3.35 | 2.28 | 2.37 | 3.13 | 3.47 | 2.50 | Wet |
| 2007 | 0.51 | 0.36 | 0.59 | 0.59 | 0.60 | 0.60 | 0.85 | 0.55 | 0.55 | 0.47 | 0.81 | 0.59 | Dry |
| 2008 | 0.95 | 0.91 | 0.99 | 0.99 | 1.05 | 1.06 | 1.33 | 0.98 | 0.99 | 0.63 | 1.04 | 0.99 | Critically Dry |

| Year | Empirical | Alt1 | Alt2woTUCPAllVA | Alt2woTUCPDeltaVA | Alt2woTUCPwoVA | Alt2wTUCPwoVA | Alt3 | Alt4 | Action 5 | EXP1 | EXP3 | NAA | Sacramento Valley Water Year Index |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2009 | 0.64 | 0.49 | 0.73 | 0.73 | 0.73 | 0.72 | 0.81 | 0.70 | 0.71 | 0.62 | 1.15 | 0.73 | Dry |
| 2010 | 1.26 | 1.14 | 1.25 | 1.24 | 1.28 | 1.24 | 1.40 | 1.25 | 1.23 | 2.24 | 2.33 | 1.27 | Below Normal |
| 2011 | 3.65 | 2.65 | 2.77 | 2.76 | 2.75 | 2.77 | 2.60 | 2.80 | 2.79 | 4.74 | 4.70 | 2.75 | Wet |
| 2012 | 0.95 | 0.65 | 0.91 | 0.92 | 0.93 | 0.92 | 1.05 | 0.92 | 0.92 | 0.56 | 0.93 | 0.94 | Below Normal |
| 2013 | 0.90 | 0.79 | 0.83 | 0.83 | 0.84 | 0.84 | 1.01 | 0.83 | 0.84 | 0.45 | 0.73 | 0.82 | Dry |
| 2014 | 0.43 | 0.36 | 0.41 | 0.44 | 0.43 | 0.43 | 0.59 | 0.38 | 0.39 | 0.30 | 0.45 | 0.40 | Critically Dry |
| 2015 | 0.66 | 0.65 | 0.55 | 0.63 | 0.64 | 0.62 | 0.73 | 0.54 | 0.54 | 0.40 | 0.60 | 0.55 | Critically Dry |

Table F.4-5. Geometric mean of predicted population growth rate ($\lambda$) across all years and binned into wetter and drier years for all alternatives. Empirical scenario indicates the LCME fit to observed data, while all alternative models represent simulations using CalSim output.

| Category | Action 5 | Alt1 | Alt2woTUCPAllVA | Alt2woTUCPDeltaVA | Alt2woTUCPwoVA | Alt2wTUCPwoVA | Alt3 | Alt4 | EXP1 | EXP3 | Empirical | NAA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1995-2015 | 0.90 | 0.70 | 0.95 | 0.95 | 0.93 | 0.92 | 1.18 | 0.90 | 1.02 | 1.43 | 0.96 | 0.95 |
| Below Normal, Dry, or Critically Dry years | 0.62 | 0.48 | 0.67 | 0.67 | 0.65 | 0.63 | 0.85 | 0.62 | 0.46 | 0.76 | 0.51 | 0.63 |
| Wet and Above Normal years | 1.20 | 0.97 | 1.25 | 1.25 | 1.22 | 1.22 | 1.56 | 1.19 | 1.90 | 2.32 | 1.65 | 1.30 |

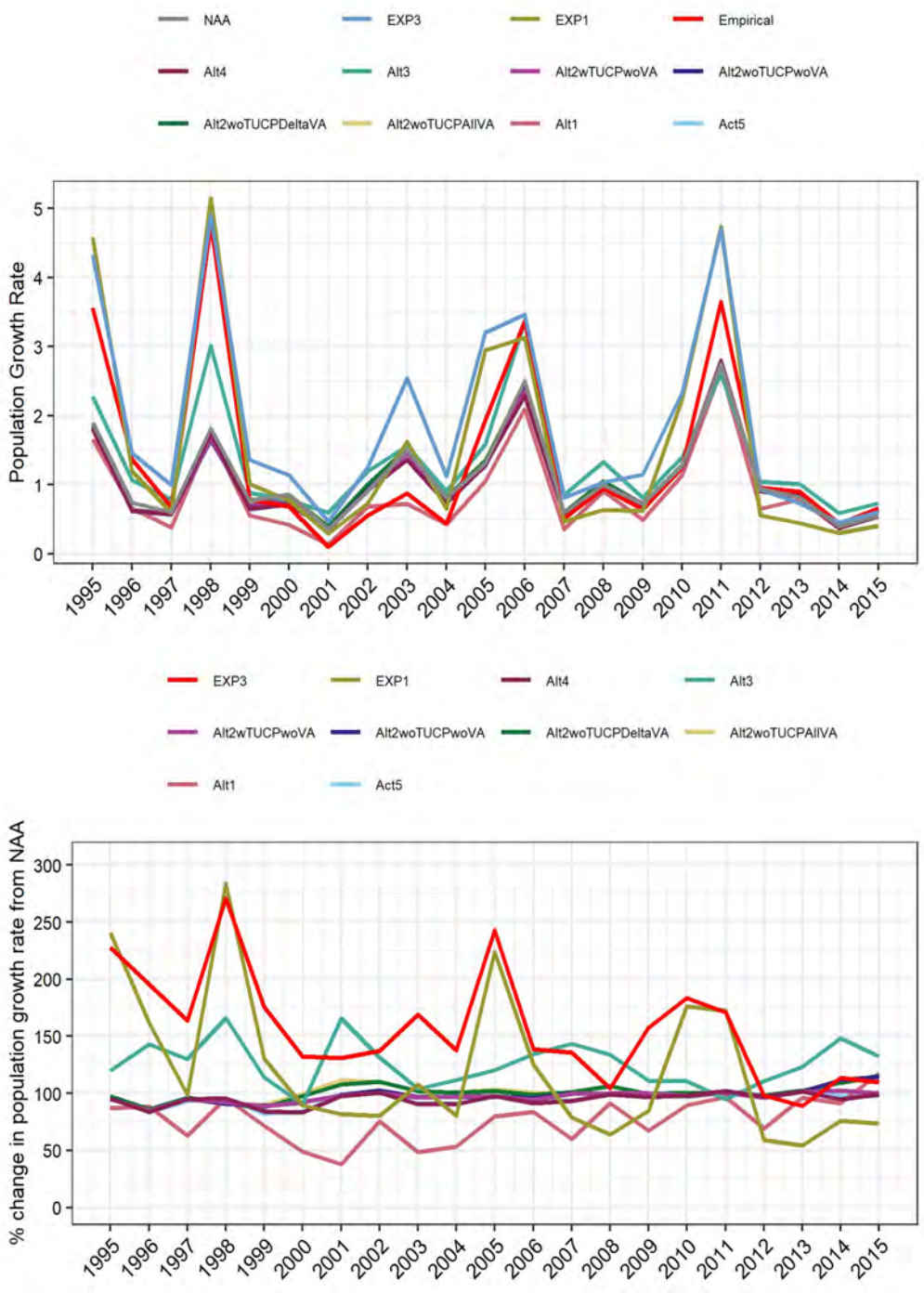



Figure F.4-8. Annual time series of delta smelt population growth rate. Top: Line plot of population growth rate ($\lambda$) across alternatives as seen in Table F.4-4. Bottom: Line plot showing % change calculated as $\lambda$ for a given alternative divided by estimated population growth rate for NAA (no action alternative); no change from NAA = 100. Note the color change for NAA in the bottom figure.

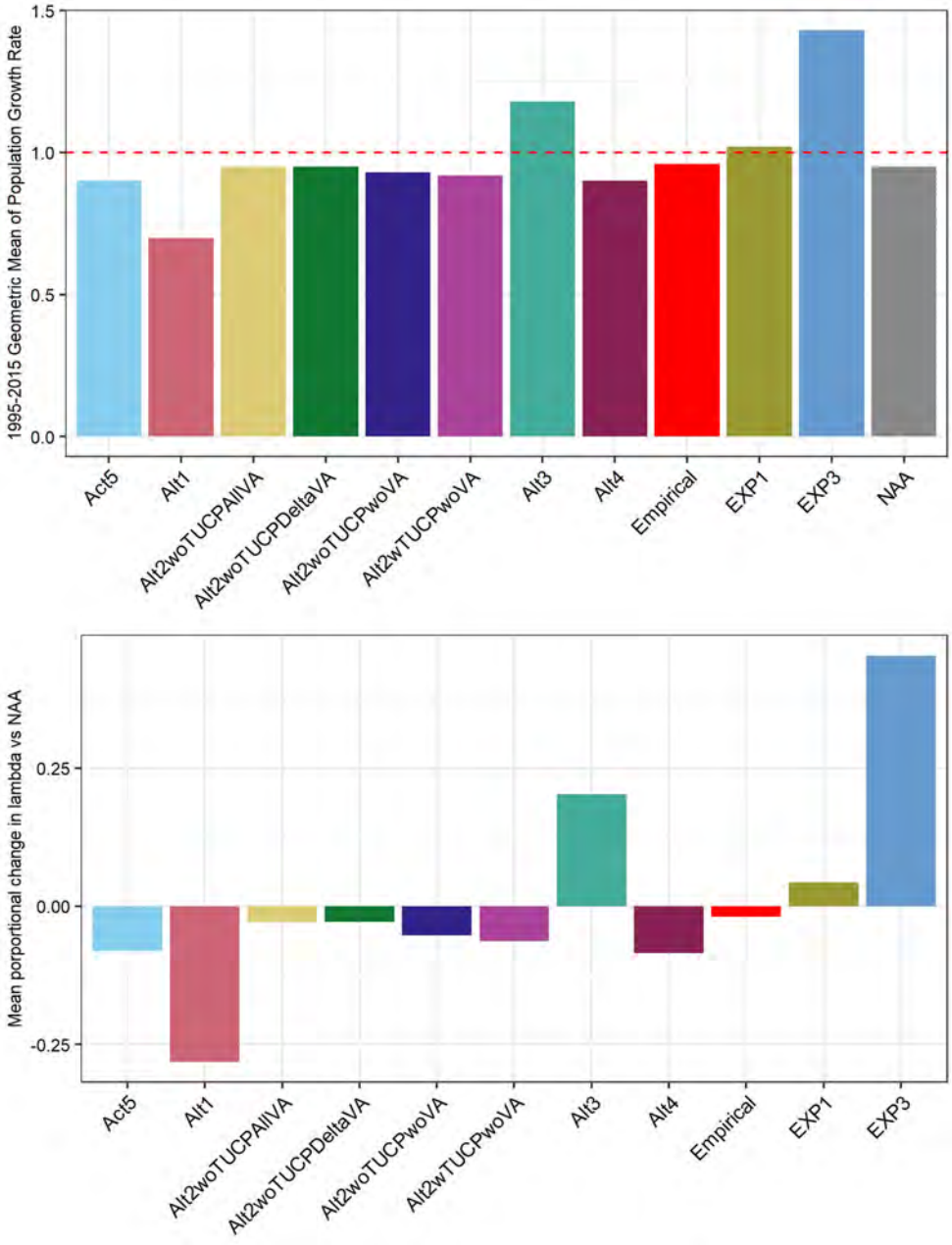



Figure F.4-9. Mean population growth rates aggregated across the years. Top: Bar plot demonstrating the geometric mean of population growth rate (lambda) from 1995 to 2015 for the various alternatives as seen in Table F.4-5. Red dotted line indicates stable population at λ=1. Bottom: Bar plot demonstrating the relative difference in geometric mean of population growth rate (1995-2015) for each alternative compared to the no action alternative ($[\lambda_{alternative} - \lambda_{no\ action}]\ \lambda_{no\ action}$). Negative numbers indicate alternatives that result in poorer conditions for delta smelt and positive numbers indicate alternatives that are predicted to improve conditions.

### F.4.3.1 Key Takeaways

- Geometric mean of population growth rate from 1995 to 2015 only showed considerable differences from the observed data and/or NAA for EXP3, Alt1, and Alt3 scenarios, where EXP3 and Alt3 performed better than most scenarios/alternatives (i.e., higher $\lambda$) and Alt1 performed worse than most alternatives (i.e., lower $\lambda$).
- EXP3 and Alt3 scenarios likely produced higher $\lambda$ due to more positive OMR flows for most months, higher food biomass, and relatively high June-August Delta Outflow during wet years (Figure F.4-5, Figure F.4-6, Figure F.4-7).
- Alt1 scenario likely produced lower $\lambda$ relative to most scenarios due to the more negative OMR flows during most months (Figure F.4-5, Figure F.4-6).
- NAA, Action 5, all components of Alt2, and Alt4 did not produce considerably higher $\lambda$ than the empirical data despite OMR restrictions that should reduce entrainment. This may be due to how flow and hydrology are calculated in CalSim 3 that resulted in somewhat lower June-August Delta Outflow in wet years (Figure F.4-6, Figure F.4-7).

### F.4.3.2 BA Takeaways

The Delta Smelt Life Cycle Model with Entrainment Analysis (LCME) estimated values for larval recruitment and survival at the subsequent life stages (Smith et al. 2021). The most statistically supported model used means of December-June Old and Middle River (OMR) values, June-August outflow aggregated from monthly values or longer timescales, and aggregated food/prey metric from January to March. The model is used to calculate expected annual population growth rate ($\lambda$; the abundance of current year divided by abundance from previous year) as a performance measure of Delta seasonal flow operations influence on OMR and outflow over a twenty year time period (1995-2015).

The general statistical prohibition against extrapolation suggests that model predictions are more uncertain when explanatory variables are outside the range of observations to which the model was fit. Most CalSim-predicted flows and zooplankton predictions were not outside the range of observations to which the Delta smelt LCME was fit, but some alternatives did include out-of-range values. EXP1 included much lower June-August Delta Outflows than observed and higher (more positive) OMR values than observed in some years. EXP3 OMR values were, similarly to EXP1, higher than observed, but EXP3 June-August Delta Outflows were within the observed range. The multiple components of the PA also contained some April-May OMR values that were more negative than the observed range. Overall, CalSim-predicted June-August Outflow values were generally lower than the empirical data under Wet or Above Normal years. Predicted prey biomass for all alternatives was within the observed range, except for certain years where higher prey biomass were predicted than the empirical data for all alternatives.

The geometric mean of the expected population growth across years (1995-2015), $\lambda$, for the PA components and Action 5 ranged from 0.9 to 0.95 (Table F.4-6). The means of the expected population growth rate varied more widely across water year types, and showed positive growth rates under wetter meteorology and negative growth rates under drier meteorology. Note that wetter years also occurred with greater frequency at the beginning of the time series (1995-1999) compared to the end of the time series (2006-2015). Predicted flow and zooplankton conditions

associated with EXP3 resulted in the highest geometric mean $\lambda$ (1.43), whereas NAA, Action 5, and the various components of PA produced geometric mean $\lambda$ similar to the empirical data (0.9-0.95 vs. 0.96). While NAA, Action 5, and the various components of the PA resulted in higher $\lambda$ than the empirical data during drier years, they also resulted in lower $\lambda$ than the empirical data during wetter years (Table F.4-6).

NAA, Action 5, and the various components of the PA may have produced higher $\lambda$ during drier years due to the more positive OMR values for multiple months and higher zooplankton estimates in February and March. Meanwhile, NAA, Action 5, and the PA components may have produced lower $\lambda$ than the empirical data during wetter years because of the lower June-August Delta Outflow values and more negative OMR values for some months. NAA, Action 5, and the PA components did not produce higher $\lambda$ despite OMR restrictions that should reduce entrainment of Delta smelt. This may be due to how flow and hydrology are calculated in CalSim 3 that resulted in somewhat lower June-August Delta Outflow in wet years relative to the empirical data.

Table F.4-6. Geometric mean of predicted population growth rate ($\lambda$) across all years and binned into wetter and drier years for all alternatives. Empirical scenario indicates the LCME fit to observed data, while all alternative models represent simulations using CalSim output.

| Category | Action 5 | EXP1 | EXP3 | NAA | PA woTUCP woVA | PAwoTUCP DeltaVA | PAwoTUCP Systemwide VA | Empirical |
|---|---|---|---|---|---|---|---|---|
| 1995-2015 | 0.90 | 1.02 | 1.43 | 0.95 | 0.93 | 0.95 | 0.95 | 0.96 |
| Below Normal, Dry, or Critically Dry years | 0.62 | 0.46 | 0.76 | 0.63 | 0.65 | 0.67 | 0.67 | 0.51 |
| Wet and Above Normal years | 1.20 | 1.90 | 2.32 | 1.30 | 1.22 | 1.25 | 1.25 | 1.65 |

### F.4.3.3 EIS Takeaways

The Delta Smelt Life Cycle Model with Entrainment Analysis (LCME) produces estimated values for larval recruitment and survival at the subsequent life stages (Smith et al. 2021). The most statistically supported model used means of December-June Old and Middle River (OMR) values, June-August outflow aggregated from monthly values or longer timescales, and aggregated food/prey metric from January to March. The model is used to calculate expected annual population growth rate ($\lambda$; the abundance of current year divided by abundance from previous year) as a performance measure of Delta seasonal flow operations influence on OMR and outflow over a twenty year time period (1995-2015).

The general statistical prohibition against extrapolation suggests that model predictions are more uncertain when explanatory variables are outside the range of observations to which the model

was fit. Most CalSim-predicted flows and zooplankton predictions were not outside the range of observations to which the Delta smelt LCME was fit, but some alternatives did include out-of-range values. Alternative 1, the multiple phases of Alternative 2, and Alternative 4 contained some April-May OMR values that were more negative than the observed range. Alternative 1 also contained OMR values more negative than the observed data for the months of December-January and March. Overall, CalSim-predicted June-August Outflow values were generally lower than the empirical data under Wet or Above Normal years. Predicted prey biomass for all alternatives was within the observed range, except for certain years where higher prey biomass were predicted than the empirical data for all alternatives.

The geometric mean of the expected population growth across years (1995-2015), $\lambda$, for the Alternative 2 phases ranged from 0.9 to 0.94 (Table F.4-7). The means of the expected population growth rate varied more widely across water year types, and showed positive growth rates under wetter meteorology and negative growth rates under drier meteorology. Note that wetter years also occurred with greater frequency at the beginning of the time series (1995-1999) compared to the end of the time series (2006-2015). Predicted flow and zooplankton conditions associated with Alternative 3 resulted in the highest geometric mean $\lambda$ (1.16), whereas conditions associated with Alternative 1 resulted in the lowest geometric mean $\lambda$ (0.69). No Action Alternative, the various phases of Alternative 2, and Alternative 4 produced geometric mean $\lambda$ similar to the empirical data (0.9-0.94 vs. 0.96). While No Action Alternative, the various phases of Alternative 2, and Alternative 4 resulted in higher $\lambda$ than the empirical data during drier years, they also resulted in lower $\lambda$ than the empirical data during wetter years (Table F.4-7).

No Action Alternative, the various phases of Alternative 2, and Alternative 4 may have produced higher $\lambda$ during drier years relative to the empirical data due to the more positive OMR values for multiple months and higher zooplankton estimates in February. Meanwhile, No Action Alternative, the various phases of Alternative 2, and Alternative 4 may have produced lower $\lambda$ than the empirical data during wetter years because of the lower June-August Delta Outflow values and more negative OMR values for some months. No Action Alternative, the various phases of Alternative 2, and Alternative 4 did not produce higher $\lambda$ despite OMR restrictions that should reduce entrainment of Delta smelt. This may be due to the apparent trade-off between OMR flow and summer Delta outflow that somehow occurred between these alternatives and the empirical data.

Table F.4-7. Geometric mean of predicted population growth rate ($\lambda$) across all years and binned into wetter and drier years for all alternatives. Empirical scenario indicates the LCME fit to observed data, while all alternative models represent simulations using CalSim output.

| Category | Alt1 | Alt2wo TUCPwoVA | Alt2wTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP SystemwideVA | Alt3 | Alt4 | Empirical | NAA |
|---|---|---|---|---|---|---|---|---|---|
| 1995-2015 | 0.69 | 0.91 | 0.9 | 0.94 | 0.94 | 1.16 | 0.88 | 0.96 | 0.93 |
| Below Normal, Dry, or Critically Dry years | 0.52 | 0.71 | 0.7 | 0.73 | 0.73 | 0.9 | 0.68 | 0.58 | 0.7 |
| Wet and Above Normal years | 0.96 | 1.21 | 1.21 | 1.23 | 1.24 | 1.53 | 1.18 | 1.68 | 1.28 |

## F.4.4 References


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Appendix I, Old and Middle River Flow Management

# Attachment I.1 Negative Binomial Model

## I.1.1 Model Overview

To evaluate potential changes to the number of length at date (LAD) winter winter-run Chinook salmon, LAD spring-run Chinook salmon, and steelhead salvaged at the CVP and SWP pumping facilities based on the alternatives, Reclamation analyzed historical salvage data via negative binomial regression. Negative binomial regression requires estimation of a dispersion parameter rather than assuming the variance is equal to the mean. In doing so, negative binomial regression can account for overdispersion, which is common in ecological data (e.g., the salvage dataset), as well as reduce the likelihood of biased coefficient estimation.

## I.1.2 Model Development

### I.1.2.1 Methods

#### *I.1.2.1.1 Model Development*

Winter-run and spring-run LAD Chinook salmon and steelhead salvage and loss records from January 1, 1993, to December 31, 2020, were gathered from the CDFW salvage database posted at the SacPAS website (http://www.cbr.washington.edu/sacramento/data/query_loss_detail.html). Steelhead salvage records from January 1, 1993, to December 31, 2020, were gathered from the CDFW salvage app webpage (https://apps.wildlife.ca.gov/Salvage/). For all models, loss at both salvage facilities was the response variable. To incorporate hydrodynamic effects on salvage count into the models, Delta export (QEXPORT), Sacramento River flow (QSAC), and San Joaquin River (QSJR) were extracted from the California Department of Water Resources Dayflow data (https://data.cnra.ca.gov/dataset/dayflow). Additionally, combined Old and Middle River flow (OMR) data were pulled from the U.S. Geological Survey National Water Information System website (https://nwis.waterdata.usgs.gov/nwis; stations 11313405 and 11312676). Because data gaps exist in the OMR flow data, ordinary least squares regressions were conducted so that each dataset could be used to predict, and therefore complete the dataset (adjusted $R^2$: 0.97). Lastly, to account for the variable numbers of juvenile Chinook salmon entering the Delta by year and month, Sacramento Trawl data were acquired from the Delta Juvenile Fish Monitoring Program through the "deltafish" package available on GitHub (https://github.com/jeanetteclark/deltaFish). Sacramento Trawl catch per unit trawl for each day was calculated for both winter-run-sized and spring-run-sized Chinook salmon. Catch data from Delta fish monitoring for steelhead was sparse and therefore not calculated or used in further analysis.

For each variable, data were averaged by month and year with missing data removed. Because monthly loss values tend to be low or mostly zeroes for most months out of the year, only December to April period was used for winter-run Chinook salmon analysis, only March to June period was used for spring-run Chinook salmon analysis, and only December to June period was used for steelhead analysis. Overdispersion was apparent during initial inspection of the response variable data (mean ≠ variance) supporting the use of negative binomial regression in this analysis.

To avoid collinearity, variance inflation factor (VIF) analyses were conducted for all predictor variables mentioned above. A full negative binomial regression model with all predictor variables was constructed for each Chinook salmon race (winter-run and spring-run), followed by an assessment of VIF values. The variable with the highest VIF value was removed and models were re-run until all VIF values were below 3. For all models, OMR had the highest VIF value (>25) and had to be removed from further analysis along with Sacramento River flow (VIF value >3). For the final model selection, the covariates included were San Joaquin River flow, Delta export flow value, Sacramento Trawl catch per unit effort for juvenile Chinook salmon (specific to each race), and monthly categorical variable. Each continuous covariate was standardized to z-score prior to the model selection process.

For the two Chinook salmon races and steelhead, the model selection process included all possible additive combination of covariates, as well as addition combination that involves at least one interaction between a continuous variable and the monthly categorical variable. This resulted in 26 possible models (including null) for each Chinook salmon race and 14 possible models for steelhead. The top performing model was determined by Akaike Information Criterion for small sample size (AICc). The top model identified through this model selection process was then further evaluated by using leave-one-out cross validation (LOOCV). This was done to provide a measure for model predictive performance. LOOCV involves removal of a single record from the dataset, refitting the top model to the remaining data, estimating the expected salvage count for the 'out-of-sample' data, and comparing the predicted versus observed salvage count. This process is repeated for all records in the dataset. Ordinary least squares linear regression is used to compare the relationship between observed and predicted salvage counts, and the resulting $R^2$ from this regression is a measure agreement between observed and predicted observations.

#### *I.1.2.1.2 Model Application*

The negative binomial model was used to predict daily average salvage of salmonids for each month from 1922 to 2021 by water year type (CalSim 3 WYT) using modeled exports (combined Jones and Banks), San Joaquin River flow at Vernalis, and winter-run Sacramento Trawl CPUE (present only as a variable in the winter-run Chinook salmon model). Monthly historic values from water years 1993 – 2020 were used to generate an average monthly winter-run CPUE chosen as representative of recent patterns. The following scenarios were analyzed: Exploratory 1 (EXP1), Exploratory 3 (EXP3), No Action Alternative (NAA), Alternative 1 (Alt1), Alternative 2 with Temporary Urgency Change Petitions (TUCPs) without Voluntary Agreements (VAs), Alternative 2 without TUCPs without VAs, Alternative 2 without TUCPs Delta VAs, Alternative 2 without TUCPs All VAs, Alternative 3 (Alt3), Alternative 4 (Alt4), and Action 5 (Act5). Modeled average monthly salvage was predicted using individual negative binomial models for spring-run Chinook salmon (months of March through June), winter-run Chinook salmon (months of December through April), and steelhead (months of December through June). Results

from all scenarios are presented. For the purposes of the Biological Assessment no comparisons were made, for the purposes of the Environmental Impact Statement comparisons were made for all alternatives with the NAA. Alternative 2 is the Proposed Action.

### I.1.2.2 Assumptions / Uncertainty

Negative binomial model was used to predict average monthly salvage. Results are presented as average monthly salvage averaged by water year type. Historic monthly values for Sacramento Trawl winter-run CPUE were assumed to be representative of recent salmonid temporal distribution patterns and were applied as constant across the full dataset.

### I.1.2.3 Code and Data Repository

Salvage inputs: Salvage data available online at http://www.cbr.washington.edu/sacramento/data/query_loss_detail.html

Hydrodynamic inputs (for model development): Available online at CDWR Dayflow data https://data.cnra.ca.gov/dataset/dayflow and the U.S. Geological Survey National Water Information System website https://nwis.waterdata.usgs.gov/nwis; stations 11313405 and 11312676

Fish inputs (for model development): Available online from the DJFMP through "deltafish" package on GitHub https://github.com/jeanetteclark/deltaFish

Exports inputs: CalSim modeled exports available from Reclamation upon request.

Analysis files (for model development and model application): Available online at https://github.com/BDO-Science/salmon_negbinmodel.

## I.1.3 Results

### I.1.3.1 Model Development

The top supported model for winter-run Chinook salmon salvage included an interaction between the month categorical variable and Sacramento Trawl catch per trawl, as well as export level and San Joaquin River flow (Table I.1-1). The top-ranked winter-run Chinook salmon model was substantially more supported than the null model (ΔAICc = 111.01) and has the majority of the Akaike weight (0.74). For the winter-run Chinook salmon model, the correlation between observed and predicted data (log10 transformed) based on the LOOCV was positive but relatively weak (Adjusted $R^2$ = 0.49). See Table I.1-2 for model coefficients with z-scored covariates.

Table I.1-1. Summary of the Top-Ranked Negative Binomial Regression Models for Winter-Run Chinook Salmon Salvage That Make Up ~0.99 of the Akaike Weight

| Model | AICc | ΔAICc | Akaike weight | Cumulative Weight | Log-Likelihood |
|---|---|---|---|---|---|
| Month*Sacramento Trawl Catch + Export + San Joaquin River Flow | 710.08 | 0.00 | 0.74 | 0.74 | -340.60 |
| Month + San Joaquin River Flow + Sacramento Trawl Catch + Export | 713.20 | 3.12 | 0.15 | 0.89 | -346.91 |
| Month*Sacramento Trawl Catch + Export | 714.07 | 3.98 | 0.10 | 0.99 | -343.81 |

AICc: Akaike Information Criterion; ΔAICc: change in Akaike Information Criterion.

Table I.1-2. Summary of model coefficients for Negative Binomial Monthly Winter-Run sized Chinook Salmon Salvage Model. The month of January was used as the reference categorical variable (i.e., intercept). The dispersion parameter was 1.38.

| Model Variable | Estimated Coefficient | Standard Error |
|---|---|---|
| Intercept | 0.27 | 0.27 |
| Month – February | 1.06 | 0.33 |
| Month – March | 2.25 | 0.34 |
| Month – April | 16.54 | 6.03 |
| Month – December | -0.48 | 0.36 |
| Sac Trawl CPUE | 0.37 | 0.19 |
| Export | 1.03 | 0.12 |
| San Joaquin Flow | -0.31 | 0.11 |
| Month – February: Sac Trawl CPUE | 0.18 | 0.28 |
| Month – March: Sac Trawl CPUE | -0.88 | 0.34 |
| Month – April: Sac Trawl CPUE | 19.7 | 7.97 |
| Month – December: Sac Trawl CPUE | 0.01 | 0.26 |

The top supported model for spring-run Chinook salmon salvage included export level and an interaction between the month categorical variable and San Joaquin River flow (Table I.1-3). The top-ranked spring-run Chinook salmon model was substantially more supported than the null model (ΔAICc = 122.72) and has the majority of the Akaike weight (0.77). For the spring-run Chinook salmon model, the correlation between observed and predicted data (log10 transformed) based on the LOOCV was higher than that for winter-run Chinook salmon (Adjusted $R^2$ = 0.60). See Table I.1-4 for model coefficients with z-scored covariates.

Table I.1-3. Summary of the Top-Ranked Negative Binomial Regression Models for Spring-Run Chinook Salmon Salvage That Consist of ~0.99 of the Akaike Weight

| Model | AICc | ΔAICc | Akaike weight | Cumulative Weight | Log-Likelihood |
|---|---|---|---|---|---|
| Month*San Joaquin River Flow + Export | 1018.17 | 0.00 | 0.77 | 0.77 | -498.00 |
| Month*San Joaquin River Flow + Sacramento Trawl Catch + Export | 1020.61 | 2.44 | 0.23 | 1.00 | -497.98 |

AICc: Akaike Information Criterion; ΔAICc: change in Akaike Information Criterion.

Table I.1-4. Summary of model coefficients for Negative Binomial Monthly Spring-Run sized Chinook Salmon Salvage Model. The month of March was used as the reference categorical variable (i.e., intercept). The dispersion parameter was 0.84.

| Model Variable | Estimated Coefficient | Standard Error |
|---|---|---|
| Intercept | 2.78 | 0.24 |
| Month – April | 2.88 | 0.34 |
| Month – May | 1.99 | 0.37 |
| Month - June | -2.71 | 0.39 |
| San Joaquin Flow | 1.31 | 0.21 |
| Export | 1.11 | 0.16 |
| Month – April: San Joaquin Flow | -1.16 | 0.28 |
| Month – May: San Joaquin Flow | -0.51 | 0.31 |
| Month – June: San Joaquin Flow | 0.66 | 0.43 |

The top supported model for steelhead salvage included export level and the month categorical variable (Table I.1-5). The top-ranked steelhead model was substantially more supported than the null model (ΔAICc = 121.47) and has a slight majority in Akaike weight (0.57). For the steelhead top model, the correlation between observed and predicted data (log10 transformed) based on the LOOCV was lower than the Chinook salmon models (Adjusted $R^2$ = 0.47). See Table I.1-6 for model coefficients with z-scored covariates. Collectively these results suggest the top-ranked models for both races of Chinook salmon and steelhead provided reasonable fit to the observed data and have some predictive capability.

Table I.1-5. Summary of the Top-Ranked Negative Binomial Regression Models for Steelhead Salvage That Consist of ~0.99 of the Akaike Weight

| Model | AICc | ΔAICc | Akaike weight | Cumulative Weight | Log-Likelihood |
|---|---|---|---|---|---|
| Month + Export | 2415.45 | 0.00 | 0.57 | 0.57 | -1198.22 |
| Export*San Joaquin River Flow + Month | 2416.09 | 0.64 | 0.41 | 0.99 | -1196.30 |

AICc: Akaike Information Criterion; ΔAICc: change in Akaike Information Criterion.

Table I.1-6. Summary of model coefficients for Negative Binomial Monthly Steelhead Salvage Model. The month of January was used as the reference categorical variable (i.e., intercept). The dispersion parameter was 0.57.

| Model Variable | Estimated Coefficient | Standard Error |
|---|---|---|
| Intercept | 4.78 | 0.26 |
| Month – February | 1.02 | 0.36 |
| Month – March | 1.91 | 0.37 |
| Month – April | 2.43 | 0.39 |
| Month – May | 1.98 | 0.40 |
| Month - June | -0.38 | 0.37 |
| Month - December | -2.41 | 0.36 |
| Export | 1.44 | 0.12 |

### I.1.3.2 Model Application

Results are provided by species (winter-run Chinook salmon, spring-run Chinook salmon, and steelhead) by month and water year type by alternative in the following tables. Tables of predicted average monthly salvage represent results for the Biological Assessment (odd table numbers) and for the Environmental Impact Statement (even table numbers): LAD winter-run Chinook salmon (Table I.1-7 BA, Table I.1-8 EIS), LAD spring-run Chinook salmon (Table I.1-9 BA, Table I.1-10 EIS), steelhead (Table I.1-11 BA, Table I.1-12 EIS).

Figure I.1-1 through Figure I.1-6 show species-specific predicted average monthly salvage by month and water year type: winter-run Chinook salmon (Figure I.1-1 and Figure I.1-2), spring-run Chinook salmon (Figure I.1-3a, Figure I.1-3b, Figure I.1-4a, and Figure I.1-4b), and steelhead (Figure I.1-5a, Figure I.1-5b, Figure I.1-6a, and Figure I.1-6b).

The mean monthly predicted salvage at the Delta Fish Collection Facilities of LAD winter-run Chinook salmon from the negative binomial regression models calculated across all water year types for the months of December through April and all alternatives has a wide range. The final model included three variables: Sacramento Trawl catch, combined exports at the Banks and Jones facilities, and San Joaquin River flow (VNS). The greatest predicted salvage of LAD winter-run Chinook salmon occurred in March followed by February, in all water year types. The range of mean predicted salvage of winter-run Chinook salmon for the four components of Alternative 2 for March ranged from 43 (Alternative 2 with TUCP no VAs and Alternative 2 without TUCP no VAs) to 39 (Alternative 2 with Systemwide VAs) in a wet water year type to from 9 (Alternative 2 with TUCP no VAs) to 8 (Alternative 2 with Delta VAs) in a critically dry water year type (Table I.1-7, Figure I.1-1). Alternative 1 had the greatest predicted salvage of LAD winter-run Chinook salmon of all alternatives in all water year types except April of a Wet water year type. The greatest predicted salvage occurred in March followed by February in all water year types. Alternative 1 predicted salvage ranged from 78 to 15 in March of an above normal and critically dry water year type, respectively (Table I.1-7). Alternative 3 had the least predicted salvage of LAD winter-run Chinook salmon of all alternatives in wet and critical water year types, and the greatest predicted salvage in March followed by February in all water year types. Alternative 3 predicted salvage ranged from 24 to 6 in March of an Above Normal and Critical water year type, respectively (Table I.1-7). Alternative 4 has similar predicted salvage of LAD winter-run Chinook salmon to Alternative 2 without TUCP no VAs and Alternative 2 with TUCP no VAs. The greatest predicted salvage under Alternative 4 occurred in March followed by February in all water year types. Alternative 4 predicted salvage ranged from 48 to 10 in March of a wet and critically dry water year type, respectively (Table I.1-7). Action 5 has similar predicted salvage to Alternative 4. The greatest predicted salvage under Action 5 occurred in March followed by February in all water year types. Action 5 predicted salvage ranged from 51 to 10 in March of a wet and critically dry water year type, respectively (Table I.17). The No Action Alternative had the greatest predicted salvage in March followed by February in all water year types. The No Action Alternative predicted salvage ranged from 34 to 10 in March of wet and critical water year type, respectively (Table I.1-7). The values from the exploratory modeling scenarios (EXP1 and EXP3) were not included for consideration in the range of mean predicted salvage, exports in EXP1 and EXP3 are zero.

The months of highest predicted winter-run Chinook salvage at the facilities temporally coincides with when the largest proportion of the juvenile winter-run Chinook salmon population is expected to be in the Delta. Generally, across all water year types, combined monthly OMR flows become increasingly more positive from November to February through late-fall and winter into spring (Chapter 4, Figure 66.) Monthly Sacramento River flows below Keswick Dam, across all water year types, increase across the same months and seasons (Chapter 4, Figure 3). This increase of flows cues juveniles to outmigrate from the upper Sacramento River through the mainstem. Fish are present in the South Delta if they become entrained into the Central and Interior Delta through routes like Georgiana Slough or the Delta Cross Channel.

The mean monthly predicted salvage at the Delta Fish Collection Facilities of LAD spring-run Chinook salmon from the negative binomial regression model calculated across the months of March through June and all alternatives has a wide range. The final model included two variables: San Joaquin River flow (VNS) and combined exports at the Banks and Jones facilities. The greatest predicted salvage occurred in the months of April followed by May in above normal, dry, and critically dry water year types. In wet water year types, the greatest predicted salvage occurred in May followed by March. In below normal water year types, the greatest predicted salvage occurred in May followed by April. The range of mean predicted salvage of spring-run Chinook salmon for the four components of Alternative 2 for May ranged from 3,544 (Alternative 2 with TUCP no VAs) to 3,514 (Alternative 2 Without TUCP Delta VAs) in a wet water year type to from 32 (Alternative 2 with TUCP no VAs) to 30 (Alternative 2 without TUCP no VAs) in a critically dry water year type (Table I.1-9, Figure I.1-3a and Figure I.1-3b). Alternative 1 often, but not consistently, had the greatest predicted salvage of LAD spring-run Chinook salmon compared with other alternatives. The greatest predicted salvage occurred in May followed by March in a wet water year type. In Above Normal and Dry water year types, the greatest predicted salvage occurred in April followed by March while in Below Normal and Critical water year types, the greatest predicted salvage occurred in April followed by May. Alternative 1 predicted salvage ranged from 3,264 to 33 in May of a wet and critical water year type, respectively (Table I.1-9, Figure I.1-3a and Figure I.1-3b). Alternative 3 predicted salvage ranged from 89 to 14 in May of a wet and critical water year type, respectively (Table I.1-9, Figure I.1-3a and Figure I.1-3b). Alternative 3 had the least predicted salvage of LAD spring-run Chinook salmon of all alternatives in all months and water year types. The greatest predicted salvage occurred in March followed by April in Wet and Above Normal water year types. In Below Normal and Critical water year types, the greatest salvage occurred in April followed by May while in a Dry water year the greatest predicted salvage occurred in April followed by March. Alternative 4 has similar predicted salvage of LAD spring-run Chinook salmon among some months to Alternative 2 without TUCP without VAs and Alternative 2 with TUCP without VAs. The greatest predicted salvage under Alternative 4 occurred in April and May in all water year types. Alternative 4 predicted salvage ranged from 3,431 to 32 in May of a wet and critical water year type, respectively (Table I.1-9, Figure I.1-3a and Figure I.1-3b). Action 5 had the greatest predicted salvage of any alternative in March of wet water year types. In above normal, dry, and critical water year types, the greatest salvage occurred in April followed by May. Action 5 predicted salvage ranged from 3,426 to 32 in May of wet and critical water year types, respectively (Table I.19, Figure I.1-3a and Figure I.1-3b). No Action Alternative had the greatest predicted salvage in April followed by May in above normal, dry, and critical water year types; March followed by May in a wet water year type; and May followed by April in a below normal water year type. No Action Alternative predicted salvage ranged from 2,194 to 24 in May of wet

and critical water year type, respectively (Table I.1-9, Figure I.1-3a and Figure I.1-3b). Values from the exploratory modeling scenarios (EXP1 and EXP3) were not included for consideration in the range of mean predicted salvage, exports in EXP1 and EXP3 are zero.

The months of highest predicted spring-run Chinook salvage at the facilities temporally coincides with when the largest proportion of the juvenile spring-run Chinook salmon population is expected to be in the Delta. Generally, across all water year types, combined monthly OMR flows become slightly more positive or consistent from March through May (Chapter 4, Figure 66). Monthly Sacramento River flows below Keswick Dam, across all water year types, decreases from February through April after increasing since November, and begins to increase in May through the summer months (Chapter 4, Figure 3). This increase of flows cues juveniles to outmigrate from the upper Sacramento River through the mainstem. Fish are present in the South Delta if they become entrained into the Central and Interior Delta through routes like Georgiana Slough or the Delta Cross Channel.

The mean monthly predicted salvage at the Delta Fish Collection Facilities of steelhead from the negative binomial regression model calculated across the months of December through June and all alternatives has a wide range. The final model included a single variable: combined exports at the Banks and Jones facilities. Among the 4 components of Alternative 2, the greatest predicted salvage occurred in the months of March followed by February in wet, dry, and critical water year types. In above normal water year types, the greatest predicted salvage occurred in February followed by March or May. In below normal water year types, the greatest predicted salvage occurred in February followed by March or May. The range of mean predicted salvage of steelhead for the four components of Alternative 2 in March ranged from 8,549 (Alternative 2 with TUCP no VAs) to 7,535 (Alternative 2 without TUCP with Systemwide VAs) in a wet water year type to from 500 (Alternative 2 with TUCP no VAs) to 411 (Alternative 2 without TUCP with Delta VAs) in a critically dry water year type (Table I.1-11, Figure I.1-5a and Figure I.1-5b). Alternative 1 often, but not across all months and water year types, had the greatest predicted salvage of steelhead compared with other alternatives. The greatest predicted salvage occurred in March followed by February in wet, above normal, and below normal water year types. In dry and critical water year types, greatest predicted salvage occurred in February followed by March. Alternative 1 predicted salvage ranged from 11,364 to 1,409 in March of an above normal and critical water year type, respectively (Table I.1-11, Figure I.1-5a and Figure I.1-5b). Alternative 3 had the least predicted salvage of steelhead of all alternatives in all months and water year types except March of Above Normal, Below Normal, and Critical. The greatest predicted salvage occurred in March followed by February in above normal, below normal, and dry water year types; and in February followed by March in wet and critical water year types. Alternative 3 predicted salvage ranged from 2,962 to 262 in March of an above normal and critical water year type, respectively (Table I.1-11, Figure I.1-5a and Figure I.1-5b). Action 5 had the greatest predicted salvage in March followed by February in wet, dry, and critical water year types and in February followed by March in above normal and below normal water year types. Action 5 predicted salvage ranged from 11,098 to 596 in March of a wet and critical water year type, respectively (Table I.1-11, Figure I.1-5a and Figure I.1-5b). No Action Alternative had the greatest predicted salvage in March followed by February in dry and critical water year types and in February followed by March in wet, above normal, and below normal water year types. No Action Alternative predicted salvage ranged from 6,404 to 579 in March of wet and critical water year type, respectively (Table I.1-11, Figure I.1-5a and Figure I.1-5b). Values from the

exploratory modeling scenarios (EXP1 and EXP3) were not included for consideration in the range of mean predicted salvage, exports in EXP1 and EXP3 are zero.

The months of highest predicted steelhead salvage at the facilities temporally coincides with when a large proportion of the juvenile steelhead population is expected to be in the Delta. Generally, across all water year types, combined monthly OMR flows become increasingly more positive from November to February through late fall into winter (Chapter 4, Figure 66.) Monthly Sacramento River flows below Keswick Dam, across all water year types, increase across the same months and seasons (Chapter 4, Figure 3). Monthly Stanislaus River flows below Goodwin Dam, across all water year types, increase from November to February before decreasing in March (Chapter 4, Figure 42). This increase of flows in the Sacramento River cues juveniles to outmigrate from the upper Sacramento River through the mainstem. This increase of flows in the Stanislaus River cues juveniles to outmigrate through the San Joaquin River. Fish are present in the South Delta if they become entrained into the Central and Interior Delta at junctions like Georgiana Slough or the Delta Cross Channel, from the Sacramento River route, or at junctions like Head of Old River, from the San Joaquin River route.

#### *I.1.3.2.1 Tables and Figures*

Table I.1-7. Predicted average monthly salvage of juvenile Winter-Run Chinook Salmon at the Delta fish collection facilities for Exploratory runs 1 and 3 (EXP1, EXP3), No Action Alternative (NAA), 4 components of Alternative 2 and Action 5, averaged by water year type and month (December through April), based on the negative binomial salvage method. Absolute values are rounded.

| Water Year Type | Month | EXP1 | EXP3 | NAA | Alt2woTUCP woVA | Alt2wTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | Act5 |
|---|---|---|---|---|---|---|---|---|---|
| Wet | Dec | 0 | 0 | 3 | 2 | 2 | 2 | 2 | 3 |
| Wet | Jan | 0 | 0 | 5 | 5 | 5 | 5 | 5 | 5 |
| Wet | Feb | 0 | 0 | 16 | 18 | 18 | 18 | 18 | 19 |
| Wet | Mar | 1 | 1 | 34 | 43 | 43 | 40 | 39 | 51 |
| Wet | Apr | 0 | 0 | 6 | 8 | 8 | 6 | 6 | 6 |
| AN | Dec | 0 | 0 | 2 | 2 | 2 | 2 | 2 | 2 |
| AN | Jan | 0 | 0 | 3 | 3 | 3 | 3 | 3 | 3 |
| AN | Feb | 0 | 0 | 11 | 12 | 13 | 12 | 12 | 16 |
| AN | Mar | 1 | 1 | 20 | 21 | 21 | 13 | 13 | 22 |
| AN | Apr | 0 | 0 | 2 | 4 | 4 | 2 | 2 | 2 |
| BN | Dec | 0 | 0 | 2 | 2 | 2 | 2 | 2 | 2 |
| BN | Jan | 0 | 0 | 2 | 2 | 2 | 2 | 2 | 2 |
| BN | Feb | 0 | 0 | 9 | 8 | 8 | 8 | 8 | 10 |
| BN | Mar | 2 | 2 | 17 | 17 | 17 | 10 | 10 | 14 |
| BN | Apr | 0 | 0 | 2 | 3 | 3 | 2 | 2 | 2 |
| Dry | Dec | 0 | 0 | 1 | 1 | 2 | 1 | 1 | 1 |

| Water Year Type | Month | EXP1 | EXP3 | NAA | Alt2woTUCP woVA | Alt2wTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | Act5 |
|---|---|---|---|---|---|---|---|---|---|
| Dry | Jan | 0 | 0 | 2 | 2 | 2 | 2 | 2 | 2 |
| Dry | Feb | 0 | 0 | 6 | 5 | 5 | 5 | 5 | 6 |
| Dry | Mar | 2 | 2 | 15 | 14 | 14 | 10 | 10 | 13 |
| Dry | Apr | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 |
| C | Dec | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 |
| C | Jan | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 |
| C | Feb | 1 | 1 | 4 | 4 | 4 | 4 | 4 | 4 |
| C | Mar | 2 | 2 | 10 | 8 | 9 | 8 | 8 | 10 |
| C | Apr | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |

Table I.1-8. Predicted average monthly salvage of juvenile Winter-Run Chinook Salmon at the Delta fish collection facilities for the No Action Alternative (NAA), Alternative 1 (Alt1), 4 components of Alternative 2, Alternative 3 (Alt3), Alternative 4 (Alt4), and Action 5 (Act5) averaged by water year type and month (December through April), based on the negative binomial salvage method. Percentage values in parentheses indicate the difference between NAA and each alternative. Absolute and percentage values are rounded.

| WYT | Month | NAA | Alt1 | Alt2woTUCP woVA | Alt2wTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | Alt3 | Alt4 | Act5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Wet | Dec | 3 | 7 (133%) | 2 (-33%) | 2 (-33%) | 2 (-33%) | 2 (-33%) | 1 (-67%) | 2 (-33%) | 3 (0%) |
| Wet | Jan | 5 | 16 (220%) | 5 (0%) | 5 (0%) | 5 (0%) | 5 (0%) | 4 (-20%) | 5 (0%) | 5 (0%) |
| Wet | Feb | 16 | 34 (112%) | 18 (12%) | 18 (12%) | 18 (12%) | 18 (12%) | 8 (-50%) | 19 (19%) | 19 (19%) |
| Wet | Mar | 34 | 61 (79%) | 43 (26%) | 43 (26%) | 40 (18%) | 39 (15%) | 16 (-53%) | 48 (41%) | 51 (50%) |
| Wet | Apr | 6 | 7 (17%) | 8 (33%) | 8 (33%) | 6 (0%) | 6 (0%) | 1 (-83%) | 8 (33%) | 6 (0%) |

| WYT | Month | NAA | Alt1 | Alt2woTUCPwoVA | Alt2wTUCPwoVA | Alt2woTUCPDeltaVA | Alt2woTUCPAllVA | Alt3 | Alt4 | Act5 |
|---|---|---|---|---|---|---|---|---|---|---|
| AN | Dec | 2 | 6 (200%) | 2 (0%) | 2 (0%) | 2 (0%) | 2 (0%) | 1 (-50%) | 2 (0%) | 2 (0%) |
| AN | Jan | 3 | 16 (433%) | 3 (0%) | 3 (0%) | 3 (0%) | 3 (0%) | 2 (-33%) | 3 (0%) | 3 (0%) |
| AN | Feb | 11 | 35 (218%) | 12 (9%) | 13 (18%) | 12 (9%) | 12 (9%) | 11 (0%) | 15 (36%) | 16 (45%) |
| AN | Mar | 20 | 78 (290%) | 21 (5%) | 21 (5%) | 13 (-35%) | 13 (-35%) | 24 (20%) | 23 (15%) | 22 (10%) |
| AN | Apr | 2 | 4 (100%) | 4 (100%) | 4 (100%) | 2 (0%) | 2 (0%) | 1 (-50%) | 4 (100%) | 2 (0%) |
| BN | Dec | 2 | 4 (100%) | 2 (0%) | 2 (0%) | 2 (0%) | 2 (0%) | 1 (-50%) | 1 (-50%) | 2 (0%) |
| BN | Jan | 2 | 12 (500%) | 2 (0%) | 2 (0%) | 2 (0%) | 2 (0%) | 1 (-50%) | 2 (0%) | 2 (0%) |
| BN | Feb | 9 | 25 (178%) | 8 (-11%) | 8 (-11%) | 8 (-11%) | 8 (-11%) | 7 (-22%) | 10 (11%) | 10 (11%) |
| BN | Mar | 17 | 66 (288%) | 17 (0%) | 17 (0%) | 10 (-41%) | 10 (-41%) | 19 (12%) | 17 (0%) | 14 (-18%) |
| BN | Apr | 2 | 4 (100%) | 3 (50%) | 3 (50%) | 2 (0%) | 2 (0%) | 1 (-50%) | 3 (50%) | 2 (0%) |
| Dry | Dec | 1 | 3 (200%) | 1 (0%) | 2 (100%) | 1 (0%) | 1 (0%) | 0 (-100%) | 1 (0%) | 1 (0%) |
| Dry | Jan | 2 | 8 (300%) | 2 (0%) | 2 (0%) | 2 (0%) | 2 (0%) | 1 (-50%) | 2 (0%) | 2 (0%) |
| Dry | Feb | 6 | 24 (300%) | 5 (-17%) | 5 (-17%) | 5 (-17%) | 5 (-17%) | 5 (-17%) | 7 (17%) | 6 (0%) |
| Dry | Mar | 15 | 44 (193%) | 14 (-7%) | 14 (-7%) | 10 (-33%) | 10 (-33%) | 14 (-7%) | 14 (-7%) | 13 (-13%) |
| Dry | Apr | 2 | 2 (0%) | 2 (0%) | 2 (0%) | 2 (0%) | 2 (0%) | 1 (-50%) | 2 (0%) | 2 (0%) |
| C | Dec | 1 | 2 (100%) | 1 (0%) | 1 (0%) | 1 (0%) | 1 (0%) | 0 (-100%) | 1 (0%) | 1 (0%) |
| C | Jan | 1 | 5 (400%) | 1 (0%) | 1 (0%) | 1 (0%) | 1 (0%) | 1 (0%) | 1 (0%) | 1 (0%) |
| C | Feb | 4 | 11 (175%) | 4 (0%) | 4 (0%) | 4 (0%) | 4 (0%) | 3 (-25%) | 6 (50%) | 4 (0%) |
| C | Mar | 10 | 15 (50%) | 8 (-20%) | 9 (-10%) | 8 (-20%) | 8 (-20%) | 6 (-40%) | 10 (0%) | 10 (0%) |
| C | Apr | 1 | 1 (0%) | 1 (0%) | 1 (0%) | 1 (0%) | 1 (0%) | 1 (0%) | 1 (0%) | 1 (0%) |

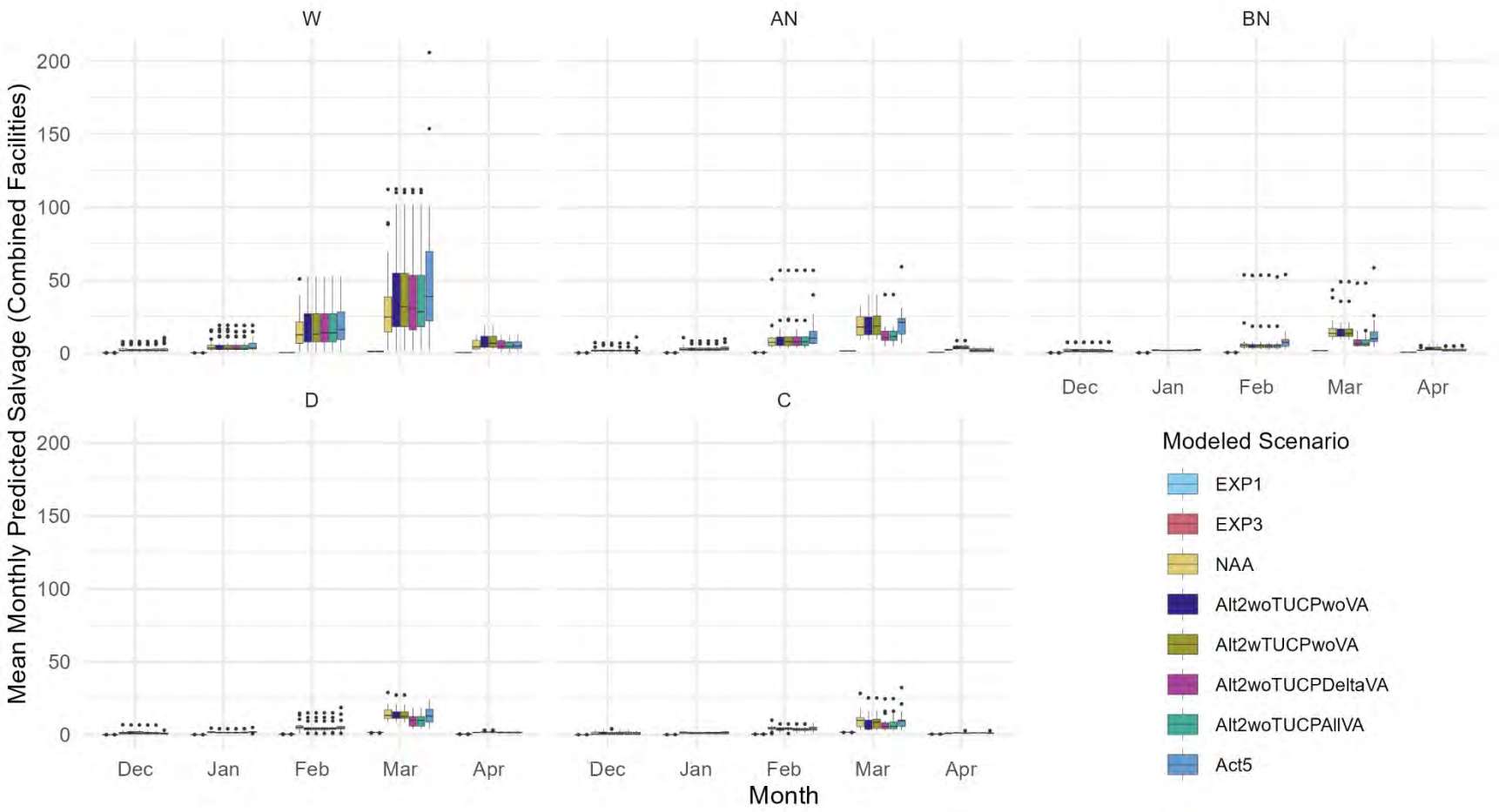



Figure I.1-1. Predicted average monthly salvage of winter-run Chinook salmon at the Delta fish collection facilities by water year type and month, based on the negative binomial salvage method. Note the y-axis scale is fixed. Figure displays data given in the preceding data tables: Table I.1-7, Table I.1-8.

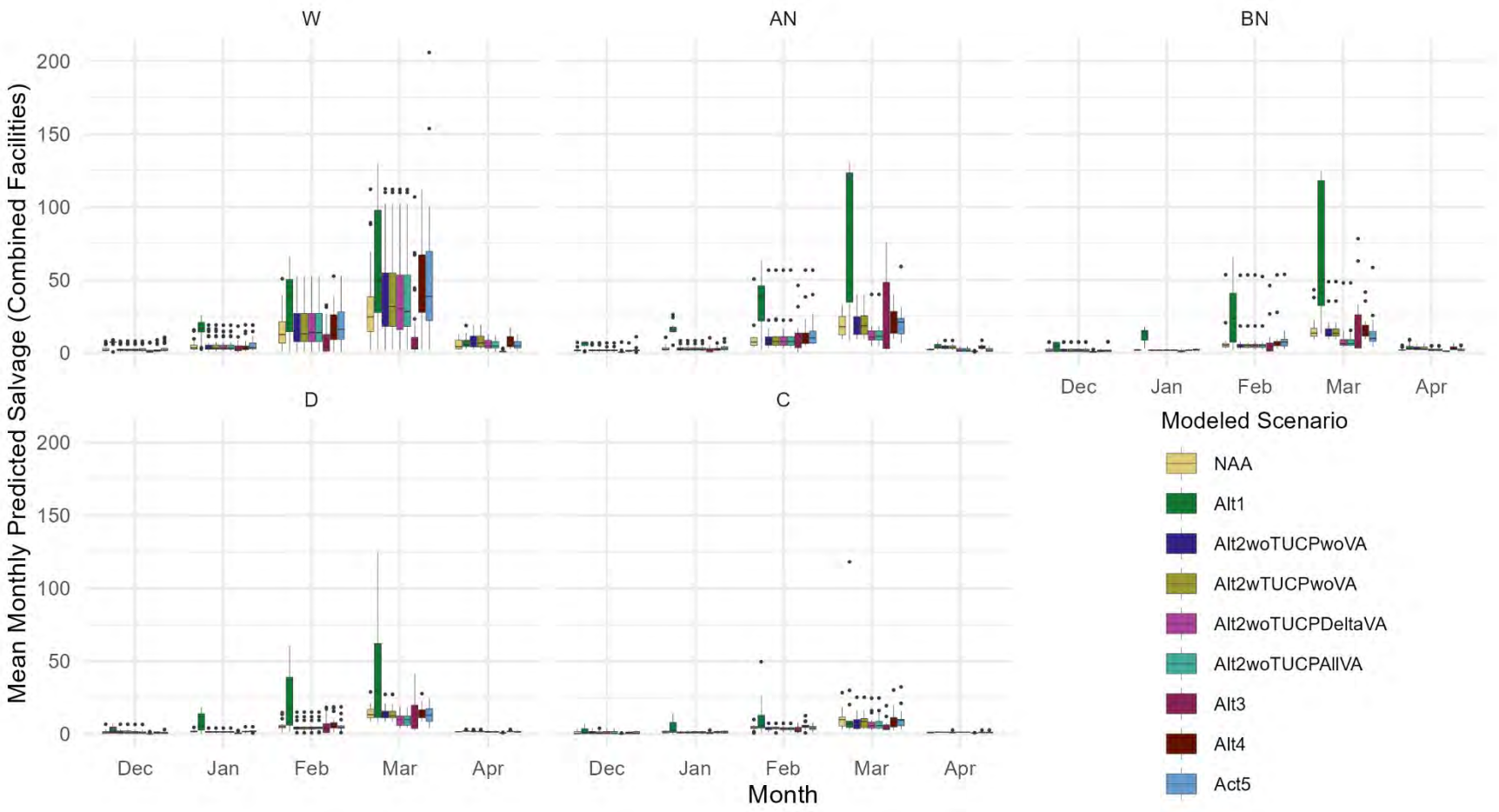



Figure I.1-2. Predicted average monthly salvage of winter-run Chinook salmon at the Delta fish collection facilities by water year type and month, based on the negative binomial salvage method. Note the y-axis scale is fixed. Figure displays data given in the preceding data tables: Table I.1-7, Table I.1-8.

Table I.1-9. Predicted average monthly salvage of juvenile Spring-Run Chinook Salmon at the Delta fish collection facilities for Exploratory runs 1 and 3 (EXP1, EXP3), No Action Alternative (NAA), 4 components of Alternative 2 and Action 5, averaged by water year type and month (March through June), based on the negative binomial salvage method. Absolute values are rounded.

| WYT | Month | EXP1 | EXP3 | NAA | Alt2woTUCP woVA | Alt2wTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | Act5 |
|---|---|---|---|---|---|---|---|---|---|
| Wet | March | 151 | 151 | 2611 | 2883 | 2900 | 2702 | 2638 | 3556 |
| Wet | April | 44 | 44 | 1563 | 2250 | 2197 | 1526 | 1489 | 1491 |
| Wet | May | 70 | 70 | 2194 | 3528 | 3544 | 3514 | 3541 | 3426 |
| Wet | June | 9 | 9 | 92 | 92 | 92 | 92 | 93 | 93 |
| AN | March | 4 | 4 | 76 | 84 | 84 | 51 | 51 | 90 |
| AN | April | 37 | 37 | 264 | 604 | 607 | 250 | 250 | 261 |
| AN | May | 16 | 16 | 119 | 202 | 202 | 182 | 178 | 187 |
| AN | June | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 |
| BN | March | 2 | 2 | 45 | 44 | 44 | 25 | 25 | 39 |
| BN | April | 36 | 36 | 227 | 391 | 392 | 255 | 262 | 284 |
| BN | May | 18 | 18 | 261 | 384 | 390 | 386 | 382 | 362 |
| BN | June | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 |
| Dry | March | 1 | 1 | 17 | 16 | 16 | 10 | 10 | 14 |
| Dry | April | 34 | 34 | 136 | 171 | 172 | 129 | 130 | 132 |
| Dry | May | 10 | 10 | 41 | 63 | 63 | 59 | 59 | 62 |
| Dry | June | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| C | March | 1 | 1 | 9 | 7 | 8 | 7 | 7 | 9 |
| C | April | 33 | 33 | 89 | 105 | 103 | 104 | 105 | 103 |
| C | May | 9 | 9 | 24 | 30 | 32 | 30 | 30 | 32 |

| WYT | Month | EXP1 | EXP3 | NAA | Alt2woTUCP woVA | Alt2wTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | Act5 |
|---|---|---|---|---|---|---|---|---|---|
| C | June | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

Table I.1-10. Predicted average monthly salvage of juvenile Spring-Run Chinook Salmon at the Delta fish collection facilities for the No Action Alternative (NAA), Alternative 1 (Alt1), 4 components of Alternative 2, Alternative 3 (Alt3) Alternative 4 (Alt4) and Action 5 averaged by water year type and month (March through June), based on the negative binomial salvage method. Percentage values in parentheses indicate the difference between NAA and each alternative. Absolute and percentage values are rounded.

| WYT | Month | NAA | Alt1 | Alt2woTUCP woVA | Alt2wTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | Alt3 | Alt4 | Act5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Wet | March | 2611 | 2390 (-8%) | 2883 (10%) | 2900 (11%) | 2702 (3%) | 2638 (1%) | 593 (-77%) | 3106 (19%) | 3556 (36%) |
| Wet | April | 1563 | 1862 (19%) | 2250 (44%) | 2197 (41%) | 1526 (-2%) | 1489 (-5%) | 119 (-92%) | 2221 (42%) | 1491 (-5%) |
| Wet | May | 2194 | 3264 (49%) | 3528 (61%) | 3544 (62%) | 3514 (60%) | 3541 (61%) | 89 (-96%) | 3431 (56%) | 3426 (56%) |
| Wet | June | 92 | 106 (15%) | 92 (0%) | 92 (0%) | 92 (0%) | 93 (1%) | 35 (-62%) | 91 (-1%) | 93 (1%) |
| AN | March | 76 | 323 (325%) | 84 (11%) | 84 (11%) | 51 (-33%) | 51 (-33%) | 121 (59%) | 89 (17%) | 90 (18%) |
| AN | April | 264 | 605 (129%) | 604 (129%) | 607 (130%) | 250 (-5%) | 250 (-5%) | 78 (-70%) | 611 (131%) | 261 (-1%) |
| AN | May | 119 | 237 (99%) | 202 (70%) | 202 (70%) | 182 (53%) | 178 (50%) | 22 (-82%) | 204 (71%) | 187 (57%) |
| AN | June | 1 | 2 (100%) | 1 (0%) | 1 (0%) | 1 (0%) | 1 (0%) | 0 (-100%) | 1 (0%) | 1 (0%) |
| BN | March | 45 | 216 (380%) | 44 (-2%) | 44 (-2%) | 25 (-44%) | 25 (-44%) | 78 (73%) | 42 (-7%) | 39 (-13%) |
| BN | April | 227 | 527 (132%) | 391 (72%) | 392 (73%) | 255 (12%) | 262 (15%) | 97 (-57%) | 398 (75%) | 284 (25%) |
| BN | May | 261 | 366 (40%) | 384 (47%) | 390 (49%) | 386 (48%) | 382 (46%) | 85 (-67%) | 363 (39%) | 362 (39%) |
| BN | June | 1 | 3 (200%) | 1 (0%) | 1 (0%) | 1 (0%) | 1 (0%) | 0 (-100%) | 1 (0%) | 1 (0%) |
| Dry | March | 17 | 78 (359%) | 16 (-6%) | 16 (-6%) | 10 (-41%) | 10 (-41%) | 17 (0%) | 16 (-6%) | 14 (-18%) |
| Dry | April | 136 | 203 (49%) | 171 (26%) | 172 (26%) | 129 (-5%) | 130 (-4%) | 59 (-57%) | 173 (27%) | 132 (-3%) |
| Dry | May | 41 | 73 (78%) | 63 (54%) | 63 (54%) | 59 (44%) | 59 (44%) | 17 (-59%) | 64 (56%) | 62 (51%) |

| WYT | Month | NAA | Alt1 | Alt2woTUCPwoVA | Alt2wTUCPwoVA | Alt2woTUCPDeltaVA | Alt2woTUCPAllVA | Alt3 | Alt4 | Act5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Dry | June | 0 | 0 (NaN%) | 0 (NaN%) | 0 (NaN%) | 0 (NaN%) | 0 (NaN%) | 0 (NaN%) | 0 (NaN%) | 0 (NaN%) |
| C | March | 9 | 21 (133%) | 7 (-22%) | 8 (-11%) | 7 (-22%) | 7 (-22%) | 4 (-56%) | 9 (0%) | 9 (0%) |
| C | April | 89 | 108 (21%) | 105 (18%) | 103 (16%) | 104 (17%) | 105 (18%) | 53 (-40%) | 105 (18%) | 103 (16%) |
| C | May | 24 | 33 (38%) | 30 (25%) | 32 (33%) | 30 (25%) | 30 (25%) | 14 (-42%) | 32 (33%) | 32 (33%) |
| C | June | 0 | 0 (NaN%) | 0 (NaN%) | 0 (NaN%) | 0 (NaN%) | 0 (NaN%) | 0 (NaN%) | 0 (NaN%) | 0 (NaN%) |

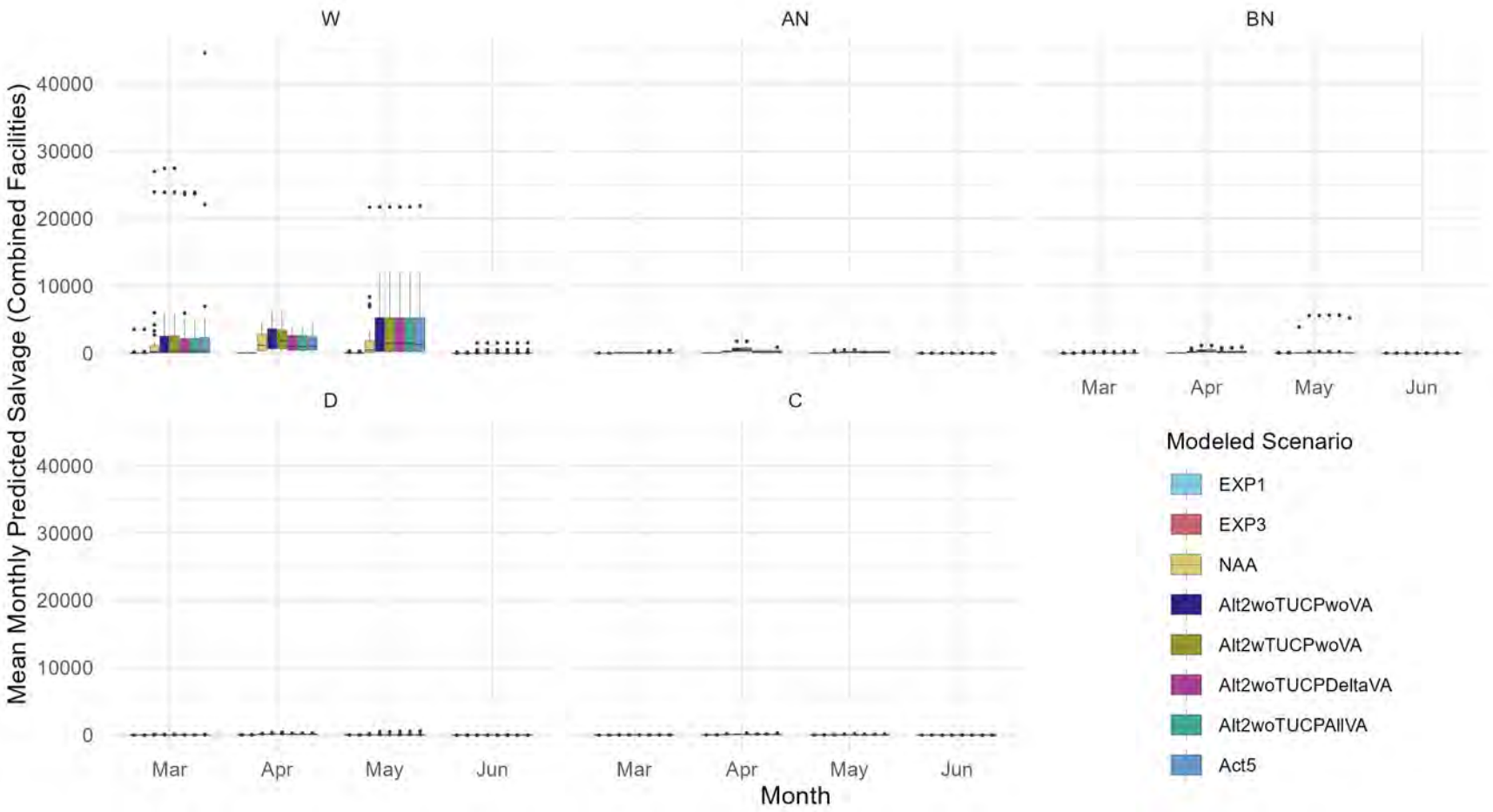



Figure I.1-3a. Predicted average monthly salvage of spring-run Chinook salmon at the Delta fish collection facilities by water year type and month, based on the negative binomial salvage method. Note the y-axis scale is fixed. Figure displays data given in the preceding data tables: Table I.1-9, Table I.1-10.

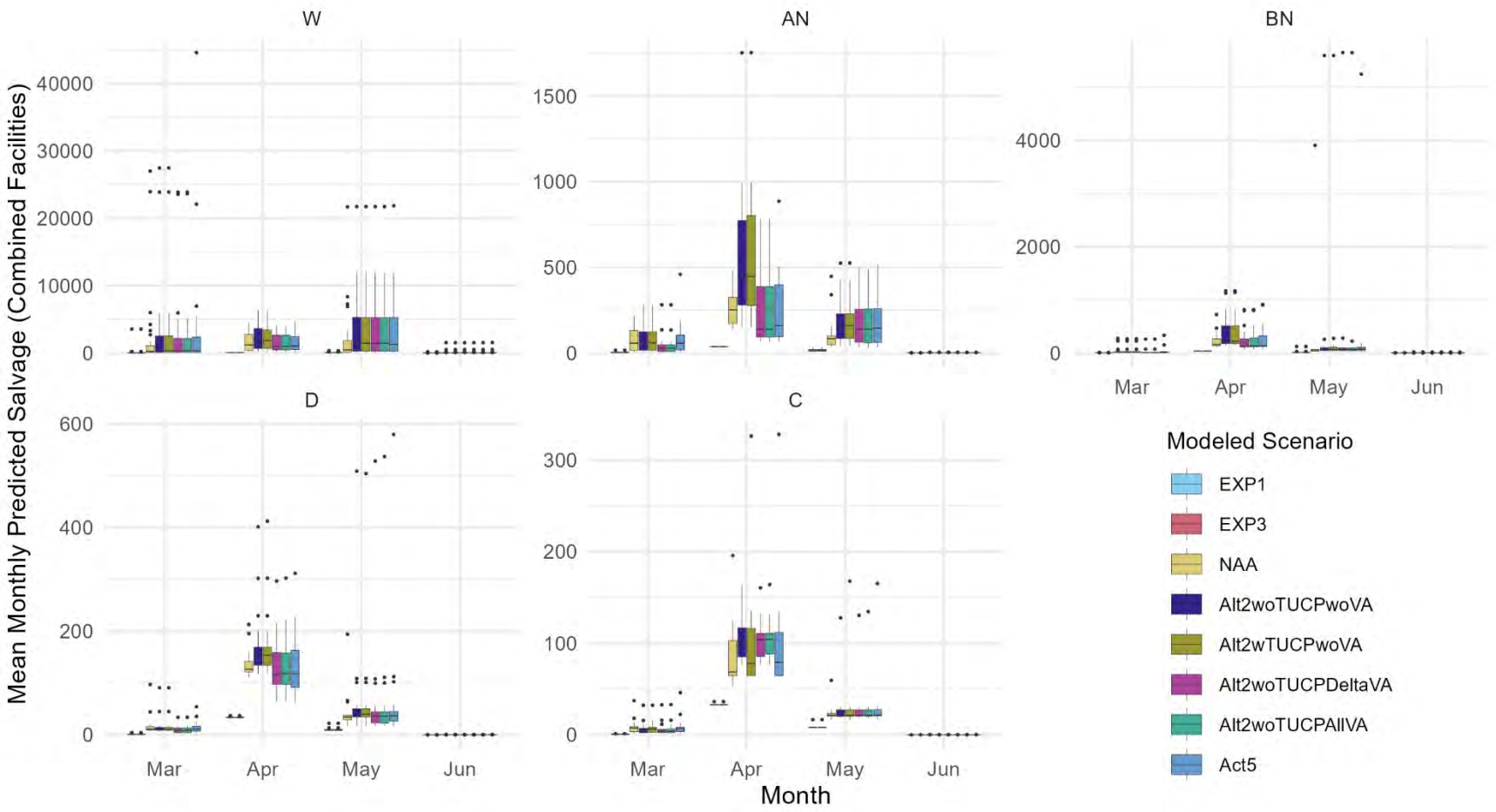



Figure I.1-3b. Predicted average monthly salvage of spring-run Chinook salmon at the Delta fish collection facilities by water year type and month, based on the negative binomial salvage method. Note the y-axis scale is free. Figure displays data given in the preceding data tables: Table I.1-9, Table I.1-10.

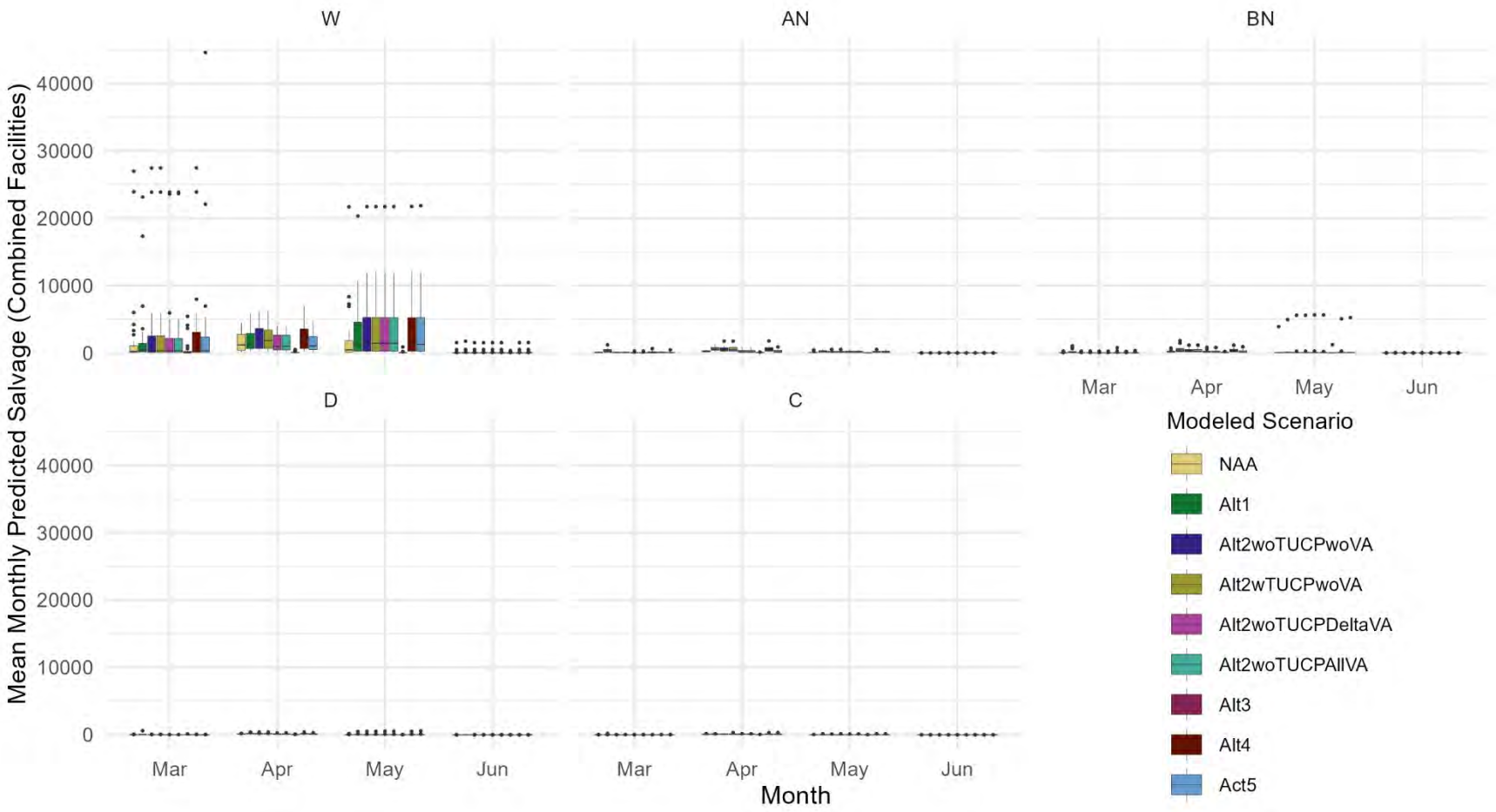



Figure I.1-4a. Predicted average monthly salvage of spring-run Chinook salmon at the Delta fish collection facilities by water year type and month, based on the negative binomial salvage method. Note the y-axis scale is fixed. Figure displays data given in the preceding data tables: Table I.1-9, Table I.1-10.

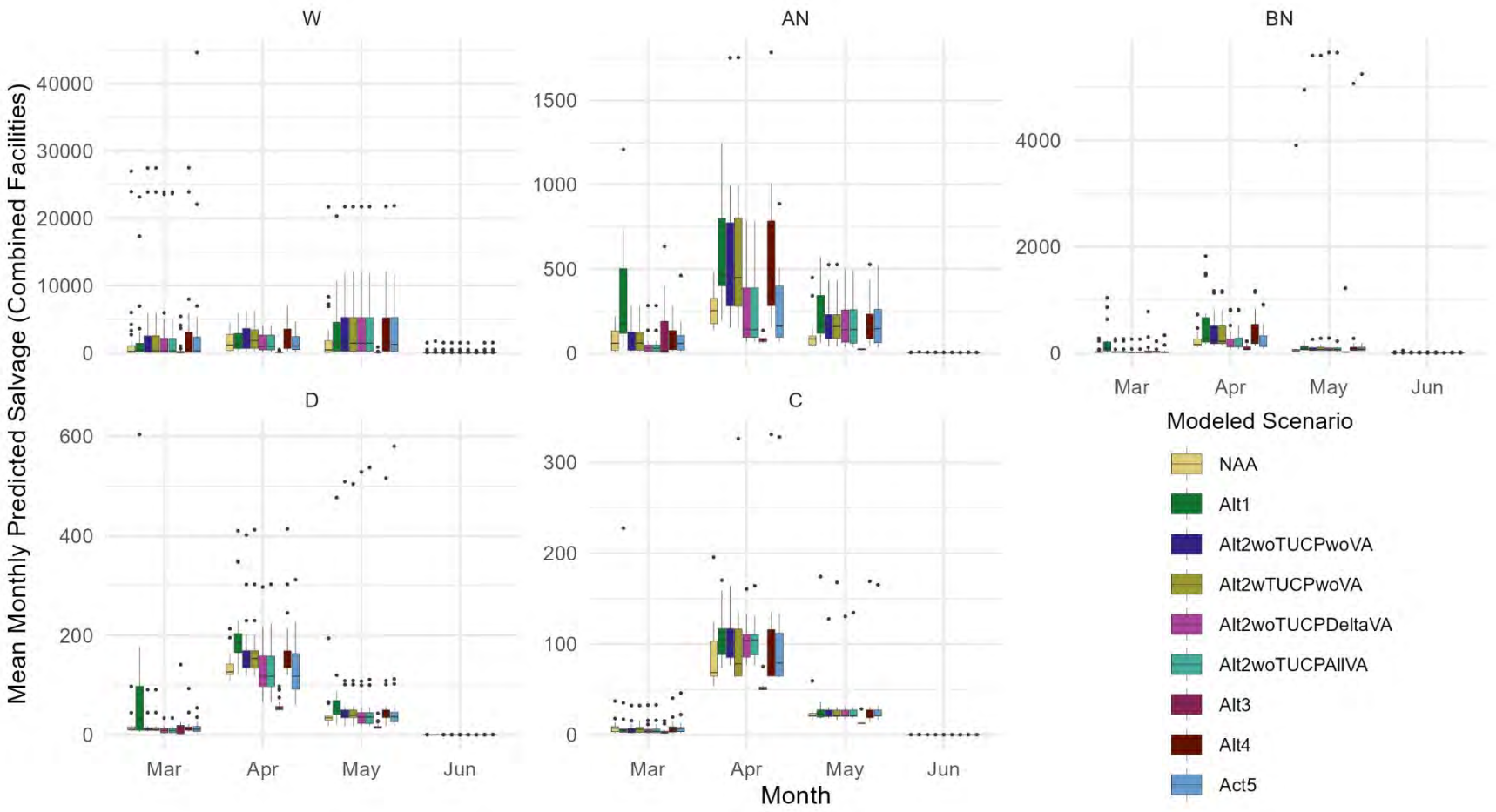



Figure I.1-4b. Predicted average monthly salvage of spring-run Chinook salmon at the Delta fish collection facilities by water year type and month, based on the negative binomial salvage method. Note the y-axis scale is free. Figure displays data given in the preceding data tables: Table I.1-9, Table I.1-10.

Table I.1-11. Predicted average monthly salvage of juvenile Steelhead at the Delta fish collection facilities for Exploratory runs 1 and 3 (EXP1, EXP3), No Action Alternative (NAA), 4 components of Alternative 2 and Action 5, averaged by water year type and month (December through June), based on the negative binomial salvage method. Absolute values are rounded.

| Water Year Type | Month | EXP1 | EXP3 | NAA | Alt2woTUCP woVA | Alt2wTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | Alt5 |
|---|---|---|---|---|---|---|---|---|---|
| Wet | Dec | 1 | 1 | 84 | 80 | 80 | 80 | 81 | 116 |
| Wet | Jan | 7 | 7 | 1649 | 1782 | 1783 | 1739 | 1750 | 1638 |
| Wet | Feb | 20 | 20 | 7077 | 7625 | 7722 | 7824 | 7824 | 8018 |
| Wet | Mar | 48 | 48 | 6404 | 8522 | 8549 | 7976 | 7535 | 11098 |
| Wet | Apr | 81 | 81 | 4176 | 6281 | 6126 | 4075 | 3969 | 3973 |
| Wet | May | 51 | 51 | 2313 | 5404 | 5439 | 5418 | 5438 | 5074 |
| Wet | Jun | 5 | 5 | 316 | 308 | 309 | 310 | 310 | 301 |
| AN | Dec | 1 | 1 | 56 | 59 | 59 | 57 | 57 | 84 |
| AN | Jan | 7 | 7 | 503 | 423 | 424 | 423 | 423 | 528 |
| AN | Feb | 20 | 20 | 2770 | 3481 | 3808 | 3482 | 3266 | 5167 |
| AN | Mar | 48 | 48 | 1800 | 1996 | 2008 | 1067 | 1080 | 2097 |
| AN | Apr | 81 | 81 | 696 | 1728 | 1737 | 664 | 665 | 697 |
| AN | May | 51 | 51 | 534 | 976 | 977 | 866 | 846 | 890 |
| AN | Jun | 5 | 5 | 89 | 73 | 73 | 72 | 72 | 76 |
| BN | Dec | 1 | 1 | 46 | 43 | 43 | 44 | 43 | 41 |
| BN | Jan | 7 | 7 | 174 | 157 | 157 | 159 | 159 | 197 |
| BN | Feb | 20 | 20 | 2024 | 1947 | 1953 | 1952 | 1948 | 2155 |
| BN | Mar | 48 | 48 | 1363 | 1372 | 1373 | 726 | 727 | 1174 |

| Water Year Type | Month | EXP1 | EXP3 | NAA | Alt2woTUCP woVA | Alt2wTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | Alt5 |
|---|---|---|---|---|---|---|---|---|---|
| BN | Apr | 81 | 81 | 622 | 1114 | 1116 | 699 | 719 | 780 |
| BN | May | 51 | 51 | 713 | 1119 | 1153 | 1105 | 1092 | 1040 |
| BN | Jun | 5 | 5 | 87 | 72 | 70 | 71 | 71 | 69 |
| Dry | Dec | 1 | 1 | 25 | 26 | 27 | 24 | 23 | 15 |
| Dry | Jan | 7 | 7 | 168 | 138 | 138 | 139 | 140 | 181 |
| Dry | Feb | 20 | 20 | 622 | 521 | 521 | 520 | 530 | 637 |
| Dry | Mar | 48 | 48 | 900 | 839 | 839 | 540 | 542 | 803 |
| Dry | Apr | 81 | 81 | 370 | 477 | 479 | 352 | 353 | 358 |
| Dry | May | 51 | 51 | 232 | 352 | 352 | 322 | 318 | 336 |
| Dry | Jun | 5 | 5 | 56 | 42 | 42 | 40 | 40 | 49 |
| C | Dec | 1 | 1 | 19 | 21 | 19 | 20 | 20 | 16 |
| C | Jan | 7 | 7 | 119 | 89 | 91 | 100 | 99 | 122 |
| C | Feb | 20 | 20 | 408 | 333 | 360 | 316 | 315 | 380 |
| C | Mar | 48 | 48 | 579 | 433 | 500 | 411 | 416 | 596 |
| C | Apr | 81 | 81 | 236 | 285 | 280 | 281 | 284 | 279 |
| C | May | 51 | 51 | 149 | 186 | 201 | 188 | 190 | 200 |
| C | Jun | 5 | 5 | 15 | 13 | 13 | 13 | 13 | 14 |

Table I.1-12. Predicted average monthly salvage of juvenile Steelhead at the Delta fish collection facilities for the No Action Alternative (NAA), Alternative 1 (Alt1), 4 components of Alternative 2, Alternative 3 (Alt3), Alternative 4 (Alt4), and Action 5 averaged by water year type and month (December through June), based on the negative binomial salvage method. Percentage values in parentheses indicate the difference between NAA and each alternative. Absolute and percentage values are rounded.

| WYT | Month | NAA | Alt1 | Alt2woTUCPwoVA | Alt2wTUCPwoVA | Alt2woTUCPDeltaVA | Alt2woTUCPAllVA | Alt3 | Alt4 | Act5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Wet | Dec | 84 | 229 (173%) | 80 (-5%) | 80 (-5%) | 80 (-5%) | 81 (-4%) | 39 (-54%) | 79 (-6%) | 116 (38%) |
| Wet | Jan | 1649 | 4675 (184%) | 1782 (8%) | 1783 (8%) | 1739 (5%) | 1750 (6%) | 898 (-46%) | 1602 (-3%) | 1638 (-1%) |
| Wet | Feb | 7077 | 11661 (65%) | 7625 (8%) | 7722 (9%) | 7824 (11%) | 7824 (11%) | 2950 (-58%) | 7848 (11%) | 8018 (13%) |
| Wet | Mar | 6404 | 10783 (68%) | 8522 (33%) | 8549 (33%) | 7976 (25%) | 7535 (18%) | 2665 (-58%) | 9545 (49%) | 11098 (73%) |
| Wet | Apr | 4176 | 5100 (22%) | 6281 (50%) | 6126 (47%) | 4075 (-2%) | 3969 (-5%) | 269 (-94%) | 6167 (48%) | 3973 (-5%) |
| Wet | May | 2313 | 5130 (122%) | 5404 (134%) | 5439 (135%) | 5418 (134%) | 5438 (135%) | 139 (-94%) | 5097 (120%) | 5074 (119%) |
| Wet | Jun | 316 | 419 (33%) | 308 (-3%) | 309 (-2%) | 310 (-2%) | 310 (-2%) | 207 (-34%) | 284 (-10%) | 301 (-5%) |
| AN | Dec | 56 | 165 (195%) | 59 (5%) | 59 (5%) | 57 (2%) | 57 (2%) | 32 (-43%) | 48 (-14%) | 84 (50%) |
| AN | Jan | 503 | 3767 (649%) | 423 (-16%) | 424 (-16%) | 423 (-16%) | 423 (-16%) | 381 (-24%) | 344 (-32%) | 528 (5%) |
| AN | Feb | 2770 | 8926 (222%) | 3481 (26%) | 3808 (37%) | 3482 (26%) | 3266 (18%) | 2943 (6%) | 4951 (79%) | 5167 (87%) |
| AN | Mar | 1800 | 11364 (531%) | 1996 (11%) | 2008 (12%) | 1067 (-41%) | 1080 (-40%) | 2962 (65%) | 2193 (22%) | 2097 (16%) |
| AN | Apr | 696 | 1744 (151%) | 1728 (148%) | 1737 (150%) | 664 (-5%) | 665 (-4%) | 193 (-72%) | 1748 (151%) | 697 (0%) |
| AN | May | 534 | 1187 (122%) | 976 (83%) | 977 (83%) | 866 (62%) | 846 (58%) | 96 (-82%) | 987 (85%) | 890 (67%) |
| AN | Jun | 89 | 207 (133%) | 73 (-18%) | 73 (-18%) | 72 (-19%) | 72 (-19%) | 28 (-69%) | 73 (-18%) | 76 (-15%) |
| BN | Dec | 46 | 109 (137%) | 43 (-7%) | 43 (-7%) | 44 (-4%) | 43 (-7%) | 9 (-80%) | 20 (-57%) | 41 (-11%) |
| BN | Jan | 174 | 2278 (1209%) | 157 (-10%) | 157 (-10%) | 159 (-9%) | 159 (-9%) | 97 (-44%) | 158 (-9%) | 197 (13%) |
| BN | Feb | 2024 | 6048 (199%) | 1947 (-4%) | 1953 (-4%) | 1952 (-4%) | 1948 (-4%) | 1717 (-15%) | 2298 (14%) | 2155 (6%) |

| WYT | Month | NAA | Alt1 | Alt2woTUCPwoVA | Alt2wTUCPwoVA | Alt2woTUCPDeltaVA | Alt2woTUCPAllVA | Alt3 | Alt4 | Act5 |
|---|---|---|---|---|---|---|---|---|---|---|
| BN | Mar | 1363 | 8712 (539%) | 1372 (1%) | 1373 (1%) | 726 (-47%) | 727 (-47%) | 2042 (50%) | 1330 (-2%) | 1174 (-14%) |
| BN | Apr | 622 | 1542 (148%) | 1114 (79%) | 1116 (79%) | 699 (12%) | 719 (16%) | 248 (-60%) | 1135 (82%) | 780 (25%) |
| BN | May | 713 | 1126 (58%) | 1119 (57%) | 1153 (62%) | 1105 (55%) | 1092 (53%) | 207 (-71%) | 1088 (53%) | 1040 (46%) |
| BN | Jun | 87 | 185 (113%) | 72 (-17%) | 70 (-20%) | 71 (-18%) | 71 (-18%) | 19 (-78%) | 67 (-23%) | 69 (-21%) |
| Dry | Dec | 25 | 67 (168%) | 26 (4%) | 27 (8%) | 24 (-4%) | 23 (-8%) | 5 (-80%) | 15 (-40%) | 15 (-40%) |
| Dry | Jan | 168 | 1308 (679%) | 138 (-18%) | 138 (-18%) | 139 (-17%) | 140 (-17%) | 58 (-65%) | 166 (-1%) | 181 (8%) |
| Dry | Feb | 622 | 4957 (697%) | 521 (-16%) | 521 (-16%) | 520 (-16%) | 530 (-15%) | 681 (9%) | 863 (39%) | 637 (2%) |
| Dry | Mar | 900 | 4752 (428%) | 839 (-7%) | 839 (-7%) | 540 (-40%) | 542 (-40%) | 953 (6%) | 885 (-2%) | 803 (-11%) |
| Dry | Apr | 370 | 570 (54%) | 477 (29%) | 479 (29%) | 352 (-5%) | 353 (-5%) | 149 (-60%) | 484 (31%) | 358 (-3%) |
| Dry | May | 232 | 407 (75%) | 352 (52%) | 352 (52%) | 322 (39%) | 318 (37%) | 92 (-60%) | 354 (53%) | 336 (45%) |
| Dry | Jun | 56 | 65 (16%) | 42 (-25%) | 42 (-25%) | 40 (-29%) | 40 (-29%) | 10 (-82%) | 42 (-25%) | 49 (-12%) |
| C | Dec | 19 | 54 (184%) | 21 (11%) | 19 (0%) | 20 (5%) | 20 (5%) | 3 (-84%) | 14 (-26%) | 16 (-16%) |
| C | Jan | 119 | 730 (513%) | 89 (-25%) | 91 (-24%) | 100 (-16%) | 99 (-17%) | 76 (-36%) | 108 (-9%) | 122 (3%) |
| C | Feb | 408 | 1716 (321%) | 333 (-18%) | 360 (-12%) | 316 (-23%) | 315 (-23%) | 270 (-34%) | 564 (38%) | 380 (-7%) |
| C | Mar | 579 | 1409 (143%) | 433 (-25%) | 500 (-14%) | 411 (-29%) | 416 (-28%) | 262 (-55%) | 590 (2%) | 596 (3%) |
| C | Apr | 236 | 294 (25%) | 285 (21%) | 280 (19%) | 281 (19%) | 284 (20%) | 134 (-43%) | 284 (20%) | 279 (18%) |
| C | May | 149 | 206 (38%) | 186 (25%) | 201 (35%) | 188 (26%) | 190 (28%) | 83 (-44%) | 199 (34%) | 200 (34%) |
| C | Jun | 15 | 18 (20%) | 13 (-13%) | 13 (-13%) | 13 (-13%) | 13 (-13%) | 9 (-40%) | 12 (-20%) | 14 (-7%) |

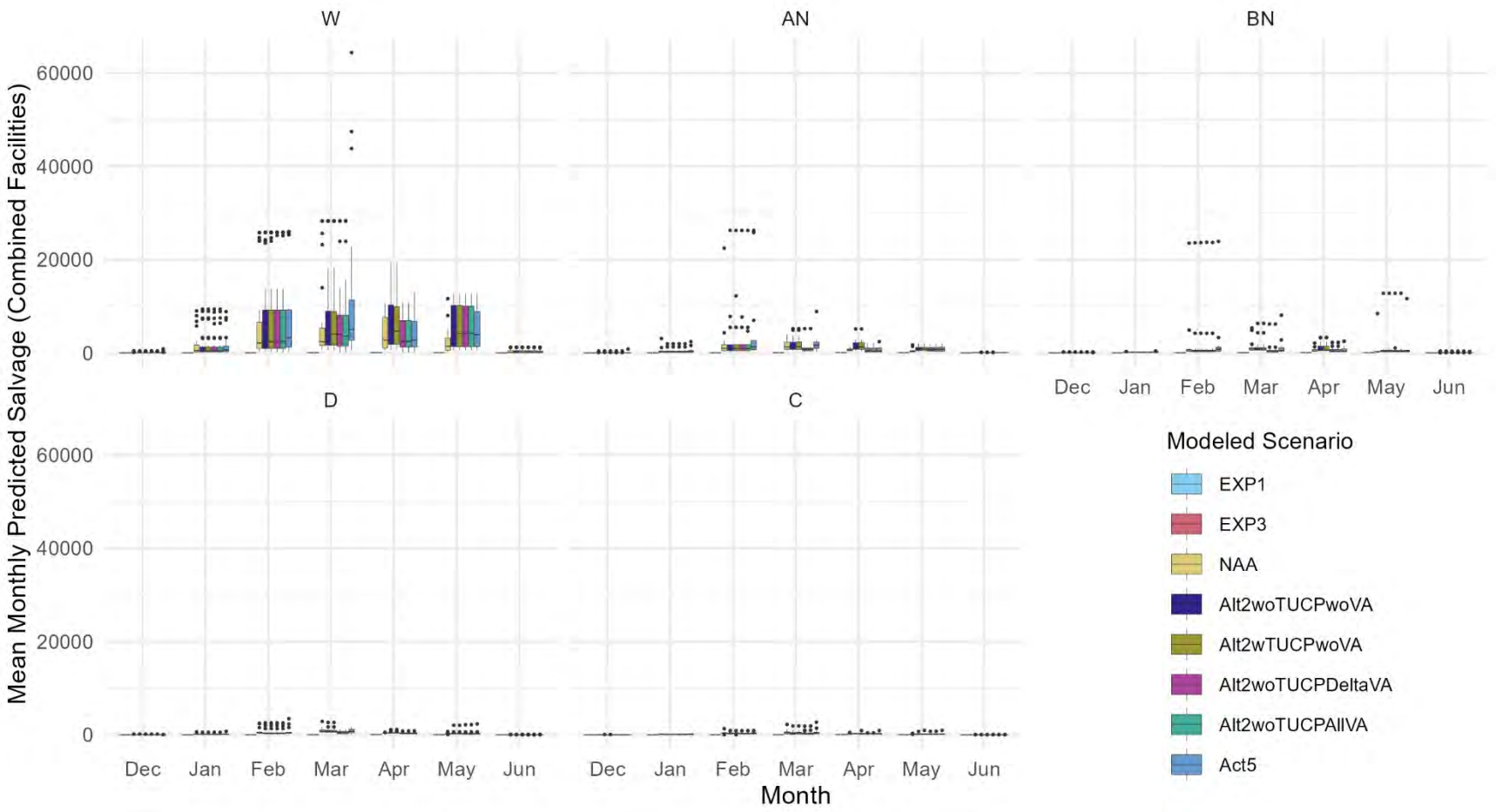



Figure I.1-5a. Predicted average monthly salvage of steelhead at the Delta fish collection facilities by water year type and month, based on the negative binomial salvage method. Note the y-axis scale is fixed. Figure displays data given in the preceding data tables: Table I.1-11, Table I.1-12.

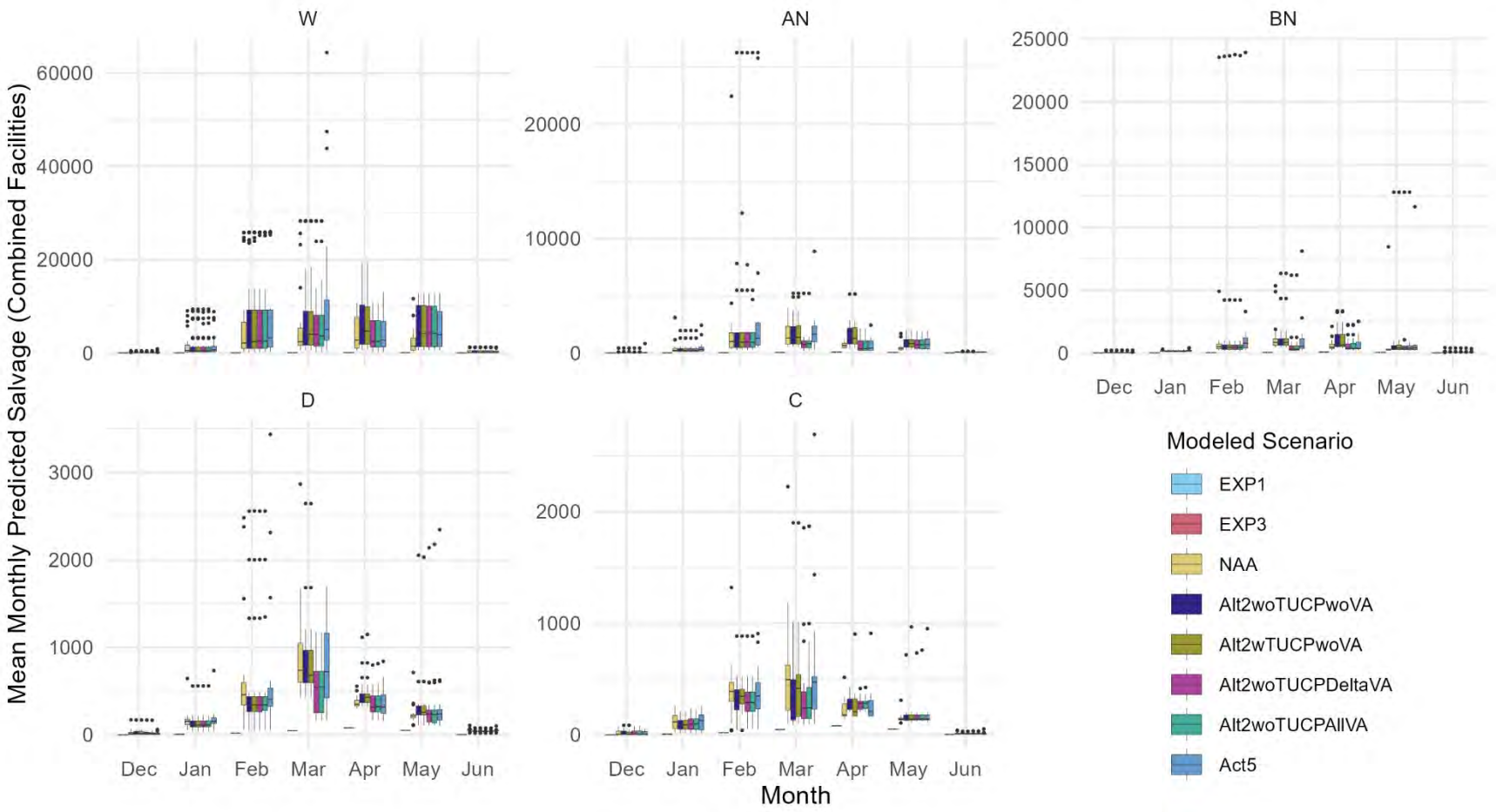



Figure I.1-5b. Predicted average monthly salvage of steelhead at the Delta fish collection facilities by water year type and month, based on the negative binomial salvage method. Note the y-axis scale is free. Figure displays data given in the preceding data tables: Table I.1-11, Table I.1-12.

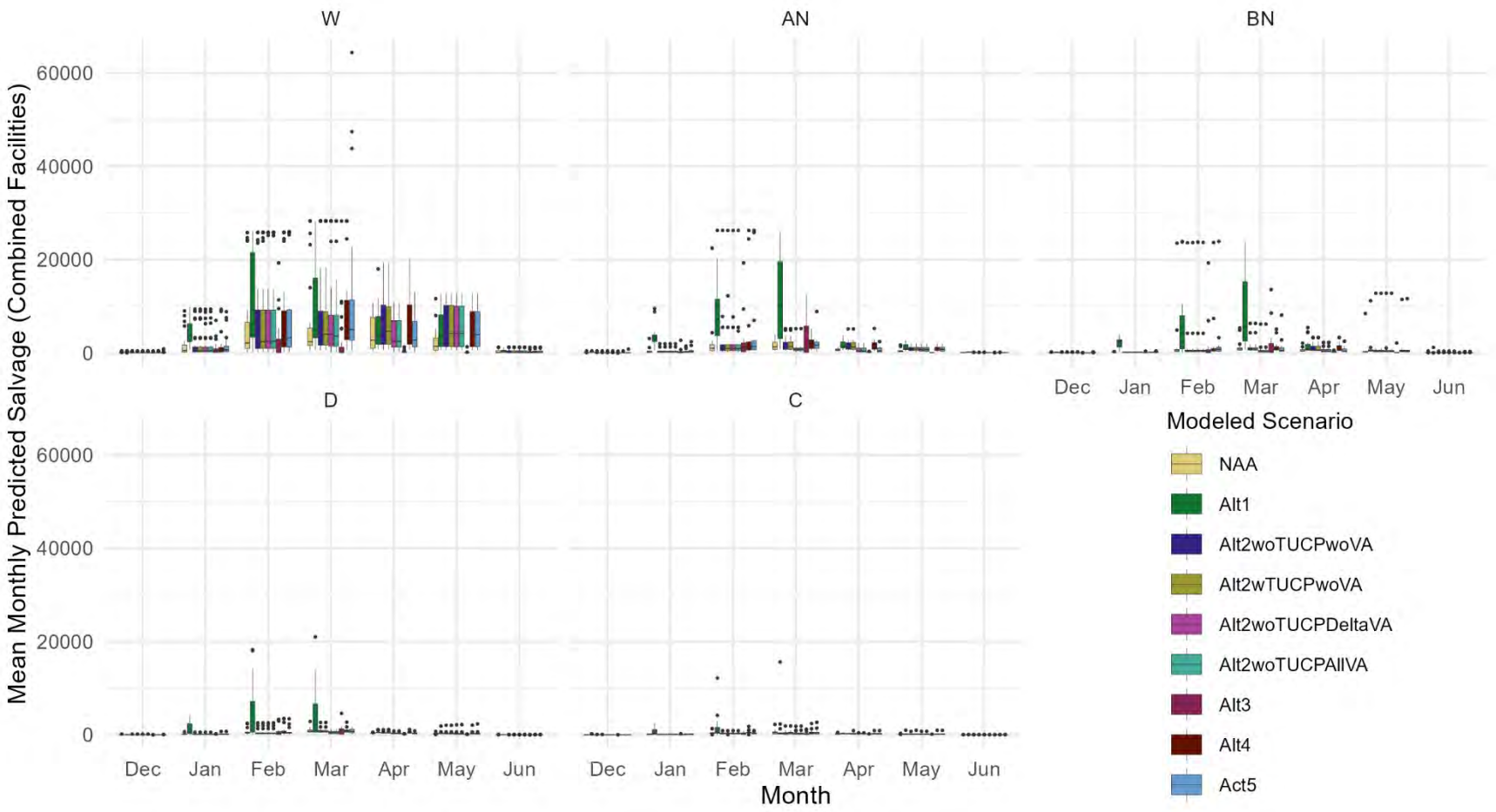



Figure I.1-6a. Predicted average monthly salvage of steelhead at the Delta fish collection facilities by water year type and month, based on the negative binomial salvage method. Note the y-axis scale is fixed. Figure displays data given in the preceding data tables: Table I.1-11, Table I.1-12.

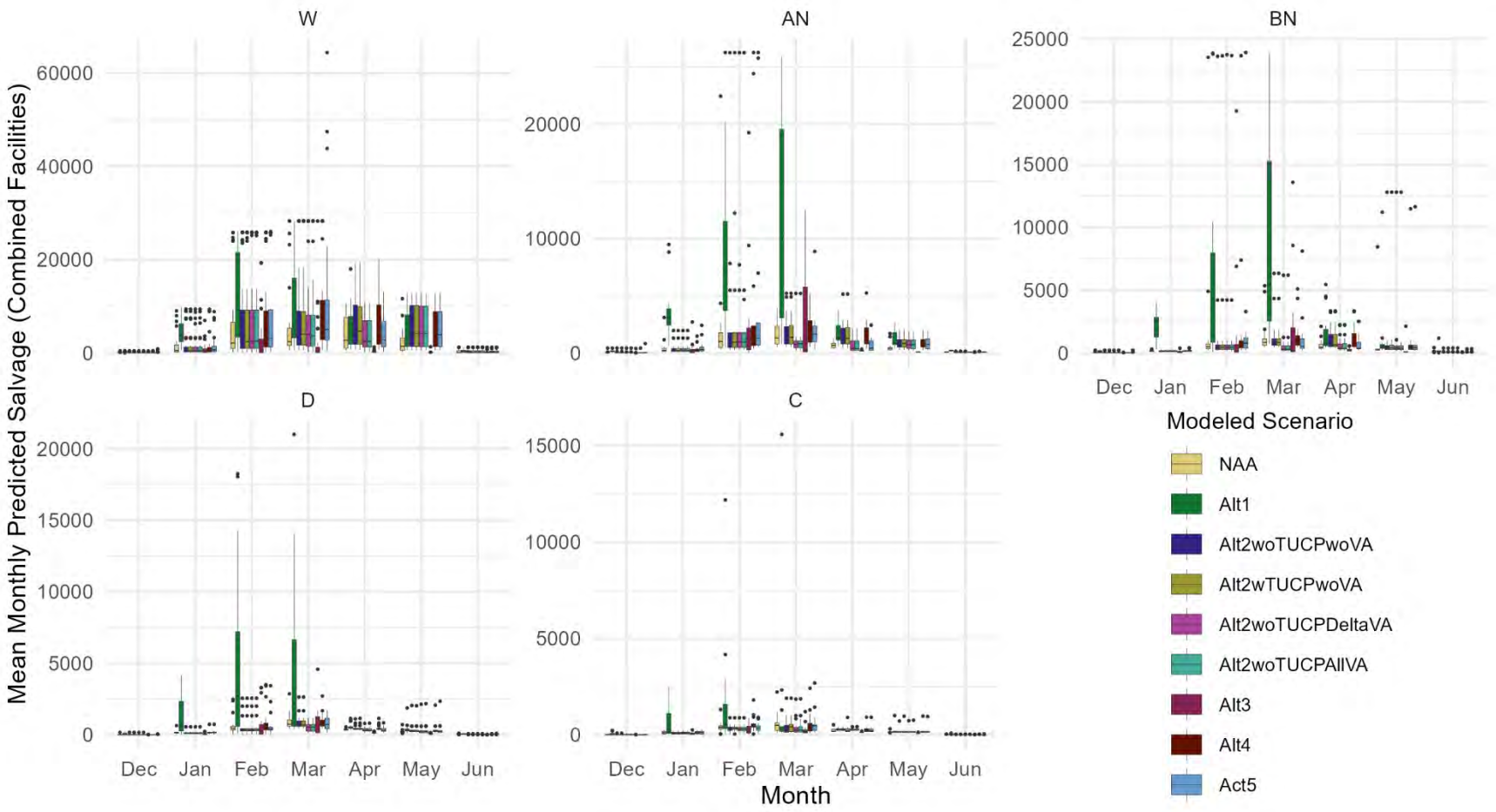



Figure I.1-6b. Predicted average monthly salvage of steelhead at the Delta fish collection facilities by water year type and month, based on the negative binomial salvage method. Note the y-axis scale is free. Figure displays data given in the preceding data tables: Table I.1-11, Table I.1-12.

Appendix I, Old and Middle River Flow Management

# Attachment I.2 Salvage Density Model Loss Simulation

## I.2.1 Model Overview

The salvage-density method is a model of entrainment into the south Delta facilities as a function of flow based on historical salvage data. The results are a quantitative analysis of entrainment differences between operating scenarios (including the Proposed Action). The method uses data from 2009 – 2022, reflective of current observed loss of salmonids at the CVP and SWP collection facilities and export rates. This period represents conditions under the 2009 Biological Opinion and conditions under the 2019 Biological Opinion.

## I.2.2 Model Development

### I.2.2.1 Methods

Data were downloaded, hosted online at https://apps.wildlife.ca.gov/Salvage. Salvage from water years 2009 - 2022 were included in the analysis. These years were chosen as representative of recent salvage patterns and the water year type was known. Juvenile salmonids with clipped and unclipped adipose fins were included. Together, clipped and unclipped fish represent the hatchery-origin and wild-origin portions of each Evolutionary Significant Unit (ESU). Daily loss density (fish per thousand acre-feet of exported water) for juvenile salmonids was independently calculated for the Central Valley Project and State Water Project Delta export facilities.

The daily loss density values for each month, export facility, and water year type were multiplied by the CalSim-modeled exports (1922 – 2021, CalSim3) for the same month for all the water years of that water-year type for the modeled scenarios to create predictions. The following scenarios were analyzed: Exploratory 1 (EXP1), Exploratory 3 (EXP3), No Action Alternative (NAA), Alternative 1 (Alt1), Alternative 2 with Temporary Urgency Change Petitions (TUCPs) without Voluntary Agreements (VAs), Alternative 2 without TUCPs without VAs, Alternative 2 without TUCPs with Delta VA, Alternative 2 without TUCPs with systemwide VAs, Alternative 3 (Alt3), Alternative 4 (Alt4), and Action 5. Results from all scenarios are presented. For the purposes of the Biological Assessment no comparisons were made, for the purposes of the Environmental Impact Statement comparisons were made for all alternatives with NAA. Absolute and percentage values are rounded. Alternative 2 is the Proposed Action.

### I.2.2.2 Assumptions / Uncertainty

Salvage from 2009 - 2022 is assumed to be representative of recent salvage patterns. There were no above normal water year types 2009-2022, so wet was used for above normal. Both clipped and unclipped juvenile salmonids were included in the salvage record assumed to be representative of the ESU. The salvage-density method provides outputs of fish lost but should not be treated as predictions of future entrainment. Results should be interpreted as differences between scenarios weighted by historical loss and should be used to compare scenarios. The use of expanded salvage estimates has a known associated statistical error caused by the expansion of subsamples. This statistical error has not been accounted for in the current salvage-density method though this is consistent with analyses using these data. The method assumes a linear relationship between entrainment and export flows due to a lack of information on how salvage would increase with increasing flows. The method does not account for spatial distribution of fish populations. Juvenile Chinook were assigned a race using length at date (LAD) method. There is a large overlap in size distributions among races which can lead to false race assignments and LAD has been shown to be inaccurate for both winter-run and spring-run Chinook salmon when compared with genetic identification assignment. Salvage by race should be interpreted with caution. Additionally, the salvage density model was run using juvenile Chinook genetically identified as winter-run.

### I.2.2.3 Code and Data Repository

Salvage inputs: Salvage data available online at https://apps.wildlife.ca.gov/Salvage.

Exports inputs: CalSim modeled exports are available upon request.

Analysis files: Excel analysis files for salvage density input data and the salvage density model analysis are available upon request.

## I.2.3 Results

Results are provided by Delta pumping facility (Banks Pumping Plant, Jones Pumping Plant) by species (LAD Winter-Run Chinook Salmon, Genetic Winter-Run Chinook Salmon, LAD Spring-Run Chinook Salmon, Steelhead) by water year type in the following tables for the Biological Assessment: LAD winter-run Chinook salmon at SWP Banks (Table I.2-1) and CVP Jones (Table I.2-3), Genetic winter-run Chinook salmon at SWP Banks (Table I.2-5) and CVP Jones (Table I.2-7), LAD spring-run Chinook salmon at SWP Banks (Table I.2-9) and CVP Jones (Table I.2-11), Steelhead at SWP Banks (Table I.2-13) and CVP Jones (Table I.2-15), Green sturgeon at SWP Banks (Table I.2-21) and CVP Jones (Table I.2-23).

Results are provided by Delta pumping facility by species in the following tables for all alternatives and the NAA LAD winter-run Chinook salmon at SWP Banks (Table I.2-2) and CVP Jones (Table I.2-4), Genetic winter-run Chinook salmon at SWP Banks(Table I.2-6) and CVP Jones (Table I.2-8), LAD spring-run Chinook salmon at SWP Banks (Table I.2-10) and CVP Jones (Table I.2-12), steelhead at SWP Banks (Table I.2-14) and CVP Jones (Table I.2-16), fall-run Chinook salmon at SWP Banks (Table I.2-17) and CVP Jones (Table I.2-18), late fall-run Chinook salmon at SWP Banks (Table I.2-19) and CVP Jones (Table I.2-20), green sturgeon at

SWP Banks (Table I.2-22) and CVP Jones (Table I.2-24), American shad at SWP Banks (Table I.2-25) and CVP Jones (Table I.2-26), Hardhead at SWP Banks (Table I.2-27) and CVP Jones (Table I.2-28), Pacific Lamprey at SWP Banks (Table I.2-29) and CVP Jones (Table I.2-30), River Lamprey at SWP Banks (Table I.2-31) and CVP Jones (Table I.2-32), Largemouth Bass at SWP Banks (Table I.2-33) and CVP Jones (Table I.2-34), Sacramento splittail at SWP Banks (Table I.2-35) and CVP Jones (Table I.2-36), Smallmouth Bass at SWP Banks (Table I.2-37) and CVP Jones (Table I.2-38), Spotted Bass at SWP Banks (Table I.2-39) and CVP Jones (Table I.2-40), Striped Bass at SWP Banks (Table I.2-41) and CVP Jones (Table I.2-42), White Sturgeon at SWP Banks (Table I.2-43) and CVP Jones (Table I.2-44), California Roach at SWP Banks (Table I.2-45) and CVP Jones (Table I.2-46), Threadfin shad at SWP Banks (Table I.2-47) and CVP Jones (Table I.2-48), Hitch at SWP Banks (Table I.2-49) and CVP Jones (Table I.2-50), Starry Flounder at SWP Banks (Table I.2-51) and CVP Jones (Table I.2-52).

### I.2.3.1 LAD Winter-run Chinook Salmon

The mean predicted loss of length at date (LAD) winter-run Chinook salmon at Banks from the salvage density model calculated across all water year types for each month and all alternatives, has a wide range. The greatest predicted loss of LAD winter-run Chinook salmon at Banks occurred in March followed by February in wet and above normal water year types. In below normal water year types, depending on the component of Alternative 2, the greatest predicted loss occurred in February or March. In dry water year types, the greatest predicted loss of LAD winter-run Chinook salmon at Banks occurred in March followed by December. In critically dry water year types, the greatest loss of LAD winter-run Chinook salmon at Banks occurred in March followed by February and April. The range of mean predicted loss of LAD winter-run Chinook salmon at Banks for the four components of Alternative 2 for March ranged from 1,414 (Alternative 2 without TUCP no VAs) to 1,362 (Alternative 2 without TUCP with Systemwide VAs) in a wet water year type to from 41 (Alternative 2 with TUCP no VAs) to 34 (Alternative 2 without TUCP no VAs) in a critically dry water year type (Table I.2-2). Alternative 1 had the greatest predicted loss of LAD winter-run Chinook salmon at Banks of all alternatives in all water year types and the greatest predicted loss in March followed by February in all water year types. Alternative 1 predicted loss ranged from 1,707 to 49 in March of a wet and critically dry water year type, respectively (Table I.2-2). Alternative 3 had the least predicted loss of LAD winter-run Chinook salmon at Banks of all alternatives in wet and above normal water year types, and the greatest predicted loss in March followed by February in all water year types. Alternative 3 predicted loss ranged from 768 to 49 in March of a below normal and critically dry water year type, respectively (Table I.2-2). Alternative 4 has similar predicted loss of LAD winter-run Chinook salmon at Banks to Alternative 2 with TUCP no VAs and Alternative 2 without TUCP no VAs. The greatest predicted loss under Alternative 4 occurred in March followed by February in all water year types. Alternative 4 predicted loss ranged from 1,483 to 44 in March of wet and critically dry water year types, respectively (Table I.2-2). Action 5 had more predicted loss of LAD winter-run Chinook salmon at Banks under all alternatives except for Alternative 1, except in dry and critically dry years, where it had less predicted loss than Alternatives 1, 3 and 4. Action 5 had the greatest predicted loss in March followed by February in all but dry water year types (80 in February versus 85 in December). Action 5 predicted loss ranged from 1,527 to 42 in March and 634 to 13 in February of wet and critically dry water year types, respectively (Table I.2-2). The predicted loss for LAD winter-run Chinook Salmon at Banks for the NAA was similar to all components of Alternative 2 (with TUCP no VAs, without

TUCP no VAs, Delta VAs, and systemwide VAs) for all water year types. In a wet year type, the NAA had less predicted loss than all the other alternatives, except for Alternative 3. For above normal water year types, the NAA had lower predicted loss than Alternative 1, two components of Alternative 2 (with TUCP no VAs, without TUCP no VAs), Alternative 4, and Action 5. For below normal water year types, the NAA had lower predicted loss than all other alternatives except for Alternative 1, Alternative 2 with TUCP no VAs, Alternative 4, and Action 5. For dry and critically dry water year types, the NAA had higher predicted loss than all components of Alternative 2, yet had less predicted loss than Alternatives 1, 3, and 4. The NAA had higher predicted loss compared to Action 5 in dry years, but similar predicted loss in critically dry years. The NAA had the greatest predicted loss occurring in March, followed by February for all water year types. The NAA had a predicted loss in March that ranged from 1,322 to 43 of wet and critically dry water year types, respectively (Table I.2-2). The values from the exploratory modeling scenarios (EXP1 and EXP3) were not included for consideration in the range of mean predicted salvage, exports in EXP1 and EXP3 are zero.

The mean predicted loss of length at date (LAD) winter-run Chinook salmon at Jones from the salvage density model calculated across all water year types for each month and all alternatives, has a wide range, though less wide than predictions at Banks. The greatest predicted loss of LAD winter-run Chinook salmon at Jones occurred in March followed by February in wet and above normal water year types among components of Alternative 2. In below normal water year types, depending on the component of Alternative 2, the greatest predicted loss occurred in February or March. In dry water year types, the greatest predicted loss of LAD winter-run Chinook salmon at Jones occurred in March followed by January and February (loss predictions from all versions of Alternative 2 are within a few fish). In critically dry water year types, the greatest loss of LAD winter-run Chinook salmon at Jones occurred in March followed by January. The range of mean predicted loss of LAD winter-run Chinook salmon at Jones for the four versions of Alternative 2 for March ranged from 263 (Alternative 2 without TUCP no VAs) to 162 (Alternative 2 with without TUCP Systemwide VAs) in a below normal water year type to from 24 (Alternative 2 with TUCP no VAs) to 20 (Alternative 2 without TUCP with Delta VA, Alternative 2 without TUCP with Systemwide VAs) in a critically dry water year type (Table I.2-4). Alternative 1 had the greatest predicted loss of LAD winter-run Chinook salmon at Jones in above normal, below normal, and dry water year types and the greatest predicted loss in March followed by February in wet, above normal, and below normal water year types. Alternative 1 predicted loss ranged from 296 to 22 in March of a below normal and critically dry water year type, respectively (Table I.2-4). Alternative 3 had the least predicted loss of LAD winter-run Chinook salmon at Jones of all alternatives in wet, above normal, and dry water year types, and the greatest predicted loss occurred in all but critically dry water year types. Alternative 3 predicted loss ranged from 170 to 8 in March of a below normal and critically dry water year type, respectively (Table I.2-4). Alternative 4 has similar predicted loss of LAD winter-run Chinook salmon at Jones to Alternative 2 with TUCP no VAs and Alternative 2 without TUCP no VAs. The greatest predicted loss under Alternative 4 occurred in March followed by February in all but critically dry water year types. Alternative 4 predicted loss ranged from 256 to 25 in March of a below normal and critically dry water year type, respectively (Table I.2-4). The predicted loss for LAD winter-run Chinook Salmon at Jones for the NAA was similar to all versions of Alternative 2 (with TUCP no VAs, without TUCP no VAs, Delta VAs, and systemwide VAs) for all water year types. Action 5 has fewer predicted losses than Alternative 2 with TUCP no VAs and Alternative 2 without TUCP no VAs in all water year types, and Alternatives 1 and 4. Action 5 predicted loss

ranged from 178 to 26 in March of a below normal and critically dry water year type, respectively (Table I.2-4). Under Action 5 the greatest predicted losses occurred in below normal water years. In a wet year type, the NAA performed better than all the other alternatives, except for Alternative 3. For above normal and below normal water year types, the NAA had lower loss than all other alternatives, except for Alternative 3, Alternatives 2 with Delta VAs and Alternative 2 with systemwide VAs. For the dry year type the NAA had higher loss than all other alternatives, except for Alternative 1. For the critically dry year type the NAA had higher loss than all other alternatives. The NAA had the greatest predicted loss occurring in March, followed by February for all water year types. The NAA had a predicted loss in March that ranged from 251 to 26 of below normal and critically dry water year types, respectively (Table I.2-4). The values from the exploratory modeling scenarios (EXP1 and EXP3) were not included for consideration in the range of mean predicted salvage, exports in EXP1 and EXP3 are zero.

The months of highest predicted winter-run Chinook loss at the facilities (both LAD and genetic) temporally coincides with when the largest proportion of the juvenile winter-run Chinook salmon population is expected to be in the Delta. Generally, across all water year types, combined monthly OMR flows become increasingly more positive from November to March through late-fall and winter into spring (Chapter 4, Figure 66.) Monthly Sacramento River flows below Keswick Dam, across all water year types, increase across the same months and seasons (Chapter 4, Figure 3). This increase of flows cues juveniles to out-migrate from the upper Sacramento River through the mainstem. Fish are present in the South Delta if they become entrained into the Central and Interior Delta through routes like Georgiana Slough or the Delta Cross Channel.

### I.2.3.2 Genetic Winter-run Chinook Salmon

The mean predicted loss of genetic winter-run Chinook salmon at Banks from the salvage density model calculated across all water year types for each month and all alternatives, has a wide range. The greatest predicted loss of genetic winter-run Chinook salmon at Banks occurred in March followed by February in wet and below normal water year types. In the above normal water year type, the greatest predicted loss also occurred in March followed by February. In the dry water year type, the greatest predicted loss of genetic winter-run Chinook salmon at Banks occurred in March, followed by April, with no loss occurring in any other months. Similarly, in critically dry water year types, the greatest loss of genetic winter-run Chinook salmon at Banks occurred in April followed by March, but only by a very small margin, with no loss occurring in any other months. The range of mean predicted loss of genetic winter-run Chinook salmon at Banks for all alternatives including Action 5 in March ranged from 807 (Alternative 1) to 288 (Alternative 2 with Delta VAs) in a below normal water year type to from 7 (Alternative 1, and Alternative 4) to 3 (Alternative 2 without TUCP no VAs, Alternative 2 Delta VAs, and Alternative 2 systemwide VAs) in a critically dry water year type (Table I.2-6). Alternative 1 had the greatest predicted loss of genetic winter-run Chinook salmon at Banks of all alternatives including Action 5 with the greatest predicted loss in March followed by February for wet, above normal, and below normal water year types. Similarly, Alternative 1 had the highest predicted loss in dry, and critically dry water year types, but the greatest loss occurred in March followed by April for the dry year type, and the greatest loss occurred in April followed by March for the critically dry water year type. Alternative 4 also had the same predicted loss for genetic winter-run Chinook salmon at Banks for the critically dry water year type, with the greatest loss occurring in April followed by March. Alternative 1 predicted loss ranged from 807 to 5 in

March of a below normal and critically dry water year type, respectively (Table I.2-6). Alternative 3 had the least predicted loss of genetic winter-run Chinook salmon at Banks of all alternatives including Action 5 in wet and above normal water year types, and the greatest predicted loss occurred in March followed by February. Alternative 3 predicted loss ranged from 290 to 4 in March of an above normal and critically dry water year type, respectively (Table I.2-6). Alternative 4 has similar predicted loss of genetic winter-run Chinook salmon at Banks to Alternative 2 with TUCP no VAs and Alternative 2 without TUCP no VAs. The greatest predicted loss under Alternative 4 occurred in March followed by February in wet, above normal, and below normal water year types. Alternative 4 predicted loss ranged from 613 to 4 in March of wet and critically dry water year types, respectively (Table I.2-6). Action 5 had the highest predicted losses in March and February in wet, above normal, and below normal water years, and in March and April in dry and critically dry water years. Action 5 predicted loss ranged from 631 to 4 in March of a wet and critically dry water year type, respectively (Table I.2-6). Action 5 had similar predicted losses of genetic winter-run Chinook salmon at Banks as Alternative 4, with higher predicted losses in wet, above normal, and below normal water years, and lower predicted losses in dry and critically dry water years (Table I.2-6). The predicted loss for genetic winter-run Chinook Salmon at Banks for the NAA was similar to all components of Alternative 2 (with TUCP no VAs, without TUCP no VAs, Delta VAs, and systemwide VAs), as well as Alternative 4 for all water year types. In a wet year type, the NAA was slightly lower than all the other alternatives, except for Alternative 3. For the above normal water year type, the NAA had higher loss than Alternative 2 without TUCP with Delta VAs, Alternative 2 without TUCP with Systemwide VAs, and Alternative 3. In below normal water year types, the NAA had lower losses all alternatives except Alternatives 1 and 4 and Action 5. In dry water years, NAA had higher predicted losses than Alternative 2 without TUCP with Delta VAs and Alternative 2 without TUCP with Systemwide VAs and Action 5, but in critically dry years, predicted losses were similar for all alternatives – less than 10 during March and April for each alternative including Action 5. The NAA had a predicted loss in March that ranged from 547 to 4 of wet and critically dry water year types, respectively (Table I.2-6). Values from the exploratory modeling scenarios (EXP1 and EXP3 were not included for consideration in the range of mean predicted salvage, exports in EXP1 and EXP3 are zero.

The mean predicted loss of genetic winter-run Chinook salmon at Jones from the salvage density model calculated across all water year types for each month and all alternatives, has a wide range. The greatest predicted loss of genetic winter-run Chinook salmon at Jones occurred in March followed by February in above normal and below normal water year types. In the wet water year type, the greatest predicted loss also occurred in March followed by February. In the dry water year type, the greatest predicted loss of genetic winter-run Chinook salmon at Jones occurred in March, with no loss occurring in any other months. Similarly, in critically dry water year types, the greatest loss of genetic winter-run Chinook salmon at Jones occurred in March, followed by January (for all alternatives including Action 5), with no loss occurring in any other months. The range of mean predicted loss of genetic winter-run Chinook salmon at Jones for all alternatives in March ranged from 112 (Alternative 1) to 61 (Alternative 2 with systemwide VAs) in a below normal water year type and from 11 (NAA, Alt 4 and Action 5) to 3 (Alternative 3) in a critically dry water year type (Table I.2-8). Alternative 4 had the greatest predicted loss of genetic winter-run Chinook salmon at Jones of all alternatives including Action 5 with the greatest predicted loss in March followed by February for below normal, wet, and above normal water year types, with Alternative 1 having the same predicted loss as Alterative 4 in an above

normal water year. The range of predicted loss for Alternative 4 in wet, and above normal water years was 63 (above normal) to 60 (wet water year). For a below normal water year the highest predicted loss for genetic winter-run Chinook salmon at Jones was for Alternative 1 with 112 for the month of March.

In a dry water year type, Alternative 1 had the highest predicted loss of 48 for the month of March and Alternative 3 had the lowest predicted loss of 25. For a critically dry water year type, the highest predicted loss for genetic winter-run Chinook salmon was for Alternative 4 and Action 5, with the NAA having the same projected loss of 11 for the month of March (Table I.2-8). Of all the alternatives, Alternative 3 had the lowest predicted loss of genetic winter-run Chinook salmon in all water year types, except for the below normal water year type in the month of March. The range of predicted loss in March for Alternative 3 was 41 to 3 in above normal and critically dry water year types, respectively. For the below water year type, Alternative 2 systemwide VAs had the lowest predicted loss of 61 for the month of March (Table I.2-8). Action 5 had predicted losses in all water year types similar to Alternative 4 except in above normal and below normal water years, in which Action 5 was more similar to Alternative 2 without TUCP with Delta VAs and Alternative 2 without TUCP with Systemwide VAs. The NAA had a similar predicted loss for genetic winter-run Chinook salmon as the first two components of Alternative 2 (with TUCP no VAs, without TUCP no VAs). The NAA did not outperform any of the other alternatives for all water year types in the month of March. The NAA had the highest predicted loss for a critically dry water year in March, with Alternative 4 having the same predicted loss. The NAA had a predicted loss in March that ranged from 94 to 11 of below normal and critically dry water year types, respectively (Table I.2-8). Values from the exploratory modeling scenarios (EXP1 and EXP3 were not included for consideration in the range of mean predicted salvage, exports in EXP1 and EXP3 are zero.

#### I.2.3.3 LAD Spring-run Chinook Salmon

The mean predicted loss of LAD spring-run Chinook salmon at Banks from the salvage density model calculated across all water year types for each month and all alternatives has a wide range. The greatest predicted loss of spring-run Chinook salmon at Banks occurred in May followed by April in wet and above normal water year types for all alternatives and Action 5. In below normal and dry water year types, the greatest predicted loss occurred in April followed by May. In critically dry years, the greatest predicted loss occurred in April followed by March. The range of -mean predicted loss of LAD spring-run Chinook salmon at Banks for all the alternatives for May ranged from 43,920 (Alternative 2 with TUCP no VAs) to 8,259 (Alternative 3) in a wet water year type to from 37 (Alternative 4) to 25 (NAA) in a critically dry water year type (Table I.2-10). In the wet water year type Alternative 2 with TUCP no VAs had the highest loss out of all alternatives including Action 5 with a predicted loss of 43,920 in the month of May. For the above normal water year type Alternative 4 had the highest loss with a predicted loss of 22,352 for the month of May. For below normal, and the dry water year types, Alternative 1 had the highest predicted loss with the greatest loss occurred in the month of April. The range of predicted loss for spring-run Chinook salmon at Banks was from 4,989 to 3,195 for below normal and dry water year types in the month of April. For the critically dry water year type Alternative 4 had the highest predicted loss with 251 for the month of April. The lowest predicted loss for spring-run Chinook salmon at Banks for wet and above normal water year types was for Alternative 3 for the month of May. The range of predicted loss for Alternative 3

was from 8,259 to 7,051 in May for wet and above normal water year types, respectively. Alternative 3 also had the lowest loss for the dry water year type, with the highest predicted loss occurring in April at 1,691. For below normal, and the critically dry water year types, the NAA had the lowest loss with a range of 2,520 to 195 for the month of April (Table I.2-10). For the predicted loss of spring-run Chinook salmon at Banks, the NAA had lower loss than all other alternatives except for Alternative 3 in the wet and above normal water year types for May. The NAA in the month of May had a range of 26,136 to 9,964 for wet and above normal water year types, respectively. For the dry water year type the NAA had lower loss than all alternatives except for Alternative 3, with 1,817 for the month of April (Table I.2-10). Values from the exploratory modeling scenarios (EXP1 and EXP3) and the NAA were not included for consideration in the range of mean predicted salvage, exports in EXP1 and EXP3 are zero.

The mean predicted loss of LAD spring-run Chinook salmon at Jones from the salvage density model calculated across all water year types for each month and all alternatives has a wide range, though less wide than predictions at Banks. The greatest predicted loss of spring-run Chinook salmon at Jones occurred in May followed by April in wet and above normal water year types in all alternatives including Action 5. In below normal and dry water year types, the greatest predicted loss occurred in April followed by May. In critically dry years, the greatest predicted loss occurred in April followed by March. The range of mean predicted loss of LAD spring-run Chinook salmon at Jones for all the alternatives for May ranged from 6,210 (Alternative 4) to 881 (Alternative 3) in a wet water year type to 36 (all components of Alternative 2, Alternative 1, and Action 5) to 7 (Alternative 3) in a critically dry water year type (Table I.2-12). For the wet water year type Alternative 4 had the highest predicted loss for LAD spring-run Chinook salmon at Jones, with 6,210 in May. For the above normal water year type Alternative 1 had the highest predicted loss in May with 5,359. Similarly Alternative 1 also had the highest loss for the below normal, and dry water year types in April, the month with the highest predicted loss for all alternatives including Action 5. Alternative 1 had a range of mean predicted loss of LAD spring-run Chinook salmon of 2,473 to 1,742 for the below normal and dry water year types, respectively. In the critically dry water year type Alternative 2 without TUCP and no VAs had the highest loss with 162 in May (Table I.2-12). Alternative 3 had the lowest predicted loss for LAD spring-run Chinook salmon at Jones for all water year types. The range of mean predicted loss for Alternative 3 was 881 to 7 during the month of May for a wet, and a critically dry water year type, respectively. For the month of April, the range of predicted loss for Alternative 3 was 362 to 33 for a wet, and a critically dry water year type, respectively (Table I.2-12). The NAA performed similarly to the various components of Alternative 2 in all water year types during the months of April and May. Alternative 4 and Action 5 had similar predicted losses in a critically dry water year. The NAA had lower loss by a slight margin compared to all alternatives except Alternative 3 for a wet water year type for the month of May with 6,092. The range of predicted loss for LAD spring-run Chinook salmon at Jones for the NAA was 6,092 to 4,899 in May for a wet, and an above normal water year, respectively. For the dry and critically dry water year types during the month with the highest predicted loss (for all alternatives including Action 5) in April, the NAA had lower loss than all alternatives, except for Alternative 3. The range of mean predicted loss for LAD spring-run Chinook salmon was 1,593 to 126 during the month of April, for the dry and critically dry water year, respectively. During a below normal water year type the NAA had a higher predicted loss than Alternative 3, and two of the components of Alternative 2 (Delta VAs, and systemwide VAs) with 2,198 in April (Table I.2-12). Values from the exploratory

modeling scenarios (EXP1 and EXP3) and the NAA were not included for consideration in the range of mean predicted salvage, exports in EXP1 and EXP3 are zero.

The months of highest predicted spring-run Chinook loss at the facilities temporally coincides with when the largest proportion of the juvenile spring-run Chinook salmon population is expected to be in the Delta. Generally, across all water year types, combined monthly OMR flows become slightly more positive or consistent from March through May (Chapter 4, Figure 66). Monthly Sacramento River flows below Keswick Dam, across all water year types, decreases from February through April, beginning to increase in May through the summer months (Chapter 4, Figure 3). This increase of flows cues juveniles to out-migrate from the upper Sacramento River through the mainstem. Fish are present in the South Delta if they become entrained into the Central and Interior Delta through routes like Georgiana Slough or the Delta Cross Channel.

#### I.2.3.4 Steelhead

The mean predicted loss of steelhead at Banks from the salvage density model calculated across all water year types for each month and all alternatives has a wide range. The greatest predicted loss of steelhead at Banks occurred in December followed by January in wet, above normal, dry, and critically dry water year types. In below normal water year types, the greatest predicted loss occurred in January followed by February. The range of mean predicted loss of steelhead at Banks for all alternatives including Action 5 in December ranged from 1,182 (Alternative 1) to 376 (Alternative 3) in a wet water year type to from 138 (Alternative 1) to 56 (Alternative 3) in a below normal water year type (Table I.2-14). The predicted loss of steelhead at Banks was the highest for Alternative 1 for the wet, above normal, dry, and critically dry water year types for the month of December. The range of predicted loss for Alternative 1 was 1,182 to 339 for wet, above normal, dry, and the critically dry water year types in December. For the below normal water year type in the month of December the highest predicted loss at Banks was for Alternative 1 with 138. The month with the highest predicted loss for steelhead during a below normal water year type was in January, with Alternative 1 performing significantly worse than all other alternatives with a predicted loss of 408 (Table I.2-14). Alternative 3 performed the best out of all alternatives including Action 5 in every water year type for the month of December. The range of predicted loss for steelhead at Banks for Alternative 3 was 376 to 56 for the wet, and below normal water year types, respectively. For the month of the highest predicted loss in a below normal water year, January, Alternative 3 only performed better than Alternative 1, and had a predicted loss of 165. For a below normal water year in January Alternative 4, and two components of Alternative 2 (with TUCP no VAs, without TUCP no VAs) performed the best, all having the same predicted loss of 159. The NAA in December had a predicted loss for steelhead at Banks that was greater than all alternatives and Action 5, except for Alternative 1 for the wet, above normal, and below normal water year types and except for Action 5 for a wet water year type. In a dry water year type and a critically dry water year type the NAA had lower loss than Alternative 1 and two components of Alternative 2 (with TUCP no VAs, without TUCP no VAs) but had a higher predicted loss for steelhead at Banks than all the other alternatives and Action 5 with a loss of 690 and 260 for the month of December respectively (Table I.2-14).Values from the exploratory modeling scenarios (EXP1 and EXP3) and the NAA were not included for consideration in the range of mean predicted salvage, exports in EXP1 and EXP3 are zero.

The mean predicted loss of steelhead at Jones from the salvage density model calculated across all water year types for each month and all the alternatives has a wide range. The greatest predicted loss of steelhead at Banks occurred in December followed by January in wet, above normal, dry, and critically dry water year types. In below normal water year types, the greatest predicted loss occurred in January followed by February. The range of mean predicted loss of steelhead at Jones for all the alternatives in December ranged from 225 (Alternative 1) to 138 (Alternative 3) in the wet water year type, to from 7 (NAA, Alternative 1, all components of Alternative 2, and Action 5) to 4 (Alternative 3) in a below normal water year type (Table I.2-16). The greatest predicted loss for steelhead at Jones in the month of December across all water year types was for Alternative 1. The range of mean predicted loss for Alternative 1 in December was from 225 to 7 in a wet, and below normal water year type, respectively. In the below normal water year type, Alternative 1 had the same predicted loss of steelhead at Jones as the NAA, Alternative 1, all components of Alternative 2, and Action 5. The lowest predicted loss of steelhead at Jones was for Alternative 3, for all water year types, in December. The range of predicted loss for Alternative 3, in the month of December was from 138 to 4 for the wet, and the below normal water year type, respectively (Table I.2-16). The NAA had similar loss as the various components of Alternative 2 for all water year types in December. The NAA had a mean predicted loss for steelhead at Jones in December, that ranged from 212 to 7 for the wet, and below normal water year types, respectively (Table I.2-16). Values from the exploratory modeling scenarios (EXP1 and EXP3) and the NAA were not included for consideration in the range of mean predicted salvage, exports in EXP1 and EXP3 are zero.

The months of highest predicted steelhead loss at the facilities temporally coincides with when the largest proportion of the juvenile steelhead population is expected to be in the Delta. Generally, across all water year types, combined monthly OMR flows become increasingly more positive from November to February through late fall into winter (Chapter 4, Figure 66.) Monthly Sacramento River flows below Keswick Dam, across all water year types, increase across the same months and seasons (Chapter 4, Figure 3). Monthly Stanislaus River flows below Goodwin Dam, across all water year types, increase from November to February before decreasing in March (Chapter 4, Figure 42). This increase of flows in the Sacramento River cues juveniles to out-migrate from the upper Sacramento River through the mainstem. This increase of flows in the Stanislaus River cues juveniles to out-migrate through the San Joaquin River. Fish are present in the South Delta if they become entrained into the Central and Interior Delta at junctions like Georgiana Slough or the Delta Cross Channel, from the Sacramento River route, or at junctions like Head of Old River, from the San Joaquin River route.

### I.2.3.5 Green Sturgeon

The mean predicted loss of Green Sturgeon at Banks from the salvage density model calculated across all water year types for each month and all alternatives has a narrow range. There is little difference in mean predicted loss of Green Sturgeon with the greatest monthly prediction of 4 (Alternative 1, below normal water year type) and the lowest prediction of 1 (March of a wet water year type, all alternatives and Action 5, except Alternative 3; March of an above normal water year type, all alternatives, except Alternative 3, and two components of Alternative 2 (Delta VAs, and systemwide VAs); and January of an below normal water year type, all alternatives including Action 5, except Alternative 3 (Table I.2-22). In the dry and critically dry water year types, the predicted loss of Green Sturgeon at Banks was zero for all alternatives

including Action 5, and all months. While the range of mean predicted loss of Green Sturgeon at Banks is small, Alternative 3 performed the best out of all the alternatives, in all water year types that had a predicted loss greater than zero. The range of predicted loss for Alternative 3 was from 1 (below normal water year) to 0 (wet, and above normal water year types). The NAA performed similarly to all the other alternatives with a predicted loss for Green Sturgeon at Banks with a value of 1 for all water year types that had a predicted loss greater than zero (Table I.2-22). Values from the exploratory modeling scenarios (EXP1 and EXP3) and the NAA were not included for consideration in the range of mean predicted salvage, exports in EXP1 and EXP3 are zero.

The mean predicted loss of Green Sturgeon at Jones from the salvage density model calculated across all water year types for each month and all alternatives has a narrow range. There is little difference in mean predicted loss of Green Sturgeon with the greatest monthly predictions of 7 (June of wet water year type, Alternative 1 and NAA; June of above normal water year type, Alternative 1) to 1 (June of an above normal water year type, Alternative 3; June and July of a dry water year type, all alternatives and Action 5, except Alternative 3; Table I.2-24). Although the range of predicted loss for Green Sturgeon at Jones was small, Alternative 1 had the highest loss with a range of 7 (June of the wet, and above normal water year types) to 1 (June and July of a dry water year type). Alternative 3 had the lowest predicted loss of all alternatives and Action 5 in all water year types, with a range of 4 to 1 for the month of June, in the wet, and the above normal water year types, respectively. The NAA had a similar predicted loss for Green Sturgeon at Jones as all other alternatives and Action 5 with a range of 7 (June of a wet water year type) to 1 (June and July for a dry water year type; Table I.2-24). Values from the exploratory modeling scenarios (EXP1 and EXP3) and the NAA were not included for consideration in the range of mean predicted salvage, exports in EXP1 and EXP3 are zero.

Historic occurrence of salvage of Green Sturgeon is rare. Green Sturgeon have been observed at Jones in the months of June and July and at Banks in the months of January and March. This temporal discrepancy between facilities makes it difficult to provide trends in monthly Sacramento River flows and combined OMR.

### I.2.3.6 Hardhead

The mean predicted loss of Hardhead at Banks from the salvage density model calculated across all water year types for each month and all alternatives has a very narrow range. Predicted loss only occurs in the month of April for wet and above normal water year types. For the critically dry water year type loss only occurs during the month of September. During below normal, and dry water year types there is no predicted loss of Hardhead at the Banks facility. The greatest monthly prediction for loss of Hardhead had a value 9 (Alternative 3, critically dry water year type) and the lowest predicted loss had a value of 1 (all alternatives and Action 5 except Alternative 3, of a wet water year type) and Alternative 1, Alternative 2 (with TUCP, without VAs), Alternative 2 (without TUCP, without VAs), and Alternative 4 for the above normal water year type; Table I.2-27). Of the months that had a predicted loss of Hardhead at the Banks facility Alternative 3 performed the best with a value of 0 for below normal and wet water year types, but the worst during critically dry water year type. Alternative 2 (without TUCP and no VAs, and without TUCP Delta VAs) also had a value of 0, but only for the below normal water year type (Table I.2-27). Values from the exploratory modeling scenarios (EXP1 and EXP3) and

the NAA were not included for consideration in the range of mean predicted salvage, exports in EXP1 and EXP3 are zero.

The mean predicted loss of Hardhead at the Jones facility from the salvage density model calculated across all water year types for each month and all alternatives was zero. Historical data used in the salvage density model would suggest that Hardhead are not known to be present at the Jones facility during all months of the year and for every water year type (Table I.2-28).

### I.2.3.7 Pacific Lamprey

The mean predicted loss of Pacific Lamprey at the Banks facility from the salvage density model calculated across all water year types for each month and all alternatives was zero. Historical data used in the salvage density model would suggest that Pacific Lamprey are not known to be present at the Jones facility during all months of the year and for every water year type (Table I.2-29).

The mean predicted loss of Pacific Lamprey at the Jones facility from the salvage density model calculated across all water year types for each month and all alternatives had a wide range. The greatest predicted loss for Pacific Lamprey at Jones occurred in the month of April in the critically dry water year type for all alternatives and Action 5, and in the months of January and March in the below normal water year type for all alternatives and Action 5. The highest predicted loss of Pacific Lamprey for wet, and above normal water year types occurred in January, and the greatest loss occurred in March for below normal water year types. The greatest predicted loss for Pacific Lamprey at Jones was for a critically dry water year type and had a value of 470 (Alternative 2 without TUCP, no VAs). The lowest predicted loss of Pacific Lamprey at Jones had a value of 1 (all alternatives) in critically dry, and below normal water year types (Table I.2-30). Alternative 3 performed the best in all but the wet water year type. Values from the exploratory modeling scenarios (EXP1 and EXP3) and the NAA were not included for consideration in the range of mean predicted salvage, exports in EXP1 and EXP3 are zero.

### I.2.3.8 River Lamprey

The mean predicted loss of River Lamprey at the Banks facility from the salvage density model calculated across all water year types for each month and all alternatives was zero. Historical data used in the salvage density model would suggest that River Lamprey is not known to be present at the Banks facility during all months of the year and for every water year type (Table I.2-31).

The mean predicted loss of River Lamprey at the Jones facility generated from the salvage density model has a very narrow range. Predicted loss of River Lamprey at Jones was low for all alternatives and Action 5 and in all water year types. The mean predicted loss of River Lamprey at Jones ranged from 6 (Alternative 1, below normal water year type) to 1 (all alternatives and Action 5, for wet and above normal water year types, Alternative 3 for critically dry water year type; Table I.2-32). The highest loss occurred in the month of January for all water year types, except the critically dry water year type in which the highest loss for River Lamprey occurred in February followed by March. For the months that had a predicted loss for River Lamprey at Jones, Alternative 3 performed the best, having a slightly lower predicted loss compared to all the other alternatives and Action 5, for all water year types (Table I.2-32). Values from the

exploratory modeling scenarios (EXP1 and EXP3) and the NAA were not included for consideration in the range of mean predicted salvage, exports in EXP1 and EXP3 are zero.

### I.2.3.9 Sacramento Splittail

The mean predicted loss of Sacramento Splittail at Banks from the salvage density model calculated across all water year types for each month and all the alternatives and Action 5 has a wide range. For wet, and above normal water year types, the greatest loss for Sacramento Splittail was predicted for the month of May. The greatest predicted loss was in June, and April for dry, and below normal water year types, respectively. For critically dry water year types, the highest predicted loss of Splittail occurred in February for Alternative 3 and December for all other alternatives and Action 5. The range of predicted loss for Splittail at Banks ranged from 712,548 (Alternative 2 with TUCP, no VAs) for May of a wet water year type, to 1 for August in a dry water year type for 2 components of Alternative 2 (without TUCP with Delta VAs, and without TUCP, all VAs), Alternative 3, and Action 5; October of dry years for all alternatives; July in a critically dry water year type for Alternative 1, 2 components of Alternative 2 (with TUCP no VAs and without TUCP, no VAs), and Alternative 4; and in August for Alternative 1, 2 components of Alternative 2 (with TUCP no VAs and without TUCP, no VAs), and Alternative 4. (Table I.2-35). Overall Alternative 3 performed better than all other alternatives for wet, above normal, and below normal water year types for the month of June. In dry and critically dry water year types the NAA performed the best in the month of June (Table I.2-35). Values from the exploratory modeling scenarios (EXP1 and EXP3) and the NAA were not included for consideration in the range of mean predicted salvage, exports in EXP1 and EXP3 are zero.

The mean predicted loss for Sacramento Splittail at the Jones facility from the salvage density model calculated across all water year types for each month and all alternatives and Action 5 has a wide range. The highest predicted loss for Splittail at Jones occurred in the month of May for wet, above normal, and below normal water year types. The highest predicted loss of Splittail during dry and critically dry water year types occurred in June, and October, respectively. The range of predicted loss for Splittail at Jones is from 6,921,465 (Alternative 4, wet water year type) to 1 (all alternatives and Action 5 in January and all alternatives and Action 5 except Alternative 1 in February and October of a dry water year type; all alternatives and Action 5 except Alternative 3 in March of a critically dry water year type, Alternative 3 in May of a critically dry water year type, Alternative 2 with TUCP no VAs and Alternative 4 and Action 5 in July of a critically dry water year type, all alternatives and Action 5 in October of a critically dry water year type, and all alternatives and Action 5 except Alternative 3 in November of a critically dry water year type )(Table I.2-36).

Overall, Alternative 3 performed substantially better than all other alternatives, and for all water year types in the month of May. Values from the exploratory modeling scenarios (EXP1 and EXP3) and the NAA were not included for consideration in the range of mean predicted salvage, exports in EXP1 and EXP3 are zero.

### I.2.3.10 White Sturgeon

The mean predicted loss of White Sturgeon at Banks from the salvage density model calculated across all water year types for each month and all the alternatives has a narrow range. Overall predicted loss for White Sturgeon at the Banks facility was low across all alternatives and water

year types. The highest predicted loss for White Sturgeon at Banks was for the month of January for wet, and above normal water year types and in June for below normal water year types. For dry water year types, the highest loss occurred in May. There was no predicted loss for White Sturgeon at Banks during the critically dry water year type. During the month of January, the predicted loss of White Sturgeon ranged from 10 (Alternative 1, wet water year type) to 1 (all alternatives and Action 5 in February of a wet water year type and Alternative 3 in March July and August of a wet water year type and Alternative 1 in December of a wet water year type, all alternatives except Alternative 3 in February and May of an above normal water year type and all alternatives except Alternative 1 in June of an above normal water year type and Alternative 3 in July and August of an above normal water year type and Alternative 1 in December of an above normal water year type, all alternatives except Alternative 1 in March of a below water year type and Alternative 1 in April of a below water year type and Alternative 3 in November of a below water year type)(Table I.2-43).

Alternative 3 performed the best out of all the other alternatives in the wet water year type for January, but did not perform notably better than the other alternatives in all other water year types in the month of January (Table I.2-43). Values from the exploratory modeling scenarios (EXP1 and EXP3) and the NAA were not included for consideration in the range of mean predicted salvage, exports in EXP1 and EXP3 are zero.

The mean predicted loss of White Sturgeon at Jones from the salvage density model calculated across all water year types for each month and all the alternatives has a narrow range. The highest predicted loss for White Sturgeon occurred during the month of June in the wet water year type. The highest loss of White Sturgeon occurred during the months of June and August for the above normal water year type, and the highest loss occurred in October for the below normal water year type, and November for dry water year types. Critically dry water year types had no predicted loss for White Sturgeon at the Jones facility. The mean predicted loss for White Sturgeon at Jones had a range from 24 (NAA, June, wet water year type) to 1 (Alternative 3 in May of a wet water year type and all alternatives and Action 5 in October of a wet water year type, Alternative 3 in May July and November of an above normal water year type and all alternatives and Action 5 except Alternative 4 in October of an above normal water year type; Alternative 3 in February and December of a below normal water year type and all components of Alternative 2 and Action 5 in May of a below normal water year; all alternatives and Action 5 in November of a dry water year type)(Table I.2-44). Overall, Alternative 3 performed better than all other alternatives in water year types that had a predicted loss for White Sturgeon at Jones (Table I.2-44). Values from the exploratory modeling scenarios (EXP1 and EXP3) and the NAA were not included for consideration in the range of mean predicted salvage, exports in EXP1 and EXP3 are zero.

### I.2.3.11 California Roach

The mean predicted loss of California Roach at the Banks facility from the salvage density model calculated across all water year types for each month and all alternatives was zero. Historical data used in the salvage density model would suggest that California Roach are not known to be present at the Banks facility during all months of the year and for every water year type (Table I.2-45).

The mean predicted loss of California Roach at the Jones facility from the salvage density model calculated across all water year types for each month and all alternatives was zero. Historical data used in the salvage density model would suggest that California Roach are not known to be present at the Jones facility during all months of the year and for every water year type (Table I.2-46).

### I.2.3.12 Hitch

The mean predicted loss of Hitch at the Banks facility from the salvage density model calculated across all water year types for each month and all the alternatives has a narrow range. Predicted loss of Hitch at Banks only occurs during the month of April for the wet and above normal water year types. During below normal water year types predicted loss of hitch occurs over several months (March, June, August, and November), and dry water year types have predicted losses during October. During the critically dry water year type predicted loss for Hitch at Banks is zero across all months (Table I.2-49). The range of mean predicted loss for Hitch at the Banks facility is from 4 (Action 5, below normal water year type) to 1 (2 components of Alternative 2 (without TUCP Delta VAs and without TUCP Systemwide VAs) and Action 5 in April of a wet water year type, 2 components of Alternative 2 (with TUCP no VAs and without TUCP no VAs) Alternative 1 and Alternative 4 in April of an above normal water year type, Alternative 1 in March of a below normal water year type and Alternative 3 in November of a below normal water year type and all alternatives and Action 5 except Alternative 3 in June of a below normal water year type, and all alternatives and Action 5 in October of a dry water year type) (Table I.2-49). With the very narrow range of predicted loss occurring across the model results, no alternative performed notable better or worse. Predicted loss of Hitch at Banks was closely related to water year type and month of the year. Values from the exploratory modeling scenarios (EXP1 and EXP3) and the NAA were not included for consideration in the range of mean predicted salvage, exports in EXP1 and EXP3 are zero.

The mean predicted loss of Hitch at the Jones facility from the salvage density model calculated across all water year types for each month and all the alternatives has a narrow range. Predicted loss of Hitch at Jones only occurs during the month of April for the wet and above normal water year types. For the below normal water year type predicted loss of Hitch at Jones only occurs during the month of March. During the dry and critically dry water year types, the predicted loss of Hitch at the Jones facility is zero (Table I.2-50). The range of predicted loss of Hitch at Jones is from 3 (all alternatives except Alternative 3 and Action 5 in April of a wet water year type and Alternative 1, 2 components of Alternative 2 (with TUCP no VAs and without TUCP no VAs), and Alternative 4 in April of an above normal water year type) to 1 (all alternatives and Action 5 of a below normal water year type and Alternative 3 in April of wet water year type) (Table I.2-50). With the very narrow range of predicted loss of Hitch at Jones alternative 3 performed slightly better than all other alternatives but the difference is not substantial. Values from the exploratory modeling scenarios (EXP1 and EXP3) and the NAA were not included for consideration in the range of mean predicted salvage, exports in EXP1 and EXP3 are zero.

### I.2.3.13 Starry Flounder

The mean predicted loss of Starry Flounder at Banks from the salvage density model calculated across all water year types for each month and all the alternatives has a wide range. Predicted loss of Starry Flounder at Banks is shown to occur from December through July for the wet and

above normal water year types. In the below normal year type predicted loss of Starry Flounder at Banks would occur from February to August. In the dry water year type predicted loss of Starry Flounder would occur from March through August and November and in the critically dry water year type only in the month of October (Table I.2-51). Predicted loss of Starry Flounder at Banks had a range from 128 (Alternative 1 in June of a below normal water year type) to 1 (all alternatives and Action 5 in October of the critically dry water year type). Overall Alternative 3 performed better than all other alternatives for all water year types (Table I.2-51). Values from the exploratory modeling scenarios (EXP1 and EXP3) and the NAA were not included for consideration in the range of mean predicted salvage, exports in EXP1 and EXP3 are zero.

The mean predicted loss of Starry Flounder at Jones from the salvage density model calculated across all water year types for each month and all the alternatives has a narrow range. The predicted loss for Starry Flounder at Jones occurs from June to October in the wet and above normal water year types. Predicted loss of Starry Flounder occurs from March to August for below normal water year types. Predicted loss of Starry Flounder occurs in May and November for dry water year type, and in January and September for the critically dry water year type (Table I.2-52). The range of mean predicted loss for Starry Flounder at Jones is from 8 (Alternative 1, Alternative 2 w/o TUCP no VAs, Alternative 4, below normal water year type; Table I.2-51). Alternative 3 performed slightly better than all other alternatives in all water year types, but with such a narrow range the difference is minimal. Values from the exploratory modeling scenarios (EXP1 and EXP3) and the NAA were not included for consideration in the range of mean predicted salvage, exports in EXP1 and EXP3 are zero.

### I.2.3.14 American Shad and Threadfin Shad

The mean predicted loss of American Shad and Threadfin Shad at the Banks facility is substantial and occurs all months of the year and in all water year types. The mean predicted loss of American Shad and Threadfin Shad has a wide range. The mean predicted loss of American Shad at Banks has a range from 139,591 (Alternative 1, above normal water year type) to 6 (NAA, Alternative 2 w/TUCP no VAs, Alternative 2 w/o TUCP no VAs, Alternative 4, critically dry water year type; Table I.2-25). The mean predicted loss for Threadfin Shad at Banks has a range from 824,513 (Action 5, below normal water year type) to 21 (Alternative 2 Delta VAs, dry water year types; Table I.2-47). Values from the exploratory modeling scenarios (EXP1 and EXP3) and the NAA were not included for consideration in the range of mean predicted salvage, exports in EXP1 and EXP3 are zero.

The mean predicted loss of American Shad and Threadfin Shad at the Jones Facility is substantial and occurs all months of the year and in all water year types. The mean predicted loss of American Shad and Threadfin Shad has a wide range. The mean predicted loss of American Shad at the Jones facility is from 117,946 (Action 5, above normal water year type) to 2 (all alternatives and Action 5 except Alternative 3, critically dry water year type; Table I.2-26). The mean predicted loss of Threadfin Shad at the Jones facility is from 982,865 (Alternative 1, dry water year type) to 21 (Alternative 3, critically dry water year type, Table I.2-48). Values from the exploratory modeling scenarios (EXP1 and EXP3) and the NAA were not included for consideration in the range of mean predicted salvage, exports in EXP1 and EXP3 are zero.

The consistent high level of predicted loss seen in the modeling results is likely related to the high abundance of these species in the Delta, and the ideal habitat conditions created by the pumping facilities themselves.

### I.2.3.15 Striped Bass and Largemouth Bass

The mean predicted loss of Striped Bass and Largemouth Bass at the Banks facility is substantial and occurs all months of the year and in all water year types. The mean predicted loss of Striped Bass and Largemouth Bass has a wide range. The mean predicted loss of Striped Bass at Banks has a range from 186,855 (Alternative 1, below normal water year type) to 62 (Alternative 4, critically dry water year type; Table I.2-41). The mean predicted loss of Largemouth Bass at the Banks facility has a range from 16,601 (Alternative 3, critically dry water year type) to 5 (Alternative 2 Delta VAs, Alternative 2 systemwide VAs, dry water year type; Table I.2-33). Overall Alternative 3 performed better than all other alternatives across water year types. Values from the exploratory modeling scenarios (EXP1 and EXP3) and the NAA were not included for consideration in the range of mean predicted salvage, exports in EXP1 and EXP3 are zero.

The mean predicted loss of Striped Bass and Largemouth Bass at the Jones facility is substantial and occurs all months of the year and in all water year types. The mean predicted loss of Stiped Bass and Largemouth Bass has a wide range. The mean predicted loss of Striped Bass at Jones has a range from 89,558 (Alternative 1, dry water year type) to 12 (Alternative 3, wet and above normal water year type; Table I.2-42). The mean predicted loss of Largemouth Bass at Jones has a range from 57,036 (Alternative 1, dry water year type) to 33 (Alternative 3, dry water year type; Table I.2-34). Overall Alternative 3 performed better than all other alternatives across all the water year types. Values from the exploratory modeling scenarios (EXP1 and EXP3) and the NAA were not included for consideration in the range of mean predicted salvage, exports in EXP1 and EXP3 are zero.

The consistent high level of predicted loss seen in the modeling results is likely related to the high abundance of these species in the Delta, and the ideal habitat conditions created by the pumping facilities themselves.

### I.2.3.16 Spotted Bass and Smallmouth Bass

The mean predicted loss of Spotted Bass and Smallmouth Bass at the Banks facility has a narrow range. The only predicted loss for Spotted Bass at Banks was for the below normal water year type in the month of March. The predicted loss of Spotted Bass at the Banks facility was from 3 (Alternative 1, below normal water year type) to 1 (Alternative 2 w/o TUCP no VAs, Alternative 2 Delta VAs, Alternative 2 systemwide VAs, Alternative 3, below normal water year type; Table I.2-39). Predicted loss of Smallmouth Bass occurring at the Banks facility was in the months of December through February, and October in below normal and dry water year types. There was no predicted loss for Smallmouth Bass at Banks during the critically dry water year type. The range of predicted loss for Smallmouth Bass at the Banks facility was from 10 (Alternative 1, below normal water year type) to 1 (all alternatives and Action 5, above normal water year type; Table I.2-37). Overall Alternative 3 performed better than all other alternatives, but the differences in predicted loss were minimal for all alternatives and across water year types. Values from the exploratory modeling scenarios (EXP1 and EXP3) and the NAA were not included for consideration in the range of mean predicted salvage, exports in EXP1 and EXP3 are zero.

The mean predicted loss of Spotted Bass and Smallmouth Bass at the Jones facility has a narrow range. Predicted loss of Spotted Bass at Jones occurred during the months of January, February, March, April, August, November, and December. The range of mean predicted loss for Spotted Bass at the Jones facility was from 7 (all alternatives except Alternative 1, Alternative 3, and Action 5, dry water year type) to 1 (all alternatives and Action 5 except Alternative 3, critically dry water year type; Table I.2-40). The mean predicted loss of Smallmouth Bass at Jones occurred during the months of January through March and May. There was no predicted loss for Smallmouth Bass at Jones during the wet, above normal, and dry water year types. The mean predicted loss of Smallmouth Bass at Jones had a range from 7 (Alternative w/ TUCP no VAs, Alternative 1, Alternative 4, below normal water year type) to 1 (all alternatives and Action 5, critically dry water year type; Table I.2-38). Overall Alternative 3 performed better than all other alternatives but the differences in mean predicted loss was minimal between alternatives and water year types. Values from the exploratory modeling scenarios (EXP1 and EXP3) and the NAA were not included for consideration in the range of mean predicted salvage, exports in EXP1 and EXP3 are zero.

Table I.2-1. Loss of juvenile LAD Winter-Run Chinook salmon at SWP Banks Pumping Plant for Exploratory runs 1 and 3 (EXP1, EXP3), the "No Action Alternative", 4 components of Alternative 2 (Alt2), and Action 5 averaged by water year type and month, based on the salvage-density method. Absolute values are rounded.

| Water Year Type | Month | EXP1 | EXP3 | NAA | Alt2 wTUCPwoVA | Alt2 woTUCPwoVA | Alt2 woTUCPDeltaVA | Alt2 woTUCPAllVA | Action 5 |
|---|---|---|---|---|---|---|---|---|---|
| Wet | Jan | 0 | 0 | 205 | 202 | 202 | 202 | 202 | 212 |
| Wet | Feb | 0 | 0 | 595 | 605 | 606 | 603 | 604 | 634 |
| Wet | Mar | 0 | 0 | 1,322 | 1,404 | 1,414 | 1,376 | 1,362 | 1,527 |
| Wet | Apr | 0 | 0 | 117 | 136 | 136 | 125 | 125 | 129 |
| Wet | May | 0 | 0 | 4 | 6 | 6 | 6 | 6 | 6 |
| Wet | Jun | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wet | Jul | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wet | Aug | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wet | Sep | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wet | Oct | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wet | Nov | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wet | Dec | 0 | 0 | 185 | 181 | 181 | 181 | 182 | 190 |
| AN | Jan | 0 | 0 | 139 | 135 | 135 | 135 | 135 | 146 |
| AN | Feb | 0 | 0 | 402 | 421 | 413 | 414 | 406 | 473 |
| AN | Mar | 0 | 0 | 858 | 822 | 819 | 700 | 707 | 1,001 |
| AN | Apr | 0 | 0 | 27 | 75 | 75 | 40 | 40 | 43 |
| AN | May | 0 | 0 | 1 | 3 | 3 | 3 | 3 | 3 |
| AN | Jun | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| AN | Jul | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| AN | Aug | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

| Water Year Type | Month | EXP1 | EXP3 | NAA | Alt2 wTUCPwoVA | Alt2 woTUCPwoVA | Alt2 woTUCPDeltaVA | Alt2 woTUCPAllVA | Action 5 |
|---|---|---|---|---|---|---|---|---|---|
| AN | Sep | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| AN | Oct | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| AN | Nov | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| AN | Dec | 0 | 0 | 172 | 167 | 165 | 162 | 162 | 166 |
| BN | Jan | 0 | 0 | 211 | 204 | 204 | 205 | 205 | 216 |
| BN | Feb | 0 | 0 | 670 | 662 | 648 | 645 | 646 | 749 |
| BN | Mar | 0 | 0 | 862 | 853 | 808 | 608 | 630 | 910 |
| BN | Apr | 0 | 0 | 41 | 71 | 73 | 46 | 47 | 53 |
| BN | May | 0 | 0 | 13 | 25 | 26 | 26 | 26 | 25 |
| BN | Jun | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| BN | Jul | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| BN | Aug | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| BN | Sep | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| BN | Oct | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| BN | Nov | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| BN | Dec | 0 | 0 | 4 | 4 | 4 | 4 | 4 | 4 |
| Dry | Jan | 0 | 0 | 80 | 72 | 72 | 72 | 70 | 79 |
| Dry | Feb | 0 | 0 | 82 | 78 | 78 | 77 | 77 | 80 |
| Dry | Mar | 0 | 0 | 567 | 542 | 542 | 447 | 464 | 553 |
| Dry | Apr | 0 | 0 | 18 | 28 | 28 | 19 | 19 | 18 |
| Dry | May | 0 | 0 | 1 | 2 | 2 | 2 | 1 | 2 |
| Dry | Jun | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dry | Jul | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

| Water Year Type | Month | EXP1 | EXP3 | NAA | Alt2 wTUCPwoVA | Alt2 woTUCPwoVA | Alt2 woTUCPDeltaVA | Alt2 woTUCPAllVA | Action 5 |
|---|---|---|---|---|---|---|---|---|---|
| Dry | Aug | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dry | Sep | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dry | Oct | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dry | Nov | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dry | Dec | 0 | 0 | 94 | 95 | 95 | 93 | 90 | 85 |
| C | Jan | 0 | 0 | 2 | 2 | 2 | 2 | 2 | 2 |
| C | Feb | 0 | 0 | 12 | 13 | 11 | 11 | 11 | 13 |
| C | Mar | 0 | 0 | 43 | 41 | 34 | 36 | 37 | 42 |
| C | Apr | 0 | 0 | 11 | 13 | 12 | 12 | 13 | 13 |
| C | May | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| C | Jun | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| C | Jul | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| C | Aug | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| C | Sep | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| C | Oct | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| C | Nov | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| C | Dec | 0 | 0 | 7 | 7 | 7 | 6 | 7 | 6 |

Table I.2-2. Loss of juvenile LAD Winter-Run Chinook salmon at SWP Banks Pumping Plant for the No Action Alternative (NAA), Alternative 1 (Alt1), 4 components of Alternative 2 (Alt2), Alternative 3 (Alt3), Alternative 4 (Alt4), and Action 5, averaged by water year type and month, based on the salvage-density method. Percentage values in parentheses indicate the difference between NAA and each alternative. Absolute and percentage values are rounded.

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Wet | Jan | 205 | 340 (66%) | 202 (-1%) | 202 (-1%) | 202 (-1%) | 202 (-1%) | 137 (-33%) | 192 (-7%) | 212 (4%) |
| Wet | Feb | 595 | 793 (33%) | 605 (2%) | 606 (2%) | 603 (2%) | 604 (2%) | 281 (-53%) | 621 (5%) | 634 (7%) |
| Wet | Mar | 1,322 | 1,707 (29%) | 1,404 (6%) | 1,414 (7%) | 1,376 (4%) | 1,362 (3%) | 552 (-58%) | 1,483 (12%) | 1,527 (16%) |
| Wet | Apr | 117 | 138 (18%) | 136 (16%) | 136 (16%) | 125 (7%) | 125 (7%) | 41 (-65%) | 134 (15%) | 129 (10%) |
| Wet | May | 4 | 6 (67%) | 6 (68%) | 6 (68%) | 6 (68%) | 6 (68%) | 1 (-68%) | 6 (64%) | 6 (65%) |
| Wet | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Dec | 185 | 307 (66%) | 181 (-2%) | 181 (-2%) | 181 (-2%) | 182 (-1%) | 98 (-47%) | 167 (-9%) | 190 (3%) |
| AN | Jan | 139 | 317 (128%) | 135 (-3%) | 135 (-3%) | 135 (-3%) | 135 (-3%) | 123 (-11%) | 128 (-8%) | 146 (5%) |
| AN | Feb | 402 | 706 (76%) | 421 (5%) | 413 (3%) | 414 (3%) | 406 (1%) | 340 (-15%) | 466 (16%) | 473 (18%) |
| AN | Mar | 858 | 1,618 (89%) | 822 (-4%) | 819 (-4%) | 700 (-18%) | 707 (-18%) | 699 (-18%) | 849 (-1%) | 1,001 (17%) |
| AN | Apr | 27 | 83 (208%) | 75 (178%) | 75 (177%) | 40 (49%) | 40 (49%) | 38 (39%) | 75 (177%) | 43 (58%) |
| AN | May | 1 | 3 (149%) | 3 (124%) | 3 (124%) | 3 (96%) | 3 (93%) | 1 (-29%) | 3 (124%) | 3 (96%) |
| AN | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| AN | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Dec | 172 | 278 (62%) | 167 (-3%) | 165 (-4%) | 162 (-6%) | 162 (-6%) | 82 (-52%) | 146 (-15%) | 166 (-3%) |
| BN | Jan | 211 | 525 (149%) | 204 (-3%) | 204 (-3%) | 205 (-3%) | 205 (-3%) | 212 (1%) | 205 (-3%) | 216 (3%) |
| BN | Feb | 670 | 1,160 (73%) | 662 (-1%) | 648 (-3%) | 645 (-4%) | 646 (-4%) | 586 (-13%) | 748 (12%) | 749 (12%) |
| BN | Mar | 862 | 1,703 (98%) | 853 (-1%) | 808 (-6%) | 608 (-29%) | 630 (-27%) | 768 (-11%) | 841 (-2%) | 910 (6%) |
| BN | Apr | 41 | 81 (98%) | 71 (74%) | 73 (78%) | 46 (12%) | 47 (15%) | 43 (5%) | 71 (75%) | 53 (30%) |
| BN | May | 13 | 27 (109%) | 25 (94%) | 26 (97%) | 26 (96%) | 26 (98%) | 13 (0%) | 25 (92%) | 25 (96%) |
| BN | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Dec | 4 | 6 (34%) | 4 (-5%) | 4 (-3%) | 4 (-2%) | 4 (-8%) | 2 (-45%) | 3 (-22%) | 4 (-5%) |
| Dry | Jan | 80 | 150 (88%) | 72 (-10%) | 72 (-10%) | 72 (-10%) | 70 (-13%) | 66 (-17%) | 81 (1%) | 79 (-2%) |
| Dry | Feb | 82 | 162 (97%) | 78 (-6%) | 78 (-6%) | 77 (-6%) | 77 (-6%) | 93 (13%) | 93 (12%) | 80 (-3%) |
| Dry | Mar | 567 | 1,019 (80%) | 542 (-4%) | 542 (-4%) | 447 (-21%) | 464 (-18%) | 726 (28%) | 569 (0%) | 553 (-2%) |
| Dry | Apr | 18 | 31 (76%) | 28 (59%) | 28 (59%) | 19 (6%) | 19 (6%) | 16 (-7%) | 28 (60%) | 18 (2%) |
| Dry | May | 1 | 2 (119%) | 2 (87%) | 2 (88%) | 2 (63%) | 1 (58%) | 1 (19%) | 2 (88%) | 2 (64%) |

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Dry | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Dec | 94 | 131 (38%) | 95 (1%) | 95 (0%) | 93 (-2%) | 90 (-5%) | 47 (-51%) | 82 (-14%) | 85 (-10%) |
| C | Jan | 2 | 4 (70%) | 2 (-6%) | 2 (-16%) | 2 (-18%) | 2 (-16%) | 2 (3%) | 2 (-4%) | 2 (-3%) |
| C | Feb | 12 | 18 (51%) | 13 (6%) | 11 (-11%) | 11 (-12%) | 11 (-13%) | 15 (26%) | 15 (24%) | 13 (7%) |
| C | Mar | 43 | 49 (14%) | 41 (-4%) | 34 (-21%) | 36 (-17%) | 37 (-15%) | 49 (13%) | 44 (1%) | 42 (-2%) |
| C | Apr | 11 | 14 (27%) | 13 (20%) | 12 (12%) | 12 (10%) | 13 (15%) | 11 (4%) | 14 (29%) | 13 (20%) |
| C | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Dec | 7 | 9 (30%) | 7 (3%) | 7 (2%) | 6 (-3%) | 7 (-3%) | 3 (-50%) | 6 (-9%) | 6 (-4%) |

Table I.2-3. Loss of juvenile LAD Winter-Run Chinook salmon at CVP Jones Pumping Plant for Exploratory runs 1 and 3 (EXP1, EXP3), the "No Action Alternative", 4 components of Alternative 2 (ALT2), and Action 5 averaged by water year type and month, based on the salvage-density method. Absolute values are rounded.

| Water Year Type | Month | EXP1 | EXP3 | NAA | Alt2 wTUCPwoVA | Alt2 woTUCPwoVA | Alt2 woTUCPDeltaVA | Alt2 woTUCPAllVA | Action 5 |
|---|---|---|---|---|---|---|---|---|---|
| Wet | Jan | 0 | 0 | 37 | 37 | 37 | 37 | 37 | 38 |
| Wet | Feb | 0 | 0 | 56 | 58 | 58 | 59 | 59 | 58 |
| Wet | Mar | 0 | 0 | 111 | 119 | 118 | 113 | 113 | 117 |
| Wet | Apr | 0 | 0 | 3 | 3 | 3 | 3 | 3 | 3 |
| Wet | May | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wet | Jun | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wet | Jul | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wet | Aug | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wet | Sep | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wet | Oct | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wet | Nov | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wet | Dec | 0 | 0 | 53 | 52 | 52 | 52 | 53 | 53 |
| AN | Jan | 0 | 0 | 36 | 36 | 36 | 36 | 36 | 37 |
| AN | Feb | 0 | 0 | 61 | 62 | 62 | 62 | 62 | 64 |
| AN | Mar | 0 | 0 | 118 | 126 | 126 | 93 | 93 | 102 |
| AN | Apr | 0 | 0 | 3 | 3 | 3 | 2 | 2 | 2 |
| AN | May | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| AN | Jun | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| AN | Jul | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

| Water Year Type | Month | EXP1 | EXP3 | NAA | Alt2 wTUCPwoVA | Alt2 woTUCPwoVA | Alt2 woTUCPDeltaVA | Alt2 woTUCPAllVA | Action 5 |
|---|---|---|---|---|---|---|---|---|---|
| AN | Aug | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| AN | Sep | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| AN | Oct | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| AN | Nov | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| AN | Dec | 0 | 0 | 43 | 46 | 46 | 47 | 47 | 48 |
| BN | Jan | 0 | 0 | 115 | 112 | 112 | 112 | 112 | 118 |
| BN | Feb | 0 | 0 | 172 | 166 | 167 | 166 | 166 | 175 |
| BN | Mar | 0 | 0 | 251 | 252 | 263 | 167 | 162 | 178 |
| BN | Apr | 0 | 0 | 45 | 48 | 47 | 43 | 43 | 43 |
| BN | May | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| BN | Jun | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| BN | Jul | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| BN | Aug | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| BN | Sep | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| BN | Oct | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| BN | Nov | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| BN | Dec | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 |
| Dry | Jan | 0 | 0 | 47 | 45 | 45 | 45 | 47 | 50 |
| Dry | Feb | 0 | 0 | 47 | 44 | 44 | 44 | 45 | 48 |
| Dry | Mar | 0 | 0 | 118 | 117 | 117 | 94 | 92 | 104 |
| Dry | Apr | 0 | 0 | 5 | 5 | 5 | 4 | 4 | 4 |
| Dry | May | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dry | Jun | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

| Water Year Type | Month | EXP1 | EXP3 | NAA | Alt2 wTUCPwoVA | Alt2 woTUCPwoVA | Alt2 woTUCPDeltaVA | Alt2 woTUCPAllVA | Action 5 |
|---|---|---|---|---|---|---|---|---|---|
| Dry | Jul | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dry | Aug | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dry | Sep | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dry | Oct | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dry | Nov | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dry | Dec | 0 | 0 | 9 | 9 | 9 | 9 | 9 | 8 |
| C | Jan | 0 | 0 | 13 | 12 | 13 | 14 | 13 | 13 |
| C | Feb | 0 | 0 | 2 | 2 | 2 | 2 | 2 | 1 |
| C | Mar | 0 | 0 | 26 | 24 | 22 | 20 | 20 | 26 |
| C | Apr | 0 | 0 | 2 | 2 | 3 | 3 | 3 | 2 |
| C | May | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| C | Jun | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| C | Jul | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| C | Aug | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| C | Sep | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| C | Oct | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| C | Nov | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| C | Dec | 0 | 0 | 4 | 4 | 4 | 4 | 4 | 4 |

Table I.2-4. Loss of juvenile LAD Winter-Run Chinook salmon at CVP Jones Pumping Plant for the No Action Alternative (NAA), Alternatives 1 3 and 4 (ALT1, ALT 3, ALT4), 4 components of Alternative 2 (ALT2), and Action 5, averaged by water year type and month, based on the salvage-density method. Percentage values in parentheses indicate the difference between NAA and each alternative. Absolute and percentage values are rounded.

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Wet | Jan | 37 | 40 (6%) | 37 (0%) | 37 (0%) | 37 (0%) | 37 (0%) | 38 (2%) | 37 (0%) | 38 (2%) |
| Wet | Feb | 56 | 57 (3%) | 58 (5%) | 58 (4%) | 59 (6%) | 59 (6%) | 57 (2%) | 59 (7%) | 58 (5%) |
| Wet | Mar | 111 | 112 (1%) | 119 (8%) | 118 (6%) | 113 (2%) | 113 (2%) | 71 (-36%) | 125 (13%) | 117 (5%) |
| Wet | Apr | 3 | 3 (1%) | 3 (10%) | 3 (11%) | 3 (-10%) | 3 (-11%) | 1 (-80%) | 3 (12%) | 3 (-13%) |
| Wet | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Dec | 53 | 56 (6%) | 52 (-2%) | 52 (-2%) | 52 (-2%) | 53 (-1%) | 35 (-35%) | 49 (-7%) | 53 (0%) |
| AN | Jan | 36 | 42 (15%) | 36 (-1%) | 36 (-1%) | 36 (-1%) | 36 (-1%) | 23 (-35%) | 35 (-2%) | 37 (2%) |
| AN | Feb | 61 | 65 (6%) | 62 (2%) | 62 (2%) | 62 (2%) | 62 (2%) | 60 (-1%) | 64 (5%) | 64 (5%) |
| AN | Mar | 118 | 130 (11%) | 126 (7%) | 126 (7%) | 93 (-21%) | 93 (-21%) | 86 (-27%) | 131 (12%) | 102 (-13%) |
| AN | Apr | 3 | 3 (-3%) | 3 (0%) | 3 (0%) | 2 (-33%) | 2 (-33%) | 0 (-85%) | 3 (0%) | 2 (-33%) |
| AN | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| AN | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Dec | 43 | 51 (19%) | 46 (8%) | 46 (9%) | 47 (10%) | 47 (10%) | 20 (-52%) | 44 (3%) | 48 (12%) |
| BN | Jan | 115 | 139 (20%) | 112 (-3%) | 112 (-3%) | 112 (-3%) | 112 (-3%) | 51 (-56%) | 112 (-3%) | 118 (3%) |
| BN | Feb | 172 | 187 (8%) | 166 (-4%) | 167 (-3%) | 166 (-3%) | 166 (-4%) | 101 (-41%) | 175 (2%) | 175 (2%) |
| BN | Mar | 251 | 296 (18%) | 252 (0%) | 263 (5%) | 167 (-33%) | 162 (-36%) | 170 (-32%) | 256 (2%) | 178 (-29%) |
| BN | Apr | 45 | 51 (13%) | 48 (5%) | 47 (4%) | 43 (-6%) | 43 (-5%) | 14 (-68%) | 48 (6%) | 43 (-6%) |
| BN | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Dec | 1 | 1 (-1%) | 1 (-2%) | 1 (0%) | 1 (-1%) | 1 (-4%) | 1 (-49%) | 1 (-7%) | 1 (-3%) |
| Dry | Jan | 47 | 54 (13%) | 45 (-5%) | 45 (-5%) | 45 (-4%) | 47 (-1%) | 13 (-72%) | 46 (-3%) | 50 (6%) |
| Dry | Feb | 47 | 54 (15%) | 44 (-8%) | 44 (-8%) | 44 (-8%) | 45 (-4%) | 28 (-41%) | 49 (3%) | 48 (1%) |
| Dry | Mar | 118 | 130 (10%) | 117 (-1%) | 117 (-1%) | 94 (-21%) | 92 (-22%) | 68 (-42%) | 117 (-1%) | 104 (-12%) |
| Dry | Apr | 5 | 6 (9%) | 5 (-1%) | 5 (-1%) | 4 (-14%) | 4 (-14%) | 1 (-80%) | 5 (0%) | 4 (-13%) |
| Dry | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Dry | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Dec | 9 | 10 (14%) | 9 (5%) | 9 (1%) | 9 (0%) | 9 (-1%) | 4 (-55%) | 9 (0%) | 8 (-5%) |
| C | Jan | 13 | 16 (22%) | 12 (-11%) | 13 (-3%) | 14 (1%) | 13 (0%) | 7 (-46%) | 13 (-2%) | 13 (0%) |
| C | Feb | 2 | 2 (14%) | 2 (-2%) | 2 (1%) | 2 (-1%) | 2 (-1%) | 1 (-55%) | 2 (7%) | 1 (-4%) |
| C | Mar | 26 | 22 (-14%) | 24 (-8%) | 22 (-16%) | 20 (-21%) | 20 (-21%) | 8 (-69%) | 25 (-3%) | 26 (0%) |
| C | Apr | 2 | 3 (26%) | 2 (8%) | 3 (28%) | 3 (28%) | 3 (27%) | 1 (-74%) | 2 (6%) | 2 (7%) |
| C | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Dec | 4 | 5 (27%) | 4 (6%) | 4 (12%) | 4 (16%) | 4 (17%) | 2 (-43%) | 4 (8%) | 4 (10%) |

Table I.2-5. Loss of juvenile genetic Winter-Run Chinook salmon at SWP Banks Pumping Plant for Exploratory runs 1 and 3 (EXP1, EXP3), the "No Action Alternative", 4 components of Alternative 2 (Alt2), and Action 5 averaged by water year type and month, based on the salvage-density method. Absolute values are rounded.

| Water Year Type | Month | EXP1 | EXP3 | NAA | Alt2 wTUCPwoVA | Alt2 woTUCPwoVA | Alt2 woTUCPDeltaVA | Alt2 woTUCPAllVA | Action 5 |
|---|---|---|---|---|---|---|---|---|---|
| Wet | Jan | 0 | 0 | 9 | 8 | 8 | 8 | 8 | 9 |
| Wet | Feb | 0 | 0 | 205 | 209 | 209 | 208 | 209 | 219 |
| Wet | Mar | 0 | 0 | 547 | 581 | 585 | 569 | 563 | 631 |
| Wet | Apr | 0 | 0 | 61 | 70 | 70 | 65 | 65 | 67 |
| Wet | May | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 |
| Wet | Jun | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wet | Jul | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wet | Aug | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wet | Sep | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wet | Oct | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wet | Nov | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wet | Dec | 0 | 0 | 4 | 4 | 4 | 4 | 4 | 4 |
| AN | Jan | 0 | 0 | 6 | 6 | 6 | 6 | 6 | 6 |
| AN | Feb | 0 | 0 | 139 | 145 | 143 | 143 | 140 | 163 |
| AN | Mar | 0 | 0 | 355 | 340 | 339 | 290 | 292 | 414 |
| AN | Apr | 0 | 0 | 14 | 39 | 39 | 21 | 21 | 22 |
| AN | May | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 |
| AN | Jun | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| AN | Jul | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| AN | Aug | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

| Water Year Type | Month | EXP1 | EXP3 | NAA | Alt2 wTUCPwoVA | Alt2 woTUCPwoVA | Alt2 woTUCPDeltaVA | Alt2 woTUCPAllVA | Action 5 |
|---|---|---|---|---|---|---|---|---|---|
| AN | Sep | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| AN | Oct | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| AN | Nov | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| AN | Dec | 0 | 0 | 4 | 4 | 4 | 4 | 4 | 4 |
| BN | Jan | 0 | 0 | 9 | 9 | 9 | 9 | 9 | 10 |
| BN | Feb | 0 | 0 | 131 | 129 | 126 | 126 | 126 | 146 |
| BN | Mar | 0 | 0 | 408 | 404 | 383 | 288 | 299 | 431 |
| BN | Apr | 0 | 0 | 5 | 9 | 9 | 6 | 6 | 7 |
| BN | May | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| BN | Jun | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| BN | Jul | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| BN | Aug | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| BN | Sep | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| BN | Oct | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| BN | Nov | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| BN | Dec | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dry | Jan | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dry | Feb | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dry | Mar | 0 | 0 | 96 | 92 | 92 | 76 | 79 | 94 |
| Dry | Apr | 0 | 0 | 7 | 11 | 11 | 8 | 8 | 7 |
| Dry | May | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dry | Jun | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dry | Jul | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

| Water Year Type | Month | EXP1 | EXP3 | NAA | Alt2 wTUCPwoVA | Alt2 woTUCPwoVA | Alt2 woTUCPDeltaVA | Alt2 woTUCPAllVA | Action 5 |
|---|---|---|---|---|---|---|---|---|---|
| Dry | Aug | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dry | Sep | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dry | Oct | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dry | Nov | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dry | Dec | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| C | Jan | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| C | Feb | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| C | Mar | 0 | 0 | 4 | 4 | 3 | 3 | 3 | 4 |
| C | Apr | 0 | 0 | 5 | 6 | 6 | 6 | 6 | 6 |
| C | May | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| C | Jun | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| C | Jul | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| C | Aug | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| C | Sep | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| C | Oct | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| C | Nov | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| C | Dec | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

Table I.2-6. Loss of juvenile genetic Winter-Run Chinook salmon at SWP Banks Pumping Plant for the No Action Alternative (NAA), Alternative 1 (Alt1), 4 components of Alternative 2 (Alt2), Alternative 3 (Alt3), Alternative 4 (Alt4), and Action 5, averaged by water year type and month, based on the salvage-density method. Percentage values in parentheses indicate the difference between NAA and each alternative. Absolute and percentage values are rounded.

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Wet | Jan | 9 | 14 (66%) | 8 (-1%) | 8 (-1%) | 8 (-1%) | 8 (-1%) | 6 (-33%) | 8 (-7%) | 9 (4%) |
| Wet | Feb | 205 | 274 (33%) | 209 (2%) | 209 (2%) | 208 (2%) | 209 (2%) | 97 (-53%) | 215 (5%) | 219 (7%) |
| Wet | Mar | 547 | 706 (29%) | 581 (6%) | 585 (7%) | 569 (4%) | 563 (3%) | 228 (-58%) | 613 (12%) | 631 (16%) |
| Wet | Apr | 61 | 71 (18%) | 70 (16%) | 70 (16%) | 65 (7%) | 65 (7%) | 21 (-65%) | 70 (15%) | 67 (10%) |
| Wet | May | 1 | 1 (67%) | 1 (68%) | 1 (68%) | 1 (68%) | 1 (68%) | 0 (-68%) | 1 (64%) | 1 (65%) |
| Wet | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Dec | 4 | 7 (66%) | 4 (-2%) | 4 (-2%) | 4 (-2%) | 4 (-1%) | 2 (-47%) | 4 (-9%) | 4 (3%) |
| AN | Jan | 6 | 13 (128%) | 6 (-3%) | 6 (-3%) | 6 (-3%) | 6 (-3%) | 5 (-11%) | 5 (-8%) | 6 (5%) |
| AN | Feb | 139 | 244 (76%) | 145 (5%) | 143 (3%) | 143 (3%) | 140 (1%) | 117 (-15%) | 161 (16%) | 163 (18%) |
| AN | Mar | 355 | 669 (89%) | 340 (-4%) | 339 (-4%) | 290 (-18%) | 292 (-18%) | 289 (-18%) | 351 (-1%) | 414 (17%) |
| AN | Apr | 14 | 43 (208%) | 39 (178%) | 39 (177%) | 21 (49%) | 21 (49%) | 19 (39%) | 39 (177%) | 22 (58%) |
| AN | May | 0 | 1 (149%) | 1 (124%) | 1 (124%) | 1 (96%) | 1 (93%) | 0 (-29%) | 1 (124%) | 1 (96%) |
| AN | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| AN | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Dec | 4 | 7 (62%) | 4 (-3%) | 4 (-4%) | 4 (-6%) | 4 (-6%) | 2 (-52%) | 3 (-15%) | 4 (-3%) |
| BN | Jan | 9 | 23 (149%) | 9 (-3%) | 9 (-3%) | 9 (-3%) | 9 (-3%) | 9 (1%) | 9 (-3%) | 10 (3%) |
| BN | Feb | 131 | 226 (73%) | 129 (-1%) | 126 (-3%) | 126 (-4%) | 126 (-4%) | 114 (-13%) | 146 (12%) | 146 (12%) |
| BN | Mar | 408 | 807 (98%) | 404 (-1%) | 383 (-6%) | 288 (-29%) | 299 (-27%) | 364 (-11%) | 399 (-2%) | 431 (6%) |
| BN | Apr | 5 | 10 (98%) | 9 (74%) | 9 (78%) | 6 (12%) | 6 (15%) | 5 (5%) | 9 (75%) | 7 (30%) |
| BN | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Dec | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Jan | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Feb | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Mar | 96 | 173 (80%) | 92 (-4%) | 92 (-4%) | 76 (-21%) | 79 (-18%) | 123 (28%) | 97 (0%) | 94 (-2%) |
| Dry | Apr | 7 | 13 (76%) | 11 (59%) | 11 (59%) | 8 (6%) | 8 (6%) | 7 (-7%) | 11 (60%) | 7 (2%) |
| Dry | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Dry | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Dec | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Jan | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Feb | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Mar | 4 | 5 (14%) | 4 (-4%) | 3 (-21%) | 3 (-17%) | 3 (-15%) | 4 (13%) | 4 (1%) | 4 (-2%) |
| C | Apr | 5 | 7 (27%) | 6 (20%) | 6 (12%) | 6 (10%) | 6 (15%) | 6 (4%) | 7 (29%) | 6 (20%) |
| C | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Dec | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |

Table I.2-7. Loss of juvenile genetic Winter-Run Chinook salmon at CVP Jones Pumping Plant for Exploratory runs 1 and 3 (EXP1, EXP3), the "No Action Alternative", 4 components of Alternative 2 (ALT2), and Action 5 averaged by water year type and month, based on the salvage-density method. Absolute values are rounded.

| Water Year Type | Month | EXP1 | EXP3 | NAA | Alt2 wTUCPwoVA | Alt2 woTUCPwoVA | Alt2 woTUCPDeltaVA | Alt2 woTUCPAllVA | Action 5 |
|---|---|---|---|---|---|---|---|---|---|
| Wet | Jan | 0 | 0 | 4 | 4 | 4 | 4 | 4 | 4 |
| Wet | Feb | 0 | 0 | 21 | 22 | 22 | 22 | 22 | 22 |
| Wet | Mar | 0 | 0 | 53 | 57 | 57 | 54 | 54 | 56 |
| Wet | Apr | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 |
| Wet | May | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wet | Jun | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wet | Jul | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wet | Aug | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wet | Sep | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wet | Oct | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wet | Nov | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wet | Dec | 0 | 0 | 4 | 4 | 4 | 4 | 4 | 4 |
| AN | Jan | 0 | 0 | 4 | 4 | 4 | 4 | 4 | 4 |
| AN | Feb | 0 | 0 | 23 | 23 | 23 | 23 | 23 | 24 |
| AN | Mar | 0 | 0 | 57 | 61 | 61 | 44 | 45 | 49 |
| AN | Apr | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 |
| AN | May | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| AN | Jun | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| AN | Jul | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| AN | Aug | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

| Water Year Type | Month | EXP1 | EXP3 | NAA | Alt2 wTUCPwoVA | Alt2 woTUCPwoVA | Alt2 woTUCPDeltaVA | Alt2 woTUCPAllVA | Action 5 |
|---|---|---|---|---|---|---|---|---|---|
| AN | Sep | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| AN | Oct | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| AN | Nov | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| AN | Dec | 0 | 0 | 3 | 3 | 3 | 3 | 3 | 3 |
| BN | Jan | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| BN | Feb | 0 | 0 | 37 | 35 | 36 | 36 | 36 | 38 |
| BN | Mar | 0 | 0 | 94 | 95 | 99 | 63 | 61 | 67 |
| BN | Apr | 0 | 0 | 4 | 4 | 4 | 4 | 4 | 4 |
| BN | May | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| BN | Jun | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| BN | Jul | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| BN | Aug | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| BN | Sep | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| BN | Oct | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| BN | Nov | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| BN | Dec | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 |
| Dry | Jan | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dry | Feb | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dry | Mar | 0 | 0 | 43 | 43 | 43 | 34 | 33 | 38 |
| Dry | Apr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dry | May | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dry | Jun | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dry | Jul | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

| Water Year Type | Month | EXP1 | EXP3 | NAA | Alt2 wTUCPwoVA | Alt2 woTUCPwoVA | Alt2 woTUCPDeltaVA | Alt2 woTUCPAllVA | Action 5 |
|---|---|---|---|---|---|---|---|---|---|
| Dry | Aug | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dry | Sep | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dry | Oct | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dry | Nov | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dry | Dec | 0 | 0 | 2 | 2 | 2 | 2 | 1 | 1 |
| C | Jan | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 |
| C | Feb | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| C | Mar | 0 | 0 | 11 | 10 | 9 | 9 | 9 | 11 |
| C | Apr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| C | May | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| C | Jun | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| C | Jul | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| C | Aug | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| C | Sep | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| C | Oct | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| C | Nov | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| C | Dec | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

Table I.2-8. Loss of juvenile genetic Winter-Run Chinook salmon at CVP Jones Pumping Plant for the No Action Alternative (NAA), Alternatives 1 3 and 4 (ALT1, ALT 3, ALT4), 4 components of Alternative 2 (ALT2), and Action 5, averaged by water year type and month, based on the salvage-density method. Percentage values in parentheses indicate the difference between NAA and each alternative. Absolute and percentage values are rounded.

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Wet | Jan | 4 | 4 (6%) | 4 (0%) | 4 (0%) | 4 (0%) | 4 (0%) | 4 (2%) | 4 (0%) | 4 (2%) |
| Wet | Feb | 21 | 21 (3%) | 22 (5%) | 22 (4%) | 22 (6%) | 22 (6%) | 21 (2%) | 22 (7%) | 22 (5%) |
| Wet | Mar | 53 | 54 (1%) | 57 (8%) | 57 (6%) | 54 (2%) | 54 (2%) | 34 (-36%) | 60 (13%) | 56 (5%) |
| Wet | Apr | 1 | 1 (1%) | 1 (10%) | 1 (11%) | 1 (-10%) | 1 (-11%) | 0 (-80%) | 1 (12%) | 1 (-13%) |
| Wet | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Dec | 4 | 4 (6%) | 4 (-2%) | 4 (-2%) | 4 (-2%) | 4 (-1%) | 2 (-35%) | 3 (-7%) | 4 (0%) |
| AN | Jan | 4 | 5 (15%) | 4 (-1%) | 4 (-1%) | 4 (-1%) | 4 (-1%) | 3 (-35%) | 4 (-2%) | 4 (2%) |
| AN | Feb | 23 | 24 (6%) | 23 (2%) | 23 (2%) | 23 (2%) | 23 (2%) | 23 (-1%) | 24 (5%) | 24 (5%) |
| AN | Mar | 57 | 63 (11%) | 61 (7%) | 61 (7%) | 44 (-21%) | 45 (-21%) | 41 (-27%) | 63 (12%) | 49 (-13%) |
| AN | Apr | 1 | 1 (-3%) | 1 (0%) | 1 (0%) | 1 (-33%) | 1 (-33%) | 0 (-85%) | 1 (0%) | 1 (-33%) |
| AN | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| AN | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Dec | 3 | 4 (19%) | 3 (8%) | 3 (9%) | 3 (10%) | 3 (10%) | 1 (-52%) | 3 (3%) | 3 (12%) |
| BN | Jan | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Feb | 37 | 40 (8%) | 35 (-4%) | 36 (-3%) | 36 (-3%) | 36 (-4%) | 22 (-41%) | 38 (2%) | 38 (2%) |
| BN | Mar | 94 | 112 (18%) | 95 (0%) | 99 (5%) | 63 (-33%) | 61 (-36%) | 64 (-32%) | 96 (2%) | 67 (-29%) |
| BN | Apr | 4 | 5 (13%) | 4 (5%) | 4 (4%) | 4 (-6%) | 4 (-5%) | 1 (-68%) | 5 (6%) | 4 (-6%) |
| BN | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Dec | 1 | 1 (-1%) | 1 (-2%) | 1 (0%) | 1 (-1%) | 1 (-4%) | 1 (-49%) | 1 (-7%) | 1 (-3%) |
| Dry | Jan | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Feb | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Mar | 43 | 48 (10%) | 43 (-1%) | 43 (-1%) | 34 (-21%) | 33 (-22%) | 25 (-42%) | 43 (-1%) | 38 (-12%) |
| Dry | Apr | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Dry | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Dec | 2 | 2 (14%) | 2 (5%) | 2 (1%) | 2 (0%) | 1 (-1%) | 1 (-55%) | 2 (0%) | 1 (-5%) |
| C | Jan | 1 | 1 (22%) | 1 (-11%) | 1 (-3%) | 1 (1%) | 1 (0%) | 0 (-46%) | 1 (-2%) | 1 (0%) |
| C | Feb | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Mar | 11 | 9 (-14%) | 10 (-8%) | 9 (-16%) | 9 (-21%) | 9 (-21%) | 3 (-69%) | 11 (-3%) | 11 (0%) |
| C | Apr | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Dec | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |

Table I.2-9. Loss of juvenile LAD spring-run Chinook salmon at SWP Banks Pumping Plant for Exploratory runs 1 and 3 (EXP1, EXP3), the "No Action Alternative", 4 components of Alternative 2 (Alt2), and Action 5 averaged by water year type and month, based on the salvage-density method. Absolute values are rounded.

| Water Year Type | Month | EXP1 | EXP3 | NAA | Alt2 wTUCPwoVA | Alt2 woTUCPwoVA | Alt2 woTUCPDeltaVA | Alt2 woTUCPAllVA | Action 5 |
|---|---|---|---|---|---|---|---|---|---|
| Wet | Jan | 0 | 0 | 6 | 6 | 6 | 6 | 6 | 6 |
| Wet | Feb | 0 | 0 | 68 | 70 | 70 | 69 | 69 | 73 |
| Wet | Mar | 0 | 0 | 1,690 | 1795 | 1808 | 1758 | 1742 | 1,953 |
| Wet | Apr | 0 | 0 | 15,325 | 17826 | 17806 | 16334 | 16338 | 16,856 |
| Wet | May | 0 | 0 | 26,136 | 43920 | 43836 | 43782 | 43899 | 43,015 |
| Wet | Jun | 0 | 0 | 1,749 | 1814 | 1811 | 1824 | 1821 | 1,835 |
| Wet | Jul | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wet | Aug | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wet | Sep | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wet | Oct | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wet | Nov | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wet | Dec | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| AN | Jan | 0 | 0 | 4 | 4 | 4 | 4 | 4 | 4 |
| AN | Feb | 0 | 0 | 46 | 48 | 47 | 48 | 47 | 54 |
| AN | Mar | 0 | 0 | 1096 | 1051 | 1048 | 895 | 904 | 1,280 |
| AN | Apr | 0 | 0 | 3543 | 9850 | 9818 | 5283 | 5284 | 5,598 |
| AN | May | 0 | 0 | 9964 | 22299 | 22291 | 19504 | 19218 | 19,503 |
| AN | Jun | 0 | 0 | 1258 | 1184 | 1191 | 1161 | 1152 | 1,176 |
| AN | Jul | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

| Water Year Type | Month | EXP1 | EXP3 | NAA | Alt2 wTUCPwoVA | Alt2 woTUCPwoVA | Alt2 woTUCPDeltaVA | Alt2 woTUCPAllVA | Action 5 |
|---|---|---|---|---|---|---|---|---|---|
| AN | Aug | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| AN | Sep | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| AN | Oct | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| AN | Nov | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| AN | Dec | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| BN | Jan | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| BN | Feb | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| BN | Mar | 0 | 0 | 719 | 711 | 674 | 507 | 526 | 759 |
| BN | Apr | 0 | 0 | 2,520 | 4383 | 4480 | 2811 | 2908 | 3,265 |
| BN | May | 0 | 0 | 1,519 | 2940 | 2993 | 2974 | 3006 | 2,973 |
| BN | Jun | 0 | 0 | 25 | 24 | 25 | 25 | 24 | 23 |
| BN | Jul | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| BN | Aug | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| BN | Sep | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| BN | Oct | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| BN | Nov | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| BN | Dec | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dry | Jan | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dry | Feb | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dry | Mar | 0 | 0 | 273 | 261 | 261 | 215 | 224 | 266 |
| Dry | Apr | 0 | 0 | 1,817 | 2893 | 2891 | 1917 | 1924 | 1,862 |
| Dry | May | 0 | 0 | 611 | 1145 | 1150 | 998 | 963 | 1,001 |
| Dry | Jun | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

| Water Year Type | Month | EXP1 | EXP3 | NAA | Alt2 wTUCPwoVA | Alt2 woTUCPwoVA | Alt2 woTUCPDeltaVA | Alt2 woTUCPAllVA | Action 5 |
|---|---|---|---|---|---|---|---|---|---|
| Dry | Jul | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dry | Aug | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dry | Sep | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dry | Oct | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dry | Nov | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dry | Dec | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| C | Jan | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| C | Feb | 0 | 0 | 3 | 3 | 3 | 3 | 3 | 3 |
| C | Mar | 0 | 0 | 114 | 110 | 91 | 95 | 97 | 112 |
| C | Apr | 0 | 0 | 195 | 233 | 218 | 214 | 225 | 234 |
| C | May | 0 | 0 | 25 | 35 | 33 | 33 | 34 | 35 |
| C | Jun | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| C | Jul | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| C | Aug | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| C | Sep | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| C | Oct | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| C | Nov | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| C | Dec | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

Table I.2-10. Loss of juvenile LAD spring-run Chinook salmon at SWP Banks Pumping Plant for the No Action Alternative (NAA), Alternative 1 (Alt1), 4 components of Alternative 2 (Alt2), Alternative 3 (Alt3), Alternative 4 (Alt4), and Action 5, averaged by water year type and month, based on the salvage-density method. Percentage values in parentheses indicate the difference between NAA and each alternative. Absolute and percentage values are rounded.

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Wet | Jan | 6 | 10 (66%) | 6 (-1%) | 6 (-1%) | 6 (-1%) | 6 (-1%) | 4 (-33%) | 5 (-7%) | 6 (4%) |
| Wet | Feb | 68 | 91 (33%) | 70 (2%) | 70 (2%) | 69 (2%) | 69 (2%) | 32 (-53%) | 71 (5%) | 73 (7%) |
| Wet | Mar | 1,690 | 2,182(29%) | 1,795 (6%) | 1,808 (7%) | 1,758 (4%) | 1,742 (3%) | 706 (-58%) | 1,896 (12%) | 1,953 (16%) |
| Wet | Apr | 15,325 | 18,068 (18%) | 17,826 (16%) | 17,806 (16%) | 16,334 (7%) | 16,338 (7%) | 5,368 (-65%) | 17,587 (15%) | 16,856 (10%) |
| Wet | May | 26,136 | 43,634 (67%) | 43,920 (68%) | 43,836 (68%) | 43,782 (68%) | 43,899 (68%) | 8,259 (-68%) | 42,937 (64%) | 43,015 (65%) |
| Wet | Jun | 1,749 | 2,258 (29%) | 1,814 (4%) | 1,811 (4%) | 1,824 (4%) | 1,821 (4%) | 1,786 (2%) | 1,773 (1%) | 1,835 (5%) |
| Wet | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Dec | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Jan | 4 | 9 (128%) | 4 (-3%) | 4 (-3%) | 4 (-3%) | 4 (-3%) | 3 (-11%) | 4 (-8%) | 4 (5%) |
| AN | Feb | 46 | 81 (76%) | 48 (5%) | 47 (3%) | 48 (3%) | 47 (1%) | 39 (-15%) | 54 (16%) | 54 (18%) |
| AN | Mar | 1,096 | 2,069 (89%) | 1,051 (-4%) | 1,048 (-4%) | 895 (-18%) | 904 (-18%) | 894 (-18%) | 1,085 (-1%) | 1,280 (17%) |
| AN | Apr | 3,543 | 10,910 (208%) | 9,850 (178%) | 9,818 (177%) | 5,283 (49%) | 5,284 (49%) | 4,922 (39%) | 9,824 (177%) | 5,598 (58%) |
| AN | May | 9,964 | 24,796 (149%) | 22,299 (124%) | 22,291 (124%) | 19,504 (96%) | 19,218 (93%) | 7,051 (-29%) | 22,352 (124%) | 19,503 (96%) |
| AN | Jun | 1258 | 1,875 (49%) | 1,184 (-6%) | 1,191 (-5%) | 1,161 (-8%) | 1,152 (-8%) | 1,059 (-16%) | 1,183 (-6%) | 1,176 (-7%) |

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| AN | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Dec | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Jan | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Feb | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Mar | 719 | 1,420 (98%) | 711 (-1%) | 674 (-6%) | 507 (-29%) | 526 (-27%) | 641 (-11%) | 702 (-2%) | 759 (6%) |
| BN | Apr | 2,520 | 4,989 (98%) | 4,383 (74%) | 4,480 (78%) | 2,811 (12%) | 2,908 (15%) | 2,648 (5%) | 4,400 (75%) | 3,265 (30%) |
| BN | May | 1,519 | 3,169 (109%) | 2,940 (94%) | 2,993 (97%) | 2,974 (96%) | 3,006 (98%) | 1,512 (0%) | 2,917 (92%) | 2,973 (96%) |
| BN | Jun | 25 | 33 (32%) | 24 (-6%) | 25 (-2%) | 25 (-2%) | 24 (-4%) | 18 (-28%) | 23 (-10%) | 23 (-8%) |
| BN | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Dec | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Jan | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Feb | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Mar | 273 | 491 (80%) | 261 (-4%) | 261 (-4%) | 215 (-21%) | 224 (-18%) | 349 (28%) | 274 (0%) | 266 (-2%) |
| Dry | Apr | 1817 | 3,195 (76%) | 2,893 (59%) | 2,891 (59%) | 1,917 (6%) | 1,924 (6%) | 1,691 (-7%) | 2,904 (60%) | 1,862 (2%) |
| Dry | May | 611 | 1,339 (119%) | 1,145 (87%) | 1,150 (88%) | 998 (63%) | 963 (58%) | 726 (19%) | 1,149 (88%) | 1,001 (64%) |

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Dry | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Dec | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Jan | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Feb | 3 | 5 (51%) | 3 (6%) | 3 (-11%) | 3 (-12%) | 3 (-13%) | 4 (26%) | 4 (24%) | 3 (7%) |
| C | Mar | 114 | 130 (14%) | 110 (-4%) | 91 (-21%) | 95 (-17%) | 97 (-15%) | 129 (13%) | 116 (1%) | 112 (-2%) |
| C | Apr | 195 | 249 (27%) | 233 (20%) | 218 (12%) | 214 (10%) | 225 (15%) | 202 (4%) | 251 (29%) | 234 (20%) |
| C | May | 25 | 37 (47%) | 35 (39%) | 33 (31%) | 33 (32%) | 34 (34%) | 30 (20%) | 37 (47%) | 35 (41%) |
| C | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Dec | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |

Table I.2 11. Loss of juvenile LAD spring-run Chinook salmon at CVP Jones Pumping Plant for Exploratory runs 1 and 3 (EXP1, EXP3), the "No Action Alternative", 4 components of Alternative 2 (ALT2), and Action 5 averaged by water year type and month, based on the salvage-density method. Absolute values are rounded.

| Water Year Type | Month | EXP1 | EXP3 | NAA | Alt2 wTUCPwoVA | Alt2 woTUCPwoVA | Alt2 woTUCPDeltaVA | Alt2 woTUCPAllVA | Action 5 |
|---|---|---|---|---|---|---|---|---|---|
| Wet | Jan | 0 | 0 | 3 | 3 | 3 | 3 | 3 | 3 |
| Wet | Feb | 0 | 0 | 13 | 14 | 14 | 14 | 14 | 14 |
| Wet | Mar | 0 | 0 | 173 | 186 | 183 | 175 | 176 | 181 |
| Wet | Apr | 0 | 0 | 1,853 | 2035 | 2050 | 1675 | 1653 | 1,609 |
| Wet | May | 0 | 0 | 6,092 | 6189 | 6185 | 6182 | 6182 | 6,185 |
| Wet | Jun | 0 | 0 | 398 | 375 | 376 | 373 | 374 | 380 |
| Wet | Jul | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wet | Aug | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wet | Sep | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wet | Oct | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wet | Nov | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wet | Dec | 0 | 0 | 9 | 9 | 9 | 9 | 9 | 9 |
| AN | Jan | 0 | 0 | 3 | 3 | 3 | 3 | 3 | 3 |
| AN | Feb | 0 | 0 | 14 | 15 | 15 | 15 | 15 | 15 |
| AN | Mar | 0 | 0 | 183 | 197 | 197 | 144 | 144 | 159 |
| AN | Apr | 0 | 0 | 1,845 | 1842 | 1842 | 1227 | 1229 | 1,239 |
| AN | May | 0 | 0 | 4,899 | 5058 | 5056 | 4910 | 4879 | 4,950 |
| AN | Jun | 0 | 0 | 340 | 310 | 309 | 312 | 313 | 322 |
| AN | Jul | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| AN | Aug | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

| Water Year Type | Month | EXP1 | EXP3 | NAA | Alt2 wTUCPwoVA | Alt2 woTUCPwoVA | Alt2 woTUCPDeltaVA | Alt2 woTUCPAllVA | Action 5 |
|---|---|---|---|---|---|---|---|---|---|
| AN | Sep | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| AN | Oct | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| AN | Nov | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| AN | Dec | 0 | 0 | 7 | 8 | 8 | 8 | 8 | 8 |
| BN | Jan | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 2 |
| BN | Feb | 0 | 0 | 6 | 6 | 6 | 6 | 6 | 6 |
| BN | Mar | 0 | 0 | 646 | 650 | 678 | 430 | 416 | 459 |
| BN | Apr | 0 | 0 | 2,198 | 2314 | 2280 | 2067 | 2092 | 2,058 |
| BN | May | 0 | 0 | 1,182 | 1223 | 1158 | 1124 | 1093 | 1,131 |
| BN | Jun | 0 | 0 | 10 | 9 | 8 | 8 | 8 | 9 |
| BN | Jul | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| BN | Aug | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| BN | Sep | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| BN | Oct | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| BN | Nov | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| BN | Dec | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dry | Jan | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dry | Feb | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dry | Mar | 0 | 0 | 216 | 214 | 214 | 171 | 167 | 189 |
| Dry | Apr | 0 | 0 | 1,593 | 1580 | 1578 | 1373 | 1374 | 1,390 |
| Dry | May | 0 | 0 | 524 | 519 | 517 | 482 | 475 | 493 |
| Dry | Jun | 0 | 0 | 4 | 3 | 3 | 3 | 3 | 3 |
| Dry | Jul | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

| Water Year Type | Month | EXP1 | EXP3 | NAA | Alt2 wTUCPwoVA | Alt2 woTUCPwoVA | Alt2 woTUCPDeltaVA | Alt2 woTUCPAllVA | Action 5 |
|---|---|---|---|---|---|---|---|---|---|
| Dry | Aug | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dry | Sep | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dry | Oct | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dry | Nov | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dry | Dec | 0 | 0 | 22 | 23 | 22 | 21 | 21 | 20 |
| C | Jan | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| C | Feb | 0 | 0 | 3 | 3 | 3 | 3 | 3 | 3 |
| C | Mar | 0 | 0 | 139 | 127 | 117 | 110 | 109 | 138 |
| C | Apr | 0 | 0 | 126 | 135 | 162 | 161 | 160 | 134 |
| C | May | 0 | 0 | 34 | 36 | 36 | 36 | 36 | 36 |
| C | Jun | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| C | Jul | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| C | Aug | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| C | Sep | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| C | Oct | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| C | Nov | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| C | Dec | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

Table I.2-12. Loss juvenile LAD spring-run Chinook salmon at CVP Jones Pumping Plant for the No Action Alternative (NAA), Alternatives 1 3 and 4 (ALT1, ALT 3, ALT4), 4 components of Alternative 2 (ALT2), and Action 5, averaged by water year type and month, based on the salvage-density method. Percentage values in parentheses indicate the difference between NAA and each alternative. Absolute and percentage values are rounded.

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Wet | Jan | 3 | 3 (6%) | 3 (0%) | 3 (0%) | 3 (0%) | 3 (0%) | 3 (2%) | 3 (0%) | 3 (2%) |
| Wet | Feb | 13 | 14 (3%) | 14 (5%) | 14 (4%) | 14 (6%) | 14 (6%) | 14 (2%) | 14 (7%) | 14 (5%) |
| Wet | Mar | 173 | 175 (1%) | 186 (8%) | 183 (6%) | 175 (2%) | 176 (2%) | 110 (-36%) | 195 (13%) | 181 (5%) |
| Wet | Apr | 1,853 | 1,863 (1%) | 2,035 (10%) | 2,050 (11%) | 1,675 (-10%) | 1,653 (-11%) | 362 (-80%) | 2,073 (12%) | 1,609 (-13%) |
| Wet | May | 6,092 | 6,135 (1%) | 6,189 (2%) | 6,185 (2%) | 6,182 (1%) | 6,182 (1%) | 881 (-86%) | 6,210 (2%) | 6,185 (2%) |
| Wet | Jun | 398 | 397 (0%) | 375 (-6%) | 376 (-6%) | 373 (-6%) | 374 (-6%) | 214 (-46%) | 376 (-6%) | 380 (-5%) |
| Wet | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Dec | 9 | 9 (6%) | 9 (-2%) | 9 (-2%) | 9 (-2%) | 9 (-1%) | 6 (-35%) | 8 (-7%) | 9 (0%) |
| AN | Jan | 3 | 4 (15%) | 3 (-1%) | 3 (-1%) | 3 (-1%) | 3 (-1%) | 2 (-35%) | 3 (-2%) | 3 (2%) |
| AN | Feb | 14 | 15 (6%) | 15 (2%) | 15 (2%) | 15 (2%) | 15 (2%) | 14 (-1%) | 15 (5%) | 15 (5%) |
| AN | Mar | 183 | 202 (11%) | 197 (7%) | 197 (7%) | 144 (-21%) | 144 (-21%) | 134 (-27%) | 204 (12%) | 159 (-13%) |
| AN | Apr | 1,845 | 1,793 (-3%) | 1,842 (0%) | 1,842 (0%) | 1,227 (-33%) | 1,229 (-33%) | 282 (-85%) | 1,851 (0%) | 1,239 (-33%) |
| AN | May | 4,899 | 5,359 (9%) | 5,058 (3%) | 5,056 (3%) | 4,910 (0%) | 4,879 (0%) | 812 (-83%) | 5,075 (4%) | 4,950 (1%) |
| AN | Jun | 340 | 397 (17%) | 310 (-9%) | 309 (-9%) | 312 (-8%) | 313 (-8%) | 70 (-79%) | 310 (-9%) | 322 (-6%) |

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| AN | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Dec | 7 | 8 (19%) | 8 (8%) | 8 (9%) | 8 (10%) | 8 (10%) | 3 (-52%) | 7 (3%) | 8 (12%) |
| BN | Jan | 1 | 2 (20%) | 1 (-3%) | 1 (-3%) | 1 (-3%) | 1 (-3%) | 1 (-56%) | 1 (-3%) | 2 (3%) |
| BN | Feb | 6 | 6 (8%) | 6 (-4%) | 6 (-3%) | 6 (-3%) | 6 (-4%) | 4 (-41%) | 6 (2%) | 6 (2%) |
| BN | Mar | 646 | 764 (18%) | 650 (0%) | 678 (5%) | 430 (-33%) | 416 (-36%) | 439 (-32%) | 660 (2%) | 459 (-29%) |
| BN | Apr | 2,198 | 2,473 (13%) | 2,314 (5%) | 2,280 (4%) | 2,067 (-6%) | 2,092 (-5%) | 697 (-68%) | 2,331 (6%) | 2,058 (-6%) |
| BN | May | 1,182 | 1,285 (9%) | 1,223 (3%) | 1,158 (-2%) | 1,124 (-5%) | 1,093 (-8%) | 260 (-78%) | 1,235 (5%) | 1,131 (-4%) |
| BN | Jun | 10 | 11 (10%) | 9 (-11%) | 8 (-13%) | 8 (-14%) | 8 (-13%) | 1 (-85%) | 9 (-8%) | 9 (-9%) |
| BN | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Dec | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Jan | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Feb | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Mar | 216 | 238 (10%) | 214 (-1%) | 214 (-1%) | 171 (-21%) | 167 (-22%) | 125 (-42%) | 213 (-1%) | 189 (-12%) |
| Dry | Apr | 1593 | 1,742 (9%) | 1,580 (-1%) | 1,578 (-1%) | 1,373 (-14%) | 1,374 (-14%) | 322 (-80%) | 1,589 (0%) | 1,390 (-13%) |
| Dry | May | 524 | 574 (10%) | 519 (-1%) | 517 (-1%) | 482 (-8%) | 475 (-9%) | 89 (-83%) | 519 (-1%) | 493 (-6%) |

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Dry | Jun | 4 | 4 (3%) | 3 (-16%) | 3 (-16%) | 3 (-14%) | 3 (-13%) | 0 (-88%) | 3 (-13%) | 3 (-7%) |
| Dry | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Dec | 22 | 25 (14%) | 23 (5%) | 22 (1%) | 21 (0%) | 21 (-1%) | 10 (-55%) | 22 (0%) | 20 (-5%) |
| C | Jan | 0 | 1 (22%) | 0 (-11%) | 0 (-3%) | 0 (1%) | 0 (0%) | 0 (-46%) | 0 (-2%) | 0 (0%) |
| C | Feb | 3 | 4 (14%) | 3 (-2%) | 3 (1%) | 3 (-1%) | 3 (-1%) | 2 (-55%) | 4 (7%) | 3 (-4%) |
| C | Mar | 139 | 119 (-14%) | 127 (-8%) | 117 (-16%) | 110 (-21%) | 109 (-21%) | 43 (-69%) | 135 (-3%) | 138 (0%) |
| C | Apr | 126 | 158 (26%) | 135 (8%) | 162 (28%) | 161 (28%) | 160 (27%) | 33 (-74%) | 133 (6%) | 134 (7%) |
| C | May | 34 | 36 (4%) | 36 (4%) | 36 (6%) | 36 (6%) | 36 (6%) | 7 (-79%) | 34 (-1%) | 36 (4%) |
| C | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Dec | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |

Table I.2-13. Loss of juvenile steelhead at SWP Banks Pumping Plant for Exploratory runs 1 and 3 (EXP1, EXP3), the "No Action Alternative", 4 components of Alternative 2 (Alt2), and Action 5 averaged by water year type and month, based on the salvage-density method. Absolute values are rounded.

| Water Year Type | Month | EXP1 | EXP3 | NAA | Alt2 wTUCPwoVA | Alt2 woTUCPwoVA | Alt2 woTUCPDeltaVA | Alt2 woTUCPAllVA | Action 5 |
|---|---|---|---|---|---|---|---|---|---|
| Wet | Jan | 0 | 0 | 690 | 681 | 681 | 680 | 680 | 714 |
| Wet | Feb | 0 | 0 | 99 | 100 | 101 | 100 | 100 | 105 |
| Wet | Mar | 0 | 0 | 9 | 10 | 10 | 10 | 10 | 11 |
| Wet | Apr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wet | May | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wet | Jun | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wet | Jul | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wet | Aug | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wet | Sep | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wet | Oct | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wet | Nov | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wet | Dec | 0 | 0 | 711 | 697 | 698 | 698 | 700 | 732 |
| AN | Jan | 0 | 0 | 468 | 455 | 454 | 453 | 454 | 492 |
| AN | Feb | 0 | 0 | 67 | 70 | 69 | 69 | 68 | 79 |
| AN | Mar | 0 | 0 | 6 | 6 | 6 | 5 | 5 | 7 |
| AN | Apr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| AN | May | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| AN | Jun | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| AN | Jul | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| AN | Aug | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

| Water Year Type | Month | EXP1 | EXP3 | NAA | Alt2 wTUCPwoVA | Alt2 woTUCPwoVA | Alt2 woTUCPDeltaVA | Alt2 woTUCPAllVA | Action 5 |
|---|---|---|---|---|---|---|---|---|---|
| AN | Sep | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| AN | Oct | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| AN | Nov | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| AN | Dec | 0 | 0 | 660 | 642 | 636 | 623 | 623 | 639 |
| BN | Jan | 0 | 0 | 164 | 159 | 159 | 160 | 160 | 168 |
| BN | Feb | 0 | 0 | 115 | 114 | 112 | 111 | 111 | 129 |
| BN | Mar | 0 | 0 | 20 | 20 | 19 | 14 | 15 | 21 |
| BN | Apr | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 |
| BN | May | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| BN | Jun | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| BN | Jul | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| BN | Aug | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| BN | Sep | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| BN | Oct | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| BN | Nov | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| BN | Dec | 0 | 0 | 103 | 98 | 100 | 101 | 95 | 98 |
| Dry | Jan | 0 | 0 | 28 | 26 | 25 | 26 | 25 | 28 |
| Dry | Feb | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dry | Mar | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dry | Apr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dry | May | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dry | Jun | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dry | Jul | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

| Water Year Type | Month | EXP1 | EXP3 | NAA | Alt2 wTUCPwoVA | Alt2 woTUCPwoVA | Alt2 woTUCPDeltaVA | Alt2 woTUCPAllVA | Action 5 |
|---|---|---|---|---|---|---|---|---|---|
| Dry | Aug | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dry | Sep | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dry | Oct | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dry | Nov | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dry | Dec | 0 | 0 | 690 | 695 | 691 | 676 | 655 | 618 |
| C | Jan | 0 | 0 | 118 | 111 | 99 | 96 | 99 | 114 |
| C | Feb | 0 | 0 | 79 | 84 | 71 | 70 | 69 | 85 |
| C | Mar | 0 | 0 | 10 | 10 | 8 | 9 | 9 | 10 |
| C | Apr | 0 | 0 | 13 | 16 | 15 | 15 | 16 | 16 |
| C | May | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| C | Jun | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| C | Jul | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| C | Aug | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| C | Sep | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| C | Oct | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| C | Nov | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| C | Dec | 0 | 0 | 260 | 269 | 265 | 251 | 252 | 249 |

Table I.2-14. Loss of juvenile steelhead at SWP Banks Pumping Plant for the No Action Alternative (NAA), Alternative 1 (Alt1), 4 components of Alternative 2 (Alt2), Alternative 3 (Alt3), Alternative 4 (Alt4), and Action 5 averaged by water year type and month, based on the salvage-density method. Percentage values in parentheses indicate the difference between NAA and each alternative. Absolute and percentage values are rounded.

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Wet | Jan | 690 | 1,145 (66%) | 681 (-1%) | 681 (-1%) | 680 (-1%) | 680 (-1%) | 461 (-33%) | 645 (-7%) | 714 (4%) |
| Wet | Feb | 99 | 132 (33%) | 100 (2%) | 101 (2%) | 100 (2%) | 100 (2%) | 47 (-53%) | 103 (5%) | 105 (7%) |
| Wet | Mar | 9 | 12 (29%) | 10 (6%) | 10 (7%) | 10 (4%) | 10 (3%) | 4 (-58%) | 10 (12%) | 11 (16%) |
| Wet | Apr | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Dec | 711 | 1,182 (66%) | 697 (-2%) | 698 (-2%) | 698 (-2%) | 700 (-1%) | 376 (-47%) | 644 (-9%) | 732 (3%) |
| AN | Jan | 468 | 1,067 (128%) | 455 (-3%) | 454 (-3%) | 453 (-3%) | 454 (-3%) | 416 (-11%) | 430 (-8%) | 492 (5%) |
| AN | Feb | 67 | 117 (76%) | 70 (5%) | 69 (3%) | 69 (3%) | 68 (1%) | 56 (-15%) | 77 (16%) | 79 (18%) |
| AN | Mar | 6 | 11 (89%) | 6 (-4%) | 6 (-4%) | 5 (-18%) | 5 (-18%) | 5 (-18%) | 6 (-1%) | 7 (17%) |
| AN | Apr | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| AN | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Dec | 660 | 1,071 (62%) | 642 (-3%) | 636 (-4%) | 623 (-6%) | 623 (-6%) | 317 (-52%) | 563 (-15%) | 639 (-3%) |
| BN | Jan | 164 | 408 (149%) | 159 (-3%) | 159 (-3%) | 160 (-3%) | 160 (-3%) | 165 (1%) | 159 (-3%) | 168 (3%) |
| BN | Feb | 115 | 200 (73%) | 114 (-1%) | 112 (-3%) | 111 (-4%) | 111 (-4%) | 101 (-13%) | 129 (12%) | 129 (12%) |
| BN | Mar | 20 | 40 (98%) | 20 (-1%) | 19 (-6%) | 14 (-29%) | 15 (-27%) | 18 (-11%) | 20 (-2%) | 21 (6%) |
| BN | Apr | 1 | 1 (98%) | 1 (74%) | 1 (78%) | 1 (12%) | 1 (15%) | 1 (5%) | 1 (75%) | 1 (30%) |
| BN | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Dec | 103 | 138 (34%) | 98 (-5%) | 100 (-3%) | 101 (-2%) | 95 (-8%) | 56 (-45%) | 81 (-22%) | 98 (-5%) |
| Dry | Jan | 28 | 53 (88%) | 26 (-10%) | 25 (-10%) | 26 (-10%) | 25 (-13%) | 23 (-17%) | 29 (1%) | 28 (-2%) |
| Dry | Feb | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Mar | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Apr | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Dry | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Dec | 690 | 953 (38%) | 695 (1%) | 691 (0%) | 676 (-2%) | 655 (-5%) | 341 (-51%) | 595 (-14%) | 618 (-10%) |
| C | Jan | 118 | 201 (70%) | 111 (-6%) | 99 (-16%) | 96 (-18%) | 99 (-16%) | 121 (3%) | 113 (-4%) | 114 (-3%) |
| C | Feb | 79 | 120 (51%) | 84 (6%) | 71 (-11%) | 70 (-12%) | 69 (-13%) | 100 (26%) | 98 (24%) | 85 (7%) |
| C | Mar | 10 | 12 (14%) | 10 (-4%) | 8 (-21%) | 9 (-17%) | 9 (-15%) | 12 (13%) | 11 (1%) | 10 (-2%) |
| C | Apr | 13 | 17 (27%) | 16 (20%) | 15 (12%) | 15 (10%) | 16 (15%) | 14 (4%) | 17 (29%) | 16 (20%) |
| C | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Dec | 260 | 339 (30%) | 269 (3%) | 265 (2%) | 251 (-3%) | 252 (-3%) | 131 (-50%) | 237 (-9%) | 249 (-4%) |

Table I.2-15. Loss of juvenile steelhead at CVP Jones Pumping Plant for Exploratory runs 1 and 3 (EXP1, EXP3), the "No Action Alternative", 4 components of Alternative 2 (ALT2), and Action 5 averaged by water year type and month, based on the salvage-density method. Absolute values are rounded.

| Water Year Type | Month | EXP1 | EXP3 | NAA | Alt2 wTUCPwoVA | Alt2 woTUCPwoVA | Alt2 woTUCPDeltaVA | Alt2 woTUCPAllVA | Action 5 |
|---|---|---|---|---|---|---|---|---|---|
| Wet | Jan | 0 | 0 | 74 | 74 | 74 | 74 | 74 | 75 |
| Wet | Feb | 0 | 0 | 2 | 2 | 2 | 2 | 2 | 2 |
| Wet | Mar | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wet | Apr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wet | May | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wet | Jun | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wet | Jul | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wet | Aug | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wet | Sep | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wet | Oct | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 |
| Wet | Nov | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 |
| Wet | Dec | 0 | 0 | 212 | 209 | 209 | 209 | 210 | 212 |
| AN | Jan | 0 | 0 | 71 | 71 | 70 | 71 | 71 | 73 |
| AN | Feb | 0 | 0 | 2 | 2 | 2 | 2 | 2 | 2 |
| AN | Mar | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| AN | Apr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| AN | May | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| AN | Jun | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| AN | Jul | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

| Water Year Type | Month | EXP1 | EXP3 | NAA | Alt2 wTUCPwoVA | Alt2 woTUCPwoVA | Alt2 woTUCPDeltaVA | Alt2 woTUCPAllVA | Action 5 |
|---|---|---|---|---|---|---|---|---|---|
| AN | Aug | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| AN | Sep | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| AN | Oct | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 |
| AN | Nov | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 |
| AN | Dec | 0 | 0 | 170 | 184 | 185 | 186 | 187 | 190 |
| BN | Jan | 0 | 0 | 54 | 53 | 52 | 53 | 53 | 56 |
| BN | Feb | 0 | 0 | 9 | 8 | 8 | 8 | 8 | 9 |
| BN | Mar | 0 | 0 | 2 | 2 | 2 | 1 | 1 | 1 |
| BN | Apr | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 |
| BN | May | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| BN | Jun | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| BN | Jul | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| BN | Aug | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| BN | Sep | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| BN | Oct | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| BN | Nov | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| BN | Dec | 0 | 0 | 7 | 7 | 7 | 7 | 7 | 7 |
| Dry | Jan | 0 | 0 | 15 | 14 | 15 | 15 | 15 | 16 |
| Dry | Feb | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dry | Mar | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dry | Apr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dry | May | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dry | Jun | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

| Water Year Type | Month | EXP1 | EXP3 | NAA | Alt2 wTUCPwoVA | Alt2 woTUCPwoVA | Alt2 woTUCPDeltaVA | Alt2 woTUCPAllVA | Action 5 |
|---|---|---|---|---|---|---|---|---|---|
| Dry | Jul | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dry | Aug | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dry | Sep | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dry | Oct | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dry | Nov | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dry | Dec | 0 | 0 | 68 | 72 | 69 | 68 | 67 | 65 |
| C | Jan | 0 | 0 | 66 | 59 | 64 | 67 | 66 | 66 |
| C | Feb | 0 | 0 | 11 | 11 | 11 | 11 | 11 | 11 |
| C | Mar | 0 | 0 | 6 | 6 | 5 | 5 | 5 | 6 |
| C | Apr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| C | May | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| C | Jun | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| C | Jul | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| C | Aug | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| C | Sep | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| C | Oct | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| C | Nov | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| C | Dec | 0 | 0 | 32 | 34 | 35 | 37 | 37 | 35 |

Table I.2-16. Loss juvenile steelhead at CVP Jones Pumping Plant for the No Action Alternative (NAA), Alternatives 1 3 and 4 (ALT1, ALT 3, ALT4), 4 components of Alternative 2 (ALT2), and Action 5 averaged by water year type and month, based on the salvage-density method. Percentage values in parentheses indicate the difference between NAA and each alternative. Absolute and percentage values are rounded.

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Wet | Jan | 74 | 78 (6%) | 74 (0%) | 74 (0%) | 74 (0%) | 74 (0%) | 75 (2%) | 74 (0%) | 75 (2%) |
| Wet | Feb | 2 | 2 (3%) | 2 (5%) | 2 (4%) | 2 (6%) | 2 (6%) | 2 (2%) | 2 (7%) | 2 (5%) |
| Wet | Mar | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Apr | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Oct | 1 | 1 (8%) | 1 (-3%) | 1 (-4%) | 1 (-3%) | 1 (1%) | 1 (-10%) | 1 (1%) | 1 (10%) |
| Wet | Nov | 1 | 1 (-7%) | 1 (2%) | 1 (2%) | 1 (1%) | 1 (1%) | 1 (9%) | 1 (0%) | 1 (-2%) |
| Wet | Dec | 212 | 225 (6%) | 209 (-2%) | 209 (-2%) | 209 (-2%) | 210 (-1%) | 138 (-35%) | 197 (-7%) | 212 (0%) |
| AN | Jan | 71 | 82 (15%) | 71 (-1%) | 70 (-1%) | 71 (-1%) | 71 (-1%) | 46 (-35%) | 70 (-2%) | 73 (2%) |
| AN | Feb | 2 | 2 (6%) | 2 (2%) | 2 (2%) | 2 (2%) | 2 (2%) | 2 (-1%) | 2 (5%) | 2 (5%) |
| AN | Mar | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Apr | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| AN | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Oct | 1 | 1 (34%) | 1 (0%) | 1 (-1%) | 1 (-1%) | 1 (1%) | 0 (-24%) | 1 (0%) | 1 (32%) |
| AN | Nov | 1 | 1 (-8%) | 1 (-1%) | 1 (0%) | 1 (-1%) | 1 (0%) | 0 (-43%) | 1 (-1%) | 1 (-1%) |
| AN | Dec | 170 | 202 (19%) | 184 (8%) | 185 (9%) | 186 (10%) | 187 (10%) | 81 (-52%) | 176 (3%) | 190 (12%) |
| BN | Jan | 54 | 65 (20%) | 53 (-3%) | 52 (-3%) | 53 (-3%) | 53 (-3%) | 24 (-56%) | 53 (-3%) | 56 (3%) |
| BN | Feb | 9 | 9 (8%) | 8 (-4%) | 8 (-3%) | 8 (-3%) | 8 (-4%) | 5 (-41%) | 9 (2%) | 9 (2%) |
| BN | Mar | 2 | 2 (18%) | 2 (0%) | 2 (5%) | 1 (-33%) | 1 (-36%) | 1 (-32%) | 2 (2%) | 1 (-29%) |
| BN | Apr | 1 | 1 (13%) | 1 (5%) | 1 (4%) | 1 (-6%) | 1 (-5%) | 0 (-68%) | 1 (6%) | 1 (-6%) |
| BN | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Dec | 7 | 7 (-1%) | 7 (-2%) | 7 (0%) | 7 (-1%) | 7 (-4%) | 4 (-49%) | 6 (-7%) | 7 (-3%) |
| Dry | Jan | 15 | 17 (13%) | 14 (-5%) | 15 (-5%) | 15 (-4%) | 15 (-1%) | 4 (-72%) | 15 (-3%) | 16 (6%) |
| Dry | Feb | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Mar | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Apr | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Dry | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Dec | 68 | 78 (14%) | 72 (5%) | 69 (1%) | 68 (0%) | 67 (-1%) | 31 (-55%) | 68 (0%) | 65 (-5%) |
| C | Jan | 66 | 80 (22%) | 59 (-11%) | 64 (-3%) | 67 (1%) | 66 (0%) | 36 (-46%) | 65 (-2%) | 66 (0%) |
| C | Feb | 11 | 13 (14%) | 11 (-2%) | 11 (1%) | 11 (-1%) | 11 (-1%) | 5 (-55%) | 12 (7%) | 11 (-4%) |
| C | Mar | 6 | 5 (-14%) | 6 (-8%) | 5 (-16%) | 5 (-21%) | 5 (-21%) | 2 (-69%) | 6 (-3%) | 6 (0%) |
| C | Apr | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Dec | 32 | 40 (27%) | 34 (6%) | 35 (12%) | 37 (16%) | 37 (17%) | 18 (-43%) | 34 (8%) | 35 (10%) |

Table I.2-17. Loss of fall-run Chinook salmon at SWP Banks Pumping Plant for the No Action Alternative (NAA), Alternatives 1 3 and 4 (ALT1, ALT 3, ALT4), 4 components of Alternative 2 (ALT2), and Action 5, averaged by water year type and month, based on the salvage-density method. Absolute values are rounded.

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Wet | Jan | 1,273 | 2,112 (66%) | 1,257 (-1%) | 1,256 (-1%) | 1,254 (-1%) | 1,254 (-1%) | 851 (-33%) | 1,190 (-7%) | 1,318 (4%) |
| Wet | Feb | 3,056 | 4,076 (33%) | 3,109 (2%) | 3,113 (2%) | 3,102 (2%) | 3,106 (2%) | 1,445 (-53%) | 3,194 (5%) | 3,259 (7%) |
| Wet | Mar | 358 | 462 (29%) | 380 (6%) | 382 (7%) | 372 (4%) | 368 (3%) | 149 (-58%) | 401 (12%) | 413 (16%) |
| Wet | Apr | 476 | 561 (18%) | 553 (16%) | 553 (16%) | 507 (7%) | 507 (7%) | 167 (-65%) | 546 (15%) | 523 (10%) |
| Wet | May | 9,062 | 15,130 (67%) | 15,229 (68%) | 15,200 (68%) | 15,181 (68%) | 15,222 (68%) | 2,864 (-68%) | 14,888 (64%) | 14,915 (65%) |
| Wet | Jun | 6,833 | 8,823 (29%) | 7,088 (4%) | 7,074 (4%) | 7,127 (4%) | 7,114 (4%) | 6,978 (2%) | 6,925 (1%) | 7,168 (5%) |
| Wet | Jul | 11 | 11 (1%) | 11 (1%) | 11 (1%) | 11 (1%) | 11 (1%) | 3 (-69%) | 11 (1%) | 11 (1%) |
| Wet | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Dec | 65 | 108 (66%) | 64 (-2%) | 64 (-2%) | 64 (-2%) | 64 (-1%) | 34 (-47%) | 59 (-9%) | 67 (3%) |
| AN | Jan | 863 | 1,968 (128%) | 839 (-3%) | 838 (-3%) | 837 (-3%) | 837 (-3%) | 767 (-11%) | 794 (-8%) | 908 (5%) |
| AN | Feb | 2,065 | 3,629 (76%) | 2,164 (5%) | 2,122 (3%) | 2,127 (3%) | 2,090 (1%) | 1,747 (-15%) | 2,396 (16%) | 2,432 (18%) |
| AN | Mar | 232 | 438 (89%) | 222 (-4%) | 222 (-4%) | 189 (-18%) | 191 (-18%) | 189 (-18%) | 230 (-1%) | 271 (17%) |
| AN | Apr | 110 | 339 (208%) | 306 (178%) | 305 (177%) | 164 (49%) | 164 (49%) | 153 (39%) | 305 (177%) | 174 (58%) |
| AN | May | 3,455 | 8,598 (149%) | 7,732 (124%) | 7,729 (124%) | 6,763 (96%) | 6,664 (93%) | 2,445 (-29%) | 7,750 (124%) | 6,763 (96%) |
| AN | Jun | 4,915 | 7,326 (49%) | 4,627 (-6%) | 4,653 (-5%) | 4,534 (-8%) | 4,502 (-8%) | 4,136 (-16%) | 4,620 (-6%) | 4,593 (-7%) |
| AN | Jul | 11 | 12 (3%) | 12 (3%) | 12 (3%) | 11 (2%) | 11 (2%) | 3 (-73%) | 12 (3%) | 12 (3%) |

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| AN | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Dec | 60 | 98 (62%) | 59 (-3%) | 58 (-4%) | 57 (-6%) | 57 (-6%) | 29 (-52%) | 51 (-15%) | 58 (-3%) |
| BN | Jan | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Feb | 8 | 14 (73%) | 8 (-1%) | 8 (-3%) | 8 (-4%) | 8 (-4%) | 7 (-13%) | 9 (12%) | 9 (12%) |
| BN | Mar | 91 | 179 (98%) | 90 (-1%) | 85 (-6%) | 64 (-29%) | 66 (-27%) | 81 (-11%) | 88 (-2%) | 96 (6%) |
| BN | Apr | 927 | 1,835 (98%) | 1,612 (74%) | 1,648 (78%) | 1,034 (12%) | 1,070 (15%) | 974 (5%) | 1,618 (75%) | 1,201 (30%) |
| BN | May | 2,798 | 5,839 (109%) | 5,416 (94%) | 5,514 (97%) | 5,480 (96%) | 5,539 (98%) | 2,786 (0%) | 5,375 (92%) | 5,478 (96%) |
| BN | Jun | 368 | 487 (32%) | 345 (-6%) | 360 (-2%) | 360 (-2%) | 354 (-4%) | 265 (-28%) | 329 (-10%) | 339 (-8%) |
| BN | Jul | 4 | 4 (3%) | 4 (4%) | 4 (4%) | 4 (1%) | 4 (1%) | 1 (-66%) | 4 (2%) | 4 (9%) |
| BN | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Dec | 6 | 8 (34%) | 6 (-5%) | 6 (-3%) | 6 (-2%) | 6 (-8%) | 3 (-45%) | 5 (-22%) | 6 (-5%) |
| Dry | Jan | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Feb | 7 | 15 (97%) | 7 (-6%) | 7 (-6%) | 7 (-6%) | 7 (-6%) | 8 (13%) | 8 (12%) | 7 (-3%) |
| Dry | Mar | 84 | 151 (80%) | 80 (-4%) | 80 (-4%) | 66 (-21%) | 69 (-18%) | 107 (28%) | 84 (0%) | 82 (-2%) |
| Dry | Apr | 1,813 | 3,189 (76%) | 2,887 (59%) | 2,885 (59%) | 1,913 (6%) | 1,920 (6%) | 1,687 (-7%) | 2,898 (60%) | 1,858 (2%) |
| Dry | May | 1,666 | 3,647 (119%) | 3,120 (87%) | 3,134 (88%) | 2,719 (63%) | 2,624 (58%) | 1,979 (19%) | 3,132 (88%) | 2,727 (64%) |
| Dry | Jun | 24 | 25 (8%) | 22 (-6%) | 22 (-7%) | 21 (-12%) | 20 (-14%) | 10 (-56%) | 22 (-8%) | 23 (-3%) |

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Dry | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Dec | 324 | 447 (38%) | 326 (1%) | 325 (0%) | 317 (-2%) | 308 (-5%) | 160 (-51%) | 280 (-14%) | 290 (-10%) |
| C | Jan | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Feb | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Mar | 6 | 7 (14%) | 6 (-4%) | 5 (-21%) | 5 (-17%) | 5 (-15%) | 7 (13%) | 6 (1%) | 6 (-2%) |
| C | Apr | 216 | 275 (27%) | 258 (20%) | 241 (12%) | 237 (10%) | 249 (15%) | 224 (4%) | 278 (29%) | 259 (20%) |
| C | May | 243 | 357 (47%) | 336 (39%) | 318 (31%) | 320 (32%) | 325 (34%) | 291 (20%) | 357 (47%) | 342 (41%) |
| C | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Dec | 7 | 10 (30%) | 8 (3%) | 8 (2%) | 7 (-3%) | 7 (-3%) | 4 (-50%) | 7 (-9%) | 7 (-4%) |

Table I.2-18. Loss of fall-run Chinook salmon at CVP Jones Pumping Plant for the No Action Alternative (NAA), Alternative 1 (Alt1), 4 components of Alternative 2 (Alt2), Alternative 3 (Alt3), Alternative 4 (Alt4), and Action 5 averaged by water year type and month, based on the salvage-density method. Percentage values in parentheses indicate the difference between NAA and each alternative. Absolute and percentage values are rounded.

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Wet | Jan | 757 | 801 (6%) | 756 (0%) | 755 (0%) | 754 (0%) | 754 (0%) | 772 (2%) | 756 (0%) | 770 (2%) |
| Wet | Feb | 725 | 745 (3%) | 759 (5%) | 756 (4%) | 766 (6%) | 765 (6%) | 741 (2%) | 773 (7%) | 760 (5%) |
| Wet | Mar | 178 | 180 (1%) | 192 (8%) | 189 (6%) | 181 (2%) | 182 (2%) | 114 (-36%) | 201 (13%) | 187 (5%) |
| Wet | Apr | 83 | 83 (1%) | 91 (10%) | 92 (11%) | 75 (-10%) | 74 (-11%) | 16 (-80%) | 93 (12%) | 72 (-13%) |
| Wet | May | 4,893 | 4,927 (1%) | 4,970 (2%) | 4,967 (2%) | 4,965 (1%) | 4,965 (1%) | 707 (-86%) | 4,987 (2%) | 4,967 (2%) |
| Wet | Jun | 2,729 | 2,719 (0%) | 2,574 (-6%) | 2,578 (-6%) | 2,559 (-6%) | 2,565 (-6%) | 1,466 (-46%) | 2,578 (-6%) | 2,605 (-5%) |
| Wet | Jul | 28 | 26 (-9%) | 27 (-6%) | 27 (-5%) | 26 (-8%) | 26 (-7%) | 10 (-64%) | 27 (-5%) | 26 (-7%) |
| Wet | Aug | 2 | 2 (-5%) | 2 (-5%) | 2 (-5%) | 2 (-5%) | 2 (-5%) | 0 (-82%) | 2 (-5%) | 2 (2%) |
| Wet | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Nov | 1 | 1 (-7%) | 1 (2%) | 1 (2%) | 1 (1%) | 1 (1%) | 1 (9%) | 1 (0%) | 1 (-2%) |
| Wet | Dec | 16 | 17 (6%) | 16 (-2%) | 16 (-2%) | 16 (-2%) | 16 (-1%) | 10 (-35%) | 15 (-7%) | 16 (0%) |
| AN | Jan | 731 | 841 (15%) | 724 (-1%) | 723 (-1%) | 724 (-1%) | 723 (-1%) | 474 (-35%) | 714 (-2%) | 750 (2%) |
| AN | Feb | 795 | 842 (6%) | 809 (2%) | 807 (2%) | 807 (2%) | 807 (2%) | 784 (-1%) | 837 (5%) | 838 (5%) |
| AN | Mar | 189 | 209 (11%) | 203 (7%) | 203 (7%) | 148 (-21%) | 149 (-21%) | 138 (-27%) | 211 (12%) | 164 (-13%) |
| AN | Apr | 83 | 80 (-3%) | 82 (0%) | 82 (0%) | 55 (-33%) | 55 (-33%) | 13 (-85%) | 83 (0%) | 55 (-33%) |
| AN | May | 3,934 | 4,304 (9%) | 4,062 (3%) | 4,060 (3%) | 3,943 (0%) | 3,918 (0%) | 652 (-83%) | 4,076 (4%) | 3,975 (1%) |
| AN | Jun | 2,333 | 2,723 (17%) | 2,125 (-9%) | 2,116 (-9%) | 2,142 (-8%) | 2,148 (-8%) | 483 (-79%) | 2,126 (-9%) | 2,205 (-6%) |

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| AN | Jul | 27 | 29 (8%) | 28 (3%) | 28 (3%) | 27 (0%) | 27 (-1%) | 2 (-91%) | 28 (4%) | 27 (0%) |
| AN | Aug | 2 | 2 (-2%) | 2 (1%) | 2 (-1%) | 1 (-3%) | 1 (-4%) | 0 (-92%) | 2 (-1%) | 2 (8%) |
| AN | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Nov | 1 | 1 (-8%) | 1 (-1%) | 1 (0%) | 1 (-1%) | 1 (0%) | 0 (-43%) | 1 (-1%) | 1 (-1%) |
| AN | Dec | 13 | 15 (19%) | 14 (8%) | 14 (9%) | 14 (10%) | 14 (10%) | 6 (-52%) | 13 (3%) | 14 (12%) |
| BN | Jan | 7 | 9 (20%) | 7 (-3%) | 7 (-3%) | 7 (-3%) | 7 (-3%) | 3 (-56%) | 7 (-3%) | 8 (3%) |
| BN | Feb | 17 | 19 (8%) | 17 (-4%) | 17 (-3%) | 17 (-3%) | 17 (-4%) | 10 (-41%) | 18 (2%) | 18 (2%) |
| BN | Mar | 134 | 158 (18%) | 134 (0%) | 140 (5%) | 89 (-33%) | 86 (-36%) | 91 (-32%) | 136 (2%) | 95 (-29%) |
| BN | Apr | 960 | 1,080 (13%) | 1,011 (5%) | 996 (4%) | 903 (-6%) | 914 (-5%) | 305 (-68%) | 1,018 (6%) | 899 (-6%) |
| BN | May | 1,931 | 2,099 (9%) | 1,998 (3%) | 1,891 (-2%) | 1,835 (-5%) | 1,784 (-8%) | 424 (-78%) | 2,018 (5%) | 1,846 (-4%) |
| BN | Jun | 165 | 181 (10%) | 146 (-11%) | 143 (-13%) | 142 (-14%) | 144 (-13%) | 25 (-85%) | 152 (-8%) | 151 (-9%) |
| BN | Jul | 2 | 1 (-8%) | 1 (-5%) | 1 (-7%) | 1 (-8%) | 1 (-6%) | 0 (-91%) | 2 (1%) | 2 (-2%) |
| BN | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Dec | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Jan | 5 | 6 (13%) | 5 (-5%) | 5 (-5%) | 5 (-4%) | 5 (-1%) | 1 (-72%) | 5 (-3%) | 6 (6%) |
| Dry | Feb | 15 | 17 (15%) | 13 (-8%) | 13 (-8%) | 13 (-8%) | 14 (-4%) | 9 (-41%) | 15 (3%) | 15 (1%) |
| Dry | Mar | 30 | 33 (10%) | 30 (-1%) | 30 (-1%) | 24 (-21%) | 23 (-22%) | 17 (-42%) | 30 (-1%) | 26 (-12%) |
| Dry | Apr | 1,967 | 2,151 (9%) | 1,950 (-1%) | 1,948 (-1%) | 1,695 (-14%) | 1,696 (-14%) | 398 (-80%) | 1,961 (0%) | 1,716 (-13%) |
| Dry | May | 1,616 | 1,770 (10%) | 1,600 (-1%) | 1,594 (-1%) | 1,485 (-8%) | 1,466 (-9%) | 274 (-83%) | 1,601 (-1%) | 1,520 (-6%) |

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Dry | Jun | 43 | 44 (3%) | 36 (-16%) | 36 (-16%) | 37 (-14%) | 38 (-13%) | 5 (-88%) | 38 (-13%) | 40 (-7%) |
| Dry | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Dec | 20 | 23 (14%) | 21 (5%) | 20 (1%) | 20 (0%) | 20 (-1%) | 9 (-55%) | 20 (0%) | 19 (-5%) |
| C | Jan | 7 | 8 (22%) | 6 (-11%) | 6 (-3%) | 7 (1%) | 7 (0%) | 4 (-46%) | 7 (-2%) | 7 (0%) |
| C | Feb | 17 | 19 (14%) | 16 (-2%) | 17 (1%) | 16 (-1%) | 16 (-1%) | 7 (-55%) | 18 (7%) | 16 (-4%) |
| C | Mar | 9 | 7 (-14%) | 8 (-8%) | 7 (-16%) | 7 (-21%) | 7 (-21%) | 3 (-69%) | 8 (-3%) | 9 (0%) |
| C | Apr | 190 | 238 (26%) | 204 (8%) | 244 (28%) | 243 (28%) | 241 (27%) | 49 (-74%) | 200 (6%) | 202 (7%) |
| C | May | 223 | 233 (4%) | 233 (4%) | 236 (6%) | 236 (6%) | 236 (6%) | 46 (-79%) | 220 (-1%) | 232 (4%) |
| C | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Dec | 6 | 7 (27%) | 6 (6%) | 6 (12%) | 6 (16%) | 7 (17%) | 3 (-43%) | 6 (8%) | 6 (10%) |

Table I.2-19. Loss of late fall-run Chinook salmon at SWP Banks Pumping Plant for No Action Alternative (NAA), Alternatives 1 3 and 4 (ALT1, ALT 3, ALT4), 4 components of Alternative 2 (ALT2), and Action 5 averaged by water year type and month, based on the salvage-density method. Absolute values are rounded.

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Wet | Jan | 690 | 1,145 (66%) | 681 (-1%) | 681 (-1%) | 680 (-1%) | 680 (-1%) | 461 (-33%) | 645 (-7%) | 714 (4%) |
| Wet | Feb | 99 | 132 (33%) | 100 (2%) | 101 (2%) | 100 (2%) | 100 (2%) | 47 (-53%) | 103 (5%) | 105 (7%) |
| Wet | Mar | 9 | 12 (29%) | 10 (6%) | 10 (7%) | 10 (4%) | 10 (3%) | 4 (-58%) | 10 (12%) | 11 (16%) |
| Wet | Apr | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Dec | 711 | 1,182 (66%) | 697 (-2%) | 698 (-2%) | 698 (-2%) | 700 (-1%) | 376 (-47%) | 644 (-9%) | 732 (3%) |
| AN | Jan | 468 | 1,067 (128%) | 455 (-3%) | 454 (-3%) | 453 (-3%) | 454 (-3%) | 416 (-11%) | 430 (-8%) | 492 (5%) |
| AN | Feb | 67 | 117 (76%) | 70 (5%) | 69 (3%) | 69 (3%) | 68 (1%) | 56 (-15%) | 77 (16%) | 79 (18%) |
| AN | Mar | 6 | 11 (89%) | 6 (-4%) | 6 (-4%) | 5 (-18%) | 5 (-18%) | 5 (-18%) | 6 (-1%) | 7 (17%) |
| AN | Apr | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| AN | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Dec | 660 | 1,071 (62%) | 642 (-3%) | 636 (-4%) | 623 (-6%) | 623 (-6%) | 317 (-52%) | 563 (-15%) | 639 (-3%) |
| BN | Jan | 164 | 408 (149%) | 159 (-3%) | 159 (-3%) | 160 (-3%) | 160 (-3%) | 165 (1%) | 159 (-3%) | 168 (3%) |
| BN | Feb | 115 | 200 (73%) | 114 (-1%) | 112 (-3%) | 111 (-4%) | 111 (-4%) | 101 (-13%) | 129 (12%) | 129 (12%) |
| BN | Mar | 20 | 40 (98%) | 20 (-1%) | 19 (-6%) | 14 (-29%) | 15 (-27%) | 18 (-11%) | 20 (-2%) | 21 (6%) |
| BN | Apr | 1 | 1 (98%) | 1 (74%) | 1 (78%) | 1 (12%) | 1 (15%) | 1 (5%) | 1 (75%) | 1 (30%) |
| BN | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Dec | 103 | 138 (34%) | 98 (-5%) | 100 (-3%) | 101 (-2%) | 95 (-8%) | 56 (-45%) | 81 (-22%) | 98 (-5%) |
| Dry | Jan | 28 | 53 (88%) | 26 (-10%) | 25 (-10%) | 26 (-10%) | 25 (-13%) | 23 (-17%) | 29 (1%) | 28 (-2%) |
| Dry | Feb | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Mar | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Apr | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Dry | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Dec | 690 | 953 (38%) | 695 (1%) | 691 (0%) | 676 (-2%) | 655 (-5%) | 341 (-51%) | 595 (-14%) | 618 (-10%) |
| C | Jan | 118 | 201 (70%) | 111 (-6%) | 99 (-16%) | 96 (-18%) | 99 (-16%) | 121 (3%) | 113 (-4%) | 114 (-3%) |
| C | Feb | 79 | 120 (51%) | 84 (6%) | 71 (-11%) | 70 (-12%) | 69 (-13%) | 100 (26%) | 98 (24%) | 85 (7%) |
| C | Mar | 10 | 12 (14%) | 10 (-4%) | 8 (-21%) | 9 (-17%) | 9 (-15%) | 12 (13%) | 11 (1%) | 10 (-2%) |
| C | Apr | 13 | 17 (27%) | 16 (20%) | 15 (12%) | 15 (10%) | 16 (15%) | 14 (4%) | 17 (29%) | 16 (20%) |
| C | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Dec | 260 | 339 (30%) | 269 (3%) | 265 (2%) | 251 (-3%) | 252 (-3%) | 131 (-50%) | 237 (-9%) | 249 (-4%) |

Table I.2-20. Loss of late fall-run Chinook salmon at CVP Jones Pumping Plant for the No Action Alternative (NAA), Alternatives 1 3 and 4 (ALT1, ALT 3, ALT4), 4 components of Alternative 2 (ALT2), and Action 5 averaged by water year type and month, based on the salvage-density method. Percentage values in parentheses indicate the difference between NAA and each alternative. Absolute and percentage values are rounded.

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Wet | Jan | 74 | 78 (6%) | 74 (0%) | 74 (0%) | 74 (0%) | 74 (0%) | 75 (2%) | 74 (0%) | 75 (2%) |
| Wet | Feb | 2 | 2 (3%) | 2 (5%) | 2 (4%) | 2 (6%) | 2 (6%) | 2 (2%) | 2 (7%) | 2 (5%) |
| Wet | Mar | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Apr | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Oct | 1 | 1 (8%) | 1 (-3%) | 1 (-4%) | 1 (-3%) | 1 (1%) | 1 (-10%) | 1 (1%) | 1 (10%) |
| Wet | Nov | 1 | 1 (-7%) | 1 (2%) | 1 (2%) | 1 (1%) | 1 (1%) | 1 (9%) | 1 (0%) | 1 (-2%) |
| Wet | Dec | 212 | 225 (6%) | 209 (-2%) | 209 (-2%) | 209 (-2%) | 210 (-1%) | 138 (-35%) | 197 (-7%) | 212 (0%) |
| AN | Jan | 71 | 82 (15%) | 71 (-1%) | 70 (-1%) | 71 (-1%) | 71 (-1%) | 46 (-35%) | 70 (-2%) | 73 (2%) |
| AN | Feb | 2 | 2 (6%) | 2 (2%) | 2 (2%) | 2 (2%) | 2 (2%) | 2 (-1%) | 2 (5%) | 2 (5%) |
| AN | Mar | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Apr | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| AN | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Oct | 1 | 1 (34%) | 1 (0%) | 1 (-1%) | 1 (-1%) | 1 (1%) | 0 (-24%) | 1 (0%) | 1 (32%) |
| AN | Nov | 1 | 1 (-8%) | 1 (-1%) | 1 (0%) | 1 (-1%) | 1 (0%) | 0 (-43%) | 1 (-1%) | 1 (-1%) |
| AN | Dec | 170 | 202 (19%) | 184 (8%) | 185 (9%) | 186 (10%) | 187 (10%) | 81 (-52%) | 176 (3%) | 190 (12%) |
| BN | Jan | 54 | 65 (20%) | 53 (-3%) | 52 (-3%) | 53 (-3%) | 53 (-3%) | 24 (-56%) | 53 (-3%) | 56 (3%) |
| BN | Feb | 9 | 9 (8%) | 8 (-4%) | 8 (-3%) | 8 (-3%) | 8 (-4%) | 5 (-41%) | 9 (2%) | 9 (2%) |
| BN | Mar | 2 | 2 (18%) | 2 (0%) | 2 (5%) | 1 (-33%) | 1 (-36%) | 1 (-32%) | 2 (2%) | 1 (-29%) |
| BN | Apr | 1 | 1 (13%) | 1 (5%) | 1 (4%) | 1 (-6%) | 1 (-5%) | 0 (-68%) | 1 (6%) | 1 (-6%) |
| BN | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Dec | 7 | 7 (-1%) | 7 (-2%) | 7 (0%) | 7 (-1%) | 7 (-4%) | 4 (-49%) | 6 (-7%) | 7 (-3%) |
| Dry | Jan | 15 | 17 (13%) | 14 (-5%) | 15 (-5%) | 15 (-4%) | 15 (-1%) | 4 (-72%) | 15 (-3%) | 16 (6%) |
| Dry | Feb | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Mar | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Apr | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Dry | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Dec | 68 | 78 (14%) | 72 (5%) | 69 (1%) | 68 (0%) | 67 (-1%) | 31 (-55%) | 68 (0%) | 65 (-5%) |
| C | Jan | 66 | 80 (22%) | 59 (-11%) | 64 (-3%) | 67 (1%) | 66 (0%) | 36 (-46%) | 65 (-2%) | 66 (0%) |
| C | Feb | 11 | 13 (14%) | 11 (-2%) | 11 (1%) | 11 (-1%) | 11 (-1%) | 5 (-55%) | 12 (7%) | 11 (-4%) |
| C | Mar | 6 | 5 (-14%) | 6 (-8%) | 5 (-16%) | 5 (-21%) | 5 (-21%) | 2 (-69%) | 6 (-3%) | 6 (0%) |
| C | Apr | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Dec | 32 | 40 (27%) | 34 (6%) | 35 (12%) | 37 (16%) | 37 (17%) | 18 (-43%) | 34 (8%) | 35 (10%) |

Table I.2-21. Loss of green sturgeon at SWP Banks Pumping Plant for Exploratory runs 1 and 3 (EXP1, EXP3), the "No Action Alternative", 4 components of Alternative 2 (Alt2), and Action 5 averaged by water year type and month, based on the salvage-density method. Absolute values are rounded.

| Water Year Type | Month | EXP1 | EXP3 | NAA | Alt2 wTUCPwoVA | Alt2 woTUCPwoVA | Alt2 woTUCPDeltaVA | Alt2 woTUCPAllVA | Action 5 |
|---|---|---|---|---|---|---|---|---|---|
| Wet | Jan | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wet | Feb | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wet | Mar | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 |
| Wet | Apr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wet | May | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wet | Jun | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wet | Jul | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wet | Aug | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wet | Sep | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wet | Oct | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wet | Nov | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wet | Dec | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| AN | Jan | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| AN | Feb | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| AN | Mar | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 1 |
| AN | Apr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| AN | May | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| AN | Jun | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| AN | Jul | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

| Water Year Type | Month | EXP1 | EXP3 | NAA | Alt2 wTUCPwoVA | Alt2 woTUCPwoVA | Alt2 woTUCPDeltaVA | Alt2 woTUCPAllVA | Action 5 |
|---|---|---|---|---|---|---|---|---|---|
| AN | Aug | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| AN | Sep | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| AN | Oct | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| AN | Nov | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| AN | Dec | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| BN | Jan | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 |
| BN | Feb | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| BN | Mar | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| BN | Apr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| BN | May | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| BN | Jun | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| BN | Jul | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| BN | Aug | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| BN | Sep | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| BN | Oct | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| BN | Nov | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| BN | Dec | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dry | Jan | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dry | Feb | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dry | Mar | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dry | Apr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dry | May | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dry | Jun | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

| Water Year Type | Month | EXP1 | EXP3 | NAA | Alt2 wTUCPwoVA | Alt2 woTUCPwoVA | Alt2 woTUCPDeltaVA | Alt2 woTUCPAllVA | Action 5 |
|---|---|---|---|---|---|---|---|---|---|
| Dry | Jul | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dry | Aug | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dry | Sep | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dry | Oct | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dry | Nov | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dry | Dec | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| C | Jan | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| C | Feb | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| C | Mar | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| C | Apr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| C | May | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| C | Jun | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| C | Jul | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| C | Aug | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| C | Sep | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| C | Oct | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| C | Nov | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| C | Dec | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

Table I.2-22. Loss of green sturgeon at SWP Banks Pumping Plant for the No Action Alternative (NAA), Alternative 1 (Alt1), 4 components of Alternative 2 (Alt2), Alternative 3 (Alt3), Alternative 4 (Alt4), and Action 5 averaged by water year type and month, based on the salvage-density method. Percentage values in parentheses indicate the difference between NAA and each alternative. Absolute and percentage values are rounded.

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Wet | Jan | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Feb | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Mar | 1 | 1 (29%) | 1 (6%) | 1 (7%) | 1 (4%) | 1 (3%) | 0 (-58%) | 1 (12%) | 1 (16%) |
| Wet | Apr | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Dec | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Jan | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Feb | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Mar | 1 | 1 (89%) | 1 (-4%) | 1 (-4%) | 0 (-18%) | 0 (-18%) | 0 (-18%) | 1 (-1%) | 1 (17%) |
| AN | Apr | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| AN | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Dec | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Jan | 1 | 4 (149%) | 1 (-3%) | 1 (-3%) | 1 (-3%) | 1 (-3%) | 1 (1%) | 1 (-3%) | 1 (3%) |
| BN | Feb | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Mar | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Apr | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Dec | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Jan | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Feb | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Mar | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Apr | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Dry | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Dec | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Jan | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Feb | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Mar | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Apr | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Dec | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |

Table I.2-23. Loss of green sturgeon at CVP Jones Pumping Plant for Exploratory runs 1 and 3 (EXP1, EXP3), the "No Action Alternative", 4 components of Alternative 2 (ALT2), and Action 5 averaged by water year type and month, based on the salvage-density method. Absolute values are rounded.

| Water Year Type | Month | EXP1 | EXP3 | NAA | Alt2 wTUCPwoVA | Alt2 woTUCPwoVA | Alt2 woTUCPDeltaVA | Alt2 woTUCPAllVA | Action 5 |
|---|---|---|---|---|---|---|---|---|---|
| Wet | Jan | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wet | Feb | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wet | Mar | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wet | Apr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wet | May | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wet | Jun | 0 | 0 | 7 | 6 | 6 | 6 | 6 | 6 |
| Wet | Jul | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wet | Aug | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wet | Sep | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wet | Oct | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wet | Nov | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wet | Dec | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| AN | Jan | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| AN | Feb | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| AN | Mar | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| AN | Apr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| AN | May | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| AN | Jun | 0 | 0 | 6 | 5 | 5 | 5 | 5 | 5 |
| AN | Jul | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| AN | Aug | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

| Water Year Type | Month | EXP1 | EXP3 | NAA | Alt2 wTUCPwoVA | Alt2 woTUCPwoVA | Alt2 woTUCPDeltaVA | Alt2 woTUCPAllVA | Action 5 |
|---|---|---|---|---|---|---|---|---|---|
| AN | Sep | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| AN | Oct | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| AN | Nov | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| AN | Dec | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| BN | Jan | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| BN | Feb | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| BN | Mar | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| BN | Apr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| BN | May | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| BN | Jun | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| BN | Jul | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| BN | Aug | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| BN | Sep | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| BN | Oct | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| BN | Nov | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| BN | Dec | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dry | Jan | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dry | Feb | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dry | Mar | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dry | Apr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dry | May | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dry | Jun | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 |
| Dry | Jul | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 |

| Water Year Type | Month | EXP1 | EXP3 | NAA | Alt2 wTUCPwoVA | Alt2 woTUCPwoVA | Alt2 woTUCPDeltaVA | Alt2 woTUCPAllVA | Action 5 |
|---|---|---|---|---|---|---|---|---|---|
| Dry | Aug | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dry | Sep | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dry | Oct | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dry | Nov | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dry | Dec | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| C | Jan | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| C | Feb | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| C | Mar | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| C | Apr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| C | May | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| C | Jun | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| C | Jul | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| C | Aug | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| C | Sep | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| C | Oct | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| C | Nov | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| C | Dec | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

Table I.2-24. Loss of green sturgeon at CVP Jones Pumping Plant for the No Action Alternative (NAA), Alternatives 1 3 and 4 (ALT1, ALT 3, ALT4), 4 components of Alternative 2 (ALT2), and Action 5 averaged by water year type and month, based on the salvage-density method. Percentage values in parentheses indicate the difference between NAA and each alternative. Absolute and percentage values are rounded.

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Wet | Jan | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Feb | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Mar | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Apr | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Jun | 7 | 7 (0%) | 6 (-6%) | 6 (-6%) | 6 (-6%) | 6 (-6%) | 4 (-46%) | 6 (-6%) | 6 (-5%) |
| Wet | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Dec | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Jan | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Feb | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Mar | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Apr | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Jun | 6 | 7 (17%) | 5 (-9%) | 5 (-9%) | 5 (-8%) | 5 (-8%) | 1 (-79%) | 5 (-9%) | 5 (-6%) |

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| AN | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Dec | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Jan | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Feb | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Mar | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Apr | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Dec | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Jan | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Feb | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Mar | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Apr | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Dry | Jun | 1 | 1 (3%) | 1 (-16%) | 1 (-16%) | 1 (-14%) | 1 (-13%) | 0 (-88%) | 1 (-13%) | 1 (-7%) |
| Dry | Jul | 1 | 1 (-6%) | 1 (-11%) | 1 (-10%) | 1 (-8%) | 1 (-7%) | 0 (-90%) | 1 (-8%) | 1 (-2%) |
| Dry | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Dec | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Jan | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Feb | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Mar | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Apr | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Dec | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |

Table I.2-25. Loss of American shad at SWP Banks Pumping Plant for the No Action Alternative (NAA), Alternative 1 (Alt1), 4 components of Alternative 2 (Alt2), Alternative 3 (Alt3), Alternative 4 (Alt4), and Action 5 averaged by water year type and month, based on the salvage-density method. Percentage values in parentheses indicate the difference between NAA and each alternative. Absolute and percentage values are rounded.

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Wet | Jan | 25,347 | 42,061 (66%) | 25,024 (-1%) | 25,007 (-1%) | 24,976 (-1%) | 24,980 (-1%) | 16,948 (-33%) | 23,688 (-7%) | 26,248 (4%) |
| Wet | Feb | 12,615 | 16,823 (33%) | 12,834 (2%) | 12,850 (2%) | 12,805 (2%) | 12,819 (2%) | 5,964 (-53%) | 13,185 (5%) | 13,453 (7%) |
| Wet | Mar | 1,289 | 1,663 (29%) | 1,369 (6%) | 1,378 (7%) | 1,341 (4%) | 1,328 (3%) | 538 (-58%) | 1,445 (12%) | 1,489 (16%) |
| Wet | Apr | 292 | 344 (18%) | 339 (16%) | 339 (16%) | 311 (7%) | 311 (7%) | 102 (-65%) | 335 (15%) | 321 (10%) |
| Wet | May | 2,046 | 3,416 (67%) | 3,439 (68%) | 3,432 (68%) | 3,428 (68%) | 3,437 (68%) | 647 (-68%) | 3,362 (64%) | 3,368 (65%) |
| Wet | Jun | 13,154 | 16,985 (29%) | 13,644 (4%) | 13,618 (4%) | 13,720 (4%) | 13,695 (4%) | 13,433 (2%) | 13,332 (1%) | 13,799 (5%) |
| Wet | Jul | 137,148 | 137,966 (1%) | 138,799 (1%) | 138,821 (1%) | 138,929 (1%) | 138,844 (1%) | 42,115 (-69%) | 138,792 (1%) | 138,855 (1%) |
| Wet | Aug | 101,512 | 105,096 (4%) | 103,723 (2%) | 103,561 (2%) | 103,456 (2%) | 103,595 (2%) | 43,153 (-57%) | 103,469 (2%) | 105,489 (4%) |
| Wet | Sep | 12,138 | 18,127 (49%) | 12,403 (2%) | 12,410 (2%) | 12,690 (5%) | 12,582 (4%) | 10,116 (-17%) | 12,712 (5%) | 17,893 (47%) |
| Wet | Oct | 865 | 1,106 (28%) | 838 (-3%) | 830 (-4%) | 846 (-2%) | 873 (1%) | 769 (-11%) | 860 (-1%) | 1,068 (23%) |
| Wet | Nov | 10,447 | 10,259 (-2%) | 10,539 (1%) | 10,536 (1%) | 10,513 (1%) | 10,412 (0%) | 6,482 (-38%) | 10,478 (0%) | 10,510 (1%) |
| Wet | Dec | 20,577 | 34,207 (66%) | 20,193 (-2%) | 20,201 (-2%) | 20,193 (-2%) | 20,273 (-1%) | 10,896 (-47%) | 18,640 (-9%) | 21,192 (3%) |
| AN | Jan | 17,186 | 39,196 (128%) | 16,718 (-3%) | 16,695 (-3%) | 16,661 (-3%) | 16,672 (-3%) | 15,269 (-11%) | 15,807 (-8%) | 18,077 (5%) |
| AN | Feb | 8,525 | 14,978 (76%) | 8,930 (5%) | 8,760 (3%) | 8,778 (3%) | 8,625 (1%) | 7,211 (-15%) | 9,888 (16%) | 10,039 (18%) |
| AN | Mar | 836 | 1,577 (89%) | 801 (-4%) | 799 (-4%) | 683 (-18%) | 689 (-18%) | 681 (-18%) | 827 (-1%) | 976 (17%) |
| AN | Apr | 67 | 208 (208%) | 187 (178%) | 187 (177%) | 101 (49%) | 101 (49%) | 94 (39%) | 187 (177%) | 107 (58%) |
| AN | May | 780 | 1,941 (149%) | 1,746 (124%) | 1,745 (124%) | 1,527 (96%) | 1,505 (93%) | 552 (-29%) | 1,750 (124%) | 1,527 (96%) |
| AN | Jun | 9,461 | 14,104 (49%) | 8,907 (-6%) | 8,958 (-5%) | 8,729 (-8%) | 8,668 (-8%) | 7,962 (-16%) | 8,894 (-6%) | 8,842 (-7%) |

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| AN | Jul | 135,460 | 139,591 (3%) | 139,272 (3%) | 139,269 (3%) | 138,518 (2%) | 138,596 (2%) | 36,160 (-73%) | 139,238 (3%) | 139,431 (3%) |
| AN | Aug | 101,421 | 107,703 (6%) | 103,388 (2%) | 103,195 (2%) | 103,732 (2%) | 103,374 (2%) | 39,188 (-61%) | 102,985 (2%) | 105,930 (4%) |
| AN | Sep | 6,366 | 16,233 (155%) | 7,861 (23%) | 7,831 (23%) | 8,692 (37%) | 8,637 (36%) | 7,167 (13%) | 7,864 (24%) | 12,193 (92%) |
| AN | Oct | 569 | 1,031 (81%) | 545 (-4%) | 549 (-4%) | 547 (-4%) | 560 (-2%) | 614 (8%) | 547 (-4%) | 866 (52%) |
| AN | Nov | 8,033 | 7,447 (-7%) | 8,109 (1%) | 8,189 (2%) | 8,158 (2%) | 8,210 (2%) | 5,333 (-34%) | 8,093 (1%) | 6,037 (-25%) |
| AN | Dec | 19,120 | 31,016 (62%) | 18,590 (-3%) | 18,420 (-4%) | 18,040 (-6%) | 18,031 (-6%) | 9,167 (-52%) | 16,297 (-15%) | 18,491 (-3%) |
| BN | Jan | 6,889 | 17,172 (149%) | 6,674 (-3%) | 6,671 (-3%) | 6,714 (-3%) | 6,714 (-3%) | 6,931 (1%) | 6,697 (-3%) | 7,080 (3%) |
| BN | Feb | 3,124 | 5,403 (73%) | 3,085 (-1%) | 3,019 (-3%) | 3,006 (-4%) | 3,011 (-4%) | 2,731 (-13%) | 3,486 (12%) | 3,488 (12%) |
| BN | Mar | 439 | 867 (98%) | 434 (-1%) | 411 (-6%) | 310 (-29%) | 321 (-27%) | 391 (-11%) | 428 (-2%) | 463 (6%) |
| BN | Apr | 49 | 96 (98%) | 85 (74%) | 87 (78%) | 54 (12%) | 56 (15%) | 51 (5%) | 85 (75%) | 63 (30%) |
| BN | May | 2,187 | 4,563 (109%) | 4,232 (94%) | 4,308 (97%) | 4,282 (96%) | 4,328 (98%) | 2,177 (0%) | 4,200 (92%) | 4,281 (96%) |
| BN | Jun | 6,667 | 8,826 (32%) | 6,255 (-6%) | 6,533 (-2%) | 6,526 (-2%) | 6,428 (-4%) | 4,813 (-28%) | 5,974 (-10%) | 6,153 (-8%) |
| BN | Jul | 72,467 | 74,944 (3%) | 75,248 (4%) | 75,317 (4%) | 73,443 (1%) | 73,467 (1%) | 24,844 (-66%) | 74,127 (2%) | 78,876 (9%) |
| BN | Aug | 49,322 | 48,928 (-1%) | 52,801 (7%) | 48,000 (-3%) | 54,871 (11%) | 55,181 (12%) | 29,309 (-41%) | 53,318 (8%) | 61,112 (24%) |
| BN | Sep | 4,586 | 7,047 (54%) | 5,061 (10%) | 4,826 (5%) | 4,772 (4%) | 5,203 (13%) | 6,782 (48%) | 5,039 (10%) | 5,542 (21%) |
| BN | Oct | 26,883 | 42,520 (58%) | 26,494 (-1%) | 25,495 (-5%) | 25,818 (-4%) | 26,715 (-1%) | 29,136 (8%) | 27,871 (4%) | 39,469 (47%) |
| BN | Nov | 36,010 | 33,913 (-6%) | 35,882 (0%) | 35,634 (-1%) | 37,104 (3%) | 37,615 (4%) | 22,147 (-38%) | 35,779 (-1%) | 35,083 (-3%) |
| BN | Dec | 22,941 | 30,706 (34%) | 21,840 (-5%) | 22,162 (-3%) | 22,457 (-2%) | 21,197 (-8%) | 12,549 (-45%) | 17,916 (-22%) | 21,737 (-5%) |
| Dry | Jan | 9,225 | 17,301 (88%) | 8,309 (-10%) | 8,256 (-10%) | 8,315 (-10%) | 8,018 (-13%) | 7,613 (-17%) | 9,292 (1%) | 9,031 (-2%) |
| Dry | Feb | 1,934 | 3,811 (97%) | 1,821 (-6%) | 1,820 (-6%) | 1,817 (-6%) | 1,819 (-6%) | 2,191 (13%) | 2,176 (12%) | 1,881 (-3%) |
| Dry | Mar | 366 | 657 (80%) | 349 (-4%) | 349 (-4%) | 288 (-21%) | 299 (-18%) | 468 (28%) | 366 (0%) | 356 (-2%) |
| Dry | Apr | 274 | 483 (76%) | 437 (59%) | 437 (59%) | 290 (6%) | 291 (6%) | 255 (-7%) | 439 (60%) | 281 (2%) |
| Dry | May | 113 | 248 (119%) | 212 (87%) | 213 (88%) | 185 (63%) | 178 (58%) | 135 (19%) | 213 (88%) | 185 (64%) |

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Dry | Jun | 344 | 370 (8%) | 324 (-6%) | 322 (-7%) | 301 (-12%) | 295 (-14%) | 150 (-56%) | 316 (-8%) | 334 (-3%) |
| Dry | Jul | 13,917 | 14,434 (4%) | 13,256 (-5%) | 12,924 (-7%) | 14,308 (3%) | 14,488 (4%) | 10,307 (-26%) | 13,564 (-3%) | 16,807 (21%) |
| Dry | Aug | 7,516 | 9,286 (24%) | 8,029 (7%) | 7,719 (3%) | 12,190 (62%) | 12,506 (66%) | 17,392 (131%) | 8,408 (12%) | 15,319 104%) |
| Dry | Sep | 1,905 | 1,851 (-3%) | 1,924 (1%) | 1,915 (0%) | 1,851 (-3%) | 1,865 (-2%) | 4,770 (150%) | 1,933 (1%) | 1,899 (0%) |
| Dry | Oct | 3,029 | 4,025 (33%) | 2,889 (-5%) | 2,889 (-5%) | 2,996 (-1%) | 3,109 (3%) | 3,399 (12%) | 2,902 (-4%) | 4,219 (39%) |
| Dry | Nov | 19,267 | 17,371 (-10%) | 19,164 (-1%) | 19,058 (-1%) | 20,524 (7%) | 20,461 (6%) | 12,079 (-37%) | 19,335 (0%) | 17,279 -10%) |
| Dry | Dec | 35,730 | 49,377 (38%) | 36,010 (1%) | 35,811 (0%) | 35,010 (-2%) | 33,954 (-5%) | 17,648 (-51%) | 30,843 (-14%) | 32,042 -10%) |
| C | Jan | 3,491 | 5,949 (70%) | 3,274 (-6%) | 2,935 (-16%) | 2,853 (-18%) | 2,918 (-16%) | 3,588 (3%) | 3,355 (-4%) | 3,384 (-3%) |
| C | Feb | 1,570 | 2,379 (51%) | 1,664 (6%) | 1,402 (-11%) | 1,386 (-12%) | 1,374 (-13%) | 1,986 (26%) | 1,943 (24%) | 1,676 (7%) |
| C | Mar | 307 | 349 (14%) | 296 (-4%) | 244 (-21%) | 256 (-17%) | 261 (-15%) | 348 (13%) | 311 (1%) | 302 (-2%) |
| C | Apr | 68 | 87 (27%) | 82 (20%) | 76 (12%) | 75 (10%) | 79 (15%) | 71 (4%) | 88 (29%) | 82 (20%) |
| C | May | 108 | 159 (47%) | 150 (39%) | 142 (31%) | 143 (32%) | 145 (34%) | 130 (20%) | 159 (47%) | 153 (41%) |
| C | Jun | 6 | 9 (47%) | 6 (-5%) | 6 (5%) | 7 (21%) | 7 (13%) | 11 (87%) | 6 (-4%) | 7 (18%) |
| C | Jul | 78 | 93 (20%) | 70 (-10%) | 73 (-6%) | 209 (170%) | 215 (177%) | 263 (239%) | 74 (-4%) | 170 (119%) |
| C | Aug | 17 | 17 (0%) | 17 (0%) | 17 (0%) | 37 (118%) | 39 (131%) | 98 (473%) | 17 (0%) | 42 (147%) |
| C | Sep | 6 | 7 (19%) | 6 (11%) | 7 (23%) | 7 (35%) | 7 (35%) | 26 (372%) | 6 (8%) | 7 (19%) |
| C | Oct | 2,231 | 2,882 (29%) | 2,158 (-3%) | 2,001 (-10%) | 2,018 (-10%) | 2,158 (-3%) | 3,088 (38%) | 2,184 (-2%) | 2,503 (12%) |
| C | Nov | 6,277 | 6,195 (-1%) | 5,984 (-5%) | 5,956 (-5%) | 5,684 (-9%) | 5,440 (-13%) | 6,410 (2%) | 5,990 (-5%) | 6,264 (0%) |
| C | Dec | 4,739 | 6,182 (30%) | 4,904 (3%) | 4,845 (2%) | 4,583 (-3%) | 4,604 (-3%) | 2,389 (-50%) | 4,332 (-9%) | 4,540 (-4%) |

Table I.2-26. Loss of American shad at CVP Jones Pumping Plant for the No Action Alternative (NAA), Alternatives 1 3 and 4 (ALT1, ALT 3, ALT4), 4 components of Alternative 2 (ALT2), and Action 5 averaged by water year type and month, based on the salvage-density method. Percentage values in parentheses indicate the difference between NAA and each alternative. Absolute and percentage values are rounded.

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Wet | Jan | 15,482 | 16,380 (6%) | 15,450 (0%) | 15,427 (0%) | 15,418 (0%) | 15,422 (0%) | 15,772 (2%) | 15,451 (0%) | 15,747 (2%) |
| Wet | Feb | 2,632 | 2,706 (3%) | 2,758 (5%) | 2,745 (4%) | 2,783 (6%) | 2,778 (6%) | 2,692 (2%) | 2,809 (7%) | 2,759 (5%) |
| Wet | Mar | 237 | 240 (1%) | 255 (8%) | 252 (6%) | 241 (2%) | 242 (2%) | 152 (-36%) | 267 (13%) | 249 (5%) |
| Wet | Apr | 22 | 22 (1%) | 25 (10%) | 25 (11%) | 20 (-10%) | 20 (-11%) | 4 (-80%) | 25 (12%) | 19 (-13%) |
| Wet | May | 19 | 19 (1%) | 19 (2%) | 19 (2%) | 19 (1%) | 19 (1%) | 3 (-86%) | 19 (2%) | 19 (2%) |
| Wet | Jun | 1,699 | 1,693 (0%) | 1,603 (-6%) | 1,605 (-6%) | 1,594 (-6%) | 1,597 (-6%) | 913 (-46%) | 1,605 (-6%) | 1,622 (-5%) |
| Wet | Jul | 52,033 | 47,594 (-9%) | 49,101 (-6%) | 49,180 (-5%) | 48,107 (-8%) | 48,165 (-7%) | 18,877 (-64%) | 49,296 (-5%) | 48,337 (-7%) |
| Wet | Aug | 114,331 | 108,524 (-5%) | 108,923 (-5%) | 109,113 (-5%) | 109,174 (-5%) | 108,955 (-5%) | 20,192 (-82%) | 109,052 (-5%) | 116,943 (2%) |
| Wet | Sep | 10,395 | 11,196 (8%) | 10,267 (-1%) | 10,263 (-1%) | 10,249 (-1%) | 10,246 (-1%) | 4,619 (-56%) | 10,257 (-1%) | 11,295 (9%) |
| Wet | Oct | 2,306 | 2,486 (8%) | 2,229 (-3%) | 2,218 (-4%) | 2,248 (-3%) | 2,325 (1%) | 2,067 (-10%) | 2,319 (1%) | 2,535 (10%) |
| Wet | Nov | 9,145 | 8,545 (-7%) | 9,298 (2%) | 9,294 (2%) | 9,219 (1%) | 9,194 (1%) | 9,928 (9%) | 9,138 (0%) | 8,946 (-2%) |
| Wet | Dec | 22,342 | 23,716 (6%) | 21,957 (-2%) | 21,994 (-2%) | 22,004 (-2%) | 22,153 (-1%) | 14,525 (-35%) | 20,731 (-7%) | 22,280 (0%) |
| AN | Jan | 14,954 | 17,198 (15%) | 14,802 (-1%) | 14,771 (-1%) | 14,798 (-1%) | 14,788 (-1%) | 9,696 (-35%) | 14,606 (-2%) | 15,324 (2%) |
| AN | Feb | 2,887 | 3,060 (6%) | 2,937 (2%) | 2,932 (2%) | 2,932 (2%) | 2,932 (2%) | 2,848 (-1%) | 3,041 (5%) | 3,045 (5%) |
| AN | Mar | 252 | 278 (11%) | 270 (7%) | 270 (7%) | 198 (-21%) | 198 (-21%) | 184 (-27%) | 281 (12%) | 218 (-13%) |
| AN | Apr | 22 | 22 (-3%) | 22 (0%) | 22 (0%) | 15 (-33%) | 15 (-33%) | 3 (-85%) | 22 (0%) | 15 (-33%) |
| AN | May | 15 | 16 (9%) | 15 (3%) | 15 (3%) | 15 (0%) | 15 (0%) | 2 (-83%) | 16 (4%) | 15 (1%) |
| AN | Jun | 1,453 | 1,696 (17%) | 1,323 (-9%) | 1,317 (-9%) | 1,334 (-8%) | 1,337 (-8%) | 301 (-79%) | 1,324 (-9%) | 1,373 (-6%) |

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| AN | Jul | 49,790 | 53,629 (8%) | 51,445 (3%) | 51,494 (3%) | 49,650 (0%) | 49,222 (-1%) | 4,337 (-91%) | 51,682 (4%) | 49,709 (0%) |
| AN | Aug | 108,874 | 106,798 (-2%) | 109,908 (1%) | 108,203 (-1%) | 105,244 (-3%) | 104,364 (-4%) | 9,119 (-92%) | 108,081 (-1%) | 117,946 (8%) |
| AN | Sep | 8,697 | 10,704 (23%) | 8,601 (-1%) | 8,596 (-1%) | 8,567 (-1%) | 8,708 (0%) | 3,473 (-60%) | 8,622 (-1%) | 11,072 (27%) |
| AN | Oct | 1,773 | 2,382 (34%) | 1,768 (0%) | 1,748 (-1%) | 1,758 (-1%) | 1,783 (1%) | 1,352 (-24%) | 1,779 (0%) | 2,340 (32%) |
| AN | Nov | 9,034 | 8,302 (-8%) | 8,976 (-1%) | 8,998 (0%) | 8,981 (-1%) | 9,008 (0%) | 5,153 (-43%) | 8,939 (-1%) | 8,964 (-1%) |
| AN | Dec | 17,864 | 21,265 (19%) | 19,358 (8%) | 19,485 (9%) | 19,618 (10%) | 19,677 (10%) | 8,540 (-52%) | 18,478 (3%) | 20,013 (12%) |
| BN | Jan | 3,520 | 4,225 (20%) | 3,412 (-3%) | 3,411 (-3%) | 3,420 (-3%) | 3,418 (-3%) | 1,545 (-56%) | 3,426 (-3%) | 3,612 (3%) |
| BN | Feb | 3,882 | 4,204 (8%) | 3,729 (-4%) | 3,757 (-3%) | 3,747 (-3%) | 3,745 (-4%) | 2,272 (-41%) | 3,949 (2%) | 3,946 (2%) |
| BN | Mar | 287 | 339 (18%) | 289 (0%) | 301 (5%) | 191 (-33%) | 185 (-36%) | 195 (-32%) | 293 (2%) | 204 (-29%) |
| BN | Apr | 196 | 221 (13%) | 207 (5%) | 204 (4%) | 185 (-6%) | 187 (-5%) | 62 (-68%) | 208 (6%) | 184 (-6%) |
| BN | May | 59 | 64 (9%) | 61 (3%) | 58 (-2%) | 56 (-5%) | 55 (-8%) | 13 (-78%) | 62 (5%) | 57 (-4%) |
| BN | Jun | 1,482 | 1,631 (10%) | 1,316 (-11%) | 1,289 (-13%) | 1,282 (-14%) | 1,293 (-13%) | 227 (-85%) | 1,370 (-8%) | 1,356 (-9%) |
| BN | Jul | 16,209 | 14,898 (-8%) | 15,349 (-5%) | 15,103 (-7%) | 14,961 (-8%) | 15,313 (-6%) | 1,428 (-91%) | 16,344 (1%) | 15,860 (-2%) |
| BN | Aug | 13,491 | 10,994 (-19%) | 13,205 (-2%) | 12,943 (-4%) | 12,669 (-6%) | 12,582 (-7%) | 1,303 (-90%) | 13,241 (-2%) | 13,617 (1%) |
| BN | Sep | 2,184 | 2,028 (-7%) | 2,221 (2%) | 2,207 (1%) | 2,200 (1%) | 2,224 (2%) | 1,082 (-50%) | 2,225 (2%) | 2,221 (2%) |
| BN | Oct | 5,143 | 5,792 (13%) | 5,080 (-1%) | 4,933 (-4%) | 5,011 (-3%) | 5,048 (-2%) | 2,742 (-47%) | 5,161 (0%) | 5,750 (12%) |
| BN | Nov | 15,918 | 15,406 (-3%) | 16,372 (3%) | 16,085 (1%) | 16,063 (1%) | 16,301 (2%) | 10,726 (-33%) | 16,438 (3%) | 16,049 (1%) |
| BN | Dec | 8,543 | 8,493 (-1%) | 8,354 (-2%) | 8,507 (0%) | 8,432 (-1%) | 8,187 (-4%) | 4,367 (-49%) | 7,904 (-7%) | 8,272 (-3%) |
| Dry | Jan | 8,104 | 9,186 (13%) | 7,695 (-5%) | 7,738 (-5%) | 7,754 (-4%) | 7,993 (-1%) | 2,275 (-72%) | 7,868 (-3%) | 8,575 (6%) |
| Dry | Feb | 1,434 | 1,644 (15%) | 1,326 (-8%) | 1,326 (-8%) | 1,323 (-8%) | 1,370 (-4%) | 845 (-41%) | 1,478 (3%) | 1,447 (1%) |
| Dry | Mar | 326 | 359 (10%) | 323 (-1%) | 323 (-1%) | 258 (-21%) | 252 (-22%) | 189 (-42%) | 322 (-1%) | 286 (-12%) |
| Dry | Apr | 75 | 82 (9%) | 75 (-1%) | 75 (-1%) | 65 (-14%) | 65 (-14%) | 15 (-80%) | 75 (0%) | 66 (-13%) |
| Dry | May | 12 | 14 (10%) | 12 (-1%) | 12 (-1%) | 11 (-8%) | 11 (-9%) | 2 (-83%) | 12 (-1%) | 12 (-6%) |

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Dry | Jun | 1,196 | 1,226 (3%) | 1,001 (-16%) | 1,006 (-16%) | 1,024 (-14%) | 1,038 (-13%) | 139 (-88%) | 1,036 (-13%) | 1,115 (-7%) |
| Dry | Jul | 28,168 | 26,534 (-6%) | 25,021 (-11%) | 25,383 (-10%) | 25,944 (-8%) | 26,328 (-7%) | 2,887 (-90%) | 25,933 (-8%) | 27,699 (-2%) |
| Dry | Aug | 14,791 | 13,752 (-7%) | 13,445 (-9%) | 13,530 (-9%) | 13,615 (-8%) | 13,904 (-6%) | 1,943 (-87%) | 13,916 (-6%) | 14,876 (1%) |
| Dry | Sep | 2,983 | 2,585 (-13%) | 2,955 (-1%) | 2,960 (-1%) | 2,921 (-2%) | 2,921 (-2%) | 1,164 (-61%) | 2,966 (-1%) | 3,050 (2%) |
| Dry | Oct | 759 | 867 (14%) | 755 (-1%) | 755 (-1%) | 744 (-2%) | 746 (-2%) | 372 (-51%) | 747 (-2%) | 848 (12%) |
| Dry | Nov | 7,335 | 6,756 (-8%) | 7,426 (1%) | 7,424 (1%) | 7,308 (0%) | 7,491 (2%) | 4,750 (-35%) | 7,414 (1%) | 7,052 (-4%) |
| Dry | Dec | 17,094 | 19,499 (14%) | 17,871 (5%) | 17,273 (1%) | 17,023 (0%) | 16,838 (-1%) | 7,702 (-55%) | 17,091 (0%) | 16,183 (-5%) |
| C | Jan | 2,166 | 2,643 (22%) | 1,928 (-11%) | 2,091 (-3%) | 2,194 (1%) | 2,168 (0%) | 1,179 (-46%) | 2,126 (-2%) | 2,176 (0%) |
| C | Feb | 115 | 132 (14%) | 113 (-2%) | 116 (1%) | 115 (-1%) | 115 (-1%) | 52 (-55%) | 123 (7%) | 111 (-4%) |
| C | Mar | 5 | 5 (-14%) | 5 (-8%) | 5 (-16%) | 4 (-21%) | 4 (-21%) | 2 (-69%) | 5 (-3%) | 5 (0%) |
| C | Apr | 1 | 2 (26%) | 2 (8%) | 2 (28%) | 2 (28%) | 2 (27%) | 0 (-74%) | 2 (6%) | 2 (7%) |
| C | May | 19 | 19 (4%) | 19 (4%) | 20 (6%) | 20 (6%) | 20 (6%) | 4 (-79%) | 18 (-1%) | 19 (4%) |
| C | Jun | 113 | 116 (3%) | 104 (-8%) | 107 (-5%) | 102 (-10%) | 100 (-12%) | 24 (-79%) | 96 (-15%) | 96 (-15%) |
| C | Jul | 20 | 28 (36%) | 18 (-10%) | 25 (22%) | 24 (16%) | 24 (16%) | 5 (-76%) | 19 (-5%) | 19 (-8%) |
| C | Aug | 191 | 179 (-6%) | 172 (-10%) | 174 (-9%) | 161 (-16%) | 159 (-17%) | 44 (-77%) | 171 (-10%) | 162 (-15%) |
| C | Sep | 487 | 521 (7%) | 512 (5%) | 583 (20%) | 569 (17%) | 567 (16%) | 105 (-78%) | 518 (6%) | 515 (6%) |
| C | Oct | 577 | 618 (7%) | 605 (5%) | 590 (2%) | 617 (7%) | 612 (6%) | 309 (-46%) | 615 (7%) | 650 (13%) |
| C | Nov | 1,466 | 1,458 (-1%) | 1,583 (8%) | 1,446 (-1%) | 1,426 (-3%) | 1,516 (3%) | 500 (-66%) | 1,581 (8%) | 1,779 (21%) |
| C | Dec | 723 | 921 (27%) | 770 (6%) | 812 (12%) | 837 (16%) | 846 (17%) | 409 (-43%) | 781 (8%) | 798 (10%) |

Table I.2-27. Loss of hardhead at SWP Banks Pumping Plant for the No Action Alternative (NAA), Alternative 1 (Alt1), 4 components of Alternative 2 (Alt2), Alternative 3 (Alt3), Alternative 4 (Alt4), and Action 5 averaged by water year type and month, based on the salvage-density method. Percentage values in parentheses indicate the difference between NAA and each alternative. Absolute and percentage values are rounded.

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Wet | Jan | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Feb | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Mar | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Apr | 1 | 1 (18%) | 1 (16%) | 1 (16%) | 1 (7%) | 1 (7%) | 0 (-65%) | 1 (15%) | 1 (10%) |
| Wet | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Dec | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Jan | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Feb | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Mar | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Apr | 0 | 1 (208%) | 1 (178%) | 1 (177%) | 0 (49%) | 0 (49%) | 0 (39%) | 1 (177%) | 0 (58%) |
| AN | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| AN | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Dec | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Jan | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Feb | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Mar | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Apr | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Dec | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Jan | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Feb | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Mar | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Apr | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Dry | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Dec | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Jan | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Feb | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Mar | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Apr | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Sep | 2 | 2 (19%) | 2 (11%) | 2 (23%) | 3 (35%) | 3 (35%) | 9 (372%) | 2 (8%) | 2 (19%) |
| C | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Dec | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |

Table I.2-28. Loss of hardhead at CVP Jones Pumping Plant for the No Action Alternative (NAA), Alternatives 1 3 and 4 (ALT1, ALT 3, ALT4), 4 components of Alternative 2 (ALT2), and Action 5 averaged by water year type and month, based on the salvage-density method. Percentage values in parentheses indicate the difference between NAA and each alternative. Absolute and percentage values are rounded.

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Wet | Jan | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Feb | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Mar | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Apr | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Dec | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Jan | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Feb | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Mar | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Apr | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| AN | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Dec | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Jan | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Feb | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Mar | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Apr | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Dec | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Jan | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Feb | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Mar | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Apr | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Dry | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Dec | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Jan | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Feb | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Mar | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Apr | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Dec | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |

Table I.2-29. Loss of Pacific Lamprey at SWP Banks Pumping Plant for the No Action Alternative (NAA), Alternative 1 (Alt1), 4 components of Alternative 2 (Alt2), Alternative 3 (Alt3), Alternative 4 (Alt4) and Action 5 averaged by water year type and month, based on the salvage-density method. Percentage values in parentheses indicate the difference between NAA and each alternative. Absolute and percentage values are rounded.

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Wet | Jan | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Feb | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Mar | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Apr | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Dec | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Jan | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Feb | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Mar | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Apr | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| AN | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Dec | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Jan | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Feb | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Mar | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Apr | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Dec | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Jan | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Feb | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Mar | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Apr | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Dry | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Dec | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Jan | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Feb | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Mar | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Apr | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Dec | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |

Table I.2-30. Loss of Pacific Lamprey at CVP Jones Pumping Plant for the No Action Alternative (NAA), Alternatives 1 3 and 4 (ALT1, ALT 3, ALT4), 4 components of Alternative 2 (ALT2), and Action 5 averaged by water year type and month, based on the salvage-density method. Percentage values in parentheses indicate the difference between NAA and each alternative. Absolute and percentage values are rounded.

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Wet | Jan | 19 | 20 (6%) | 19 (0%) | 19 (0%) | 19 (0%) | 19 (0%) | 19 (2%) | 19 (0%) | 19 (2%) |
| Wet | Feb | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Mar | 10 | 10 (1%) | 11 (8%) | 11 (6%) | 10 (2%) | 10 (2%) | 6 (-36%) | 11 (13%) | 10 (5%) |
| Wet | Apr | 4 | 4 (1%) | 4 (10%) | 4 (11%) | 3 (-10%) | 3 (-11%) | 1 (-80%) | 4 (12%) | 3 (-13%) |
| Wet | May | 13 | 13 (1%) | 13 (2%) | 13 (2%) | 13 (1%) | 13 (1%) | 2 (-86%) | 13 (2%) | 13 (2%) |
| Wet | Jun | 16 | 16 (0%) | 15 (-6%) | 15 (-6%) | 15 (-6%) | 15 (-6%) | 9 (-46%) | 15 (-6%) | 15 (-5%) |
| Wet | Jul | 10 | 9 (-9%) | 9 (-6%) | 9 (-5%) | 9 (-8%) | 9 (-7%) | 4 (-64%) | 9 (-5%) | 9 (-7%) |
| Wet | Aug | 3 | 2 (-5%) | 2 (-5%) | 2 (-5%) | 2 (-5%) | 2 (-5%) | 0 (-82%) | 2 (-5%) | 3 (2%) |
| Wet | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Dec | 3 | 3 (6%) | 3 (-2%) | 3 (-2%) | 3 (-2%) | 3 (-1%) | 2 (-35%) | 3 (-7%) | 3 (0%) |
| AN | Jan | 18 | 21 (15%) | 18 (-1%) | 18 (-1%) | 18 (-1%) | 18 (-1%) | 12 (-35%) | 18 (-2%) | 19 (2%) |
| AN | Feb | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Mar | 11 | 12 (11%) | 11 (7%) | 11 (7%) | 8 (-21%) | 8 (-21%) | 8 (-27%) | 12 (12%) | 9 (-13%) |
| AN | Apr | 4 | 4 (-3%) | 4 (0%) | 4 (0%) | 2 (-33%) | 2 (-33%) | 1 (-85%) | 4 (0%) | 2 (-33%) |
| AN | May | 10 | 11 (9%) | 11 (3%) | 11 (3%) | 10 (0%) | 10 (0%) | 2 (-83%) | 11 (4%) | 10 (1%) |
| AN | Jun | 14 | 16 (17%) | 13 (-9%) | 12 (-9%) | 13 (-8%) | 13 (-8%) | 3 (-79%) | 13 (-9%) | 13 (-6%) |

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| AN | Jul | 9 | 10 (8%) | 10 (3%) | 10 (3%) | 9 (0%) | 9 (-1%) | 1 (-91%) | 10 (4%) | 9 (0%) |
| AN | Aug | 2 | 2 (-2%) | 2 (1%) | 2 (-1%) | 2 (-3%) | 2 (-4%) | 0 (-92%) | 2 (-1%) | 3 (8%) |
| AN | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Dec | 2 | 3 (19%) | 3 (8%) | 3 (9%) | 3 (10%) | 3 (10%) | 1 (-52%) | 2 (3%) | 3 (12%) |
| BN | Jan | 341 | 410 (20%) | 331 (-3%) | 331 (-3%) | 332 (-3%) | 332 (-3%) | 150 (-56%) | 332 (-3%) | 350 (3%) |
| BN | Feb | 25 | 27 (8%) | 24 (-4%) | 24 (-3%) | 24 (-3%) | 24 (-4%) | 14 (-41%) | 25 (2%) | 25 (2%) |
| BN | Mar | 352 | 416 (18%) | 354 (0%) | 370 (5%) | 235 (-33%) | 227 (-36%) | 239 (-32%) | 360 (2%) | 250 (-29%) |
| BN | Apr | 11 | 12 (13%) | 11 (5%) | 11 (4%) | 10 (-6%) | 10 (-5%) | 3 (-68%) | 11 (6%) | 10 (-6%) |
| BN | May | 36 | 39 (9%) | 37 (3%) | 35 (-2%) | 34 (-5%) | 33 (-8%) | 8 (-78%) | 37 (5%) | 34 (-4%) |
| BN | Jun | 19 | 21 (10%) | 17 (-11%) | 16 (-13%) | 16 (-14%) | 16 (-13%) | 3 (-85%) | 17 (-8%) | 17 (-9%) |
| BN | Jul | 29 | 27 (-8%) | 27 (-5%) | 27 (-7%) | 27 (-8%) | 27 (-6%) | 3 (-91%) | 29 (1%) | 28 (-2%) |
| BN | Aug | 2 | 1 (-19%) | 2 (-2%) | 2 (-4%) | 2 (-6%) | 2 (-7%) | 0 (-90%) | 2 (-2%) | 2 (1%) |
| BN | Sep | 1 | 1 (-7%) | 1 (2%) | 1 (1%) | 1 (1%) | 1 (2%) | 1 (-50%) | 1 (2%) | 1 (2%) |
| BN | Oct | 4 | 4 (13%) | 4 (-1%) | 3 (-4%) | 3 (-3%) | 3 (-2%) | 2 (-47%) | 4 (0%) | 4 (12%) |
| BN | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Dec | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Jan | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Feb | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Mar | 56 | 62 (10%) | 56 (-1%) | 56 (-1%) | 45 (-21%) | 44 (-22%) | 33 (-42%) | 56 (-1%) | 49 (-12%) |
| Dry | Apr | 135 | 148 (9%) | 134 (-1%) | 134 (-1%) | 117 (-14%) | 117 (-14%) | 27 (-80%) | 135 (0%) | 118 (-13%) |
| Dry | May | 33 | 36 (10%) | 33 (-1%) | 33 (-1%) | 30 (-8%) | 30 (-9%) | 6 (-83%) | 33 (-1%) | 31 (-6%) |

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Dry | Jun | 20 | 20 (3%) | 16 (-16%) | 16 (-16%) | 17 (-14%) | 17 (-13%) | 2 (-88%) | 17 (-13%) | 18 (-7%) |
| Dry | Jul | 7 | 7 (-6%) | 7 (-11%) | 7 (-10%) | 7 (-8%) | 7 (-7%) | 1 (-90%) | 7 (-8%) | 7 (-2%) |
| Dry | Aug | 2 | 2 (-7%) | 2 (-9%) | 2 (-9%) | 2 (-8%) | 2 (-6%) | 0 (-87%) | 2 (-6%) | 2 (1%) |
| Dry | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Dec | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Jan | 2 | 3 (22%) | 2 (-11%) | 2 (-3%) | 2 (1%) | 2 (0%) | 1 (-46%) | 2 (-2%) | 2 (0%) |
| C | Feb | 4 | 4 (14%) | 4 (-2%) | 4 (1%) | 4 (-1%) | 4 (-1%) | 2 (-55%) | 4 (7%) | 4 (-4%) |
| C | Mar | 154 | 133 (-14%) | 142 (-8%) | 130 (-16%) | 122 (-21%) | 122 (-21%) | 48 (-69%) | 150 (-3%) | 154 (0%) |
| C | Apr | 366 | 460 (26%) | 394 (8%) | 470 (28%) | 469 (28%) | 465 (27%) | 96 (-74%) | 387 (6%) | 391 (7%) |
| C | May | 305 | 318 (4%) | 319 (4%) | 323 (6%) | 323 (6%) | 323 (6%) | 64 (-79%) | 301 (-1%) | 317 (4%) |
| C | Jun | 57 | 58 (3%) | 52 (-8%) | 54 (-5%) | 51 (-10%) | 50 (-12%) | 12 (-79%) | 48 (-15%) | 48 (-15%) |
| C | Jul | 18 | 25 (36%) | 17 (-10%) | 22 (22%) | 21 (16%) | 21 (16%) | 4 (-76%) | 18 (-5%) | 17 (-8%) |
| C | Aug | 6 | 6 (-6%) | 5 (-10%) | 5 (-9%) | 5 (-16%) | 5 (-17%) | 1 (-77%) | 5 (-10%) | 5 (-15%) |
| C | Sep | 1 | 1 (7%) | 1 (5%) | 1 (20%) | 1 (17%) | 1 (16%) | 0 (-78%) | 1 (6%) | 1 (6%) |
| C | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Dec | 12 | 16 (27%) | 13 (6%) | 14 (12%) | 14 (16%) | 14 (17%) | 7 (-43%) | 13 (8%) | 14 (10%) |

Table I.2-31. Loss of Pacific Lamprey at CVP Jones Pumping Plant for the No Action Alternative (NAA), Alternatives 1 3 and components of Alternative 2 (Alt2), Alternative 3 (Alt3), Alternative 4 (Alt4), and Action 5 averaged by water year type and month, based on the salvage-density method. Percentage values in parentheses indicate the difference between NAA and each alternative. Absolute and percentage values are rounded.

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Wet | Jan | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Feb | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Mar | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Apr | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Dec | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Jan | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Feb | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Mar | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Apr | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| AN | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Dec | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Jan | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Feb | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Mar | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Apr | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Dec | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Jan | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Feb | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Mar | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Apr | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Dry | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Dec | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Jan | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Feb | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Mar | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Apr | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Dec | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |

Table I.2-32. Loss of River Lamprey at CVP Jones Pumping Plant for the No Action Alternative (NAA), Alternatives 1 3 and 4 (ALT1, ALT 3, ALT4), 4 components of Alternative 2 (ALT2), and Action 5 averaged by water year type and month, based on the salvage-density method. Percentage values in parentheses indicate the difference between NAA and each alternative. Absolute and percentage values are rounded.

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Wet | Jan | 1 | 1 (6%) | 1 (0%) | 1 (0%) | 1 (0%) | 1 (0%) | 1 (2%) | 1 (0%) | 1 (2%) |
| Wet | Feb | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Mar | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Apr | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Dec | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Jan | 1 | 1 (15%) | 1 (-1%) | 1 (-1%) | 1 (-1%) | 1 (-1%) | 1 (-35%) | 1 (-2%) | 1 (2%) |
| AN | Feb | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Mar | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Apr | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| AN | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Dec | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Jan | 5 | 6 (20%) | 5 (-3%) | 5 (-3%) | 5 (-3%) | 5 (-3%) | 2 (-56%) | 5 (-3%) | 5 (3%) |
| BN | Feb | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Mar | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Apr | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Dec | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Jan | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Feb | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Mar | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Apr | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Dry | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Dec | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Jan | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Feb | 4 | 5 (14%) | 4 (-2%) | 4 (1%) | 4 (-1%) | 4 (-1%) | 2 (-55%) | 4 (7%) | 4 (-4%) |
| C | Mar | 3 | 2 (-14%) | 3 (-8%) | 2 (-16%) | 2 (-21%) | 2 (-21%) | 1 (-69%) | 3 (-3%) | 3 (0%) |
| C | Apr | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Dec | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |

Table I.2-33. Loss of Largemouth bass at SWP Banks Pumping Plant for the No Action Alternative (NAA), Alternative 1 (Alt1), 4 components of Alternative 2 (Alt2), Alternative 3 (Alt3), Alternative 4 (Alt4), and Action 5 averaged by water year type and month, based on the salvage-density method. Percentage values in parentheses indicate the difference between NAA and each alternative. Absolute and percentage values are rounded.

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Wet | Jan | 74 | 123 (66%) | 73 (-1%) | 73 (-1%) | 73 (-1%) | 73 (-1%) | 50 (-33%) | 69 (-7%) | 77 (4%) |
| Wet | Feb | 40 | 53 (33%) | 40 (2%) | 40 (2%) | 40 (2%) | 40 (2%) | 19 (-53%) | 41 (5%) | 42 (7%) |
| Wet | Mar | 23 | 29 (29%) | 24 (6%) | 24 (7%) | 24 (4%) | 24 (3%) | 10 (-58%) | 26 (12%) | 26 (16%) |
| Wet | Apr | 55 | 64 (18%) | 63 (16%) | 63 (16%) | 58 (7%) | 58 (7%) | 19 (-65%) | 63 (15%) | 60 (10%) |
| Wet | May | 82 | 136 (67%) | 137 (68%) | 137 (68%) | 137 (68%) | 137 (68%) | 26 (-68%) | 134 (64%) | 135 (65%) |
| Wet | Jun | 5,149 | 6,648 (29%) | 5,341 (4%) | 5,330 (4%) | 5,371 (4%) | 5,361 (4%) | 5,258 (2%) | 5,218 (1%) | 5,401 (5%) |
| Wet | Jul | 12,491 | 12,565 (1%) | 12,641 (1%) | 12,643 (1%) | 12,653 (1%) | 12,645 (1%) | 3,836 (-69%) | 12,641 (1%) | 12,646 (1%) |
| Wet | Aug | 1,933 | 2,001 (4%) | 1,975 (2%) | 1,972 (2%) | 1,970 (2%) | 1,973 (2%) | 822 (-57%) | 1,970 (2%) | 2,009 (4%) |
| Wet | Sep | 103 | 153 (49%) | 105 (2%) | 105 (2%) | 107 (5%) | 106 (4%) | 85 (-17%) | 107 (5%) | 151 (47%) |
| Wet | Oct | 51 | 65 (28%) | 50 (-3%) | 49 (-4%) | 50 (-2%) | 52 (1%) | 45 (-11%) | 51 (-1%) | 63 (23%) |
| Wet | Nov | 64 | 63 (-2%) | 65 (1%) | 65 (1%) | 65 (1%) | 64 (0%) | 40 (-38%) | 65 (0%) | 65 (1%) |
| Wet | Dec | 43 | 72 (66%) | 43 (-2%) | 43 (-2%) | 43 (-2%) | 43 (-1%) | 23 (-47%) | 39 (-9%) | 45 (3%) |
| AN | Jan | 50 | 114 (128%) | 49 (-3%) | 49 (-3%) | 49 (-3%) | 49 (-3%) | 45 (-11%) | 46 (-8%) | 53 (5%) |
| AN | Feb | 27 | 47 (76%) | 28 (5%) | 28 (3%) | 28 (3%) | 27 (1%) | 23 (-15%) | 31 (16%) | 32 (18%) |
| AN | Mar | 15 | 28 (89%) | 14 (-4%) | 14 (-4%) | 12 (-18%) | 12 (-18%) | 12 (-18%) | 15 (-1%) | 17 (17%) |
| AN | Apr | 13 | 39 (208%) | 35 (178%) | 35 (177%) | 19 (49%) | 19 (49%) | 18 (39%) | 35 (177%) | 20 (58%) |
| AN | May | 31 | 78 (149%) | 70 (124%) | 70 (124%) | 61 (96%) | 60 (93%) | 22 (-29%) | 70 (124%) | 61 (96%) |
| AN | Jun | 3703 | 5,521 (49%) | 3,487 (-6%) | 3,506 (-5%) | 3,417 (-8%) | 3,393 (-8%) | 3,117 (-16%) | 3,482 (-6%) | 3,461 (-7%) |

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| AN | Jul | 12337 | 12,713 (3%) | 12,684 (3%) | 12,684 (3%) | 12,616 (2%) | 12,623 (2%) | 3,293 (-73%) | 12,681 (3%) | 12,699 (3%) |
| AN | Aug | 1931 | 2,051 (6%) | 1,969 (2%) | 1,965 (2%) | 1,976 (2%) | 1,969 (2%) | 746 (-61%) | 1,961 (2%) | 2,017 (4%) |
| AN | Sep | 54 | 137 (155%) | 66 (23%) | 66 (23%) | 73 (37%) | 73 (36%) | 61 (13%) | 66 (24%) | 103 (92%) |
| AN | Oct | 34 | 61 (81%) | 32 (-4%) | 32 (-4%) | 32 (-4%) | 33 (-2%) | 36 (8%) | 32 (-4%) | 51 (52%) |
| AN | Nov | 50 | 46 (-7%) | 50 (1%) | 50 (2%) | 50 (2%) | 51 (2%) | 33 (-34%) | 50 (1%) | 37 (-25%) |
| AN | Dec | 40 | 65 (62%) | 39 (-3%) | 39 (-4%) | 38 (-6%) | 38 (-6%) | 19 (-52%) | 34 (-15%) | 39 (-3%) |
| BN | Jan | 40 | 101 (149%) | 39 (-3%) | 39 (-3%) | 39 (-3%) | 39 (-3%) | 41 (1%) | 39 (-3%) | 41 (3%) |
| BN | Feb | 8 | 14 (73%) | 8 (-1%) | 8 (-3%) | 8 (-4%) | 8 (-4%) | 7 (-13%) | 9 (12%) | 9 (12%) |
| BN | Mar | 10 | 20 (98%) | 10 (-1%) | 10 (-6%) | 7 (-29%) | 8 (-27%) | 9 (-11%) | 10 (-2%) | 11 (6%) |
| BN | Apr | 10 | 19 (98%) | 17 (74%) | 17 (78%) | 11 (12%) | 11 (15%) | 10 (5%) | 17 (75%) | 12 (30%) |
| BN | May | 3,212 | 6,703 (109%) | 6,217 (94%) | 6,330 (97%) | 6,290 (96%) | 6,358 (98%) | 3,199 (0%) | 6,169 (92%) | 6,288 (96%) |
| BN | Jun | 2,876 | 3,807 (32%) | 2,698 (-6%) | 2,818 (-2%) | 2,815 (-2%) | 2,773 (-4%) | 2,076 (-28%) | 2,577 (-10%) | 2,654 (-8%) |
| BN | Jul | 8,507 | 8,797 (3%) | 8,833 (4%) | 8,841 (4%) | 8,621 (1%) | 8,624 (1%) | 2,916 (-66%) | 8,702 (2%) | 9,259 (9%) |
| BN | Aug | 785 | 779 (-1%) | 841 (7%) | 764 (-3%) | 874 (11%) | 878 (12%) | 467 (-41%) | 849 (8%) | 973 (24%) |
| BN | Sep | 115 | 177 (54%) | 127 (10%) | 121 (5%) | 120 (4%) | 130 (13%) | 170 (48%) | 126 (10%) | 139 (21%) |
| BN | Oct | 331 | 523 (58%) | 326 (-1%) | 314 (-5%) | 318 (-4%) | 329 (-1%) | 358 (8%) | 343 (4%) | 485 (47%) |
| BN | Nov | 179 | 168 (-6%) | 178 (0%) | 177 (-1%) | 184 (3%) | 187 (4%) | 110 (-38%) | 178 (-1%) | 174 (-3%) |
| BN | Dec | 79 | 106 (34%) | 75 (-5%) | 76 (-3%) | 77 (-2%) | 73 (-8%) | 43 (-45%) | 62 (-22%) | 75 (-5%) |
| Dry | Jan | 40 | 75 (88%) | 36 (-10%) | 36 (-10%) | 36 (-10%) | 35 (-13%) | 33 (-17%) | 40 (1%) | 39 (-2%) |
| Dry | Feb | 14 | 28 (97%) | 14 (-6%) | 14 (-6%) | 14 (-6%) | 14 (-6%) | 16 (13%) | 16 (12%) | 14 (-3%) |
| Dry | Mar | 6 | 11 (80%) | 6 (-4%) | 6 (-4%) | 5 (-21%) | 5 (-18%) | 8 (28%) | 6 (0%) | 6 (-2%) |
| Dry | Apr | 13 | 23 (76%) | 21 (59%) | 21 (59%) | 14 (6%) | 14 (6%) | 12 (-7%) | 21 (60%) | 14 (2%) |
| Dry | May | 1,014 | 2,220 (119%) | 1,899 (87%) | 1,907 (88%) | 1,655 (63%) | 1,597 (58%) | 1,205 (19%) | 1,906 (88%) | 1,660 (64%) |

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Dry | Jun | 4,550 | 4,893 (8%) | 4,283 (-6%) | 4,252 (-7%) | 3,984 (-12%) | 3,903 (-14%) | 1,988 (-56%) | 4,176 (-8%) | 4,414 (-3%) |
| Dry | Jul | 4,799 | 4,977 (4%) | 4,571 (-5%) | 4,456 (-7%) | 4,933 (3%) | 4,996 (4%) | 3,554 (-26%) | 4,677 (-3%) | 5,795 (21%) |
| Dry | Aug | 494 | 611(24%) | 528 (7%) | 508 (3%) | 802 (62%) | 823 (66%) | 1,144 (131%) | 553 (12%) | 1,008 (104%) |
| Dry | Sep | 108 | 104 (-3%) | 109 (1%) | 108 (0%) | 104 (-3%) | 105 (-2%) | 269 (150%) | 109 (1%) | 107 (0%) |
| Dry | Oct | 651 | 865 (33%) | 621 (-5%) | 621 (-5%) | 644 (-1%) | 668 (3%) | 730 (12%) | 624 (-4%) | 907 (39%) |
| Dry | Nov | 393 | 354 (-10%) | 391 (-1%) | 388 (-1%) | 418 (7%) | 417 (6%) | 246 (-37%) | 394 (0%) | 352 (-10%) |
| Dry | Dec | 164 | 226 (38%) | 165 (1%) | 164 (0%) | 160 (-2%) | 155 (-5%) | 81 (-51%) | 141 (-14%) | 147 (-10%) |
| C | Jan | 132 | 225 (70%) | 124 (-6%) | 111 (-16%) | 108 (-18%) | 111 (-16%) | 136 (3%) | 127 (-4%) | 128 (-3%) |
| C | Feb | 82 | 124 (51%) | 87 (6%) | 73 (-11%) | 72 (-12%) | 72 (-13%) | 104 (26%) | 101 (24%) | 87 (7%) |
| C | Mar | 12 | 14 (14%) | 12 (-4%) | 9 (-21%) | 10 (-17%) | 10 (-15%) | 14 (13%) | 12 (1%) | 12 (-2%) |
| C | Apr | 14 | 18 (27%) | 17 (20%) | 16 (12%) | 16 (10%) | 17 (15%) | 15 (4%) | 19 (29%) | 17 (20%) |
| C | May | 182 | 267 (47%) | 252 (39%) | 238 (31%) | 240 (32%) | 243 (34%) | 218 (20%) | 267 (47%) | 256 (41%) |
| C | Jun | 1,558 | 2,290 (47%) | 1,476 (-5%) | 1,631 (5%) | 1,884 (21%) | 1,754 (13%) | 2,913 (87%) | 1,495 (-4%) | 1,831 (18%) |
| C | Jul | 4,904 | 5,878 (20%) | 4,433 (-10%) | 4,600 (-6%) | 13,230 (170%) | 13,578 (177%) | 16,601 (239%) | 4,702 (-4%) | 10,718 (119%) |
| C | Aug | 1,262 | 1,262 (0%) | 1,262 (0%) | 1,262 (0%) | 2,746 (118%) | 2,917 (131%) | 7,231 (473%) | 1,262 (0%) | 3,110 (147%) |
| C | Sep | 193 | 229 (19%) | 214 (11%) | 237 (23%) | 260 (35%) | 259 (35%) | 910 (372%) | 208 (8%) | 230 (19%) |
| C | Oct | 505 | 653 (29%) | 489 (-3%) | 453 (-10%) | 457 (-10%) | 489 (-3%) | 699 (38%) | 495 (-2%) | 567 (12%) |
| C | Nov | 377 | 372 (-1%) | 359 (-5%) | 358 (-5%) | 341 (-9%) | 327 (-13%) | 385 (2%) | 360 (-5%) | 376 (0%) |
| C | Dec | 89 | 116 (30%) | 92 (3%) | 91 (2%) | 86 (-3%) | 86 (-3%) | 45 (-50%) | 81 (-9%) | 85 (-4%) |

Table I.2-34. Loss of Largemouth bass at CVP Jones Pumping Plant for the No Action Alternative (NAA), Alternatives 1 3 and 4 (ALT1, ALT 3, ALT4), 4 components of Alternative 2 (ALT2), and Action 5 averaged by water year type and month, based on the salvage-density method. Percentage values in parentheses indicate the difference between NAA and each alternative. Absolute and percentage values are rounded.

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Wet | Jan | 2,300 | 2,433 (6%) | 2,295 (0%) | 2,292 (0%) | 2,290 (0%) | 2,291 (0%) | 2,343 (2%) | 2,295 (0%) | 2,339 (2%) |
| Wet | Feb | 902 | 928 (3%) | 945 (5%) | 941 (4%) | 954 (6%) | 952 (6%) | 923 (2%) | 963 (7%) | 946 (5%) |
| Wet | Mar | 433 | 439 (1%) | 466 (8%) | 459 (6%) | 440 (2%) | 442 (2%) | 277 (-36%) | 488 (13%) | 455 (5%) |
| Wet | Apr | 247 | 249 (1%) | 272 (10%) | 274 (11%) | 224 (-10%) | 221 (-11%) | 48 (-80%) | 277 (12%) | 215 (-13%) |
| Wet | May | 2,496 | 2,513 (1%) | 2,535 (2%) | 2,534 (2%) | 2,533 (1%) | 2,533 (1%) | 361 (-86%) | 2,544 (2%) | 2,534 (2%) |
| Wet | Jun | 17,878 | 17,810 (0%) | 16,864 (-6%) | 16,886 (-6%) | 16,768 (-6%) | 16,801 (-6%) | 9,605 (-46%) | 16,888 (-6%) | 17,068 (-5%) |
| Wet | Jul | 13,338 | 12,200 (-9%) | 12,587 (-6%) | 12,607 (-5%) | 12,332 (-8%) | 12,347 (-7%) | 4,839 (-64%) | 12,637 (-5%) | 12,391 (-7%) |
| Wet | Aug | 4,913 | 4,663 (-5%) | 4,680 (-5%) | 4,688 (-5%) | 4,691 (-5%) | 4,682 (-5%) | 868 (-82%) | 4,686 (-5%) | 5,025 (2%) |
| Wet | Sep | 929 | 1,001 (8%) | 918 (-1%) | 917 (-1%) | 916 (-1%) | 916 (-1%) | 413 (-56%) | 917 (-1%) | 1,010 (9%) |
| Wet | Oct | 385 | 415 (8%) | 372 (-3%) | 370 (-4%) | 375 (-3%) | 388 (1%) | 345 (-10%) | 387 (1%) | 423 (10%) |
| Wet | Nov | 946 | 884 (-7%) | 962 (2%) | 961 (2%) | 954 (1%) | 951 (1%) | 1,027 (9%) | 945 (0%) | 925 (-2%) |
| Wet | Dec | 2,193 | 2,328 (6%) | 2,155 (-2%) | 2,159 (-2%) | 2,160 (-2%) | 2,175 (-1%) | 1,426 (-35%) | 2,035 (-7%) | 2,187 (0%) |
| AN | Jan | 2,221 | 2,555 (15%) | 2,199 (-1%) | 2,194 (-1%) | 2,198 (-1%) | 2,197 (-1%) | 1,440 (-35%) | 2,170 (-2%) | 2,276 (2%) |
| AN | Feb | 990 | 1,049 (6%) | 1,007 (2%) | 1,005 (2%) | 1,005 (2%) | 1,005 (2%) | 976 (-1%) | 1,043 (5%) | 1,044 (5%) |
| AN | Mar | 460 | 508 (11%) | 494 (7%) | 494 (7%) | 361 (-21%) | 362 (-21%) | 335 (-27%) | 513 (12%) | 399 (-13%) |
| AN | Apr | 246 | 239 (-3%) | 246 (0%) | 246 (0%) | 164 (-33%) | 164 (-33%) | 38 (-85%) | 247 (0%) | 165 (-33%) |
| AN | May | 2,007 | 2,196 (9%) | 2,072 (3%) | 2,071 (3%) | 2,012 (0%) | 1,999 (0%) | 333 (-83%) | 2,079 (4%) | 2,028 (1%) |
| AN | Jun | 15,286 | 17,839 (17%) | 13,920 (-9%) | 13,860 (-9%) | 14,031 (-8%) | 14,071 (-8%) | 3,163 (-79%) | 13,930 (-9%) | 14,445 (-6%) |

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| AN | Jul | 12,763 | 13,748 (8%) | 13,188 (3%) | 13,200 (3%) | 12,727 (0%) | 12,618 (-1%) | 1,112 (-91%) | 13,248 (4%) | 12,743 (0%) |
| AN | Aug | 4,678 | 4,589 (-2%) | 4,723 (1%) | 4,649 (-1%) | 4,522 (-3%) | 4,484 (-4%) | 392 (-92%) | 4,644 (-1%) | 5,068 (8%) |
| AN | Sep | 777 | 957 (23%) | 769 (-1%) | 768 (-1%) | 766 (-1%) | 778 (0%) | 310 (-60%) | 771 (-1%) | 990 (27%) |
| AN | Oct | 296 | 398 (34%) | 295 (0%) | 292 (-1%) | 294 (-1%) | 298 (1%) | 226 (-24%) | 297 (0%) | 391 (32%) |
| AN | Nov | 934 | 859 (-8%) | 928 (-1%) | 931 (0%) | 929 (-1%) | 932 (0%) | 533 (-43%) | 925 (-1%) | 927 (-1%) |
| AN | Dec | 1,754 | 2,087 (19%) | 1,900 (8%) | 1,913 (9%) | 1,926 (10%) | 1,932 (10%) | 838 (-52%) | 1,814 (3%) | 1,965 (12%) |
| BN | Jan | 1,604 | 1,926 (20%) | 1,555 (-3%) | 1,555 (-3%) | 1,559 (-3%) | 1,558 (-3%) | 704 (-56%) | 1,562 (-3%) | 1,647 (3%) |
| BN | Feb | 482 | 522 (8%) | 463 (-4%) | 467 (-3%) | 465 (-3%) | 465 (-4%) | 282 (-41%) | 491 (2%) | 490 (2%) |
| BN | Mar | 235 | 277 (18%) | 236 (0%) | 246 (5%) | 156 (-33%) | 151 (-36%) | 159 (-32%) | 240 (2%) | 167 (-29%) |
| BN | Apr | 182 | 205 (13%) | 192 (5%) | 189 (4%) | 171 (-6%) | 173 (-5%) | 58 (-68%) | 193 (6%) | 170 (-6%) |
| BN | May | 7,465 | 8,115 (9%) | 7,724 (3%) | 7,310 (-2%) | 7,094 (-5%) | 6,898 (-8%) | 1,640 (-78%) | 7,801 (5%) | 7,138 (-4%) |
| BN | Jun | 42,789 | 47,070 (10%) | 37,997 (-11%) | 37,197 (-13%) | 37,007 (-14%) | 37,315 (-13%) | 6,556 (-85%) | 39,539 (-8%) | 39,146 (-9%) |
| BN | Jul | 11,302 | 10,388 (-8%) | 10,702 (-5%) | 10,531 (-7%) | 10,432 (-8%) | 10,678 (-6%) | 996 (-91%) | 11,396 (1%) | 11,059 (-2%) |
| BN | Aug | 1,584 | 1,291 (-19%) | 1,551 (-2%) | 1,520 (-4%) | 1,488 (-6%) | 1,478 (-7%) | 153 (-90%) | 1,555 (-2%) | 1,599 (1%) |
| BN | Sep | 475 | 441 (-7%) | 484 (2%) | 480 (1%) | 479 (1%) | 484 (2%) | 236 (-50%) | 484 (2%) | 484 (2%) |
| BN | Oct | 483 | 544 (13%) | 477 (-1%) | 463 (-4%) | 471 (-3%) | 474 (-2%) | 258 (-47%) | 485 (0%) | 540 (12%) |
| BN | Nov | 1,836 | 1,777 (-3%) | 1,888 (3%) | 1,855 (1%) | 1,852 (1%) | 1,880 (2%) | 1,237 (-33%) | 1,896 (3%) | 1,851 (1%) |
| BN | Dec | 1,172 | 1,165 (-1%) | 1,146 (-2%) | 1,167 (0%) | 1,157 (-1%) | 1,123 (-4%) | 599 (-49%) | 1,084 (-7%) | 1,135 (-3%) |
| Dry | Jan | 1,036 | 1,175 (13%) | 984 (-5%) | 990 (-5%) | 992 (-4%) | 1,022 (-1%) | 291 (-72%) | 1,006 (-3%) | 1,097 (6%) |
| Dry | Feb | 1,255 | 1,439 (15%) | 1,160 (-8%) | 1,160 (-8%) | 1,158 (-8%) | 1,199 (-4%) | 740 (-41%) | 1,294 (3%) | 1,266 (1%) |
| Dry | Mar | 649 | 715 (10%) | 645 (-1%) | 645 (-1%) | 514 (-21%) | 503 (-22%) | 376 (-42%) | 642 (-1%) | 570 (-12%) |
| Dry | Apr | 162 | 177 (9%) | 161 (-1%) | 161 (-1%) | 140 (-14%) | 140 (-14%) | 33 (-80%) | 162 (0%) | 141 (-13%) |
| Dry | May | 15,994 | 17,516 (10%) | 15,827 (-1%) | 15,771 (-1%) | 14,694 (-8%) | 14,503 (-9%) | 2,716 (-83%) | 15,845 (-1%) | 15,039 (-6%) |

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Dry | Jun | 55,611 | 57,036 (3%) | 46,535 (-16%) | 46,769 (-16%) | 47,597 (-14%) | 48,257 (-13%) | 6,443 (-88%) | 48,191 (-13%) | 51,836 (-7%) |
| Dry | Jul | 14,037 | 13,222 (-6%) | 12,468 (-11%) | 12,649 (-10%) | 12,928 (-8%) | 13,120 (-7%) | 1,439 (-90%) | 12,923 (-8%) | 13,803 (-2%) |
| Dry | Aug | 1,315 | 1,222 (-7%) | 1,195 (-9%) | 1,202 (-9%) | 1,210 (-8%) | 1,236 (-6%) | 173 (-87%) | 1,237 (-6%) | 1,322 (1%) |
| Dry | Sep | 406 | 352 (-3%) | 402 (-1%) | 403 (-1%) | 398 (-2%) | 398 (-2%) | 158 (-61%) | 404 (-1%) | 415 (2%) |
| Dry | Oct | 1,730 | 1,975 (14%) | 1,720 (-1%) | 1,720 (-1%) | 1,695 (-2%) | 1,700 (-2%) | 848 (-51%) | 1,701 (-2%) | 1,933 (12%) |
| Dry | Nov | 1,124 | 1,035 (-8%) | 1,138 (1%) | 1,138 (1%) | 1,120 (0%) | 1,148 (2%) | 728 (-35%) | 1,136 (1%) | 1,081 (-4%) |
| Dry | Dec | 799 | 912 (14%) | 836 (5%) | 808 (1%) | 796 (0%) | 787 (-1%) | 360 (-55%) | 799 (0%) | 757 (-5%) |
| C | Jan | 1,734 | 2,116 (22%) | 1,543 (-11%) | 1,674 (-3%) | 1,756 (1%) | 1,735 (0%) | 944 (-46%) | 1,702 (-2%) | 1,742 (0%) |
| C | Feb | 1,870 | 2,134 (14%) | 1,826 (-2%) | 1,882 (1%) | 1,858 (-1%) | 1,856 (-1%) | 844 (-55%) | 1,996 (7%) | 1,791 (-4%) |
| C | Mar | 405 | 347 (-4%) | 372 (-8%) | 340 (-16%) | 321 (-21%) | 320 (-21%) | 126 (-69%) | 394 (-3%) | 403 (0%) |
| C | Apr | 213 | 267 (26%) | 229 (8%) | 273 (28%) | 272 (28%) | 270 (27%) | 55 (-74%) | 225 (6%) | 227 (7%) |
| C | May | 8,411 | 8,780 (4%) | 8,784 (4%) | 8,899 (6%) | 8,907 (6%) | 8,909 (6%) | 1,751 (-79%) | 8,298 (-1%) | 8,755 (4%) |
| C | Jun | 27,973 | 28,697 (3%) | 25,725 (-8%) | 26,507 (-5%) | 25,213 (-10%) | 24,728 (-12%) | 5,855 (-79%) | 23,689 (-15%) | 23,665 (-15%) |
| C | Jul | 4,271 | 5,815 (36%) | 3,860 (-10%) | 5,199 (22%) | 4,971 (16%) | 4,956 (16%) | 1,037 (-76%) | 4,058 (-5%) | 3,922 (-8%) |
| C | Aug | 689 | 648 (-6%) | 622 (-10%) | 628 (-9%) | 581 (-16%) | 574 (-17%) | 158 (-77%) | 618 (-10%) | 584 (-15%) |
| C | Sep | 523 | 560 (7%) | 551 (5%) | 627 (20%) | 611 (17%) | 609 (16%) | 113 (-78%) | 557 (6%) | 553 (6%) |
| C | Oct | 380 | 406 (7%) | 398 (5%) | 388 (2%) | 406 (7%) | 402 (6%) | 203 (-46%) | 404 (7%) | 427 (13%) |
| C | Nov | 1,020 | 1,015 (-1%) | 1,101 (8%) | 1,006 (-1%) | 992 (-3%) | 1,055 (3%) | 348 (-66%) | 1,100 (8%) | 1,238 (21%) |
| C | Dec | 584 | 745 (27%) | 622 (6%) | 656 (12%) | 677 (16%) | 684 (17%) | 331 (-43%) | 631 (8%) | 645 (10%) |

Table I.2-35. Loss of Sacramento Splittail at SWP Banks Pumping Plant for the No Action Alternative (NAA), Alternative 1 (Alt1), 4 components of Alternative 2 (Alt2), Alternative 3 (Alt3), Alternative 4 (Alt4), and Action 5 averaged by water year type and month, based on the salvage-density method. Percentage values in parentheses indicate the difference between NAA and each alternative. Absolute and percentage values are rounded.

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Wet | Jan | 574 | 952 (66%) | 567 (-1%) | 566 (-1%) | 565 (-1%) | 566 (-1%) | 384 (-33%) | 536 (-7%) | 594 (4%) |
| Wet | Feb | 756 | 1,008 (33%) | 769 (2%) | 770 (2%) | 767 (2%) | 768 (2%) | 357 (-53%) | 790 (5%) | 806 (7%) |
| Wet | Mar | 273 | 352 (29%) | 290 (6%) | 292 (7%) | 284 (4%) | 281 (3%) | 114 (-58%) | 306 (12%) | 315 (16%) |
| Wet | Apr | 2,010 | 2,370 (18%) | 2,338 (16%) | 2,335 (16%) | 2,142 (7%) | 2,143 (7%) | 704 (-65%) | 2,307 (15%) | 2,211 (10%) |
| Wet | May | 424,024 | 707,911 (67%) | 712,548 (68%) | 711,191 (68%) | 710,303 (68%) | 712,206 (68%) | 133,986 (-68%) | 696,594 (64%) | 697,866 (65%) |
| Wet | Jun | 133,289 | 172,110 (29%) | 138,259 (4%) | 137,989 (4%) | 139,031 (4%) | 138,773 (4%) | 136,121 (2%) | 135,090 (1%) | 139,825 (5%) |
| Wet | Jul | 52,613 | 52,927 (1%) | 53,246 (1%) | 53,255 (1%) | 53,296 (1%) | 53,264 (1%) | 16,156 (-69%) | 53,244 (1%) | 53,268 (1%) |
| Wet | Aug | 5,245 | 5,431 (4%) | 5,360 (2%) | 5,351 (2%) | 5,346 (2%) | 5,353 (2%) | 2,230 (-57%) | 5,347 (2%) | 5,451 (4%) |
| Wet | Sep | 170 | 253 (49%) | 173 (2%) | 173 (2%) | 177 (5%) | 176 (4%) | 141 (-17%) | 178 (5%) | 250 (47%) |
| Wet | Oct | 9 | 12 (28%) | 9 (-3%) | 9 (-4%) | 9 (-2%) | 9 (1%) | 8 (-11%) | 9 (-1%) | 11 (23%) |
| Wet | Nov | 10 | 9 (-2%) | 10 (1%) | 10 (1%) | 10 (1%) | 10 (0%) | 6 (-38%) | 10 (0%) | 10 (1%) |
| Wet | Dec | 51 | 85 (66%) | 50 (-2%) | 50 (-2%) | 50 (-2%) | 50 (-1%) | 27 (-47%) | 46 (-9%) | 53 (3%) |
| AN | Jan | 389 | 887 (128%) | 379 (-3%) | 378 (-3%) | 377 (-3%) | 377 (-3%) | 346 (-11%) | 358 (-8%) | 409 (5%) |
| AN | Feb | 511 | 898 (76%) | 535 (5%) | 525 (3%) | 526 (3%) | 517 (1%) | 432 (-15%) | 593 (16%) | 602 (18%) |
| AN | Mar | 177 | 334 (89%) | 169 (-4%) | 169 (-4%) | 144 (-18%) | 146 (-18%) | 144 (-18%) | 175 (-1%) | 206 (17%) |
| AN | Apr | 465 | 1,431 (208%) | 1,292 (178%) | 1,288 (177%) | 693 (49%) | 693 (49%) | 646 (39%) | 1,288 (177%) | 734 (58%) |
| AN | May | 161651 | 402,280 (149%) | 361,782 (124%) | 361,649 (124%) | 316,433 (96%) | 311,787 (93%) | 114,397 (-29%) | 362,636 (124%) | 316,411 (96%) |
| AN | Jun | 95873 | 142,918 (49%) | 90,258 (-6%) | 90,774 (-5%) | 88,452 (-8%) | 87,829 (-8%) | 80,681 (-16%) | 90,128 (-6%) | 89,601 (-7%) |

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| AN | Jul | 51965 | 53,550 (3%) | 53,428 (3%) | 53,427 (3%) | 53,138 (2%) | 53,168 (2%) | 13,872 (-73%) | 53,415 (3%) | 53,489 (3%) |
| AN | Aug | 5241 | 5,565 (6%) | 5,342 (2%) | 5,332 (2%) | 5,360 (2%) | 5,342 (2%) | 2,025 (-61%) | 5,322 (2%) | 5,474 (4%) |
| AN | Sep | 89 | 227 (155%) | 110 (23%) | 109 (23%) | 121 (37%) | 121 (36%) | 100 (13%) | 110 (24%) | 170 (92%) |
| AN | Oct | 6 | 11 (81%) | 6 (-4%) | 6 (-4%) | 6 (-4%) | 6 (-2%) | 6 (8%) | 6 (-4%) | 9 (52%) |
| AN | Nov | 7 | 7 (-7%) | 7 (1%) | 8 (2%) | 8 (2%) | 8 (2%) | 5 (-34%) | 7 (1%) | 6 (-25%) |
| AN | Dec | 48 | 77 (62%) | 46 (-3%) | 46 (-4%) | 45 (-6%) | 45 (-6%) | 23 (-52%) | 41 (-15%) | 46 (-3%) |
| BN | Jan | 36 | 89 (149%) | 35 (-3%) | 35 (-3%) | 35 (-3%) | 35 (-3%) | 36 (1%) | 35 (-3%) | 37 (3%) |
| BN | Feb | 90 | 156 (73%) | 89 (-1%) | 87 (-3%) | 87 (-4%) | 87 (-4%) | 79 (-13%) | 101 (12%) | 101 (12%) |
| BN | Mar | 136 | 269 (98%) | 135 (-1%) | 127 (-6%) | 96 (-29%) | 99 (-27%) | 121 (-11%) | 133 (-2%) | 144 (6%) |
| BN | Apr | 87 | 172 (98%) | 151 (74%) | 154 (78%) | 97 (12%) | 100 (15%) | 91 (5%) | 151 (75%) | 112 (30%) |
| BN | May | 329 | 686 (109%) | 637 (94%) | 648 (97%) | 644 (96%) | 651 (98%) | 328 (0%) | 632 (92%) | 644 (96%) |
| BN | Jun | 4,637 | 6,138 (32%) | 4,350 (-6%) | 4,544 (-2%) | 4,539 (-2%) | 4,471 (-4%) | 3,347 (-28%) | 4,155 (-10%) | 4,280 (-8%) |
| BN | Jul | 901 | 932 (3%) | 935 (4%) | 936 (4%) | 913 (1%) | 913 (1%) | 309 (-66%) | 922 (2%) | 981 (9%) |
| BN | Aug | 36 | 36 (-1%) | 39 (7%) | 35 (-3%) | 40 (11%) | 40 (12%) | 21 (-41%) | 39 (8%) | 45 (24%) |
| BN | Sep | 6 | 9 (54%) | 7 (10%) | 6 (5%) | 6 (4%) | 7 (13%) | 9 (48%) | 7 (10%) | 7 (21%) |
| BN | Oct | 131 | 207 (58%) | 129 (-1%) | 124 (-5%) | 126 (-4%) | 130 (-1%) | 142 (8%) | 136 (4%) | 192 (47%) |
| BN | Nov | 763 | 718 (-6%) | 760 (0%) | 755 (-1%) | 786 (3%) | 797 (4%) | 469 (-38%) | 758 (-1%) | 743 (-3%) |
| BN | Dec | 71 | 95 (34%) | 68 (-5%) | 69 (-3%) | 70 (-2%) | 66 (-8%) | 39 (-45%) | 56 (-22%) | 67 (-5%) |
| Dry | Jan | 2 | 3 (88%) | 2 (-10%) | 2 (-10%) | 2 (-10%) | 2 (-13%) | 1 (-17%) | 2 (1%) | 2 (-2%) |
| Dry | Feb | 33 | 66 (97%) | 31 (-6%) | 31 (-6%) | 31 (-6%) | 31 (-6%) | 38 (13%) | 37 (12%) | 32 (-3%) |
| Dry | Mar | 123 | 221 (80%) | 118 (-4%) | 118 (-4%) | 97 (-21%) | 101 (-18%) | 157 (28%) | 123 (0%) | 120 (-2%) |
| Dry | Apr | 145 | 256 (76%) | 231 (59%) | 231 (59%) | 153 (6%) | 154 (6%) | 135 (-7%) | 232 (60%) | 149 (2%) |
| Dry | May | 90 | 197 (119%) | 169 (87%) | 169 (88%) | 147 (63%) | 142 (58%) | 107 (19%) | 169 (88%) | 147 (64%) |

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Dry | Jun | 99 | 107 (8%) | 93 (-6%) | 93 (-7%) | 87 (-12%) | 85 (-14%) | 43 (-56%) | 91 (-8%) | 96 (-3%) |
| Dry | Jul | 29 | 30 (4%) | 27 (-5%) | 27 (-7%) | 30 (3%) | 30 (4%) | 21 (-26%) | 28 (-3%) | 35 (21%) |
| Dry | Aug | 0 | 0 (24%) | 0 (7%) | 0 (3%) | 1 (62%) | 1 (66%) | 1 (131%) | 0 (12%) | 1 (104%) |
| Dry | Sep | 4 | 3 (-3%) | 4 (1%) | 4 (0%) | 3 (-3%) | 4 (-2%) | 9 (150%) | 4 (1%) | 4 (0%) |
| Dry | Oct | 1 | 1 (33%) | 1 (-5%) | 1 (-5%) | 1 (-1%) | 1 (3%) | 1 (12%) | 1 (-4%) | 1 (39%) |
| Dry | Nov | 24 | 22 (-10%) | 24 (-1%) | 24 (-1%) | 26 (7%) | 26 (6%) | 15 (-37%) | 24 (0%) | 22 (-10%) |
| Dry | Dec | 13 | 18 (38%) | 13 (1%) | 13 (0%) | 13 (-2%) | 12 (-5%) | 6 (-51%) | 11 (-14%) | 11 (-10%) |
| C | Jan | 33 | 56 (70%) | 31 (-6%) | 28 (-16%) | 27 (-18%) | 28 (-16%) | 34 (3%) | 32 (-4%) | 32 (-3%) |
| C | Feb | 55 | 83 (51%) | 58 (6%) | 49 (-11%) | 49 (-12%) | 48 (-13%) | 70 (26%) | 68 (24%) | 59 (7%) |
| C | Mar | 14 | 16 (14%) | 14 (-4%) | 11 (-21%) | 12 (-17%) | 12 (-15%) | 16 (13%) | 15 (1%) | 14 (-2%) |
| C | Apr | 7 | 9 (27%) | 9 (20%) | 8 (12%) | 8 (10%) | 8 (15%) | 7 (4%) | 9 (29%) | 9 (20%) |
| C | May | 5 | 7 (47%) | 7 (39%) | 6 (31%) | 7 (32%) | 7 (34%) | 6 (20%) | 7 (47%) | 7 (41%) |
| C | Jun | 16 | 24 (47%) | 15 (-5%) | 17 (5%) | 20 (21%) | 18 (13%) | 30 (87%) | 16 (-4%) | 19 (18%) |
| C | Jul | 1 | 2 (20%) | 1 (-10%) | 1 (-6%) | 4 (170%) | 4 (177%) | 5 (239%) | 1 (-4%) | 3 (119%) |
| C | Aug | 1 | 1 (0%) | 1 (0%) | 1 (0%) | 2 (118%) | 2 (131%) | 6 (473%) | 1 (0%) | 3 (147%) |
| C | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Oct | 6 | 8 (29%) | 6 (-3%) | 6 (-10%) | 6 (-10%) | 6 (-3%) | 9 (38%) | 6 (-2%) | 7 (12%) |
| C | Nov | 14 | 14 (-1%) | 13 (-5%) | 13 (-5%) | 13 (-9%) | 12 (-13%) | 14 (2%) | 13 (-5%) | 14 (0%) |
| C | Dec | 78 | 101 (30%) | 80 (3%) | 79 (2%) | 75 (-3%) | 75 (-3%) | 39 (-50%) | 71 (-9%) | 74 (-4%) |

Table I.2-36. Loss of Sacramento Splittail at CVP Jones Pumping Plant for the No Action Alternative (NAA), Alternatives 1 3 and 4 (ALT1, ALT 3, ALT4), 4 components of Alternative 2 (ALT2), and Action 5 averaged by water year type and month, based on the salvage-density method. Percentage values in parentheses indicate the difference between NAA and each alternative. Absolute and percentage values are rounded.

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Wet | Jan | 31 | 33 (6%) | 31 (0%) | 31 (0%) | 31 (0%) | 31 (0%) | 32 (2%) | 31 (0%) | 32 (2%) |
| Wet | Feb | 21 | 21 (3%) | 22 (5%) | 22 (4%) | 22 (6%) | 22 (6%) | 21 (2%) | 22 (7%) | 22 (5%) |
| Wet | Mar | 27 | 27 (1%) | 29 (8%) | 29 (6%) | 27 (2%) | 27 (2%) | 17 (-36%) | 30 (13%) | 28 (5%) |
| Wet | Apr | 6,392 | 6,428 (1%) | 7,020 (10%) | 7,073 (11%) | 5,779 (-10%) | 5,703 (-11%) | 1,251 (-80%) | 7,154 (12%) | 5,552 (-13%) |
| Wet | May | 6,789,997 | 6,836,952 (1%) | 6,897,152 (2%) | 6,892,843 (2%) | 6,890,154 (1%) | 6,890,234 (1%) | 981,777 (-86%) | 6,921,465 (2%) | 6,893,194 (2%) |
| Wet | Jun | 920,126 | 916,615 (0%) | 867,943 (-6%) | 869,074 (-6%) | 862,974 (-6%) | 864,682 (-6%) | 494,311 (-46%) | 869,150 (-6%) | 878,401 (-5%) |
| Wet | Jul | 52,691 | 48,196 (-9%) | 49,722 (-6%) | 49,803 (-5%) | 48,716 (-8%) | 48,774 (-7%) | 19,116 (-64%) | 49,919 (-5%) | 48,949 (-7%) |
| Wet | Aug | 2,393 | 2,271 (-5%) | 2,279 (-5%) | 2,283 (-5%) | 2,285 (-5%) | 2,280 (-5%) | 423 (-82%) | 2,282 (-5%) | 2,447 (2%) |
| Wet | Sep | 245 | 264 (8%) | 242 (-1%) | 242 (-1%) | 242 (-1%) | 242 (-1%) | 109 (-56%) | 242 (-1%) | 267 (9%) |
| Wet | Oct | 14 | 15 (8%) | 14 (-3%) | 14 (-4%) | 14 (-3%) | 14 (1%) | 13 (-10%) | 14 (1%) | 15 (10%) |
| Wet | Nov | 4 | 4 (-7%) | 5 (2%) | 5 (2%) | 5 (1%) | 4 (1%) | 5 (9%) | 4 (0%) | 4 (-2%) |
| Wet | Dec | 22 | 24 (6%) | 22 (-2%) | 22 (-2%) | 22 (-2%) | 22 (-1%) | 15 (-35%) | 21 (-7%) | 22 (0%) |
| AN | Jan | 30 | 35 (15%) | 30 (-1%) | 30 (-1%) | 30 (-1%) | 30 (-1%) | 19 (-35%) | 29 (-2%) | 31 (2%) |
| AN | Feb | 23 | 24 (6%) | 23 (2%) | 23 (2%) | 23 (2%) | 23 (2%) | 22 (-1%) | 24 (5%) | 24 (5%) |
| AN | Mar | 29 | 32 (11%) | 31 (7%) | 31 (7%) | 22 (-21%) | 23 (-21%) | 21 (-27%) | 32 (12%) | 25 (-13%) |
| AN | Apr | 6,365 | 6,187 (-3%) | 6,354 (0%) | 6,356 (0%) | 4,234 (-33%) | 4,241 (-33%) | 974 (-85%) | 6,385 (0%) | 4,275 (-33%) |
| AN | May | 5,460,101 | 5,973,104 (9%) | 5,636,683 (3%) | 5,634,961 (3%) | 5,471,830 (0%) | 5,437,390 (0%) | 905,009 (-83%) | 5,656,477 (4%) | 5,516,189 (1%) |
| AN | Jun | 786,690 | 918,092 (17%) | 716,417 (-9%) | 713,322 (-9%) | 722,129 (-8%) | 724,198 (-8%) | 162,810 (-79%) | 716,942 (-9%) | 743,411 (-6%) |

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| AN | Jul | 50,420 | 54,308 (8%) | 52,096 (3%) | 52,145 (3%) | 50,278 (0%) | 49,844 (-1%) | 4,392 (-91%) | 52,336 (4%) | 50,338 (0%) |
| AN | Aug | 2,278 | 2,235 (-2%) | 2,300 (1%) | 2,264 (-1%) | 2,202 (-3%) | 2,184 (-4%) | 191 (-92%) | 2,262 (-1%) | 2,468 (8%) |
| AN | Sep | 205 | 253 (23%) | 203 (-1%) | 203 (-1%) | 202 (-1%) | 206 (0%) | 82 (-60%) | 204 (-1%) | 261 (27%) |
| AN | Oct | 11 | 15 (34%) | 11 (0%) | 11 (-1%) | 11 (-1%) | 11 (1%) | 8 (-24%) | 11 (0%) | 14 (32%) |
| AN | Nov | 4 | 4 (-8%) | 4 (-1%) | 4 (0%) | 4 (-1%) | 4 (0%) | 3 (-43%) | 4 (-1%) | 4 (-1%) |
| AN | Dec | 18 | 21 (19%) | 19 (8%) | 20 (9%) | 20 (10%) | 20 (10%) | 9 (-52%) | 19 (3%) | 20 (12%) |
| BN | Jan | 44 | 52 (20%) | 42 (-3%) | 42 (-3%) | 42 (-3%) | 42 (-3%) | 19 (-56%) | 43 (-3%) | 45 (3%) |
| BN | Feb | 47 | 50 (8%) | 45 (-4%) | 45 (-3%) | 45 (-3%) | 45 (-4%) | 27 (-41%) | 47 (2%) | 47 (2%) |
| BN | Mar | 93 | 110 (18%) | 94 (0%) | 98 (5%) | 62 (-33%) | 60 (-36%) | 63 (-32%) | 95 (2%) | 66 (-29%) |
| BN | Apr | 23 | 25 (13%) | 24 (5%) | 23 (4%) | 21 (-6%) | 21 (-5%) | 7 (-68%) | 24 (6%) | 21 (-6%) |
| BN | May | 67,359 | 73,227 (9%) | 69,704 (3%) | 65,967 (-2%) | 64,019 (-5%) | 62,246 (-8%) | 14,800 (-78%) | 70,391 (5%) | 64,414 (-4%) |
| BN | Jun | 9,435 | 10,379 (10%) | 8,378 (-11%) | 8,202 (-13%) | 8,160 (-14%) | 8,228 (-13%) | 1,446 (-85%) | 8,718 (-8%) | 8,632 (-9%) |
| BN | Jul | 645 | 592 (-8%) | 610 (-5%) | 601 (-7%) | 595 (-8%) | 609 (-6%) | 57 (-91%) | 650 (1%) | 631 (-2%) |
| BN | Aug | 18 | 15 (-19%) | 17 (-2%) | 17 (-4%) | 17 (-6%) | 17 (-7%) | 2 (-90%) | 17 (-2%) | 18 (1%) |
| BN | Sep | 19 | 18 (-7%) | 19 (2%) | 19 (1%) | 19 (1%) | 19 (2%) | 9 (-50%) | 19 (2%) | 19 (2%) |
| BN | Oct | 34 | 38 (13%) | 33 (-1%) | 32 (-4%) | 33 (-3%) | 33 (-2%) | 18 (-47%) | 34 (0%) | 38 (12%) |
| BN | Nov | 9 | 8 (-3%) | 9 (3%) | 9 (1%) | 9 (1%) | 9 (2%) | 6 (-33%) | 9 (3%) | 9 (1%) |
| BN | Dec | 2 | 2 (-1%) | 2 (-2%) | 2 (0%) | 2 (-1%) | 2 (-4%) | 1 (-49%) | 2 (-7%) | 2 (-3%) |
| Dry | Jan | 1 | 1 (13%) | 1 (-5%) | 1 (-5%) | 1 (-4%) | 1 (-1%) | 0 (-72%) | 1 (-3%) | 1 (6%) |
| Dry | Feb | 1 | 2 (15%) | 1 (-8%) | 1 (-8%) | 1 (-8%) | 1 (-4%) | 1 (-41%) | 1 (3%) | 1 (1%) |
| Dry | Mar | 21 | 23 (10%) | 21 (-1%) | 21 (-1%) | 16 (-21%) | 16 (-22%) | 12 (-42%) | 20 (-1%) | 18 (-12%) |
| Dry | Apr | 15 | 16 (9%) | 15 (-1%) | 15 (-1%) | 13 (-14%) | 13 (-14%) | 3 (-80%) | 15 (0%) | 13 (-13%) |
| Dry | May | 98 | 108 (10%) | 97 (-1%) | 97 (-1%) | 90 (-8%) | 89 (-9%) | 17 (-83%) | 97 (-1%) | 93 (-6%) |

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Dry | Jun | 1,143 | 1,172 (3%) | 956 (-16%) | 961 (-16%) | 978 (-14%) | 992 (-13%) | 132 (-88%) | 990 (-13%) | 1,065 (-7%) |
| Dry | Jul | 283 | 266 (-6%) | 251 (-11%) | 255 (-10%) | 261 (-8%) | 264 (-7%) | 29 (-90%) | 260 (-8%) | 278 (-2%) |
| Dry | Aug | 4 | 3 (-7%) | 3 (-9%) | 3 (-9%) | 3 (-8%) | 3 (-6%) | 0 (-87%) | 3 (-6%) | 4 (1%) |
| Dry | Sep | 2 | 1 (-13%) | 2 (-1%) | 2 (-1%) | 2 (-2%) | 2 (-2%) | 1 (-61%) | 2 (-1%) | 2 (2%) |
| Dry | Oct | 1 | 2 (14%) | 1 (-1%) | 1 (-1%) | 1 (-2%) | 1 (-2%) | 1 (-51%) | 1 (-2%) | 1 (12%) |
| Dry | Nov | 9 | 8 (-8%) | 9 (1%) | 9 (1%) | 9 (0%) | 9 (2%) | 6 (-35%) | 9 (1%) | 9 (-4%) |
| Dry | Dec | 4 | 4 (14%) | 4 (5%) | 4 (1%) | 4 (0%) | 4 (-1%) | 2 (-55%) | 4 (0%) | 4 (-5%) |
| C | Jan | 8 | 10 (22%) | 7 (-11%) | 8 (-3%) | 8 (1%) | 8 (0%) | 4 (-46%) | 8 (-2%) | 8 (0%) |
| C | Feb | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Mar | 1 | 1 (-14%) | 1 (-8%) | 1 (-16%) | 1 (-21%) | 1 (-21%) | 0 (-69%) | 1 (-3%) | 1 (0%) |
| C | Apr | 0 | 0 (26%) | 0 (8%) | 0 (28%) | 0 (28%) | 0 (27%) | 0 (-74%) | 0 (6%) | 0 (7%) |
| C | May | 4 | 4 (4%) | 4 (4%) | 5 (6%) | 5 (6%) | 5 (6%) | 1 (-79%) | 4 (-1%) | 4 (4%) |
| C | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Jul | 2 | 2 (36%) | 1 (-10%) | 2 (22%) | 2 (16%) | 2 (16%) | 0 (-76%) | 1 (-5%) | 1 (-8%) |
| C | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Oct | 7 | 8 (7%) | 8 (5%) | 7 (2%) | 8 (7%) | 8 (6%) | 4 (-46%) | 8 (7%) | 8 (13%) |
| C | Nov | 1 | 1 (-1%) | 1 (8%) | 1 (-1%) | 1 (-3%) | 1 (3%) | 0 (-66%) | 1 (8%) | 1 (21%) |
| C | Dec | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |

Table I.2-37. Loss of Smallmouth bass at SWP Banks Pumping Plant for the No Action Alternative (NAA), Alternative 1 (Alt1), 4 components of Alternative 2 (Alt2), Alternative 3 (Alt3), Alternative 4 (Alt4), and Action 5 averaged by water year type and month, based on the salvage-density method. Percentage values in parentheses indicate the difference between NAA and each alternative. Absolute and percentage values are rounded.

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Wet | Jan | 1 | 2 (66%) | 1 (-1%) | 1 (-1%) | 1 (-1%) | 1 (-1%) | 1 (-33%) | 1 (-7%) | 1 (4%) |
| Wet | Feb | 5 | 7 (33%) | 5 (2%) | 5 (2%) | 5 (2%) | 5 (2%) | 2 (-53%) | 5 (5%) | 5 (7%) |
| Wet | Mar | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Apr | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Dec | 1 | 2 (66%) | 1 (-2%) | 1 (-2%) | 1 (-2%) | 1 (-1%) | 0 (-47%) | 1 (-9%) | 1 (3%) |
| AN | Jan | 1 | 1 (128%) | 1 (-3%) | 1 (-3%) | 1 (-3%) | 1 (-3%) | 1 (-11%) | 1 (-8%) | 1 (5%) |
| AN | Feb | 3 | 6 (76%) | 4 (5%) | 4 (3%) | 4 (3%) | 3 (1%) | 3 (-15%) | 4 (16%) | 4 (18%) |
| AN | Mar | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Apr | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| AN | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Dec | 1 | 1 (62%) | 1 (-3%) | 1 (-4%) | 1 (-6%) | 1 (-6%) | 0 (-52%) | 1 (-15%) | 1 (-3%) |
| BN | Jan | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Feb | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Mar | 0 | 1 (98%) | 0 (-1%) | 0 (-6%) | 0 (-29%) | 0 (-27%) | 0 (-11%) | 0 (-2%) | 0 (6%) |
| BN | Apr | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Oct | 6 | 10 (58%) | 6 (-1%) | 6 (-5%) | 6 (-4%) | 6 (-1%) | 7 (8%) | 7 (4%) | 9 (47%) |
| BN | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Dec | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Jan | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Feb | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Mar | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Apr | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Dry | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Oct | 6 | 8 (33%) | 6 (-5%) | 6 (-5%) | 6 (-1%) | 7 (3%) | 7 (12%) | 6 (-4%) | 9 (39%) |
| Dry | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Dec | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Jan | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Feb | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Mar | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Apr | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Dec | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |

Table I.2-38. Loss of Smallmouth bass at CVP Jones Pumping Plant for the No Action Alternative (NAA), Alternatives 1 3 and 4 (ALT1, ALT 3, ALT4), 4 components of Alternative 2 (ALT2), and Action 5 averaged by water year type and month, based on the salvage-density method. Percentage values in parentheses indicate the difference between NAA and each alternative. Absolute and percentage values are rounded.

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Wet | Jan | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Feb | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Mar | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Apr | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Dec | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Jan | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Feb | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Mar | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Apr | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| AN | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Dec | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Jan | 1 | 1 (20%) | 1 (-3%) | 1 (-3%) | 1 (-3%) | 1 (-3%) | 0 (-56%) | 1 (-3%) | 1 (3%) |
| BN | Feb | 1 | 1 (8%) | 1 (-4%) | 1 (-3%) | 1 (-3%) | 1 (-4%) | 1 (-41%) | 1 (2%) | 1 (2%) |
| BN | Mar | 2 | 2 (18%) | 2 (0%) | 2 (5%) | 1 (-33%) | 1 (-36%) | 1 (-32%) | 2 (2%) | 1 (-29%) |
| BN | Apr | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | May | 7 | 7 (9%) | 7 (3%) | 6 (-2%) | 6 (-5%) | 6 (-8%) | 1 (-78%) | 7 (5%) | 6 (-4%) |
| BN | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Dec | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Jan | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Feb | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Mar | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Apr | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Dry | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Dec | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Jan | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Feb | 1 | 1 (14%) | 1 (-2%) | 1 (1%) | 1 (-1%) | 1 (-1%) | 0 (-55%) | 1 (7%) | 1 (-4%) |
| C | Mar | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Apr | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Dec | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |

Table I.2-39. Loss of Spotted bass at SWP Banks Pumping Plant for the No Action Alternative (NAA), Alternative 1 (Alt1), 4 components of Alternative 2 (Alt2), Alternative 3 (Alt3), Alternative 4 (Alt4), and Action 5 averaged by water year type and month, based on the salvage-density method. Percentage values in parentheses indicate the difference between NAA and each alternative. Absolute and percentage values are rounded.

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Wet | Jan | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Feb | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Mar | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Apr | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Dec | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Jan | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Feb | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Mar | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Apr | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| AN | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Dec | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Jan | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Feb | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Mar | 2 | 3 (98%) | 2 (-1%) | 1 (-6%) | 1 (-29%) | 1 (-27%) | 1 (-11%) | 2 (-2%) | 2 (6%) |
| BN | Apr | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Sep | 0 | 0 (54%) | 0 (10%) | 0 (5%) | 0 (4%) | 0 (13%) | 0 (48%) | 0 (10%) | 0 (21%) |
| BN | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Dec | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Jan | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Feb | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Mar | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Apr | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Dry | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Dec | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Jan | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Feb | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Mar | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Apr | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Dec | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |

Table I.2-40. Loss of Spotted bass at CVP Jones Pumping Plant for the No Action Alternative (NAA), Alternatives 1 3 and 4 (ALT1, ALT 3, ALT4), 4 components of Alternative 2 (ALT2), and Action 5 averaged by water year type and month, based on the salvage-density method. Percentage values in parentheses indicate the difference between NAA and each alternative. Absolute and percentage values are rounded.

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Wet | Jan | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Feb | 2 | 3 (3%) | 3 (5%) | 3 (4%) | 3 (6%) | 3 (6%) | 3 (2%) | 3 (7%) | 3 (5%) |
| Wet | Mar | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Apr | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Nov | 2 | 1 (-7%) | 2 (2%) | 2 (2%) | 2 (1%) | 2 (1%) | 2 (9%) | 2 (0%) | 1 (-2%) |
| Wet | Dec | 1 | 1 (6%) | 1 (-2%) | 1 (-2%) | 1 (-2%) | 1 (-1%) | 1 (-35%) | 1 (-7%) | 1 (0%) |
| AN | Jan | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Feb | 3 | 3 (6%) | 3 (2%) | 3 (2%) | 3 (2%) | 3 (2%) | 3 (-1%) | 3 (5%) | 3 (5%) |
| AN | Mar | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Apr | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| AN | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Nov | 2 | 1 (-8%) | 1 (-1%) | 1 (0%) | 1 (-1%) | 1 (0%) | 1 (-43%) | 1 (-1%) | 1 (-1%) |
| AN | Dec | 1 | 1 (19%) | 1 (8%) | 1 (9%) | 1 (10%) | 1 (10%) | 1 (-52%) | 1 (3%) | 1 (12%) |
| BN | Jan | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Feb | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Mar | 2 | 2 (18%) | 2 (0%) | 2 (5%) | 1 (-33%) | 1 (-36%) | 1 (-32%) | 2 (2%) | 1 (-29%) |
| BN | Apr | 3 | 3 (13%) | 3 (5%) | 3 (4%) | 3 (-6%) | 3 (-5%) | 1 (-68%) | 3 (6%) | 3 (-6%) |
| BN | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Dec | 3 | 3 (-1%) | 3 (-2%) | 3 (0%) | 3 (-1%) | 3 (-4%) | 1 (-49%) | 2 (-7%) | 3 (-3%) |
| Dry | Jan | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Feb | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Mar | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Apr | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Dry | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Nov | 7 | 6 (-8%) | 7 (1%) | 7 (1%) | 7 (0%) | 7 (2%) | 4 (-35%) | 7 (1%) | 6 (-4%) |
| Dry | Dec | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Jan | 1 | 1 (22%) | 1 (-11%) | 1 (-3%) | 1 (1%) | 1 (0%) | 0 (-46%) | 1 (-2%) | 1 (0%) |
| C | Feb | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Mar | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Apr | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Aug | 2 | 2 (-6%) | 2 (-10%) | 2 (-9%) | 1 (-16%) | 1 (-17%) | 0 (-77%) | 1 (-10%) | 1 (-15%) |
| C | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Dec | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |

Table I.2-41. Loss of Striped bass at SWP Banks Pumping Plant for the No Action Alternative (NAA), Alternative 1 (Alt1), 4 components of Alternative 2 (Alt2), Alternative 3 (Alt3), Alternative 4 (Alt4), and Action 5 averaged by water year type and month, based on the salvage-density method. Percentage values in parentheses indicate the difference between NAA and each alternative. Absolute and percentage values are rounded.

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Wet | Jan | 16,810 | 27,895 (66%) | 16,596 (-1%) | 16,585 (-1%) | 16,564 (-1%) | 16,567 (-1%) | 11,240 (-33%) | 15,710 (-7%) | 17,408 (4%) |
| Wet | Feb | 14,915 | 19,890 (33%) | 15,173 (2%) | 15,192 (2%) | 15,139 (2%) | 15,155 (2%) | 7,052 (-53%) | 15,588 (5%) | 15,905 (7%) |
| Wet | Mar | 14,229 | 18,367 (29%) | 15,114 (6%) | 15,220 (7%) | 14,802 (4%) | 14,660 (3%) | 5,939 (-58%) | 15,956 (12%) | 16,437 (16%) |
| Wet | Apr | 2,227 | 2,626 (18%) | 2,591 (16%) | 2,588 (16%) | 2,374 (7%) | 2,375 (7%) | 780 (-65%) | 2,556 (15%) | 2,450 (10%) |
| Wet | May | 881 | 1,470 (67%) | 1,480 (68%) | 1,477 (68%) | 1,475 (68%) | 1,479 (68%) | 278 (-68%) | 1,447 (64%) | 1,449 (65%) |
| Wet | Jun | 25,319 | 32,693 (29%) | 26,263 (4%) | 26,212 (4%) | 26,410 (4%) | 26,361 (4%) | 25,857 (2%) | 25,661 (1%) | 26,560 (5%) |
| Wet | Jul | 183,062 | 184,154 (1%) | 185,266 (1%) | 185,295 (1%) | 185,439 (1%) | 185,326 (1%) | 56,214 (-69%) | 185,256 (1%) | 185,341 (1%) |
| Wet | Aug | 30,054 | 31,115 (4%) | 30,708 (2%) | 30,660 (2%) | 30,629 (2%) | 30,670 (2%) | 12,776 (-57%) | 30,633 (2%) | 31,231 (4%) |
| Wet | Sep | 2,889 | 4,314 (49%) | 2,952 (2%) | 2,954 (2%) | 3,020 (5%) | 2,994 (4%) | 2,408 (-17%) | 3,025 (5%) | 4,258 (47%) |
| Wet | Oct | 874 | 1,117 (28%) | 846 (-3%) | 837 (-4%) | 854 (-2%) | 881 (1%) | 776 (-11%) | 869 (-1%) | 1,078 (23%) |
| Wet | Nov | 22,131 | 21,734 (-2%) | 22,327 (1%) | 22,320 (1%) | 22,271 (1%) | 22,057 (0%) | 13,732 (-38%) | 22,198 (0%) | 22,265 (1%) |
| Wet | Dec | 16,201 | 26,933 (66%) | 15,899 (-2%) | 15,905 (-2%) | 15,899 (-2%) | 15,961 (-1%) | 8,579 (-47%) | 14,676 (-9%) | 16,686 (3%) |
| AN | Jan | 11398 | 25,995 (128%) | 11,087 (-3%) | 11,072 (-3%) | 11,049 (-3%) | 11,057 (-3%) | 10,127 (-11%) | 10,483 (-8%) | 11,989 (5%) |
| AN | Feb | 10078 | 17,708 (76%) | 10,558 (5%) | 10,357 (3%) | 10,378 (3%) | 10,197 (1%) | 8,526 (-15%) | 11,690 (16%) | 11,868 (18%) |
| AN | Mar | 9229 | 17,415 (89%) | 8,847 (-4%) | 8,818 (-4%) | 7,537 (-18%) | 7,611 (-18%) | 7,524 (-18%) | 9,135 (-1%) | 10,775 (17%) |
| AN | Apr | 515 | 1,586 (208%) | 1,432 (178%) | 1,427 (177%) | 768 (49%) | 768 (49%) | 715 (39%) | 1,428 (177%) | 814 (58%) |
| AN | May | 336 | 836 (149%) | 751 (124%) | 751 (124%) | 657 (96%) | 648 (93%) | 238 (-29%) | 753 (124%) | 657 (96%) |
| AN | Jun | 18212 | 27,148 (49%) | 17,145 (-6%) | 17,243 (-5%) | 16,802 (-8%) | 16,684 (-8%) | 15,326 (-16%) | 17,120 (-6%) | 17,020 (-7%) |

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| AN | Jul | 180,809 | 186,324 (3%) | 185,897 (3%) | 185,893 (3%) | 184,890 (2%) | 184,994 (2%) | 48,266 (-73%) | 185,852 (3%) | 186,110 (3%) |
| AN | Aug | 30,027 | 31,886 (6%) | 30,609 (2%) | 30,552 (2%) | 30,711 (2%) | 30,605 (2%) | 11,602 (-61%) | 30,490 (2%) | 31,361 (4%) |
| AN | Sep | 1,515 | 3,863 (155%) | 1,871 (23%) | 1,864 (23%) | 2,069 (37%) | 2,055 (36%) | 1,706 (13%) | 1,872 (24%) | 2,902 (92%) |
| AN | Oct | 575 | 1,041 (81%) | 550 (-4%) | 554 (-4%) | 552 (-4%) | 566 (-2%) | 619 (8%) | 553 (-4%) | 874 (52%) |
| AN | Nov | 17,017 | 15,775 (-7%) | 17,179 (1%) | 17,349 (2%) | 17,282 (2%) | 17,392 (2%) | 11,297 (-34%) | 17,145 (1%) | 12,790 (-25%) |
| AN | Dec | 15,054 | 24,421 (62%) | 14,636 (-3%) | 14,503 (-4%) | 14,204 (-6%) | 14,197 (-6%) | 7,217 (-52%) | 12,832 (-15%) | 14,558 (-3%) |
| BN | Jan | 2,294 | 5,717 (149%) | 2,222 (-3%) | 2,221 (-3%) | 2,235 (-3%) | 2,235 (-3%) | 2,308 (1%) | 2,230 (-3%) | 2,357 (3%) |
| BN | Feb | 3,658 | 6,327 (73%) | 3,613 (-1%) | 3,534 (-3%) | 3,520 (-4%) | 3,526 (-4%) | 3,197 (-13%) | 4,082 (12%) | 4,084 (12%) |
| BN | Mar | 3,577 | 7,068 (98%) | 3,538 (-1%) | 3,353 (-6%) | 2,524 (-29%) | 2,616 (-27%) | 3,188 (-11%) | 3,491 (-2%) | 3,777 (6%) |
| BN | Apr | 278 | 550 (98%) | 483 (74%) | 494 (78%) | 310 (12%) | 321 (15%) | 292 (5%) | 485 (75%) | 360 (30%) |
| BN | May | 21,057 | 43,940 (109%) | 40,757 (94%) | 41,492 (97%) | 41,235 (96%) | 41,677 (98%) | 20,967 (0%) | 40,442 (92%) | 41,223 (96%) |
| BN | Jun | 141,141 | 186,855 (32%) | 132,424 (-6%) | 138,307 (-2%) | 138,160 (-2%) | 136,098 (-4%) | 101,891 (-28%) | 126,484 (-10%) | 130,271 (-8%) |
| BN | Jul | 105,031 | 108,622 (3%) | 109,063 (4%) | 109,162 (4%) | 106,446 (1%) | 106,480 (1%) | 36,008 (-66%) | 107,438 (2%) | 114,320 (9%) |
| BN | Aug | 14,136 | 14,024 (-1%) | 15,133 (7%) | 13,758 (-3%) | 15,727 (11%) | 15,816 (12%) | 8,400 (-41%) | 15,282 (8%) | 17,516 (24%) |
| BN | Sep | 756 | 1,162 (54%) | 835 (10%) | 796 (5%) | 787 (4%) | 858 (13%) | 1,119 (48%) | 831 (10%) | 914 (21%) |
| BN | Oct | 14,756 | 23,339 (58%) | 14,542 (-1%) | 13,994 (-5%) | 14,172 (-4%) | 14,664 (-1%) | 15,993 (8%) | 15,298 (4%) | 21,664 (47%) |
| BN | Nov | 50,873 | 47,910 (-6%) | 50,693 (0%) | 50,341 (-1%) | 52,418 (3%) | 53,141 (4%) | 31,287 (-38%) | 50,546 (-1%) | 49,564 (-3%) |
| BN | Dec | 10,457 | 13,996 (34%) | 9,955 (-5%) | 10,101 (-3%) | 10,236 (-2%) | 9,661 (-8%) | 5,720 (-45%) | 8,166 (-22%) | 9,908 (-5%) |
| Dry | Jan | 10,059 | 18,867 (88%) | 9,061 (-10%) | 9,003 (-10%) | 9,068 (-10%) | 8,744 (-13%) | 8,302 (-17%) | 10,133 (1%) | 9,848 (-2%) |
| Dry | Feb | 1,712 | 3,374 (97%) | 1,612 (-6%) | 1,612 (-6%) | 1,608 (-6%) | 1,610 (-6%) | 1,940 (13%) | 1,926 (12%) | 1,665 (-3%) |
| Dry | Mar | 890 | 1,599 (80%) | 850 (-4%) | 850 (-4%) | 702 (-21%) | 729 (-18%) | 1,138 (28%) | 892 (0%) | 868 (-2%) |
| Dry | Apr | 434 | 764 (76%) | 692 (59%) | 691 (59%) | 458 (6%) | 460 (6%) | 404 (-7%) | 694 (60%) | 445 (2%) |
| Dry | May | 4,976 | 10,896(119%) | 9,320 (87%) | 9,361 (88%) | 8,123 (63%) | 7,838 (58%) | 5,913 (19%) | 9,356 (88%) | 8,146 (64%) |

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Dry | Jun | 37,638 | 40,477 (8%) | 35,427 (-6%) | 35,169 (-7%) | 32,953 (-12%) | 32,283 (-14%) | 16,445 (-56%) | 34,542 (-8%) | 36,514 (-3%) |
| Dry | Jul | 15,489 | 16,065 (4%) | 14,754 (-5%) | 14,384 (-7%) | 15,924 (3%) | 16,125 (4%) | 11,471 (-26%) | 15,096 (-3%) | 18,706 (21%) |
| Dry | Aug | 503 | 622 (24%) | 538 (7%) | 517 (3%) | 816 (62%) | 838 (66%) | 1,165 (131%) | 563 (12%) | 1,026 (104%) |
| Dry | Sep | 171 | 166 (-3%) | 173 (1%) | 172 (0%) | 167 (-3%) | 168 (-2%) | 429 (150%) | 174 (1%) | 171 (0%) |
| Dry | Oct | 1,971 | 2,619 (33%) | 1,880 (-5%) | 1,880 (-5%) | 1,950 (-1%) | 2,023 (3%) | 2,211 (12%) | 1,888 (-4%) | 2,745 (39%) |
| Dry | Nov | 12,292 | 11,082 (-10%) | 12,226 (-1%) | 12,158 (-1%) | 13,094 (7%) | 13,053 (6%) | 7,706 (-37%) | 12,335 (0%) | 11,023 (-10%) |
| Dry | Dec | 23,041 | 31,841 (38%) | 23,222 (1%) | 23,093 (0%) | 22,577 (-2%) | 21,896 (-5%) | 11,381 (-51%) | 19,890 (-14%) | 20,663 (-10%) |
| C | Jan | 2,287 | 3,898 (70%) | 2,146 (-6%) | 1,923 (-16%) | 1,870 (-18%) | 1,912 (-16%) | 2,351 (3%) | 2,198 (-4%) | 2,217 (-3%) |
| C | Feb | 4,479 | 6,784 (51%) | 4,746 (6%) | 3,998 (-11%) | 3,952 (-12%) | 3,918 (-13%) | 5,665 (26%) | 5,542 (24%) | 4,780 (7%) |
| C | Mar | 667 | 759 (14%) | 643 (-4%) | 530 (-21%) | 555 (-17%) | 568 (-15%) | 756 (13%) | 677 (1%) | 657 (-2%) |
| C | Apr | 221 | 282 (27%) | 264 (20%) | 247 (12%) | 242 (10%) | 255 (15%) | 229 (4%) | 284 (29%) | 265 (20%) |
| C | May | 3,601 | 5,296 (47%) | 4,992 (39%) | 4,721 (31%) | 4,753 (32%) | 4,819 (34%) | 4,317 (20%) | 5,293 (47%) | 5,070 (41%) |
| C | Jun | 3,107 | 4,568 (47%) | 2,944 (-5%) | 3,253 (5%) | 3,758 (21%) | 3,499 (13%) | 5,811 (87%) | 2,982 (-4%) | 3,652 (18%) |
| C | Jul | 413 | 494 (20%) | 373 (-10%) | 387 (-6%) | 1,113 (170%) | 1,142 (177%) | 1,396 (239%) | 396 (-4%) | 902 (119%) |
| C | Aug | 76 | 76 (0%) | 76 (0%) | 76 (0%) | 164 (118%) | 175 (131%) | 433 (473%) | 76 (0%) | 186 (147%) |
| C | Sep | 58 | 69 (19%) | 64 (11%) | 71 (23%) | 78 (35%) | 78 (35%) | 273 (372%) | 62 (8%) | 69 (19%) |
| C | Oct | 4,270 | 5,517 (29%) | 4,131 (-3%) | 3,831 (-10%) | 3,864 (-10%) | 4,131 (-3%) | 5,911 (38%) | 4,181 (-2%) | 4,791 (12%) |
| C | Nov | 4,865 | 4,801 (-1%) | 4,638 (-5%) | 4,616 (-5%) | 4,405 (-9%) | 4,216 (-13%) | 4,968 (2%) | 4,642 (-5%) | 4,855 (0%) |
| C | Dec | 7,890 | 10,291 (30%) | 8,163 (3%) | 8,066 (2%) | 7,629 (-3%) | 7,665 (-3%) | 3,977 (-50%) | 7,211 (-9%) | 7,558 (-4%) |

Table I.2-42. Loss of Striped bass at CVP Jones Pumping Plant for the No Action Alternative (NAA), Alternatives 1 3 and 4 (ALT1, ALT 3, ALT4), 4 components of Alternative 2 (ALT2), and Action 5 averaged by water year type and month, based on the salvage-density method. Percentage values in parentheses indicate the difference between NAA and each alternative. Absolute and percentage values are rounded.

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Wet | Jan | 6,550 | 6,929 (6%) | 6,536 (0%) | 6,527 (0%) | 6,523 (0%) | 6,525 (0%) | 6,673 (2%) | 6,537 (0%) | 6,662 (2%) |
| Wet | Feb | 1,9730 | 2,029 (3%) | 2,067 (5%) | 2,058 (4%) | 2,086 (6%) | 2,083 (6%) | 2,018 (2%) | 2,106 (7%) | 2,068 (5%) |
| Wet | Mar | 1,100 | 1,114 (1%) | 1,185 (8%) | 1,167 (6%) | 1,117 (2%) | 1,123 (2%) | 704 (-36%) | 1,240 (13%) | 1,156 (5%) |
| Wet | Apr | 1,392 | 1,400 (1%) | 1,529 (10%) | 1,540 (11%) | 1,259 (-10%) | 1,242 (-11%) | 272 (-80%) | 1,558 (12%) | 1,209 (-13%) |
| Wet | May | 86 | 87 (1%) | 88 (2%) | 88 (2%) | 88 (1%) | 88 (1%) | 12 (-86%) | 88 (2%) | 88 (2%) |
| Wet | Jun | 6,717 | 6,692 (0%) | 6,336 (-6%) | 6,345 (-6%) | 6,300 (-6%) | 6,313 (-6%) | 3,609 (-46%) | 6,345 (-6%) | 6,413 (-5%) |
| Wet | Jul | 18,411 | 16,840 (-9%) | 17,373 (-6%) | 17,401 (-5%) | 17,022 (-8%) | 17,042 (-7%) | 6,679 (-64%) | 17,442 (-5%) | 17,103 (-7%) |
| Wet | Aug | 16,811 | 15,957 (-5%) | 16,016 (-5%) | 16,044 (-5%) | 16,053 (-5%) | 16,021 (-5%) | 2,969 (-82%) | 16,035 (-5%) | 17,195 (2%) |
| Wet | Sep | 2,546 | 2,742 (8%) | 2,514 (-1%) | 2,513 (-1%) | 2,510 (-1%) | 2,509 (-1%) | 1,131 (-56%) | 2,512 (-1%) | 2,766 (9%) |
| Wet | Oct | 494 | 533 (8%) | 478 (-3%) | 476 (-4%) | 482 (-3%) | 498 (1%) | 443 (-10%) | 497 (1%) | 543 (10%) |
| Wet | Nov | 618 | 577 (-7%) | 628 (2%) | 628 (2%) | 623 (1%) | 621 (1%) | 671 (9%) | 617 (0%) | 604 (-2%) |
| Wet | Dec | 1,824 | 1,936 (6%) | 1,793 (-2%) | 1,796 (-2%) | 1,797 (-2%) | 1,809 (-1%) | 1,186 (-35%) | 1,693 (-7%) | 1,819 (0%) |
| AN | Jan | 6,326 | 7,276 (15%) | 6,262 (-1%) | 6,249 (-1%) | 6,260 (-1%) | 6,256 (-1%) | 4,102 (-35%) | 6,179 (-2%) | 6,483 (2%) |
| AN | Feb | 2,164 | 2,294 (6%) | 2,201 (2%) | 2,198 (2%) | 2,198 (2%) | 2,198 (2%) | 2,135 (-1%) | 2,280 (5%) | 2,283 (5%) |
| AN | Mar | 1,168 | 1,290 (11%) | 1,255 (7%) | 1,255 (7%) | 918 (-21%) | 921 (-21%) | 852 (-27%) | 1,303 (12%) | 1,013 (-13%) |
| AN | Apr | 1,386 | 1,347 (-3%) | 1,384 (0%) | 1,384 (0%) | 922 (-33%) | 924 (-33%) | 212 (-85%) | 1,391 (0%) | 931 (-33%) |
| AN | May | 69 | 76 (9%) | 72 (3%) | 72 (3%) | 70 (0%) | 69 (0%) | 12 (-83%) | 72 (4%) | 70 (1%) |
| AN | Jun | 5,743 | 6,702 (17%) | 5,230 (-9%) | 5,208 (-9%) | 5,272 (-8%) | 5,287 (-8%) | 1,189 (-79%) | 5,234 (-9%) | 5,427 (-6%) |

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| AN | Jul | 17,617 | 18,976 (8%) | 18,203 (3%) | 18,220 (3%) | 17,567 (0%) | 17,416 (-1%) | 1,534 (-91%) | 18,287 (4%) | 17,588 (0%) |
| AN | Aug | 16,009 | 15,704 (-2%) | 16,161 (1%) | 15,910 (-1%) | 15,475 (-3%) | 15,346 (-4%) | 1,341 (-92%) | 15,892 (-1%) | 17,343 (8%) |
| AN | Sep | 2,130 | 2,621 (23%) | 2,106 (-1%) | 2,105 (-1%) | 2,098 (-1%) | 2,132 (0%) | 850 (-60%) | 2,111 (-1%) | 2,711 (27%) |
| AN | Oct | 380 | 511 (34%) | 379 (0%) | 375 (-1%) | 377 (-1%) | 382 (1%) | 290 (-24%) | 381 (0%) | 502 (32%) |
| AN | Nov | 610 | 561 (-8%) | 606 (-1%) | 608 (0%) | 607 (-1%) | 609 (0%) | 348 (-43%) | 604 (-1%) | 606 (-1%) |
| AN | Dec | 1,459 | 1,736 (19%) | 1,581 (8%) | 1,591 (9%) | 1,602 (10%) | 1,607 (10%) | 697 (-52%) | 1,509 (3%) | 1,634 (12%) |
| BN | Jan | 4,690 | 5,630 (20%) | 4,547 (-3%) | 4,545 (-3%) | 4,557 (-3%) | 4,555 (-3%) | 2,059 (-56%) | 4,565 (-3%) | 4,814 (3%) |
| BN | Feb | 4,916 | 5,324 (8%) | 4,723 (-4%) | 4,759 (-3%) | 4,746 (-3%) | 4,743 (-4%) | 2,878 (-41%) | 5,002 (2%) | 4,998 (2%) |
| BN | Mar | 7,051 | 8,328 (18%) | 7,084 (0%) | 7,398 (5%) | 4,692 (-33%) | 4,540 (-36%) | 4,788 (-32%) | 7,199 (2%) | 5,011 (-29%) |
| BN | Apr | 991 | 1,115 (13%) | 1,043 (5%) | 1,028 (4%) | 932 (-6%) | 943 (-5%) | 314 (-68%) | 1,051 (6%) | 928 (-6%) |
| BN | May | 9,464 | 10,288 (9%) | 9,793 (3%) | 9,268 (-2%) | 8,995 (-5%) | 8,746 (-8%) | 2,079 (-78%) | 9,890 (5%) | 9,050 (-4%) |
| BN | Jun | 49,788 | 54,770 (10%) | 44,213 (-11%) | 43,282 (-13%) | 43,061 (-14%) | 43,420 (-13%) | 7,628 (-85%) | 46,007 (-8%) | 45,549 (-9%) |
| BN | Jul | 20,924 | 19,231 (-8%) | 19,813 (-5%) | 19,496 (-7%) | 19,313 (-8%) | 19,767 (-6%) | 1,843 (-91%) | 21,098 (1%) | 20,473 (-2%) |
| BN | Aug | 3,702 | 3,017 (-19%) | 3,623 (-2%) | 3,551 (-4%) | 3,476 (-6%) | 3,452 (-7%) | 358 (-90%) | 3,633 (-2%) | 3,736 (1%) |
| BN | Sep | 519 | 482 (-7%) | 528 (2%) | 524 (1%) | 523 (1%) | 528 (2%) | 257 (-50%) | 529 (2%) | 528 (2%) |
| BN | Oct | 771 | 868 (13%) | 761 (-1%) | 739 (-4%) | 751 (-3%) | 757 (-2%) | 411 (-47%) | 774 (0%) | 862 (12%) |
| BN | Nov | 2,223 | 2,152 (-3%) | 2,287 (3%) | 2,246 (1%) | 2,243 (1%) | 2,277 (2%) | 1,498 (-33%) | 2,296 (3%) | 2,242 (1%) |
| BN | Dec | 775 | 770 (-1%) | 758 (-2%) | 771 (0%) | 765 (-1%) | 742 (-4%) | 396 (-49%) | 717 (-7%) | 750 (-3%) |
| Dry | Jan | 421 | 477 (13%) | 400 (-5%) | 402 (-5%) | 403 (-4%) | 415 (-1%) | 118 (-72%) | 409 (-3%) | 445 (6%) |
| Dry | Feb | 779 | 894 (15%) | 721 (-8%) | 721 (-8%) | 719 (-8%) | 745 (-4%) | 459 (-41%) | 804 (3%) | 786 (1%) |
| Dry | Mar | 2,480 | 2,731 (10%) | 2,463 (-1%) | 2,462 (-1%) | 1,963 (-21%) | 1,922 (-22%) | 1,436 (-42%) | 2,451 (-1%) | 2,178 (-12%) |
| Dry | Apr | 508 | 555 (9%) | 503 (-1%) | 503 (-1%) | 437 (-14%) | 438 (-14%) | 103 (-80%) | 506 (0%) | 443 (-13%) |
| Dry | May | 22,362 | 24,490 (10%) | 22,130 (-1%) | 22,051 (-1%) | 20,546 (-8%) | 20,278 (-9%) | 3,797 (-83%) | 22,154 (-1%) | 21,028 (-6%) |

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Dry | Jun | 87,321 | 89,558 (3%) | 73,070 (-16%) | 73,438 (-16%) | 74,738 (-14%) | 75,774 (-13%) | 10,117 (-88%) | 75,671 (-13%) | 81,394 (-7%) |
| Dry | Jul | 24,123 | 22,723 (-6%) | 21,427 (-11%) | 21,737 (-10%) | 22,218 (-8%) | 22,547 (-7%) | 2,473 (-90%) | 22,209 (-8%) | 23,721 (-2%) |
| Dry | Aug | 1,227 | 1,141 (-7%) | 1,115 (-9%) | 1,122 (-9%) | 1,129 (-8%) | 1,153 (-6%) | 161 (-87%) | 1,154 (-6%) | 1,234 (1%) |
| Dry | Sep | 596 | 516 (-13%) | 590 (-1%) | 591 (-1%) | 583 (-2%) | 583 (-2%) | 232 (-61%) | 592 (-1%) | 609 (2%) |
| Dry | Oct | 607 | 693 (14%) | 604 (-1%) | 603 (-1%) | 595 (-2%) | 596 (-2%) | 298 (-51%) | 597 (-2%) | 678 (12%) |
| Dry | Nov | 1,445 | 1,331 (-8%) | 1,463 (1%) | 1,462 (1%) | 1,440 (0%) | 1,475 (2%) | 936 (-35%) | 1,460 (1%) | 1,389 (-4%) |
| Dry | Dec | 1,888 | 2,154 (14%) | 1,974 (5%) | 1,908 (1%) | 1,880 (0%) | 1,860 (-1%) | 851 (-55%) | 1,888 (0%) | 1,788 (-5%) |
| C | Jan | 638 | 779 (22%) | 568 (-11%) | 616 (-3%) | 646 (1%) | 639 (0%) | 347 (-46%) | 626 (-2%) | 641 (0%) |
| C | Feb | 436 | 497 (14%) | 425 (-2%) | 439 (1%) | 433 (-1%) | 433 (-1%) | 197 (-55%) | 465 (7%) | 417 (-4%) |
| C | Mar | 332 | 285 (-14%) | 305 (-8%) | 279 (-16%) | 263 (-21%) | 262 (-21%) | 103 (-69%) | 323 (-3%) | 330 (0%) |
| C | Apr | 188 | 236 (26%) | 202 (8%) | 241 (28%) | 241 (28%) | 239 (27%) | 49 (-74%) | 199 (6%) | 201 (7%) |
| C | May | 17,374 | 18,138 (4%) | 18,146 (4%) | 18,383 (6%) | 18,399 (6%) | 18,403 (6%) | 3,618 (-79%) | 17,143 (-1%) | 18,087 (4%) |
| C | Jun | 21,495 | 22,051 (3%) | 19,767 (-8%) | 20,369 (-5%) | 19,374 (-10%) | 19,001 (-12%) | 4,499 (-79%) | 18,203 (-15%) | 18,185 (-15%) |
| C | Jul | 2,392 | 3,257 (36%) | 2,162 (-10%) | 2,912 (22%) | 2,784 (16%) | 2,776 (16%) | 581 (-76%) | 2,273 (-5%) | 2,196 (-8%) |
| C | Aug | 210 | 198 (-6%) | 190 (-10%) | 192 (-9%) | 177 (-16%) | 175 (-17%) | 48 (-77%) | 189 (-10%) | 178 (-15%) |
| C | Sep | 241 | 258 (7%) | 253 (5%) | 288 (20%) | 281 (17%) | 281 (16%) | 52 (-78%) | 256 (6%) | 255 (6%) |
| C | Oct | 119 | 127 (7%) | 125 (5%) | 122 (2%) | 127 (7%) | 126 (6%) | 64 (-46%) | 127 (7%) | 134 (13%) |
| C | Nov | 336 | 335 (-1%) | 363 (8%) | 332 (-1%) | 327 (-3%) | 348 (3%) | 115 (-66%) | 363 (8%) | 408 (21%) |
| C | Dec | 781 | 995 (27%) | 831 (6%) | 877 (12%) | 904 (16%) | 914 (17%) | 442 (-43%) | 844 (8%) | 862 (10%) |

Table I.2-43. Loss of White Sturgeon at SWP Banks Pumping Plant for the No Action Alternative (NAA), Alternative 1 (Alt1), 4 components of Alternative 2 (Alt2), Alternative 3 (Alt3), Alternative 4 (Alt4), and Action 5 averaged by water year type and month, based on the salvage-density method. Percentage values in parentheses indicate the difference between NAA and each alternative. Absolute and percentage values are rounded.

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Wet | Jan | 6 | 10 (66%) | 6 (-1%) | 6 (-1%) | 6 (-1%) | 6 (-1%) | 4 (-33%) | 5 (-7%) | 6 (4%) |
| Wet | Feb | 1 | 1 (33%) | 1 (2%) | 1 (2%) | 1 (2%) | 1 (2%) | 0 (-53%) | 1 (5%) | 1 (7%) |
| Wet | Mar | 3 | 3 (29%) | 3 (6%) | 3 (7%) | 3 (4%) | 3 (3%) | 1 (-58%) | 3 (12%) | 3 (16%) |
| Wet | Apr | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | May | 1 | 2 (67%) | 2 (68%) | 2 (68%) | 2 (68%) | 2 (68%) | 0 (-68%) | 2 (64%) | 2 (65%) |
| Wet | Jun | 2 | 3 (29%) | 2 (4%) | 2 (4%) | 2 (4%) | 2 (4%) | 2 (2%) | 2 (1%) | 2 (5%) |
| Wet | Jul | 4 | 4 (1%) | 4 (1%) | 4 (1%) | 4 (1%) | 4 (1%) | 1 (-69%) | 4 (1%) | 4 (1%) |
| Wet | Aug | 3 | 3 (4%) | 3 (2%) | 3 (2%) | 3 (2%) | 3 (2%) | 1 (-57%) | 3 (2%) | 3 (4%) |
| Wet | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Dec | 0 | 1 (66%) | 0 (-2%) | 0 (-2%) | 0 (-2%) | 0 (-1%) | 0 (-47%) | 0 (-9%) | 0 (3%) |
| AN | Jan | 4 | 9 (128%) | 4 (-3%) | 4 (-3%) | 4 (-3%) | 4 (-3%) | 4 (-11%) | 4 (-8%) | 4 (5%) |
| AN | Feb | 1 | 1 (76%) | 1 (5%) | 1 (3%) | 1 (3%) | 1 (1%) | 0 (-15%) | 1 (16%) | 1 (18%) |
| AN | Mar | 2 | 3 (89%) | 2 (-4%) | 2 (-4%) | 1 (-18%) | 1 (-18%) | 1 (-18%) | 2 (-1%) | 2 (17%) |
| AN | Apr | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | May | 1 | 1 (149%) | 1 (124%) | 1 (124%) | 1 (96%) | 1 (93%) | 0 (-29%) | 1 (124%) | 1 (96%) |
| AN | Jun | 2 | 2 (49%) | 1 (-6%) | 1 (-5%) | 1 (-8%) | 1 (-8%) | 1 (-16%) | 1 (-6%) | 1 (-7%) |

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| AN | Jul | 4 | 4 (3%) | 4 (3%) | 4 (3%) | 4 (2%) | 4 (2%) | 1 (-73%) | 4 (3%) | 4 (3%) |
| AN | Aug | 3 | 3 (6%) | 3 (2%) | 3 (2%) | 3 (2%) | 3 (2%) | 1 (-61%) | 3 (2%) | 3 (4%) |
| AN | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Dec | 0 | 1 (62%) | 0 (-3%) | 0 (-4%) | 0 (-6%) | 0 (-6%) | 0 (-52%) | 0 (-15%) | 0 (-3%) |
| BN | Jan | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Feb | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Mar | 1 | 3 (98%) | 1 (-1%) | 1 (-6%) | 1 (-29%) | 1 (-27%) | 1 (-11%) | 1 (-2%) | 1 (6%) |
| BN | Apr | 0 | 1 (98%) | 0 (74%) | 0 (78%) | 0 (12%) | 0 (15%) | 0 (5%) | 0 (75%) | 0 (30%) |
| BN | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Jun | 6 | 7 (32%) | 5 (-6%) | 5 (-2%) | 5 (-2%) | 5 (-4%) | 4 (-28%) | 5 (-10%) | 5 (-8%) |
| BN | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Nov | 2 | 2 (-6%) | 2 (0%) | 2 (-1%) | 2 (3%) | 2 (4%) | 1 (-38%) | 2 (-1%) | 2 (-3%) |
| BN | Dec | 3 | 4 (34%) | 3 (-5%) | 3 (-3%) | 3 (-2%) | 3 (-8%) | 2 (-45%) | 2 (-22%) | 3 (-5%) |
| Dry | Jan | 2 | 4 (88%) | 2 (-10%) | 2 (-10%) | 2 (-10%) | 2 (-13%) | 2 (-17%) | 2 (1%) | 2 (-2%) |
| Dry | Feb | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Mar | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Apr | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | May | 1 | 3 (119%) | 3 (87%) | 3 (88%) | 2 (63%) | 2 (58%) | 2 (19%) | 3 (88%) | 2 (64%) |

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Dry | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Dec | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Jan | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Feb | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Mar | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Apr | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Dec | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |

Table I.2-44. Loss of White Sturgeon at CVP Jones Pumping Plant for the No Action Alternative (NAA), Alternatives 1 3 and 4 (ALT1, ALT 3, ALT4), 4 components of Alternative 2 (ALT2), and Action 5 averaged by water year type and month, based on the salvage-density method. Percentage values in parentheses indicate the difference between NAA and each alternative. Absolute and percentage values are rounded.

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Wet | Jan | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Feb | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Mar | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Apr | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | May | 6 | 6 (1%) | 6 (2%) | 6 (2%) | 6 (1%) | 6 (1%) | 1 (-86%) | 6 (2%) | 6 (2%) |
| Wet | Jun | 24 | 23 (0%) | 22 (-6%) | 22 (-6%) | 22 (-6%) | 22 (-6%) | 13 (-46%) | 22 (-6%) | 22 (-5%) |
| Wet | Jul | 13 | 12 (-9%) | 12 (-6%) | 12 (-5%) | 12 (-8%) | 12 (-7%) | 5 (-64%) | 12 (-5%) | 12 (-7%) |
| Wet | Aug | 21 | 20 (-5%) | 20 (-5%) | 20 (-5%) | 20 (-5%) | 20 (-5%) | 4 (-82%) | 20 (-5%) | 21 (2%) |
| Wet | Sep | 12 | 13 (8%) | 12 (-1%) | 12 (-1%) | 12 (-1%) | 12 (-1%) | 5 (-56%) | 12 (-1%) | 13 (9%) |
| Wet | Oct | 1 | 1 (8%) | 1 (-3%) | 1 (-4%) | 1 (-3%) | 1 (1%) | 1 (-10%) | 1 (1%) | 1 (10%) |
| Wet | Nov | 3 | 2 (-7%) | 3 (2%) | 3 (2%) | 3 (1%) | 3 (1%) | 3 (9%) | 3 (0%) | 3 (-2%) |
| Wet | Dec | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Jan | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Feb | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Mar | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Apr | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | May | 5 | 5 (9%) | 5 (3%) | 5 (3%) | 5 (0%) | 5 (0%) | 1 (-83%) | 5 (4%) | 5 (1%) |
| AN | Jun | 20 | 23 (17%) | 18 (-9%) | 18 (-9%) | 18 (-8%) | 18 (-8%) | 4 (-79%) | 18 (-9%) | 19 (-6%) |

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| AN | Jul | 12 | 13 (8%) | 13 (3%) | 13 (3%) | 12 (0%) | 12 (-1%) | 1 (-91%) | 13 (4%) | 12 (0%) |
| AN | Aug | 20 | 19 (-2%) | 20 (1%) | 20 (-1%) | 19 (-3%) | 19 (-4%) | 2 (-92%) | 20 (-1%) | 21 (8%) |
| AN | Sep | 10 | 12 (23%) | 10 (-1%) | 10 (-1%) | 10 (-1%) | 10 (0%) | 4 (-60%) | 10 (-1%) | 13 (27%) |
| AN | Oct | 1 | 1 (34%) | 1 (0%) | 1 (-1%) | 1 (-1%) | 1 (1%) | 1 (-24%) | 1 (0%) | 1 (32%) |
| AN | Nov | 3 | 2 (-8%) | 3 (-1%) | 3 (0%) | 3 (-1%) | 3 (0%) | 1 (-43%) | 3 (-1%) | 3 (-1%) |
| AN | Dec | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Jan | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Feb | 2 | 2 (8%) | 2 (-4%) | 2 (-3%) | 2 (-3%) | 2 (-4%) | 1 (-41%) | 2 (2%) | 2 (2%) |
| BN | Mar | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Apr | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | May | 1 | 2 (9%) | 1 (3%) | 1 (-2%) | 1 (-5%) | 1 (-8%) | 0 (-78%) | 2 (5%) | 1 (-4%) |
| BN | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Oct | 13 | 15 (13%) | 13 (-1%) | 13 (-4%) | 13 (-3%) | 13 (-2%) | 7 (-47%) | 13 (0%) | 15 (12%) |
| BN | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Dec | 2 | 2 (-1%) | 2 (-2%) | 2 (0%) | 2 (-1%) | 2 (-4%) | 1 (-49%) | 2 (-7%) | 2 (-3%) |
| Dry | Jan | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Feb | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Mar | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Apr | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Dry | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Nov | 1 | 1 (-8%) | 1 (1%) | 1 (1%) | 1 (0%) | 1 (2%) | 1 (-35%) | 1 (1%) | 1 (-4%) |
| Dry | Dec | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Jan | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Feb | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Mar | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Apr | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Dec | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |

Table I.2-45. Loss of California Roach at SWP Banks Pumping Plant for the No Action Alternative (NAA), Alternative 1 (Alt1), 4 components of Alternative 2 (Alt2), Alternative 3 (Alt3), Alternative 4 (Alt4), and Action 5 averaged by water year type and month, based on the salvage-density method. Percentage values in parentheses indicate the difference between NAA and each alternative. Absolute and percentage values are rounded.

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Wet | Jan | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Feb | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Mar | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Apr | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Dec | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Jan | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Feb | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Mar | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Apr | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| AN | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Dec | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Jan | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Feb | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Mar | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Apr | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Dec | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Jan | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Feb | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Mar | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Apr | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Dry | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Dec | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Jan | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Feb | 0 | 0 (51%) | 0 (6%) | 0 (-11%) | 0 (-12%) | 0 (-13%) | 0 (26%) | 0 (24%) | 0 (7%) |
| C | Mar | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Apr | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Dec | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |

Table I.2-46. Loss of California Roach at CVP Jones Pumping Plant for the No Action Alternative (NAA), Alternatives 1 3 and 4 (ALT1, ALT 3, ALT4), 4 components of Alternative 2 (ALT2), and Action 5 averaged by water year type and month, based on the salvage-density method. Percentage values in parentheses indicate the difference between NAA and each alternative. Absolute and percentage values are rounded.

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Wet | Jan | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Feb | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Mar | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Apr | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Dec | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Jan | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Feb | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Mar | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Apr | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| AN | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Dec | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Jan | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Feb | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Mar | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Apr | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Dec | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Jan | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Feb | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Mar | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Apr | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Dry | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Dec | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Jan | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Feb | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Mar | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Apr | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Dec | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |

Table I.2-47. Loss of Threadfin Shad at SWP Banks Pumping Plant for the No Action Alternative (NAA), Alternative 1 (Alt1), 4 components of Alternative 2 (Alt2), Alternative 3 (Alt3), Alternative 4 (Alt4), and Action 5 averaged by water year type and month, based on the salvage-density method. Percentage values in parentheses indicate the difference between NAA and each alternative. Absolute and percentage values are rounded.

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Wet | Jan | 3,606 | 5,984 (66%) | 3,560 (-1%) | 3,558 (-1%) | 3,553 (-1%) | 3,554 (-1%) | 2,411 (-33%) | 3,370 (-7%) | 3,734 (4%) |
| Wet | Feb | 1,577 | 2,103 (33%) | 1,605 (2%) | 1,607 (2%) | 1,601 (2%) | 1,603 (2%) | 746 (-53%) | 1,648 (5%) | 1,682 (7%) |
| Wet | Mar | 228 | 294 (29%) | 242 (6%) | 244 (7%) | 237 (4%) | 235 (3%) | 95 (-58%) | 255 (12%) | 263 (16%) |
| Wet | Apr | 231 | 273 (18%) | 269 (16%) | 269 (16%) | 247 (7%) | 247 (7%) | 81 (-65%) | 266 (15%) | 255 (10%) |
| Wet | May | 916 | 1,528 (67%) | 1,538 (68%) | 1,536 (68%) | 1,534 (68%) | 1,538 (68%) | 289 (-68%) | 1,504 (64%) | 1,507 (65%) |
| Wet | Jun | 18,817 | 24,298 (29%) | 19,519 (4%) | 19,481 (4%) | 19,628 (4%) | 19,592 (4%) | 19,217 (2%) | 19,072 (1%) | 19,740 (5%) |
| Wet | Jul | 221,656 | 222,978 (1%) | 224,325 (1%) | 224,360 (1%) | 224,535 (1%) | 224,398 (1%) | 68,065 (-69%) | 224,313 (1%) | 224,416 (1%) |
| Wet | Aug | 218,346 | 226,055 (4%) | 223,102 (2%) | 222,753 (2%) | 222,528 (2%) | 222,825 (2%) | 92,819 (-57%) | 222,555 (2%) | 226,900 (4%) |
| Wet | Sep | 21,491 | 32,094 (49%) | 21,959 (2%) | 21,973 (2%) | 22,467 (5%) | 22,277 (4%) | 17,911 (-17%) | 22,507 (5%) | 31,680 (47%) |
| Wet | Oct | 6,983 | 8,927 (28%) | 6,761 (-3%) | 6,695 (-4%) | 6,825 (-2%) | 7,044 (1%) | 6,205 (-11%) | 6,943 (-1%) | 8,616 (23%) |
| Wet | Nov | 4,385 | 4,306 (-2%) | 4,423 (1%) | 4,422 (1%) | 4,412 (1%) | 4,370 (0%) | 2,721 (-38%) | 4,398 (0%) | 4,411 (1%) |
| Wet | Dec | 3,828 | 6,364 (66%) | 3,757 (-2%) | 3,759 (-2%) | 3,757 (-2%) | 3,772 (-1%) | 2,027 (-47%) | 3,468 (-9%) | 3,943 (3%) |
| AN | Jan | 2445 | 5,577 (128%) | 2,379 (-3%) | 2,375 (-3%) | 2,370 (-3%) | 2,372 (-3%) | 2,172 (-11%) | 2,249 (-8%) | 2,572 (5%) |
| AN | Feb | 1066 | 1,873 (76%) | 1,117 (5%) | 1,095 (3%) | 1,098 (3%) | 1,078 (1%) | 902 (-15%) | 1,236 (16%) | 1,255 (18%) |
| AN | Mar | 148 | 279 (89%) | 142 (-4%) | 141 (-4%) | 121 (-18%) | 122 (-18%) | 120 (-18%) | 146 (-1%) | 172 (17%) |
| AN | Apr | 54 | 165 (208%) | 149 (178%) | 148 (177%) | 80 (49%) | 80 (49%) | 74 (39%) | 148 (177%) | 85 (58%) |
| AN | May | 349 | 869 (149%) | 781 (124%) | 781 (124%) | 683 (96%) | 673 (93%) | 247 (-29%) | 783 (124%) | 683 (96%) |
| AN | Jun | 13535 | 20,177 (49%) | 12,742 (-6%) | 12,815 (-5%) | 12,487 (-8%) | 12,400 (-8%) | 11,390 (-16%) | 12,724 (-6%) | 12,650 (-7%) |

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| AN | Jul | 218928 | 225,606 (3%) | 225,090 (3%) | 225,084 (3%) | 223,870 (2%) | 223,996 (2%) | 58,442 (-73%) | 225,035 (3%) | 225,347 (3%) |
| AN | Aug | 218149 | 231,662 (6%) | 222,381 (2%) | 221,965 (2%) | 223,120 (2%) | 222,350 (2%) | 84,291 (-61%) | 221,515 (2%) | 227,847 (4%) |
| AN | Sep | 11271 | 28,741 (155%) | 13,918 (23%) | 13,865 (23%) | 15,390 (37%) | 15,291 (36%) | 12,689 (13%) | 13,923 (24%) | 21,588 (92%) |
| AN | Oct | 4593 | 8,321 (81%) | 4,396 (-4%) | 4,430 (-4%) | 4,410 (-4%) | 4,521 (-2%) | 4,952 (8%) | 4,417 (-4%) | 6,986 (52%) |
| AN | Nov | 3371 | 3,125 (-7%) | 3,403 (1%) | 3,437 (2%) | 3,424 (2%) | 3,446 (2%) | 2,238 (-34%) | 3,397 (1%) | 2,534 (-25%) |
| AN | Dec | 3557 | 5,771 (62%) | 3,459 (-3%) | 3,427 (-4%) | 3,356 (-6%) | 3,355 (-6%) | 1,706 (-52%) | 3,032 (-15%) | 3,440 (-3%) |
| BN | Jan | 369 | 920 (149%) | 357 (-3%) | 357 (-3%) | 360 (-3%) | 360 (-3%) | 371 (1%) | 359 (-3%) | 379 (3%) |
| BN | Feb | 650 | 1,124 (73%) | 642 (-1%) | 628 (-3%) | 625 (-4%) | 626 (-4%) | 568 (-13%) | 725 (12%) | 725 (12%) |
| BN | Mar | 193 | 381 (98%) | 190 (-1%) | 181 (-6%) | 136 (-29%) | 141 (-27%) | 172 (-11%) | 188 (-2%) | 203 (6%) |
| BN | Apr | 52 | 104 (98%) | 91 (74%) | 93 (78%) | 58 (12%) | 60 (15%) | 55 (5%) | 91 (75%) | 68 (30%) |
| BN | May | 4,015 | 8,378 (109%) | 7,771 (94%) | 7,911 (97%) | 7,862 (96%) | 7,946 (98%) | 3,998 (0%) | 7,711 (92%) | 7,860 (96%) |
| BN | Jun | 93,961 | 124,394(32%) | 88,158 (-6%) | 92,074 (-2%) | 91,976 (-2%) | 90,604 (-4%) | 67,831 (-28%) | 84,203 (-10%) | 86,725 (-8%) |
| BN | Jul | 757,516 | 783,412 (3%) | 786,594 (4%) | 787,307 (4%) | 767,719 (1%) | 767,970 (1%) | 259,697 (-66%) | 774,875 (2%) | 824,513 (9%) |
| BN | Aug | 236,786 | 234,897 (-1%) | 253,488 (7%) | 230,443 (-3%) | 263,425 (11%) | 264,915 (12%) | 140,709 (-41%) | 255,972 (8%) | 293,392 (24%) |
| BN | Sep | 24,519 | 37,673 (54%) | 27,058 (10%) | 25,799 (5%) | 25,513 (4%) | 27,815 (13%) | 36,258 (48%) | 26,942 (10%) | 29,628 (21%) |
| BN | Oct | 144,846 | 229,098 (58%) | 142,748 (-1%) | 137,368 (-5%) | 139,108 (-4%) | 143,942 (-1%) | 156,987 (8%) | 150,168 (4%) | 212,657 (47%) |
| BN | Nov | 12,735 | 11,993 (-6%) | 12,690 (0%) | 12,602 (-1%) | 13,122 (3%) | 13,303 (4%) | 7,832 (-38%) | 12,653 (-1%) | 12,407 (-3%) |
| BN | Dec | 3,036 | 4,063 (34%) | 2,890 (-5%) | 2,933 (-3%) | 2,972 (-2%) | 2,805 (-8%) | 1,661 (-45%) | 2,371 (-22%) | 2,877 (-5%) |
| Dry | Jan | 3,216 | 6,033 (88%) | 2,897 (-10%) | 2,879 (-10%) | 2,899 (-10%) | 2,796 (-13%) | 2,654 (-17%) | 3,240 (1%) | 3,149 (-2%) |
| Dry | Feb | 45 | 88 (97%) | 42 (-6%) | 42 (-6%) | 42 (-6%) | 42 (-6%) | 51 (13%) | 50 (12%) | 43 (-3%) |
| Dry | Mar | 26 | 47 (80%) | 25 (-4%) | 25 (-4%) | 21 (-21%) | 22 (-18%) | 34 (28%) | 26 (0%) | 26 (-2%) |
| Dry | Apr | 72 | 127 (76%) | 115 (59%) | 115 (59%) | 76 (6%) | 77 (6%) | 67 (-7%) | 116 (60%) | 74 (2%) |
| Dry | May | 581 | 1,272 (119%) | 1,088 (87%) | 1,093 (88%) | 948 (63%) | 915 (58%) | 690 (19%) | 1,092 (88%) | 951 (64%) |

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Dry | Jun | 52,031 | 55,955 (8%) | 48,974 (-6%) | 48,617 (-7%) | 45,554 (-12%) | 44,629 (-14%) | 22,734 (-56%) | 47,750 (-8%) | 50,477 (-3%) |
| Dry | Jul | 542,585 | 562,762 (4%) | 516,830 (-5%) | 503,893 (-7%) | 557,830 (3%) | 564,859 (4%) | 401,844 (-26%) | 528,827 (-3%) | 655,266 (21%) |
| Dry | Aug | 58,330 | 72,073 (24%) | 62,317 (7%) | 59,907 (3%) | 94,611 (62%) | 97,061 (66%) | 134,983 (131%) | 65,255 (12%) | 118,896 (104%) |
| Dry | Sep | 25,127 | 24,408 (-3%) | 25,371 (1%) | 25,248 (0%) | 24,411 (-3%) | 24,599 (-2%) | 62,905 (150%) | 25,494 (1%) | 25,037 (0%) |
| Dry | Oct | 3,932 | 5,224 (33%) | 3,750 (-5%) | 3,750 (-5%) | 3,889 (-1%) | 4,036 (3%) | 4,411 (12%) | 3,766 (-4%) | 5,477 (39%) |
| Dry | Nov | 11,701 | 10,549 (-10%) | 11,638 (-1%) | 11,574 (-1%) | 12,464 (7%) | 12,426 (6%) | 7,336 (-37%) | 11,742 (0%) | 10,493 (-10%) |
| Dry | Dec | 5,598 | 7,736 (38%) | 5,642 (1%) | 5,610 (0%) | 5,485 (-2%) | 5,319 (-5%) | 2,765 (-51%) | 4,832 (-14%) | 5,020 (-10%) |
| C | Jan | 676 | 1,152 (70%) | 634 (-6%) | 568 (-16%) | 553 (-18%) | 565 (-16%) | 695 (3%) | 650 (-4%) | 655 (-3%) |
| C | Feb | 335 | 508 (51%) | 356 (6%) | 299 (-11%) | 296 (-12%) | 293 (-13%) | 424 (26%) | 415 (24%) | 358 (7%) |
| C | Mar | 68 | 78 (14%) | 66 (-4%) | 54 (-21%) | 57 (-17%) | 58 (-15%) | 77 (13%) | 69 (1%) | 67 (-2%) |
| C | Apr | 27 | 35 (27%) | 33 (20%) | 30 (12%) | 30 (10%) | 31 (15%) | 28 (4%) | 35 (29%) | 33 (20%) |
| C | May | 344 | 506 (47%) | 477 (39%) | 451 (31%) | 455 (32%) | 461 (34%) | 413 (20%) | 506 (47%) | 485 (41%) |
| C | Jun | 5,245 | 7,710 (47%) | 4,970 (-5%) | 5,490 (5%) | 6,344 (21%) | 5,906 (13%) | 9,809 (87%) | 5,034 (-4%) | 6,165 (18%) |
| C | Jul | 9,347 | 11,204 (20%) | 8,451 (-10%) | 8,768 (-6%) | 25,219 (170%) | 25,883 (177%) | 31,644 (239%) | 8,963 (-4%) | 20,430 (119%) |
| C | Aug | 13,707 | 13,707 (0%) | 13,707 (0%) | 13,707 (0%) | 29,833 (118%) | 31,693 (131%) | 78,565 (473%) | 13,707 (0%) | 33,788 (147%) |
| C | Sep | 25,769 | 30,655 (19%) | 28,618 (11%) | 31,667 (23%) | 34,783 (35%) | 34,676 (35%) | 121,579 (372%) | 27,766 (8%) | 30,676 (19%) |
| C | Oct | 39,254 | 50,718 (29%) | 37,970 (-3%) | 35,213 (-10%) | 35,522 (-10%) | 37,977 (-3%) | 54,337 (38%) | 38,436 (-2%) | 44,044 (12%) |
| C | Nov | 58,261 | 57,495 (-1%) | 55,542 (-5%) | 55,285 (-5%) | 52,754 (-9%) | 50,494 (-13%) | 59,494 (2%) | 55,593 (-5%) | 58,137 (0%) |
| C | Dec | 5,173 | 6,747 (30%) | 5,352 (3%) | 5,289 (2%) | 5,002 (-3%) | 5,026 (-3%) | 2,608 (-50%) | 4,728 (-9%) | 4,955 (-4%) |

Table I.2-48. Loss of Threadfin Shad at CVP Jones Pumping Plant for the No Action Alternative (NAA), Alternatives 1 3 and 4 (ALT1, ALT 3, ALT4), 4 components of Alternative 2 (ALT2), and Action 5 averaged by water year type and month, based on the salvage-density method. Percentage values in parentheses indicate the difference between NAA and each alternative. Absolute and percentage values are rounded.

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Wet | Jan | 20,069 | 21,233 (6%) | 20,027 (0%) | 19,998 (0%) | 19,987 (0%) | 19,992 (0%) | 20,445 (2%) | 20,029 (0%) | 20,412 (2%) |
| Wet | Feb | 3,931 | 4,042 (3%) | 4,119 (5%) | 4,099 (4%) | 4,156 (6%) | 4,149 (6%) | 4,020 (2%) | 4,195 (7%) | 4,120 (5%) |
| Wet | Mar | 769 | 778 (1%) | 828 (8%) | 815 (6%) | 780 (2%) | 785 (2%) | 492 (-36%) | 867 (13%) | 808 (5%) |
| Wet | Apr | 968 | 973 (1%) | 1,063 (10%) | 1,071 (11%) | 875 (-10%) | 863 (-11%) | 189 (-80%) | 1,083 (12%) | 840 (-13%) |
| Wet | May | 678 | 683 (1%) | 689 (2%) | 688 (2%) | 688 (1%) | 688 (1%) | 98 (-86%) | 691 (2%) | 688 (2%) |
| Wet | Jun | 23,942 | 23,851 (0%) | 22,584 (-6%) | 22,614 (-6%) | 22,455 (-6%) | 22,499 (-6%) | 12,862 (-46%) | 22,616 (-6%) | 22,856 (-5%) |
| Wet | Jul | 152,683 | 139,659 (-9%) | 144,080 (-6%) | 144,313 (-5%) | 141,164 (-8%) | 141,333 (-7%) | 55,392 (-64%) | 144,652 (-5%) | 141,839 (-7%) |
| Wet | Aug | 265,053 | 251,589 (-5%) | 252,515 (-5%) | 252,957 (-5%) | 253,097 (-5%) | 252,589 (-5%) | 46,811 (-82%) | 252,814 (-5%) | 271,108 (2%) |
| Wet | Sep | 99,433 | 107,095 (8%) | 98,206 (-1%) | 98,165 (-1%) | 98,029 (-1%) | 98,005 (-1%) | 44,183 (-56%) | 98,106 (-1%) | 108,034 (9%) |
| Wet | Oct | 37,129 | 40,027 (8%) | 35,883 (-3%) | 35,715 (-4%) | 36,187 (-3%) | 37,431 (1%) | 33,275 (-10%) | 37,337 (1%) | 40,806 (10%) |
| Wet | Nov | 78,493 | 73,346 (-7%) | 79,811 (2%) | 79,771 (2%) | 79,131 (1%) | 78,915 (1%) | 85,215 (9%) | 78,432 (0%) | 76,786 (-2%) |
| Wet | Dec | 26,763 | 28,408 (6%) | 26,302 (-2%) | 26,345 (-2%) | 26,358 (-2%) | 26,536 (-1%) | 17,399 (-35%) | 24,833 (-7%) | 26,688 (0%) |
| AN | Jan | 19,384 | 22,294 (15%) | 19,188 (-1%) | 19,147 (-1%) | 19,183 (-1%) | 19,169 (-1%) | 12,569 (-35%) | 18,933 (-2%) | 19,864 (2%) |
| AN | Feb | 4,312 | 4,569 (6%) | 4,385 (2%) | 4,379 (2%) | 4,378 (2%) | 4,379 (2%) | 4,254 (-1%) | 4,541 (5%) | 4,547 (5%) |
| AN | Mar | 816 | 901 (11%) | 876 (7%) | 876 (7%) | 641 (-21%) | 643 (-21%) | 595 (-27%) | 910 (12%) | 707 (-13%) |
| AN | Apr | 963 | 936 (-3%) | 962 (0%) | 962 (0%) | 641 (-33%) | 642 (-33%) | 147 (-85%) | 966 (0%) | 647 (-33%) |
| AN | May | 545 | 596 (9%) | 563 (3%) | 563 (3%) | 546 (0%) | 543 (0%) | 90 (-83%) | 565 (4%) | 551 (1%) |
| AN | Jun | 20,470 | 23,889 (17%) | 18,641 (-9%) | 18,561 (-9%) | 18,790 (-8%) | 18,844 (-8%) | 4,236 (-79%) | 18,655 (-9%) | 19,344 (-6%) |

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| AN | Jul | 146,103 | 157,368 (8%) | 150,958 (3%) | 151,101 (3%) | 145,690 (0%) | 144,434 (-1%) | 12,726 (-91%) | 151,653 (4%) | 145,864 (0%) |
| AN | Aug | 252,401 | 247,589 (-2%) | 254,799 (1%) | 250,846 (-1%) | 243,987 (-3%) | 241,946 (-4%) | 21,139 (-92%) | 250,563 (-1%) | 273,433 (8%) |
| AN | Sep | 83,189 | 102,387(23%) | 82,269 (-1%) | 82,219 (-1%) | 81,946 (-1%) | 83,296 (0%) | 33,220 (-60%) | 82,473 (-1%) | 105,903 (27%) |
| AN | Oct | 28,549 | 38,350 (34%) | 28,466 (0%) | 28,148 (-1%) | 28,306 (-1%) | 28,704 (1%) | 21,769 (-24%) | 28,645 (0%) | 37,670 (32%) |
| AN | Nov | 77,539 | 71,260 (-8%) | 77,044 (-1%) | 77,235 (0%) | 77,089 (-1%) | 77,318 (0%) | 44,228 (-43%) | 76,725 (-1%) | 76,937 (-1%) |
| AN | Dec | 21,398 | 25,472 (19%) | 23,188 (8%) | 23,341 (9%) | 23,499 (10%) | 23,570 (10%) | 10,229 (-52%) | 22,134 (3%) | 23,972 (12%) |
| BN | Jan | 7,432 | 8,920 (20%) | 7,205 (-3%) | 7,202 (-3%) | 7,220 (-3%) | 7,218 (-3%) | 3,262 (-56%) | 7,234 (-3%) | 7,627 (3%) |
| BN | Feb | 5,133 | 5,559 (8%) | 4,931 (-4%) | 4,968 (-3%) | 4,954 (-3%) | 4,952 (-4%) | 3,005 (-41%) | 5,222 (2%) | 5,217 (2%) |
| BN | Mar | 2,328 | 2,750 (18%) | 2,339 (0%) | 2,443 (5%) | 1,549 (-33%) | 1,499 (-36%) | 1,581 (-32%) | 2,377 (2%) | 1,654 (-29%) |
| BN | Apr | 361 | 406 (13%) | 380 (5%) | 374 (4%) | 339 (-6%) | 343 (-5%) | 114 (-68%) | 382 (6%) | 338 (-6%) |
| BN | May | 330 | 358 (9%) | 341 (3%) | 323 (-2%) | 313 (-5%) | 305 (-8%) | 72 (-78%) | 344 (5%) | 315 (-4%) |
| BN | Jun | 39,842 | 43,829 (10%) | 35,380 (-11%) | 34,635 (-13%) | 34,459 (-14%) | 34,746 (-13%) | 6,104 (-85%) | 36,816 (-8%) | 36,450 (-9%) |
| BN | Jul | 277,830 | 255,349 (-8%) | 263,080 (-5%) | 258,865 (-7%) | 256,434 (-8%) | 262,470 (-6%) | 24,474 (-91%) | 280,142 (1%) | 271,836 (-2%) |
| BN | Aug | 447,299 | 364,502 (-19%) | 437,809 (-2%) | 429,124 (-4%) | 420,061 (-6%) | 417,151 (-7%) | 43,215 (-90%) | 439,021 (-2%) | 451,479 (1%) |
| BN | Sep | 142,865 | 132,688 (-7%) | 145,337 (2%) | 144,391 (1%) | 143,915 (1%) | 145,500 (2%) | 70,793 (-50%) | 145,594 (2%) | 145,323 (2%) |
| BN | Oct | 18,773 | 21,141 (13%) | 18,543 (-1%) | 18,007 (-4%) | 18,292 (-3%) | 18,426 (-2%) | 10,009 (-47%) | 18,840 (0%) | 20,991 (12%) |
| BN | Nov | 82,686 | 80,024 (-3%) | 85,045 (3%) | 83,551 (1%) | 83,437 (1%) | 84,676 (2%) | 55,715 (-33%) | 85,385 (3%) | 83,368 (1%) |
| BN | Dec | 11,462 | 11,395 (-1%) | 11,209 (-2%) | 11,414 (0%) | 11,313 (-1%) | 10,984 (-4%) | 5,859 (-49%) | 10,604 (-7%) | 11,098 (-3%) |
| Dry | Jan | 7,286 | 8,258 (13%) | 6,918 (-5%) | 6,957 (-5%) | 6,971 (-4%) | 7,185 (-1%) | 2,046 (-72%) | 7,074 (-3%) | 7,709 (6%) |
| Dry | Feb | 1,668 | 1,913 (15%) | 1,542 (-8%) | 1,542 (-8%) | 1,539 (-8%) | 1,593 (-4%) | 983 (-41%) | 1,720 (3%) | 1,683 (1%) |
| Dry | Mar | 595 | 656 (10%) | 591 (-1%) | 591 (-1%) | 471 (-21%) | 462 (-22%) | 345 (-42%) | 588 (-1%) | 523 (-12%) |
| Dry | Apr | 797 | 871 (9%) | 790 (-1%) | 789 (-1%) | 687 (-14%) | 687 (-14%) | 161 (-80%) | 795 (0%) | 695 (-13%) |
| Dry | May | 185 | 202 (10%) | 183 (-1%) | 182 (-1%) | 170 (-8%) | 167 (-9%) | 31 (-83%) | 183 (-1%) | 174 (-6%) |

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Dry | Jun | 36,894 | 37,840 (3%) | 30,873 (-16%) | 31,029 (-16%) | 31,578 (-14%) | 32,016 (-13%) | 4,274 (-88%) | 31,972 (-13%) | 34,390 (-7%) |
| Dry | Jul | 874,982 | 824,208 (-6%) | 777,202 (-11%) | 788,447 (-10%) | 805,894 (-8%) | 817,824 (-7%) | 89,682 (-90%) | 805,544 (-8%) | 860,405 (-2%) |
| Dry | Aug | 105,528 | 98,116 (-7%) | 95,925 (-9%) | 96,529 (-9%) | 97,140 (-8%) | 99,203 (-6%) | 13,864 (-87%) | 99,288 (-6%) | 106,133 (1%) |
| Dry | Sep | 55,240 | 47,876 (-13%) | 54,726 (-1%) | 54,809 (-1%) | 54,096 (-2%) | 54,095 (-2%) | 21,546 (-61%) | 54,931 (-1%) | 56,480 (2%) |
| Dry | Oct | 860,947 | 982,865 (14%) | 856,012 (-1%) | 855,716 (-1%) | 843,364 (-2%) | 845,993 (-2%) | 422,033 (-51%) | 846,545 (-2%) | 961,564 (12%) |
| Dry | Nov | 122,527 | 112,848 (-8%) | 124,049 (1%) | 124,008 (1%) | 122,080 (0%) | 125,128 (2%) | 79,353 (-35%) | 123,848 (1%) | 117,795 (-4%) |
| Dry | Dec | 19,655 | 22,420 (14%) | 20,549 (5%) | 19,861 (1%) | 19,574 (0%) | 19,360 (-1%) | 8,857 (-55%) | 19,651 (0%) | 18,608 (-5%) |
| C | Jan | 1,482 | 1,808 (22%) | 1,319 (-11%) | 1,431 (-3%) | 1,501 (1%) | 1,483 (0%) | 807 (-46%) | 1,454 (-2%) | 1,489 (0%) |
| C | Feb | 400 | 457 (14%) | 391 (-2%) | 403 (1%) | 398 (-1%) | 397 (-1%) | 181 (-55%) | 427 (7%) | 383 (-4%) |
| C | Mar | 83 | 71 (-14%) | 76 (-8%) | 70 (-16%) | 66 (-21%) | 65 (-21%) | 26 (-69%) | 81 (-3%) | 82 (0%) |
| C | Apr | 88 | 110 (26%) | 94 (8%) | 113 (28%) | 112 (28%) | 111 (27%) | 23 (-74%) | 93 (6%) | 94 (7%) |
| C | May | 103 | 107 (4%) | 107 (4%) | 109 (6%) | 109 (6%) | 109 (6%) | 21 (-79%) | 101 (-1%) | 107 (4%) |
| C | Jun | 29,370 | 30,130 (3%) | 27,010 (-8%) | 27,831 (-5%) | 26,473 (-10%) | 25,963 (-12%) | 6,147 (-79%) | 24,872 (-15%) | 24,847 (-15%) |
| C | Jul | 150,668 | 205,112 (36%) | 136,158 (-10%) | 183,406 (22%) | 175,330 (16%) | 174,831 (16%) | 36,586 (-76%) | 143,134 (-5%) | 138,328 (-8%) |
| C | Aug | 90,817 | 85,361 (-6%) | 82,029 (-10%) | 82,759 (-9%) | 76,642 (-16%) | 75,712 (-17%) | 20,889 (-77%) | 81,519 (-10%) | 76,955 (-15%) |
| C | Sep | 59,403 | 63,533 (7%) | 62,512 (5%) | 71,142 (20%) | 69,392 (17%) | 69,197 (16%) | 12,867 (-78%) | 63,191 (6%) | 62,821 (6%) |
| C | Oct | 11,924 | 12,762 (7%) | 12,488 (5%) | 12,181 (2%) | 12,741 (7%) | 12,632 (6%) | 6,382 (-46%) | 12,703 (7%) | 13,416 (13%) |
| C | Nov | 6,950 | 6,914 (-1%) | 7,504 (8%) | 6,857 (-1%) | 6,762 (-3%) | 7,189 (3%) | 2,372 (-66%) | 7,495 (8%) | 8,432 (21%) |
| C | Dec | 3,601 | 4,590 (27%) | 3,833 (6%) | 4,045 (12%) | 4,171 (16%) | 4,214 (17%) | 2,038 (-43%) | 3,891 (8%) | 3,975 (10%) |

Table I.2-49. Loss of Hitch at SWP Banks Pumping Plant for the No Action Alternative (NAA), Alternative 1 (Alt1), 4 components of Alternative 2 (Alt2), Alternative 3 (Alt3), Alternative 4 (Alt4), and Action 5 averaged by water year type and month, based on the salvage-density method. Percentage values in parentheses indicate the difference between NAA and each alternative. Absolute and percentage values are rounded.

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Wet | Jan | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Feb | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Mar | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Apr | 1 | 2 (18%) | 2 (16%) | 2 (16%) | 1 (7%) | 1 (7%) | 0 (-65%) | 2 (15%) | 1 (10%) |
| Wet | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Dec | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Jan | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Feb | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Mar | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Apr | 0 | 1 (208%) | 1 (178%) | 1 (177%) | 0 (49%) | 0 (49%) | 0 (39%) | 1 (177%) | 0 (58%) |
| AN | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| AN | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Dec | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Jan | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Feb | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Mar | 0 | 1 (98%) | 0 (-1%) | 0 (-6%) | 0 (-29%) | 0 (-27%) | 0 (-11%) | 0 (-2%) | 0 (6%) |
| BN | Apr | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Jun | 1 | 2 (32%) | 1 (-6%) | 1 (-2%) | 1 (-2%) | 1 (-4%) | 1 (-28%) | 1 (-10%) | 1 (-8%) |
| BN | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Aug | 3 | 3 (-1%) | 3 (7%) | 3 (-3%) | 3 (11%) | 3 (12%) | 2 (-41%) | 3 (8%) | 4 (24%) |
| BN | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Nov | 2 | 2 (-6%) | 2 (0%) | 2 (-1%) | 2 (3%) | 2 (4%) | 1 (-38%) | 2 (-1%) | 2 (-3%) |
| BN | Dec | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Jan | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Feb | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Mar | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Apr | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Dry | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Oct | 1 | 1 (33%) | 1 (-5%) | 1 (-5%) | 1 (-1%) | 1 (3%) | 1 (12%) | 1 (-4%) | 1 (39%) |
| Dry | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Dec | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Jan | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Feb | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Mar | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Apr | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Dec | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |

Table I.2-50. Loss of Hitch at CVP Jones Pumping Plant for the No Action Alternative (NAA), Alternatives 1 3 and 4 (ALT1, ALT 3, ALT4), 4 components of Alternative 2 (ALT2), and Action 5 averaged by water year type and month, based on the salvage-density method. Percentage values in parentheses indicate the difference between NAA and each alternative. Absolute and percentage values are rounded.

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Wet | Jan | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Feb | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Mar | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Apr | 3 | 3 (1%) | 3 (10%) | 3 (11%) | 3 (-10%) | 3 (-11%) | 1 (-80%) | 3 (12%) | 2 (-13%) |
| Wet | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Dec | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Jan | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Feb | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Mar | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Apr | 3 | 3 (-3%) | 3 (0%) | 3 (0%) | 2 (-33%) | 2 (-33%) | 0 (-85%) | 3 (0%) | 2 (-33%) |
| AN | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| AN | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Dec | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Jan | 0 | 0 (20%) | 0 (-3%) | 0 (-3%) | 0 (-3%) | 0 (-3%) | 0 (-56%) | 0 (-3%) | 0 (3%) |
| BN | Feb | 0 | 0 (8%) | 0 (-4%) | 0 (-3%) | 0 (-3%) | 0 (-4%) | 0 (-41%) | 0 (2%) | 0 (2%) |
| BN | Mar | 1 | 1 (18%) | 1 (0%) | 1 (5%) | 1 (-33%) | 1 (-36%) | 1 (-32%) | 1 (2%) | 1 (-29%) |
| BN | Apr | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Dec | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Jan | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Feb | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Mar | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Apr | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Dry | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Dec | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Jan | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Feb | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Mar | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Apr | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Dec | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |

Table I.2-51. Loss of Starry Flounder at SWP Banks Pumping Plant for the No Action Alternative (NAA), Alternative 1 (Alt1), 4 components of Alternative 2 (Alt2), Alternative 3 (Alt3), Alternative 4 (Alt4), and Action 5 averaged by water year type and month, based on the salvage-density method. Percentage values in parentheses indicate the difference between NAA and each alternative. Absolute and percentage values are rounded.

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Wet | Jan | 2 | 4 (66%) | 2 (-1%) | 2 (-1%) | 2 (-1%) | 2 (-1%) | 1 (-33%) | 2 (-7%) | 2 (4%) |
| Wet | Feb | 1 | 1 (33%) | 1 (2%) | 1 (2%) | 1 (2%) | 1 (2%) | 0 (-53%) | 1 (5%) | 1 (7%) |
| Wet | Mar | 10 | 13 (29%) | 10 (6%) | 10 (7%) | 10 (4%) | 10 (3%) | 4 (-58%) | 11 (12%) | 11 (16%) |
| Wet | Apr | 8 | 10 (18%) | 10 (16%) | 10 (16%) | 9 (7%) | 9 (7%) | 3 (-65%) | 9 (15%) | 9 (10%) |
| Wet | May | 10 | 17 (67%) | 18 (68%) | 18 (68%) | 18 (68%) | 18 (68%) | 3 (-68%) | 17 (64%) | 17 (65%) |
| Wet | Jun | 17 | 22 (29%) | 17 (4%) | 17 (4%) | 17 (4%) | 17 (4%) | 17 (2%) | 17 (1%) | 18 (5%) |
| Wet | Jul | 14 | 14 (1%) | 14 (1%) | 15 (1%) | 15 (1%) | 15 (1%) | 4 (-69%) | 14 (1%) | 15 (1%) |
| Wet | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Dec | 2 | 4 (66%) | 2 (-2%) | 2 (-2%) | 2 (-2%) | 2 (-1%) | 1 (-47%) | 2 (-9%) | 2 (3%) |
| AN | Jan | 1 | 3 (128%) | 1 (-3%) | 1 (-3%) | 1 (-3%) | 1 (-3%) | 1 (-11%) | 1 (-8%) | 2 (5%) |
| AN | Feb | 1 | 1 (76%) | 1 (5%) | 1 (3%) | 1 (3%) | 1 (1%) | 1 (-15%) | 1 (16%) | 1 (18%) |
| AN | Mar | 6 | 12 (89%) | 6 (-4%) | 6 (-4%) | 5 (-18%) | 5 (-18%) | 5 (-18%) | 6 (-1%) | 7 (17%) |
| AN | Apr | 2 | 6 (208%) | 5 (178%) | 5 (177%) | 3 (49%) | 3 (49%) | 3 (39%) | 5 (177%) | 3 (58%) |
| AN | May | 4 | 10 (149%) | 9 (124%) | 9 (124%) | 8 (96%) | 8 (93%) | 3 (-29%) | 9 (124%) | 8 (96%) |
| AN | Jun | 12 | 18 (49%) | 11 (-6%) | 11 (-5%) | 11 (-8%) | 11 (-8%) | 10 (-16%) | 11 (-6%) | 11 (-7%) |

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| AN | Jul | 14 | 15 (3%) | 15 (3%) | 15 (3%) | 14 (2%) | 14 (2%) | 4 (-73%) | 15 (3%) | 15 (3%) |
| AN | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Dec | 2 | 4 (62%) | 2 (-3%) | 2 (-4%) | 2 (-6%) | 2 (-6%) | 1 (-52%) | 2 (-15%) | 2 (-3%) |
| BN | Jan | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Feb | 3 | 5 (73%) | 3 (-1%) | 3 (-3%) | 3 (-4%) | 3 (-4%) | 3 (-13%) | 3 (12%) | 3 (12%) |
| BN | Mar | 1 | 2 (98%) | 1 (-1%) | 1 (-6%) | 1 (-29%) | 1 (-27%) | 1 (-11%) | 1 (-2%) | 1 (6%) |
| BN | Apr | 6 | 12 (98%) | 10 (74%) | 11 (78%) | 7 (12%) | 7 (15%) | 6 (5%) | 11 (75%) | 8 (30%) |
| BN | May | 25 | 52 (109%) | 48 (94%) | 49 (97%) | 48 (96%) | 49 (98%) | 25 (0%) | 47 (92%) | 48 (96%) |
| BN | Jun | 97 | 128 (32%) | 91 (-6%) | 95 (-2%) | 95 (-2%) | 93 (-4%) | 70 (-28%) | 87 (-10%) | 89 (-8%) |
| BN | Jul | 4 | 4 (3%) | 4 (4%) | 4 (4%) | 4 (1%) | 4 (1%) | 1 (-66%) | 4 (2%) | 4 (9%) |
| BN | Aug | 15 | 14 (-1%) | 16 (7%) | 14 (-3%) | 16 (11%) | 16 (12%) | 9 (-41%) | 16 (8%) | 18 (24%) |
| BN | Sep | 0 | 0 (54%) | 0 (10%) | 0 (5%) | 0 (4%) | 0 (13%) | 0 (48%) | 0 (10%) | 0 (21%) |
| BN | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Dec | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Jan | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Feb | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Mar | 1 | 1 (80%) | 1 (-4%) | 1 (-4%) | 1 (-21%) | 1 (-18%) | 1 (28%) | 1 (0%) | 1 (-2%) |
| Dry | Apr | 6 | 11 (76%) | 10 (59%) | 10 (59%) | 6 (6%) | 6 (6%) | 6 (-7%) | 10 (60%) | 6 (2%) |
| Dry | May | 5 | 10 (119%) | 9 (87%) | 9 (88%) | 7 (63%) | 7 (58%) | 5 (19%) | 9 (88%) | 8 (64%) |

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Dry | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Jul | 2 | 2 (4%) | 2 (-5%) | 2 (-7%) | 2 (3%) | 2 (4%) | 2 (-26%) | 2 (-3%) | 3 (21%) |
| Dry | Aug | 1 | 1 (24%) | 1 (7%) | 1 (3%) | 1 (62%) | 1 (66%) | 1 (131%) | 1 (12%) | 1 (104%) |
| Dry | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Nov | 1 | 1 (-10%) | 1 (-1%) | 1 (-1%) | 1 (7%) | 1 (6%) | 1 (-37%) | 1 (0%) | 1 (-10%) |
| Dry | Dec | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Jan | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Feb | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Mar | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Apr | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Oct | 1 | 1 (29%) | 1 (-3%) | 1 (-10%) | 1 (-10%) | 1 (-3%) | 1 (38%) | 1 (-2%) | 1 (12%) |
| C | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Dec | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |

Table I.2-52. Loss of Starry Flounder at CVP Jones Pumping Plant for the No Action Alternative (NAA), Alternatives 1 3 and 4 (ALT1, ALT 3, ALT4), 4 components of Alternative 2 (ALT2), and Action 5 averaged by water year type and month, based on the salvage-density method. Percentage values in parentheses indicate the difference between NAA and each alternative. Absolute and percentage values are rounded.

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Wet | Jan | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Feb | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Mar | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Apr | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Jun | 5 | 5 (0%) | 5 (-6%) | 5 (-6%) | 5 (-6%) | 5 (-6%) | 3 (-46%) | 5 (-6%) | 5 (-5%) |
| Wet | Jul | 2 | 2 (-9%) | 2 (-6%) | 2 (-5%) | 2 (-8%) | 2 (-7%) | 1 (-64%) | 2 (-5%) | 2 (-7%) |
| Wet | Aug | 3 | 2 (-5%) | 2 (-5%) | 2 (-5%) | 2 (-5%) | 2 (-5%) | 0 (-82%) | 2 (-5%) | 3 (2%) |
| Wet | Sep | 3 | 3 (8%) | 3 (-1%) | 3 (-1%) | 3 (-1%) | 3 (-1%) | 1 (-56%) | 3 (-1%) | 3 (9%) |
| Wet | Oct | 1 | 1 (8%) | 1 (-3%) | 1 (-4%) | 1 (-3%) | 1 (1%) | 1 (-10%) | 1 (1%) | 1 (10%) |
| Wet | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Wet | Dec | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Jan | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Feb | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Mar | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Apr | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Jun | 4 | 5 (17%) | 4 (-9%) | 4 (-9%) | 4 (-8%) | 4 (-8%) | 1 (-79%) | 4 (-9%) | 4 (-6%) |

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| AN | Jul | 2 | 2 (8%) | 2 (3%) | 2 (3%) | 2 (0%) | 2 (-1%) | 0 (-91%) | 2 (4%) | 2 (0%) |
| AN | Aug | 2 | 2 (-2%) | 2 (1%) | 2 (-1%) | 2 (-3%) | 2 (-4%) | 0 (-92%) | 2 (-1%) | 3 (8%) |
| AN | Sep | 2 | 3 (23%) | 2 (-1%) | 2 (-1%) | 2 (-1%) | 2 (0%) | 1 (-60%) | 2 (-1%) | 3 (27%) |
| AN | Oct | 1 | 1 (34%) | 1 (0%) | 1 (-1%) | 1 (-1%) | 1 (1%) | 1 (-24%) | 1 (0%) | 1 (32%) |
| AN | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| AN | Dec | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Jan | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Feb | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Mar | 4 | 5 (18%) | 4 (0%) | 4 (5%) | 3 (-33%) | 3 (-36%) | 3 (-32%) | 4 (2%) | 3 (-29%) |
| BN | Apr | 3 | 4 (13%) | 4 (5%) | 4 (4%) | 3 (-6%) | 3 (-5%) | 1 (-68%) | 4 (6%) | 3 (-6%) |
| BN | May | 7 | 8 (9%) | 8 (3%) | 7 (-2%) | 7 (-5%) | 7 (-8%) | 2 (-78%) | 8 (5%) | 7 (-4%) |
| BN | Jun | 6 | 7 (10%) | 5 (-11%) | 5 (-13%) | 5 (-14%) | 5 (-13%) | 1 (-85%) | 6 (-8%) | 6 (-9%) |
| BN | Jul | 3 | 3 (-8%) | 3 (-5%) | 3 (-7%) | 3 (-8%) | 3 (-6%) | 0 (-91%) | 3 (1%) | 3 (-2%) |
| BN | Aug | 5 | 4 (-19%) | 5 (-2%) | 5 (-4%) | 5 (-6%) | 5 (-7%) | 1 (-90%) | 5 (-2%) | 5 (1%) |
| BN | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| BN | Dec | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Jan | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Feb | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Mar | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Apr | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | May | 6 | 6 (10%) | 6 (-1%) | 6 (-1%) | 5 (-8%) | 5 (-9%) | 1 (-83%) | 6 (-1%) | 5 (-6%) |

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Dry | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Sep | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dry | Nov | 4 | 3 (-8%) | 4 (1%) | 4 (1%) | 4 (0%) | 4 (2%) | 2 (-35%) | 4 (1%) | 4 (-4%) |
| Dry | Dec | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Jan | 3 | 4 (22%) | 3 (-11%) | 3 (-3%) | 3 (1%) | 3 (0%) | 2 (-46%) | 3 (-2%) | 3 (0%) |
| C | Feb | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Mar | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Apr | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | May | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Jun | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Jul | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Aug | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Sep | 1 | 1 (7%) | 1 (5%) | 1 (20%) | 1 (17%) | 1 (16%) | 0 (-78%) | 1 (6%) | 1 (6%) |
| C | Oct | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Nov | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| C | Dec | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |

Appendix I, Old and Middle River Flow Management

# Attachment I.3 Delta Export Zone of Influence Analysis

## I.3.1 Introduction and Background

The Sacramento–San Joaquin River Delta (Delta) provides habitat for migrating anadromous fish while also serving as critical infrastructure for California water supply. In the winter and spring months, Old and Middle River (OMR) flows are managed to protect emigrating Delta smelt, Longfin smelt, juvenile winter-run Chinook salmon, yearling spring-run Chinook salmon, and Central Valley steelhead from entrainment into the export facilities in the south Delta. During these months, changes to velocity distributions in channels, due to south Delta exports, may affect the fate of fish. This document describes techniques to evaluate the spatial extent of hydrologic alteration considering changes to velocity (hereinafter described as "Delta export zone of influence") and changes to the probability distributions of hourly average velocity as a result of pumping under varying OMR flow conditions.

### I.3.1.1 Methods

An analysis using DSM2-Hydro was conducted to analyze the spatial extent of influence of exports under CVP and SWP diversions. The DSM2-Hydro velocity results were used to generate Delta export zone of influence contour maps in the Delta.

The subsections below describe the exploration of drivers of hydrologic alteration, the subsequent use of inflow categories to standardize across combinations of San Joaquin and Sacramento River inflows, and DSM2 modeling and post-processing steps to quantify the influence of the export facilities in the south Delta (DSM2 Modeling and Post-Processing). Probability density curves of hourly average velocity at specific locations were created for pumping (export) and no pumping conditions (described in Gaussian Kernel Density Estimation) and the proportional overlap of the curves was used as a comparative metric to capture the effects of exports. Then, based on proportional overlap, two methods for evaluating Delta export zone of influence are presented for differing inflow groups and OMRs: (1) maps that illustrate the spatial extent of changes to velocity throughout the Delta (described in Gaussian KDE Proportional Overlap Contour Maps), and (2) figures that illustrate the proportion of channel lengths influenced by exports (described in Channel length associated with Delta export ZOI).

#### *I.3.1.1.1 Drivers of hydrologic alteration*

To quantify the extent of pumping influence, proportional overlap data were filtered to DSM2 nodes with values <70% (less than 70% of the velocity distribution overlapping). Channel lengths were calculated between each remaining node and its neighbor and summed across month (Dec-June) and OMR flow bins (-2000, -3500, -5000, and -6500 cfs). Results were initially viewed by month, based on analyses similar to those in the 2019 Biological Assessment on the Long-term operation of the CVP and SWP. It was expected that increasingly negative OMR flows (associated with increased exports) would result in increasing sum of channel lengths experiencing hydrologic alteration. While this pattern is observed in March-June, results from other months contradicted this expectation (Figure I.3-1). In December, fewer feet of channel length were influenced by OMR flows of -5000 cfs than by OMR flows of -3500 cfs. In January, OMR flows of -5000 and -2000 cfs influenced similar lengths of channels, while a shorter length of channels was influenced by an OMR flow of -3500 cfs. In February, OMR flow of -5000 cfs influenced a shorter length of channels than did OMR flows of -3500 or -2000 cfs. This suggested that month was not an appropriate way to look at hydrologic alteration and to consider other drivers to understand what may be influencing hydrodynamic alteration and OMRs. Thus, results were aggregated across combinations of San Joaquin and Sacramento River inflows, which are modeled to vary by month, and are hypothesized to be the main driver of variable OMR flows.

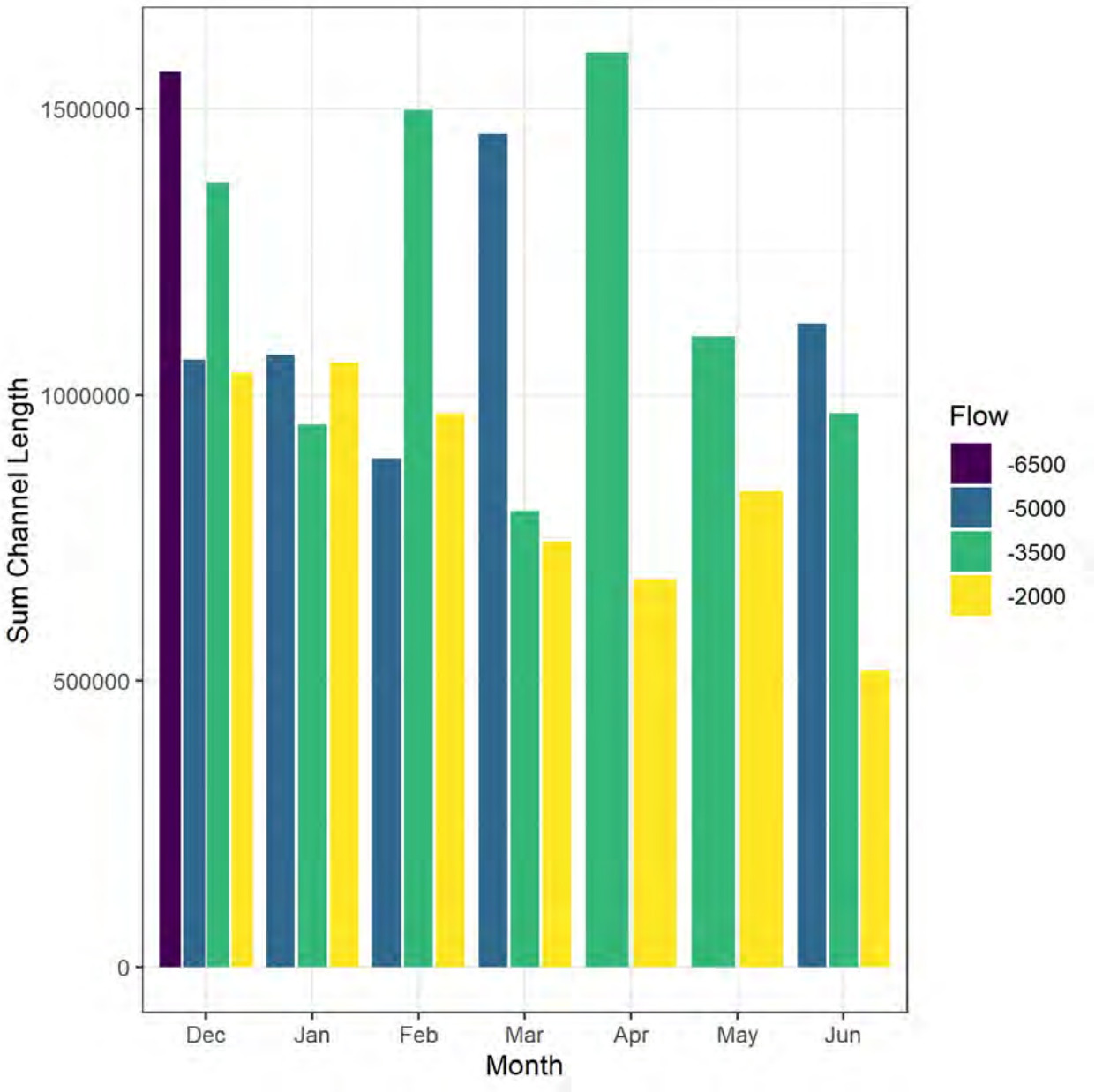



Figure I.3-1. Sum of channel lengths connecting DSM2 nodes with 70% overlap binned by month and different OMR flows. Channel length units in feet; flow units in cubic feet per second.

#### *I.3.1.1.2 Inflow Categories*

To standardize across San Joaquin (SJR, Vernalis) and Sacramento (SR, Freeport) inflows, representative combinations of average monthly SJR and SR inflow were identified. Inflow ranges are based on the CalSim 3-modeled No Action Alternative (NAA) results, which cover December 1921-May 2021. Data from December to June are used to represent the OMR management season. Flows are categorized into low (minimum value to less than 0.333 quantile), medium (0.333 to less than 0.666 quantile), and high (0.666 quantile to maximum value) inflow groupings for both SJR and SR. Data are then assigned one of the nine inflow categories representing different combinations of low/medium/high SJR inflows and low/medium/high SR inflows (Table I.3-1). For certain alternatives, data fell outside of the inflow categories. These instances were rare in all alternatives (Table I.3-2).

Table I.3-1. December – June ZOI flow groups based on CalSim 3 Sacramento (Freeport) and San Joaquin (Vernalis) River inflows under the No Action Alternative (NAA). Values have been rounded to the nearest integer.

| Inflow Group | Description | SR Inflow Range (cfs) | SJR Inflow Range (cfs) | Mean OMR (cfs) | Mean Exports (cfs) |
|---|---|---|---|---|---|
| Lolo | Low SR Low SJR | 5117 - 13415 | 890 - 1983 | -3049 | 3745 |
| Medmed | Med SR Med SJR | 13416 - 24725 | 1984 - 4096 | -3758 | 5328 |
| Hihi | High SR High SJR | 24726 - 87222 | 4097 - 61005 | -2005 | 9227 |
| Himed | High SR Med SJR | 24726 - 87222 | 1984 - 4096 | -4242 | 6548 |
| Medhi | Med SR High SJR | 13416 - 24725 | 4097 - 61005 | -2506 | 6271 |
| Lomed | Low SR Med SJR | 5117 - 13415 | 1984 - 4096 | -2805 | 3864 |
| Medlo | Med SR Low SJR | 13416 - 24725 | 890 - 1983 | -5070 | 6069 |
| Lohi | Low SR High SJR | 5117 - 13415 | 4097 - 61005 | -2916 | 5713 |
| Hilo | High SR Low SJR | 24726 - 87222 | 890 - 1983 | -4562 | 6158 |

Table I.3-2. Sample sizes (months) of alternatives in each inflow group based on CalSim 3 and DSM2 results. Values have not been filtered for OMR group.

| Inflow group | NAA | Alt1 | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt2 wTUCP woVA | Alt3 | Alt4 | Act5 |
|---|---|---|---|---|---|---|---|---|---|
| Lolo | 132 | 108 | 137 | 138 | 138 | 135 | 170 | 143 | 132 |
| Lomed | 70 | 84 | 75 | 82 | 73 | 75 | 70 | 75 | 69 |
| Lohi | 31 | 30 | 30 | 30 | 23 | 29 | 20 | 29 | 23 |
| Medlo | 81 | 76 | 72 | 64 | 64 | 72 | 62 | 66 | 62 |
| Medmed | 101 | 105 | 96 | 97 | 106 | 97 | 62 | 96 | 111 |
| Medhi | 51 | 54 | 50 | 50 | 55 | 51 | 41 | 52 | 58 |
| Hilo | 20 | 21 | 20 | 19 | 18 | 20 | 29 | 20 | 19 |
| Himed | 62 | 68 | 68 | 68 | 68 | 68 | 78 | 66 | 70 |
| Hihi | 152 | 153 | 152 | 152 | 155 | 152 | 164 | 153 | 154 |
| NA | 0 | 1 | 0 | 0 | 0 | 1 | 4 | 0 | 2 |

#### *I.3.1.1.3 OMR Bins*

For zone of influence analysis, data are also assigned OMR bins based on average monthly OMR, with data falling within +/-500 cfs of -2000 cfs, -3500 cfs, and -5000 cfs assigned to the respective -2000, -3500, and -5000 OMR bin categories, and data with OMR less than -5500 cfs assigned to the less than -5500 bin (Table I.3-3). These values (-2000, -3500, -5000) were selected to reflect values used for real-time management during OMR season. We chose to keep the bins somewhat discrete for greater relevance to management values and to distinguish bins from each other in analyses, although this led to the exclusion of certain values from the analysis (Table I.3-4, Table I.3-5; see points without colored outlines in Figure I.3-3 for data excluded in NAA).

Table I.3-3. Summary Statistics for Inflow Groups and OMR Bins used in Analyses. Cells populated with "NA" indicate a lack of data falling within the specific inflow-OMR grouping. Mean OMR and Mean Exports are associated with the No Action Alternative (NAA).

| Inflow Group | OMR Bin | OMR Range | Mean OMR (cfs) | Mean Exports (cfs) |
|---|---|---|---|---|
| Lolo | -2000 | -2500 to -1500 cfs | -1933 | 2281 |
| Lolo | -3500 | -4000 to -3000 cfs | -3526 | 4294 |
| Lolo | -5000 | -5500 to -4500 cfs | -4941 | 6046 |
| Lolo | <-5500 | less than -5500 | -6991 | 8341 |
| Lomed | -2000 | -2500 to -1500 cfs | -2084 | 3041 |
| Lomed | -3500 | -4000 to -3000 cfs | -3474 | 4911 |
| Lomed | -5000 | -5500 to -4500 cfs | -4841 | 6008 |
| Lomed | <-5500 | less than -5500 | NA | NA |
| Lohi | -2000 | -2500 to -1500 cfs | -2051 | 4273 |
| Lohi | -3500 | -4000 to -3000 cfs | -3409 | 7673 |
| Lohi | -5000 | -5500 to -4500 cfs | -4915 | 6721 |
| Lohi | <-5500 | less than -5500 | NA | NA |
| Medlo | -2000 | -2500 to -1500 cfs | -1512 | 2963 |
| Medlo | -3500 | -4000 to -3000 cfs | -3633 | 5038 |
| Medlo | -5000 | -5500 to -4500 cfs | -4990 | 5761 |
| Medlo | <-5500 | less than -5500 | -8137 | 9678 |
| medmed | -2000 | -2500 to -1500 cfs | -2124 | 3253 |
| medmed | -3500 | -4000 to -3000 cfs | -3591 | 5371 |
| medmed | -5000 | -5500 to -4500 cfs | -4908 | 6464 |
| medmed | <-5500 | less than -5500 | -8530 | 10782 |
| Medhi | -2000 | -2500 to -1500 cfs | -2081 | 4385 |
| Medhi | -3500 | -4000 to -3000 cfs | -3517 | 6907 |
| Medhi | -5000 | -5500 to -4500 cfs | -5015 | 8577 |
| Medhi | <-5500 | less than -5500 | NA | NA |
| Hilo | -2000 | -2500 to -1500 cfs | NA | NA |
| Hilo | -3500 | -4000 to -3000 cfs | -3645 | 5344 |
| Hilo | -5000 | -5500 to -4500 cfs | -4882 | 6455 |
| Hilo | <-5500 | less than -5500 | NA | NA |
| Himed | -2000 | -2500 to -1500 cfs | -2285 | 3100 |
| Himed | -3500 | -4000 to -3000 cfs | -3567 | 5811 |

| Inflow Group | OMR Bin | OMR Range | Mean OMR (cfs) | Mean Exports (cfs) |
|---|---|---|---|---|
| Himed | -5000 | -5500 to -4500 cfs | -4958 | 7483 |
| Himed | <-5500 | less than -5500 | NA | NA |
| Hihi | -2000 | -2500 to -1500 cfs | -1979 | 7624 |
| Hihi | -3500 | -4000 to -3000 cfs | -3566 | 8617 |
| Hihi | -5000 | -5500 to -4500 cfs | -4735 | 9849 |
| Hihi | <-5500 | less than -5500 | NA | NA |

Table I.3-4. Sample sizes (months) of alternatives in each inflow group and OMR bin based on CalSim 3 and DSM2 results.

| Inflow Group | OMR Bin | NAA | Alt1 | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt2 wTUCP woVA | Alt3 | Alt4 | Act5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Lolo | -2000 | 27 | 29 | 31 | 29 | 24 | 29 | 27 | 31 | 40 |
| Lolo | -3500 | 18 | 17 | 21 | 25 | 25 | 22 | 9 | 19 | 19 |
| Lolo | -5000 | 22 | 10 | 14 | 11 | 10 | 13 | 3 | 19 | 28 |
| Lolo | <-5500 | 10 | 12 | 6 | 9 | 7 | 6 | 0 | 9 | 5 |
| Lolo | NA | 55 | 40 | 65 | 64 | 72 | 65 | 131 | 65 | 40 |
| Lomed | -2000 | 25 | 38 | 35 | 23 | 20 | 33 | 11 | 32 | 14 |
| Lomed | -3500 | 9 | 8 | 8 | 5 | 6 | 9 | 2 | 10 | 8 |
| Lomed | -5000 | 12 | 5 | 4 | 3 | 3 | 4 | 1 | 4 | 10 |
| Lomed | <-5500 | 0 | 6 | 0 | 0 | 0 | 0 | 1 | 1 | 0 |
| Lomed | NA | 24 | 27 | 28 | 51 | 44 | 29 | 55 | 28 | 37 |
| Lohi | -2000 | 10 | 7 | 7 | 2 | 1 | 7 | 5 | 7 | 0 |
| lohi | -3500 | 3 | 11 | 12 | 9 | 6 | 12 | 3 | 13 | 8 |
| lohi | -5000 | 3 | 3 | 1 | 2 | 1 | 1 | 0 | 1 | 4 |
| lohi | <-5500 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| lohi | NA | 15 | 9 | 10 | 17 | 15 | 9 | 12 | 8 | 11 |
| medlo | -2000 | 1 | 4 | 3 | 2 | 3 | 3 | 14 | 2 | 0 |
| medlo | -3500 | 11 | 0 | 22 | 17 | 19 | 21 | 2 | 13 | 6 |
| medlo | -5000 | 45 | 18 | 16 | 15 | 16 | 16 | 11 | 19 | 34 |
| medlo | <-5500 | 10 | 49 | 12 | 11 | 12 | 12 | 1 | 8 | 11 |
| medlo | NA | 14 | 5 | 19 | 19 | 14 | 20 | 34 | 24 | 11 |
| medmed | -2000 | 26 | 10 | 16 | 13 | 17 | 16 | 4 | 15 | 18 |
| medmed | -3500 | 25 | 12 | 40 | 25 | 24 | 43 | 4 | 33 | 24 |

| Inflow Group | OMR Bin | NAA | Alt1 | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt2 wTUCP woVA | Alt3 | Alt4 | Act5 |
|---|---|---|---|---|---|---|---|---|---|---|
| medmed | -5000 | 20 | 8 | 6 | 6 | 6 | 6 | 7 | 17 | 37 |
| medmed | <-5500 | 5 | 65 | 5 | 5 | 5 | 5 | 0 | 4 | 3 |
| medmed | NA | 25 | 10 | 29 | 48 | 54 | 27 | 47 | 27 | 29 |
| medhi | -2000 | 11 | 7 | 11 | 7 | 8 | 11 | 0 | 11 | 4 |
| medhi | -3500 | 8 | 13 | 24 | 19 | 21 | 25 | 1 | 25 | 16 |
| medhi | -5000 | 1 | 5 | 2 | 2 | 2 | 2 | 3 | 4 | 15 |
| medhi | <-5500 | 1 | 11 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| medhi | NA | 30 | 18 | 13 | 22 | 24 | 13 | 37 | 11 | 23 |
| hilo | -2000 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 0 | 0 |
| hilo | -3500 | 2 | 1 | 6 | 6 | 5 | 6 | 1 | 3 | 4 |
| hilo | -5000 | 10 | 0 | 8 | 8 | 7 | 8 | 13 | 8 | 15 |
| hilo | <-5500 | 1 | 20 | 1 | 1 | 2 | 1 | 1 | 0 | 0 |
| hilo | NA | 7 | 0 | 5 | 4 | 4 | 5 | 10 | 9 | 0 |
| himed | -2000 | 4 | 0 | 3 | 5 | 5 | 3 | 7 | 2 | 4 |
| himed | -3500 | 12 | 1 | 21 | 14 | 14 | 21 | 5 | 13 | 14 |
| himed | -5000 | 24 | 0 | 20 | 19 | 19 | 20 | 29 | 32 | 44 |
| himed | <-5500 | 3 | 65 | 3 | 3 | 3 | 3 | 4 | 1 | 0 |
| himed | NA | 19 | 2 | 21 | 27 | 27 | 21 | 33 | 18 | 8 |
| hihi | -2000 | 16 | 12 | 13 | 17 | 17 | 13 | 5 | 14 | 7 |
| hihi | -3500 | 26 | 10 | 33 | 15 | 17 | 33 | 6 | 20 | 16 |
| hihi | -5000 | 34 | 9 | 35 | 35 | 35 | 35 | 39 | 40 | 69 |
| hihi | <-5500 | 5 | 65 | 7 | 7 | 7 | 7 | 8 | 6 | 0 |
| hihi | NA | 71 | 57 | 64 | 78 | 79 | 64 | 106 | 73 | 62 |
| NA | -2000 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| NA | -3500 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| NA | -5000 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| NA | <-5500 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| NA | NA | 0 | 1 | 0 | 0 | 0 | 0 | 4 | 0 | 40 |

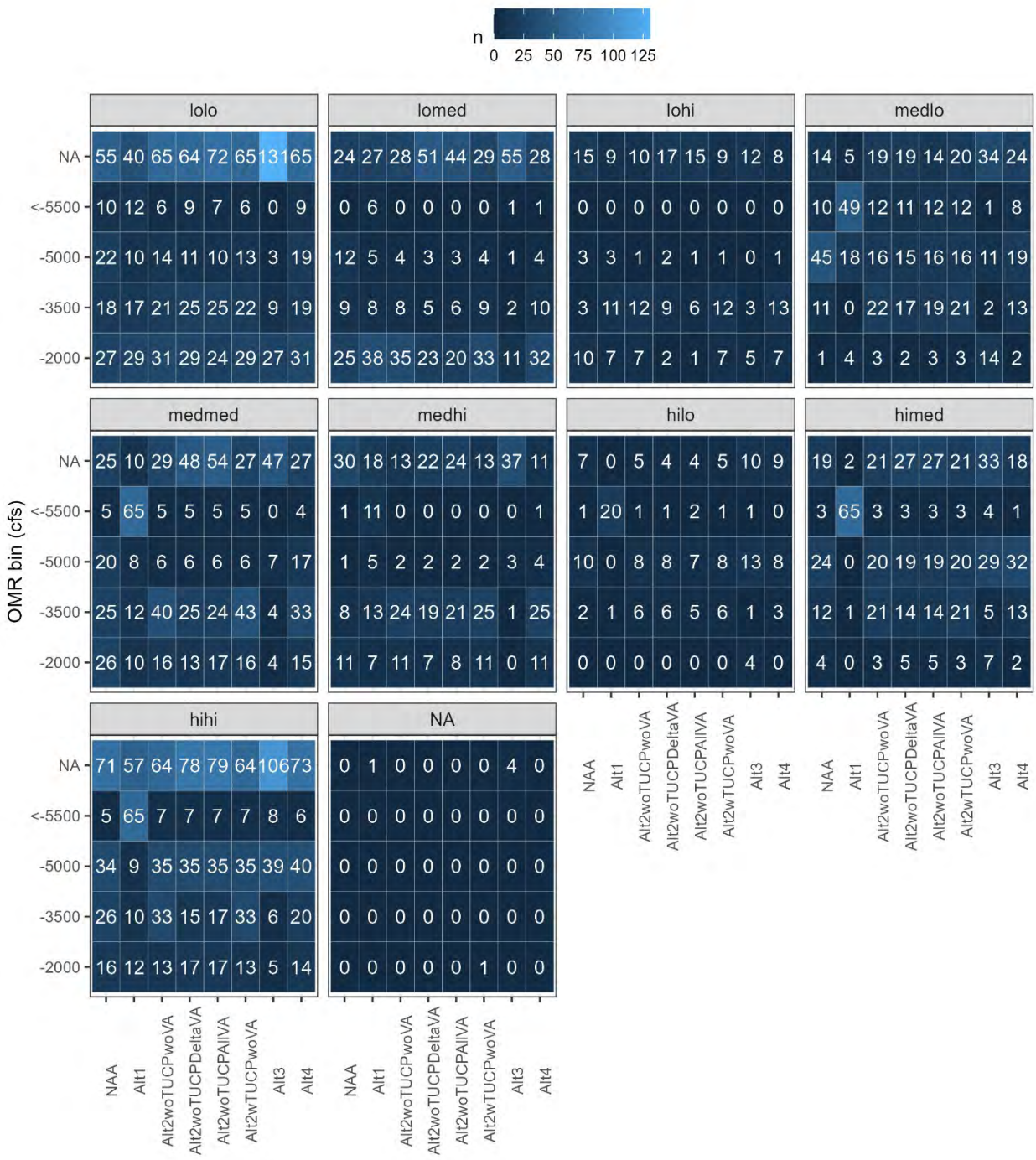



Figure I.3-2. Sample sizes (months) of alternatives in each inflow group and OMR bin based on CalSim 3 and DSM2 results. Text denotes sample size in each group. NA indicates values do not fall into pre-designated OMR bin or inflow group.

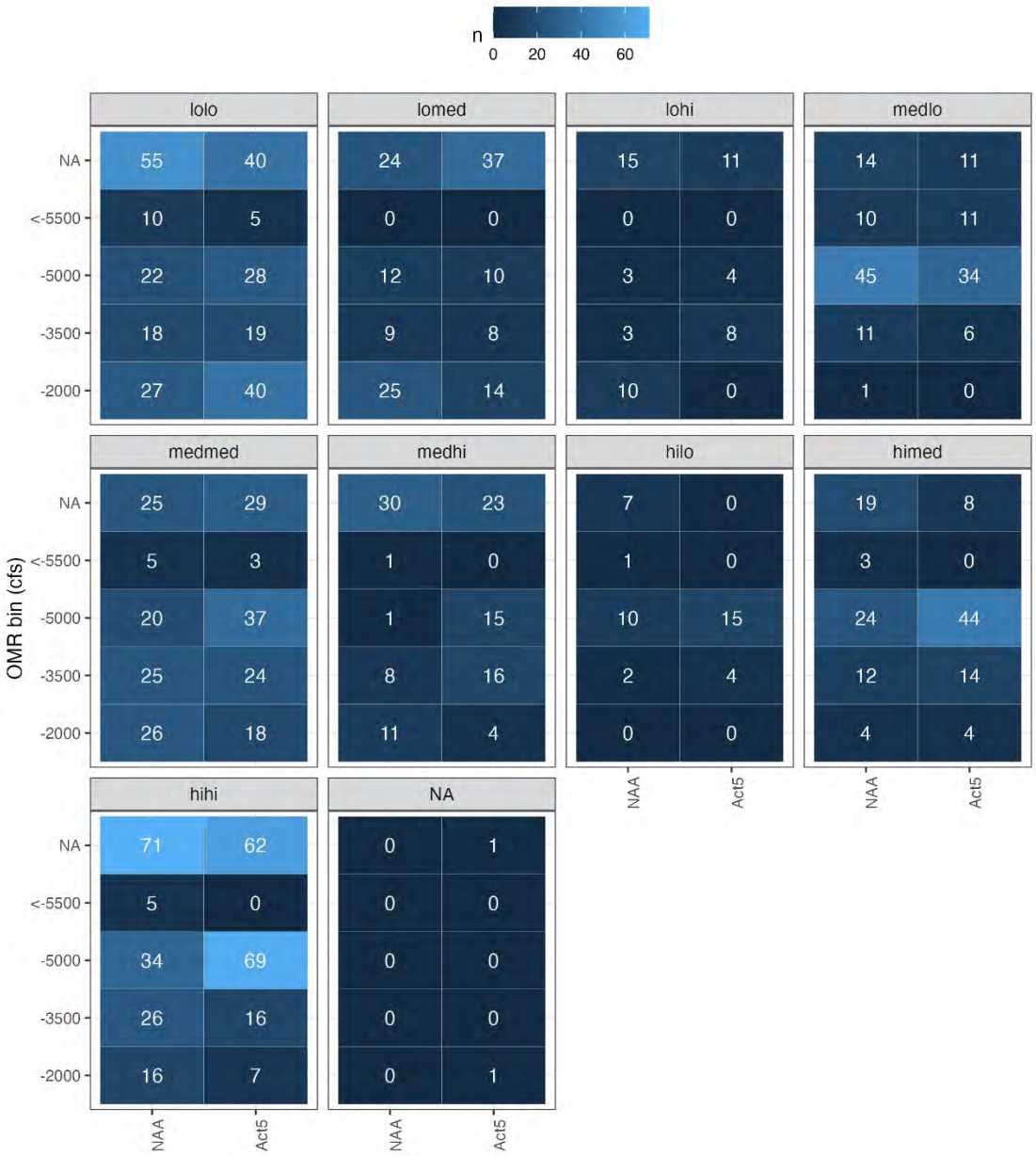



Figure I.3-2a. Sample sizes (months) of Action 5 and the No Action Alternative (NAA) in each inflow group and OMR bin based on CalSim 3 and DSM2 results. Text denotes sample size in each group. NA indicates values do not fall into pre-designated OMR bin or inflow group.

Table I.3-5. Proportion of dataset excluded from analysis based on CalSim 3 output under the No Action Alternative (NAA). OMR values in the "Other" bin fall between -2500 to -3000 and -4000 to -4500 cfs.

| OMR | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt4 | Act5 |
|---|---|---|---|---|---|---|---|---|
| Greater than -1500 | 0.13 | 0.08 | 0.09 | 0.09 | 0.15 | 0.18 | 0.09 | 0.13 |
| Other | 0.2 | 0.14 | 0.3 | 0.3 | 0.27 | 0.27 | 0.3 | 0.19 |

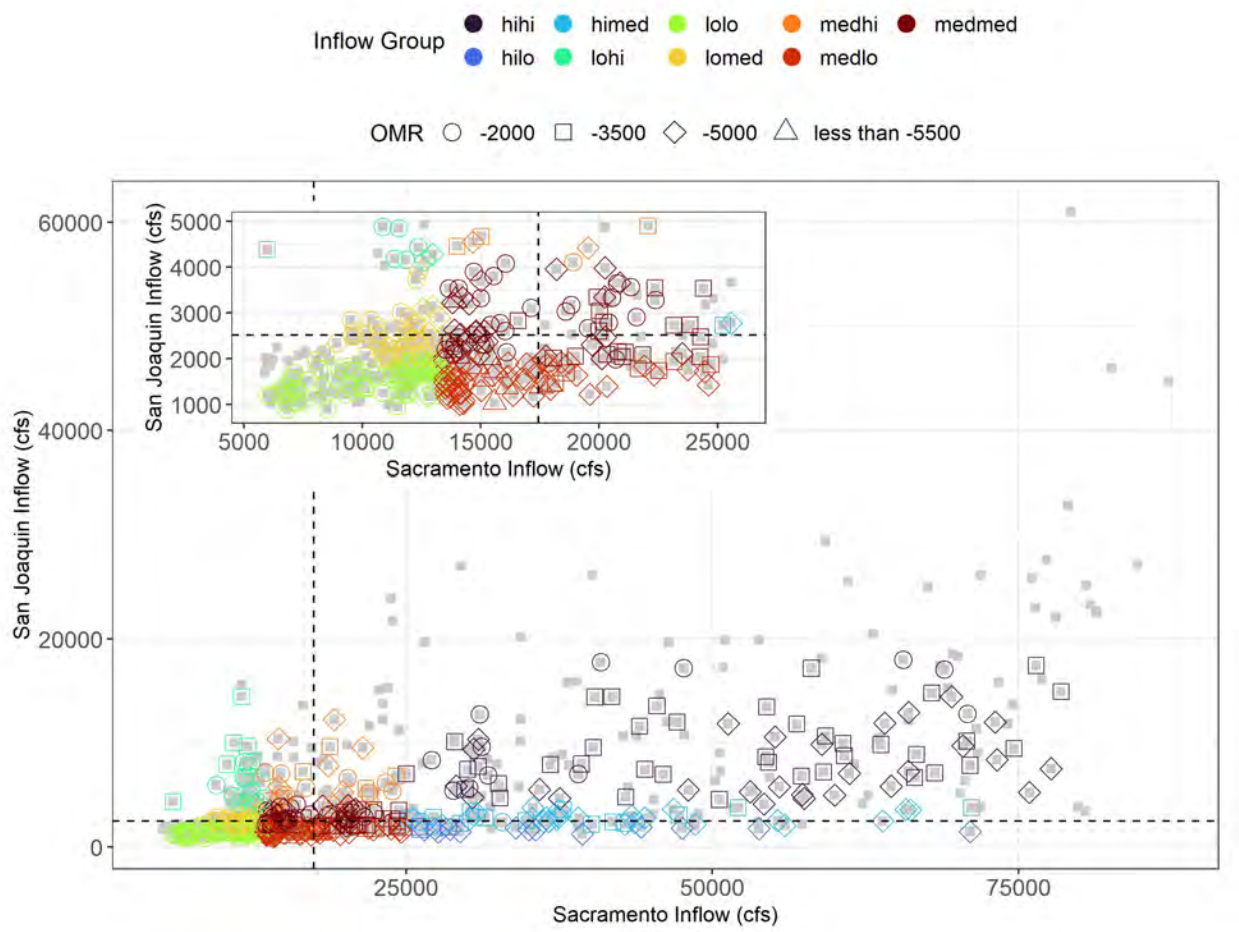



Figure I.3-3. Data categorized into Sacramento and San Joaquin River Inflow Groupings. Gray points represent all data. Points outlined in color indicate data points falling within OMR groupings, and used in subsequent modeling. Inset plot zooms in on lower inflow values for greater resolution. Points and inflow grouping are based CalSim 3 results from the No Action Alternative (NAA).

#### *I.3.1.1.4 DSM2 Velocity Modeling and Post-Processing*

In order to assess the potential for water project operations to influence hydrologic characteristics that affect survival and route entrainment, Delta hydrodynamic conditions were analyzed based on a comparative metric, proportional overlap of velocity distributions with and without pumping (proportional overlap), to capture channel level hydrodynamic details as a single number for color-scale mapping of Delta channels.

For each analysis, two DSM2 simulations must be run to isolate hydrologic alteration by exports: (1) alternative/component of interest and (2) alternative/component of interest without south Delta exports. The second simulation is required to assess the effect of pumping throughout the Delta in the alternative/component of interest. For both simulations (water year 1922 through 2021), hourly average velocity results are retrieved at Delta locations to assess the spatial influence of Delta pumping under various OMR flow conditions.

To assess the effect of pumping for a given inflow combination, the simulation results from the alternative/component of interest are reviewed to identify the periods (months) during which inflow falls within each category. Then, hourly velocity results from the scenario of interest and scenario of interest without south Delta exports are compared across the same set of inflow conditions.

#### *I.3.1.1.5 Gaussian Kernel Density Estimation*

The objective of the comparative metric is to summarize the water velocity time series for each channel and scenario such the channel-level comparison is captured in a single number. For the proportional overlap metric, kernel density estimates are calculated on each time series. The kernel density estimates represent a non-parametric smoothing of the empirical distribution of time series values. The proportional overlap of two kernel density estimates is calculated with the following steps: (1) calculate the total area under the curve (AUCt) as the sum of the AUC for each density estimate, (2) calculate the AUC of the overlapping portions (AUCo) of the two density distributions being compared, and (3) calculate the overlapping proportion of the density distributions as AUCo/AUCt. Proportional overlap is naturally bound by zero and one; a value of zero indicates no overlap and a value of one indicates complete overlap. Lower values of proportional overlap identify channels demonstrating larger differences in a scenario comparison. The plots demonstrate change to velocities at the locations listed in Table I.3-6.

Table I.3-6. Locations for Velocity KDE Plots

| **Locations** |
|---|
| San Joaquin River downstream of Old River (Brandt Bridge) |
| Turner Cut |
| Columbia Cut |
| San Joaquin River at Prisoners Point |
| San Joaquin River at Jersey Point |
| Old River at Bacon Island |
| Old River at HWY 4 |
| Middle River near Holt |
| Victoria Canal near Byron |
| San Joaquin River upstream of Old River |
| Old River at Head of Old River |
| Old River at Middle River |
| Grant Line Canal at Tracy Bridge |
| Old River near Tracy |
| Old River before Franks Tract |
| Fisherman's Cut |
| False River before Franks Tract |
| Threemile Slough |
| Mokelumne River |
| San Joaquin River downstream of Big Break |
| Sacramento River at Rio Vista |
| Sacramento River at Emmaton |

The Gaussian Kernel Density Estimate (KDE) compares hourly velocities at a given location for the scenario of interest with and without Delta exports. An example KDE plot is presented in Figure I.3-4. Each figure presents: (1) location, (2) OMR bin of interest (either -2,000 cfs, -3,500 cfs or -5,000 cfs), (3) proportion of the simulation presented, (4) proportional overlap area of the Gaussian KDE curves, (5) differential of the median velocity between the two simulations, and (6) reference directional on the x-axis.

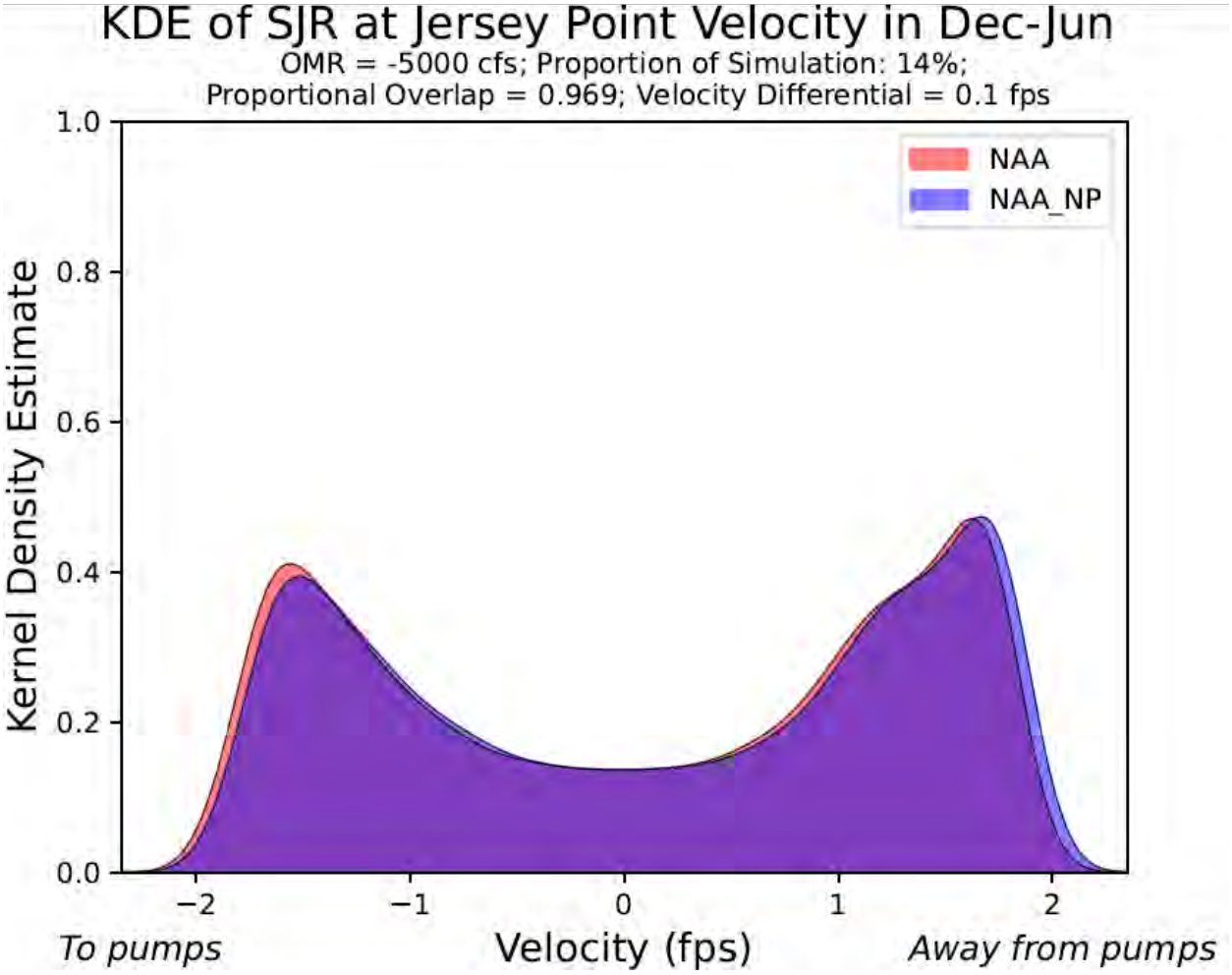



Figure I.3-4. Gaussian KDE of Velocity at San Joaquin River at Jersey Point in December through June with OMR of -5,000 cfs. Results apply to the No Action Alternative.

In Figure I.3-4, a proportional overlap value of 0.969 indicates that the distribution of velocity is similar under the NAA and NAA without Delta exports (NAA_NP), overlapping across 96.9% of the velocity distribution. A velocity differential value of 0.1fps indicates that there is a 0.1 foot per second change in the median hourly average velocity between the scenario of interest with- and w/out pumps.

The proportional overlap value and velocity differential explain the change in the velocity distribution and the magnitude to which the velocities have changed, respectively. For example, in Figure I.3-5 (below), when OMR flows are -5,000 cfs at Old River at Middle River, the proportional overlap value is 0.809 and the velocity differential is 0.14 fps. The lower value in proportional overlap (compared with Figure I.3-4) indicates a larger difference in velocity distribution. However, the velocity differential is only 0.14 fps, a small change in median velocities. Together, these values indicate that the KDE curves may be different, but the actual change to velocity at that location is relatively small.

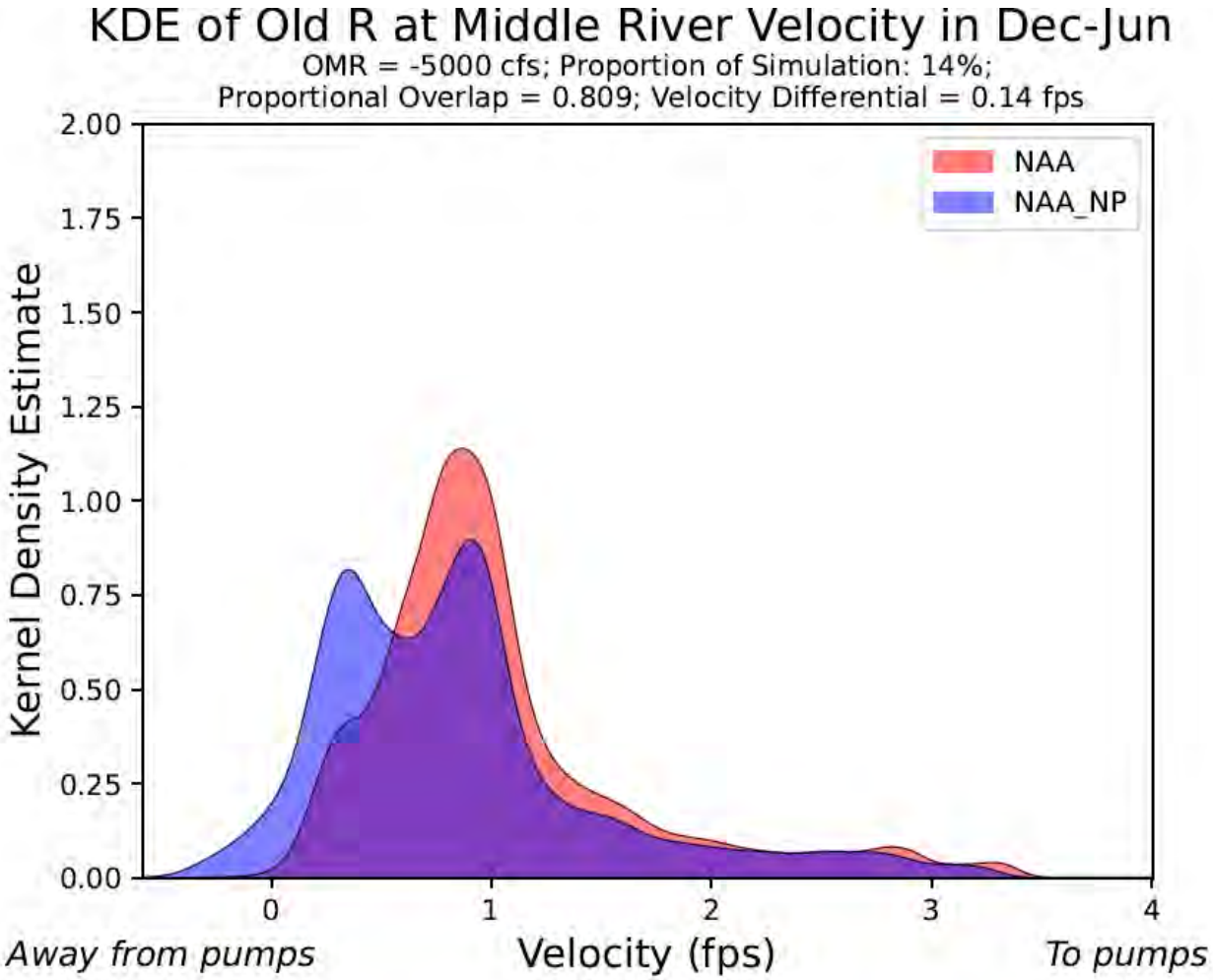



Figure I.3-5. Gaussian KDE of Velocity at Old River at Middle River in December through June with OMR of -5,000 cfs. Results apply to the No Action Alternative.

#### *I.3.1.1.6 Gaussian KDE Proportional Overlap Contour Maps*

For each inflow group, the proportional overlap of the hourly average velocity Gaussian KDEs for the scenario of interest with and without Delta exports at each location in the Delta are compared in each OMR bin.

Contour maps are used to visualize the spatial outline of the Delta export zone of influence for each condition as described above. Contours of 0.75 proportional overlap are selected to represent areas experiencing high and medium frequency of alteration from pumping. In order to reduce the noise in contour lines, DSM2 nodes that were sufficiently different from neighboring nodes to create isolated contours at several OMR flows were removed (nodes 146, 147, 148, 206, 242, 246, 432, 433, 434 for inflow contour maps). It was unclear whether the values associated with these DSM2 nodes were artifacts of the model output and/or assumptions, or due to unique hydrodynamics characteristics at each node location.

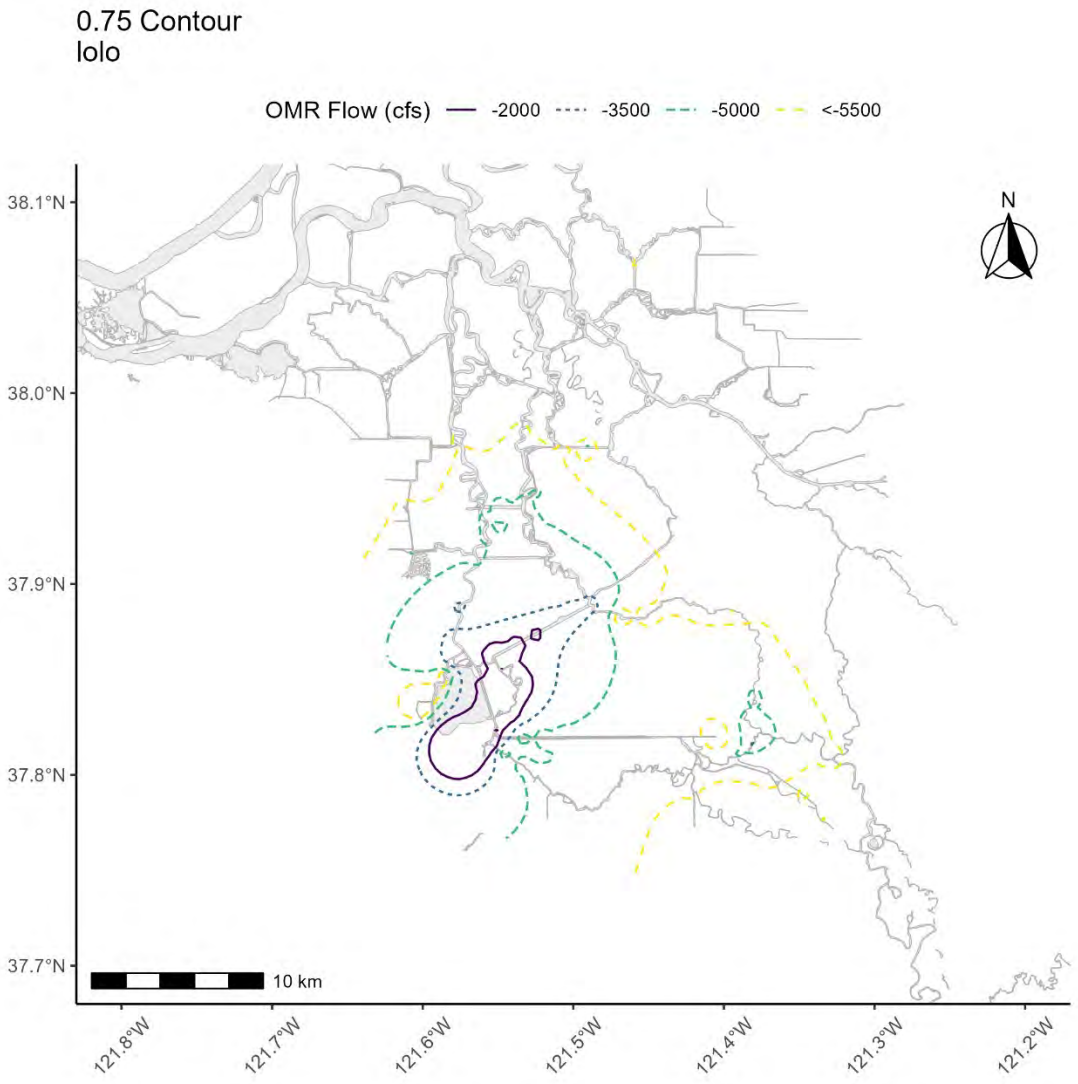



Figure I.3-6. Example 0.75 contour map for the lolo inflow group.

#### *I.3.1.1.7 Channel length associated with ZOI*

The proportion of DSM grid altered is also used as a metric to evaluate OMR influence at high, medium, and low pumping influence for each inflow group. Data are filtered to nodes with <25% proportional overlap (high alteration from pumping), 25-75% proportional overlap (medium alteration from pumping), and >75% proportional overlap (low alteration from pumping). For each inflow group and OMR bin, known lengths between DSM2 nodes are used to calculate summed channel length altered under high, medium, and low alteration from pumping. Summed channel length under each condition is divided by total DSM2 grid channel length to obtain the proportion of the DSM2 grid that was altered. Proportion of altered channel length is then plotted for each alternative by inflow group and OMR bin. Proportion of channel length altered for nodes experiencing medium alteration from pumping are also visualized separately to demonstrate for each alternative how patterns change by inflow group, OMR bin. Note that DSM2 nodes that differed from neighboring nodes sufficiently were removed (Removed nodes: 146, 147, 148, 206, 242, 246, 432, 433, 434). It is unclear whether the values associated with these DSM2 nodes are artifacts of the model output and/or assumptions, or due to unique hydrodynamics characteristics at that node location.

### I.3.1.2 Assumptions / Uncertainty / Caveats

Proportional overlap thresholds for low, medium, high proportional overlap and values chosen for contour visualization were selected based on frequency thresholds in the BA. Patterns may differ depending on the threshold selected.

While the study hypothesizes that lower proportional overlap values (higher alteration from pumping) lead to higher likelihood of altering fish movements, the proportional overlap values do not reflect the magnitude of velocity differences, only that there were differences. Thus, two locations with the same value of proportional overlap might experience very different magnitudes of velocity difference. These figures also do not directly reflect biological implications, as velocity differences are not being analyzed, and there is no comparison with values of velocity change that would alter fish movements.

Contour maps have been mapped across land to visualize the relative spatial extent of the Delta export zone of influence at each OMR flow. Reclamation assumes changes in the Delta's channels and channel configuration (e.g., new channels constructed) would impact regional hydrodynamics, and therefore the Delta export zone of influence would need to be recalculated. In other words, this map does not suggest that a new channel added within the current Delta export zone of influence would have the same impacts of pumping as existing waterways within that contour. The addition of new waterways would require an update to the current DSM2 models and recalculation of the Delta export zone of influence.

While channel length is a useful metric for calculating the extent of hydrologic influence from pumping, width and depth can also alter the hydrodynamic extent of pumping influence. These variables were not considered for this analysis.

Seasonal tidal influence can play a role in hydrodynamics, and was not taken into account for this analysis.

The primary contrasts within and between alternatives are based on the estimated overlap in velocity distributions at DSM2 nodes when facilities are and are not exporting water (i.e., pumping and no pumping). However, it is important to note that the estimated distribution of velocities under 'pumping' and 'no pumping' conditions contains time periods when no pumping is occurring in either condition because pumping is not continuous under the alternatives. The analysis does not consider the number of pumping hours in a given inflow-OMR grouping.

Sample sizes vary among different inflow groups and OMR bins (Table I.3-4). While all combinations with data were visualized, the amount of certainty and variability in a given result may differ widely depending on the sample size.

#### I.3.1.3 Code and Data Repository

Code for inflow grouping, contour maps, and channel length plots are available at: https://github.com/BDO-Science/contour-zone-of-influence. Files also available upon request.

See readme at: https://github.com/BDO-Science/contour-zone-of-influence/blob/main/README_zoi.txt for information about the files used to generate results for Delta Exports Zone of Influence.

## I.3.2 Results

With the methodology described above, results were prepared: (1) KDE plots of hourly velocities at -2000, -3500, -5000, and less than -5500 cfs OMR conditions for the different inflow groups as specific locations, (2) contour maps of proportional overlap by month with different OMR conditions, and (3) proportion of channel lengths altered under differing inflow and OMR conditions.

The Gaussian KDE plots, contour maps, and channel length plots demonstrate the effects of pumping under a range of OMR flow conditions. Several factors affect the proportional overlap and velocity differential values, including proximity to the pumps, orientation of the flow (relative to the pumps), influence of riverine flow, and preexisting flow/velocity patterns in the channel. Each location and output parameter (proportional overlap and velocity differential) must be examined to understand the influence of pumping at a given location.

#### I.3.2.1 Gaussian Kernel Density Estimation

Plots of velocity KDE for each alternative under different OMRs at three locations are presented below as examples. The three locations at which the KDE plots are presented are Turner Cut, San Joaquin River at Jersey Point, and Old River at Middle River (Figure I.3-7). At each location, several plots (one for each OMR bin and alternative combination) are included (Figure I.3-8 - Figure I.3-103l). As the regulatory environment changes in the scenarios of interest, the number of OMR bins associated with each analysis changes.

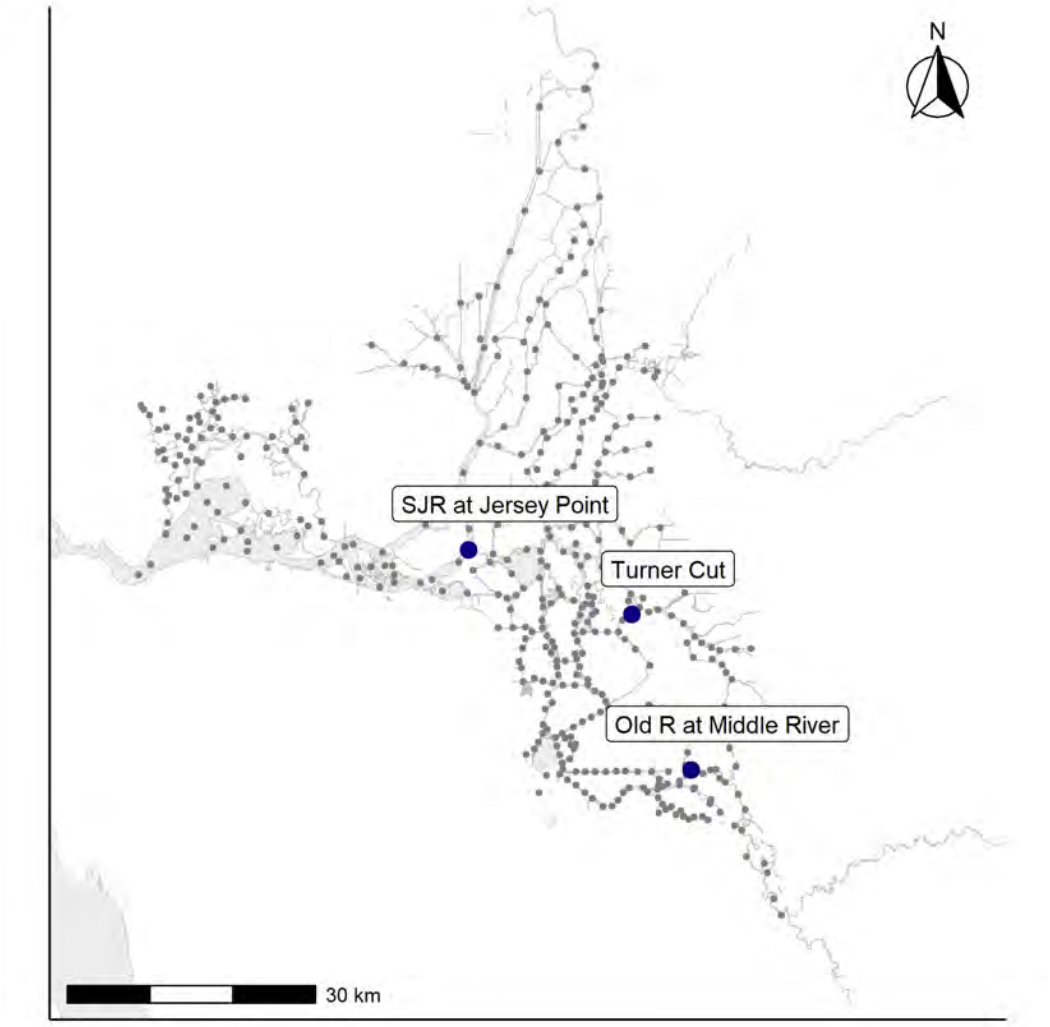



Figure I.3-7. Map of Stations Used for Kernel Density Estimate (KDE) Plot Examples. Small gray points indicate all nodes in DSM2 grid. Large navy points indicate stations selected for KDE plot examples below.

#### *I.3.2.1.1 KDE plots for No Action Alternative:*

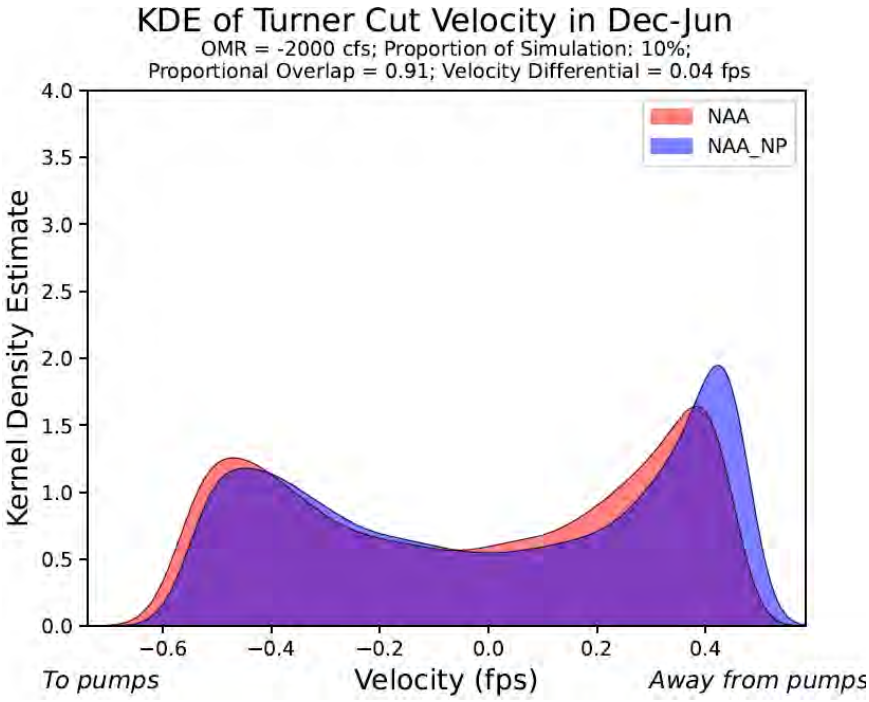



Figure I.3-8. Gaussian KDE of Velocity at Turner Cut in December through June with OMR of -2,000 cfs. Results apply to the No Action Alternative.

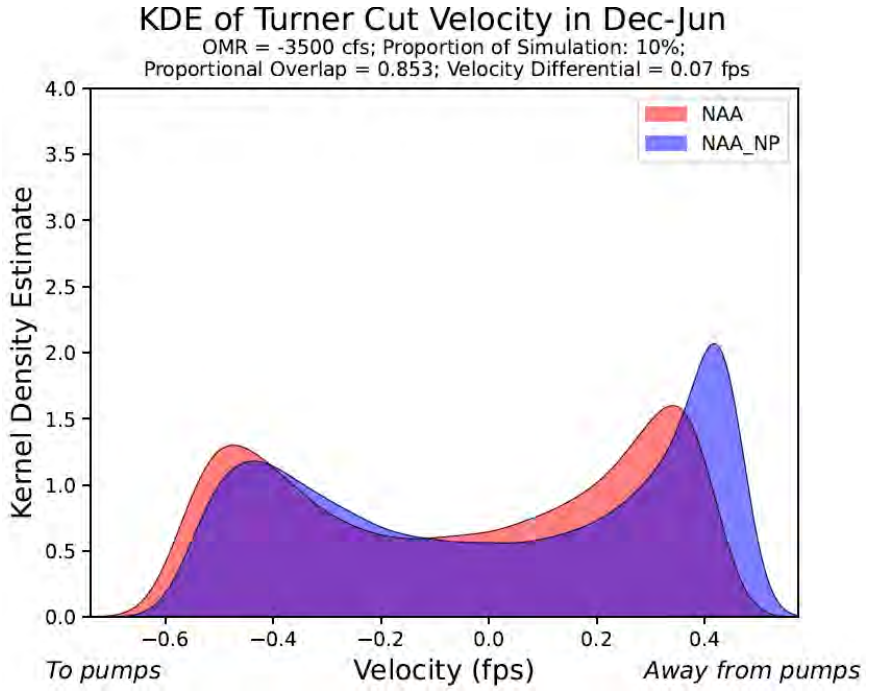



Figure I.3-9. Gaussian KDE of Velocity at Turner Cut in December through June with OMR of -3,500 cfs. Results apply to the No Action Alternative.

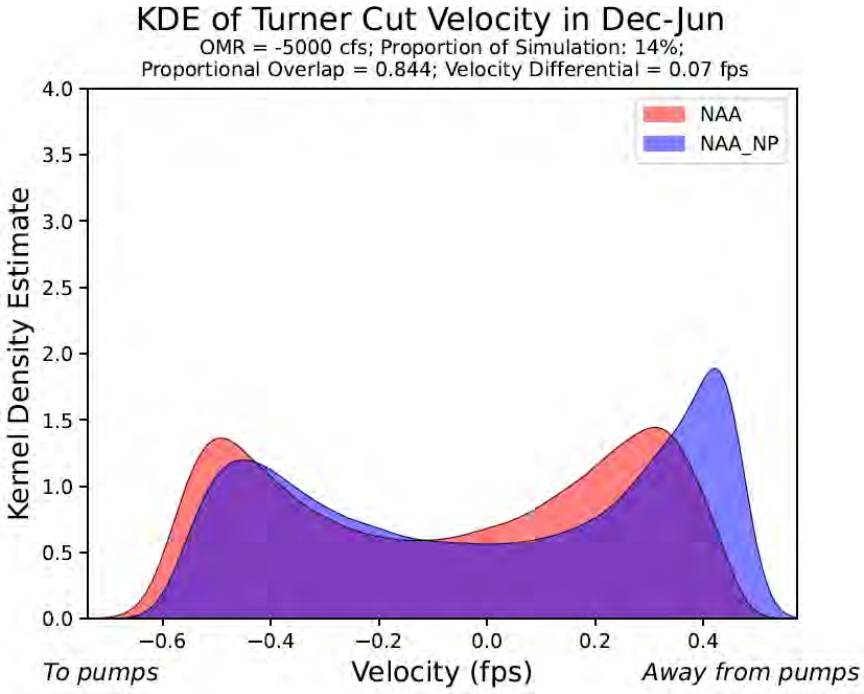



Figure I.3-10. Gaussian KDE of Velocity at Turner Cut in December through June with OMR of -5,000 cfs. Results apply to the No Action Alternative.

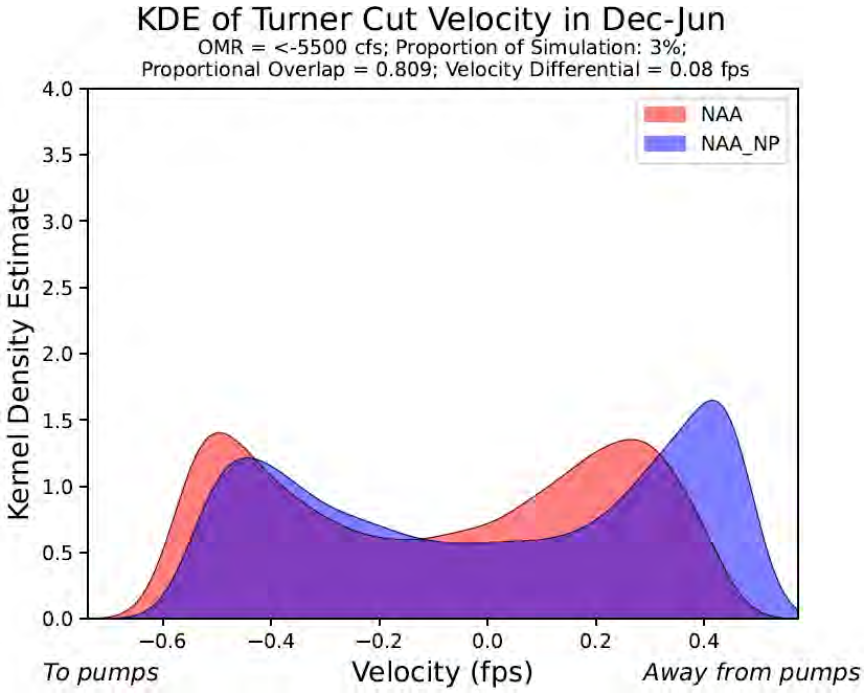



Figure I.3-11. Gaussian KDE of Velocity at Turner Cut in December through June with OMR < -5,500 cfs. Results apply to the No Action Alternative.

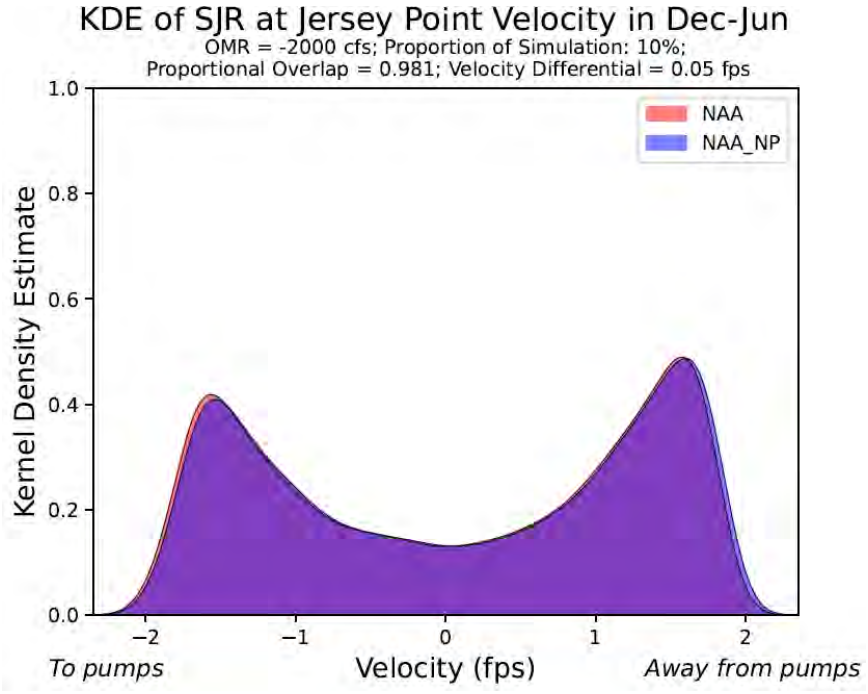



Figure I.3-12. Gaussian KDE of Velocity at San Joaquin River at Jersey Point in December through June with OMR of -2,000 cfs. Results apply to the No Action Alternative.

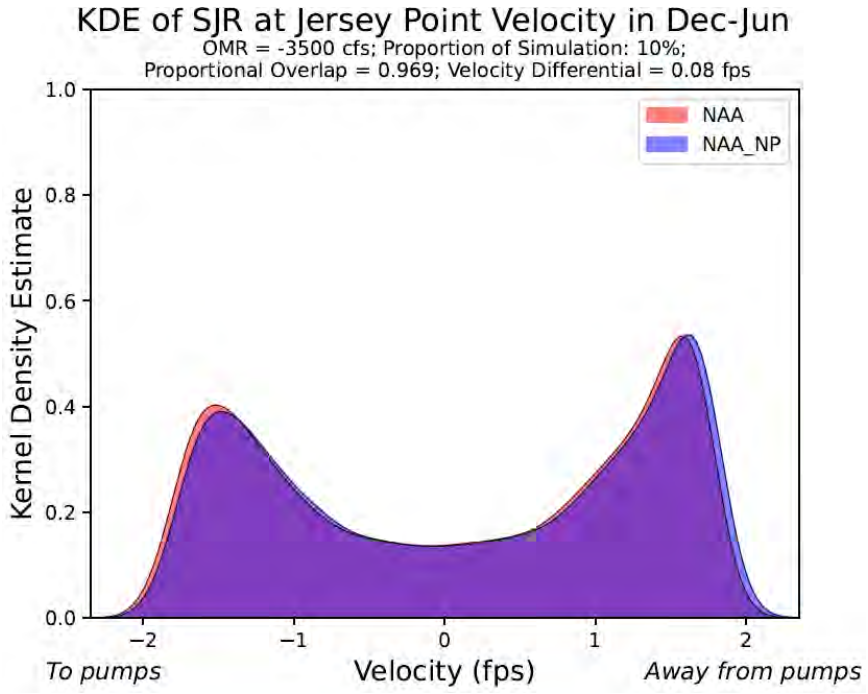



Figure I.3-13. Gaussian KDE of Velocity at San Joaquin River at Jersey Point in December through June with OMR of -3,500 cfs. Results apply to the No Action Alternative.

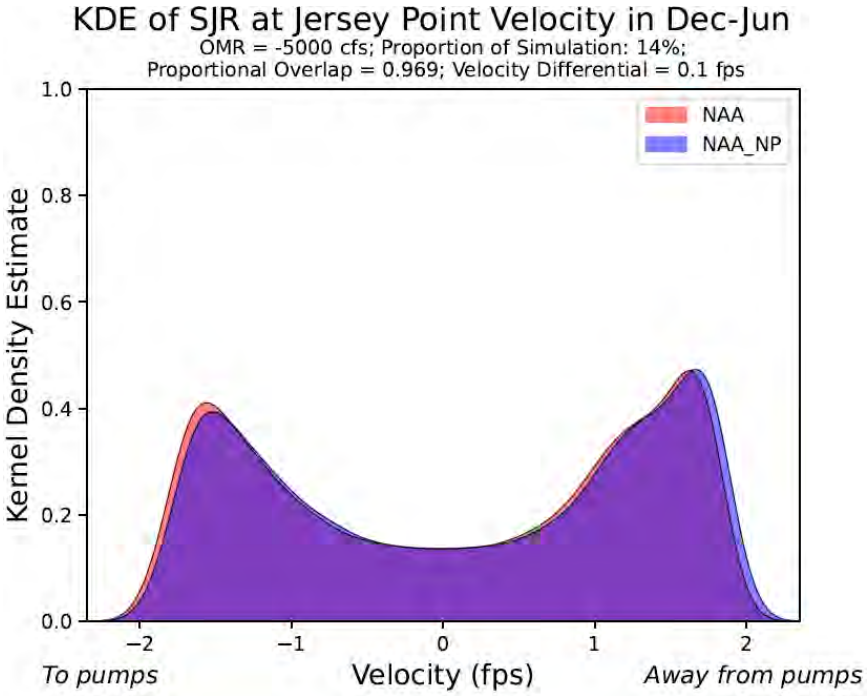



Figure I.3-14. Gaussian KDE of Velocity at San Joaquin River at Jersey Point in December through June with OMR of -5,000 cfs. Results apply to the No Action Alternative.

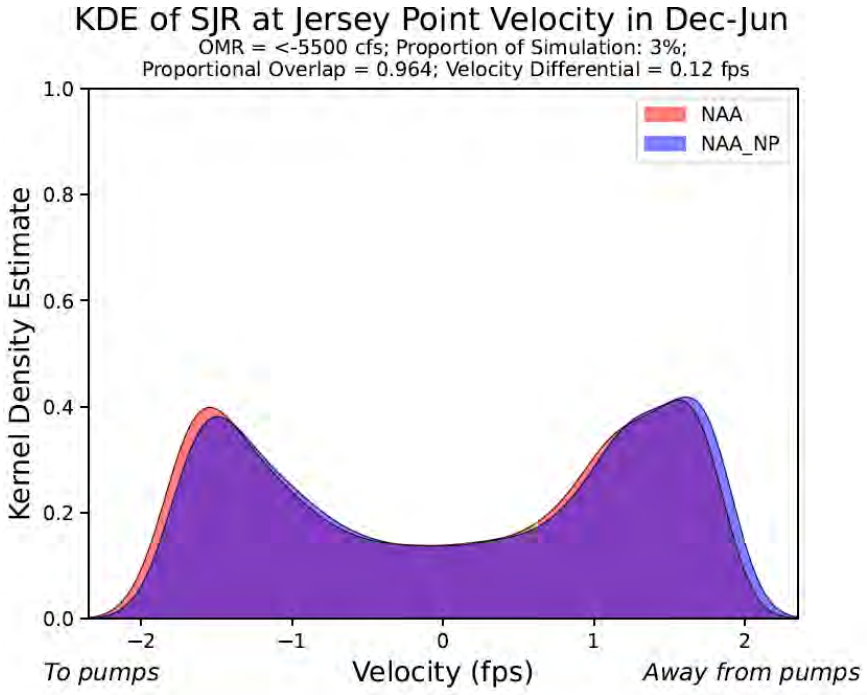



Figure I.3-15. Gaussian KDE of Velocity at San Joaquin River at Jersey Point in December through June with OMR < -5,500 cfs. Results apply to the No Action Alternative.

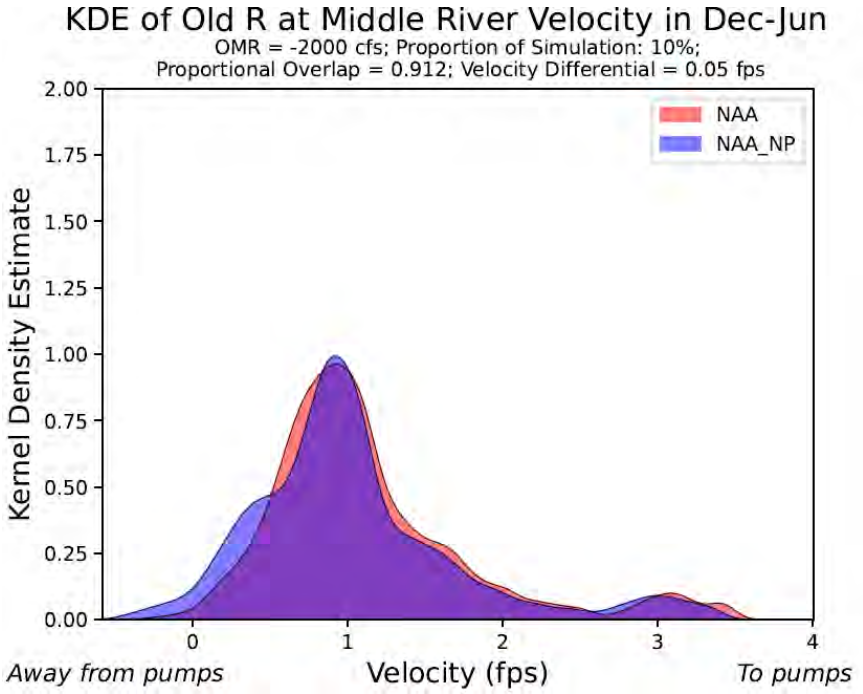



Figure I.3-16. Gaussian KDE of Velocity at Old River at Middle River in December through June with OMR of -2,000 cfs. Results apply to the No Action Alternative.

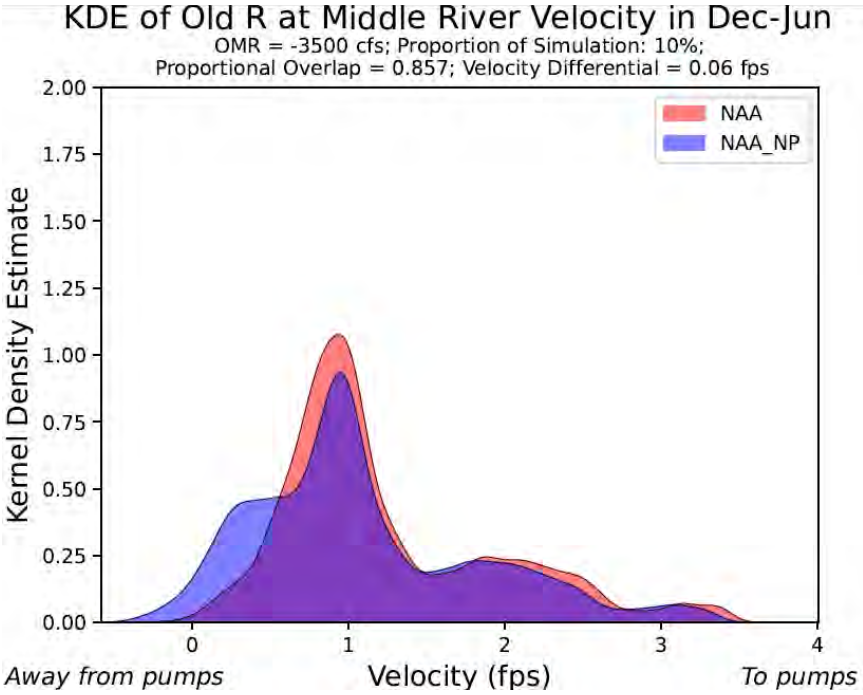



Figure I.3-17. Gaussian KDE of Velocity at Old River at Middle River in December through June with OMR of -3,500 cfs. Results apply to the No Action Alternative.

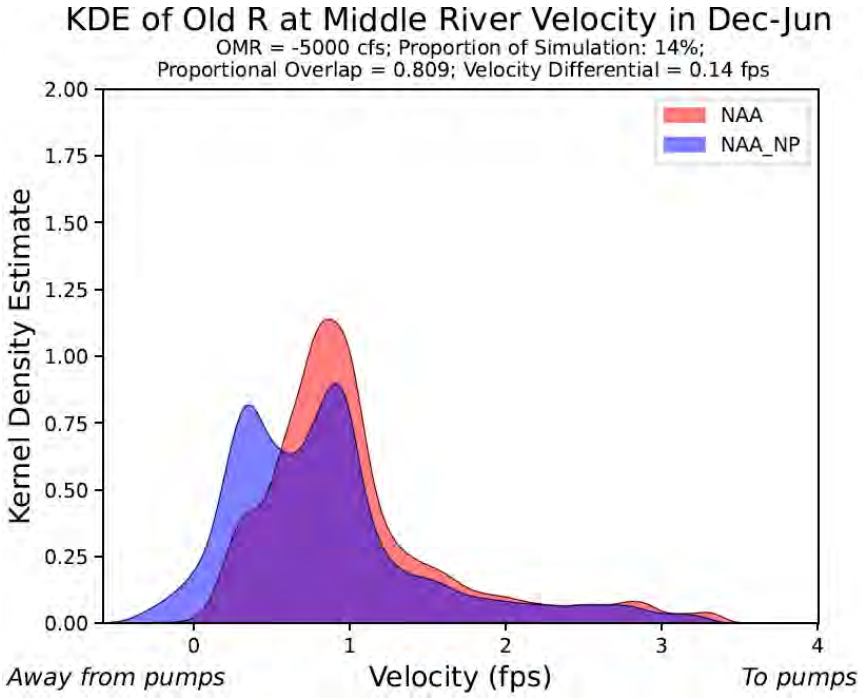



Figure I3-18. Gaussian KDE of Velocity at Old River at Middle River in December through June with OMR of -5,000 cfs. Results apply to the No Action Alternative.

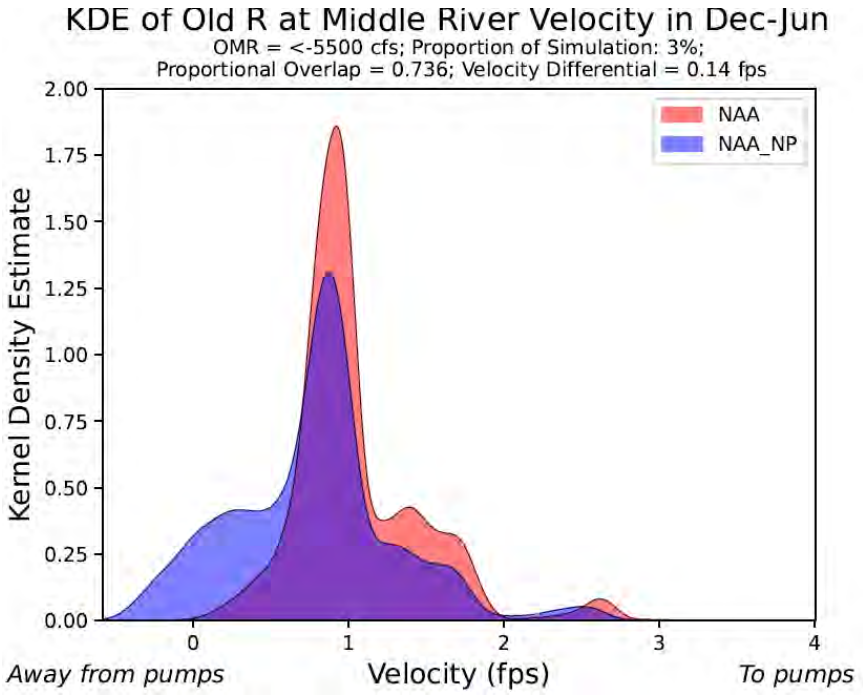



Figure I.3-19. Gaussian KDE of Velocity at Old River at Middle River in December through June with OMR < -5,500 cfs. Results apply to the No Action Alternative.

#### *I.3.2.1.2 KDE plots for Alt1 alternative:*

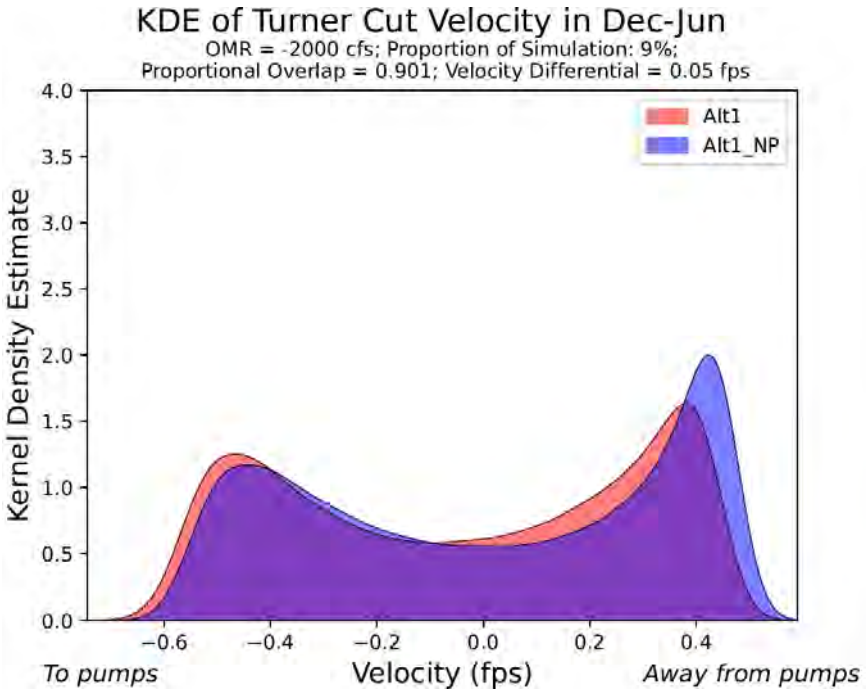



Figure I.3-20. Gaussian KDE of Velocity at Turner Cut in December through June with OMR of -2,000 cfs. Results apply to the Alt1 alternative.

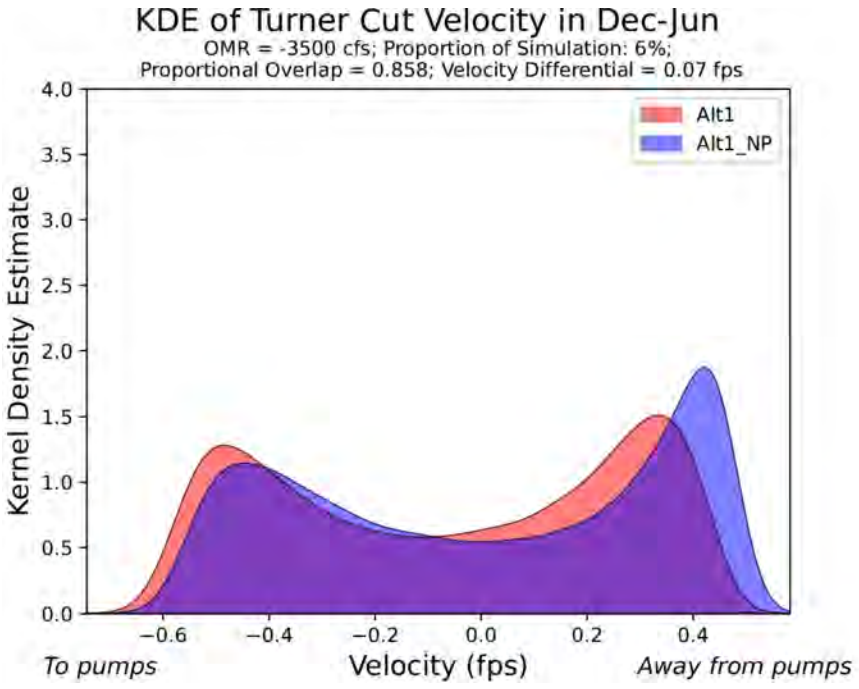



Figure I.3-21. Gaussian KDE of Velocity at Turner Cut in December through June with OMR of -3,500 cfs. Results apply to the Alt1 alternative.

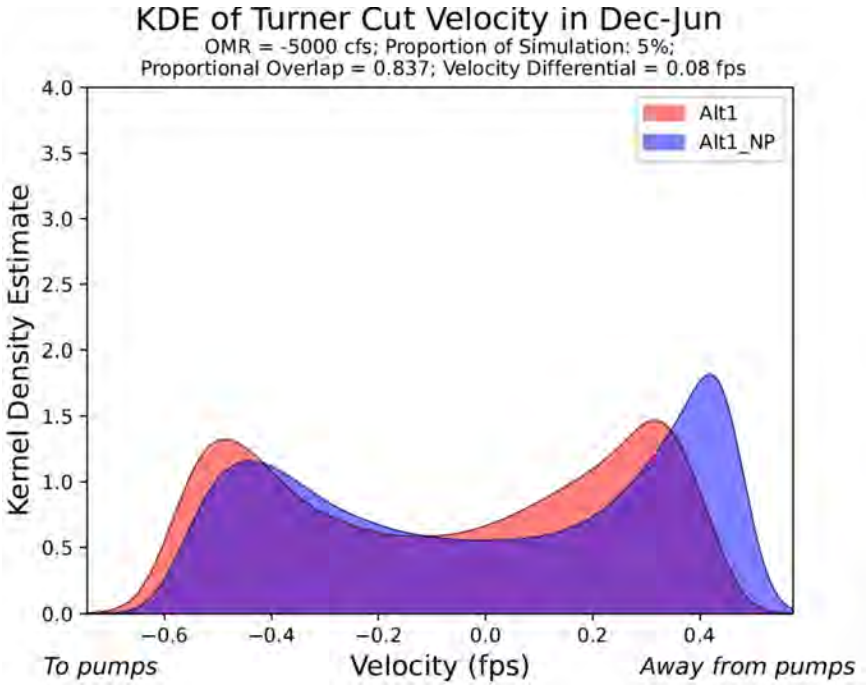



Figure I.3-22. Gaussian KDE of Velocity at Turner Cut in December through June with OMR of -5,000 cfs. Results apply to the Alt1 alternative.

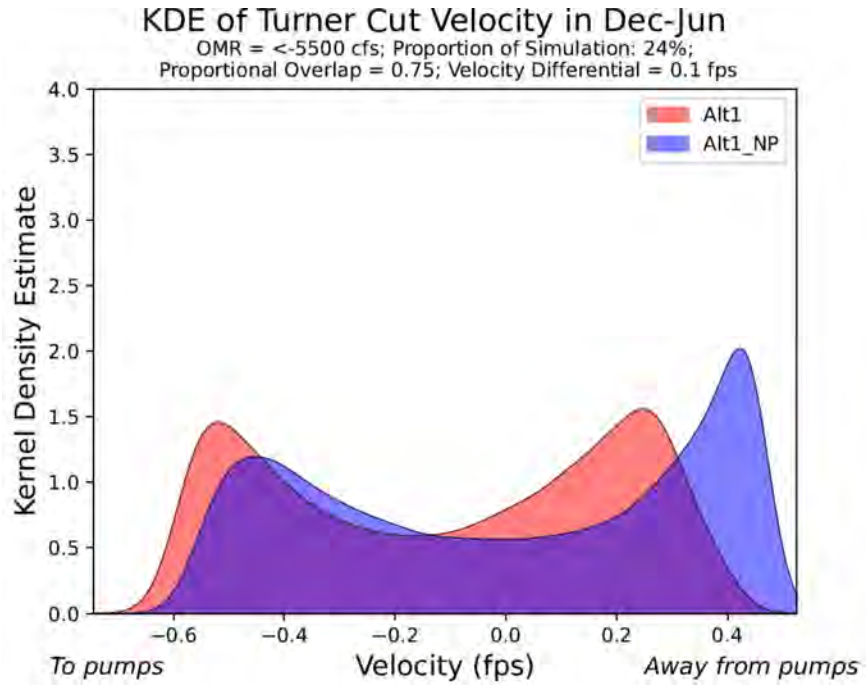



Figure I.3-23. Gaussian KDE of Velocity at Turner Cut in December through June with OMR < -5,500 cfs. Results apply to the Alt1 alternative.

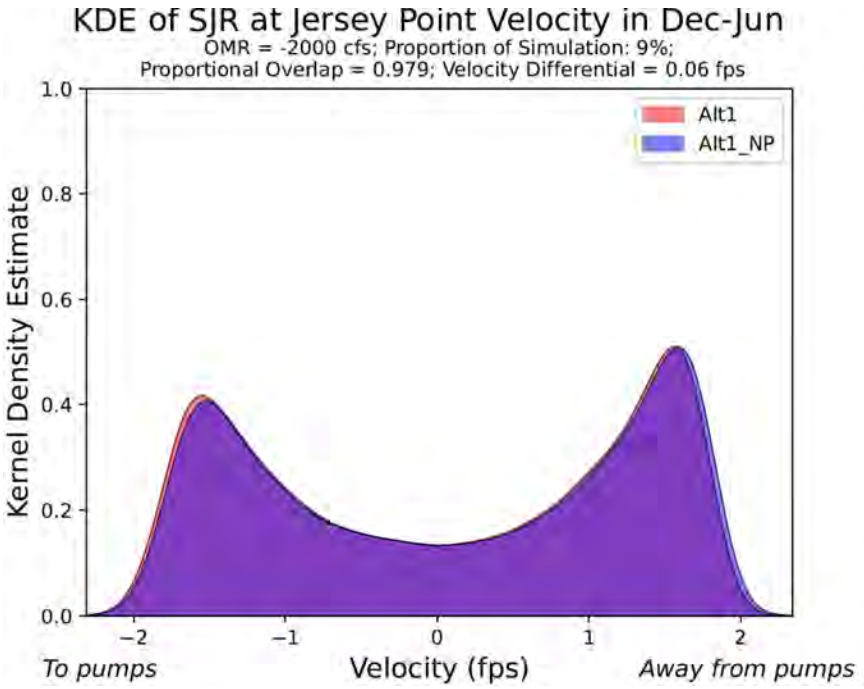



Figure I.3-24. Gaussian KDE of Velocity at San Joaquin River at Jersey Point in December through June with OMR of -2,000 cfs. Results apply to the Alt1 alternative.

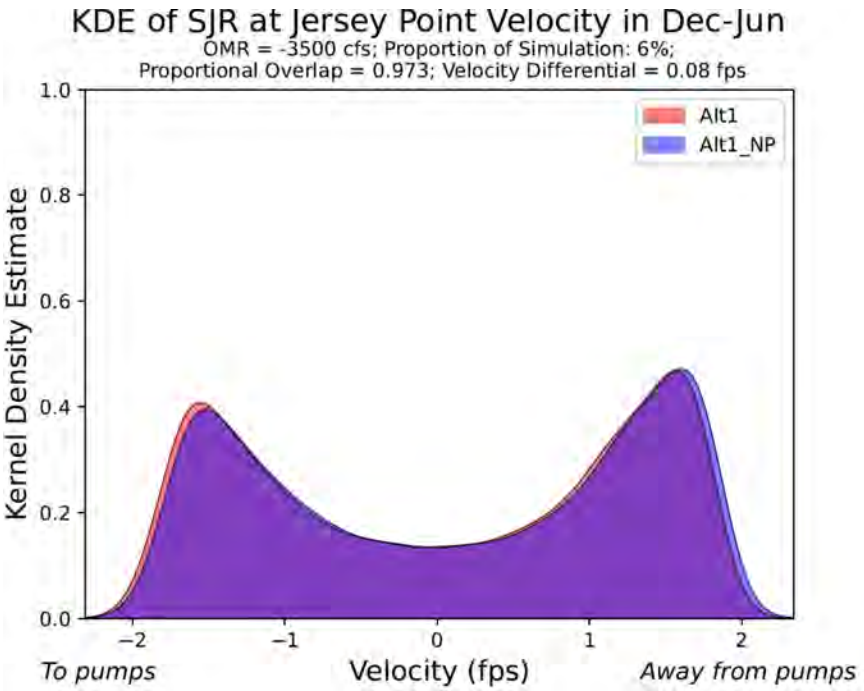



Figure I.3-25. Gaussian KDE of Velocity at San Joaquin River at Jersey Point in December through June with OMR of -3,500 cfs. Results apply to the Alt1 alternative.

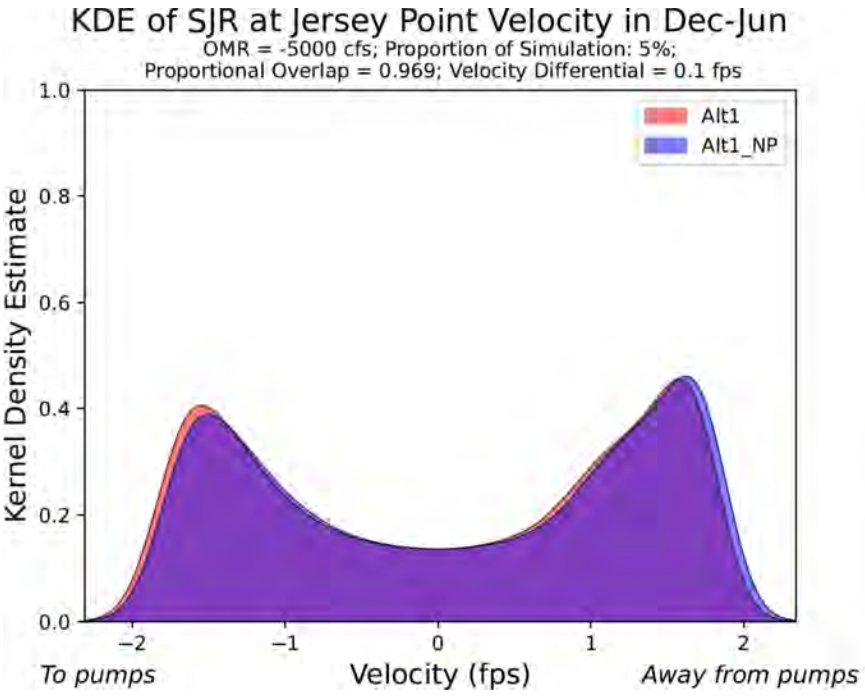



Figure I.3-26. Gaussian KDE of Velocity at San Joaquin River at Jersey Point in December through June with OMR of -5,000 cfs. Results apply to the Alt1 alternative.

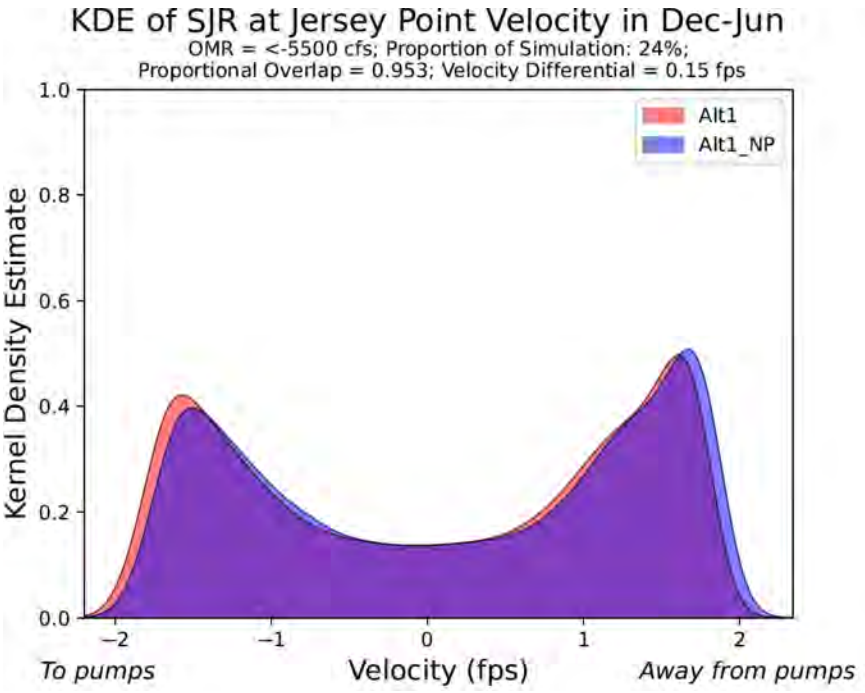



Figure I.3-27. Gaussian KDE of Velocity at San Joaquin River at Jersey Point in December through June with OMR < -5,500 cfs. Results apply to the Alt1 alternative.

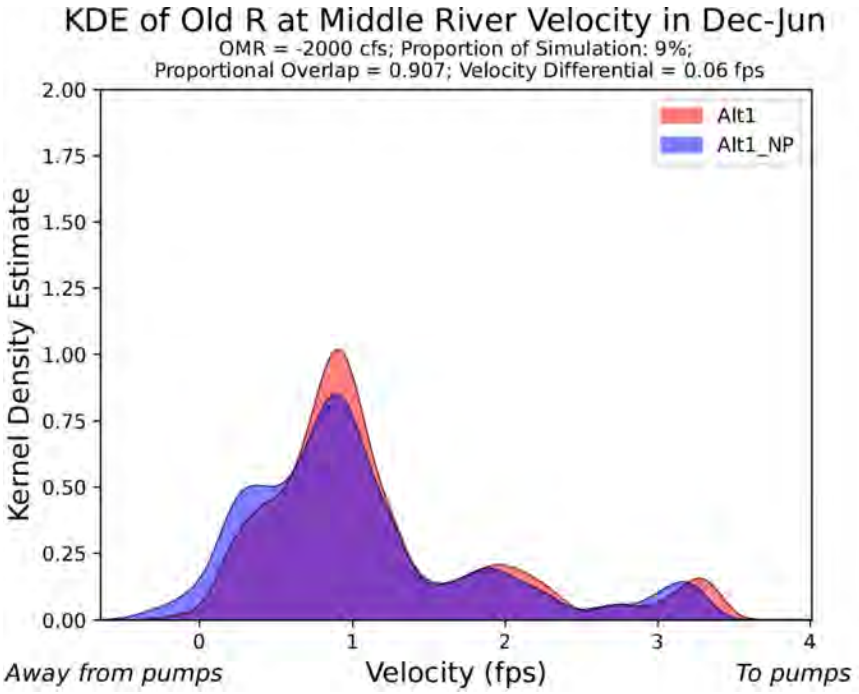



Figure I.3-28. Gaussian KDE of Velocity at Old River at Middle River in December through June with OMR of -2,000 cfs. Results apply to the Alt1 alternative.

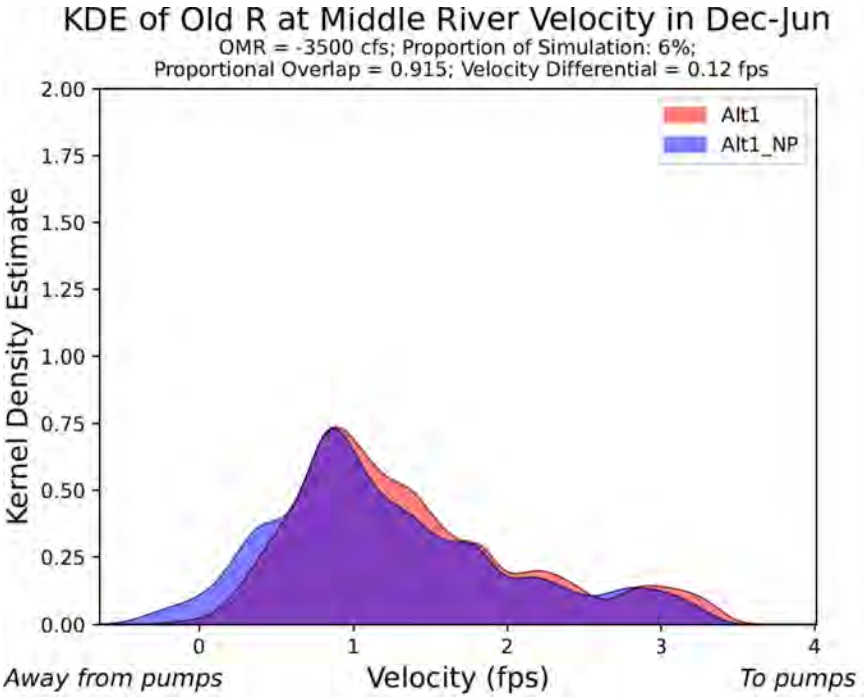



Figure I.3-29. Gaussian KDE of Velocity at Old River at Middle River in December through June with OMR of -3,500 cfs. Results apply to the Alt1 alternative.

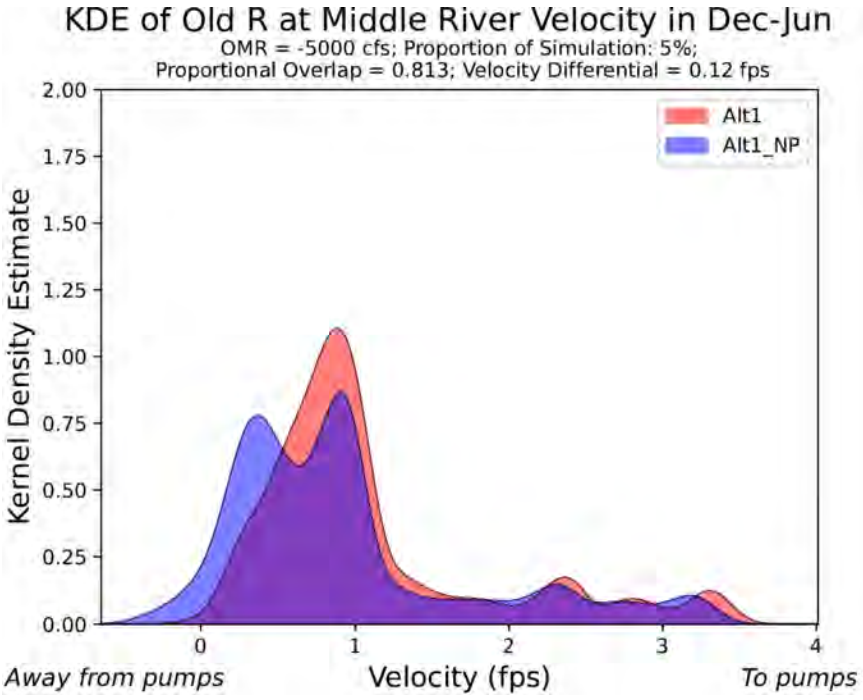



Figure I.3-30. Gaussian KDE of Velocity at Old River at Middle River in December through June with OMR of -5,000 cfs. Results apply to the Alt1 alternative.

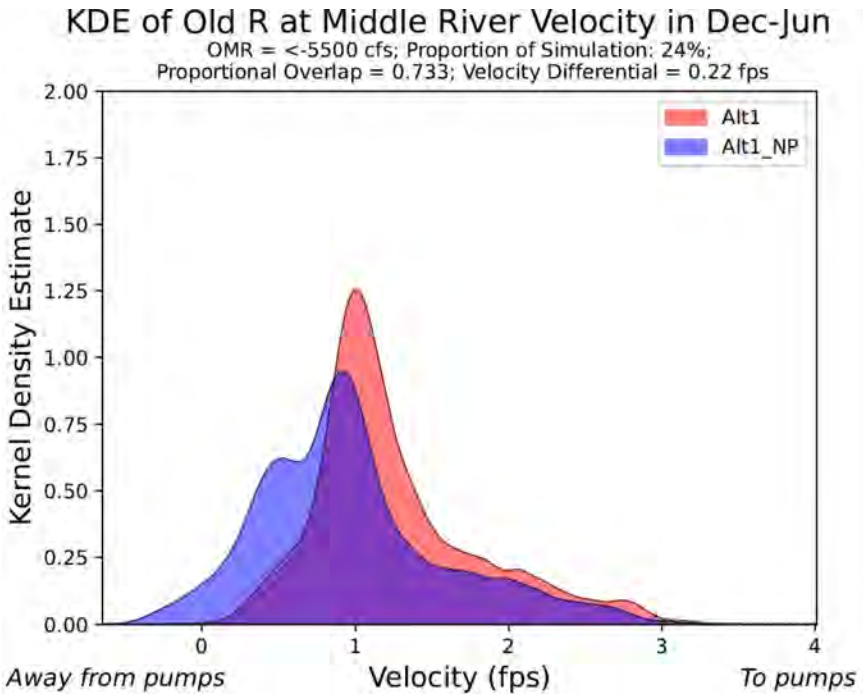



Figure I.3-31. Gaussian KDE of Velocity at Old River at Middle River in December through June with OMR < -5,500 cfs. Results apply to the Alt1 alternative.

#### *I.3.2.1.3 KDE plots for Alt2v1woTUCP alternative:*

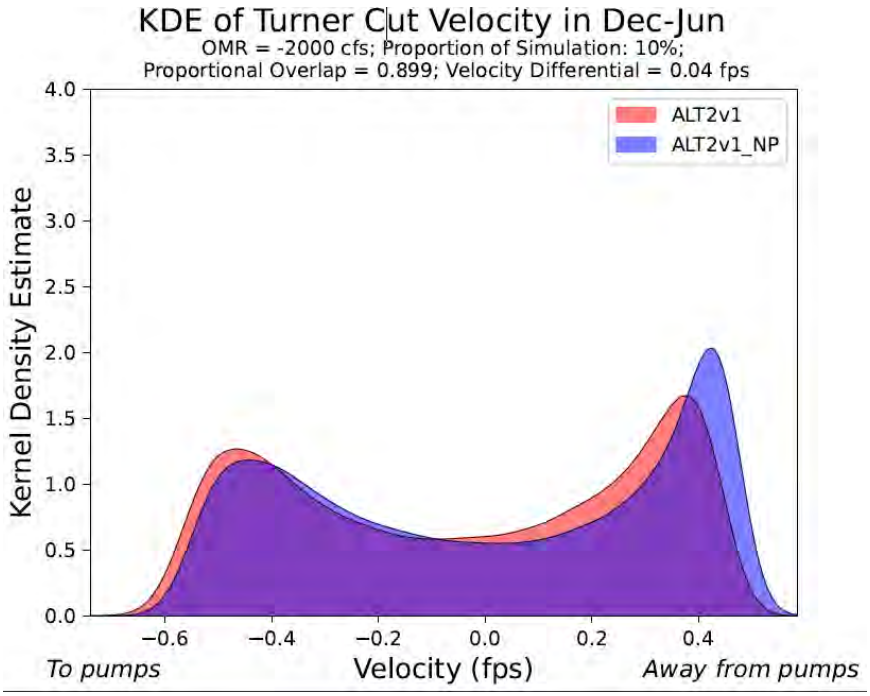



Figure I.3-32. Gaussian KDE of Velocity at Turner Cut in December through June with OMR of -2,000 cfs. Results apply to the Alt2v1woTUCP alternative.

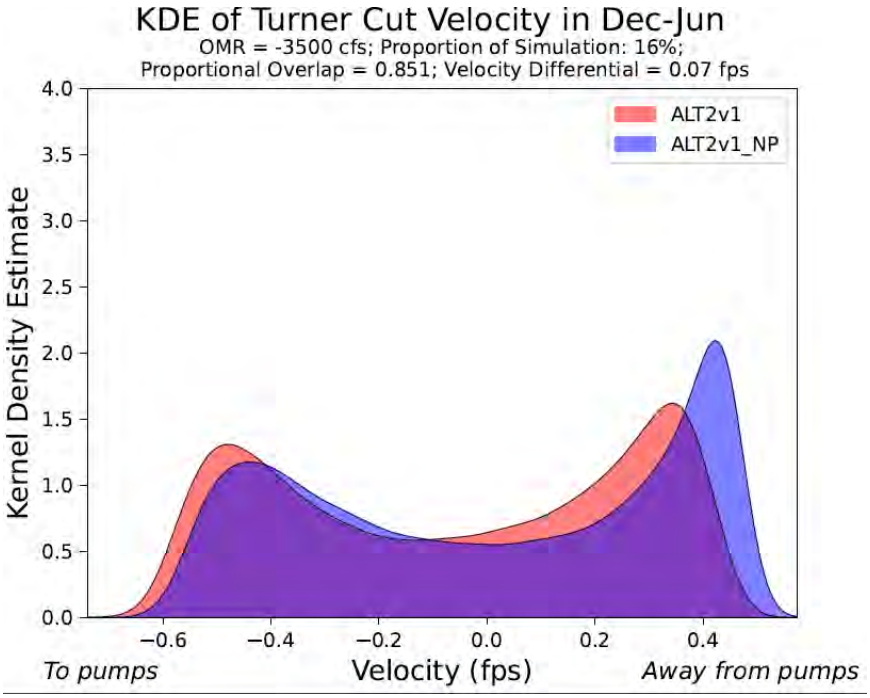



Figure I.3-33. Gaussian KDE of Velocity at Turner Cut in December through June with OMR of -3,500 cfs. Results apply to the Alt2v1woTUCP alternative.

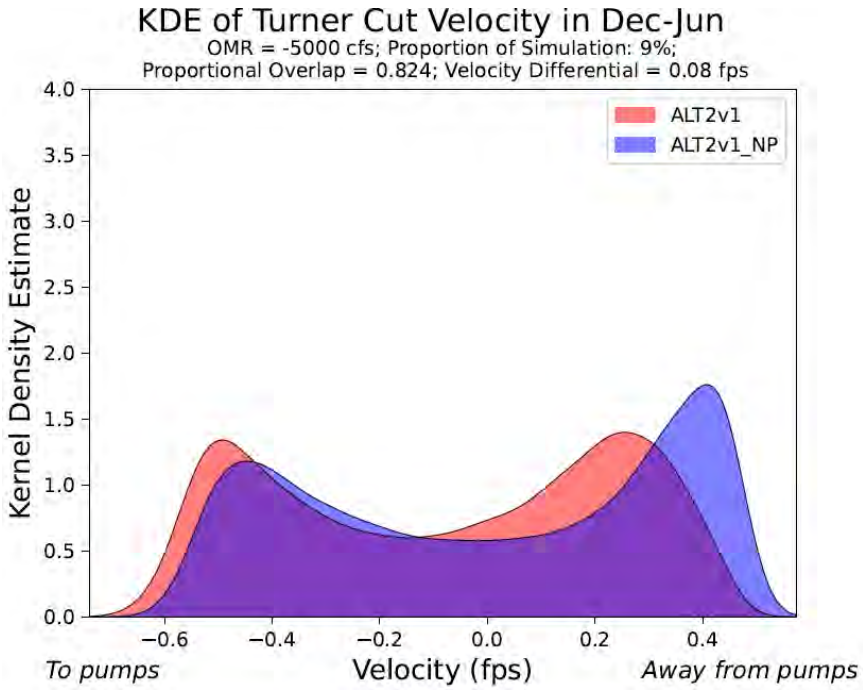



Figure I.3-34. Gaussian KDE of Velocity at Turner Cut in December through June with OMR of -5,000 cfs. Results apply to the Alt2v1woTUCP alternative.

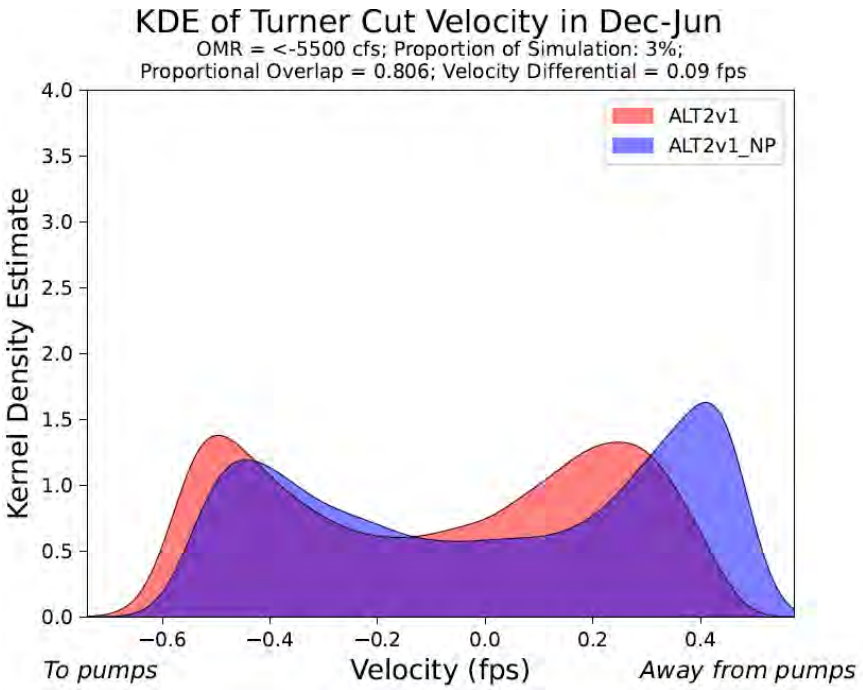



Figure I.3-35. Gaussian KDE of Velocity at Turner Cut in December through June with OMR < -5,500 cfs. Results apply to the Alt2v1woTUCP alternative.

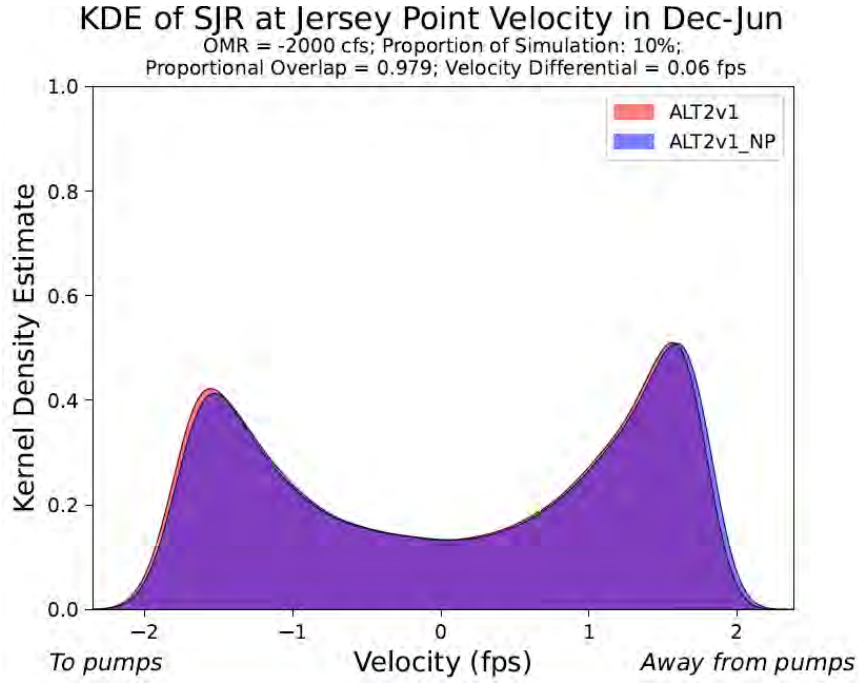



Figure I.3-36. Gaussian KDE of Velocity at San Joaquin River at Jersey Point in December through June with OMR of -2,000 cfs. Results apply to the Alt2v1woTUCP alternative.

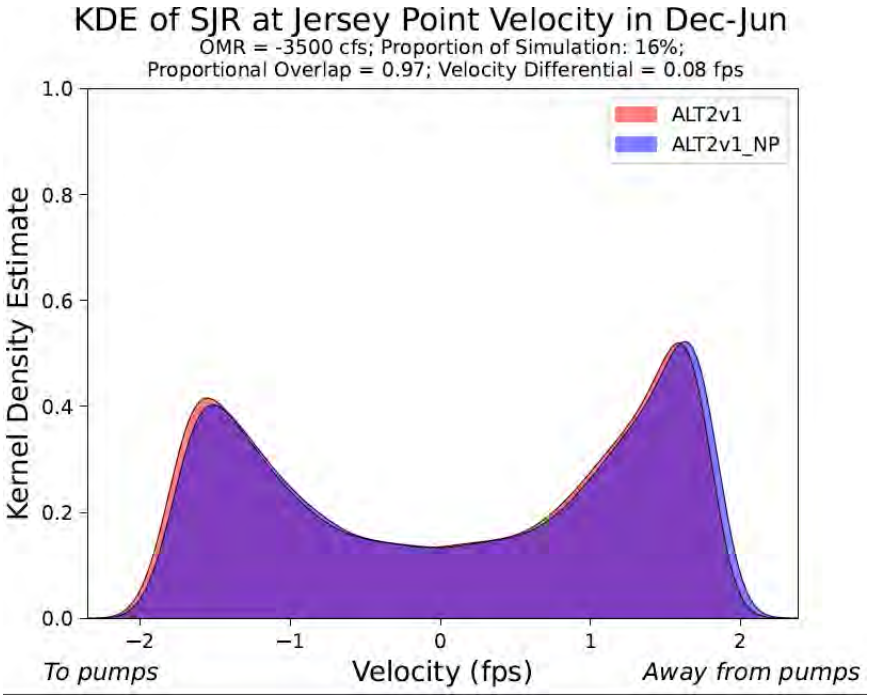



Figure I.3-37. Gaussian KDE of Velocity at San Joaquin River at Jersey Point in December through June with OMR of -3,500 cfs. Results apply to the Alt2v1woTUCP alternative.

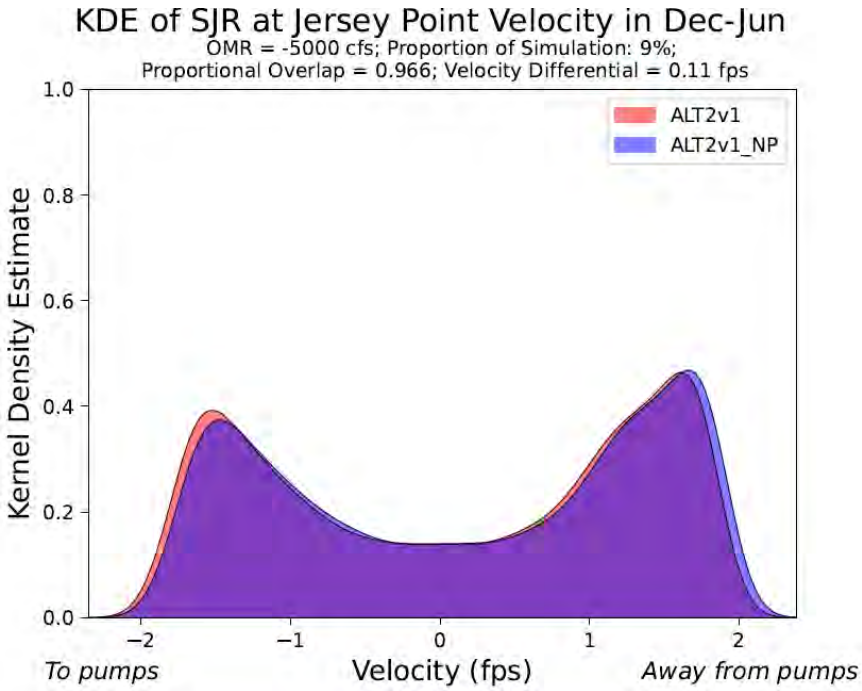



Figure I.3-38. Gaussian KDE of Velocity at San Joaquin River at Jersey Point in December through June with OMR of -5,000 cfs. Results apply to the Alt2v1woTUCP alternative.

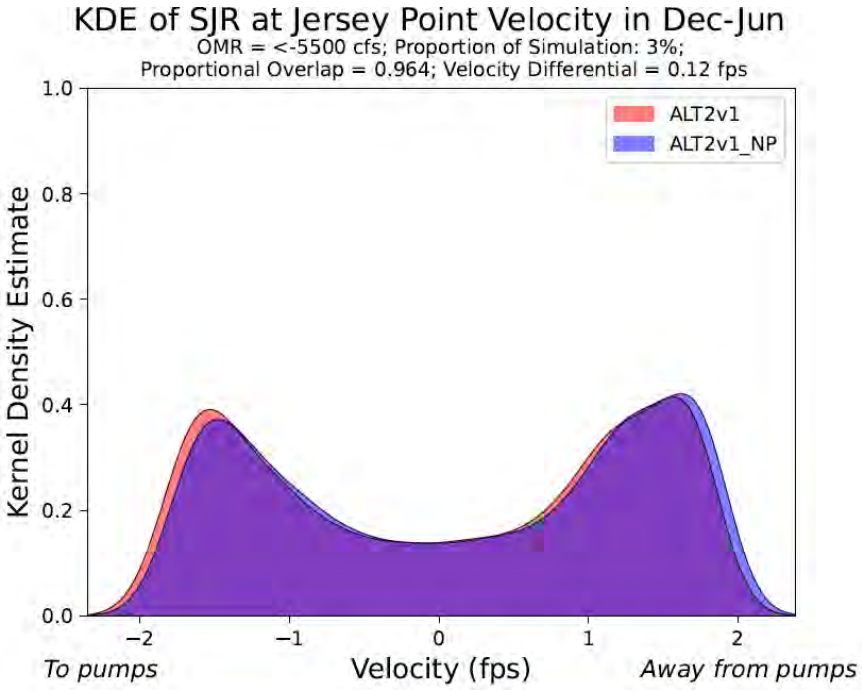



Figure I.3-39. Gaussian KDE of Velocity at San Joaquin River at Jersey Point in December through June with OMR < -5,500 cfs. Results apply to the Alt2v1woTUCP alternative.

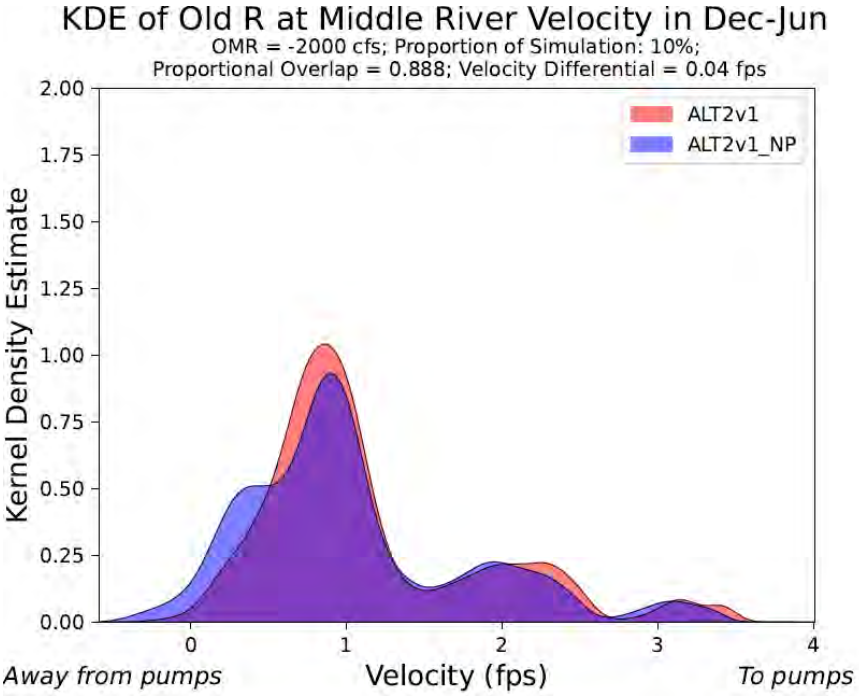



Figure I.3-40. Gaussian KDE of Velocity at Old River at Middle River in December through June with OMR of -2,000 cfs. Results apply to the Alt2v1woTUCP alternative.

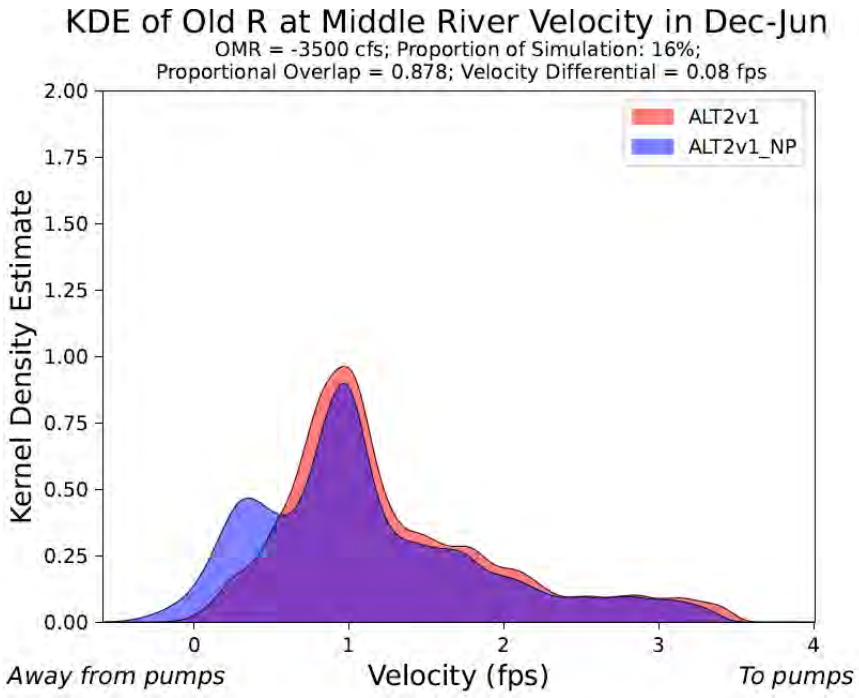



Figure I.3-41. Gaussian KDE of Velocity at Old River at Middle River in December through June with OMR of -3,500 cfs. Results apply to the Alt2v1woTUCP alternative.

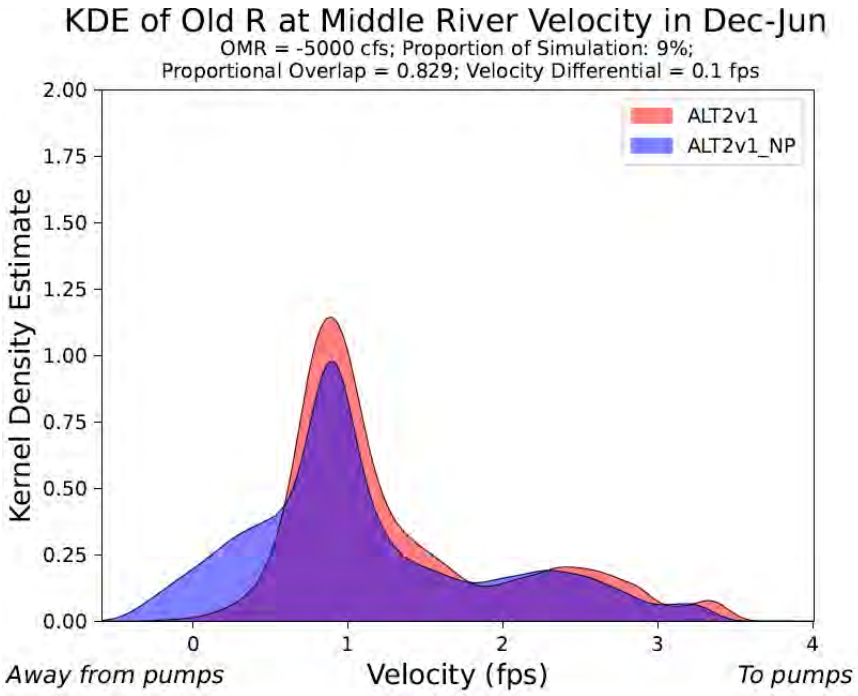



Figure I.3-42. Gaussian KDE of Velocity at Old River at Middle River in December through June with OMR of -5,000 cfs. Results apply to the Alt2v1woTUCP alternative.

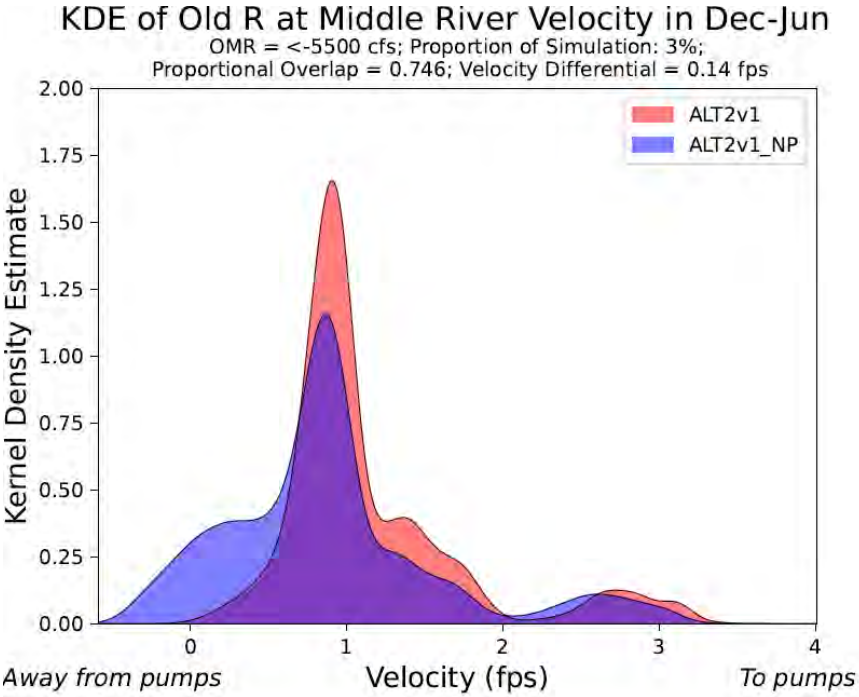



Figure I.3-43. Gaussian KDE of Velocity at Old River at Middle River in December through June with OMR < -5,500 cfs. Results apply to the Alt2v1woTUCP alternative.

#### *I.3.2.1.4 KDE plots for Alt2v2woTUCP alternative:*

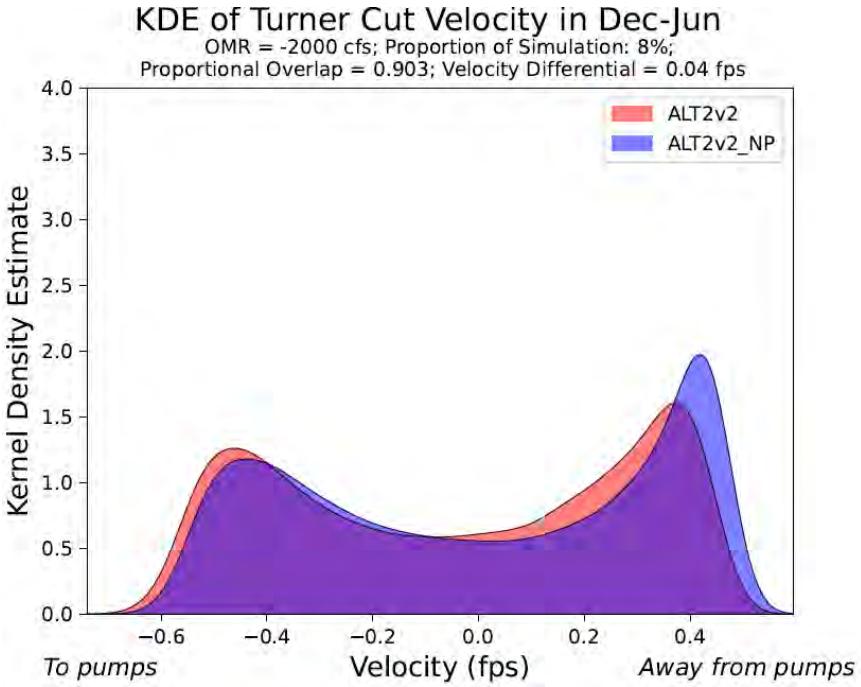



Figure I.3-44. Gaussian KDE of Velocity at Turner Cut in December through June with OMR of -2,000 cfs. Results apply to the Alt2v2woTUCP alternative.

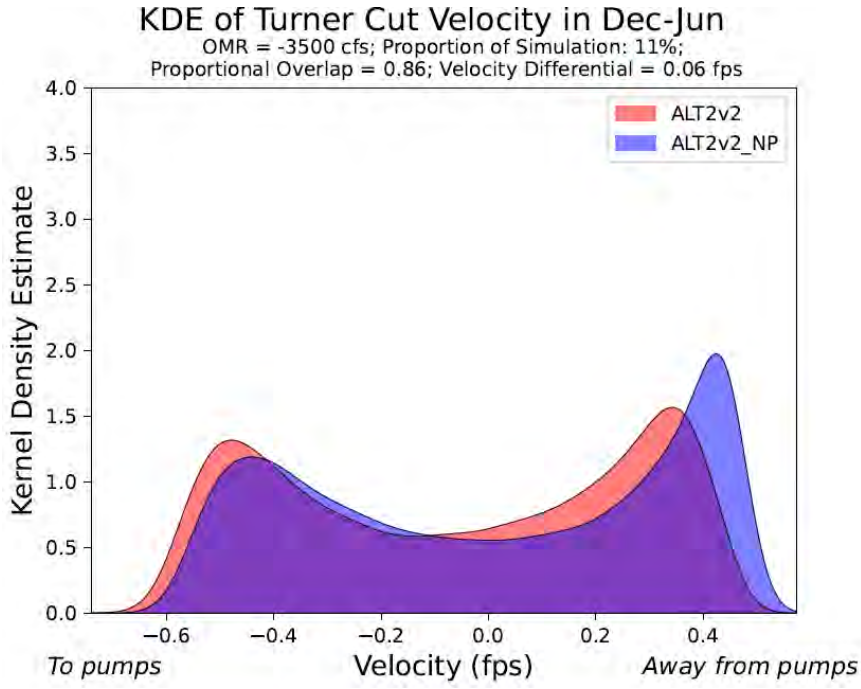



Figure I.3-45. Gaussian KDE of Velocity at Turner Cut in December through June with OMR of -3,500 cfs. Results apply to the Alt2v2woTUCP alternative.

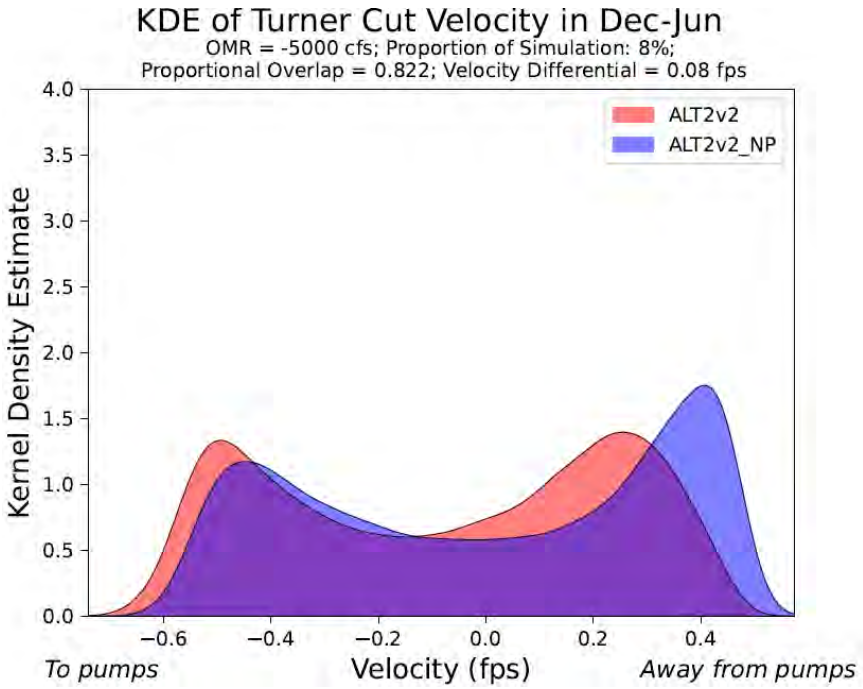



Figure I.3-46. Gaussian KDE of Velocity at Turner Cut in December through June with OMR of -5,000 cfs. Results apply to the Alt2v2woTUCP alternative.

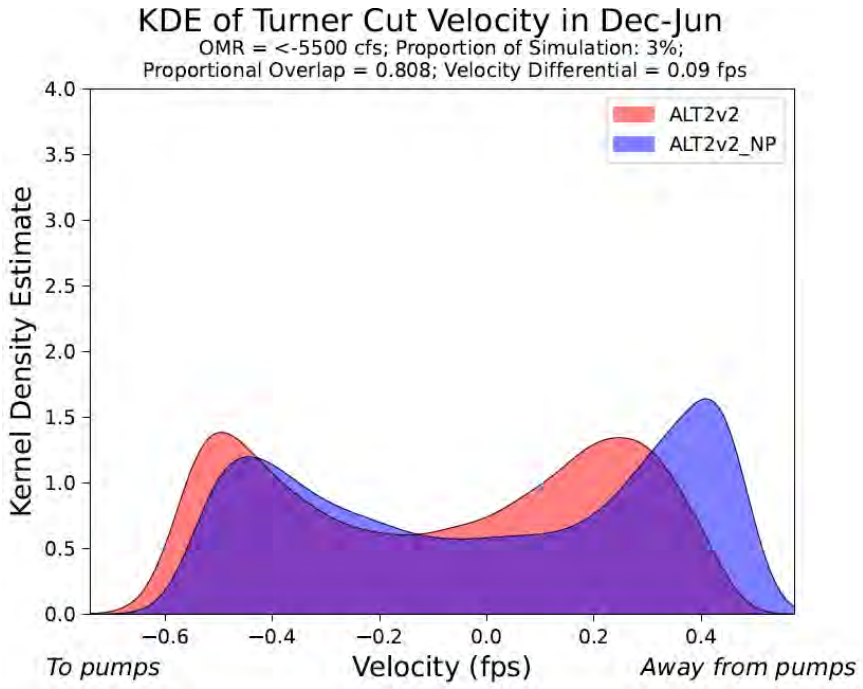



Figure I.3-47. Gaussian KDE of Velocity at Turner Cut in December through June with OMR < -5,500 cfs. Results apply to the Alt2v2woTUCP alternative.

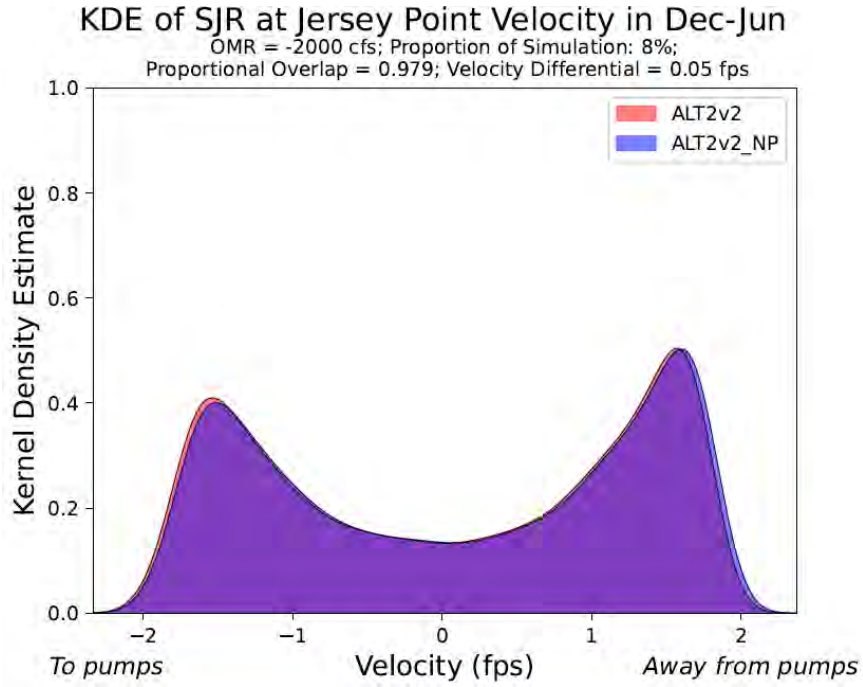



Figure I.3-48. Gaussian KDE of Velocity at San Joaquin River at Jersey Point in December through June with OMR of -2,000 cfs. Results apply to the Alt2v2woTUCP alternative.

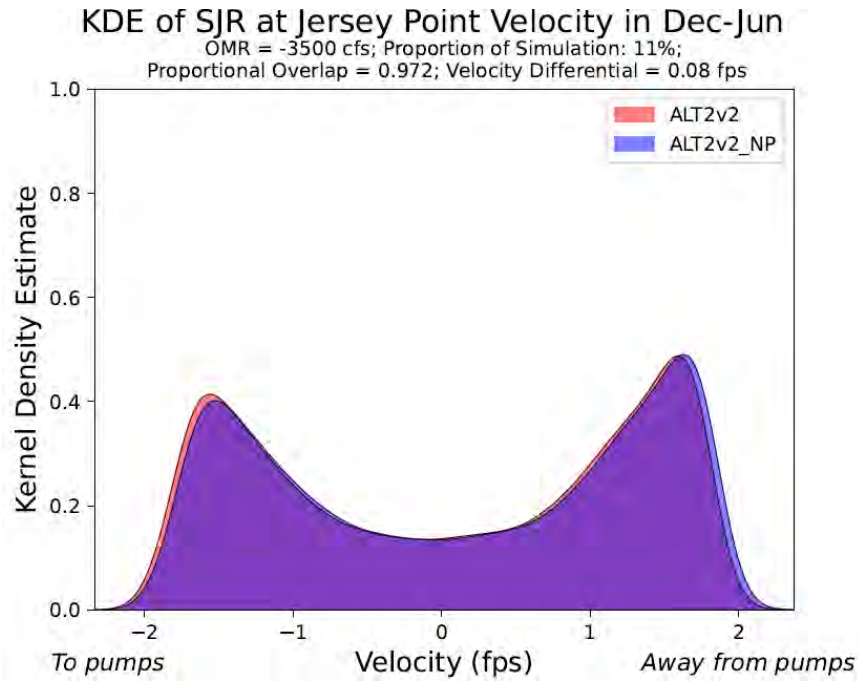



Figure I.3-49. Gaussian KDE of Velocity at San Joaquin River at Jersey Point in December through June with OMR of -3,500 cfs. Results apply to the Alt2v2woTUCP alternative.

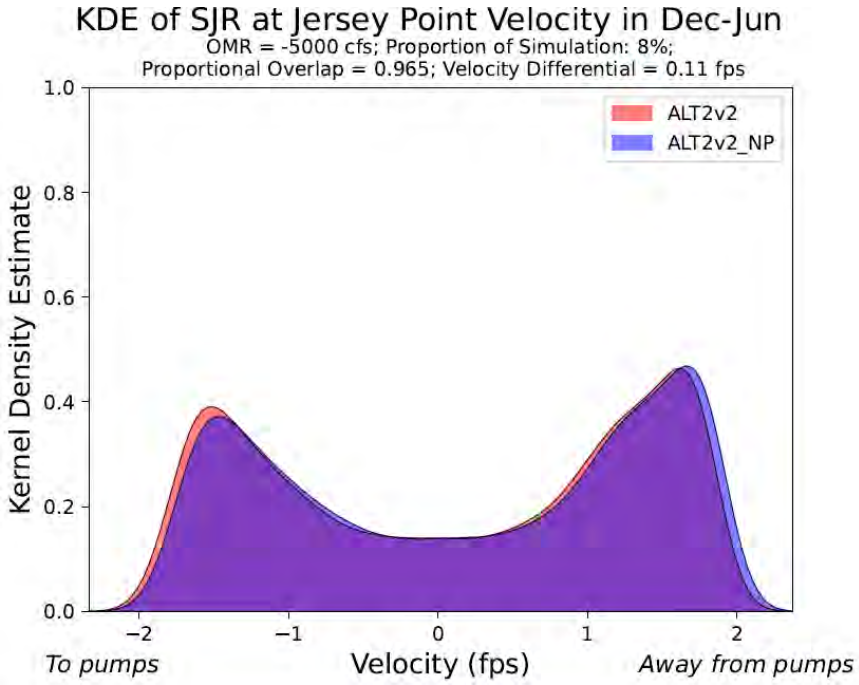



Figure I.3-50. Gaussian KDE of Velocity at San Joaquin River at Jersey Point in December through June with OMR of -5,000 cfs. Results apply to the Alt2v2woTUCP alternative.

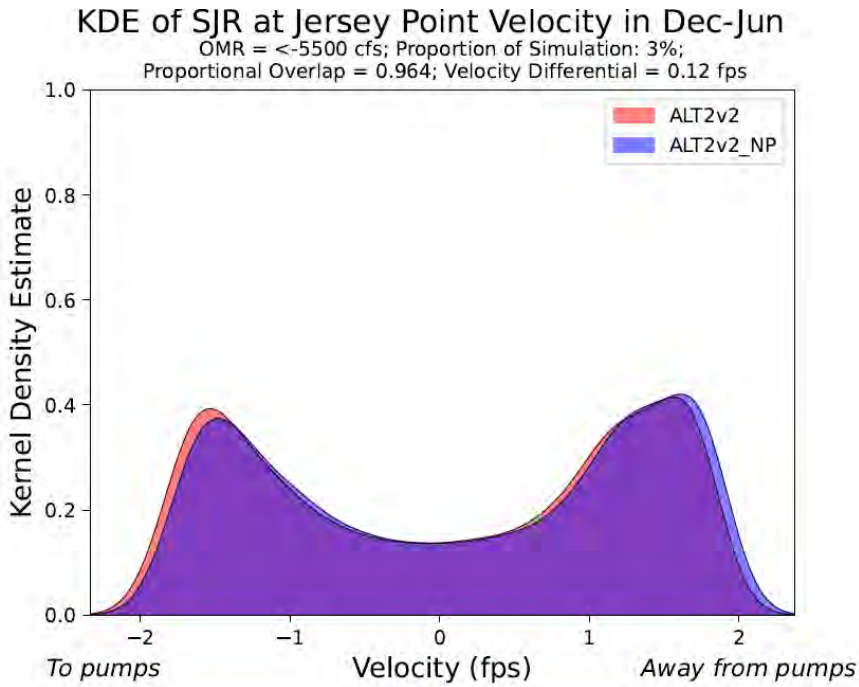



Figure I.3-51. Gaussian KDE of Velocity at San Joaquin River at Jersey Point in December through June with OMR < -5,500 cfs. Results apply to the Alt2v2woTUCP alternative.

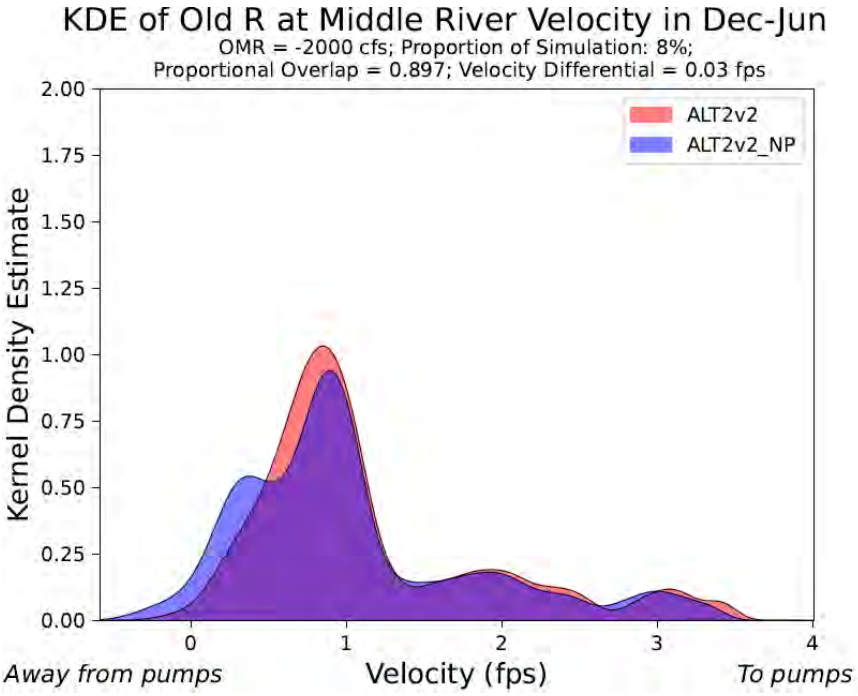



Figure I.3-52. Gaussian KDE of Velocity at Old River at Middle River in December through June with OMR of -2,000 cfs. Results apply to the Alt2v2woTUCP alternative.

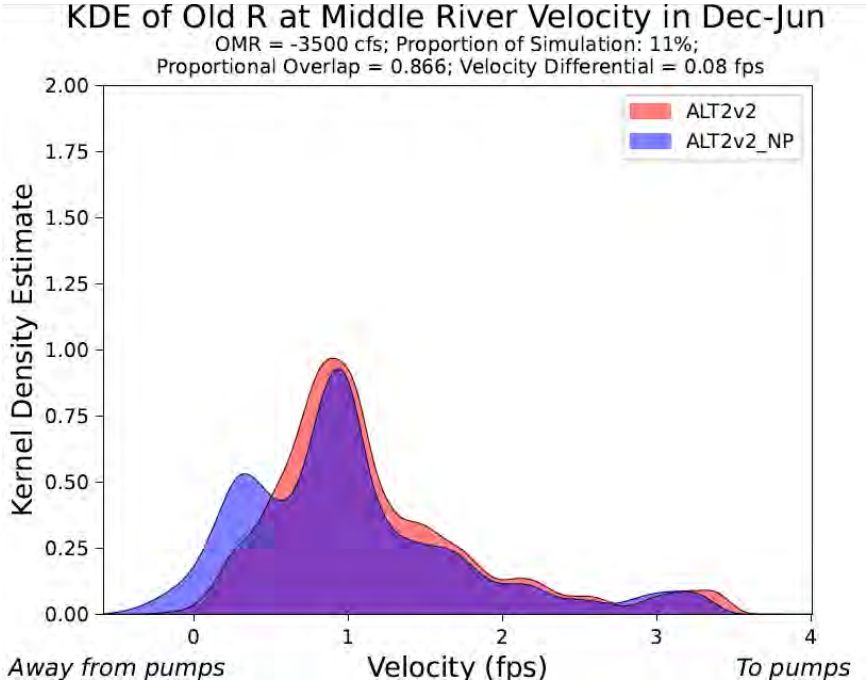



Figure I.3-53. Gaussian KDE of Velocity at Old River at Middle River in December through June with OMR of -3,500 cfs. Results apply to the Alt2v2woTUCP alternative.

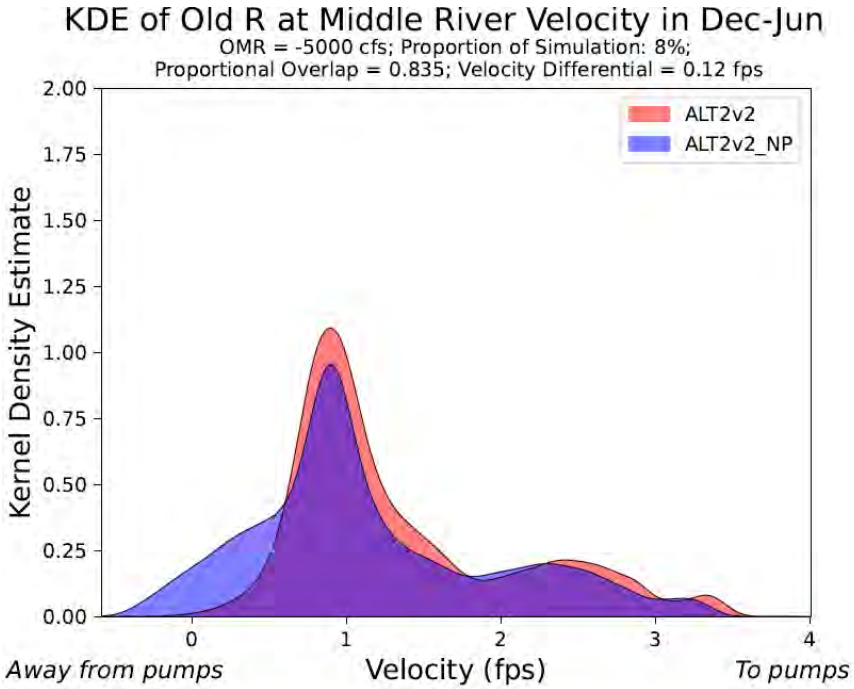



Figure I.3-54. Gaussian KDE of Velocity at Old River at Middle River in December through June with OMR of -5,000 cfs. Results apply to the Alt2v2woTUCP alternative.

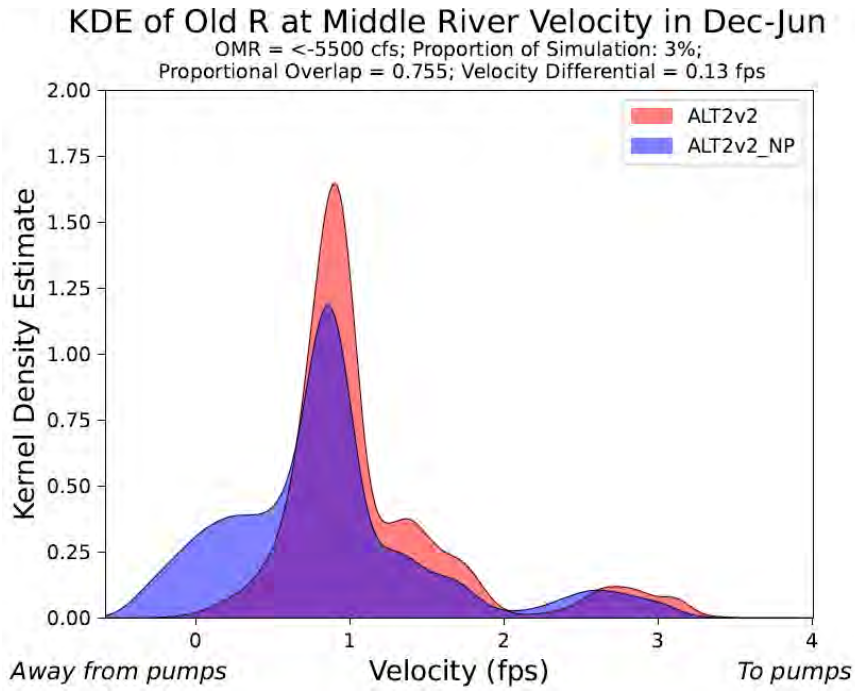



Figure I.3-55. Gaussian KDE of Velocity at Old River at Middle River in December through June with OMR < -5,500 cfs. Results apply to the Alt2v2woTUCP alternative.

#### *I.3.2.1.5 KDE plots for Alt2v3woTUCP alternative:*

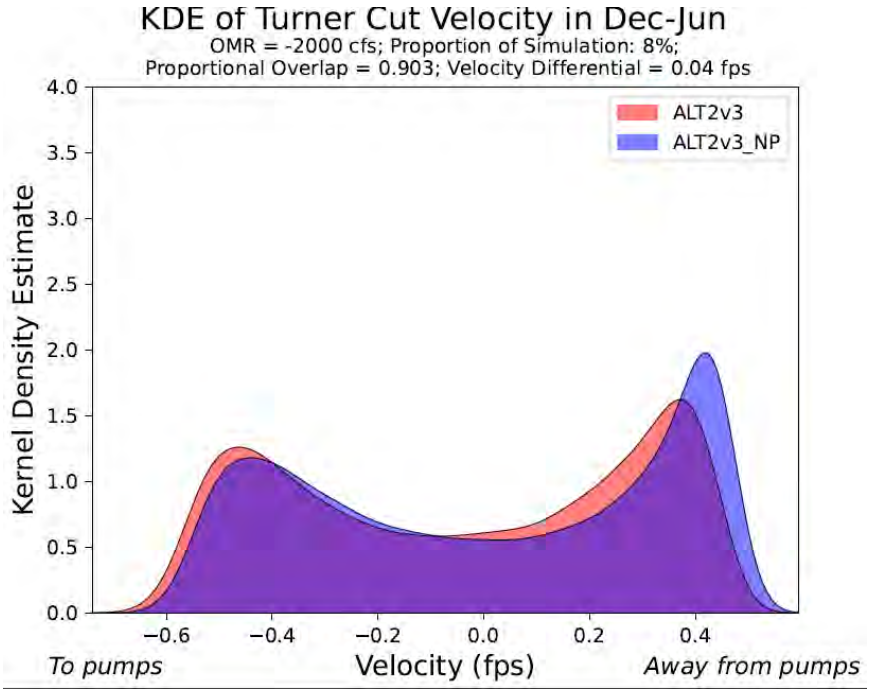



Figure I.3-56. Gaussian KDE of Velocity at Turner Cut in December through June with OMR of -2,000 cfs. Results apply to the Alt2v3woTUCP alternative.

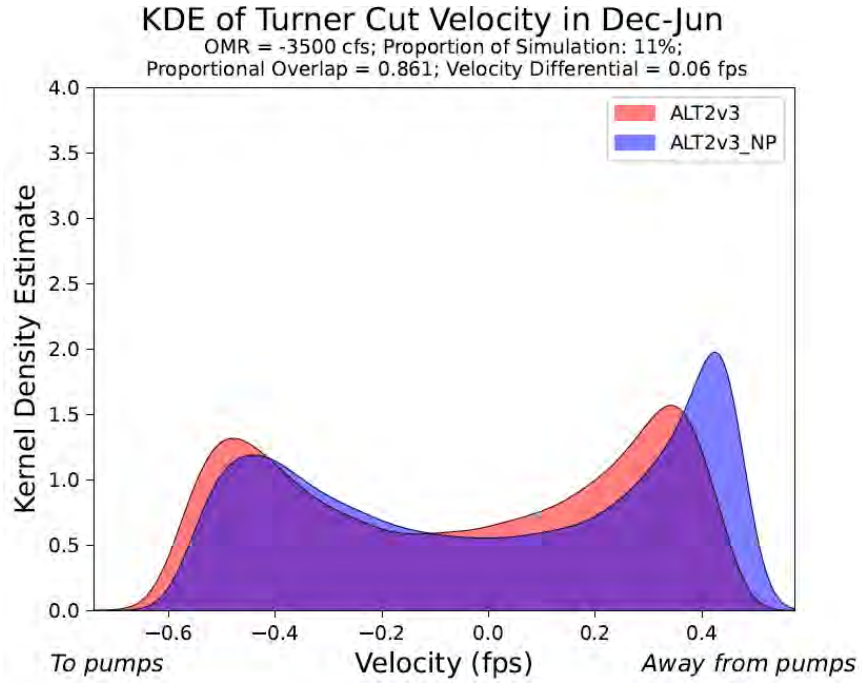



Figure I.3-57. Gaussian KDE of Velocity at Turner Cut in December through June with OMR of -3,500 cfs. Results apply to the Alt2v3woTUCP alternative.

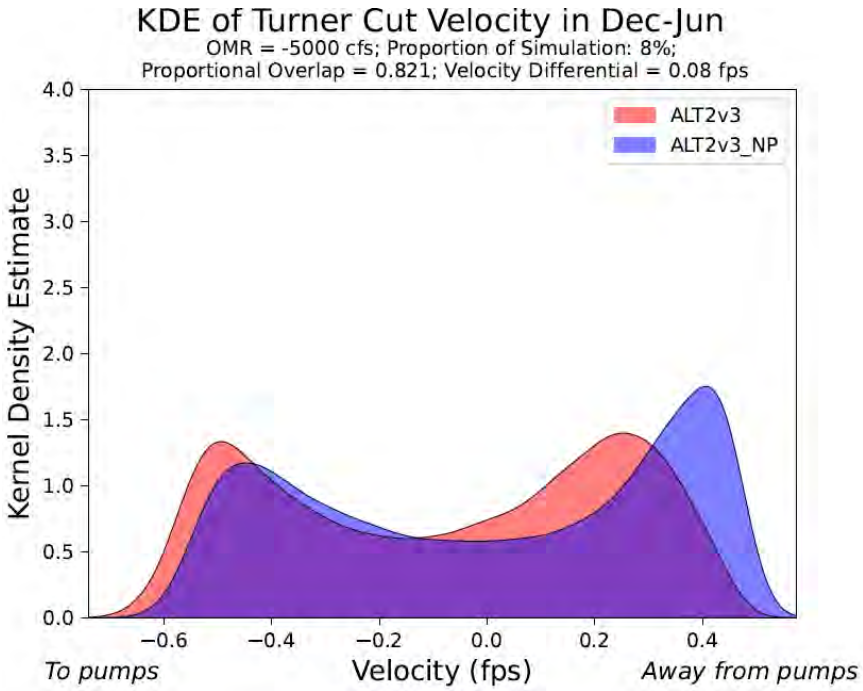



Figure I.3-58. Gaussian KDE of Velocity at Turner Cut in December through June with OMR of -5,000 cfs. Results apply to the Alt2v3woTUCP alternative.

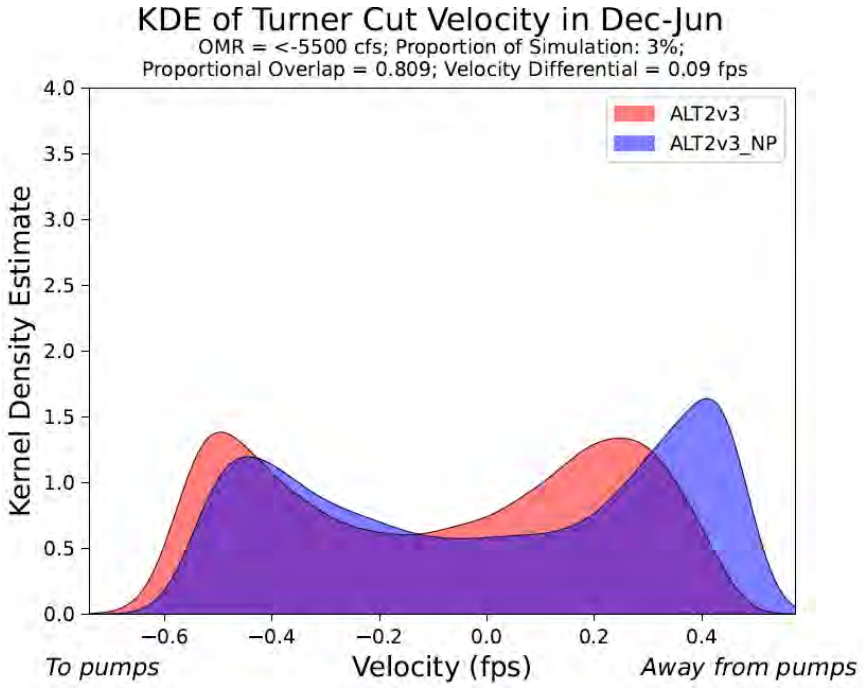



Figure I.3-59. Gaussian KDE of Velocity at Turner Cut in December through June with OMR < -5,500 cfs. Results apply to the Alt2v3woTUCP alternative.

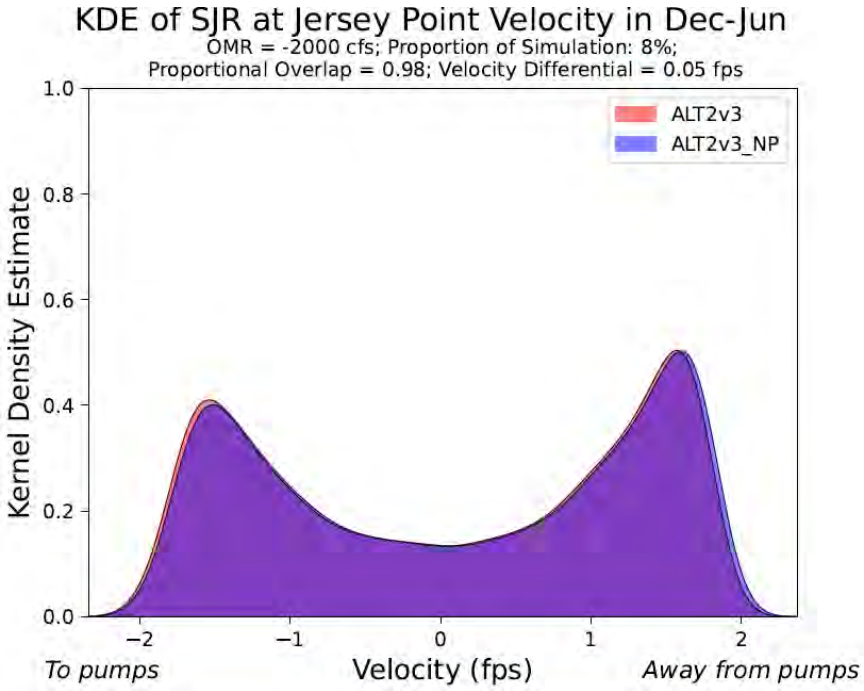



Figure I.3-60. Gaussian KDE of Velocity at San Joaquin River at Jersey Point in December through June with OMR of -2,000 cfs. Results apply to the Alt2v3woTUCP alternative.

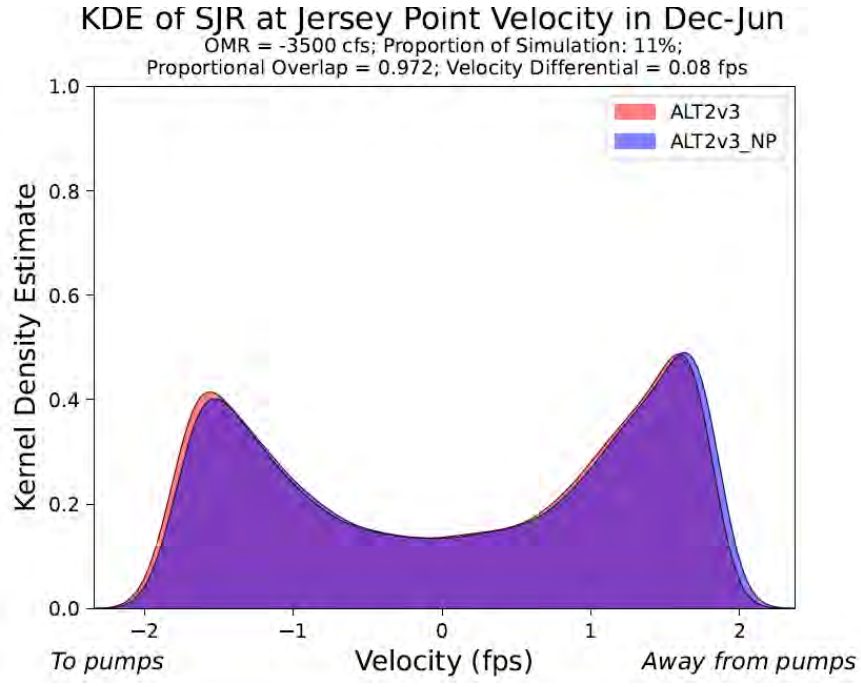



Figure I.3-61. Gaussian KDE of Velocity at San Joaquin River at Jersey Point in December through June with OMR of -3,500 cfs. Results apply to the Alt2v3woTUCP alternative.

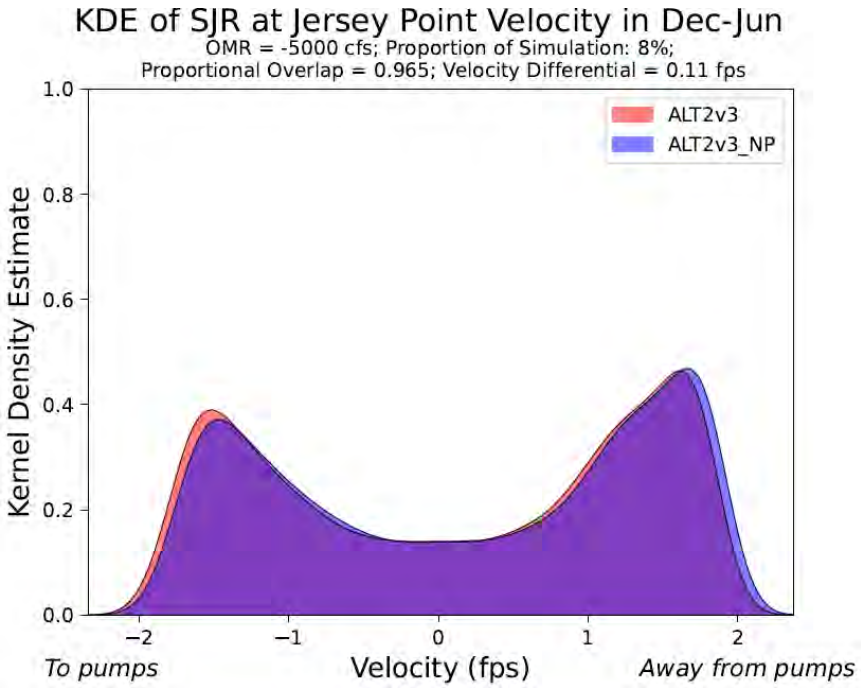



Figure I.3-62. Gaussian KDE of Velocity at San Joaquin River at Jersey Point in December through June with OMR of -5,000 cfs. Results apply to the Alt2v3woTUCP alternative.

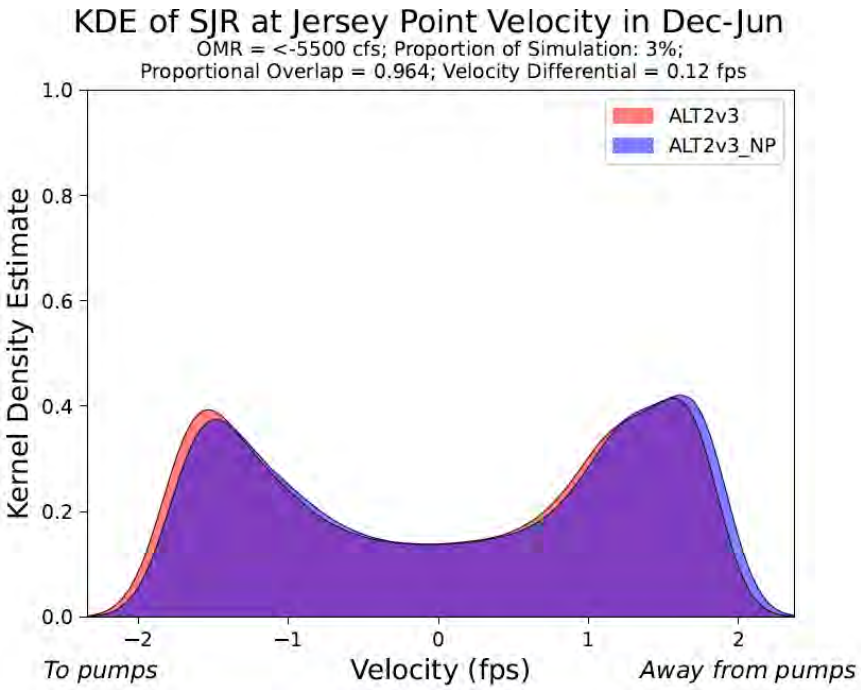



Figure I.3-63. Gaussian KDE of Velocity at San Joaquin River at Jersey Point in December through June with OMR < -5,500 cfs. Results apply to the Alt2v3woTUCP alternative.

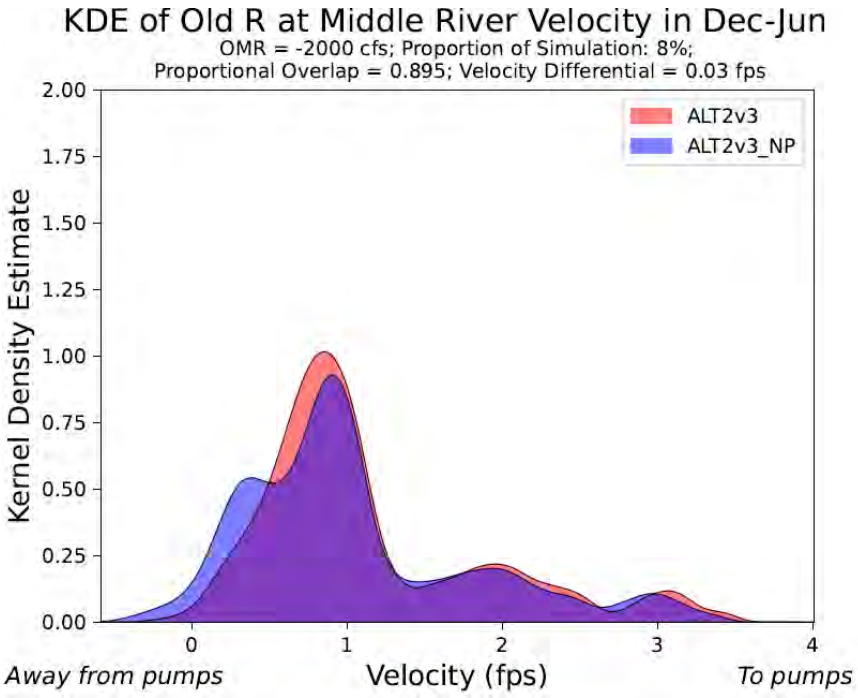



Figure I.3-64. Gaussian KDE of Velocity at Old River at Middle River in December through June with OMR of -2,000 cfs. Results apply to the Alt2v3woTUCP alternative.

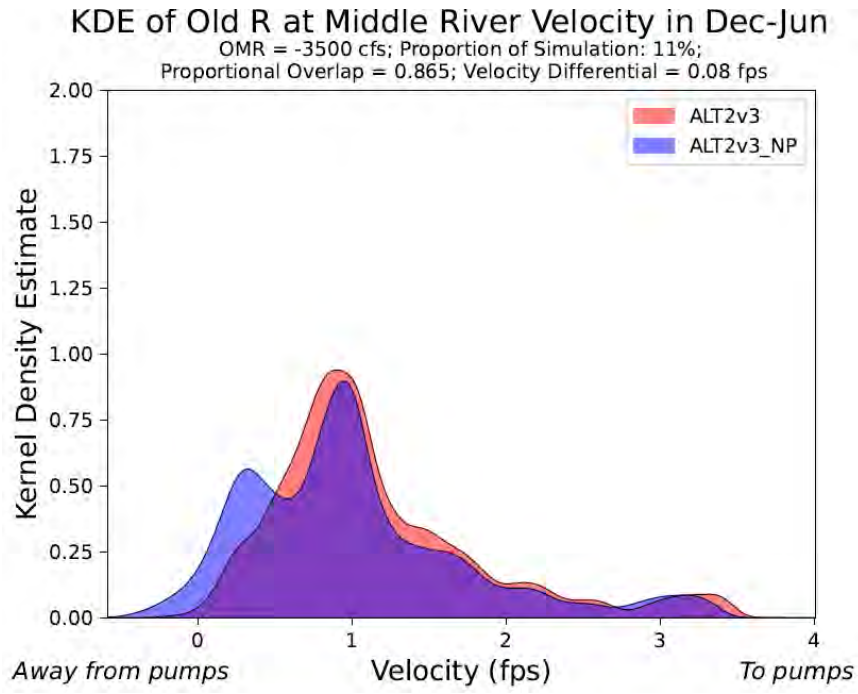



Figure I.3-65. Gaussian KDE of Velocity at Old River at Middle River in December through June with OMR of -3,500 cfs. Results apply to the Alt2v3woTUCP alternative.

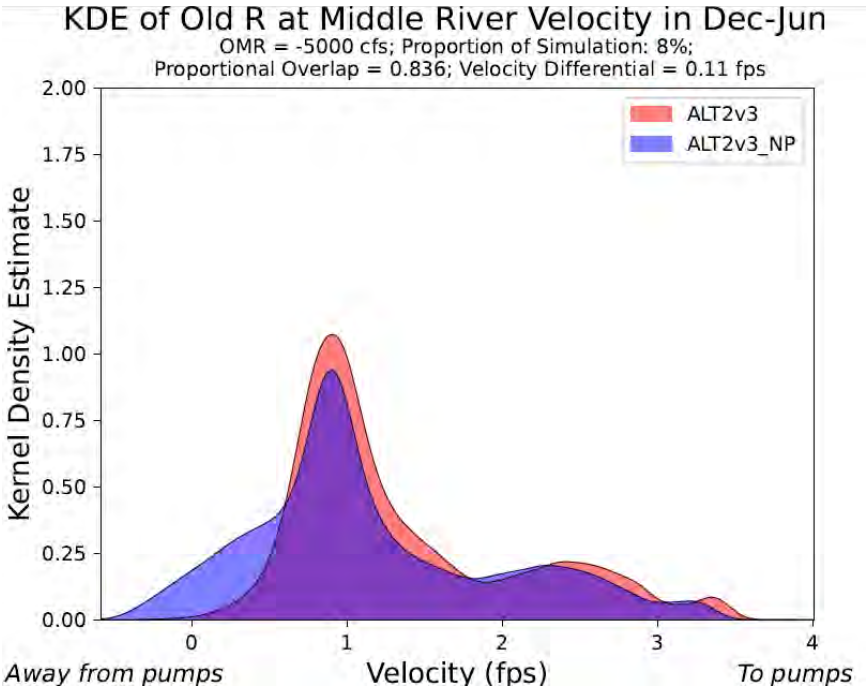



Figure I.3-66. Gaussian KDE of Velocity at Old River at Middle River in December through June with OMR of -5,000 cfs. Results apply to the Alt2v3woTUCP alternative.

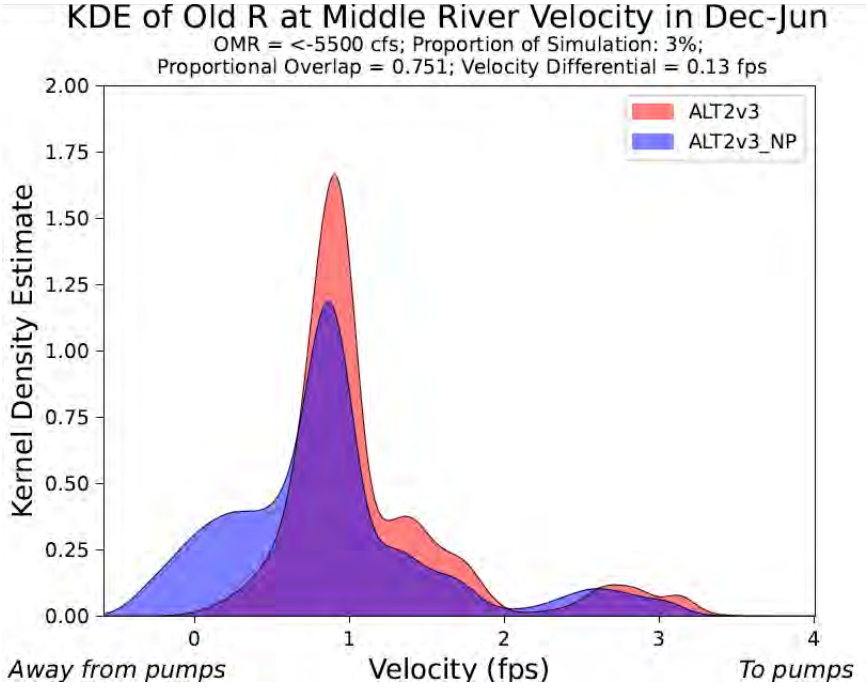



Figure I.3-67. Gaussian KDE of Velocity at Old River at Middle River in December through June with OMR < -5,500 cfs. Results apply to the Alt2v3woTUCP alternative.

#### *I.3.2.1.6 KDE plots for Alt2v1wTUCP alternative:*

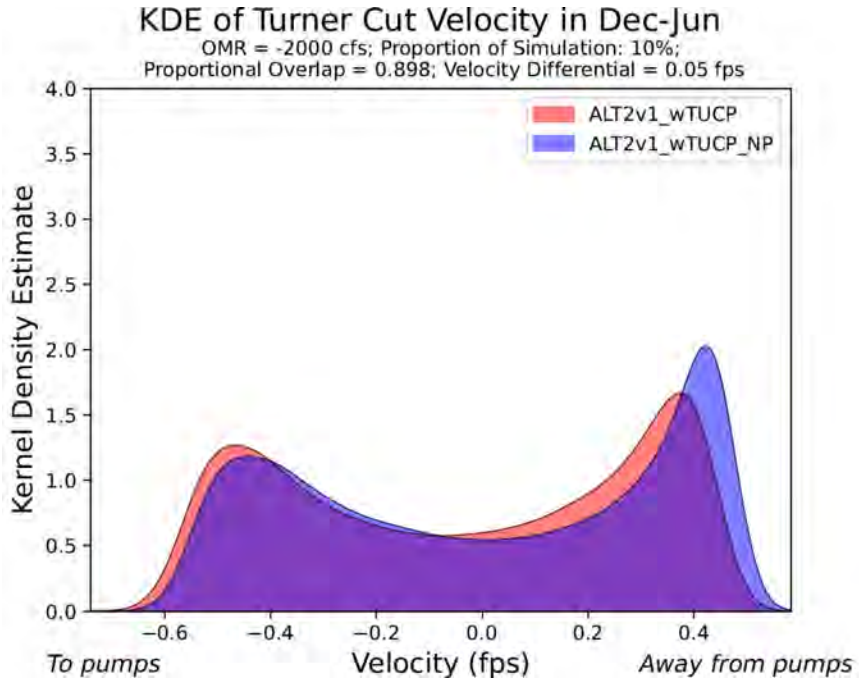



Figure I.3-68. Gaussian KDE of Velocity at Turner Cut in December through June with OMR of -2,000 cfs. Results apply to the Alt2v1wTUCP alternative.

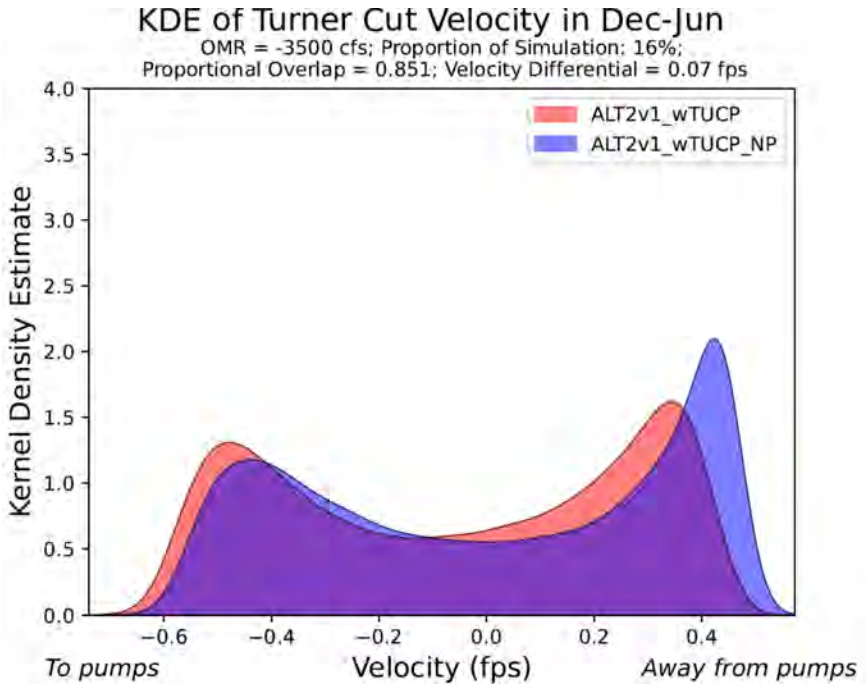



Figure I.3-69. Gaussian KDE of Velocity at Turner Cut in December through June with OMR of -3,500 cfs. Results apply to the Alt2v1wTUCP alternative.

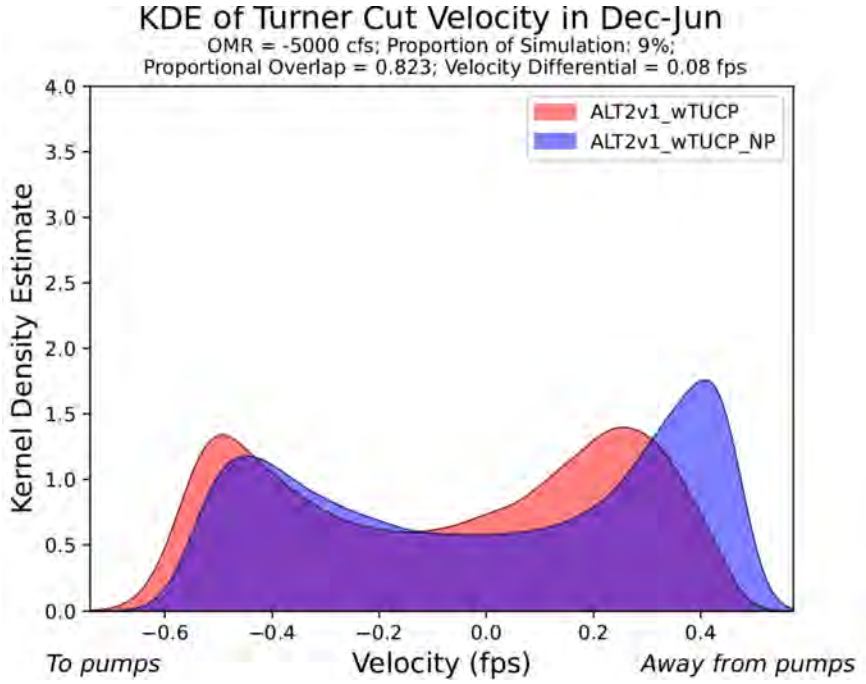



Figure I.3-70. Gaussian KDE of Velocity at Turner Cut in December through June with OMR of -5,000 cfs. Results apply to the Alt2v1wTUCP alternative.

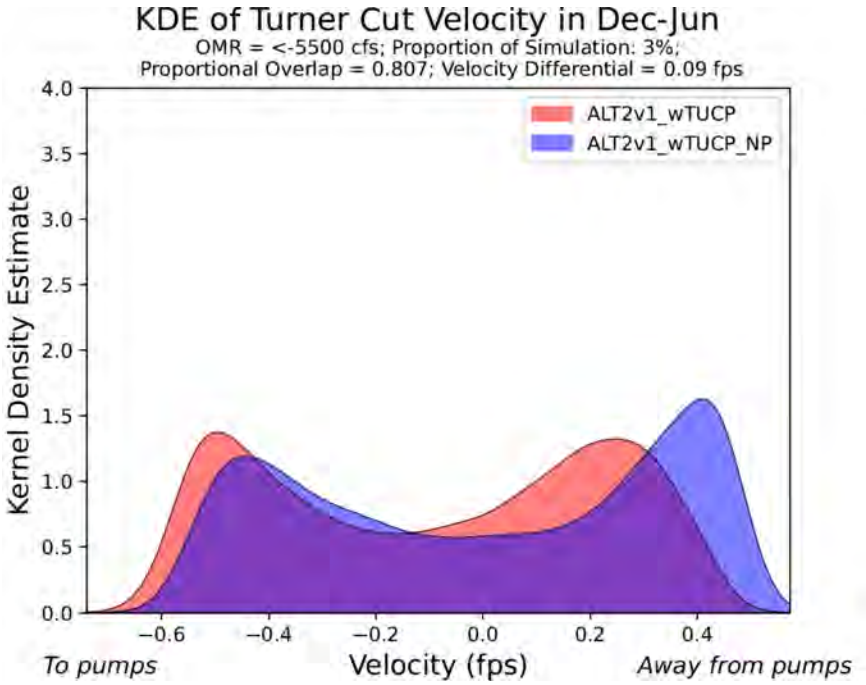



Figure I.3-71. Gaussian KDE of Velocity at Turner Cut in December through June with OMR < -5,500 cfs. Results apply to the Alt2v1wTUCP alternative.

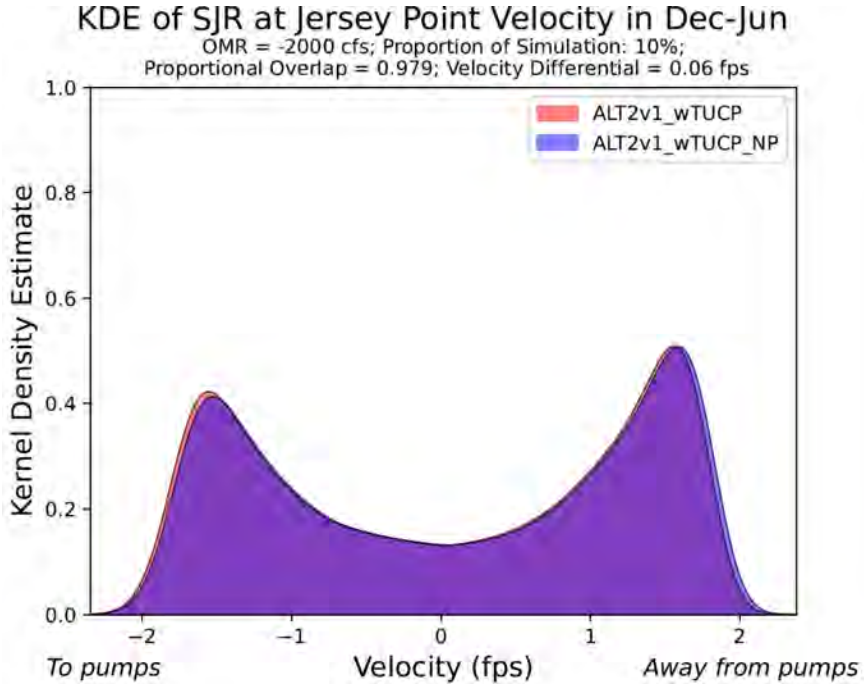



Figure I.3-72. Gaussian KDE of Velocity at San Joaquin River at Jersey Point in December through June with OMR of -2,000 cfs. Results apply to the Alt2v1wTUCP alternative.

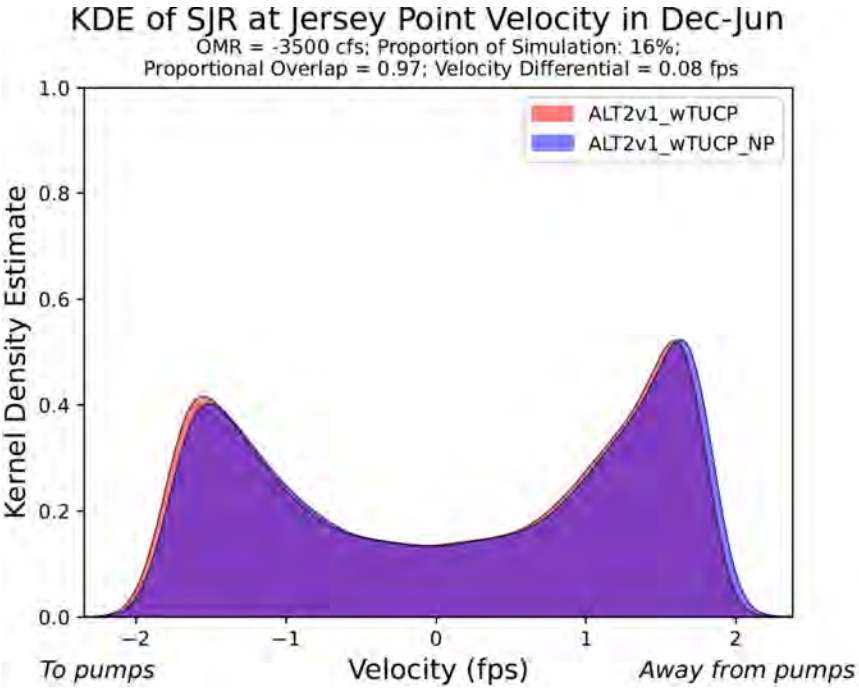



Figure I.3-73. Gaussian KDE of Velocity at San Joaquin River at Jersey Point in December through June with OMR of -3,500 cfs. Results apply to the Alt2v1wTUCP alternative.

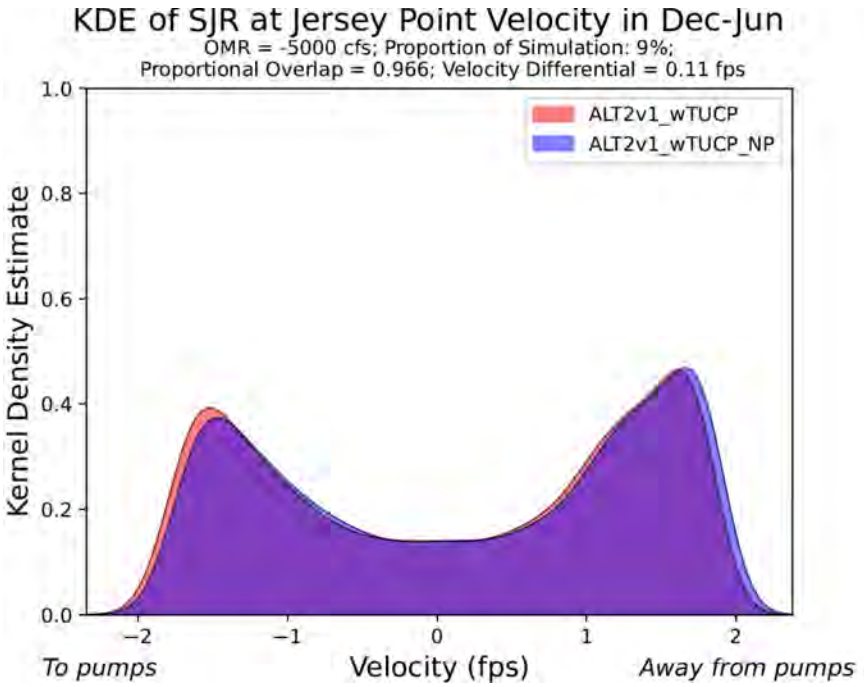



Figure I.3-74. Gaussian KDE of Velocity at San Joaquin River at Jersey Point in December through June with OMR of -5,000 cfs. Results apply to the Alt2v1wTUCP alternative.

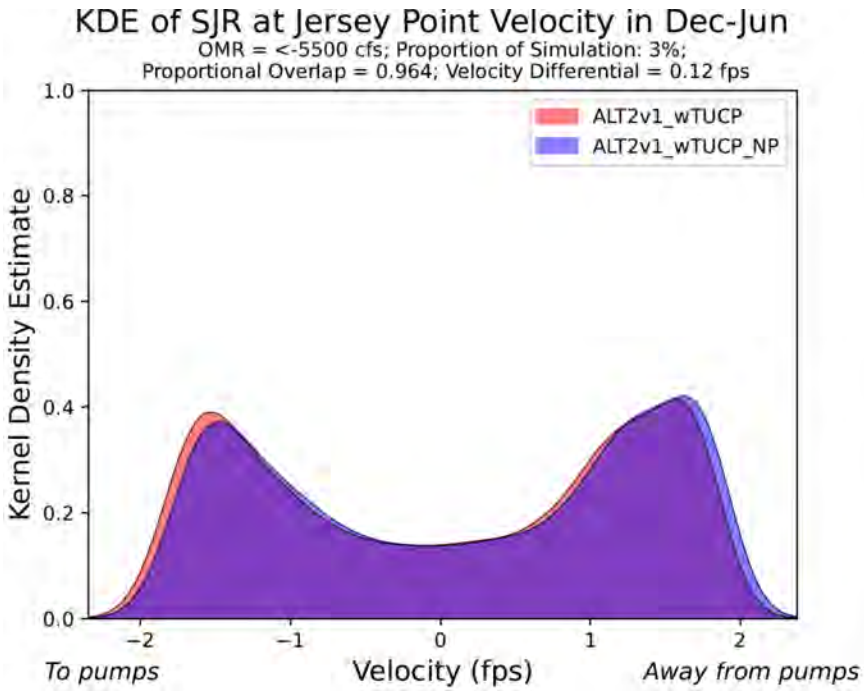



Figure I.3-75. Gaussian KDE of Velocity at San Joaquin River at Jersey Point in December through June with OMR < -5,500 cfs. Results apply to the Alt2v1wTUCP alternative.

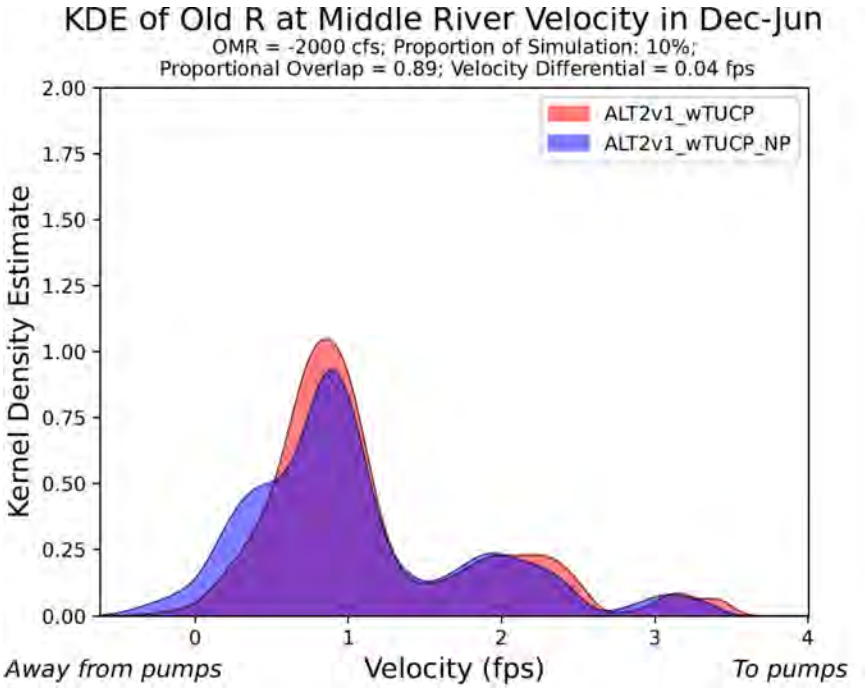



Figure I.3-76. Gaussian KDE of Velocity at Old River at Middle River in December through June with OMR of -2,000 cfs. Results apply to the Alt2v1wTUCP alternative.

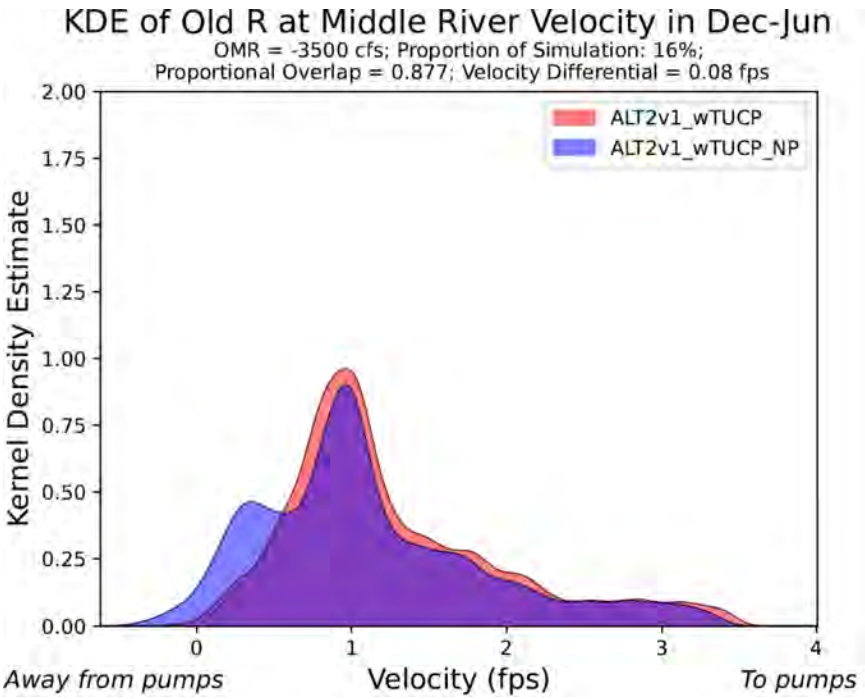



Figure I.3-77. Gaussian KDE of Velocity at Old River at Middle River in December through June with OMR of -3,500 cfs. Results apply to the Alt2v1wTUCP alternative.

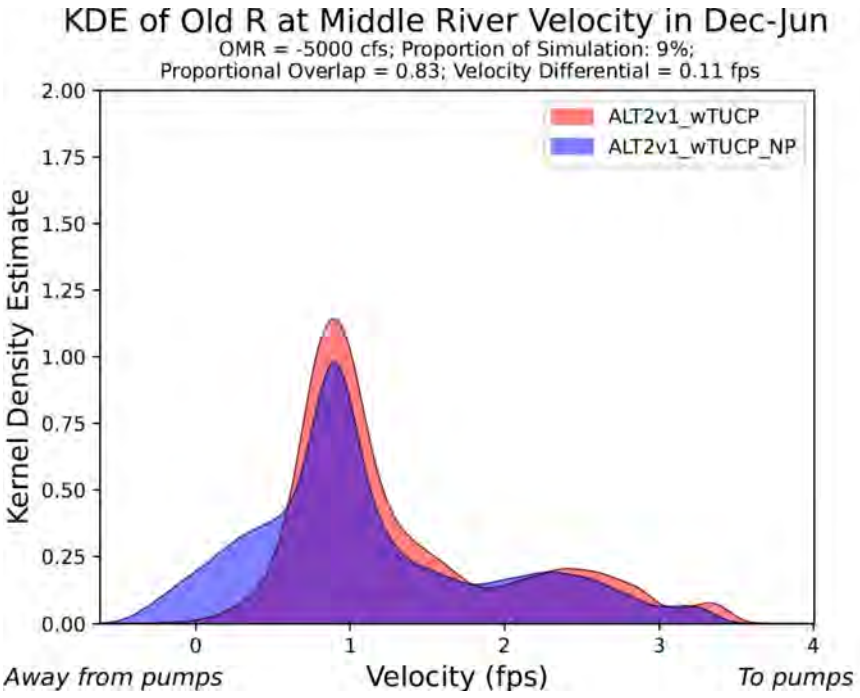



Figure I.3-78. Gaussian KDE of Velocity at Old River at Middle River in December through June with OMR of -5,000 cfs. Results apply to the Alt2v1wTUCP alternative.

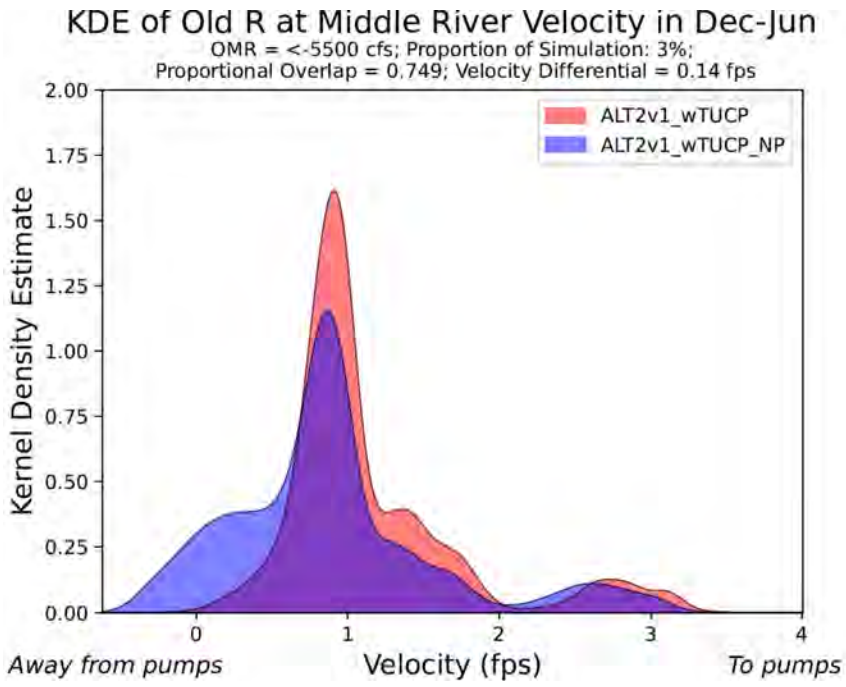



Figure I.3-79. Gaussian KDE of Velocity at Old River at Middle River in December through June with OMR < -5,500 cfs. Results apply to the Alt2v1wTUCP alternative.

#### *I.3.2.1.7 KDE plots for Alt3 alternative:*

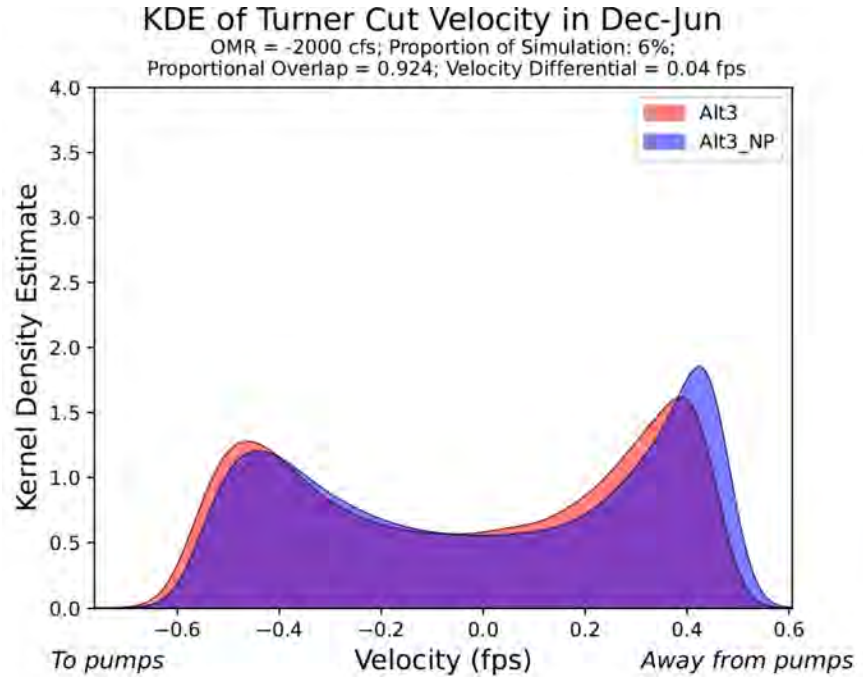



Figure I.3-80. Gaussian KDE of Velocity at Turner Cut in December through June with OMR of -2,000 cfs. Results apply to the Alt3 alternative.

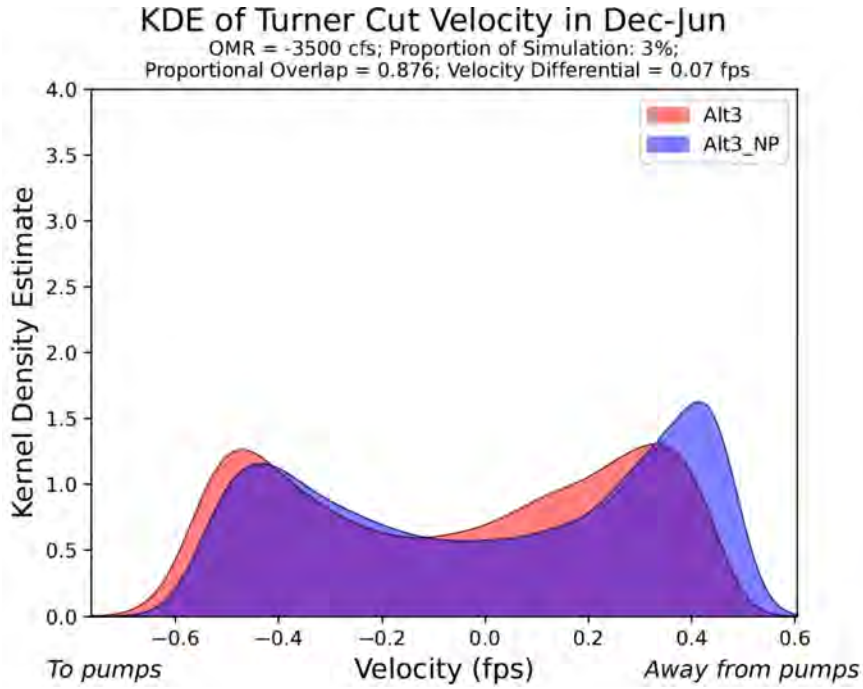



Figure I.3-81. Gaussian KDE of Velocity at Turner Cut in December through June with OMR of -3,500 cfs. Results apply to the Alt3 alternative.

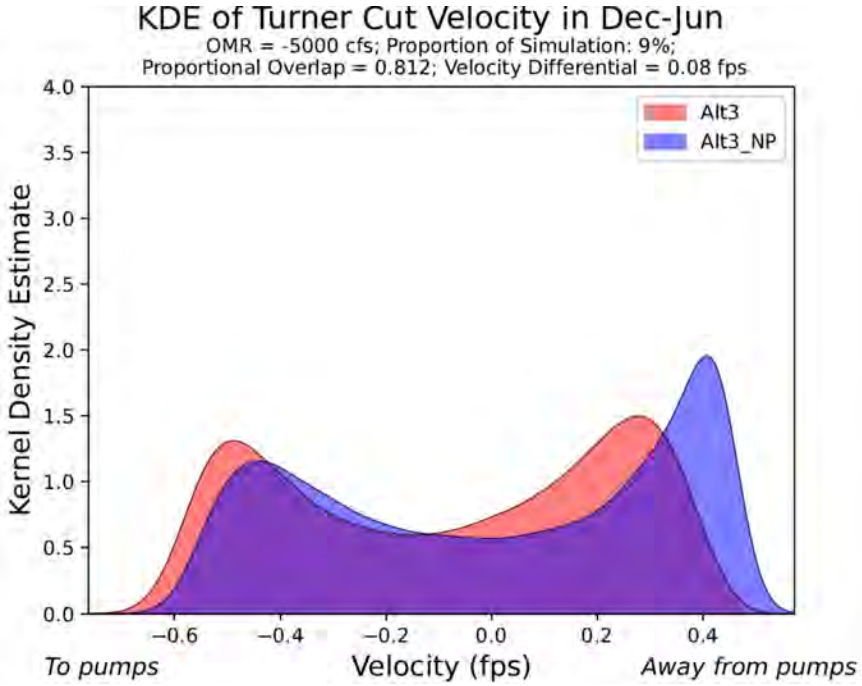



Figure I.3-82. Gaussian KDE of Velocity at Turner Cut in December through June with OMR of -5,000 cfs. Results apply to the Alt3 alternative.

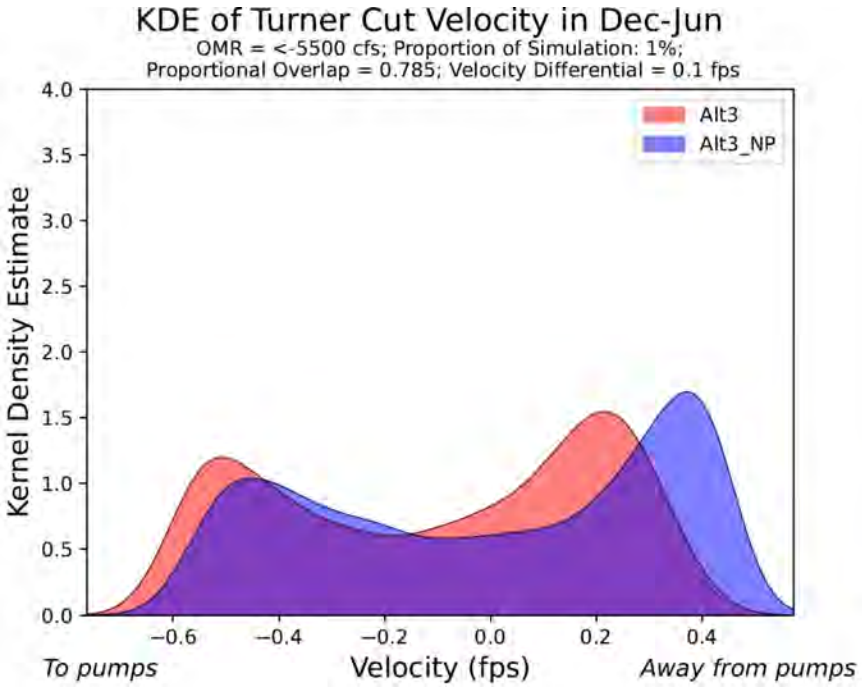



Figure I.3-83. Gaussian KDE of Velocity at Turner Cut in December through June with OMR < -5,500 cfs. Results apply to the Alt3 alternative.

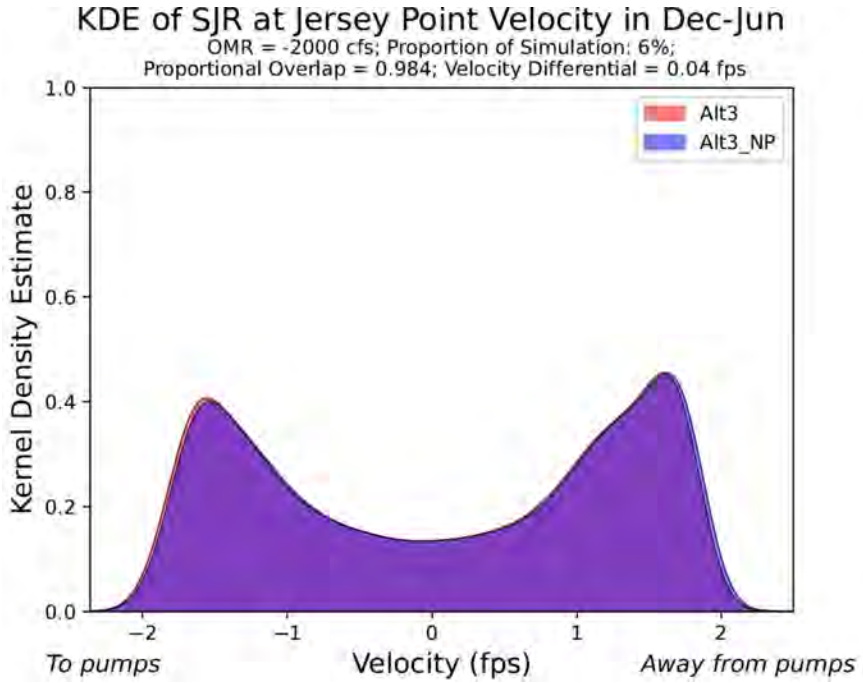



Figure I.3-84. Gaussian KDE of Velocity at San Joaquin River at Jersey Point in December through June with OMR of -2,000 cfs. Results apply to the Alt3 alternative.

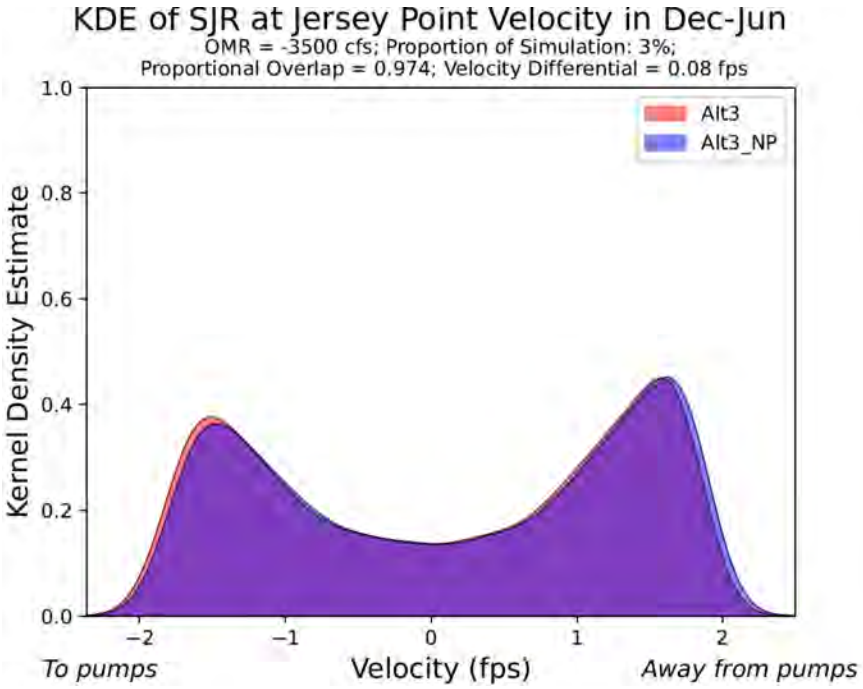



Figure I.3-85. Gaussian KDE of Velocity at San Joaquin River at Jersey Point in December through June with OMR of -3,500 cfs. Results apply to the Alt3 alternative.

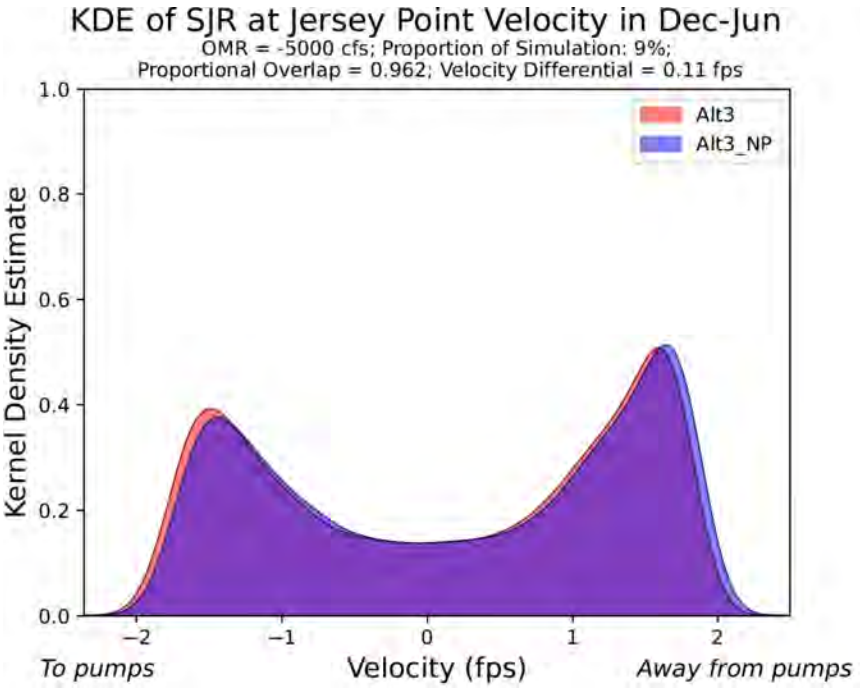



Figure I.3-86. Gaussian KDE of Velocity at San Joaquin River at Jersey Point in December through June with OMR of -5,000 cfs. Results apply to the Alt3 alternative.

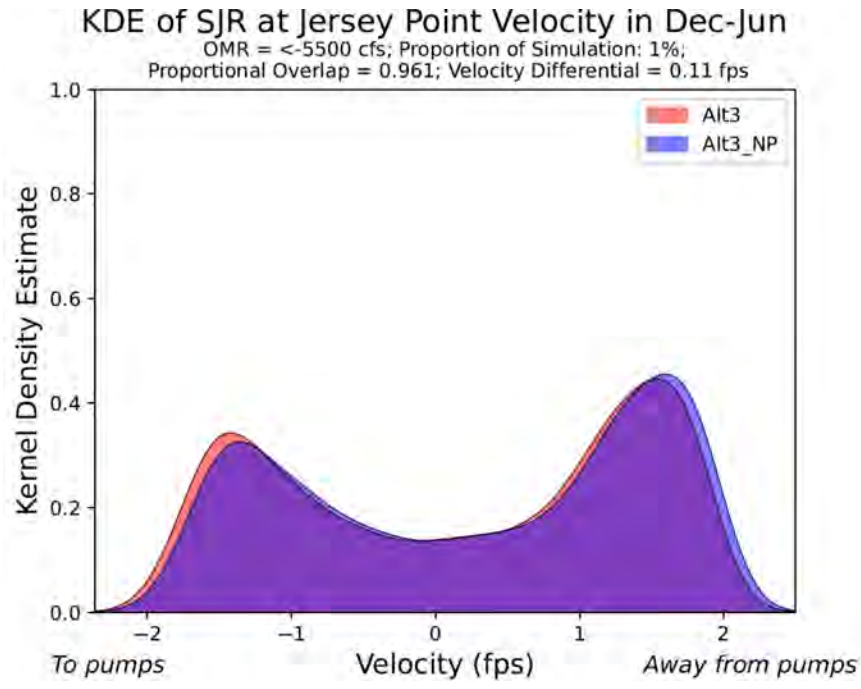



Figure I.3-87. Gaussian KDE of Velocity at San Joaquin River at Jersey Point in December through June with OMR < -5,500 cfs. Results apply to the Alt3 alternative.

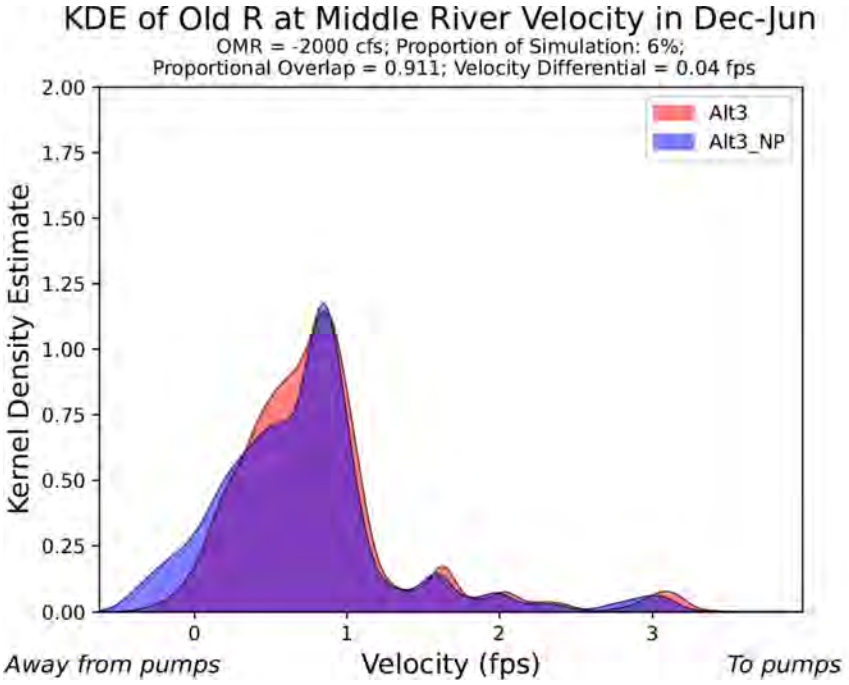



Figure I.3-88. Gaussian KDE of Velocity at Old River at Middle River in December through June with OMR of -2,000 cfs. Results apply to the Alt3 alternative.

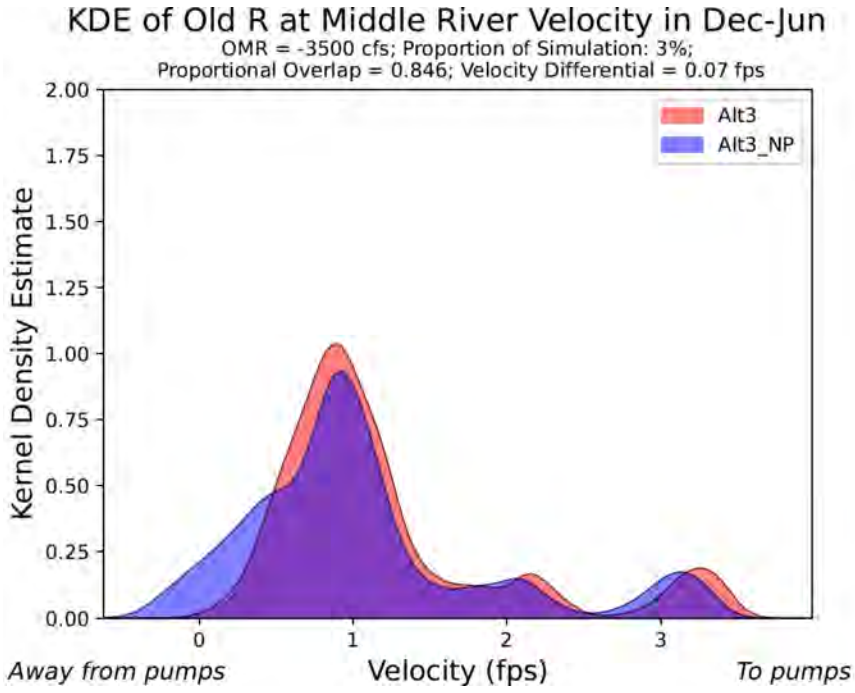



Figure I.3-89. Gaussian KDE of Velocity at Old River at Middle River in December through June with OMR of -3,500 cfs. Results apply to the Alt3 alternative.

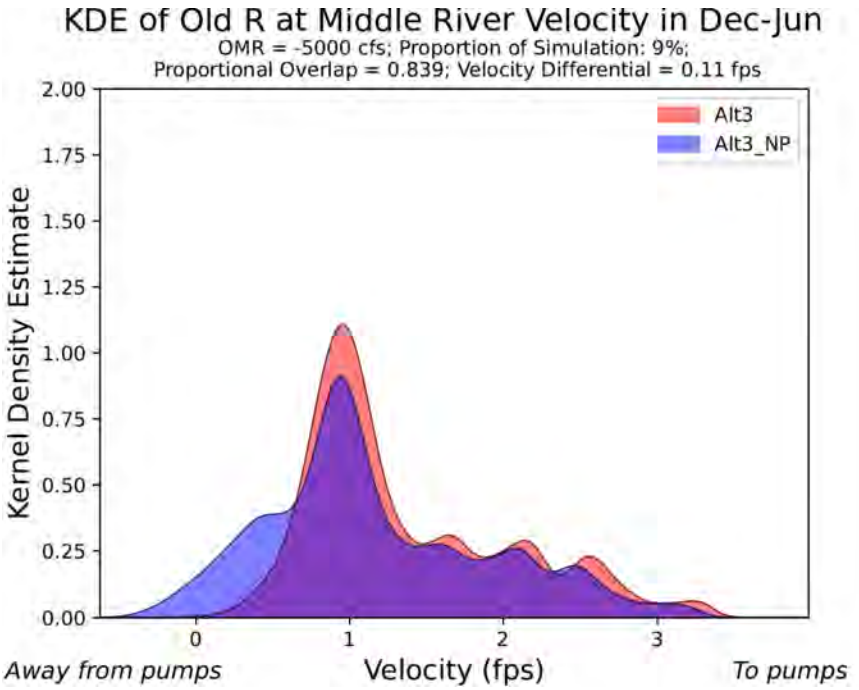



Figure I.3-90. Gaussian KDE of Velocity at Old River at Middle River in December through June with OMR of -5,000 cfs. Results apply to the Alt3 alternative.

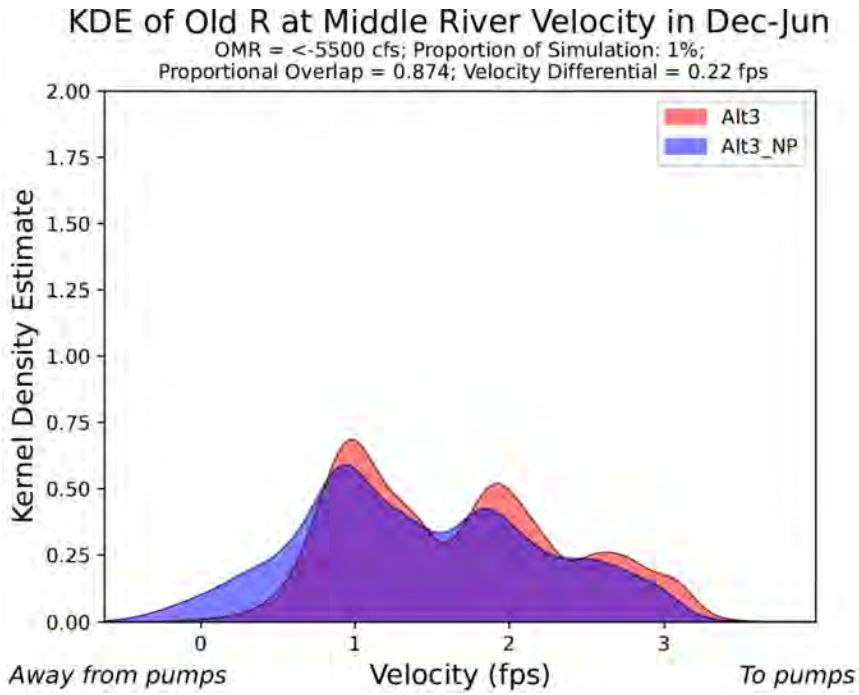



Figure I.3-91. Gaussian KDE of Velocity at Old River at Middle River in December through June with OMR < -5,500 cfs. Results apply to the Alt3 alternative.

#### *I.3.2.1.8 KDE plots for Alt4 alternative:*

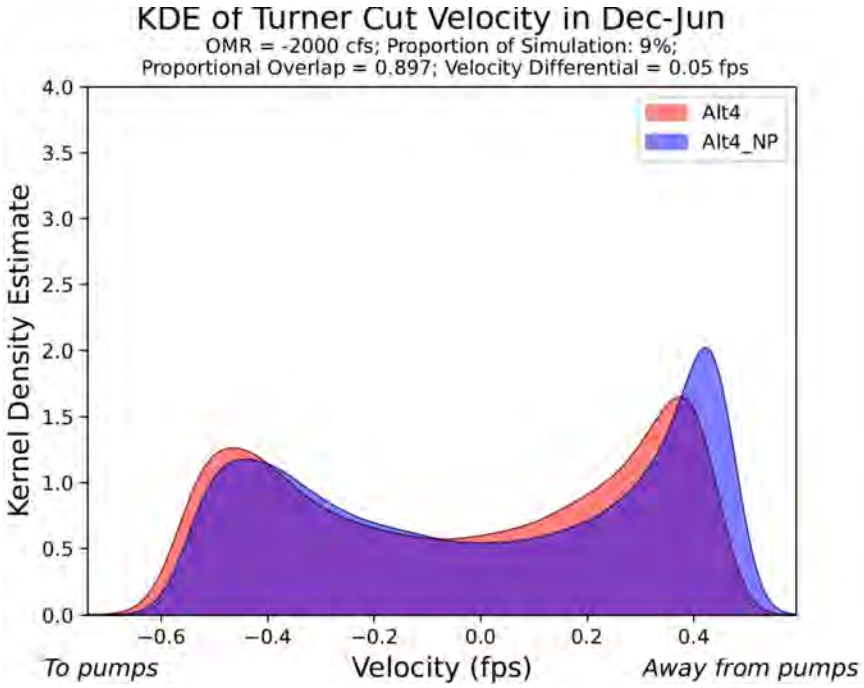



Figure I.3-92. Gaussian KDE of Velocity at Turner Cut in December through June with OMR of -2,000 cfs. Results apply to the Alt4 alternative.

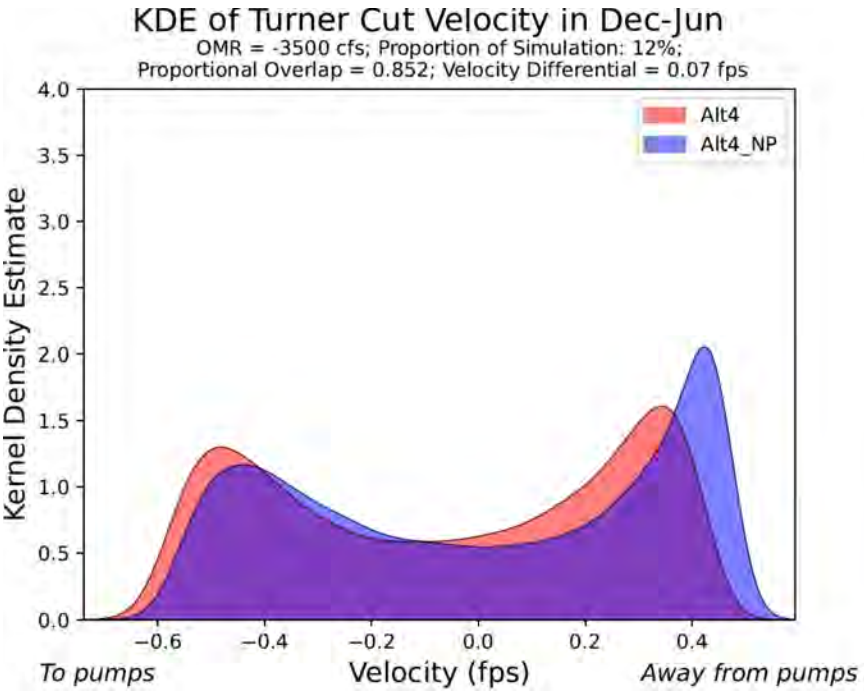



Figure I.3-93. Gaussian KDE of Velocity at Turner Cut in December through June with OMR of -3,500 cfs. Results apply to the Alt4 alternative.

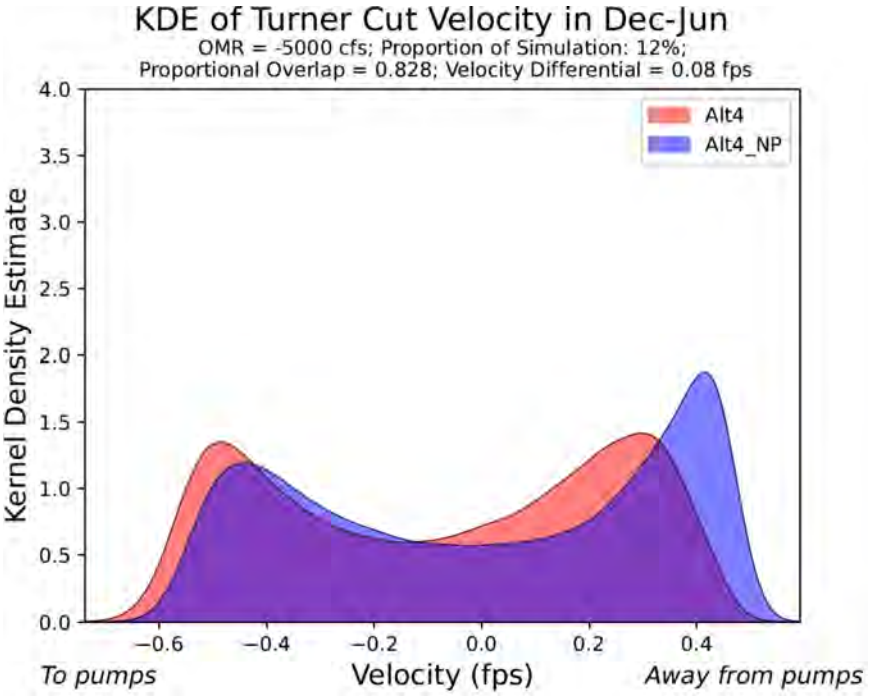



Figure I.3-94. Gaussian KDE of Velocity at Turner Cut in December through June with OMR of -5,000 cfs. Results apply to the Alt4 alternative.

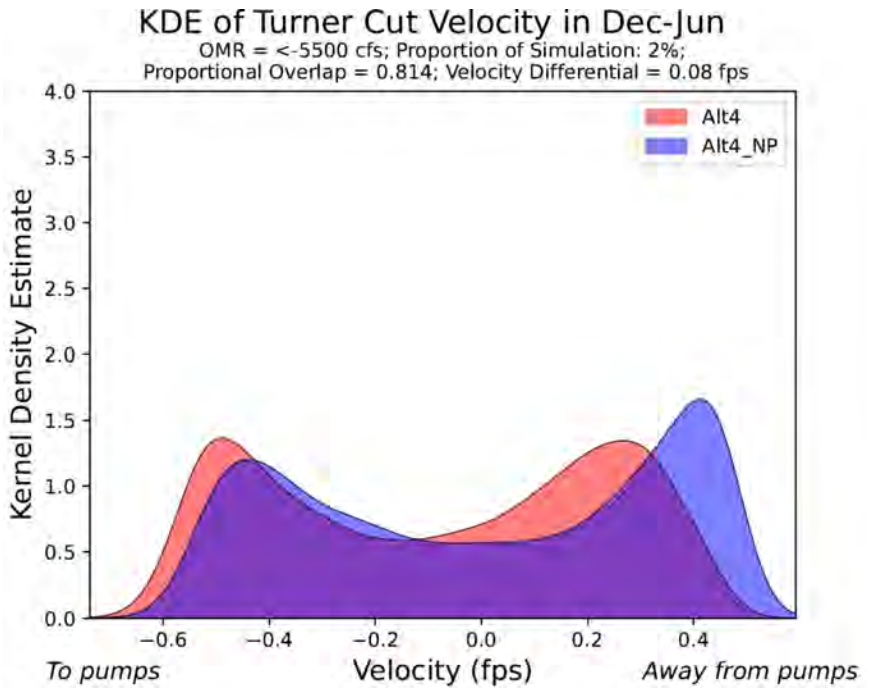



Figure I.3-95. Gaussian KDE of Velocity at Turner Cut in December through June with OMR < -5,500 cfs. Results apply to the Alt4 alternative.

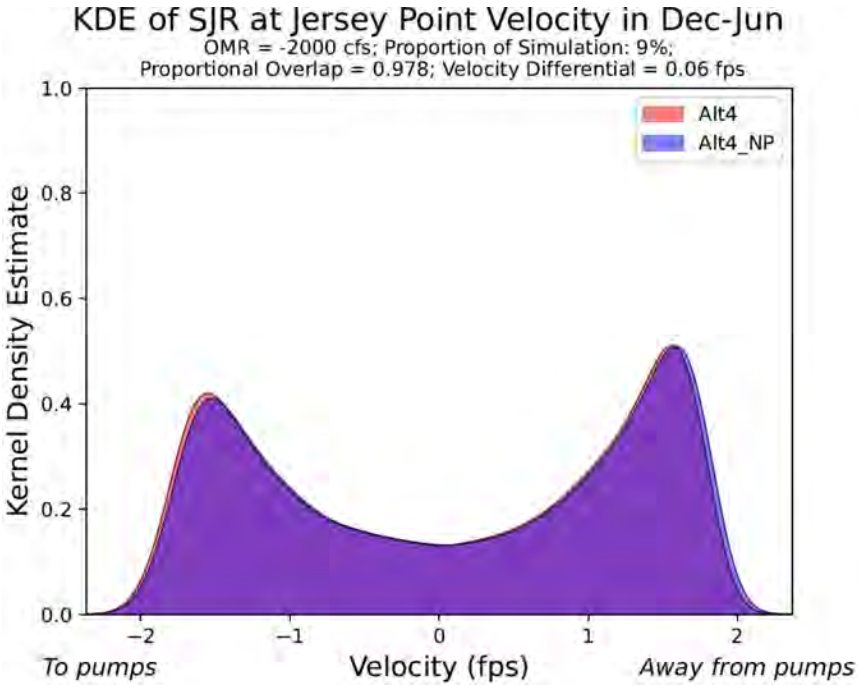



Figure I.3-96. Gaussian KDE of Velocity at San Joaquin River at Jersey Point in December through June with OMR of -2,000 cfs. Results apply to the Alt4 alternative.

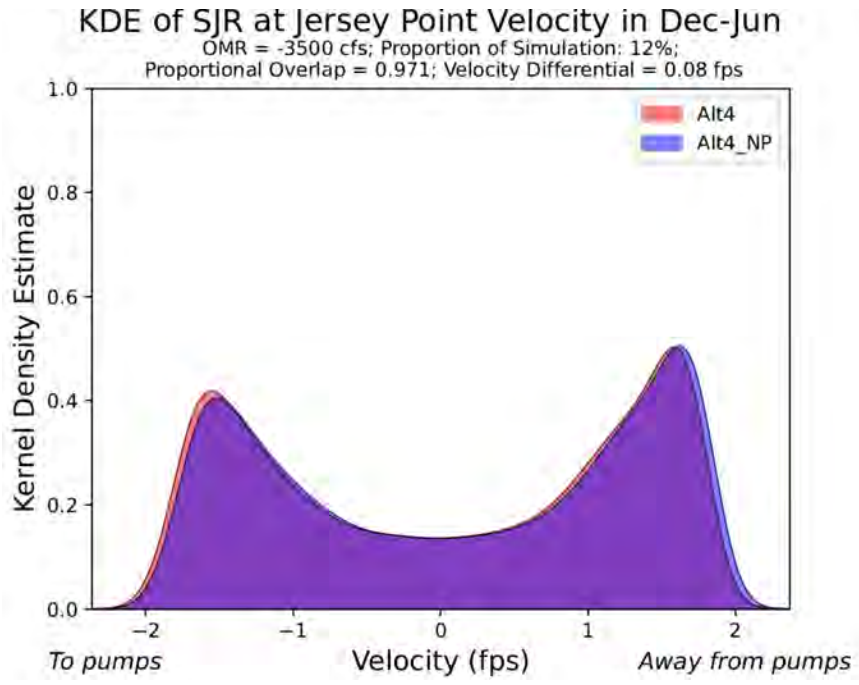



Figure I.3-97. Gaussian KDE of Velocity at San Joaquin River at Jersey Point in December through June with OMR of -3,500 cfs. Results apply to the Alt4 alternative.

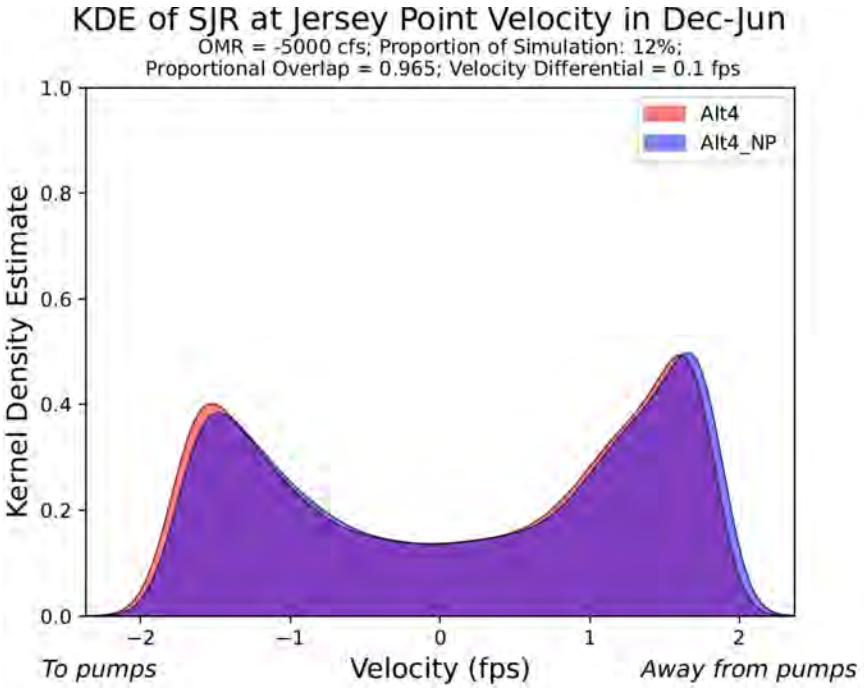



Figure I.3-98. Gaussian KDE of Velocity at San Joaquin River at Jersey Point in December through June with OMR of -5,000 cfs. Results apply to the Alt4 alternative.

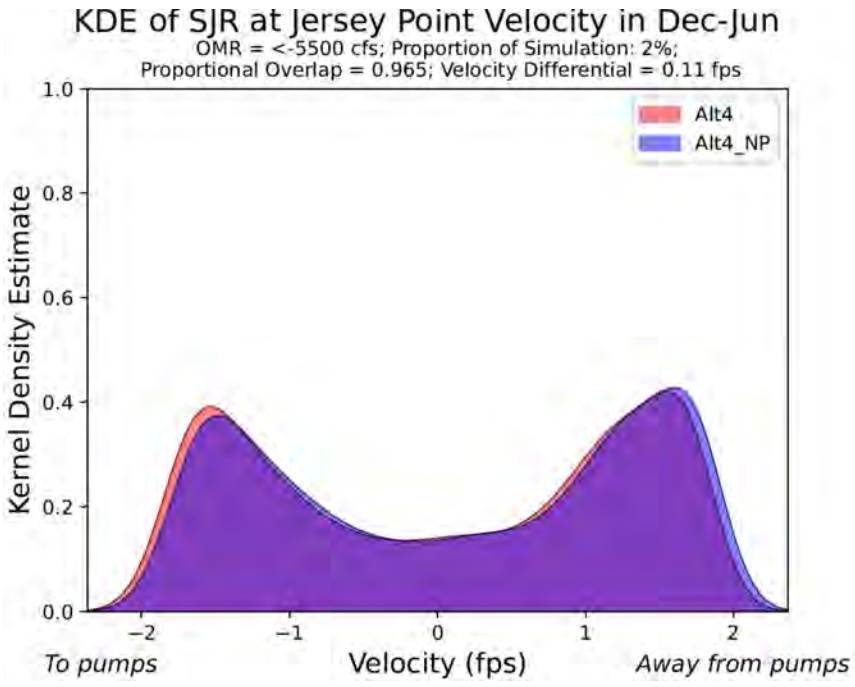



Figure I.3-99. Gaussian KDE of Velocity at San Joaquin River at Jersey Point in December through June with OMR < -5,500 cfs. Results apply to the Alt4 alternative.

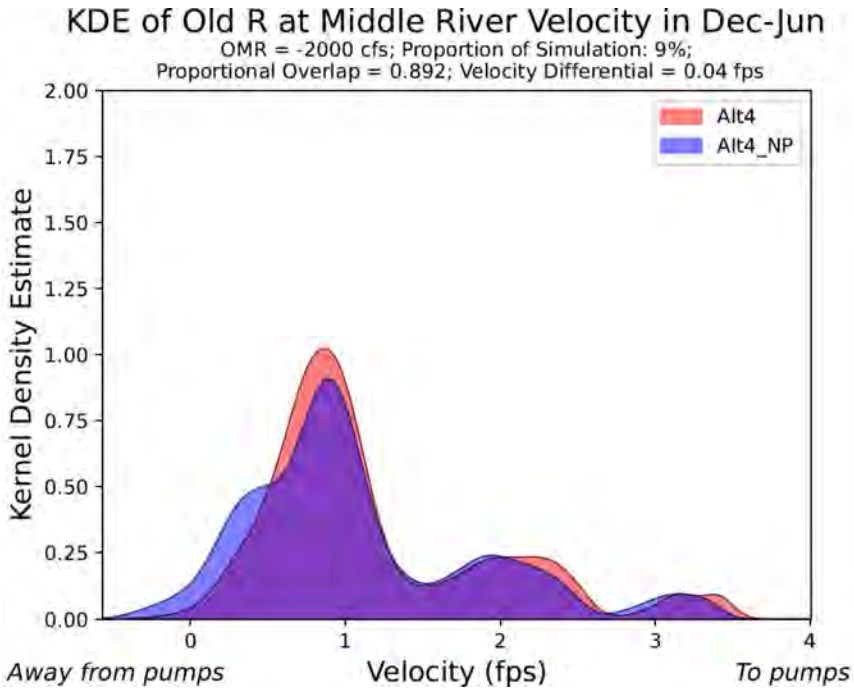



Figure I.3-100. Gaussian KDE of Velocity at Old River at Middle River in December through June with OMR of -2,000 cfs. Results apply to the Alt4 alternative.

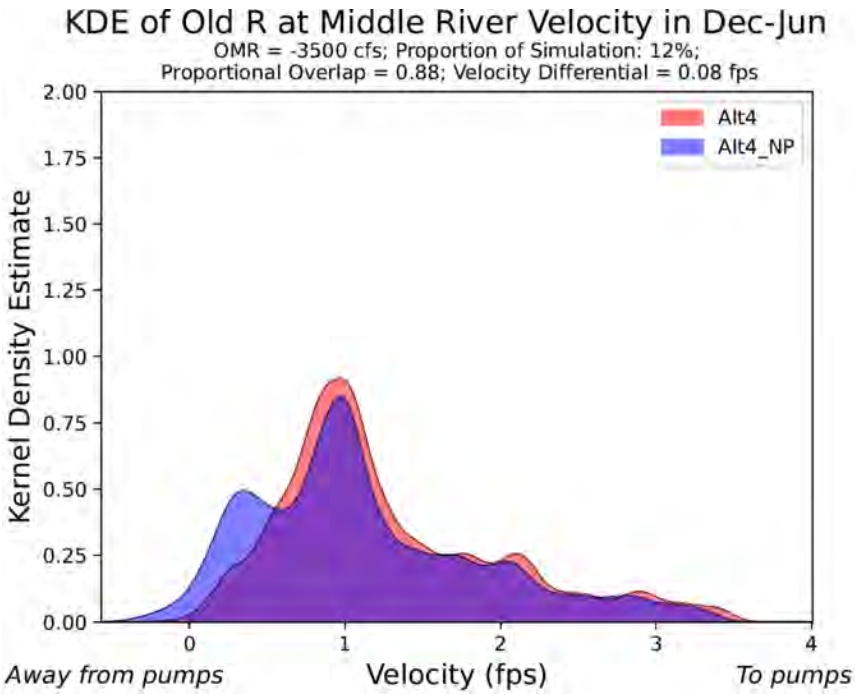



Figure I.3-101. Gaussian KDE of Velocity at Old River at Middle River in December through June with OMR of -3,500 cfs. Results apply to the Alt4 alternative.

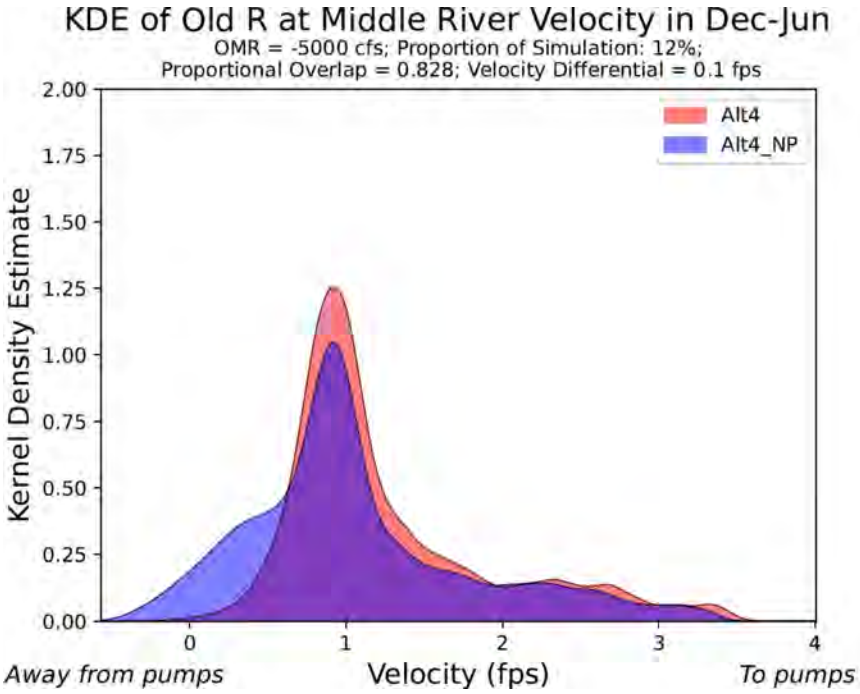



Figure I.3-102. Gaussian KDE of Velocity at Old River at Middle River in December through June with OMR of -5,000 cfs. Results apply to the Alt4 alternative.

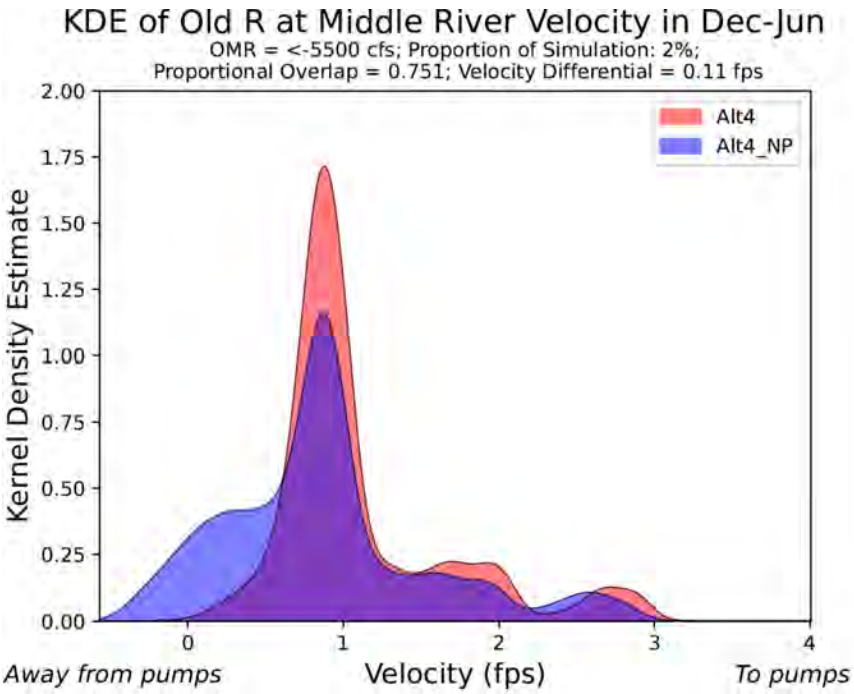



Figure I.3-103. Gaussian KDE of Velocity at Old River at Middle River in December through June with OMR < -5,500 cfs. Results apply to the Alt4 alternative.

#### *I.3.2.1.9 KDE plots for Action 5:*

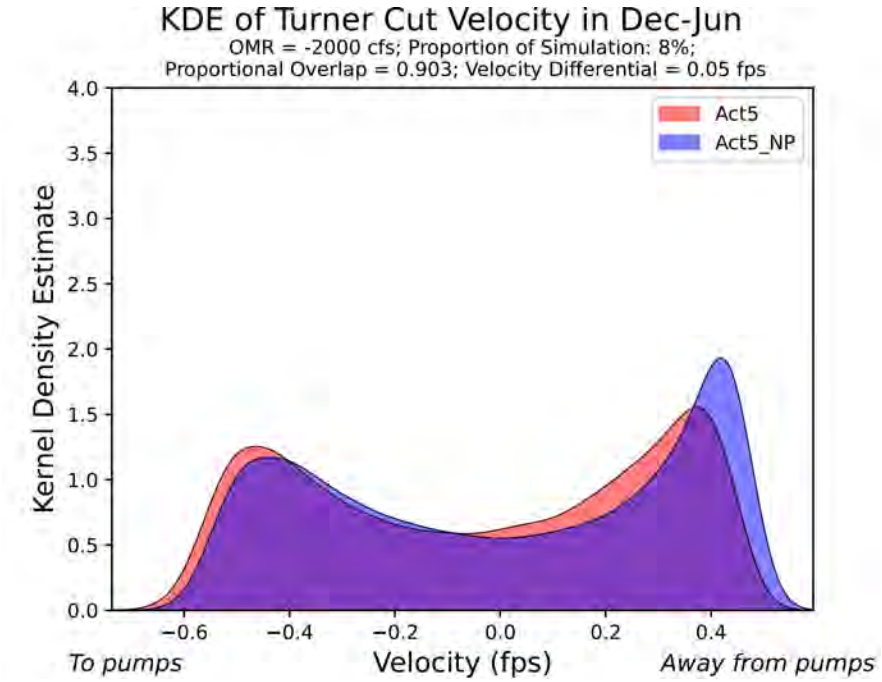



Figure I.3-103a. Gaussian KDE of Velocity at Turner Cut in December through June with OMR of -2,000 cfs. Results apply to the Action 5 alternative.

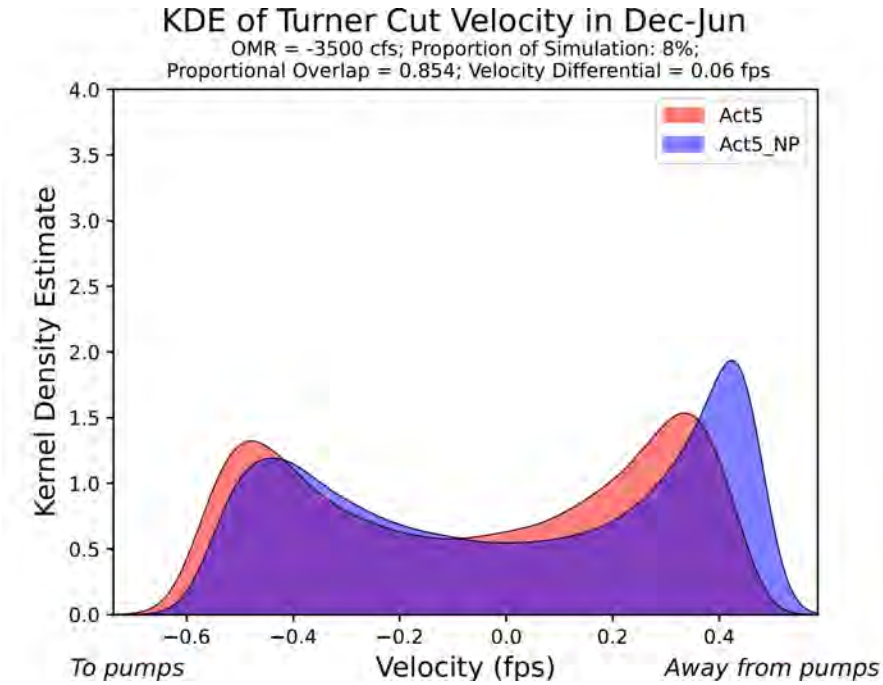



Figure I.3-103b. Gaussian KDE of Velocity at Turner Cut in December through June with OMR of -3,500 cfs. Results apply to the Action 5 alternative.

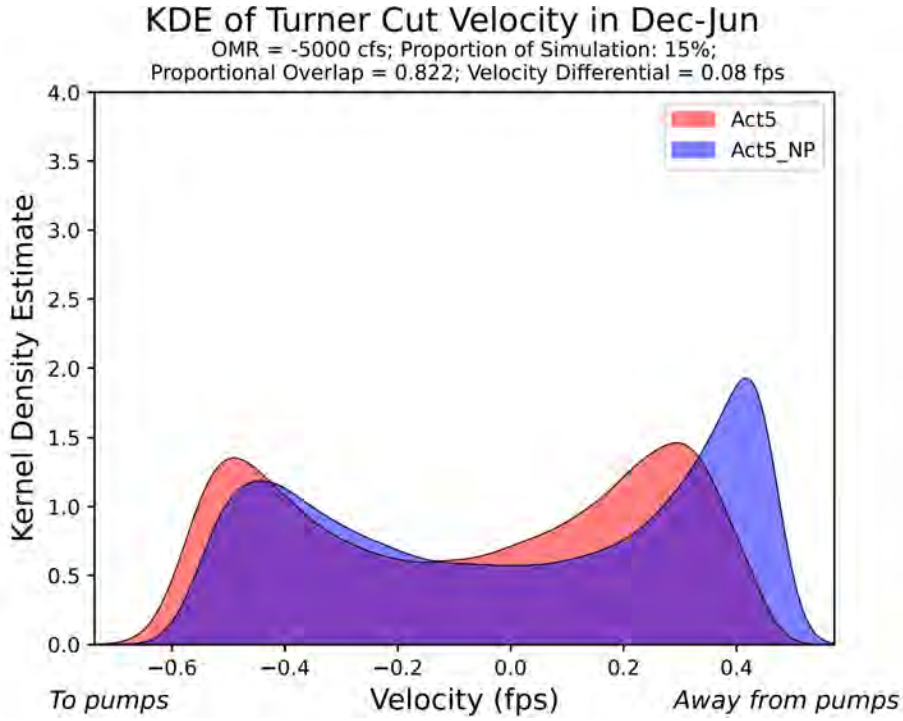



Figure I.3-103c. Gaussian KDE of Velocity at Turner Cut in December through June with OMR of -5,000 cfs. Results apply to the Action 5 alternative.

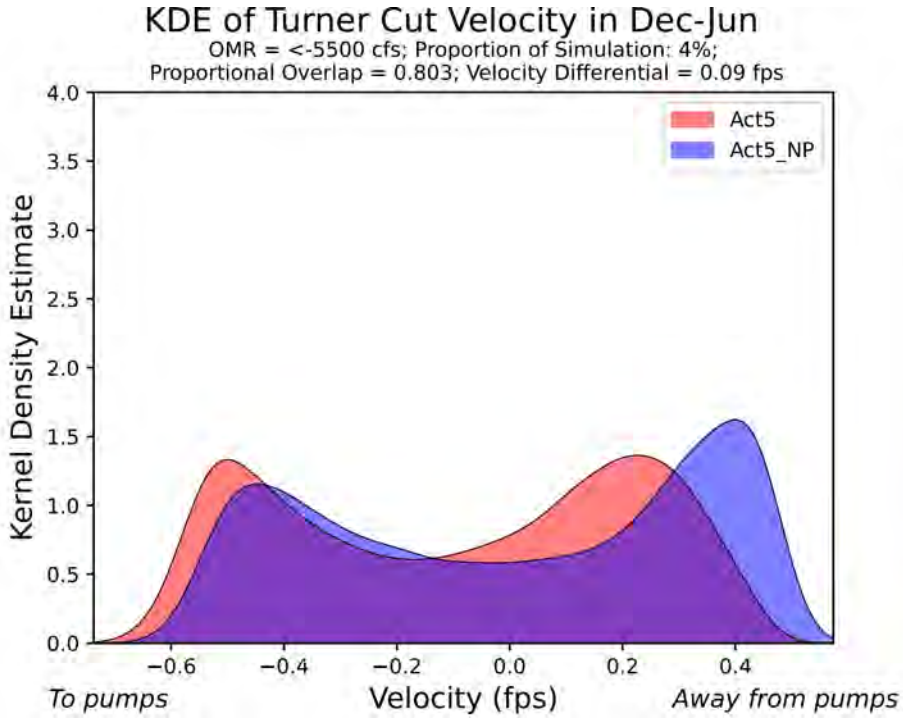



Figure I.3-103d. Gaussian KDE of Velocity at Turner Cut in December through June with OMR < -5,500 cfs. Results apply to the Action 5 alternative.

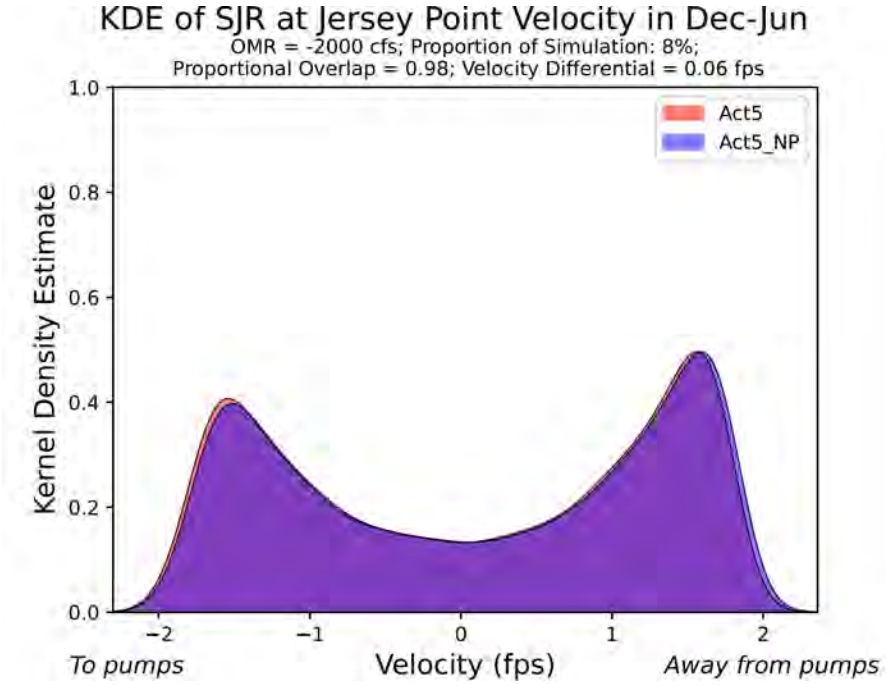



Figure I.3-103e. Gaussian KDE of Velocity at San Joaquin River at Jersey Point in December through June with OMR of -2,000 cfs. Results apply to the Action 5 alternative.

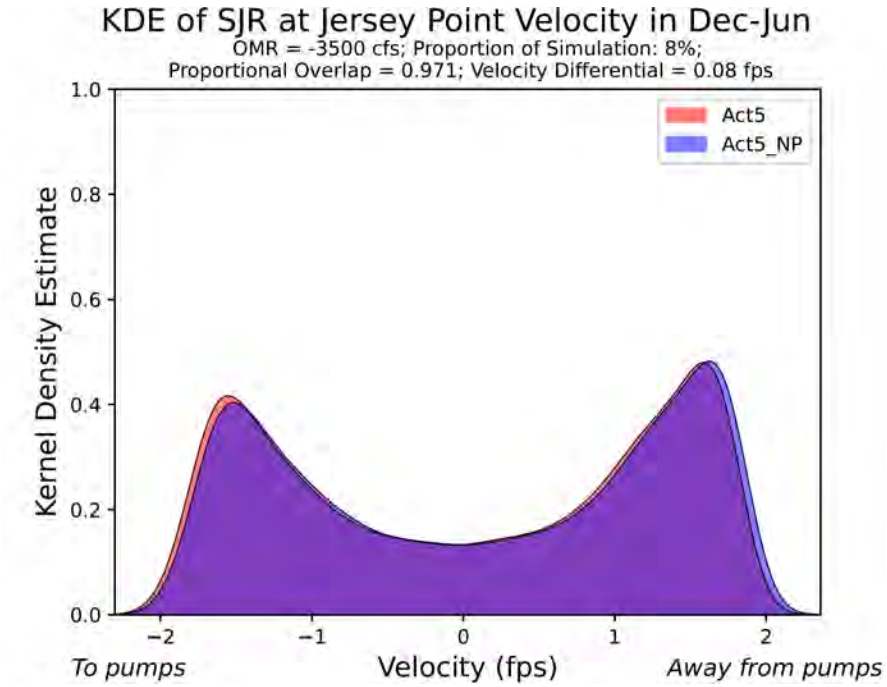



Figure I.3-103f. Gaussian KDE of Velocity at San Joaquin River at Jersey Point in December through June with OMR of -3,500 cfs. Results apply to the Action 5 alternative.

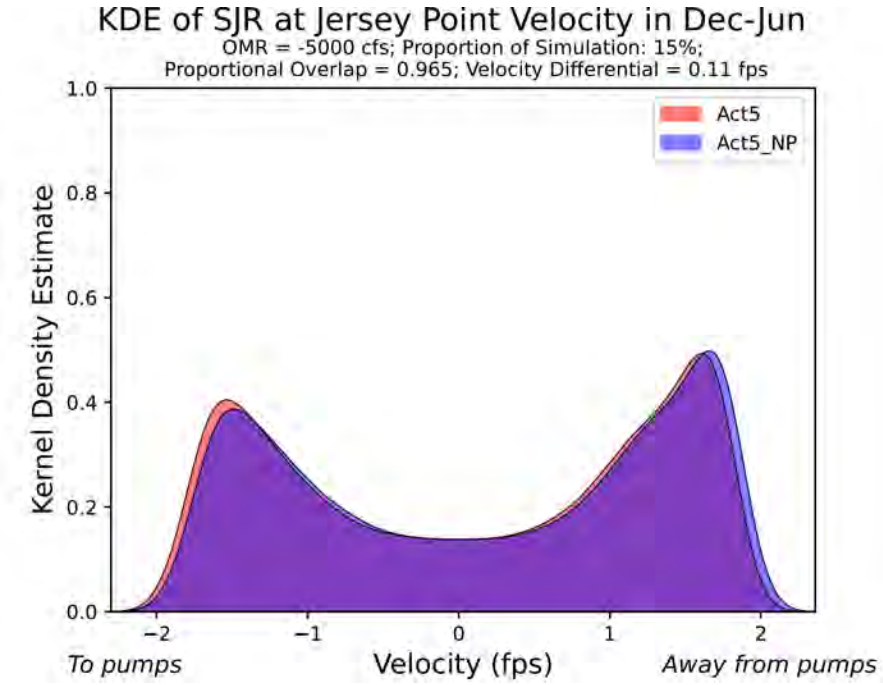



Figure I.3-103g. Gaussian KDE of Velocity at San Joaquin River at Jersey Point in December through June with OMR of -5,000 cfs. Results apply to the Action 5 alternative.

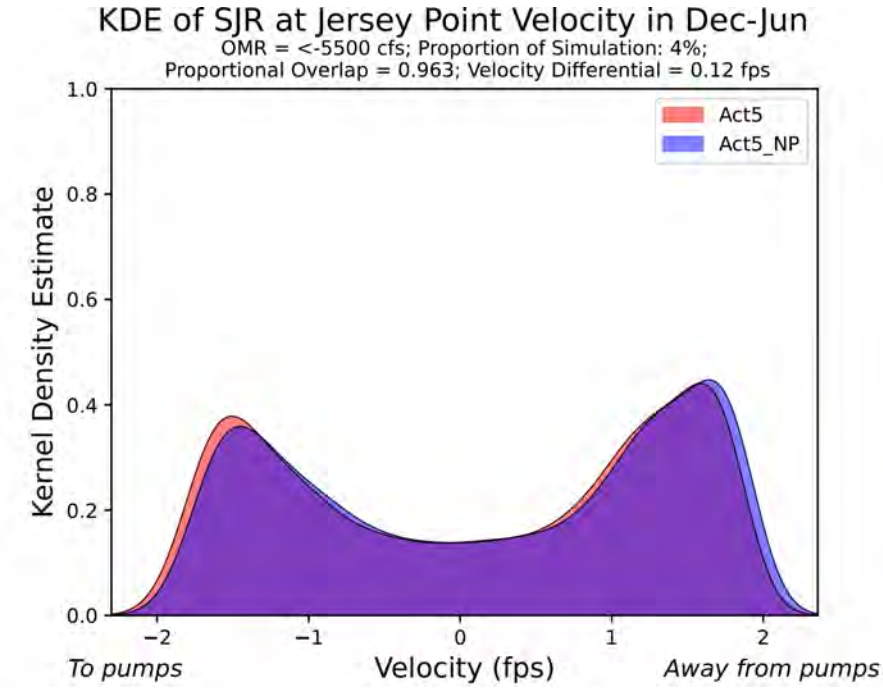



Figure I.3-103h. Gaussian KDE of Velocity at San Joaquin River at Jersey Point in December through June with OMR < -5,500 cfs. Results apply to the Action 5 alternative.

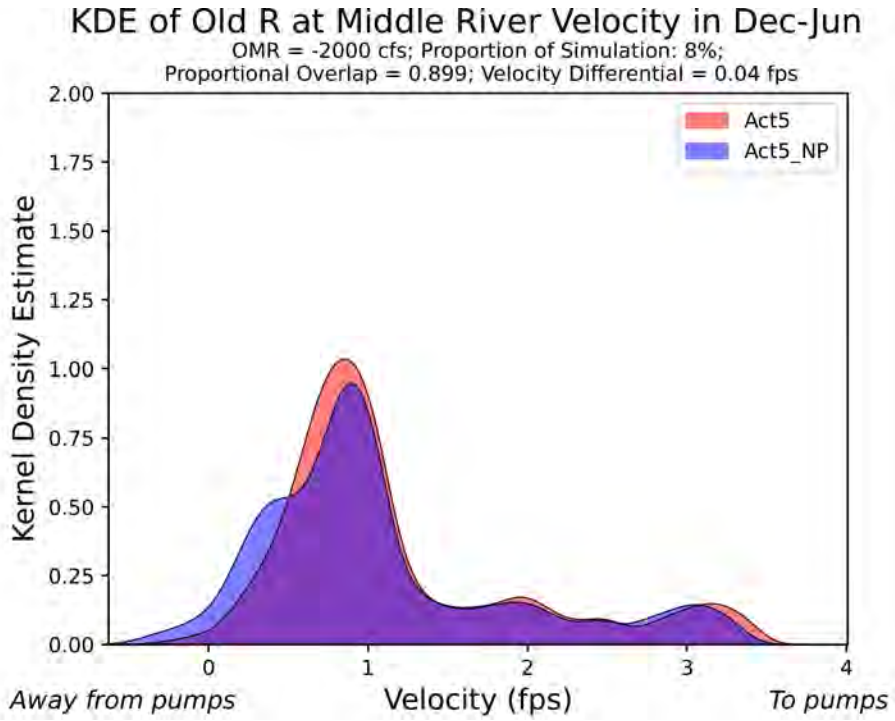



Figure I.3-103i. Gaussian KDE of Velocity at Old River at Middle River in December through June with OMR of -2,000 cfs. Results apply to the Action 5 alternative.

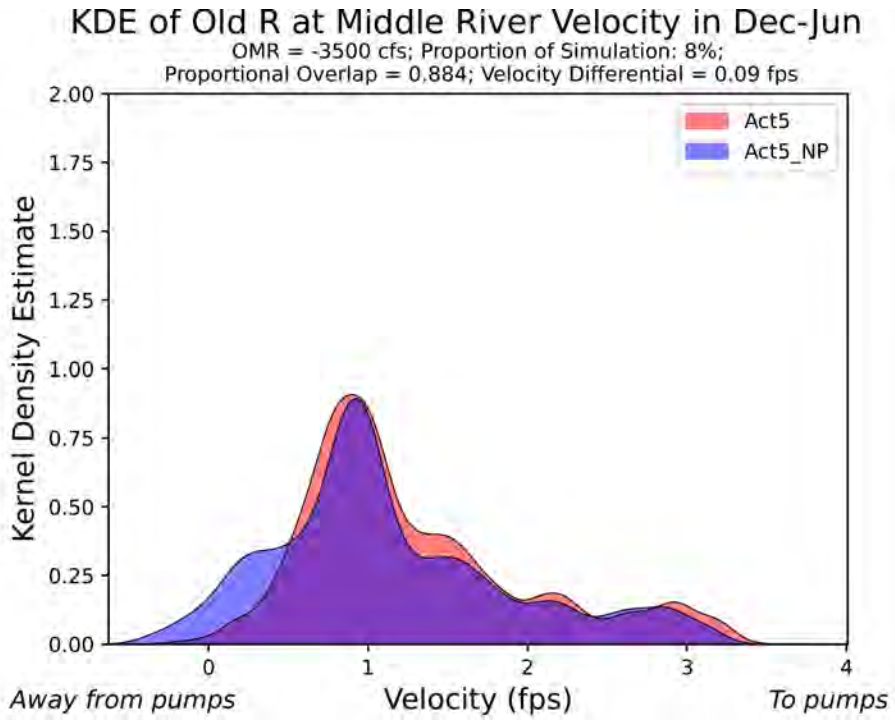



Figure I.3-103j. Gaussian KDE of Velocity at Old River at Middle River in December through June with OMR of -3,500 cfs. Results apply to the Action 5 alternative.

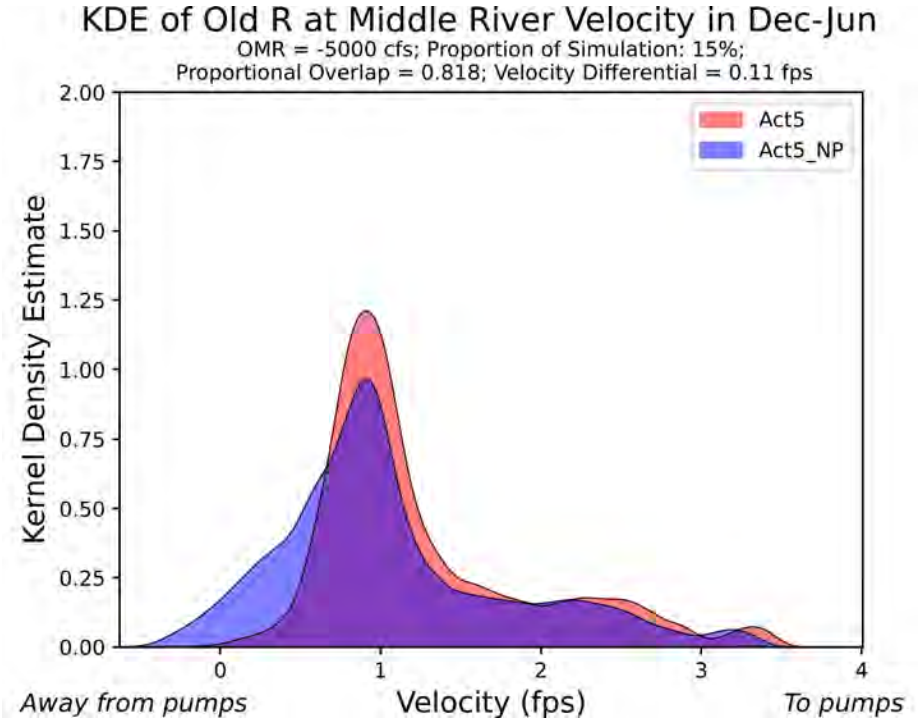



Figure I.3-103k. Gaussian KDE of Velocity at Old River at Middle River in December through June with OMR of -5,000 cfs. Results apply to the Action 5 alternative.

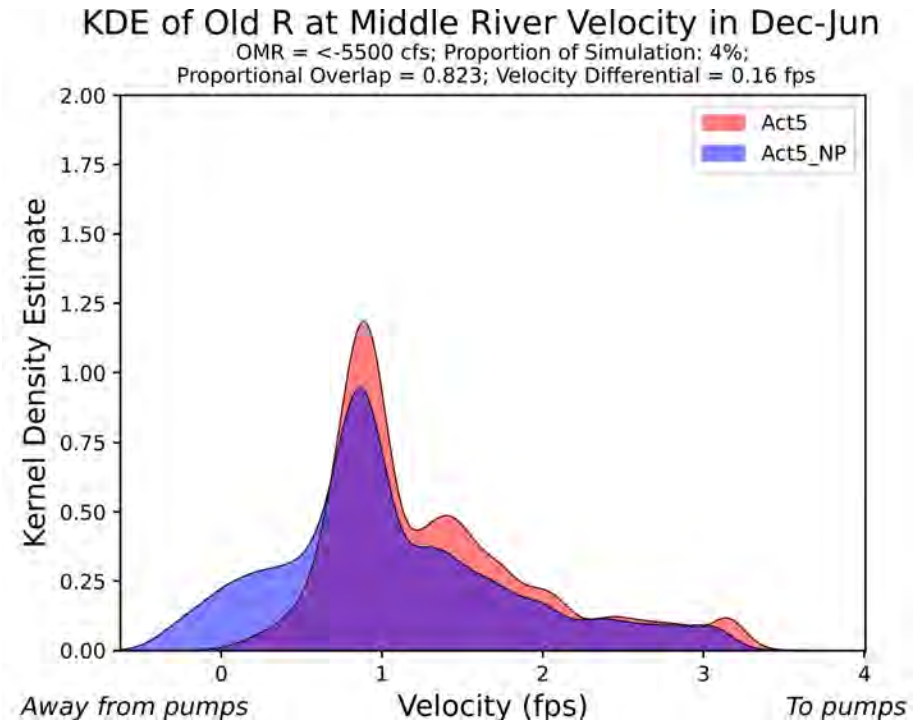



Figure I.3-103l. Gaussian KDE of Velocity at Old River at Middle River in December through June with OMR < -5,500 cfs. Results apply to the Action 5 alternative.

Table I.3-7. Proportional overlap values for Turner Cut, SJR at Jersey Point, and Old R at Middle River at different OMR bins across alternatives.

| Node | OMR bin | NAA | Alt1 | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt2 wTUCP woVA | Alt3 | Alt4 | Act5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Turner Cut | -2000 | 0.91 | 0.901 | 0.899 | 0.903 | 0.903 | 0.898 | 0.924 | 0.897 | 0.903 |
| Turner Cut | -3500 | 0.853 | 0.858 | 0.851 | 0.86 | 0.861 | 0.851 | 0.876 | 0.852 | 0.854 |
| Turner Cut | -5000 | 0.844 | 0.837 | 0.824 | 0.822 | 0.821 | 0.823 | 0.812 | 0.828 | 0.822 |
| Turner Cut | <-5500 | 0.809 | 0.75 | 0.806 | 0.808 | 0.809 | 0.807 | 0.785 | 0.814 | 0.803 |
| SJR at Jersey Point | -2000 | 0.981 | 0.979 | 0.979 | 0.979 | 0.98 | 0.979 | 0.984 | 0.978 | 0.98 |
| SJR at Jersey Point | -3500 | 0.969 | 0.973 | 0.97 | 0.972 | 0.972 | 0.97 | 0.974 | 0.971 | 0.971 |
| SJR at Jersey Point | -5000 | 0.969 | 0.969 | 0.966 | 0.965 | 0.965 | 0.966 | 0.962 | 0.965 | 0.965 |
| SJR at Jersey Point | <-5500 | 0.964 | 0.953 | 0.964 | 0.964 | 0.964 | 0.964 | 0.961 | 0.965 | 0.963 |
| Old R at Middle River | -2000 | 0.912 | 0.907 | 0.888 | 0.897 | 0.895 | 0.89 | 0.911 | 0.892 | 0.899 |
| Old R at Middle River | -3500 | 0.857 | 0.915 | 0.878 | 0.866 | 0.865 | 0.877 | 0.846 | 0.88 | 0.884 |
| Old R at Middle River | -5000 | 0.809 | 0.813 | 0.829 | 0.835 | 0.836 | 0.83 | 0.839 | 0.828 | 0.818 |
| Old R at Middle River | <-5500 | 0.736 | 0.733 | 0.746 | 0.755 | 0.751 | 0.749 | 0.874 | 0.751 | 0.823 |

With incremental increases to pumping, proportional overlap at these three locations decreases. Changes to proportional overlap are more subtle along the San Joaquin River at Jersey Point as compared to Turner Cut and Old River at Middle River (Table I.3-7). Effects of pumping are smallest at the upstream-most location (San Joaquin River at Jersey Point). Since Turner Cut is less influenced by riverine flow, it is more susceptible to changes in pumping.

The range of velocities (presented on the x-axis) is much narrower at Turner Cut (ranging from -0.7 to 0.5 fps) compared to the other two locations (-1 to 4 fps at Old River at Middle River and -2.5 to 2.5 fps along the San Joaquin River at Jersey Point). Despite a small range in the velocity at this location, the proportional overlap value is still sensitive to pumping relative to the flow along the San Joaquin River at Jersey Point. Due to proximity, channel connectivity, and/or flow/velocity patterns, proportional overlap values change significantly with pumping at Old River at Middle River. Even though the proportional overlap value at this location is sensitive to pumping, the change in median velocity is smaller (~ 0.03 to 0.14 fps) compared to San Joaquin River flow at Jersey Point.

### I.3.2.2 Gaussian KDE Proportional Overlap Contour Maps

Contour plots for each alternative are presented below. Each plot represents a different alternative, and each facet represents a different inflow group. The space within each line represents the area experiencing 25-100% alteration (0-0.75 proportional overlap) based on kernel density estimates. Missing contours indicate a lack of historical data, and thus simulation ability.

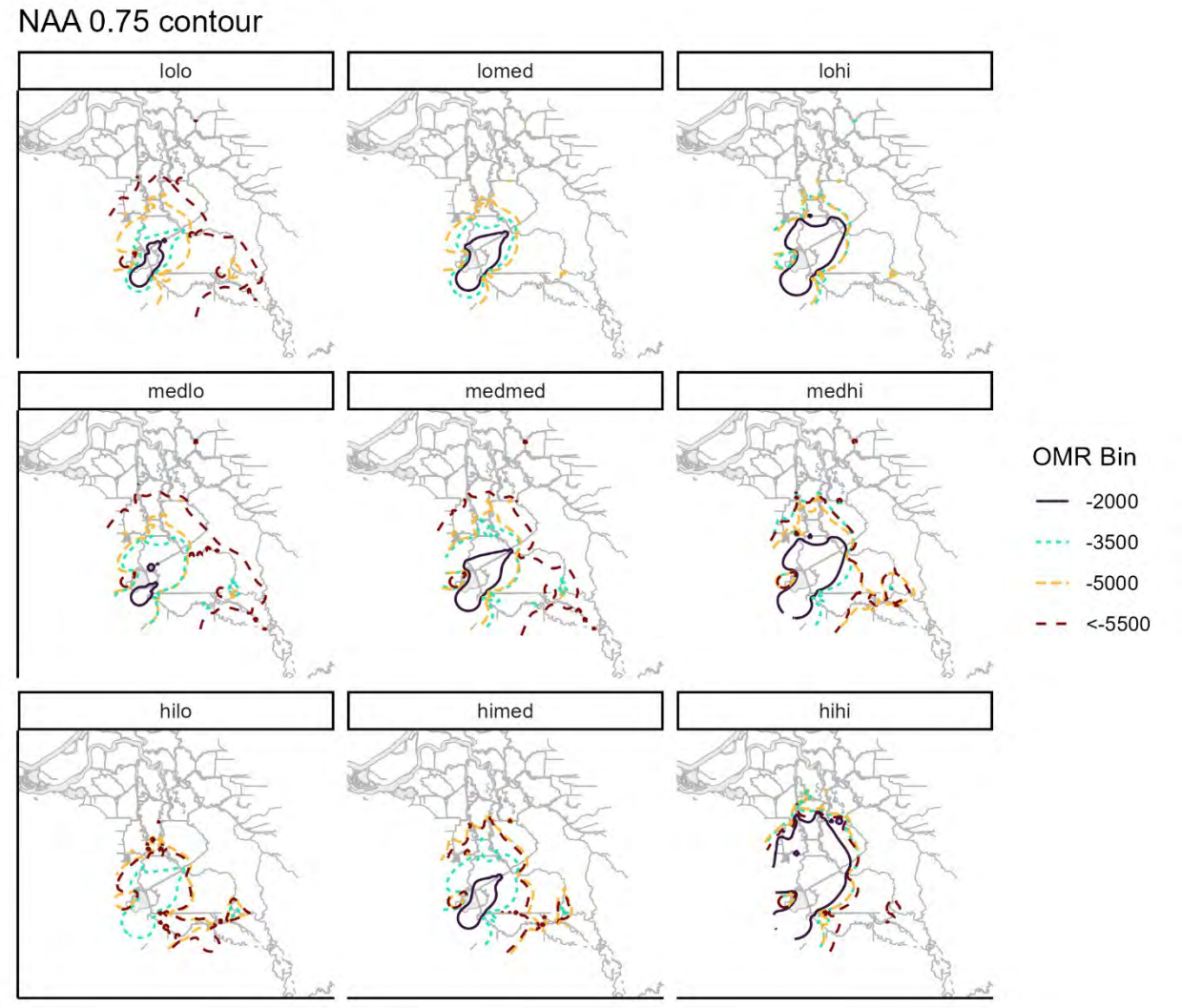



Figure I.3-104. Faceted Contour Maps Delineating Delta Export Zone of Influence Under Varying Inflows and OMR Flows. The contours identify where there is up to 75% overlap in velocity distribution with and without CVP exports. Results apply to the No Action Alternative. See Figure I.3-3 for group designations.

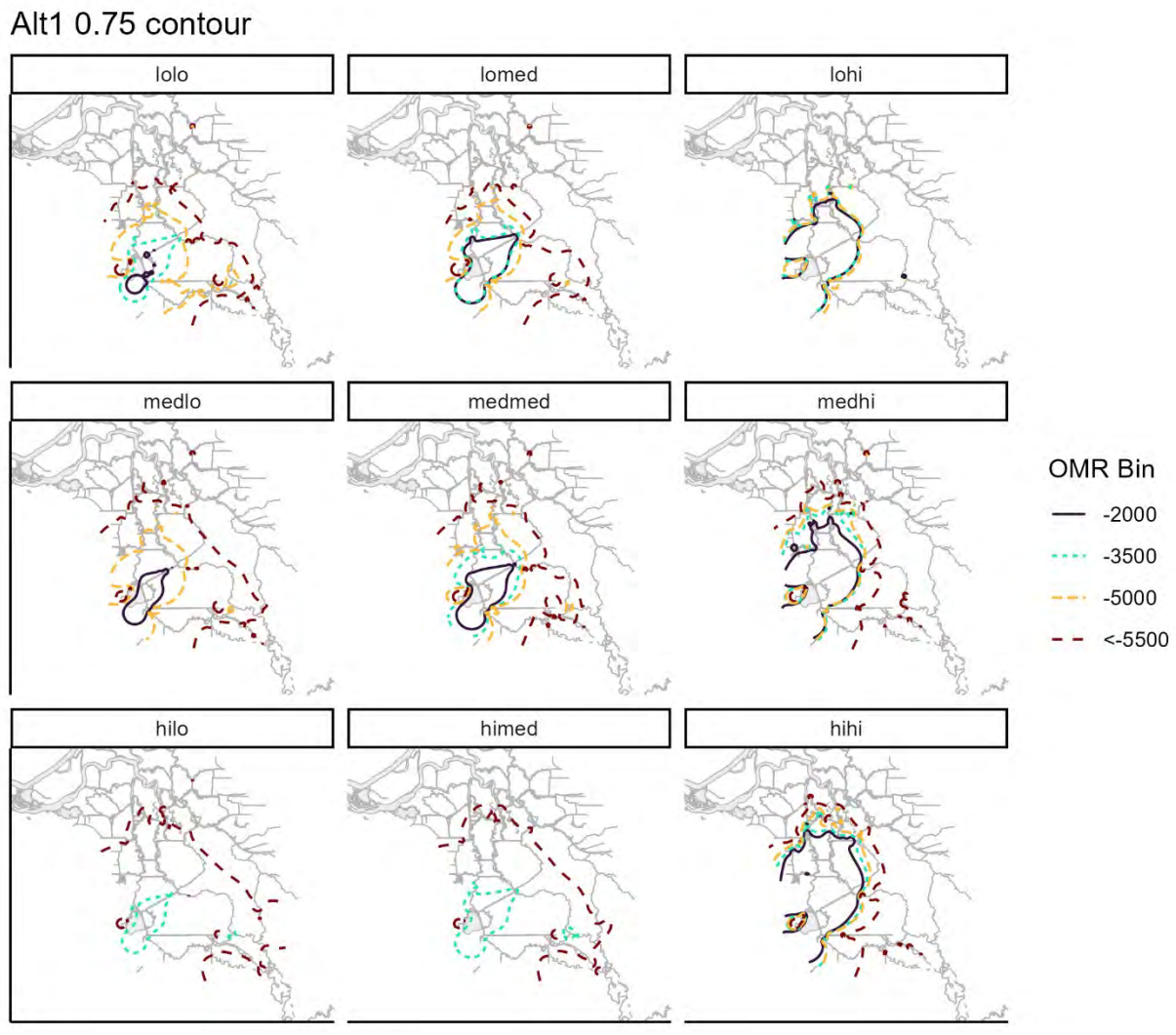



Figure I.3-105. Faceted Contour Maps Delineating Delta Export Zone of Influence Under Varying Inflows and OMR Flows. The contours identify where there is up to 75% overlap in velocity distribution with and without CVP exports. Results apply to Alternative 1. See Figure I.3-3 for group designations.

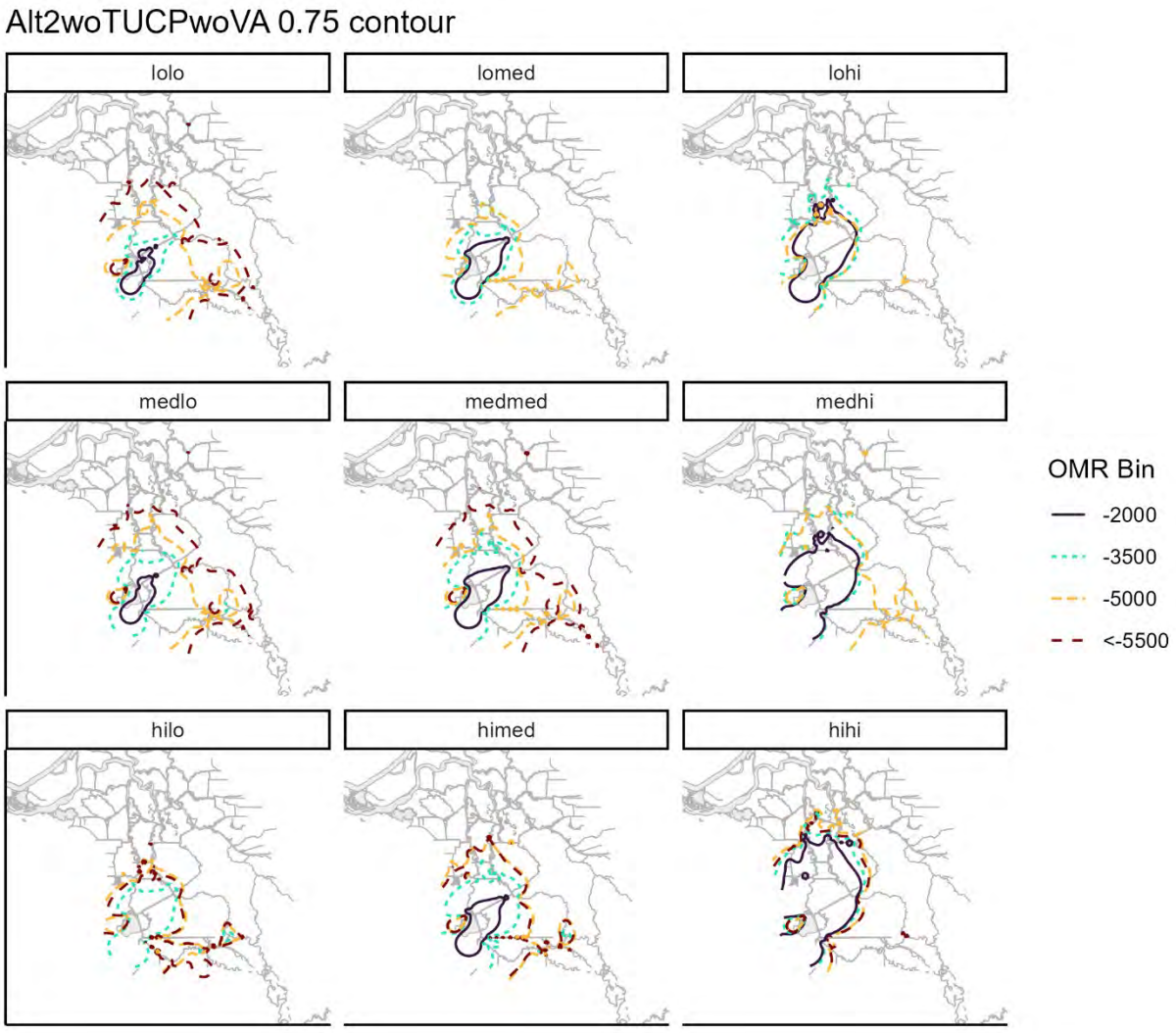



Figure I.3-106. Faceted Contour Maps Delineating Delta Export Zone of Influence Under Varying Inflows and OMR Flows. The contours identify where there is up to 75% overlap in velocity distribution with and without CVP exports. Results apply to Alt2woTUCPwoVA. See Figure I.3-3 for group designations.

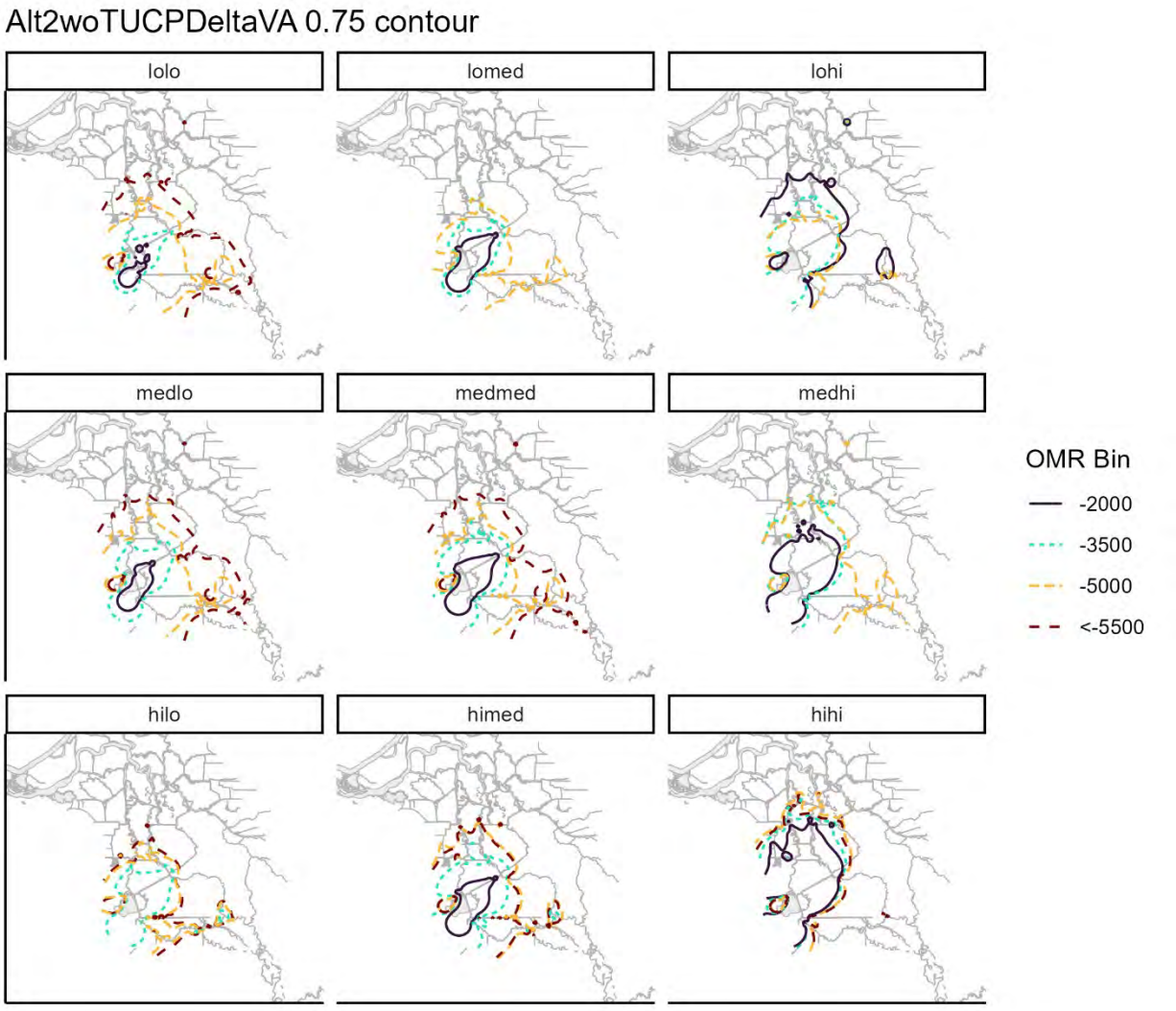



Figure I.3-107. Faceted Contour Maps Delineating Delta Export Zone of Influence Under Varying Inflows and OMR Flows. The contours identify where there is up to 75% overlap in velocity distribution with and without CVP exports. Results apply to Alt2woTUCPDeltaVA. See Figure I.3-3 for group designations.

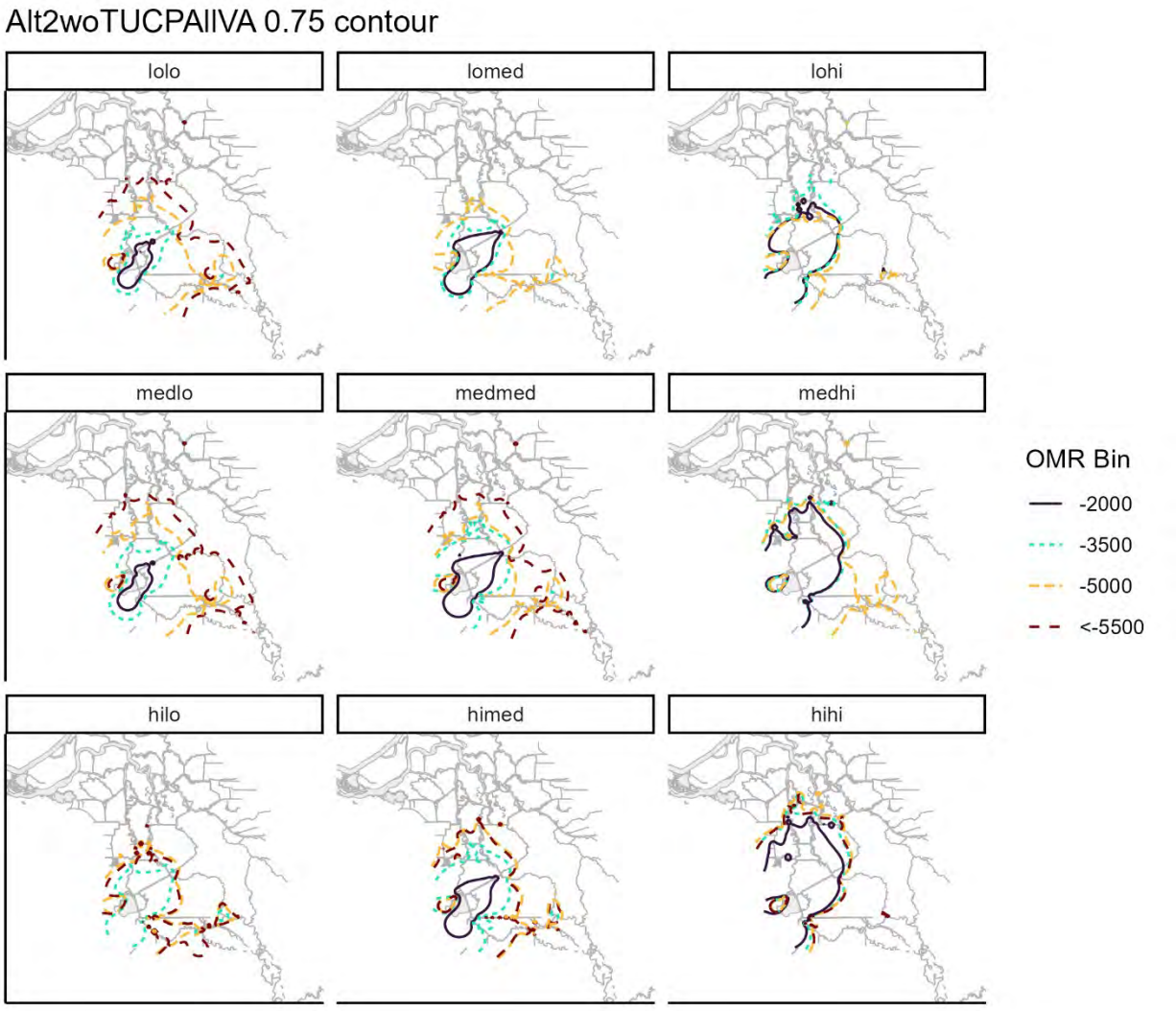



Figure I.3-108. Faceted Contour Maps Delineating Delta Export Zone of Influence Under Varying Inflows and OMR Flows. The contours identify where there is up to 75% overlap in velocity distribution with and without CVP exports. Results apply to Alt2woTUCPAllVA. See Figure I.3-3 for group designations.

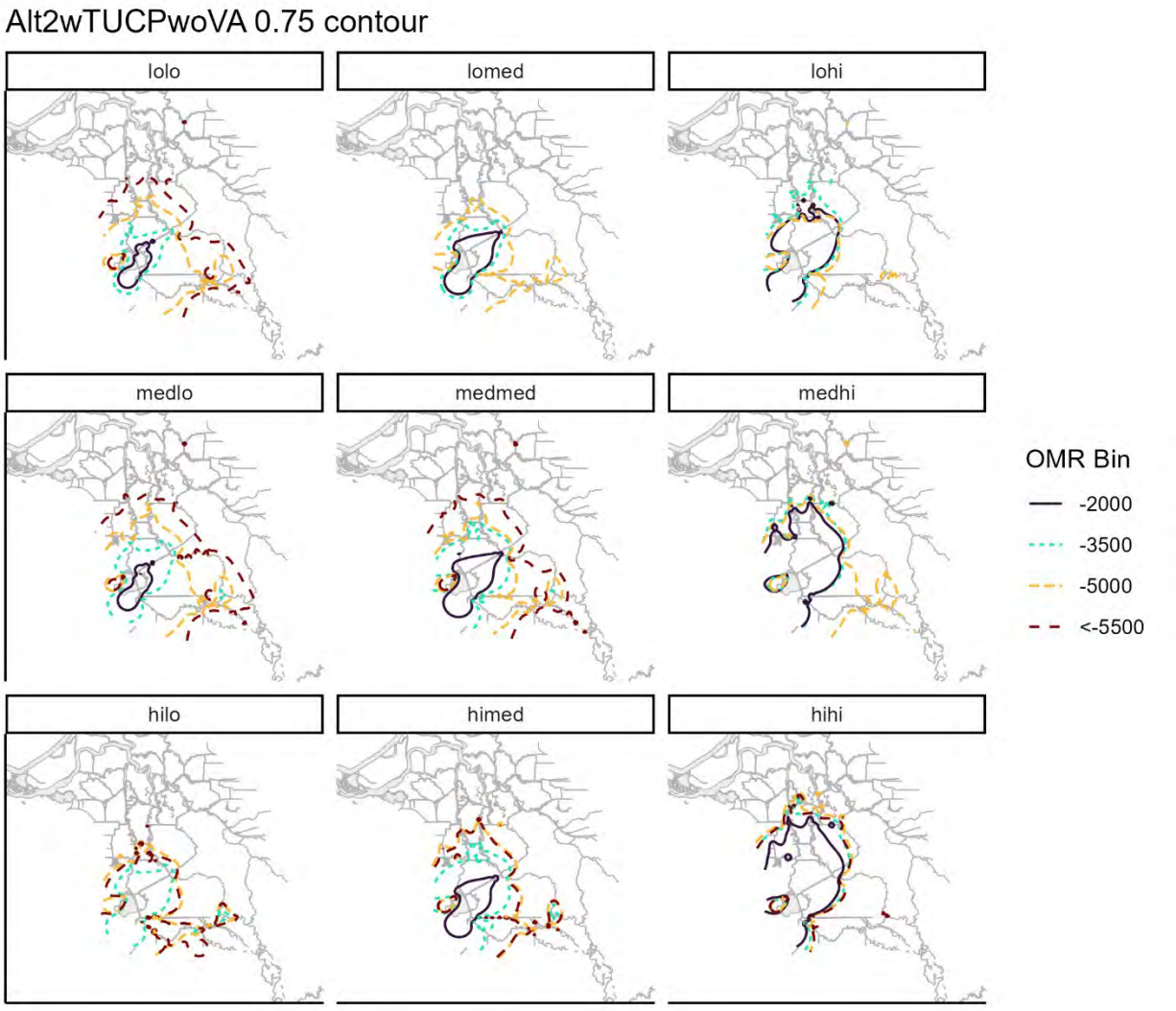



Figure I.3-109. Faceted Contour Maps Delineating Delta Export Zone of Influence Under Varying Inflows and OMR Flows. The contours identify where there is up to 75% overlap in velocity distribution with and without CVP exports. Results apply to Alt2wTUCPwoVA. See Figure I.3-3 for group designations.

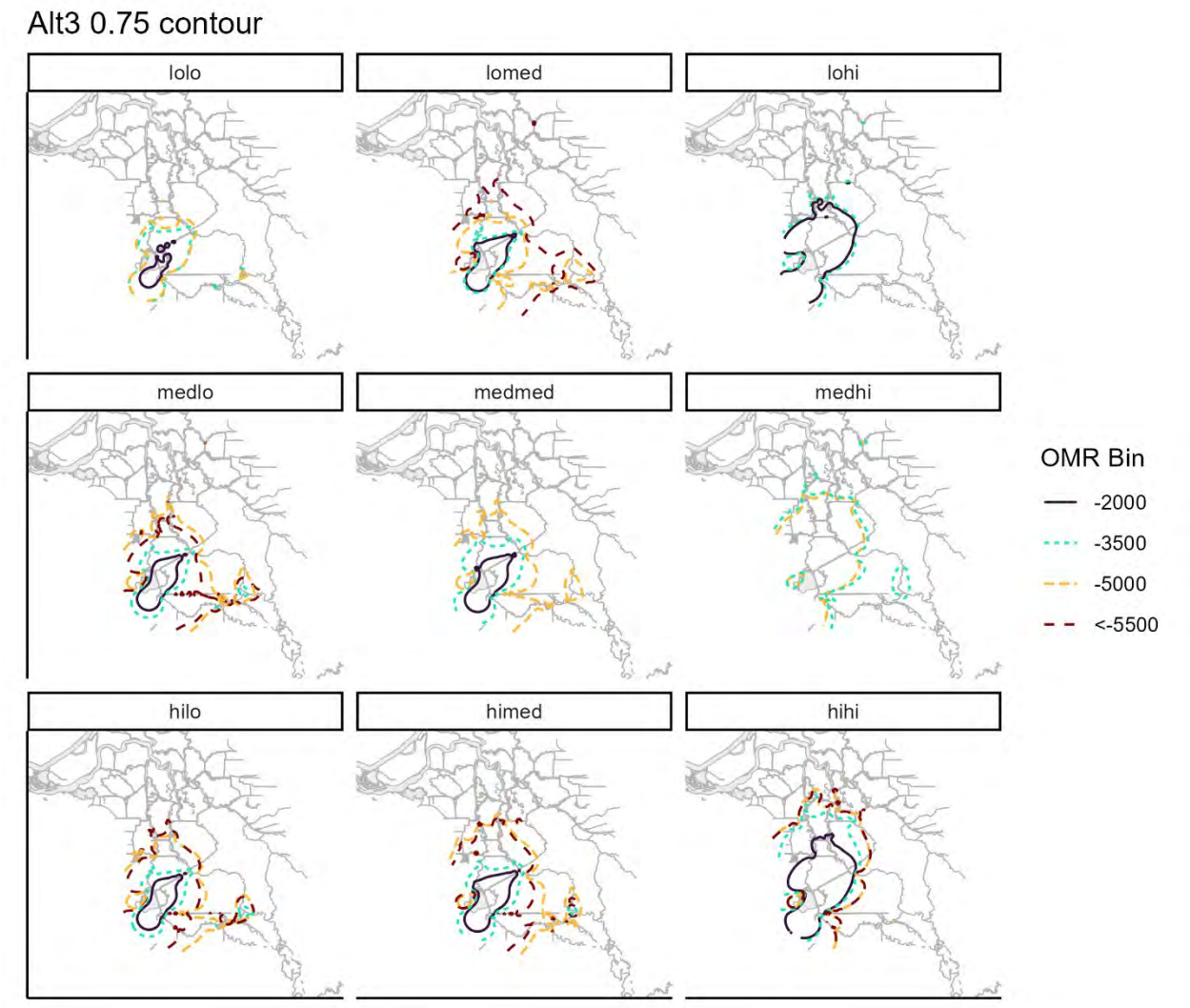



Figure I.3-110. Faceted Contour Maps Delineating Delta Export Zone of Influence Under Varying Inflows and OMR Flows. The contours identify where there is up to 75% overlap in velocity distribution with and without CVP exports. Results apply to Alt3. See Figure I.3-3 for group designations.

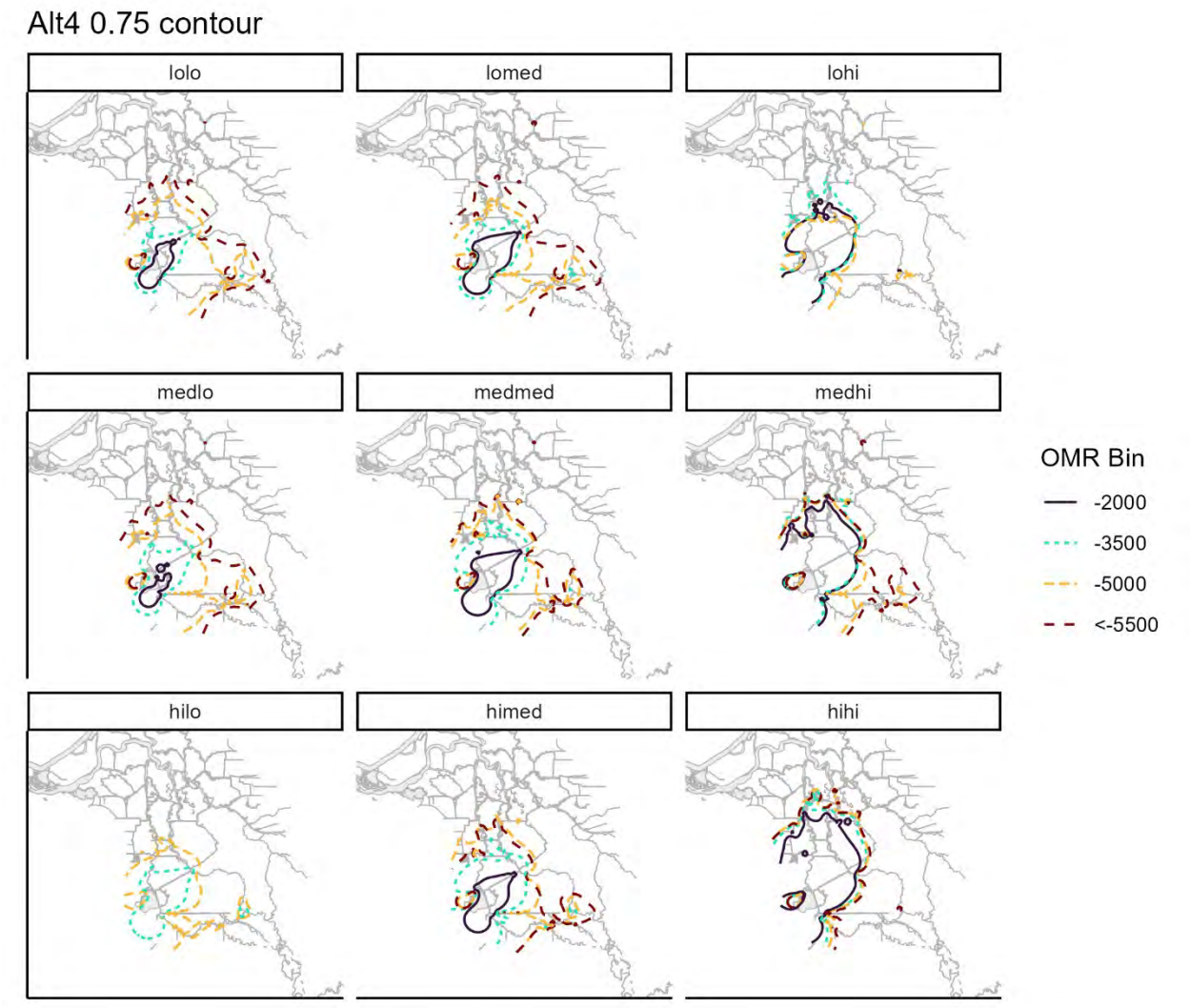



Figure I.3-111. Faceted Contour Maps Delineating Delta Export Zone of Influence Under Varying Inflows and OMR Flows. The contours identify where there is up to 75% overlap in velocity distribution with and without CVP exports. Results apply to Alt4. See Figure I.3-3 for group designations.

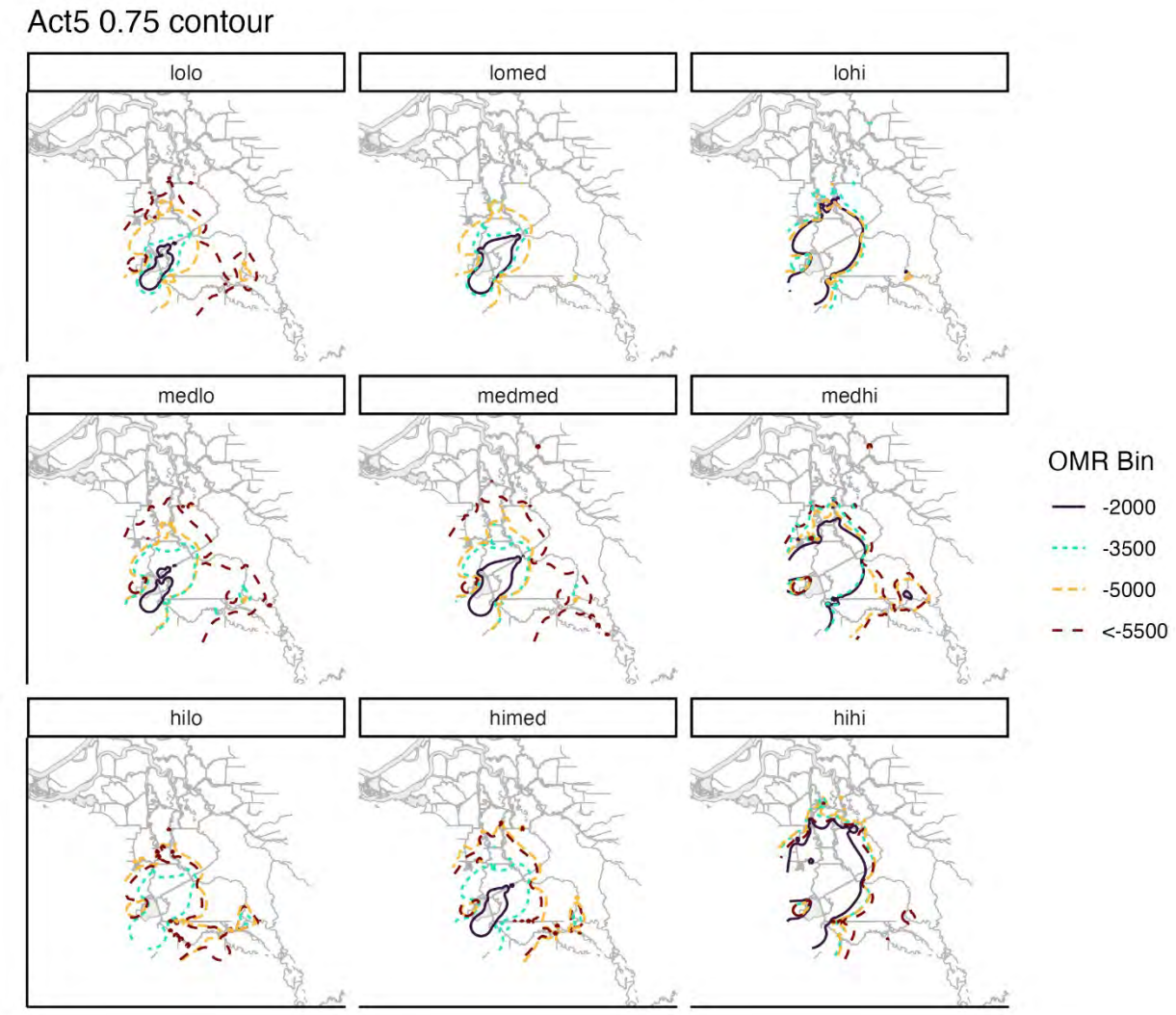



Figure I.3-111a. Faceted Contour Maps Delineating Delta Export Zone of Influence Under Varying Inflows and OMR Flows. The contours identify where there is up to 75% overlap in velocity distribution with and without CVP exports. Results apply to Action 5. See Figure I.3-3 for group designations.

## I.3.3 BA Key Takeaways

With incremental increases to pumping, proportional overlap at selected locations generally decreases. Changes to proportional overlap are more subtle along the San Joaquin River at Jersey Point as compared to Turner Cut and Old River at Middle River (Table I.3-7). For the three locations highlighted, proportional overlap ranges from 0.736 (NAA at less than -5500 cfs OMR at Old River at Middle River) to 0.984 (Alt3 at -2000 cfs OMR at SJR at Jersey Point) (Table I.3-7). Proportional overlap across Proposed Action components ranges from 0.746 (Alt2woTUCPwoVA at less than -5500 cfs OMR at Old River at Middle River) to 0.98 (Alt2woTUCPAllVA at -2000 cfs OMR SJR at Jersey Point). Proportional overlap across Action 5 ranges from 0.803 (Action 5 at less than -5500 cfs OMR at Turner Cut) to 0.98 (Action 5 at -2000 cfs OMR SJR at Jersey Point).

Across all alternatives, most of the nodes experienced low hydrologic influence due to pumping (greater than 0.75 overlap; I.3-112-Figure I.3-120a). The spatial extent (sum and proportion of channel length) of medium hydrologic alteration across all inflow groups and OMR bins ranges from 27,647 feet (0.7% of the DSM2 grid in NAA) to 606,560 feet (15.7% of the DSM2 grid in NAA) (Table I.3-8). Channel length altered across the Proposed Action components ranges from 45,576 feet (1.2% of the DSM2 grid in Alt2woTUCPDeltaVA) feet to 583,403 feet (15.2% of the DSM2 grid in Alt2woTUCPAllVA) (Table I.3-8). Channel lengths altered under Action 5 range from 45,576 feet (1.2% of the DSM2 grid) to 554,052 (14.4% of the DSM2 grid). The greatest extent of hydrologic alteration occurs in the <-5500 OMR bin, which is likely associated with greater exports.

Channel length altered and Delta Export Zone of Influence generally increase with more negative OMR (Figure I.3-104, Figure I.3-106, Figure I.3-107, Figure I.3-108, Figure I.3-111a Figure I.3-121, Figure I.3-121a). Trends appear consistent across inflow groups containing combinations of low and medium Sacramento and San Joaquin inflow (lolo, lomed, medlo, medmed inflow groups). At high Sacramento inflow (hilo, himed, hihi inflow groups), there appears to be little difference in proportional channel length altered between -5000 and <-5500 OMR bins. In the lohi and hihi inflow groups, there also appears to be less difference in proportional channel length altered across all OMR bins.

For the -2000 and -3500 OMR bins, channel length altered generally increases with higher San Joaquin inflow (Figure I.3-104, Figure I.3-106, Figure I.3-107, Figure I.3-108, Figure I.3-111a, Figure I.3-122, Figure I.3-122a). These trends are not apparent for the -5000 and <-5500 OMR bins.

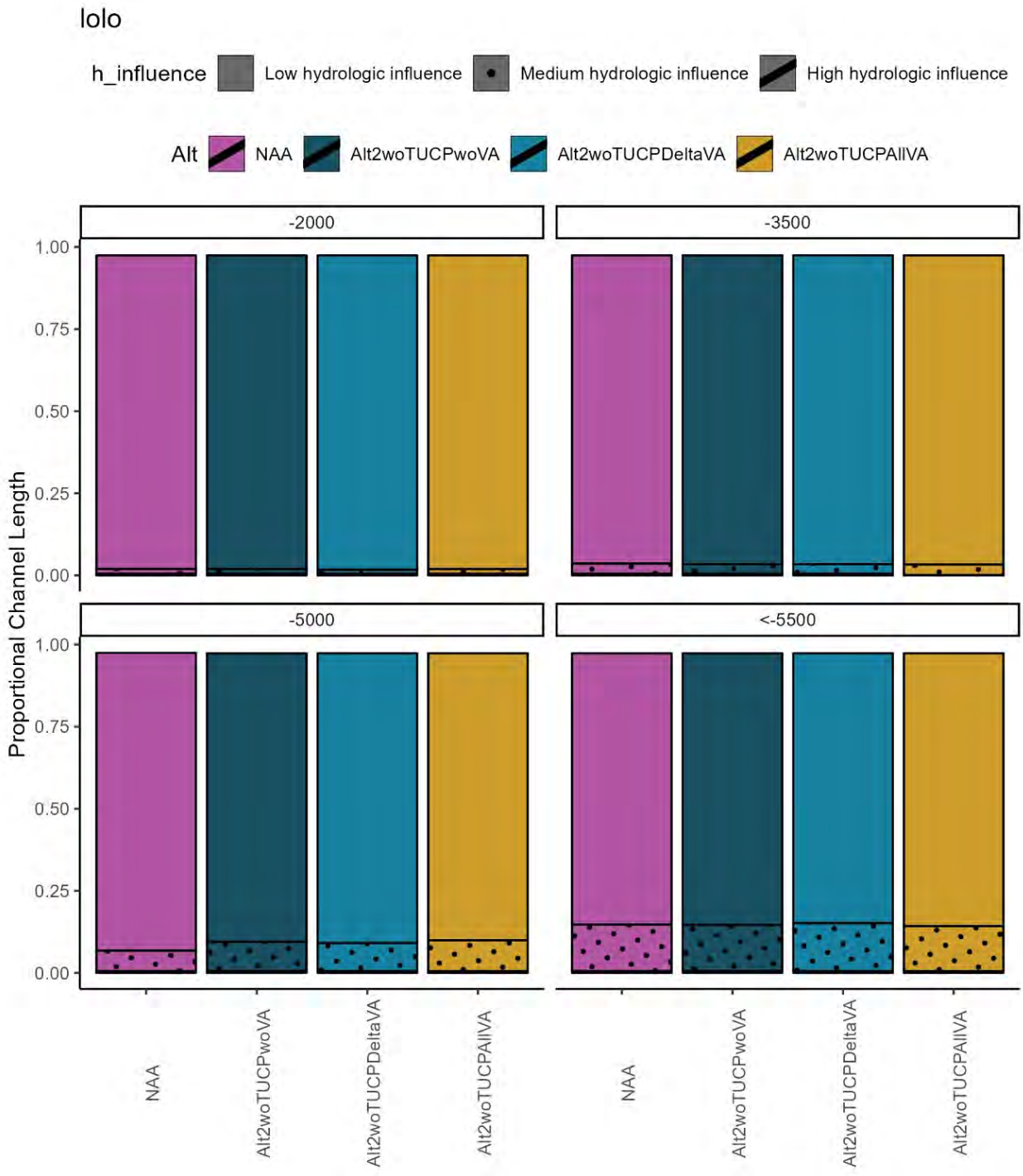



Figure I.3-112. Proportion of total channel length in the Delta (DSM2 grid) that experiences high (<25% proportional overlap), medium (25-75% proportional overlap) and low (>75% proportional overlap) hydrologic influence across Alternative 2 components and across OMR bins of -2000, -3500, -5000, and less than -5500 cfs. Results apply to the lolo inflow group.

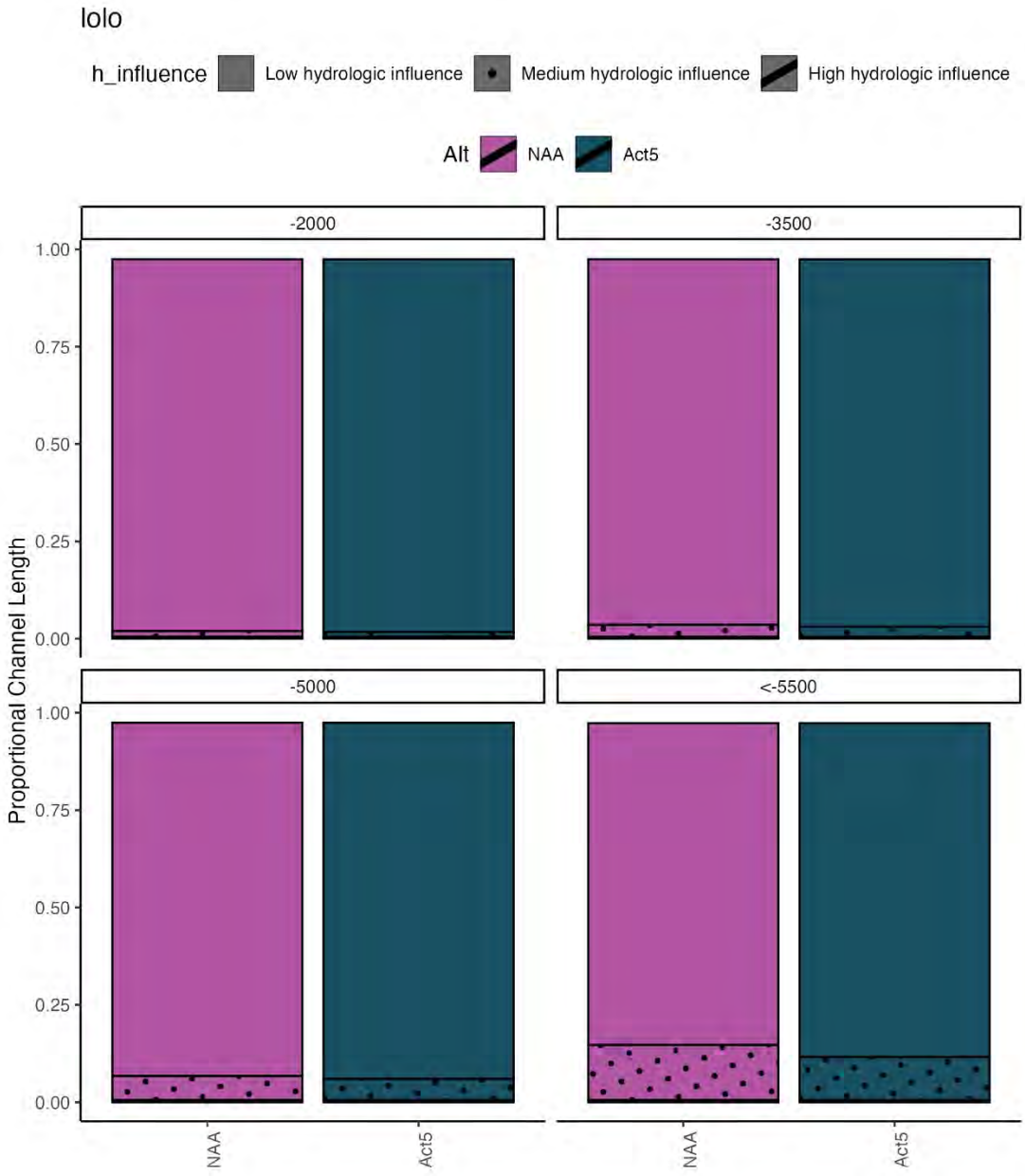



Figure I.3-112a. Proportion of total channel length in the Delta (DSM2 grid) that experiences high (<25% proportional overlap), medium (25-75% proportional overlap) and low (>75% proportional overlap) hydrologic influence across the NAA and Action 5 and across OMR bins of -2000, -3500, -5000, and less than -5500 cfs. Results apply to the lolo inflow group.

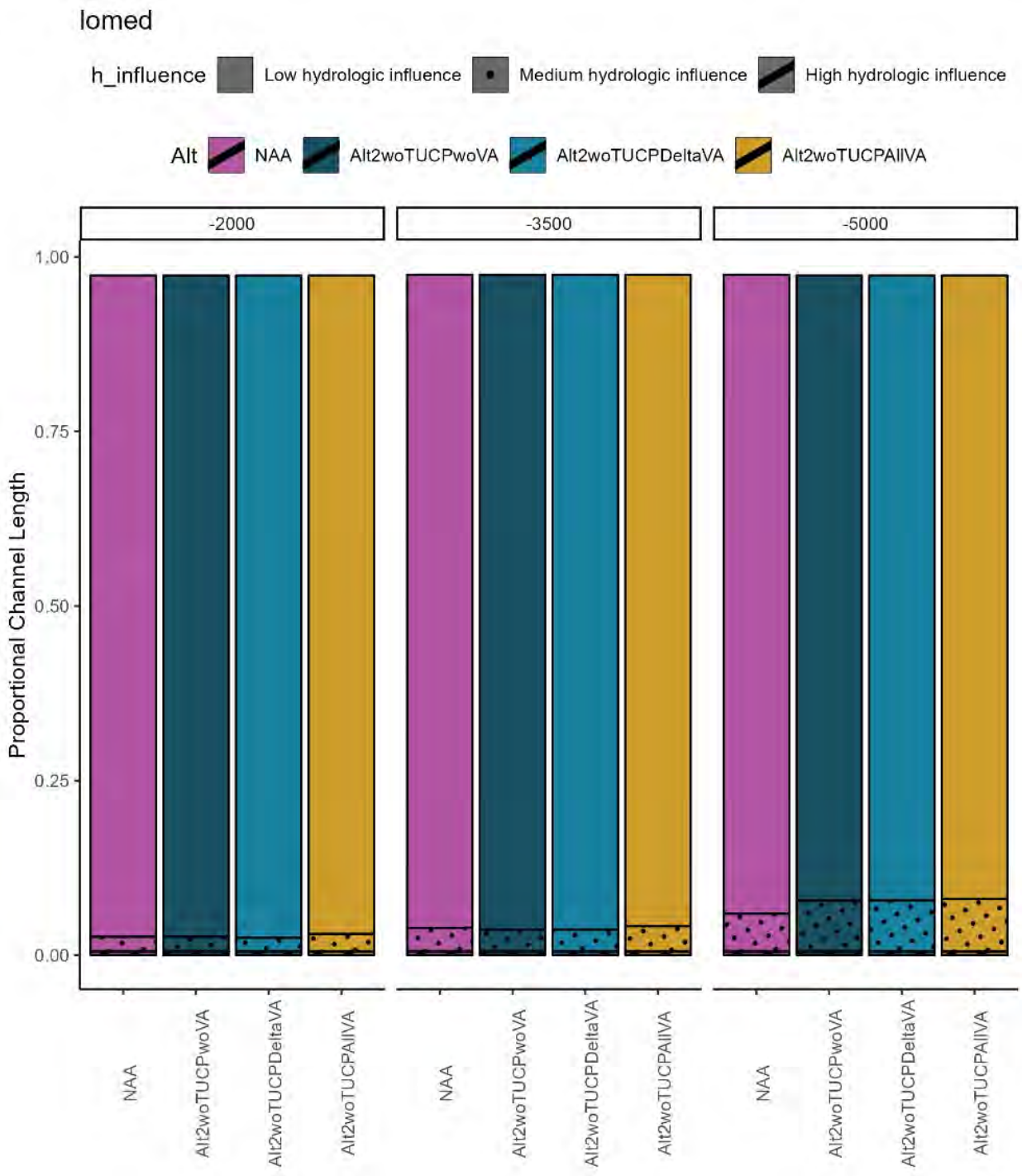



Figure I.3-113. Proportion of total channel length in the Delta (DSM2 grid) that experiences high (<25% proportional overlap), medium (25-75% proportional overlap) and low (>75% proportional overlap) hydrologic influence across Alternative 2 components and across OMR bins of -2000, -3500, -5000, and less than -5500 cfs. Results apply to the lomed inflow group.

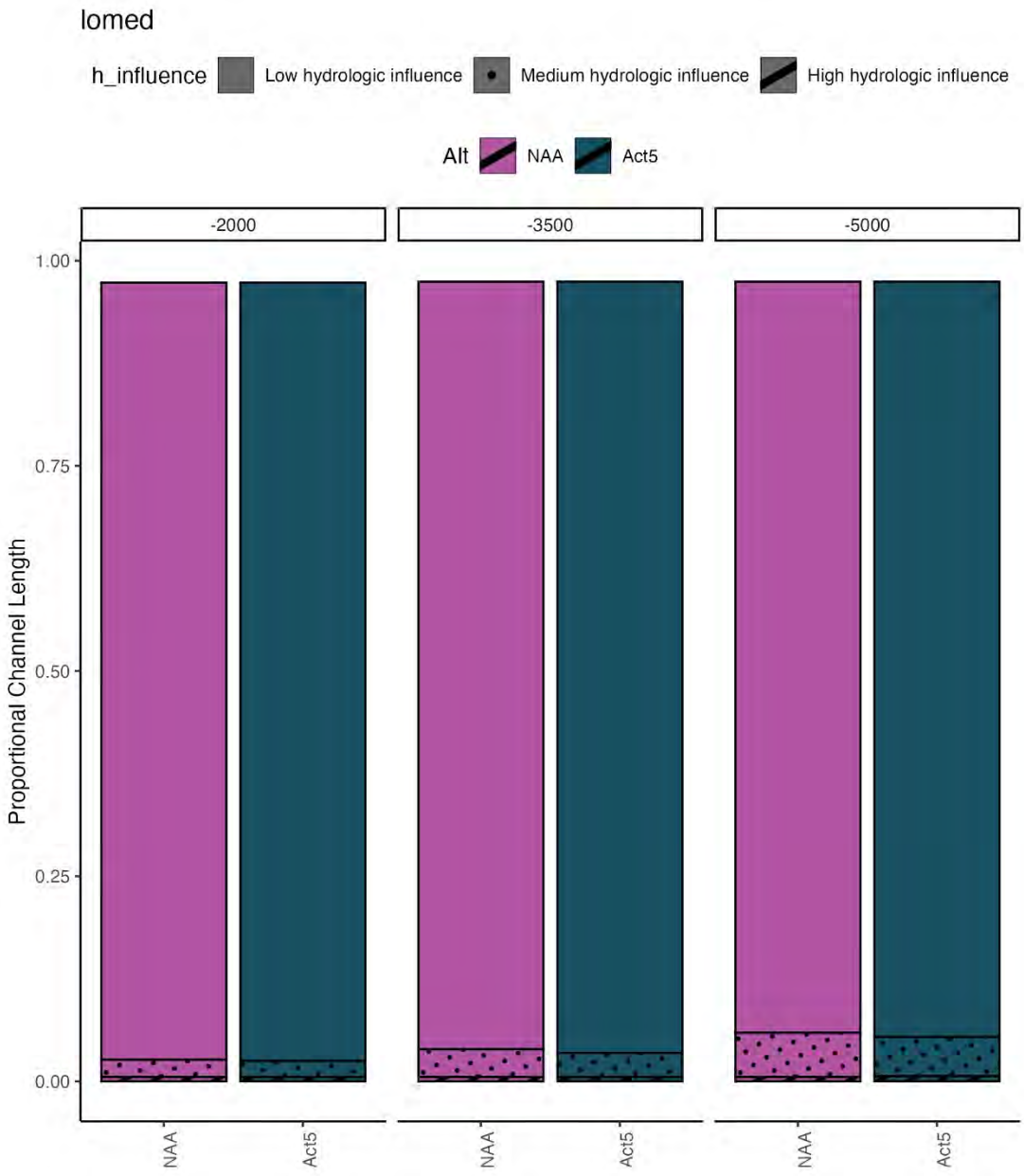



Figure I.3-113a. Proportion of total channel length in the Delta (DSM2 grid) that experiences high (<25% proportional overlap), medium (25-75% proportional overlap) and low (>75% proportional overlap) hydrologic influence across the NAA and Action 5 and across OMR bins of -2000, -3500, -5000, and less than -5500 cfs. Results apply to the lomed inflow group.

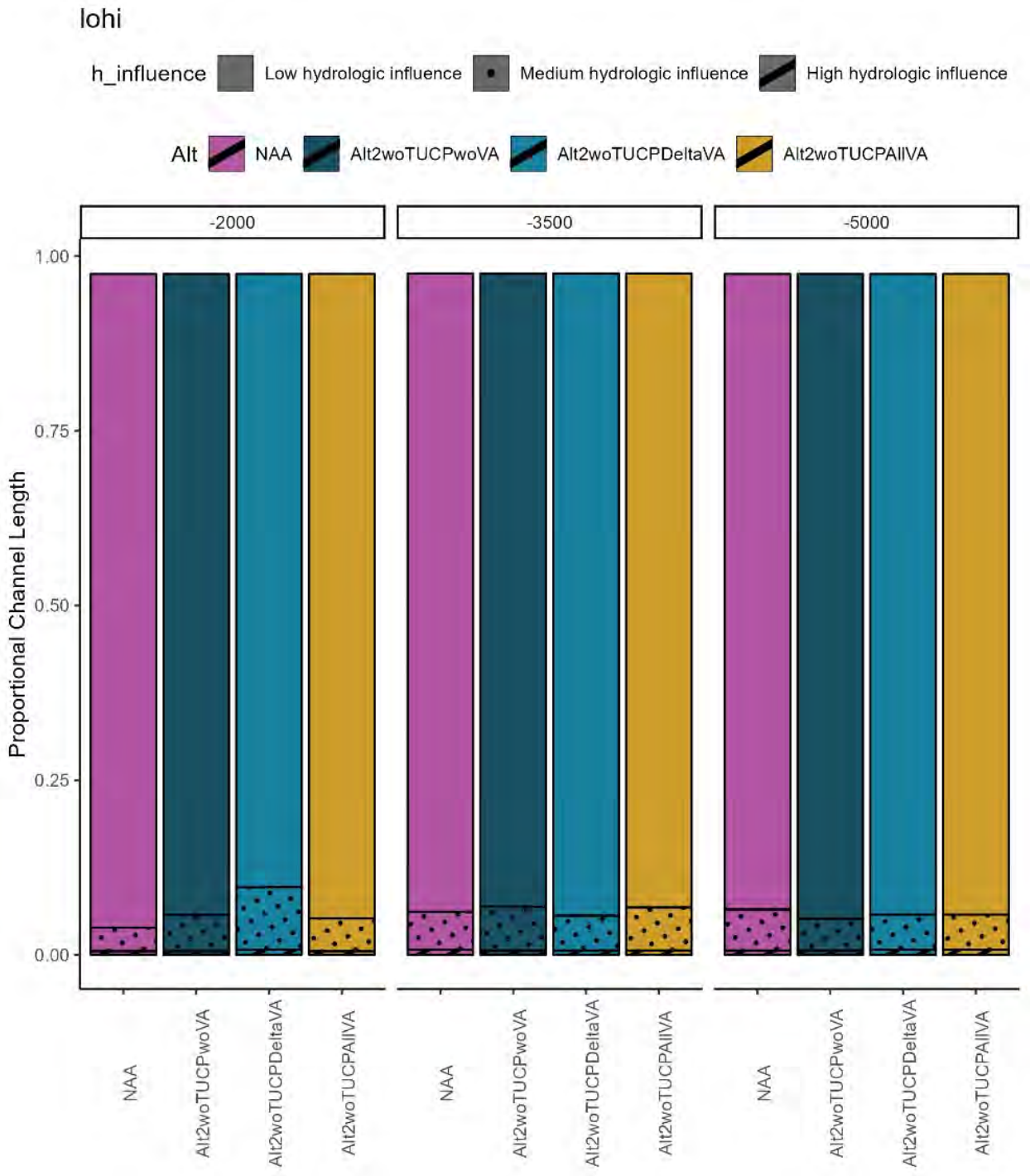



Figure I.3-114. Proportion of total channel length in the Delta (DSM2 grid) that experiences high (<25% proportional overlap), medium (25-75% proportional overlap) and low (>75% proportional overlap) hydrologic influence across Alternative 2 components and across OMR bins of -2000, -3500, -5000, and less than -5500 cfs. Results apply to the lohi inflow group.

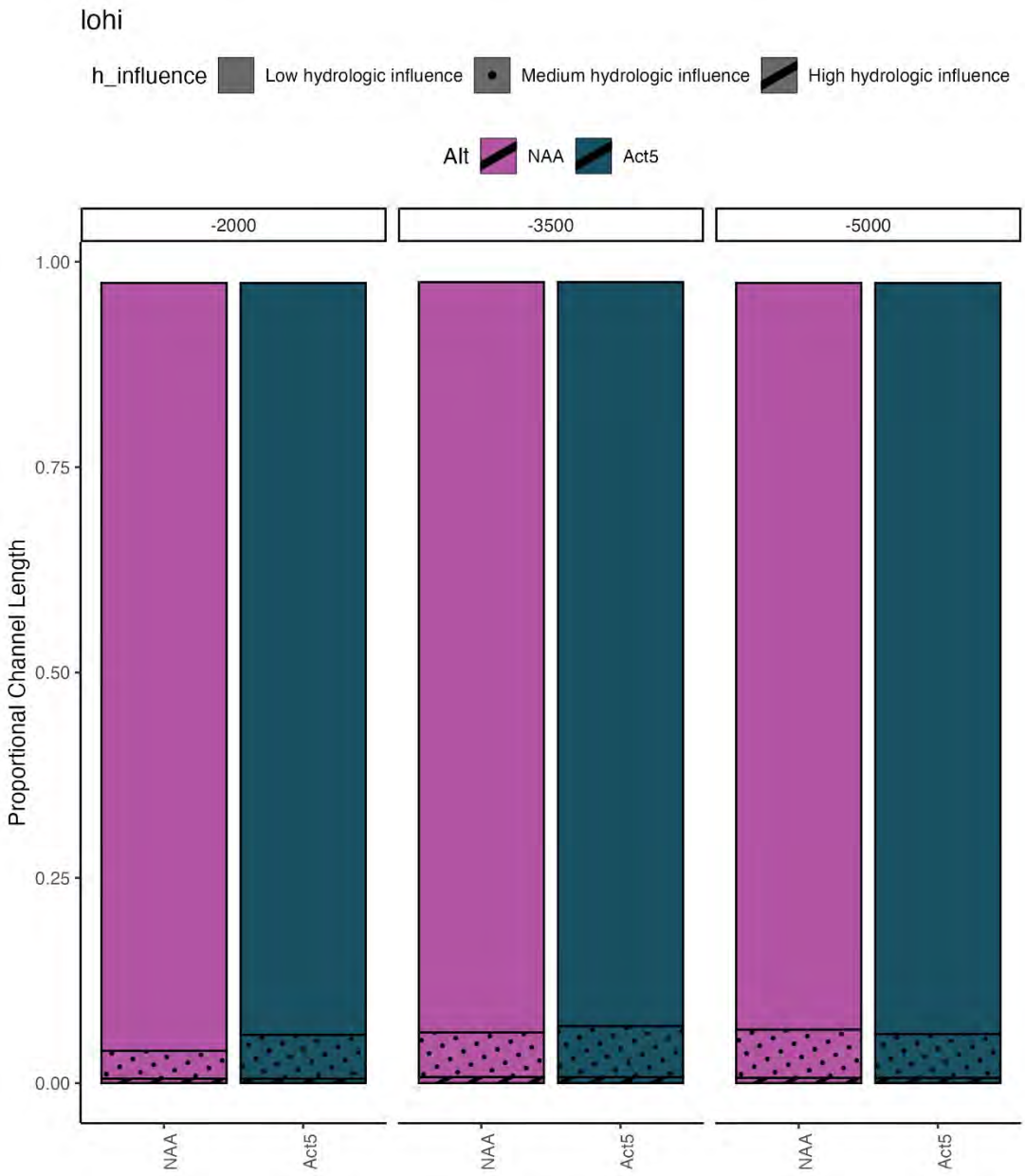



Figure I.3-114a. Proportion of total channel length in the Delta (DSM2 grid) that experiences high (<25% proportional overlap), medium (25-75% proportional overlap) and low (>75% proportional overlap) hydrologic influence across the NAA and Action 5 and across OMR bins of -2000, -3500, -5000, and less than -5500 cfs. Results apply to the lohi inflow group.

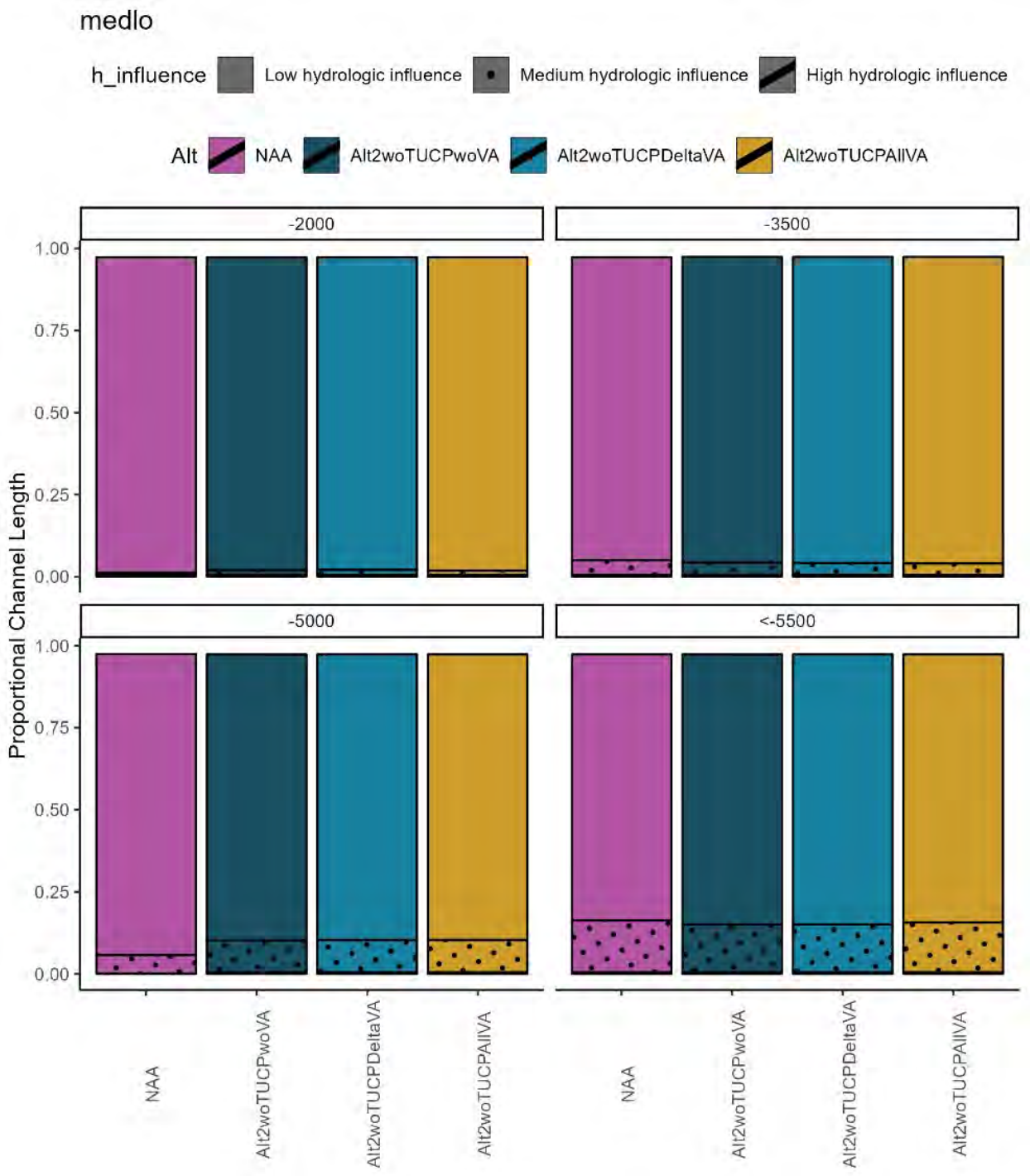



Figure I.3-115. Proportion of total channel length in the Delta (DSM2 grid) that experiences high (<25% proportional overlap), medium (25-75% proportional overlap) and low (>75% proportional overlap) hydrologic influence across Alternative 2 components and across OMR bins of -2000, -3500, -5000, and less than -5500 cfs. Results apply to the medlo inflow group.

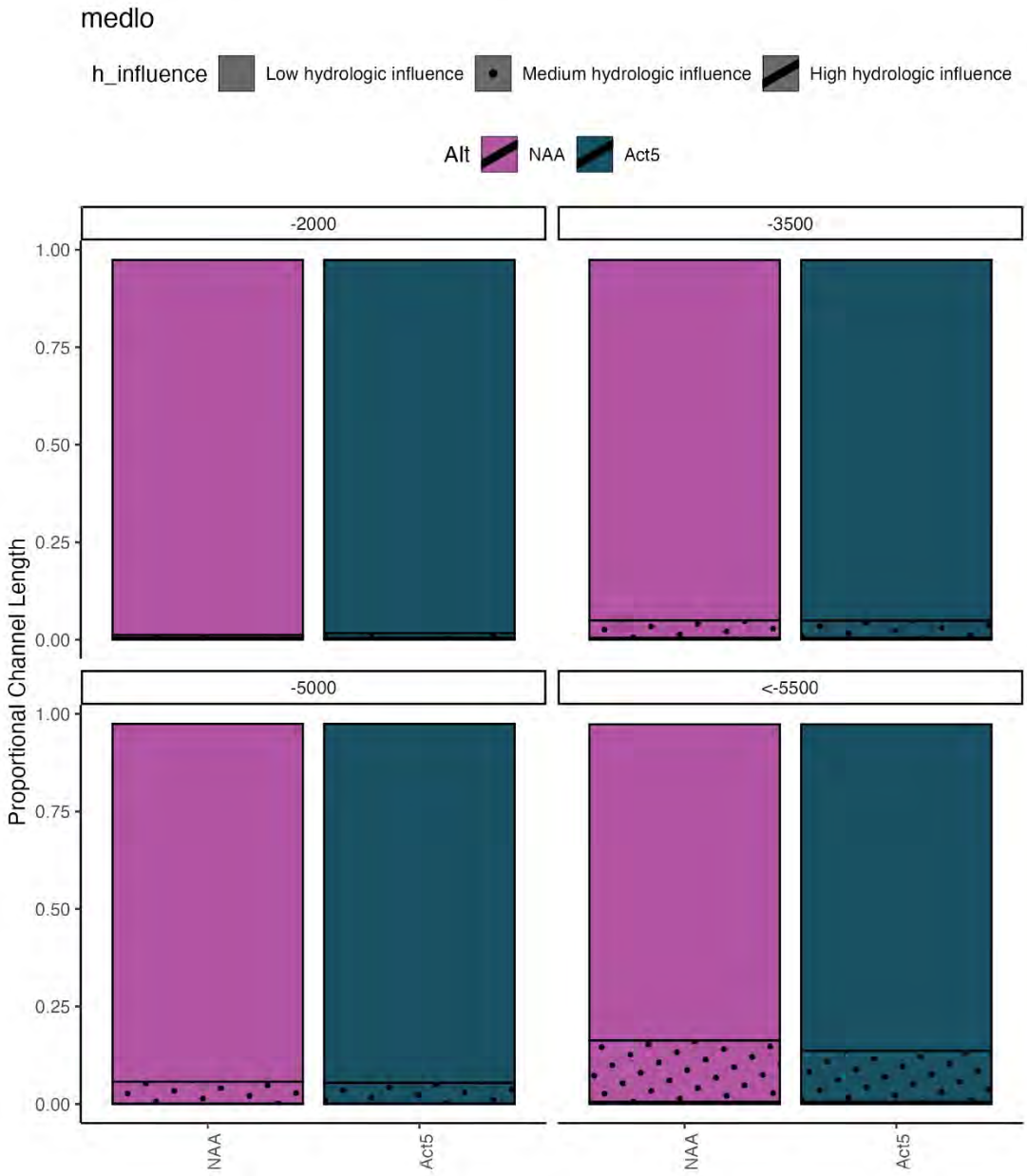



Figure I.3-115a. Proportion of total channel length in the Delta (DSM2 grid) that experiences high (<25% proportional overlap), medium (25-75% proportional overlap) and low (>75% proportional overlap) hydrologic influence across the NAA and Action 5 and across OMR bins of -2000, -3500, -5000, and less than -5500 cfs. Results apply to the medlo inflow group.

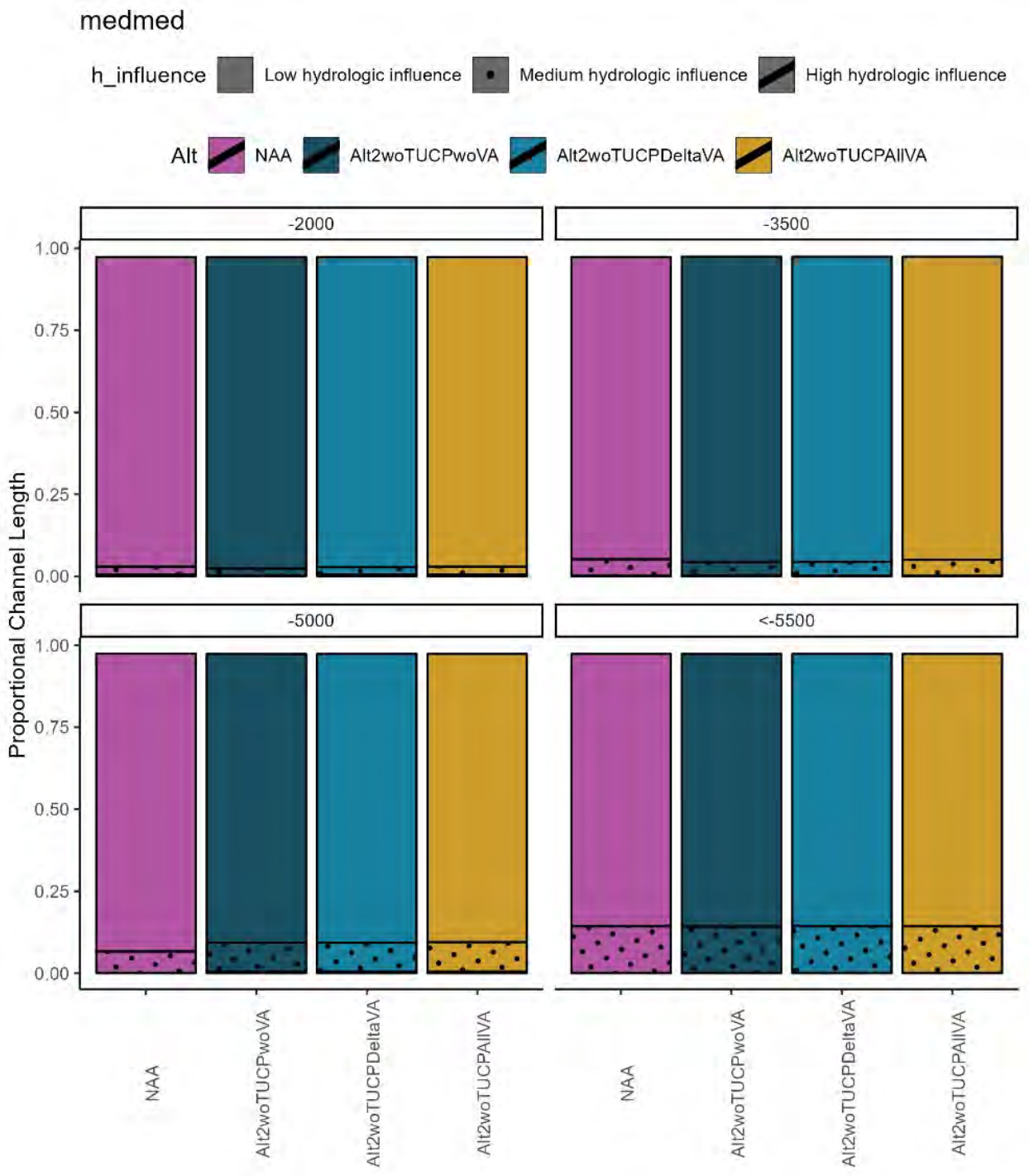



Figure I.3-116. Proportion of total channel length in the Delta (DSM2 grid) that experiences high (<25% proportional overlap), medium (25-75% proportional overlap) and low (>75% proportional overlap) hydrologic influence across Alternative 2 components and across OMR bins of -2000, -3500, -5000, and less than -5500 cfs. Results apply to the medmed inflow group.

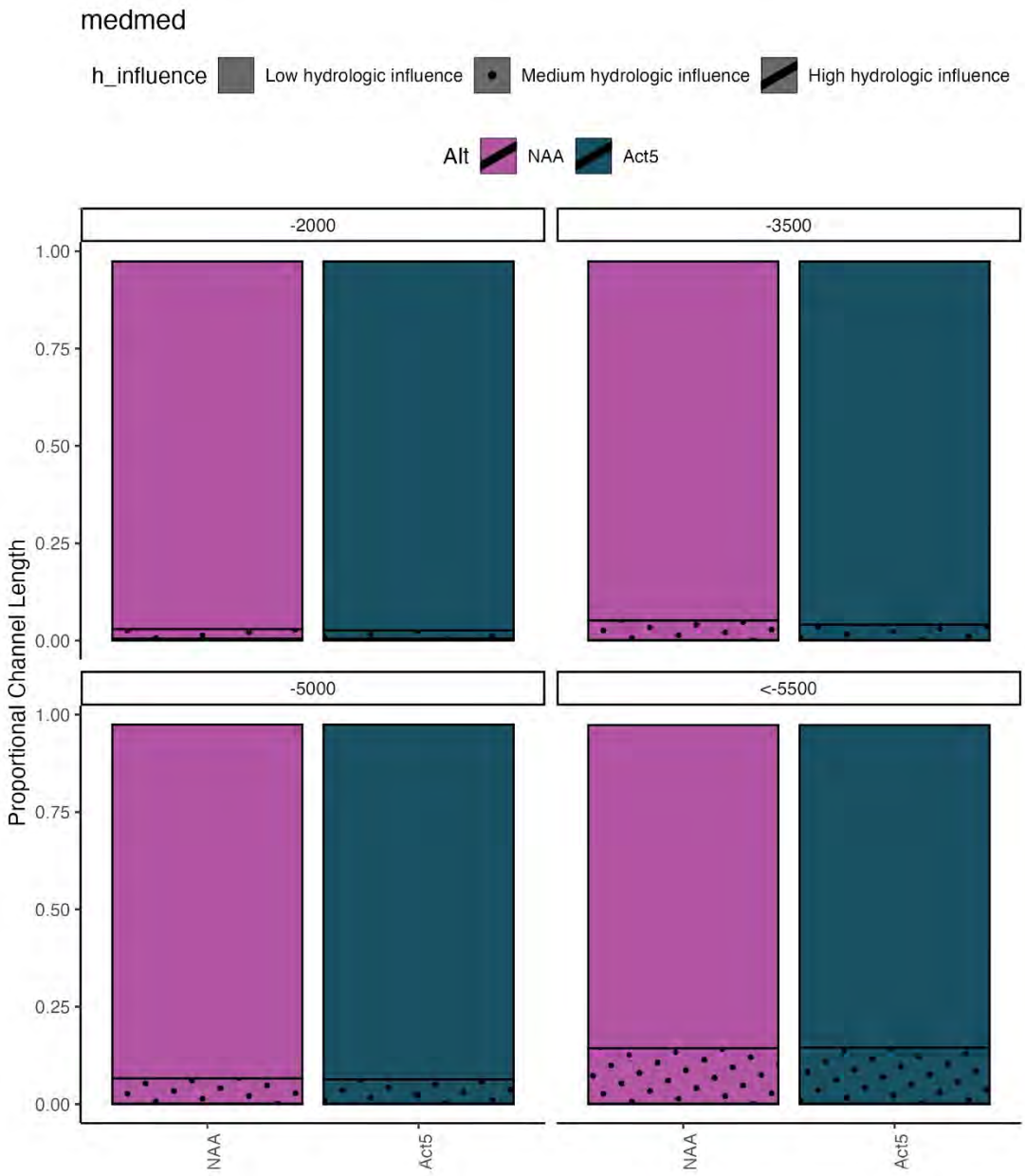



Figure I.3-116a. Proportion of total channel length in the Delta (DSM2 grid) that experiences high (<25% proportional overlap), medium (25-75% proportional overlap) and low (>75% proportional overlap) hydrologic influence across Alternative 2 components and across OMR bins of -2000, -3500, -5000, and less than -5500 cfs. Results apply to the medmed inflow group.

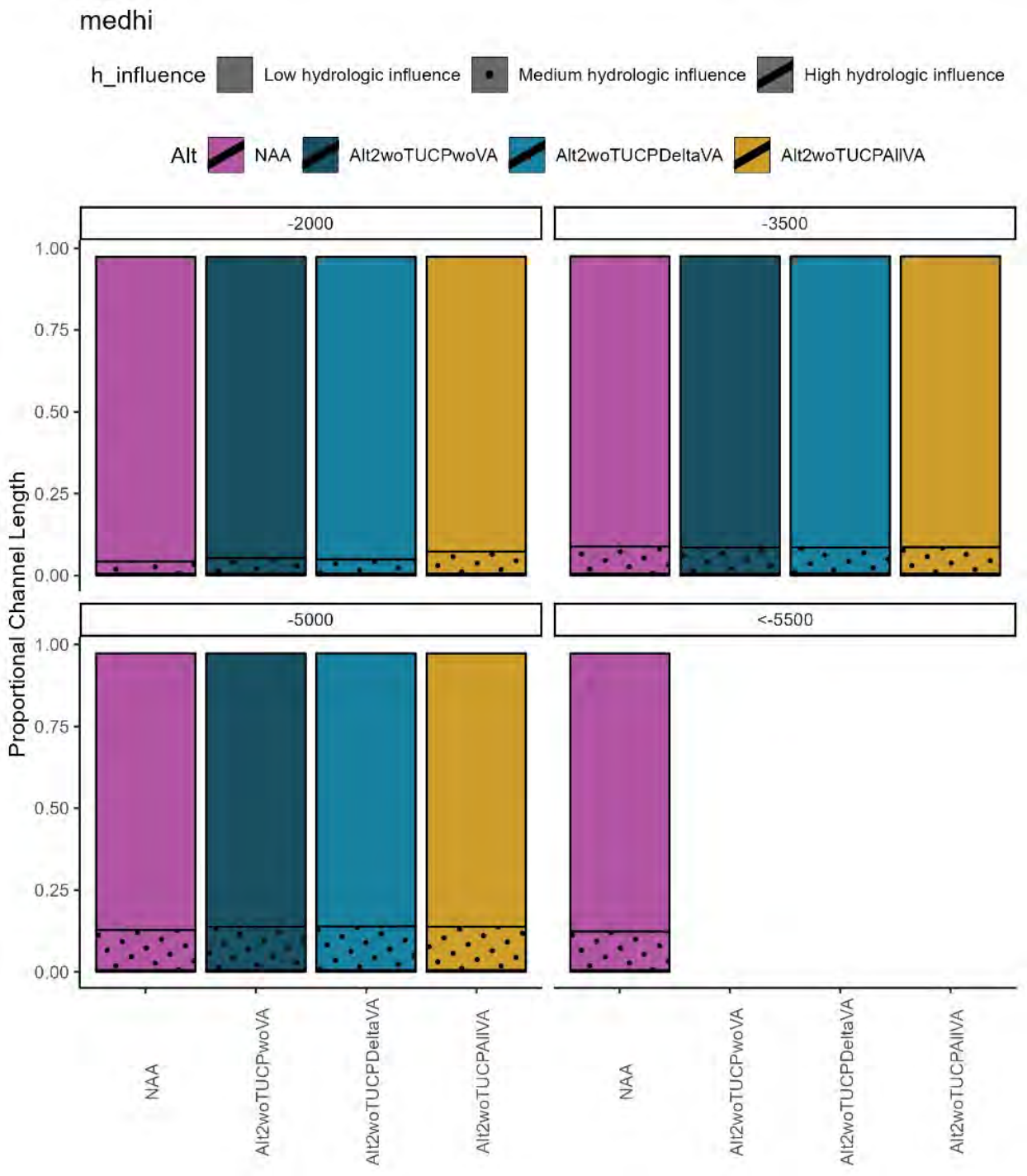



Figure I.3-117. Proportion of total channel length in the Delta (DSM2 grid) that experiences high (<25% proportional overlap), medium (25-75% proportional overlap) and low (>75% proportional overlap) hydrologic influence across Alternative 2 components and across OMR bins of -2000, -3500, -5000, and less than -5500 cfs. Results apply to the medhi inflow group.

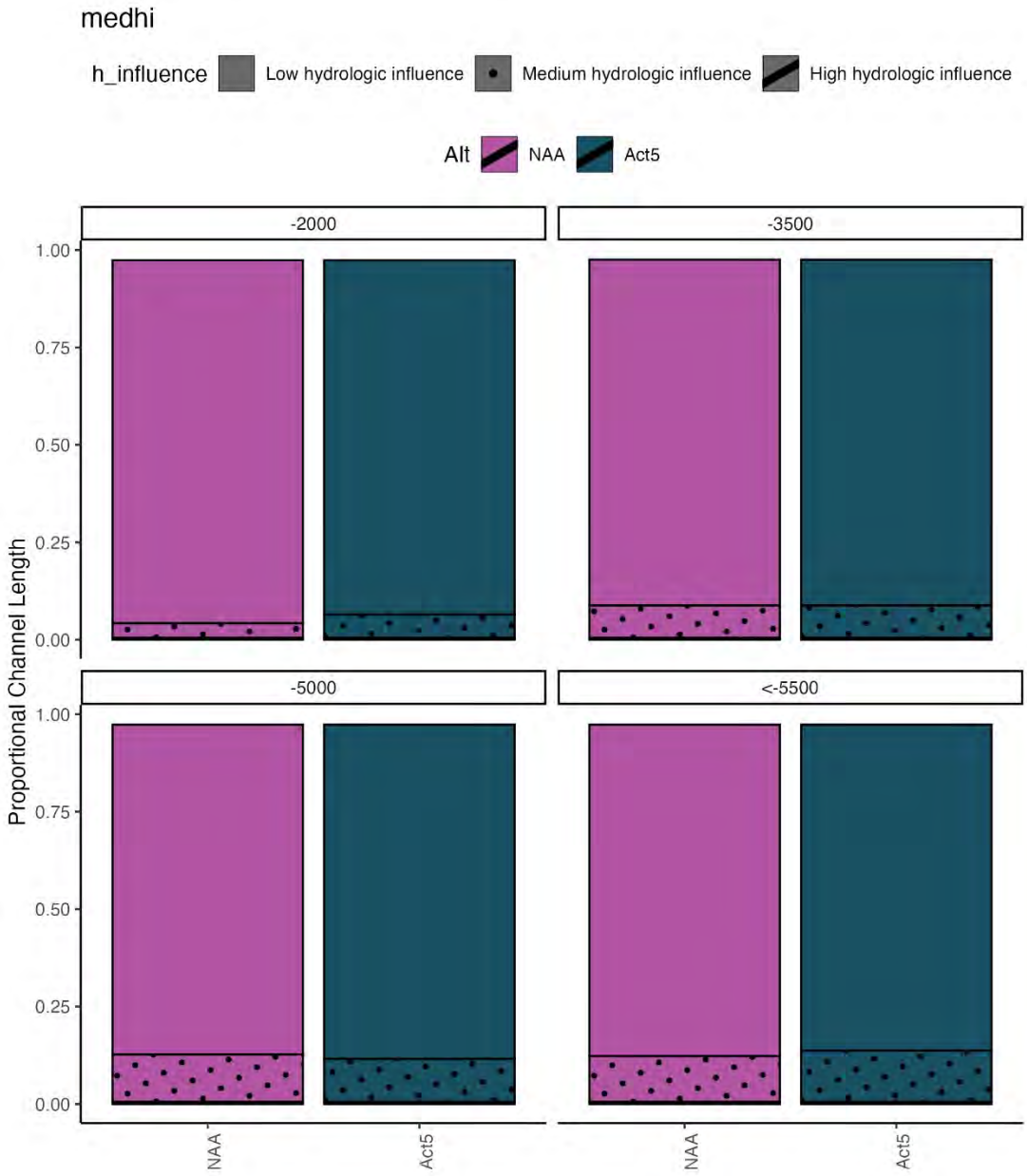



Figure I.3-117a. Proportion of total channel length in the Delta (DSM2 grid) that experiences high (<25% proportional overlap), medium (25-75% proportional overlap) and low (>75% proportional overlap) hydrologic influence across the NAA and Action 5 and across OMR bins of -2000, -3500, -5000, and less than -5500 cfs. Results apply to the medhi inflow group.

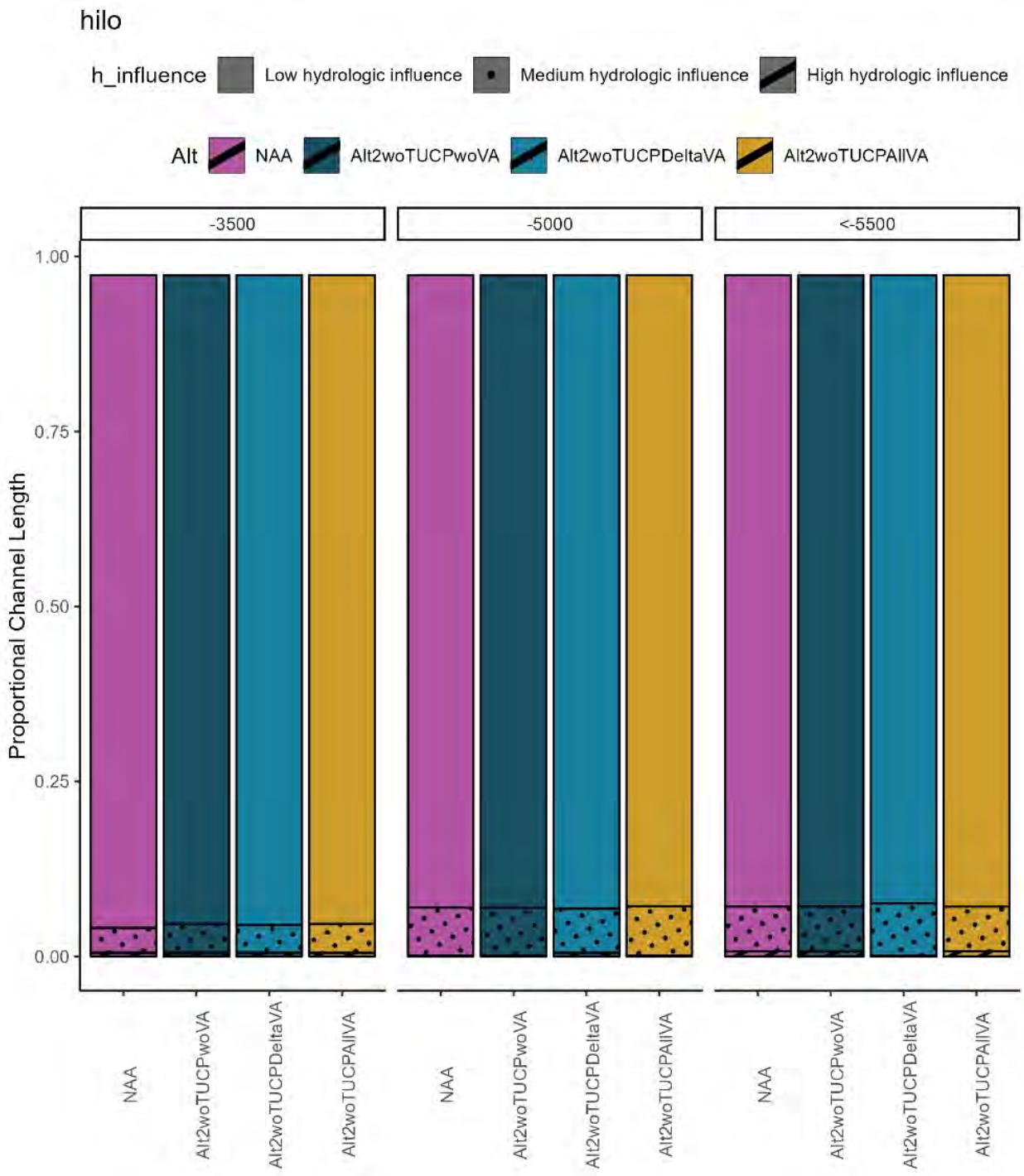



Figure I.3-118. Proportion of total channel length in the Delta (DSM2 grid) that experiences high (<25% proportional overlap), medium (25-75% proportional overlap) and low (>75% proportional overlap) hydrologic influence across Alternative 2 components and across OMR bins of -2000, -3500, -5000, and less than -5500 cfs. Results apply to the hilo inflow group.

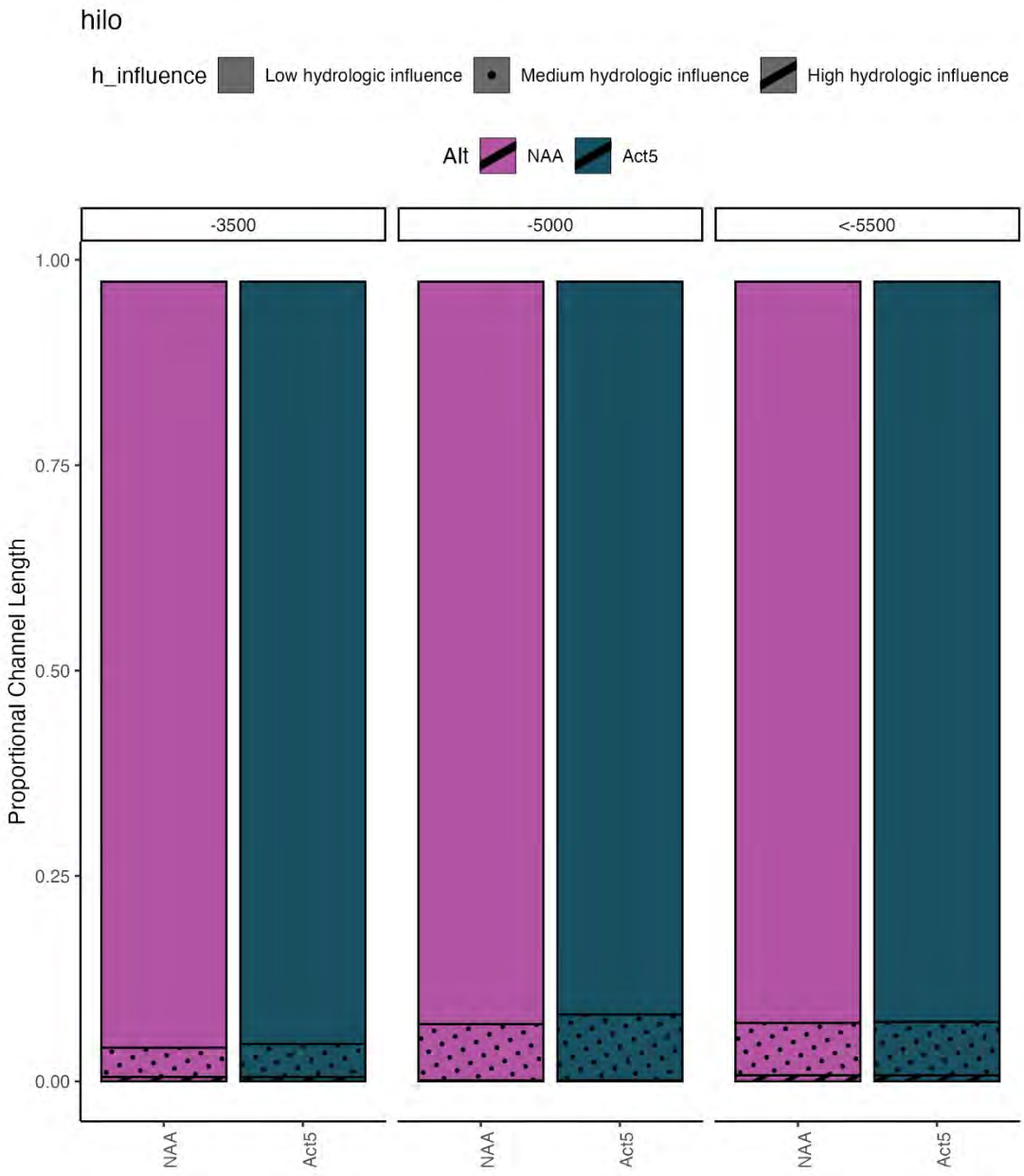



Figure I.3-118a. Proportion of total channel length in the Delta (DSM2 grid) that experiences high (<25% proportional overlap), medium (25-75% proportional overlap) and low (>75% proportional overlap) hydrologic influence across the NAA and Action 5 and across OMR bins of -2000, -3500, -5000, and less than -5500 cfs. Results apply to the hilo inflow group.

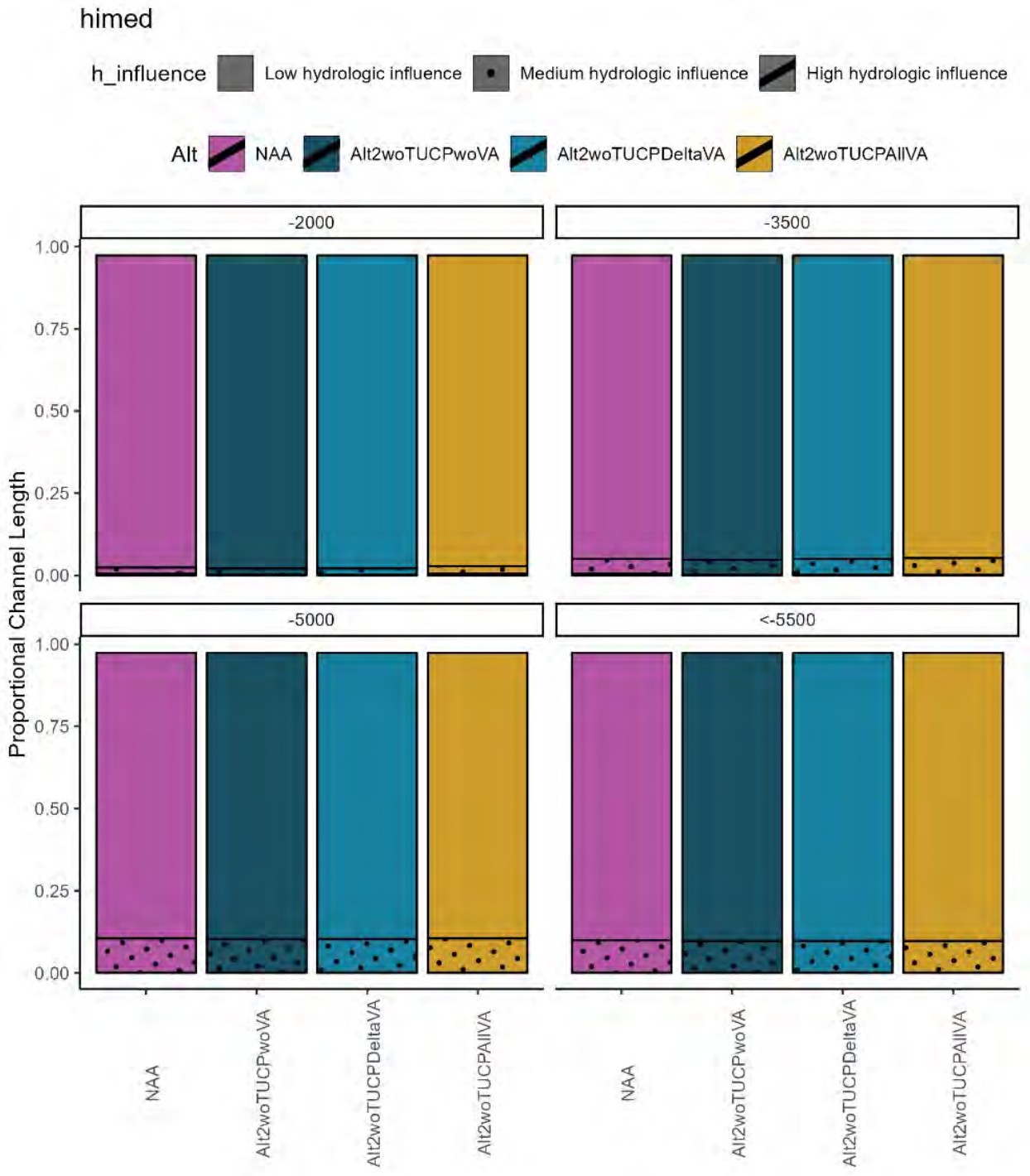



Figure I.3-119. Proportion of total channel length in the Delta (DSM2 grid) that experiences high (<25% proportional overlap), medium (25-75% proportional overlap) and low (>75% proportional overlap) hydrologic influence across Alternative 2 components and across OMR bins of -2000, -3500, -5000, and less than -5500 cfs. Results apply to the himed inflow group.

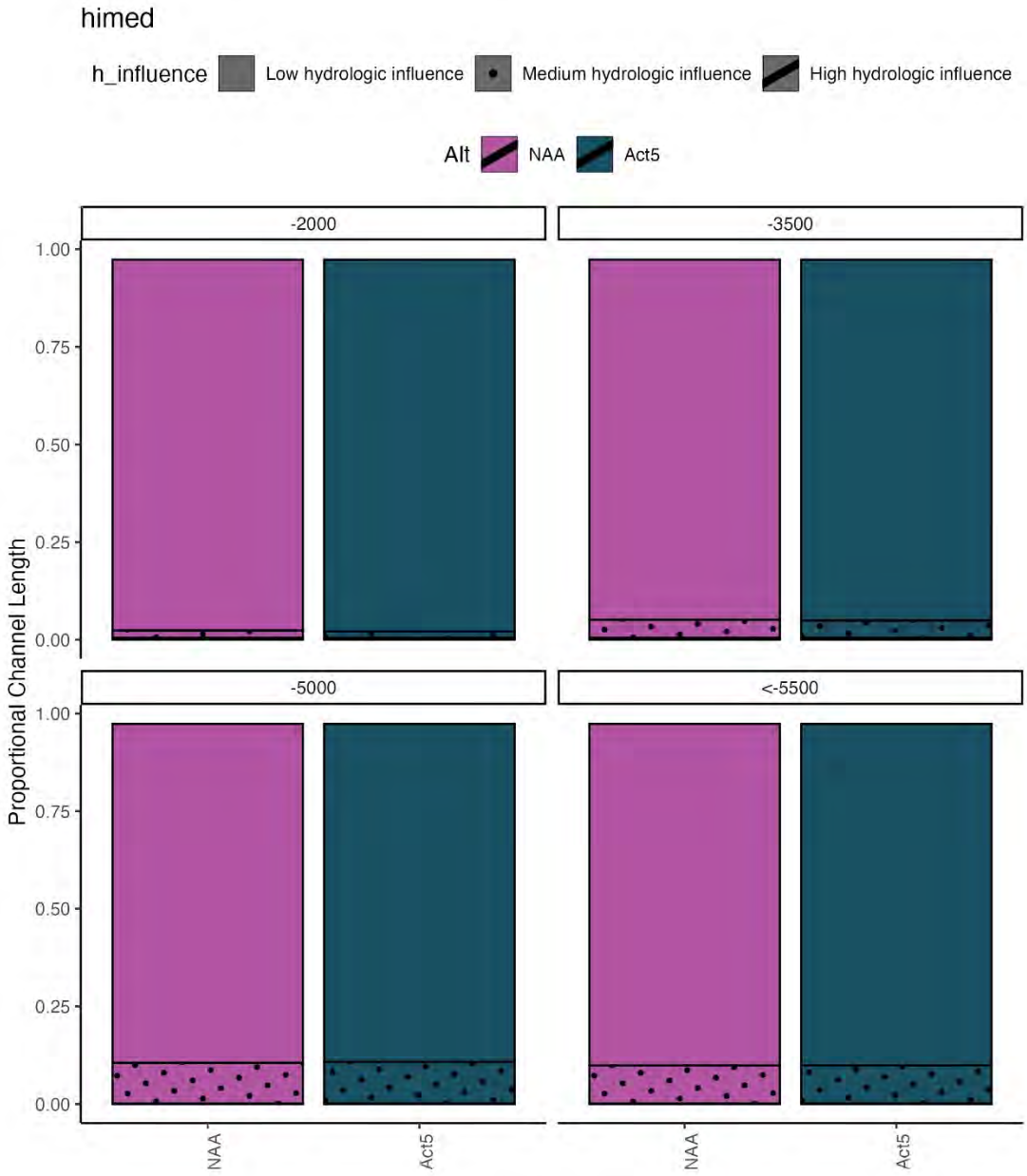



Figure I.3-119a. Proportion of total channel length in the Delta (DSM2 grid) that experiences high (<25% proportional overlap), medium (25-75% proportional overlap) and low (>75% proportional overlap) hydrologic influence across the NAA and Action 5 and across OMR bins of -2000, -3500, -5000, and less than -5500 cfs. Results apply to the himed inflow group.

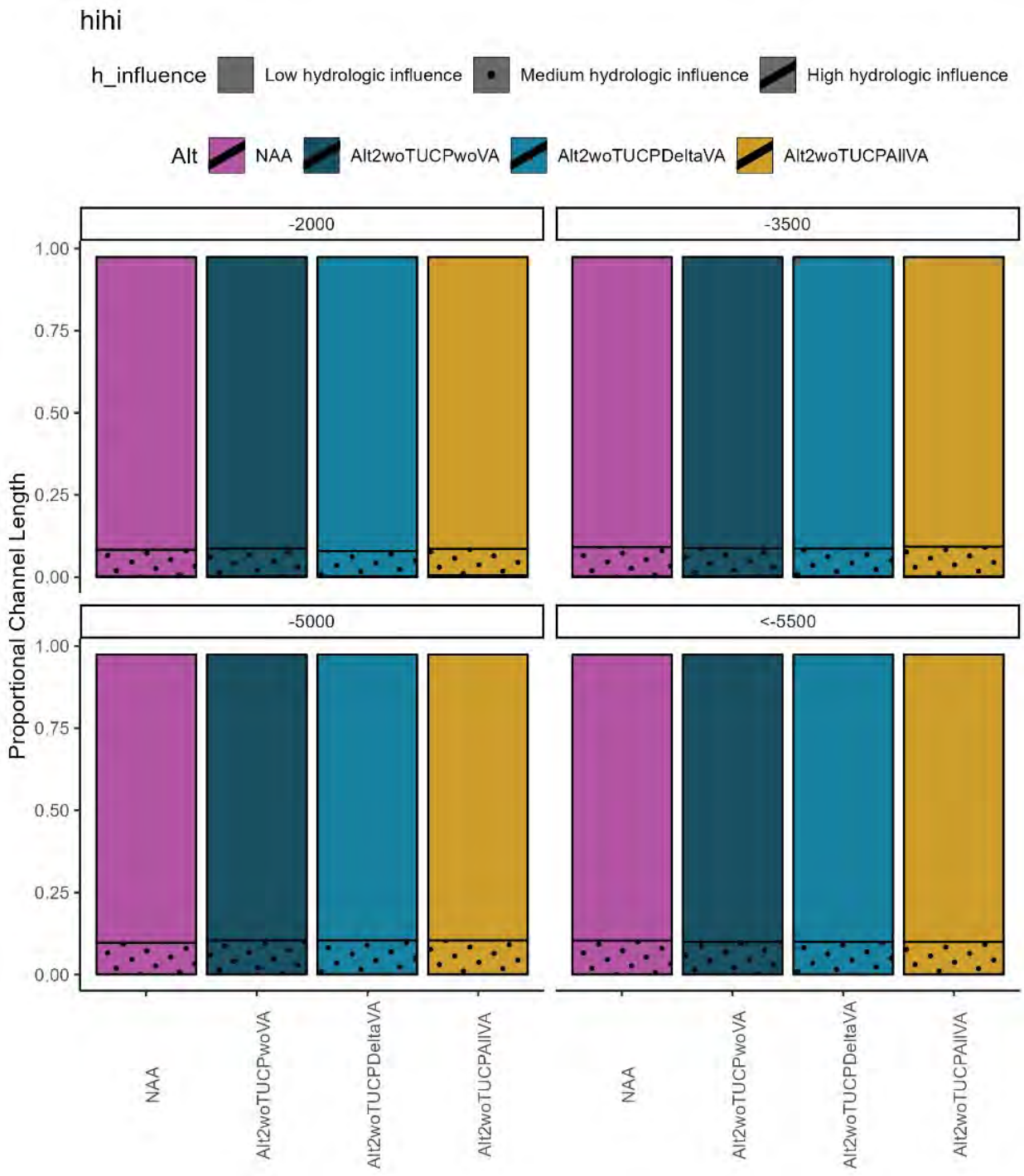



Figure I.3-120. Proportion of total channel length in the Delta (DSM2 grid) that experiences high (<25% proportional overlap), medium (25-75% proportional overlap) and low (>75% proportional overlap) hydrologic influence across Alternative 2 components and across OMR bins of -2000, -3500, -5000, and less than -5500 cfs. Results apply to the hihi inflow group.

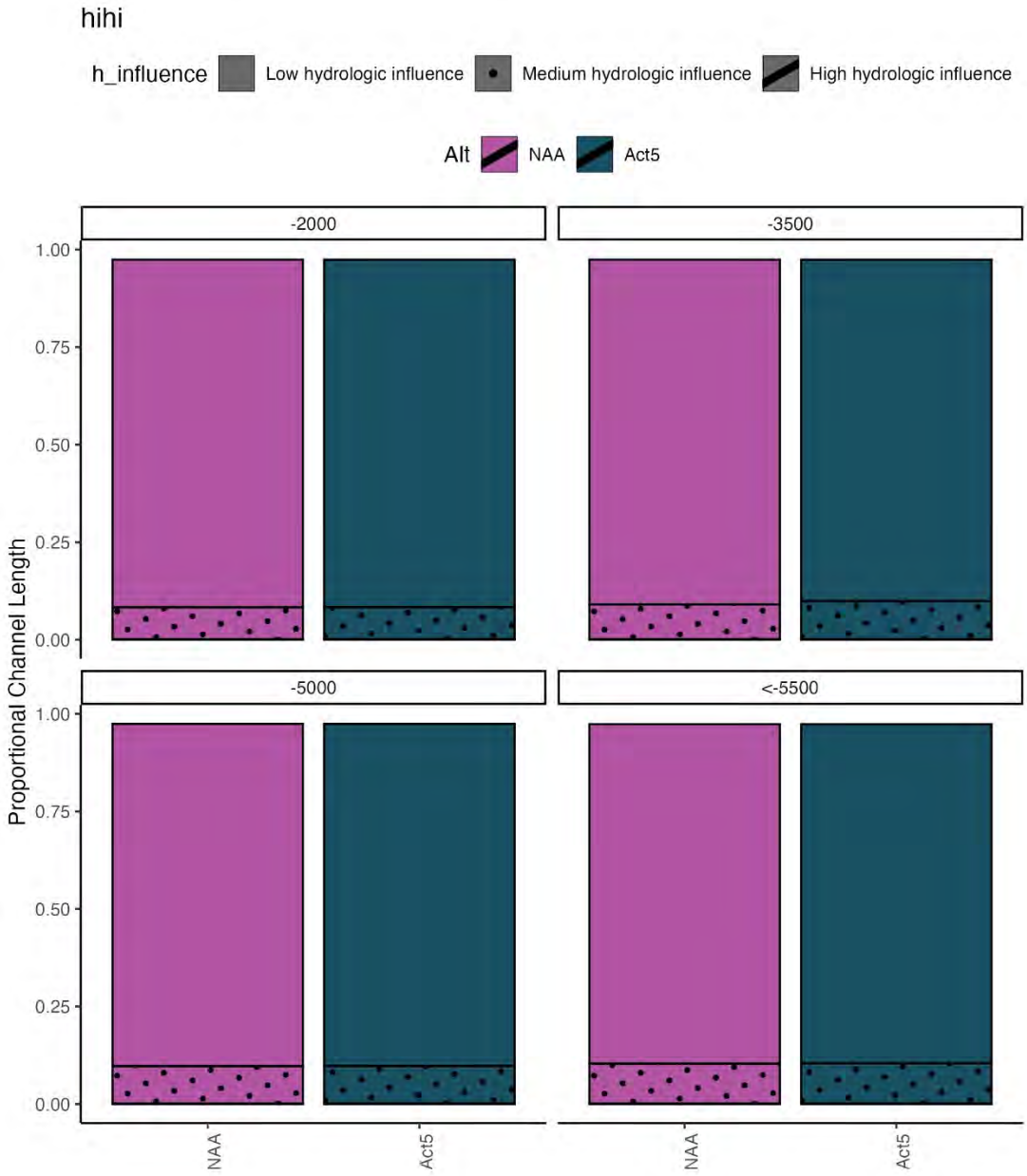



Figure I.3-120a. Proportion of total channel length in the Delta (DSM2 grid) that experiences high (<25% proportional overlap), medium (25-75% proportional overlap) and low (>75% proportional overlap) hydrologic influence across the NAA and Action 5 and across OMR bins of -2000, -3500, -5000, and less than -5500 cfs. Results apply to the hihi inflow group.

Table I.3-8. Channel length (feet) altered by pumping for No Action Alternative (NAA), three components of Alternative 2, and Action 5 across inflow groups and OMR bins. Values represent total summed channel length between nodes experiencing 0.25-0.75 proportional overlap, or medium hydrologic influence. Absolute values are rounded.

| Inflow group | OMR bin | NAA | Alt2woTUCPwoVA | Alt2woTUCPDeltaVA | Alt2woTUCPAllVA | Act5 |
|---|---|---|---|---|---|---|
| Lolo | -2000 | 54189 | 54189 | 45576 | 54189 | 48369 |
| Lolo | -3500 | 117806 | 113044 | 113044 | 124055 | 100482 |
| Lolo | -5000 | 240433 | 345257 | 329891 | 361840 | 211708 |
| Lolo | <-5500 | 546547 | 542342 | 562344 | 527855 | 427151 |
| Lomed | -2000 | 81465 | 81465 | 76711 | 96978 | 76711 |
| Lomed | -3500 | 130344 | 120549 | 120549 | 139432 | 113418 |
| Lomed | -5000 | 208217 | 281435 | 281435 | 289043 | 184167 |
| Lomed | <-5500 | NA | NA | NA | NA | NA |
| Lohi | -2000 | 130552 | 199749 | 344641 | 180584 | 205733 |
| Lohi | -3500 | 208428 | 241111 | 191942 | 238045 | 238008 |
| Lohi | -5000 | 226351 | 175053 | 193470 | 193470 | 205883 |
| Medlo | -2000 | 27647 | 56798 | 59520 | 50971 | 45576 |
| Medlo | -3500 | 172490 | 148289 | 138590 | 134670 | 169404 |
| Medlo | -5000 | 217383 | 374670 | 377919 | 377919 | 204852 |
| Medlo | <-5500 | 606560 | 559302 | 559302 | 583403 | 505209 |
| Medmed | -2000 | 92454 | 86009 | 86009 | 92454 | 81465 |
| Medmed | -3500 | 195201 | 164174 | 164174 | 188699 | 152088 |
| Medmed | -5000 | 251330 | 337165 | 337165 | 345232 | 241065 |
| Medmed | <-5500 | 546334 | 543002 | 546334 | 546334 | 554052 |
| Medhi | -2000 | 143735 | 183314 | 167915 | 262475 | 230079 |
| Medhi | -3500 | 319355 | 307325 | 303468 | 311986 | 319355 |
| Medhi | -5000 | 470418 | 510174 | 514154 | 510385 | 424496 |
| Medhi | <-5500 | 455531 | NA | NA | NA | 506249 |
| Hilo | -3500 | 137049 | 160217 | 153086 | 160217 | 154198 |
| Hilo | -5000 | 264382 | 264382 | 242315 | 271698 | 309037 |
| Hilo | <-5500 | 245068 | 245068 | 287645 | 245068 | 249990 |
| Himed | -2000 | 72558 | 76711 | 76711 | 86402 | 62747 |
| Himed | -3500 | 175651 | 176405 | 188818 | 197951 | 169801 |
| Himed | -5000 | 400448 | 392039 | 392039 | 400448 | 412419 |
| Himed | <-5500 | 375420 | 369417 | 369417 | 369417 | 375420 |
| Hihi | -2000 | 315738 | 331338 | 300952 | 311077 | 319078 |
| Hihi | -3500 | 345153 | 334832 | 330569 | 352728 | 376743 |
| Hihi | -5000 | 368941 | 396491 | 396491 | 396491 | 371534 |
| Hihi | <-5500 | 395764 | 378812 | 378812 | 378812 | 399096 |

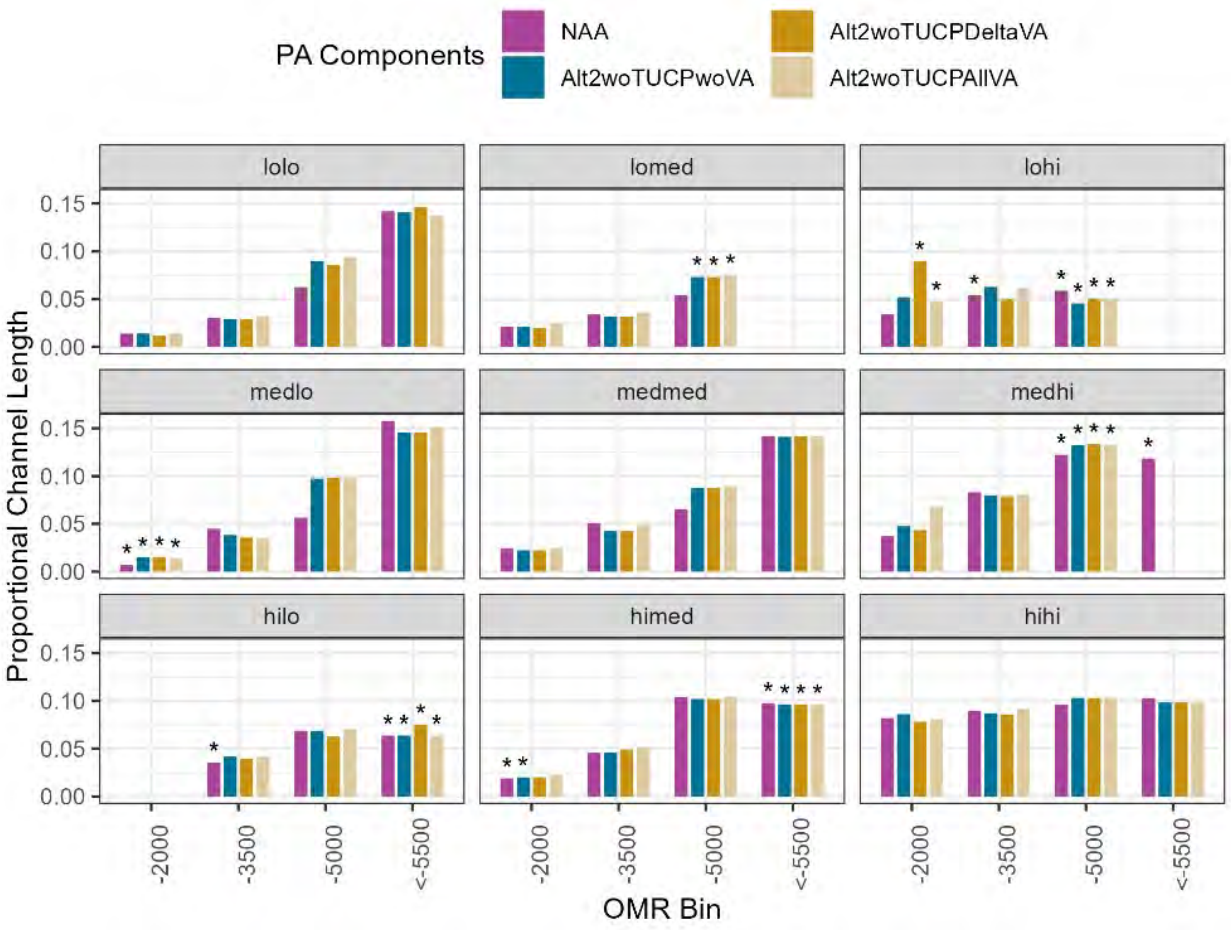



Figure I.3-121. Proportion of total channel length in the Delta (DSM2 grid) that experiences medium (25-75% proportional overlap) hydrologic influence at standardized inflow groups and across OMR bins of -2000, -3500, -5000, and less than -5500 cfs. Results are displayed across alternatives. Stars indicate combinations with five or less samples (months).

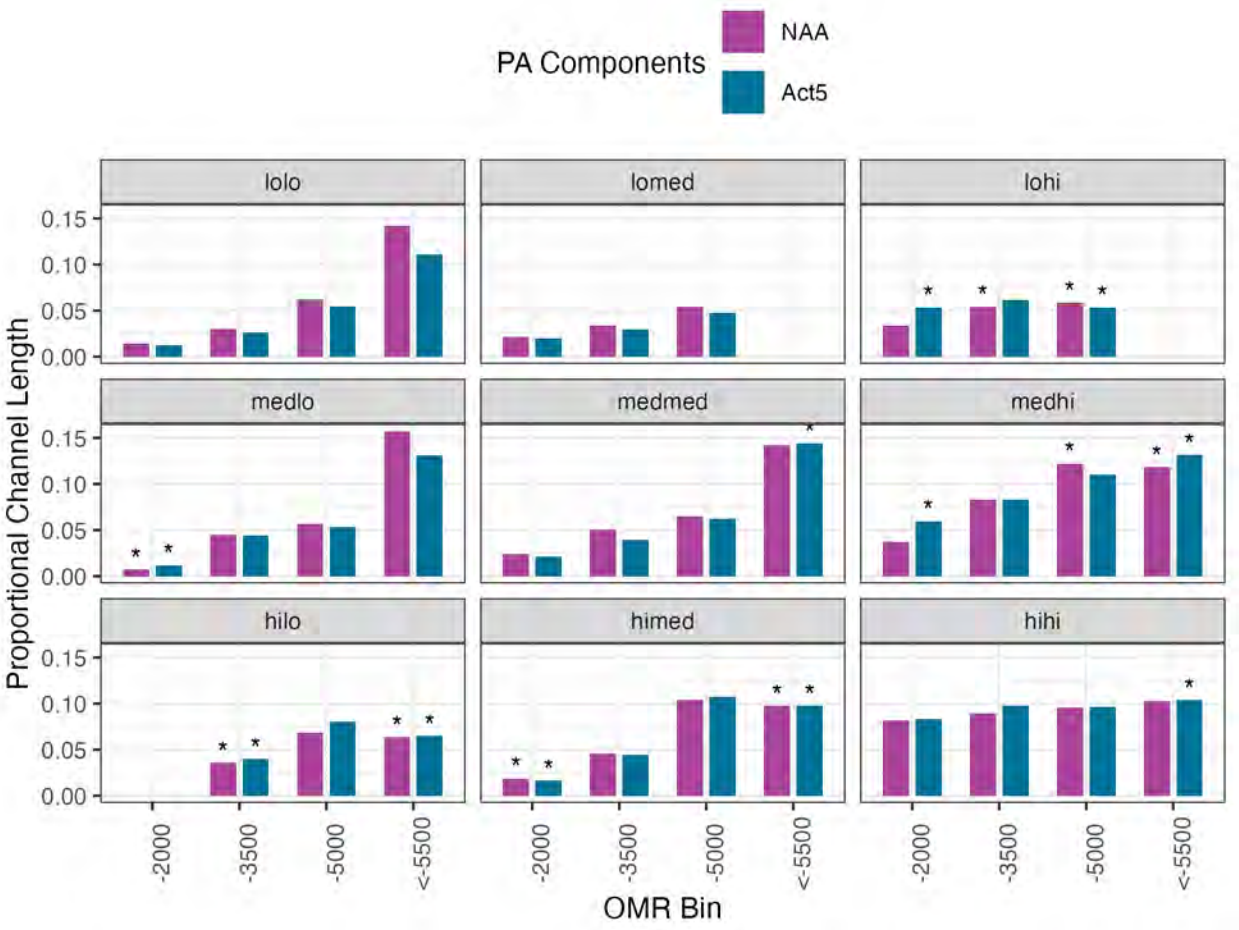



Figure I.3-121a. Proportion of total channel length in the Delta (DSM2 grid) that experiences medium (25-75% proportional overlap) hydrologic influence at standardized inflow groups and across OMR bins of -2000, -3500, -5000, and less than -5500 cfs. Results are displayed for the NAA and Action 5. Stars indicate combinations with five or less samples (months).

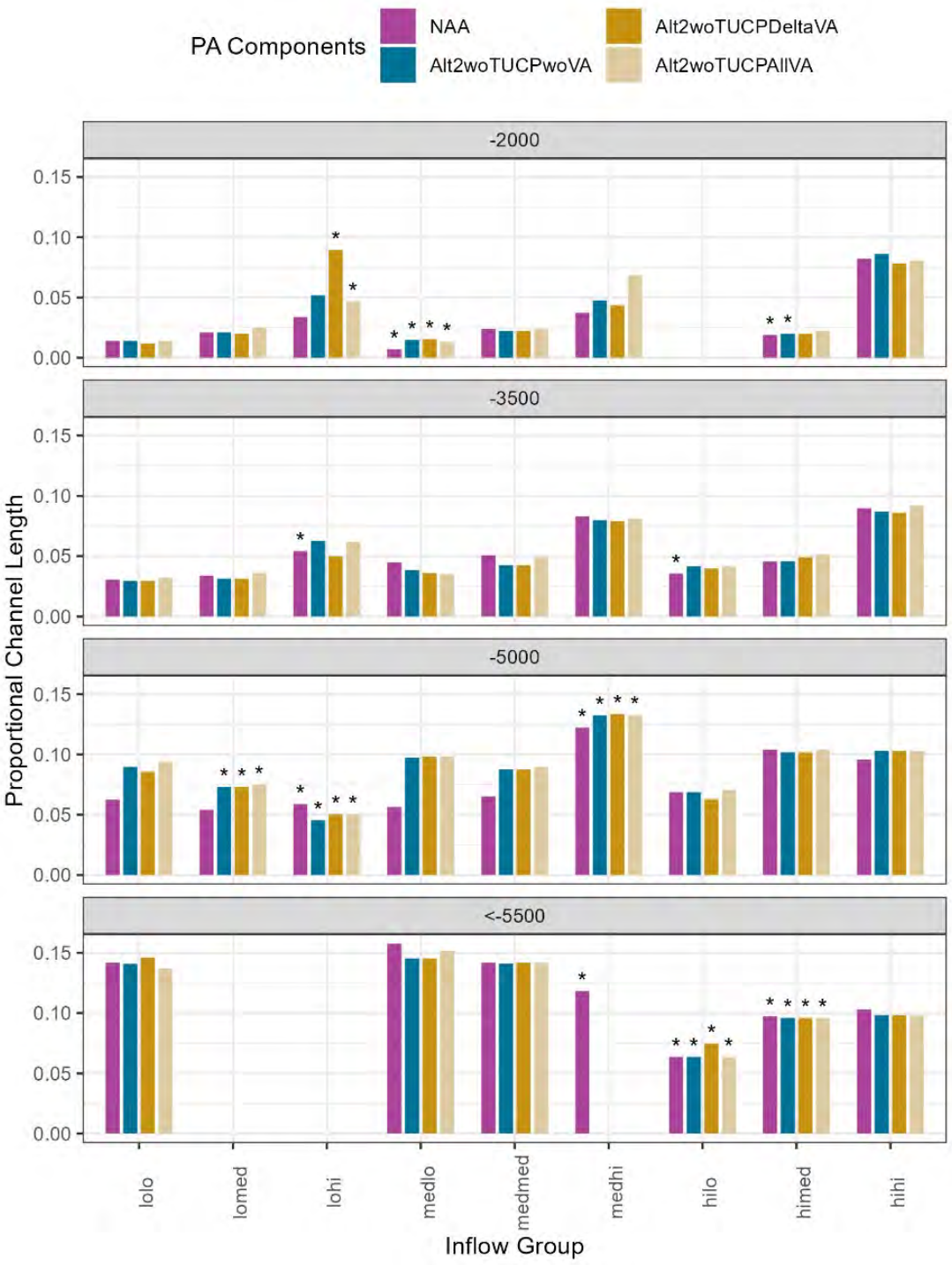



Figure I.3-122. Proportion of total channel length in the Delta (DSM2 grid) that experiences medium (25-75% proportional overlap) hydrologic influence at standardized inflow groups and across OMR bins of -2000, -3500, -5000, and less than -5500 cfs. Results are displayed across alternatives. Stars indicate combinations with five or less samples (months).

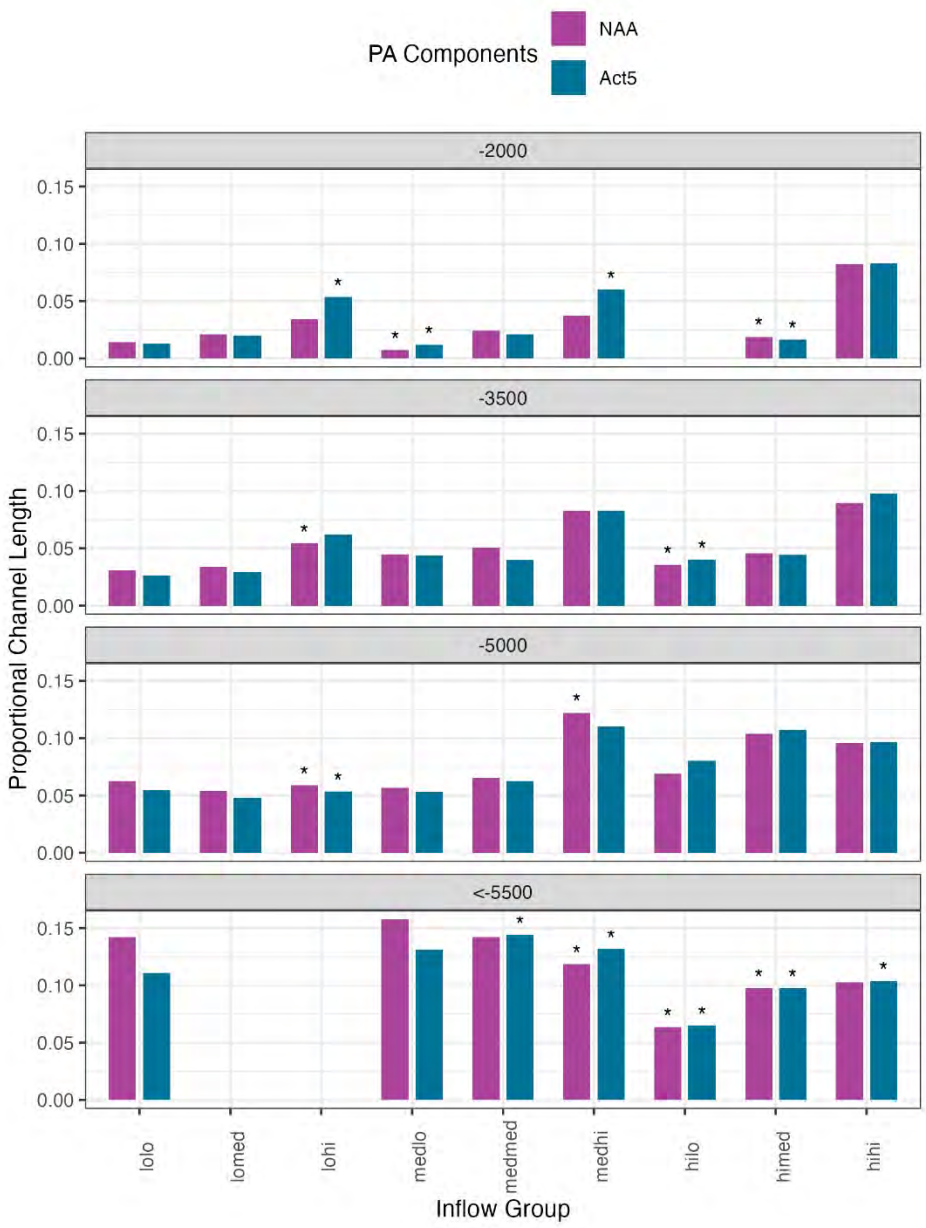



Figure I.3-122a. Proportion of total channel length in the Delta (DSM2 grid) that experiences medium (25-75% proportional overlap) hydrologic influence at standardized inflow groups and across OMR bins of -2000, -3500, -5000, and less than -5500 cfs. Results are displayed for the NAA and Action 5. Stars indicate combinations with five or less samples (months).

## I.3.4 EIS Key Takeaways

While the sample sizes within each inflow group are relatively similar across alternatives, differences between alternatives are more apparent when including OMR bin. Alt1 has a greater

number of samples falling into the <-5500 OMR bin compared with other alternatives, especially in the medlo, medmed, himed, and hihi inflow groups (Table I.3-4, Figure I.3-2). The sample sizes of Alt2woTUCPDeltaVA and Alt2woTUCPAllVA are more similarly distributed across OMR bins and inflow groups, with more months classified in the "NA" OMR bin and less classified in the -2000 or -3500 OMR bins compared with Alt2woTUCPwoVA and Alt2wTUCPwoVA in the lomed, medmed, hihi, and himed inflow groups (Table I.3-4, Figure I.3-2).

Across all alternatives, most of the nodes experience low hydrologic influence (greater than 0.75 overlap) and very few experience high hydrologic influence (less than 0.25 overlap; Figure I.3-123-Figure I.3-131a).

With incrementally negative OMR, proportional overlap at selected locations generally decreases. Changes to proportional overlap are more subtle at distances further from pumping facilities (e.g. San Joaquin River at Jersey Point as compared to Turner Cut and Old River at Middle River; Table I.3-7).

The spatial extent (sum and proportion of channel length) of medium hydrologic alteration across all inflow groups and OMR bins ranges from 27,647 feet (5.2 miles and 0.7% of the DSM2 grid in NAA) to 710,057 feet (134 miles and 18.5% of the DSM2 grid in Alt1) (Table I.3-9). Across different phases of Alternative 2, summed channel length across all inflow groups and OMR bins ranges from 45,576 feet (8.6 miles and 1.18% of the DSM2 grid in Alt2woTUCPDeltaVA) to 583,403 feet (110 miles and 15.2% of the DSM2 grid in Alt2woTUCPAllVA) (Table I.3-9). For Action 5, summed channel length ranges from 45,576 feet (8.6 miles and 1.18% of the DSM2 grid) to 554,052 (104.9 miles and 14.4% of the DSM2 grid). For NAA, summed channel length ranges from 27,647 feet (5.2 miles and 0.7% of the DSM2 grid) to 606,560 feet (115 miles and 15.8% of the DSM2 grid) (Table I.3-9). The greatest extent of hydrologic alteration occurs in the <-5500 OMR bin, which is likely associated with greater exports.

The greatest difference in summed channel length, when compared with NAA, was observed in Alt1, which experienced 182% greater channel length altered at <-5500 OMR in the hilo inflow group (Table I.3-9). A large difference (89%) was also seen for Alt1 at the <-5500 OMR in the himed inflow group. Alt1 is the only alternative with DCC operations meeting D-1641 requirements only; all other alternatives share a different set of DCC Operations based on the 2019 BiOp. Across different phases of Alternative 2, the greatest difference in summed channel length when compared with NAA was for Alt2 woTUCPDeltaVA at -2000 OMR for the lohi (164% greater channel length altered) and medlo (115% greater channel length altered) inflow groups. These results should be viewed with caution because there were very few samples simulated for these conditions. Aside from a few examples of Alt1 at high Sacramento inflow, summed channel length results vary only minorly between alternatives.

Channel length altered and delta export zone of influence generally increase with more negative OMR (Figure I.3-104-Figure I.3-111a, Figure I.3-132, Figure I.3-132a). Trends appear consistent across inflow groups containing combinations of low and medium Sacramento and San Joaquin inflow (lolo, lomed, medlo, medmed inflow groups). At high Sacramento inflow (hilo, himed, hihi inflow groups), there appears to be little difference in proportional channel length altered

between -5000 and <-5500 OMR bins. In the lohi and hihi inflow groups, there also appears to be less difference in proportional channel length altered across all OMR bins.

For the -2000 and -3500 OMR bins, channel length altered generally increases with higher San Joaquin inflow (Figure I.3-104-Figure I.3-111a, Figure I.3-133, Figure I.3-133a). These trends are not apparent for the -5000 and <-5500 OMR bins.

Because high San Joaquin inflows are associated with more positive OMR values, at higher San Joaquin inflow, greater exports (pumping) are likely required to achieve the same OMR as at low San Joaquin inflow. As an example, in NAA at -2000 OMR, mean exports are 2,281 cfs for lolo inflow and 7,624 cfs for hihi inflow (Table I.3-3). When standardizing for Sacramento inflow, this is also apparent at -2000 OMR, with mean exports of 2,963 cfs at medlo inflow and 4,385 cfs at medhi inflow (Table I.3-3). Future work may visualize results by exports instead of OMR to better understand if exports are a more direct driver of the spatial extent of the zone of influence. It is also important to note that results do not account for the magnitude of effect and have not been examined in the context of seasonal tidal fluctuations or pumping hours (see Section I.3.1.2, *Assumptions / Uncertainty/ Caveats*). Future work may take these factors into account.

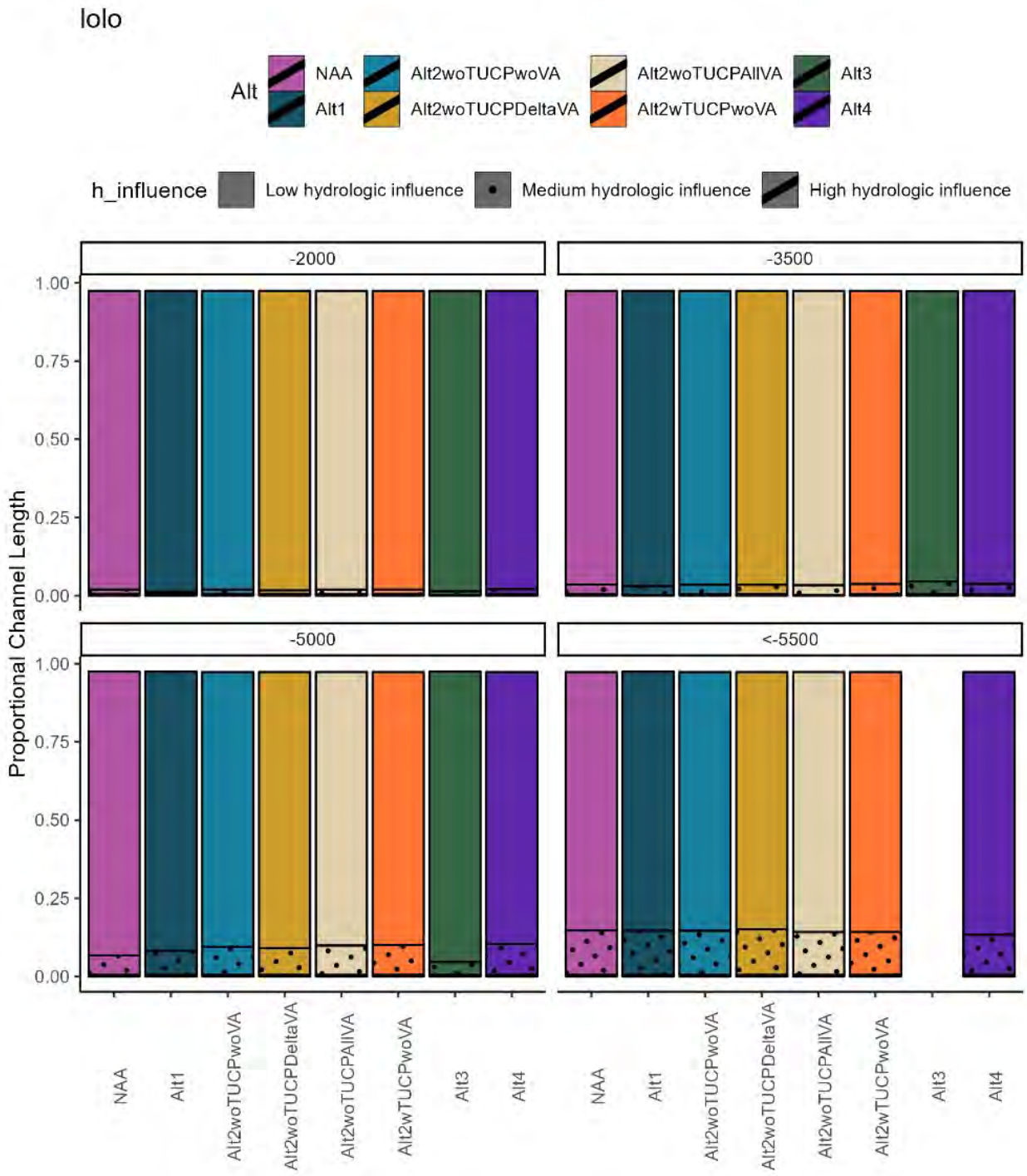



Figure I.3-123. Proportion of total channel length in the Delta (DSM2 grid) that experiences high (<25% proportional overlap), medium (25-75% proportional overlap) and low (>75% proportional overlap) hydrologic influence at standardized inflow groups and across OMR bins of -2000, -3500, -5000, and less than -5500 cfs. Results apply to the lolo inflow group.

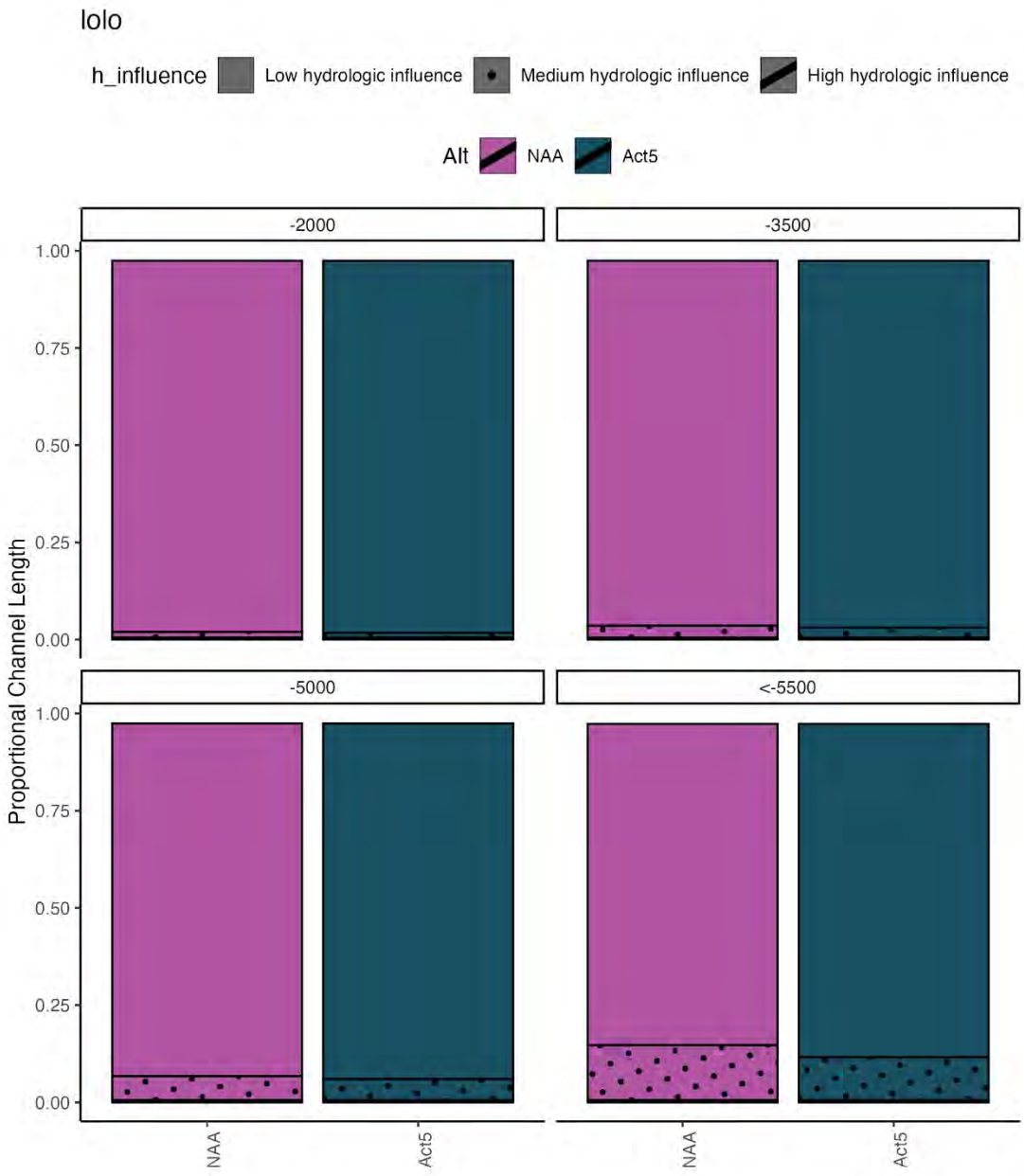



Figure I.3-123a. Proportion of total channel length in the Delta (DSM2 grid) that experiences high (<25% proportional overlap), medium (25-75% proportional overlap) and low (>75% proportional overlap) hydrologic influence at standardized inflow groups and across OMR bins of -2000, -3500, -5000, and less than -5500 cfs. Results apply to the lolo inflow group for the NAA and Action 5.

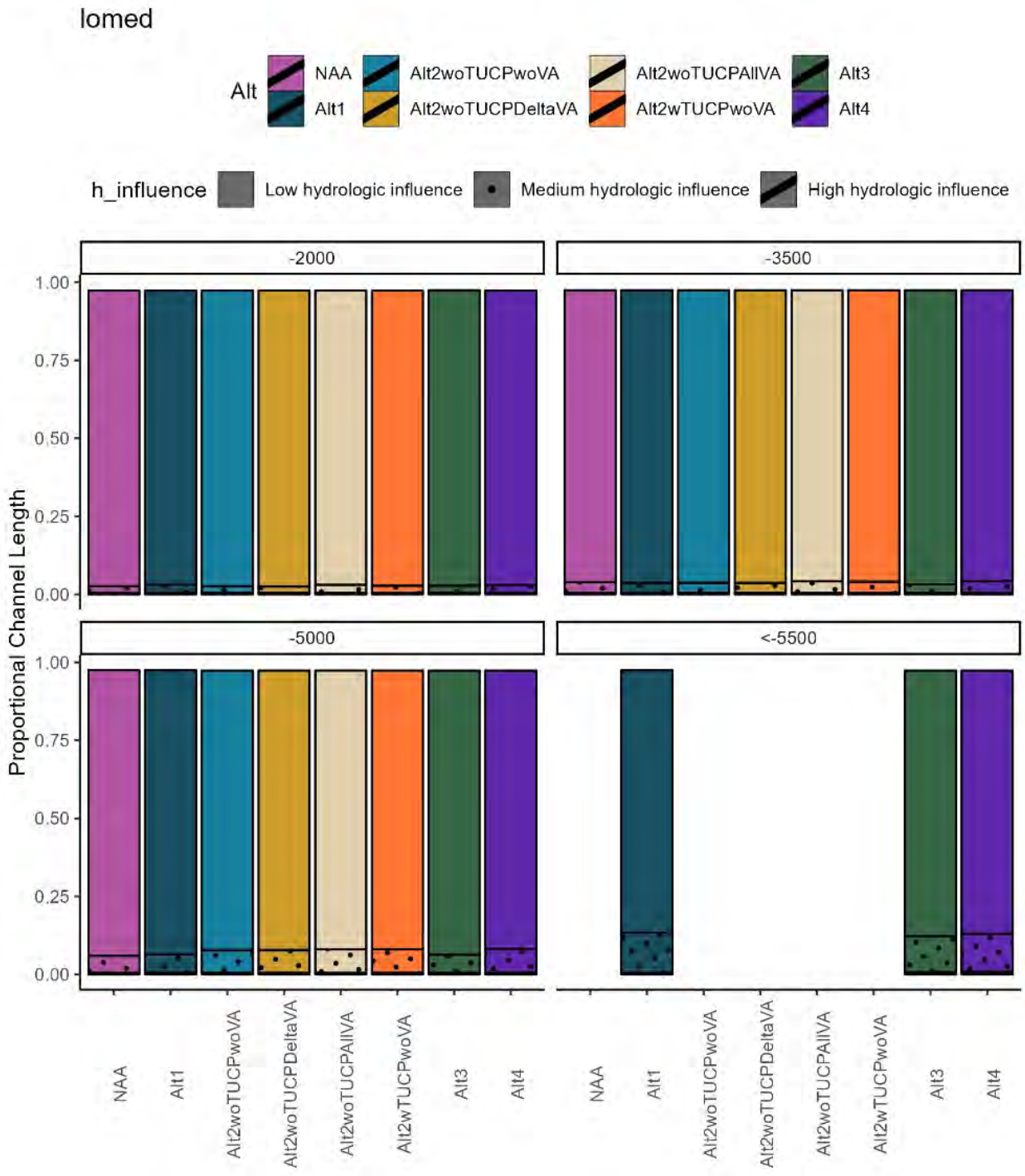



Figure I.3-124. Proportion of total channel length in the Delta (DSM2 grid) that experiences high (<25% proportional overlap), medium (25-75% proportional overlap) and low (>75% proportional overlap) hydrologic influence at standardized inflow groups and across OMR bins of -2000, -3500, -5000, and less than -5500 cfs. Results apply to lomed inflow group.

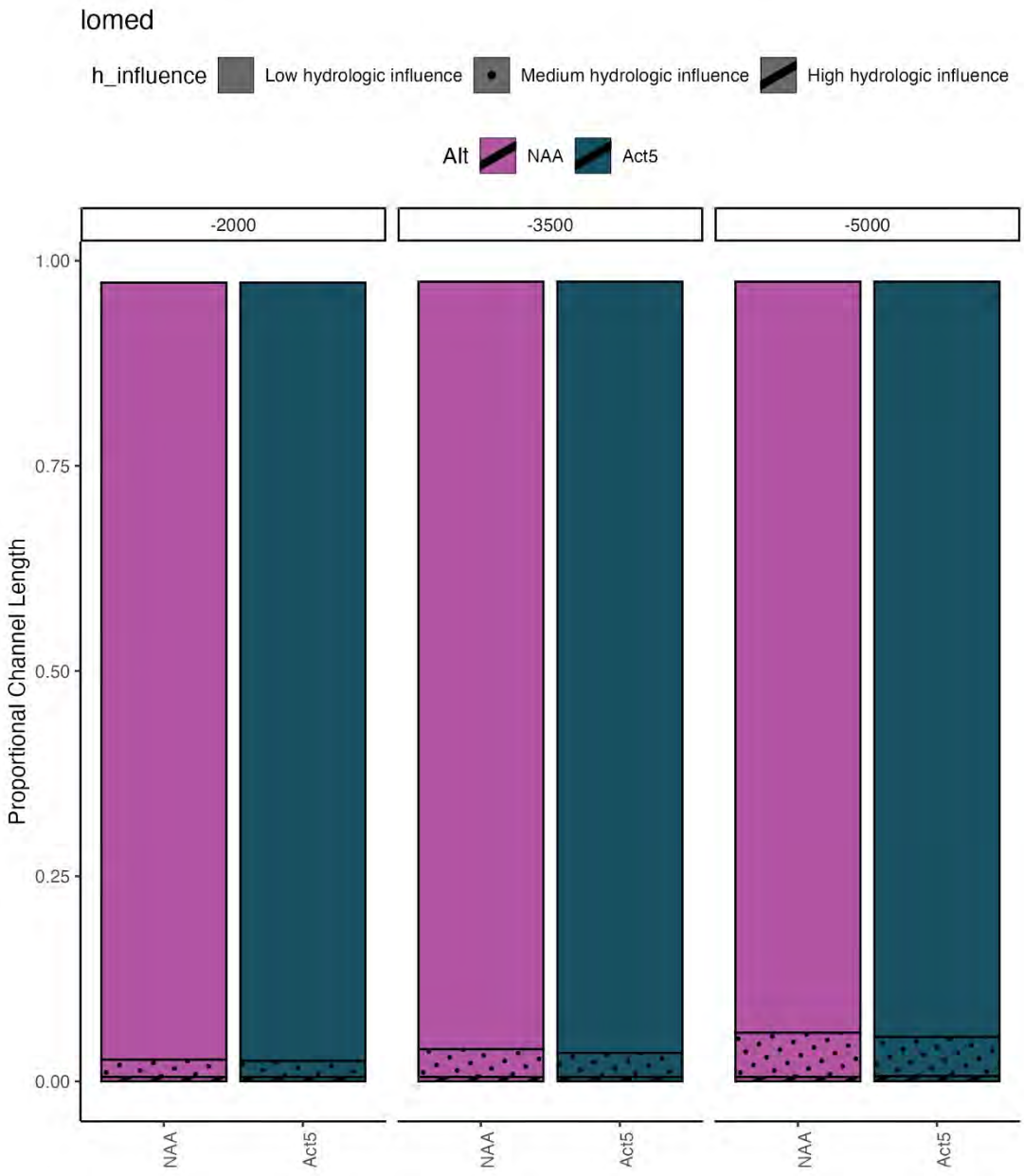



Figure I.3-124a. Proportion of total channel length in the Delta (DSM2 grid) that experiences high (<25% proportional overlap), medium (25-75% proportional overlap) and low (>75% proportional overlap) hydrologic influence at standardized inflow groups and across OMR bins of -2000, -3500, -5000, and less than -5500 cfs. Results apply to lomed inflow group for the NAA and Action 5.

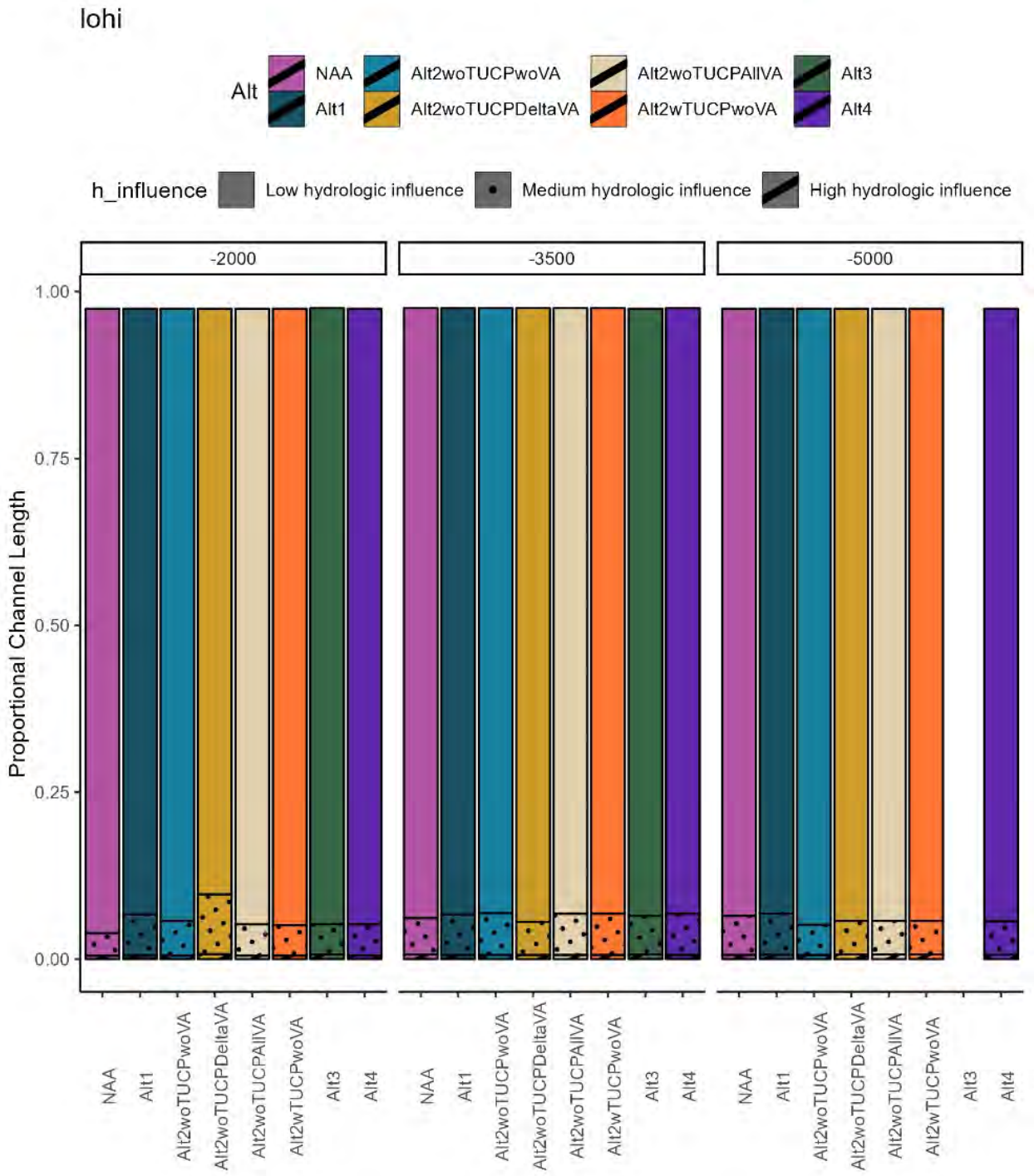



Figure I.3-125. Proportion of total channel length in the Delta (DSM2 grid) that experiences high (<25% proportional overlap), medium (25-75% proportional overlap) and low (>75% proportional overlap) hydrologic influence at standardized inflow groups and across OMR bins of -2000, -3500, -5000, and less than -5500 cfs. Results apply to lohi inflow group.

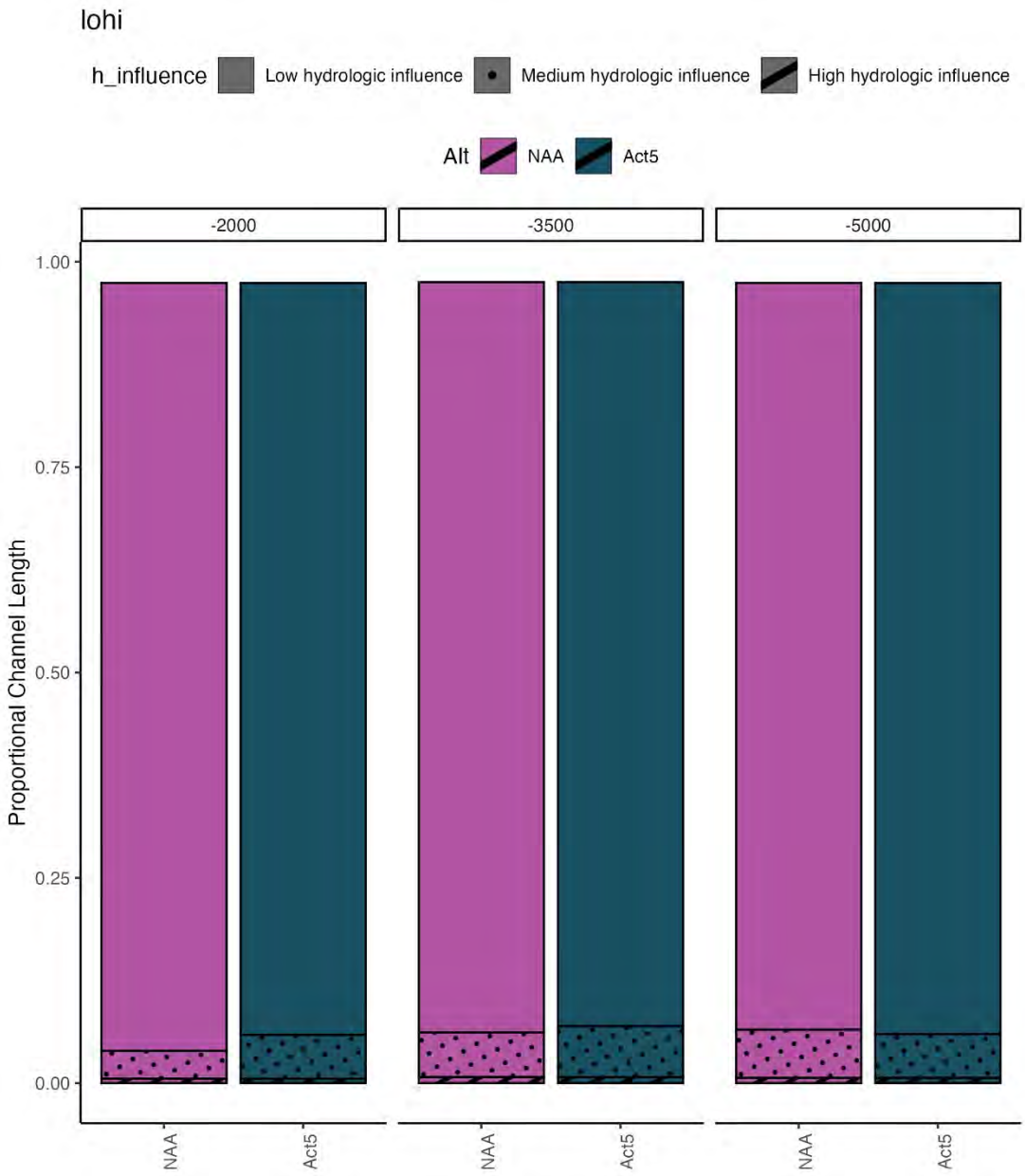



Figure I.3-125a. Proportion of total channel length in the Delta (DSM2 grid) that experiences high (<25% proportional overlap), medium (25-75% proportional overlap) and low (>75% proportional overlap) hydrologic influence at standardized inflow groups and across OMR bins of -2000, -3500, -5000, and less than -5500 cfs. Results apply to lohi inflow group for the NAA and Action 5.

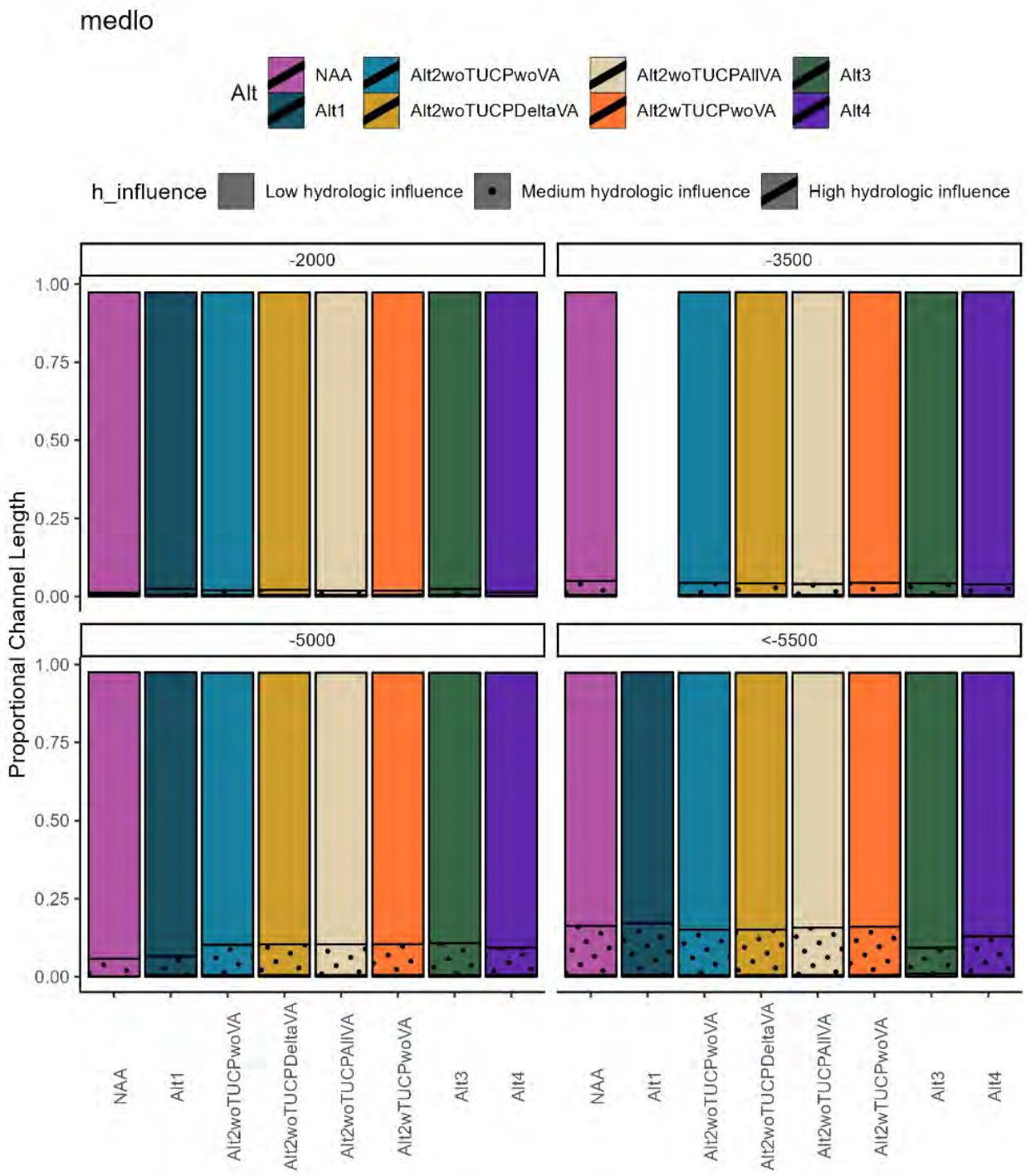



Figure I.3-126. Proportion of total channel length in the Delta (DSM2 grid) that experiences high (<25% proportional overlap), medium (25-75% proportional overlap) and low (>75% proportional overlap) hydrologic influence at standardized inflow groups and across OMR bins of -2000, -3500, -5000, and less than -5500 cfs. Results apply to medlo inflow group.

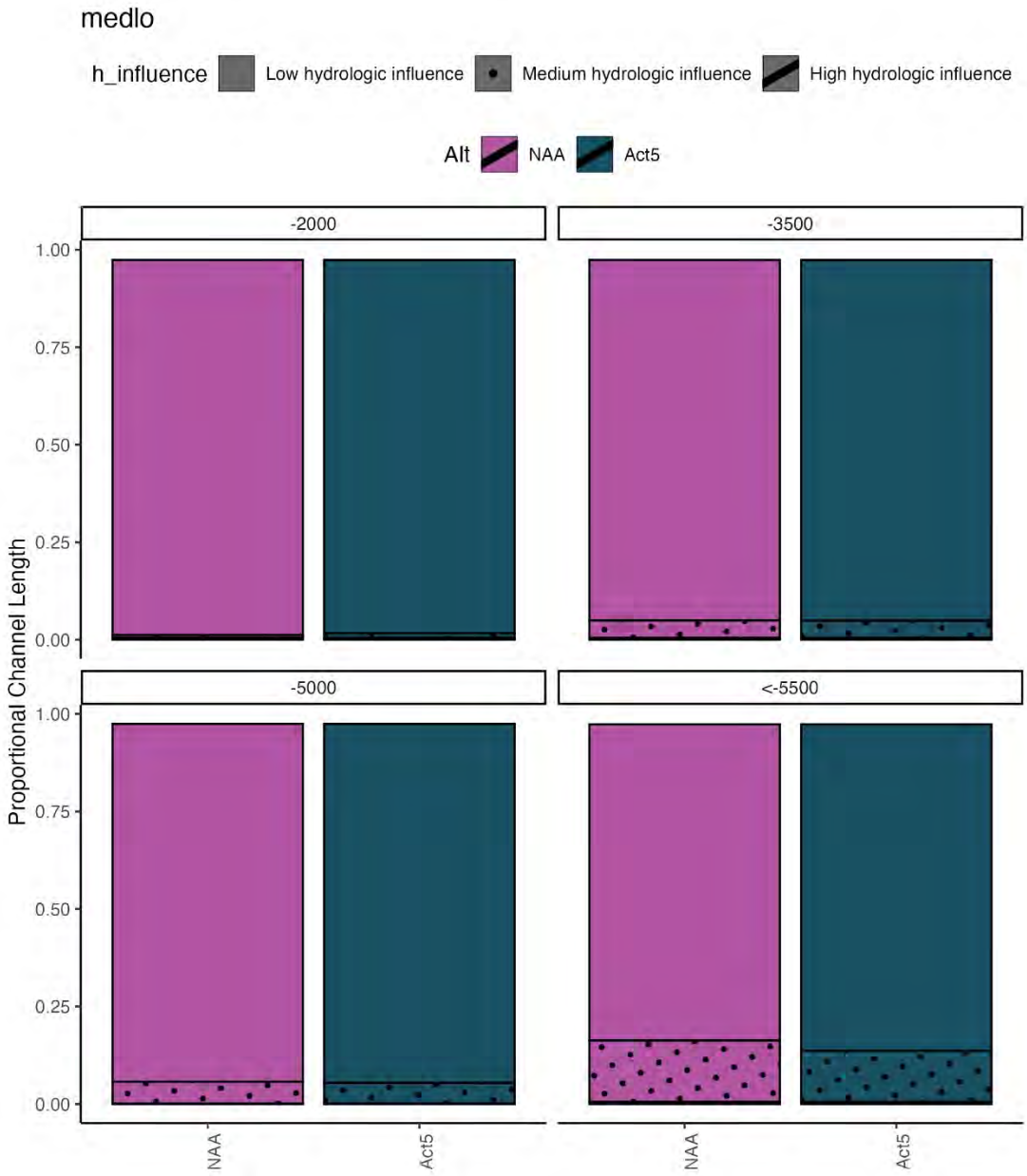



Figure I.3-126a. Proportion of total channel length in the Delta (DSM2 grid) that experiences high (<25% proportional overlap), medium (25-75% proportional overlap) and low (>75% proportional overlap) hydrologic influence at standardized inflow groups and across OMR bins of -2000, -3500, -5000, and less than -5500 cfs. Results apply to medlo inflow group for the NAA and Action 5.

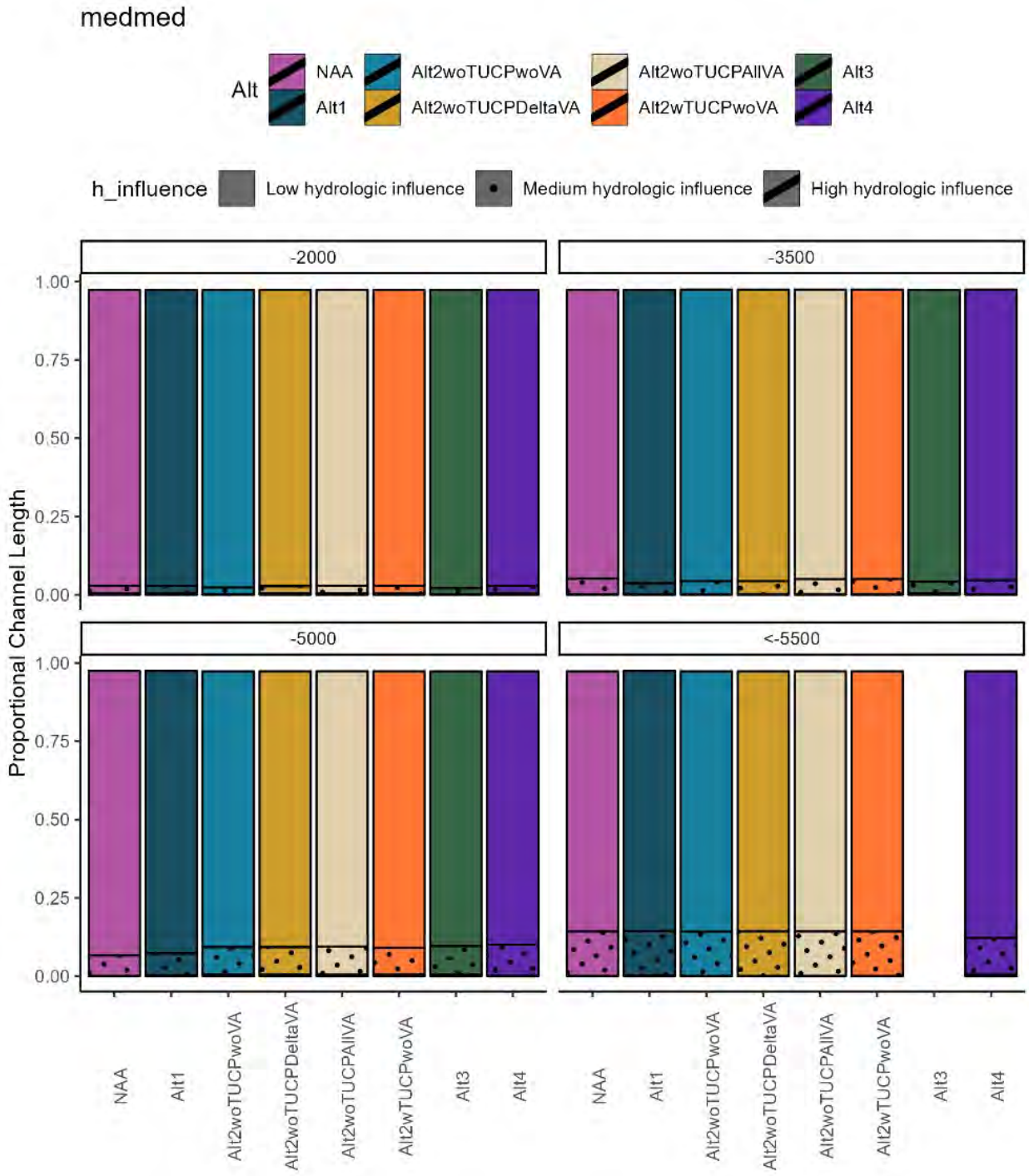



Figure I.3-127. Proportion of total channel length in the Delta (DSM2 grid) that experiences high (<25% proportional overlap), medium (25-75% proportional overlap) and low (>75% proportional overlap) hydrologic influence at standardized inflow groups and across OMR bins of -2000, -3500, -5000, and less than -5500 cfs. Results apply to medmed inflow group.

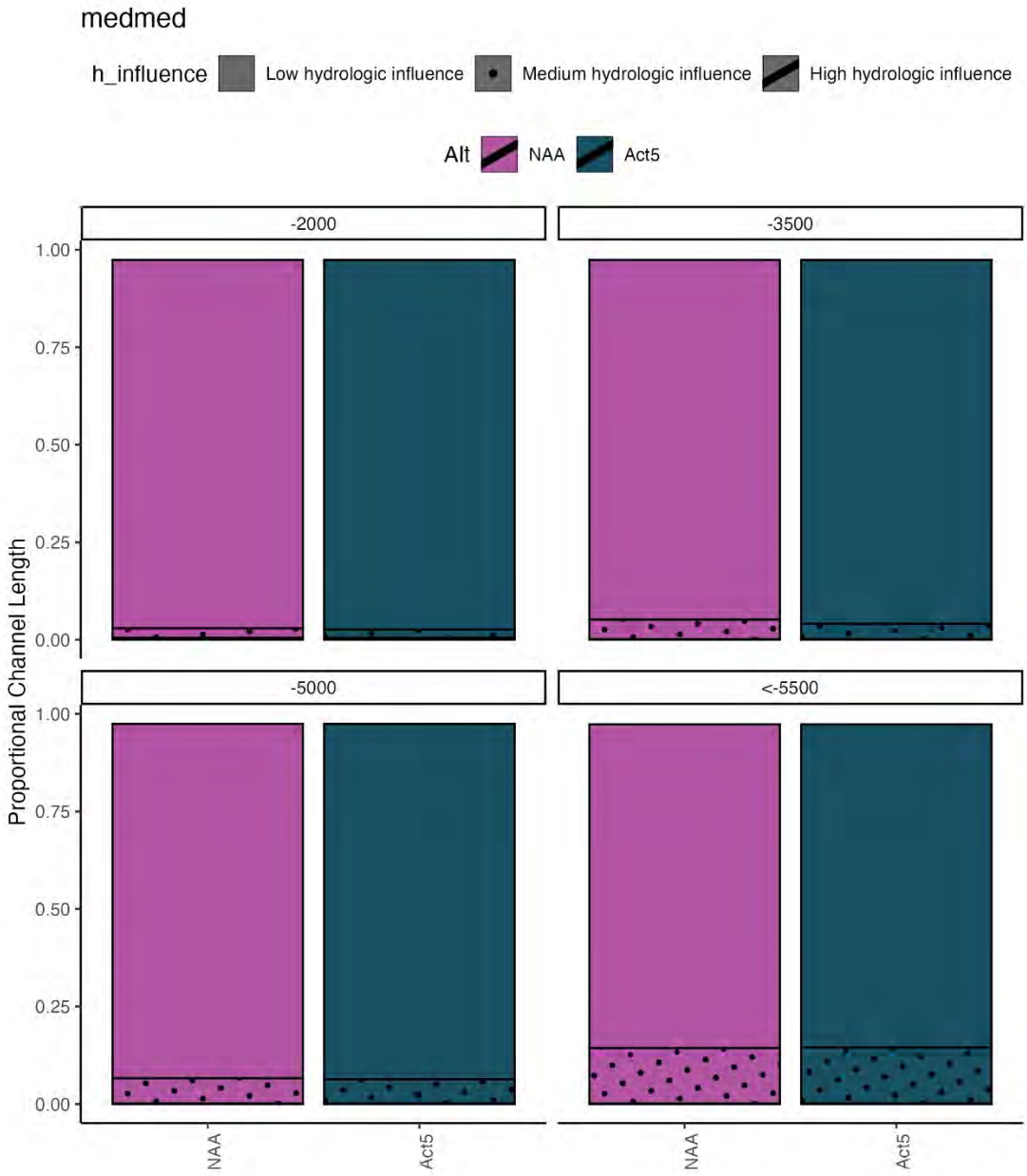



Figure I.3-127a. Proportion of total channel length in the Delta (DSM2 grid) that experiences high (<25% proportional overlap), medium (25-75% proportional overlap) and low (>75% proportional overlap) hydrologic influence at standardized inflow groups and across OMR bins of -2000, -3500, -5000, and less than -5500 cfs. Results apply to medmed inflow group for the NAA and Action 5.

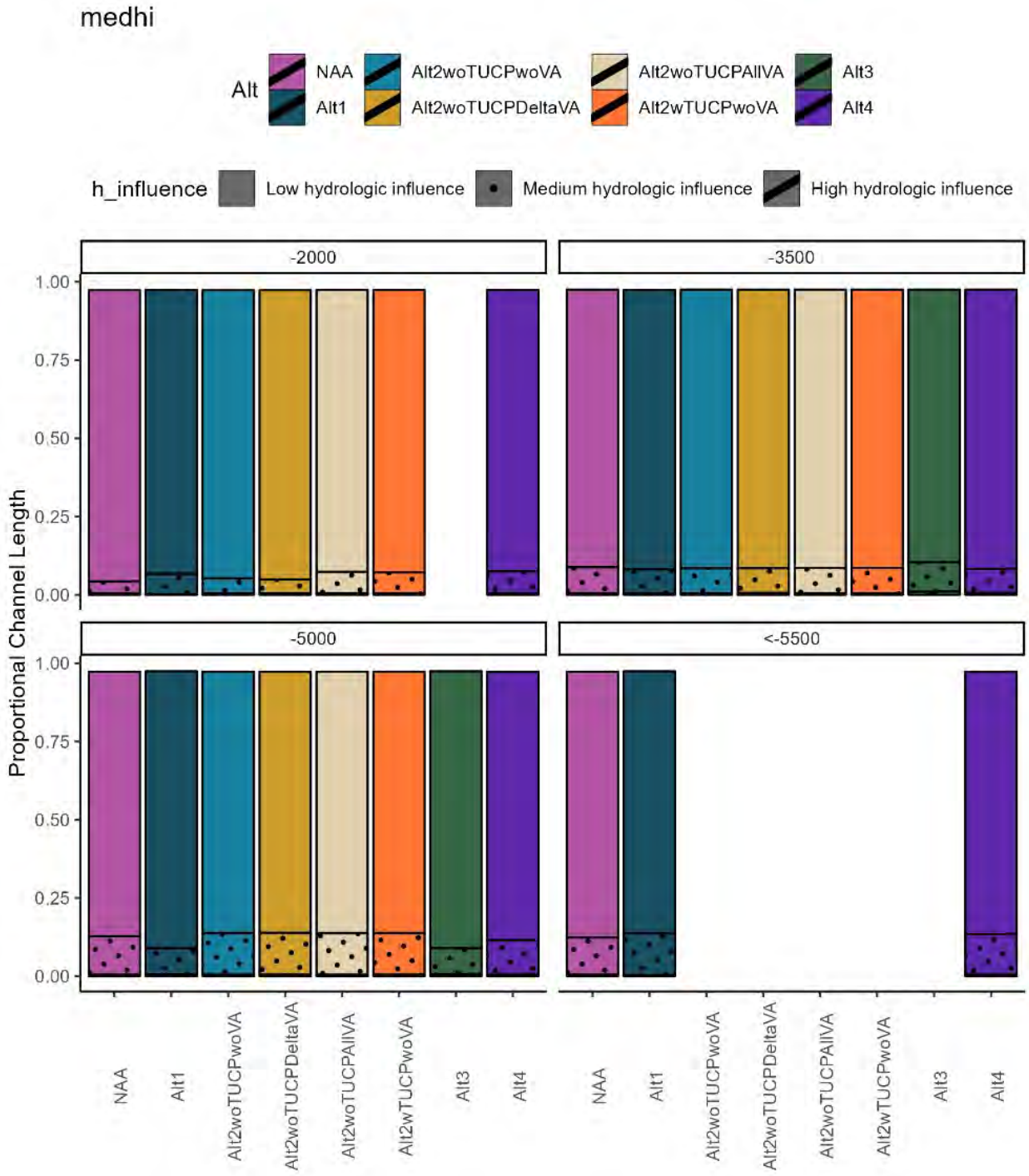



Figure I.3-128. Proportion of total channel length in the Delta (DSM2 grid) that experiences high (<25% proportional overlap), medium (25-75% proportional overlap) and low (>75% proportional overlap) hydrologic influence at standardized inflow groups and across OMR bins of -2000, -3500, -5000, and less than -5500 cfs. Results apply to medhi inflow group.

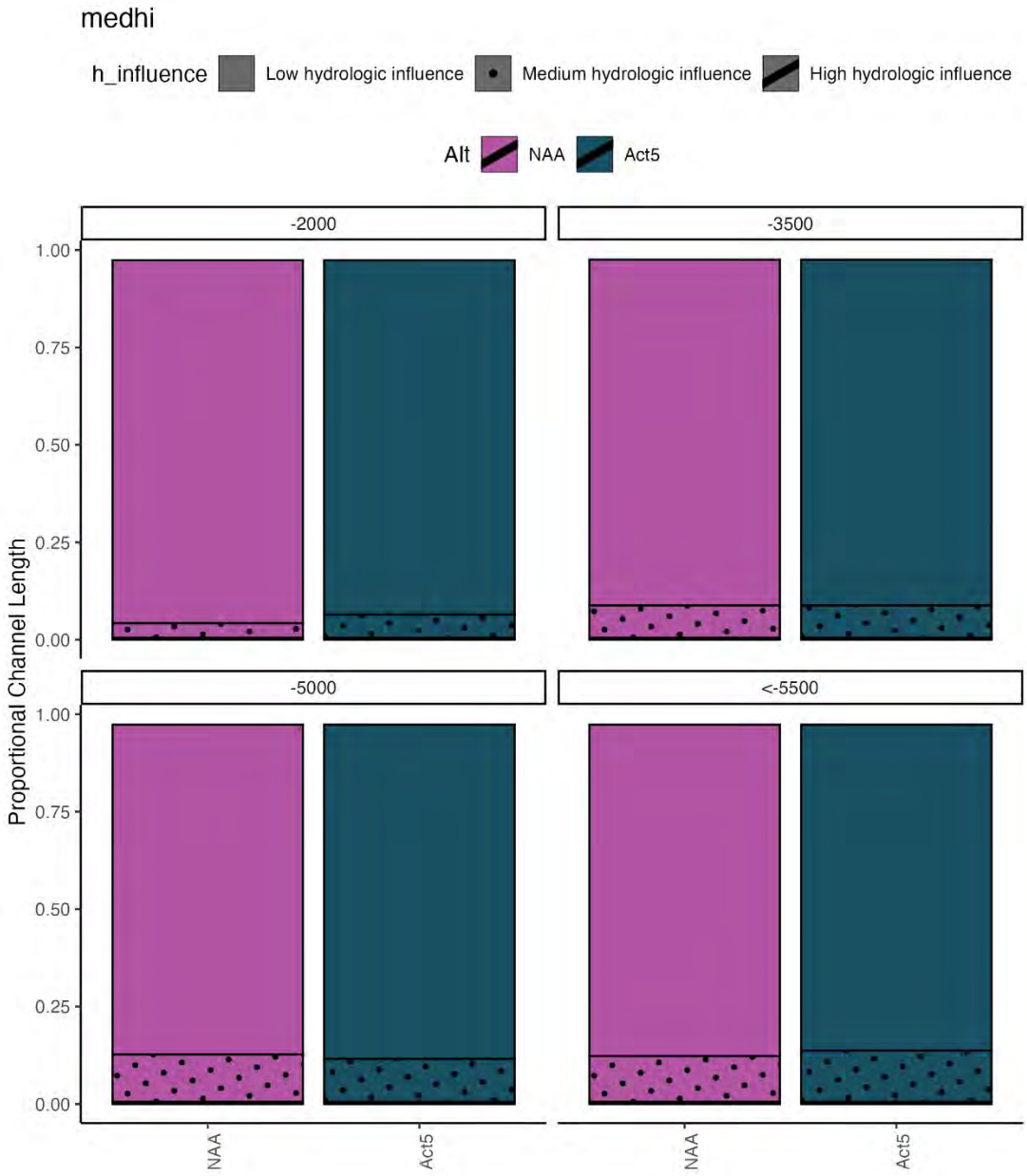



Figure I.3-128a. Proportion of total channel length in the Delta (DSM2 grid) that experiences high (<25% proportional overlap), medium (25-75% proportional overlap) and low (>75% proportional overlap) hydrologic influence at standardized inflow groups and across OMR bins of -2000, -3500, -5000, and less than -5500 cfs. Results apply to medhi inflow group for the NAA and Action 5.

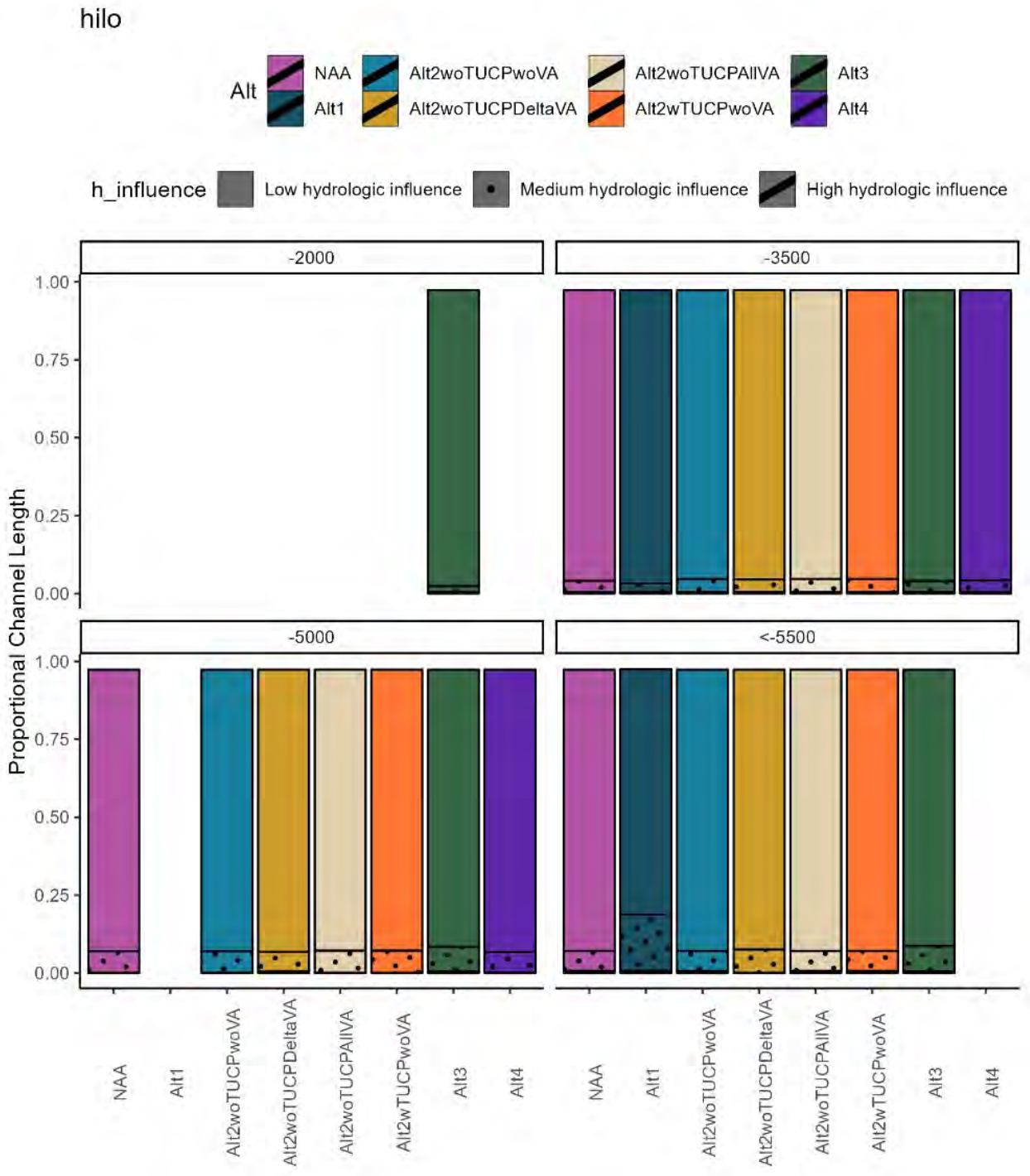



Figure I.3-129. Proportion of total channel length in the Delta (DSM2 grid) that experiences high (<25% proportional overlap), medium (25-75% proportional overlap) and low (>75% proportional overlap) hydrologic influence at standardized inflow groups and across OMR bins of -2000, -3500, -5000, and less than -5500 cfs. Results apply to hilo inflow group.

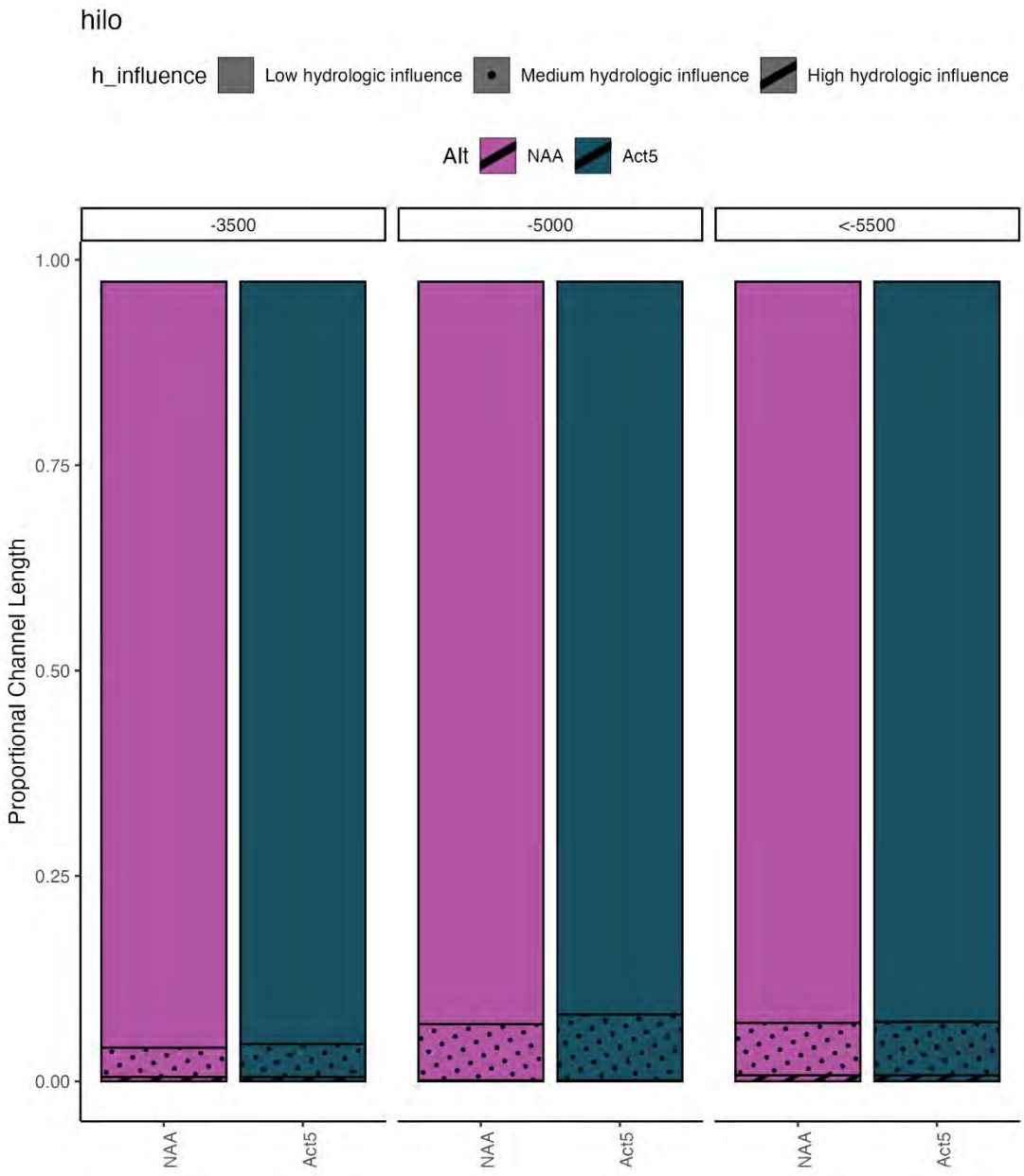



Figure I.3-129a. Proportion of total channel length in the Delta (DSM2 grid) that experiences high (<25% proportional overlap), medium (25-75% proportional overlap) and low (>75% proportional overlap) hydrologic influence at standardized inflow groups and across OMR bins of -2000, -3500, -5000, and less than -5500 cfs. Results apply to hilo inflow group for the NAA and Action 5.

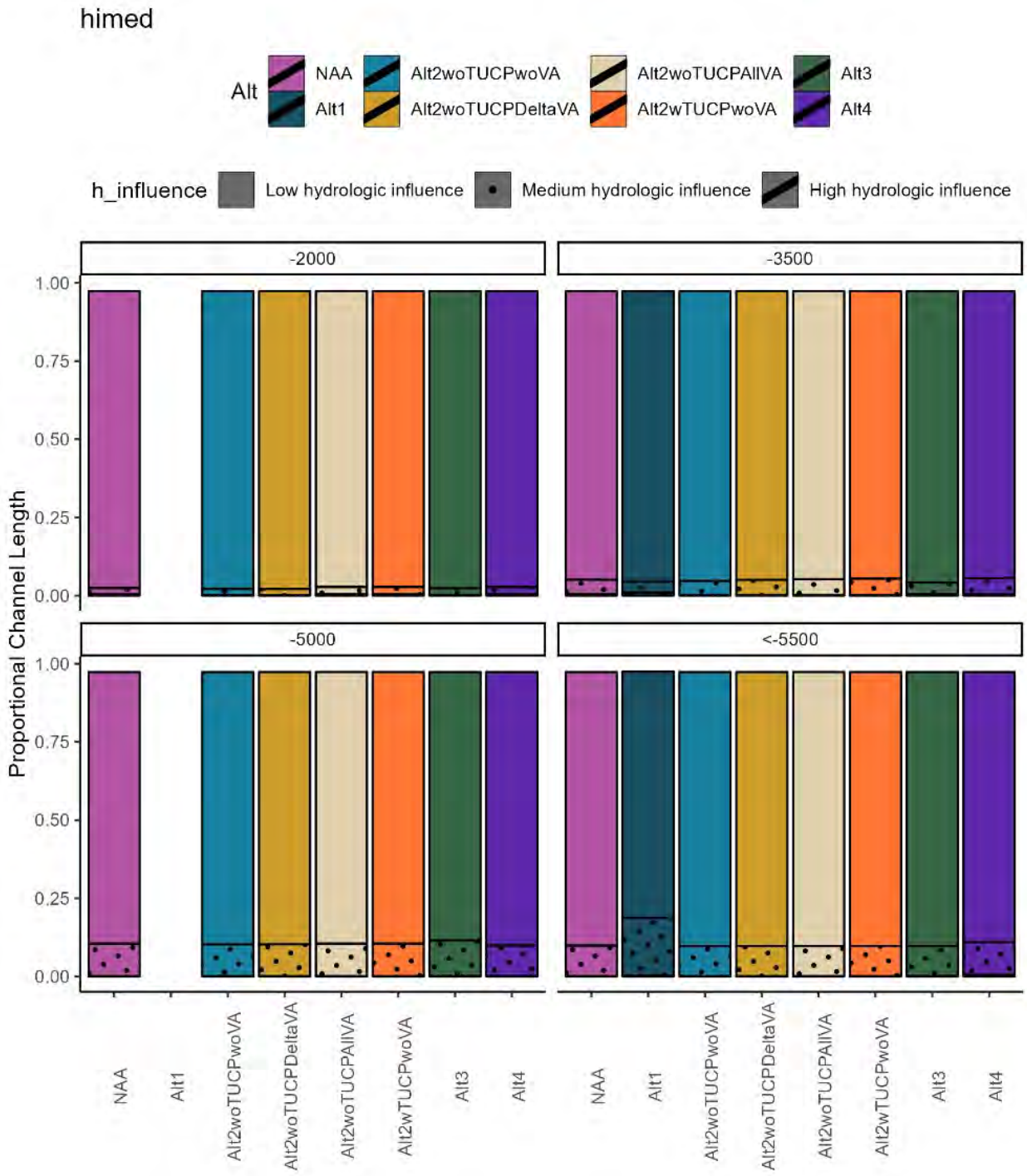



Figure I.3-130. Proportion of total channel length in the Delta (DSM2 grid) that experiences high (<25% proportional overlap), medium (25-75% proportional overlap) and low (>75% proportional overlap) hydrologic influence at standardized inflow groups and across OMR bins of -2000, -3500, -5000, and less than -5500 cfs. Results apply to himed inflow group.

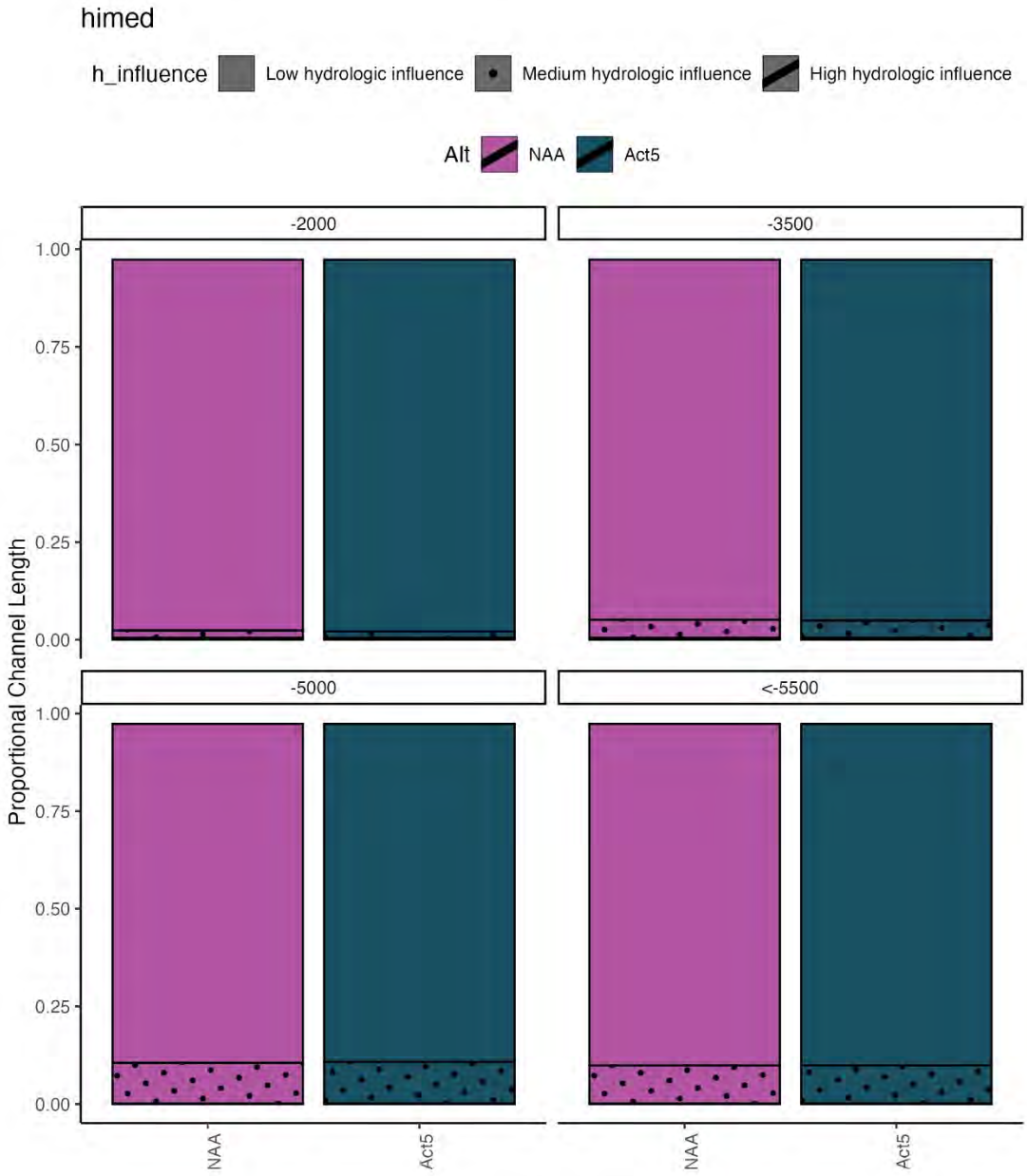



Figure I.3-130a. Proportion of total channel length in the Delta (DSM2 grid) that experiences high (<25% proportional overlap), medium (25-75% proportional overlap) and low (>75% proportional overlap) hydrologic influence at standardized inflow groups and across OMR bins of -2000, -3500, -5000, and less than -5500 cfs. Results apply to himed inflow group for the NAA and Action 5.

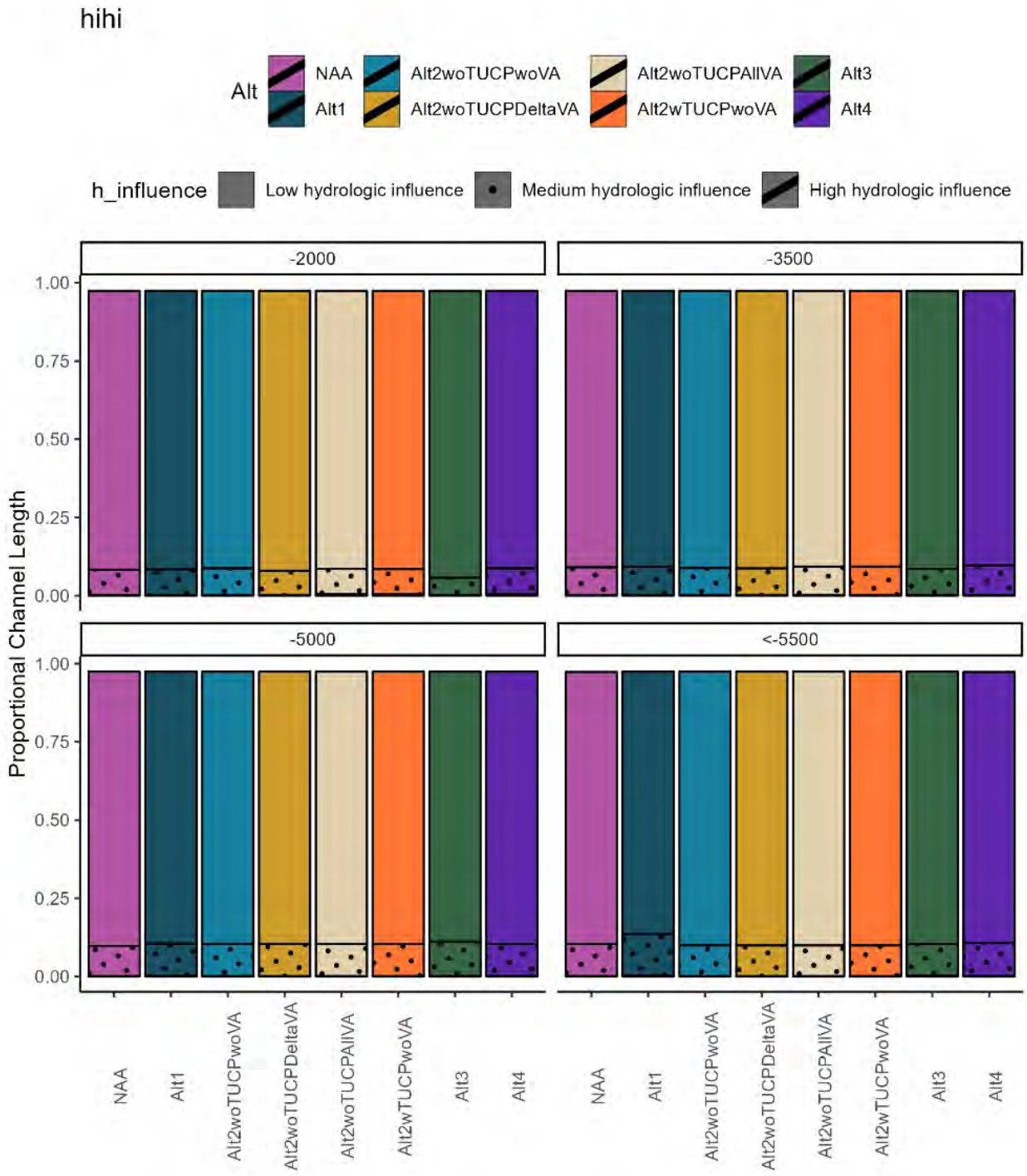



Figure I.3-131. Proportion of total channel length in the Delta (DSM2 grid) that experiences high (<25% proportional overlap), medium (25-75% proportional overlap) and low (>75% proportional overlap) hydrologic influence at standardized inflow groups and across OMR bins of -2000, -3500, -5000, and less than -5500 cfs. Results apply to hihi inflow group.

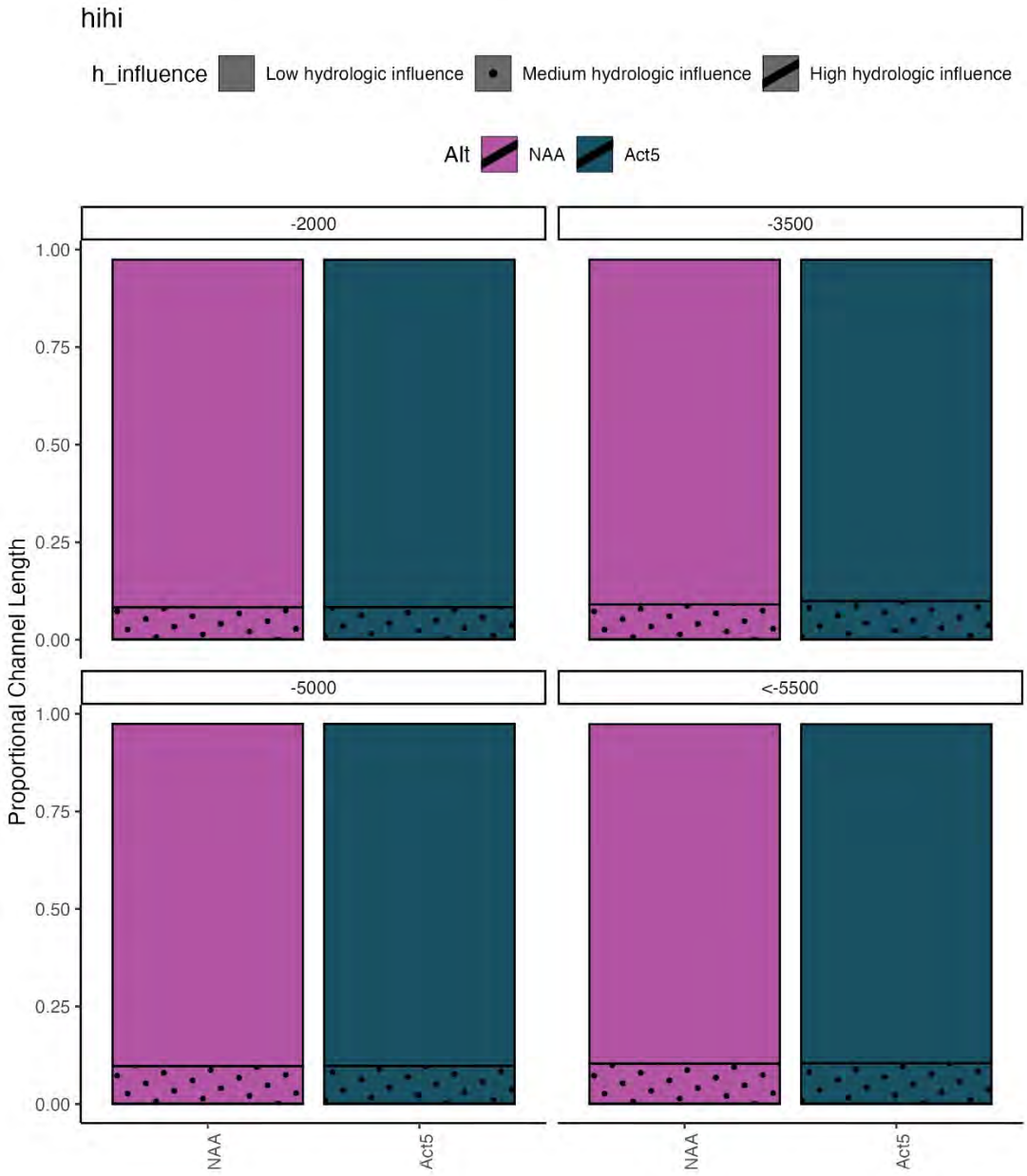



Figure I.3-131a. Proportion of total channel length in the Delta (DSM2 grid) that experiences high (<25% proportional overlap), medium (25-75% proportional overlap) and low (>75% proportional overlap) hydrologic influence at standardized inflow groups and across OMR bins of -2000, -3500, -5000, and less than -5500 cfs. Results apply to hihi inflow group for the NAA and Action 5.

Table I.3-9. Channel length (feet) altered by pumping for No Action Alternative (NAA), Alternative 1 (Alt1), four runs of Alternative 2, Alternative 3 (Alt3), Alternative 4 (Alt4), and Action 5 (Act5) across inflow groups and OMR bins. Values represent total summed channel length between nodes experiencing 0.25-0.75 proportional overlap, or medium hydrologic influence. Values in parentheses represent percent difference between each alternative and NAA. Absolute values are rounded.

| Inflow group | OMR bin | NAA | Alt1 | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt2 wTUCP woVA | Alt3 | Alt4 | Act5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Lolo | -2000 | 54189 (0%) | 27647 (-49%) | 54189 (0%) | 45576 (-16%) | 54189 (0%) | 48794 (-10%) | 54189 (0%) | 59520 (10%) | 48369 (-11%) |
| Lolo | -3500 | 117806 (0%) | 113044 (-4%) | 113044 (-4%) | 113044 (-4%) | 124055 (5%) | 153086 (30%) | 124055 (5%) | 124055 (5%) | 100482 (-15%) |
| Lolo | -5000 | 240433 (0%) | 297005 (24%) | 345257 (44%) | 329891 (37%) | 361840 (50%) | 157458 (-35%) | 365872 (52%) | 380800 (58%) | 211708 (-12%) |
| Lolo | <-5500 | 546547 (0%) | 541978 (-1%) | 542342 (-1%) | 562344 (3%) | 527855 (-3%) | NA | 527855 (-3%) | 491719 (-10%) | 427151 (-22%) |
| Lomed | -2000 | 81465 (0%) | 101000 (24%) | 81465 (0%) | 76711 (-6%) | 96978 (19%) | 86009 (6%) | 86009 (6%) | 94255 (16%) | 76711 (-6%) |
| Lomed | -3500 | 130344 (0%) | 120549 (-8%) | 120549 (-8%) | 120549 (-8%) | 139432 (7%) | 102742 (-21%) | 134670 (3%) | 139432 (7%) | 113418 (-13%) |
| Lomed | -5000 | 208217 (0%) | 228476 (10%) | 281435 (35%) | 281435 (35%) | 289043 (39%) | 223757 (7%) | 289043 (39%) | 291861 (40%) | 184167 (-12%) |
| Lomed | <-5500 | NA | 493876 (NA%) | NA | NA | NA | 441704 (NA%) | NA | 467873 (NA%) | NA |
| Lohi | -2000 | 130552 (0%) | 238535 (83%) | 199749 (53%) | 344641 (164%) | 180584 (38%) | 174501 (34%) | 176161 (35%) | 180584 (38%) | 205733 (58%) |
| Lohi | -3500 | 208428 (0%) | 235111 (13%) | 241111 (16%) | 191942 (-8%) | 238045 (14%) | 220352 (6%) | 238045 (14%) | 238045 (14%) | 238008 (14%) |

| Inflow group | OMR bin | NAA | Alt1 | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt2 wTUCP woVA | Alt3 | Alt4 | Act5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Lohi | -5000 | 226351 (0%) | 234862 (4%) | 175053 (-23%) | 193470 (-15%) | 193470 (-15%) | NA | 193470 (-15%) | 190404 (-16%) | 205883 (-9%) |
| Medlo | -2000 | 27647 (0%) | 72558 (162%) | 56798 (105%) | 59520 (115%) | 50971 (84%) | 72558 (162%) | 50971 (84%) | 45576 (65%) | 45576 (65%) |
| Medlo | -3500 | 172490 (0%) | NA | 148289 (-14%) | 138590 (-20%) | 134670 (-22%) | 140818 (-18%) | 148289 (-14%) | 126424 (-27%) | 169404 (-2%) |
| Medlo | -5000 | 217383 (0%) | 231821 (7%) | 374670 (72%) | 377919 (74%) | 377919 (74%) | 394406 (81%) | 381951 (76%) | 337552 (55%) | 204852 (-6%) |
| Medlo | <-5500 | 606560 (0%) | 639690 (5%) | 559302 (-8%) | 559302 (-8%) | 583403 (-4%) | 321144 (-47%) | 595220 (-2%) | 478383 (-21%) | 505209 (-17%) |
| Medmed | -2000 | 92454 (0%) | 92454 (0%) | 86009 (-7%) | 86009 (-7%) | 92454 (0%) | 76711 (-17%) | 92454 (0%) | 92454 (0%) | 81465 (-12%) |
| Medmed | -3500 | 195201 (0%) | 138575 (-29%) | 164174 (-16%) | 164174 (-16%) | 188699 (-3%) | 139727 (-28%) | 189671 (-3%) | 176161 (-10%) | 152088 (-22%) |
| Medmed | -5000 | 251330 (0%) | 271281 (8%) | 337165 (34%) | 337165 (34%) | 345232 (37%) | 350767 (40%) | 331544 (32%) | 383716 (53%) | 241065 (-4%) |
| Medmed | <-5500 | 546334 (0%) | 546215 (0%) | 543002 (-1%) | 546334 (0%) | 546334 (0%) | NA | 546334 (0%) | 449589 (-18%) | 554052 (1%) |
| Medhi | -2000 | 143735 (0%) | 254409 (77%) | 183314 (28%) | 167915 (17%) | 262475 (83%) | NA | 254229 (77%) | 268199 (87%) | 230079 (60%) |
| Medhi | -3500 | 319355 (0%) | 294142 (-8%) | 307325 (-4%) | 303468 (-5%) | 311986 (-2%) | 359483 (13%) | 311986 (-2%) | 294946 (-8%) | 319355 (0%) |
| Medhi | -5000 | 470418 (0%) | 322374 (-31%) | 510174 (8%) | 514154 (9%) | 510385 (8%) | 317894 (-32%) | 510174 (8%) | 422974 (-10%) | 424496 (-10%) |
| Medhi | <-5500 | 455531 (0%) | 515663 (13%) | NA | NA | NA | NA | NA | 493344 (8%) | 506249 (11%) |

| Inflow group | OMR bin | NAA | Alt1 | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt2 wTUCP woVA | Alt3 | Alt4 | Act5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Hilo | -2000 | NA | NA | NA | NA | NA | 72558 (NA%) | NA | NA | NA |
| Hilo | -3500 | 137049 (0%) | 105506 (-23%) | 160217 (17%) | 153086 (12%) | 160217 (17%) | 135197 (-1%) | 160217 (17%) | 140818 (3%) | 154198 (13%) |
| Hilo | -5000 | 264382 (0%) | NA | 264382 (0%) | 242315 (-8%) | 271698 (3%) | 304232 (15%) | 271698 (3%) | 254721 (-4%) | 309037 (17%) |
| Hilo | <-5500 | 245068 (0%) | 691451 (182%) | 245068 (0%) | 287645 (17%) | 245068 (0%) | 311950 (27%) | 245068 (0%) | NA | 249990 (2%) |
| Himed | -2000 | 72558 (0%) | NA | 76711 (6%) | 76711 (6%) | 86402 (19%) | 86009 (19%) | 86402 (19%) | 86402 (19%) | 62747 (-14%) |
| Himed | -3500 | 175651 (0%) | 135964 (-23%) | 176405 (0%) | 188818 (7%) | 197951 (13%) | 139607 (-21%) | 203970 (16%) | 192852 (10%) | 169801 (-3%) |
| Himed | -5000 | 400448 (0%) | NA | 392039 (-2%) | 392039 (-2%) | 400448 (0%) | 439660 (10%) | 400448 (0%) | 376014 (-6%) | 412419 (3%) |
| Himed | <-5500 | 375420 (0%) | 710057 (89%) | 369417 (-2%) | 369417 (-2%) | 369417 (-2%) | 371744 (-1%) | 369417 (-2%) | 403479 (7%) | 375420 (0%) |
| Hihi | -2000 | 315738 (0%) | 319078 (1%) | 331338 (5%) | 300952 (-5%) | 311077 (-1%) | 215474 (-32%) | 307097 (-3%) | 315738 (0%) | 319078 (1%) |
| Hihi | -3500 | 345153 (0%) | 351039 (2%) | 334832 (-3%) | 330569 (-4%) | 352728 (2%) | 326638 (-5%) | 352728 (2%) | 365763 (6%) | 376743 (9%) |
| Hihi | -5000 | 368941 (0%) | 399903 (8%) | 396491 (7%) | 396491 (7%) | 396491 (7%) | 426894 (16%) | 396491 (7%) | 396192 (7%) | 371534 (1%) |

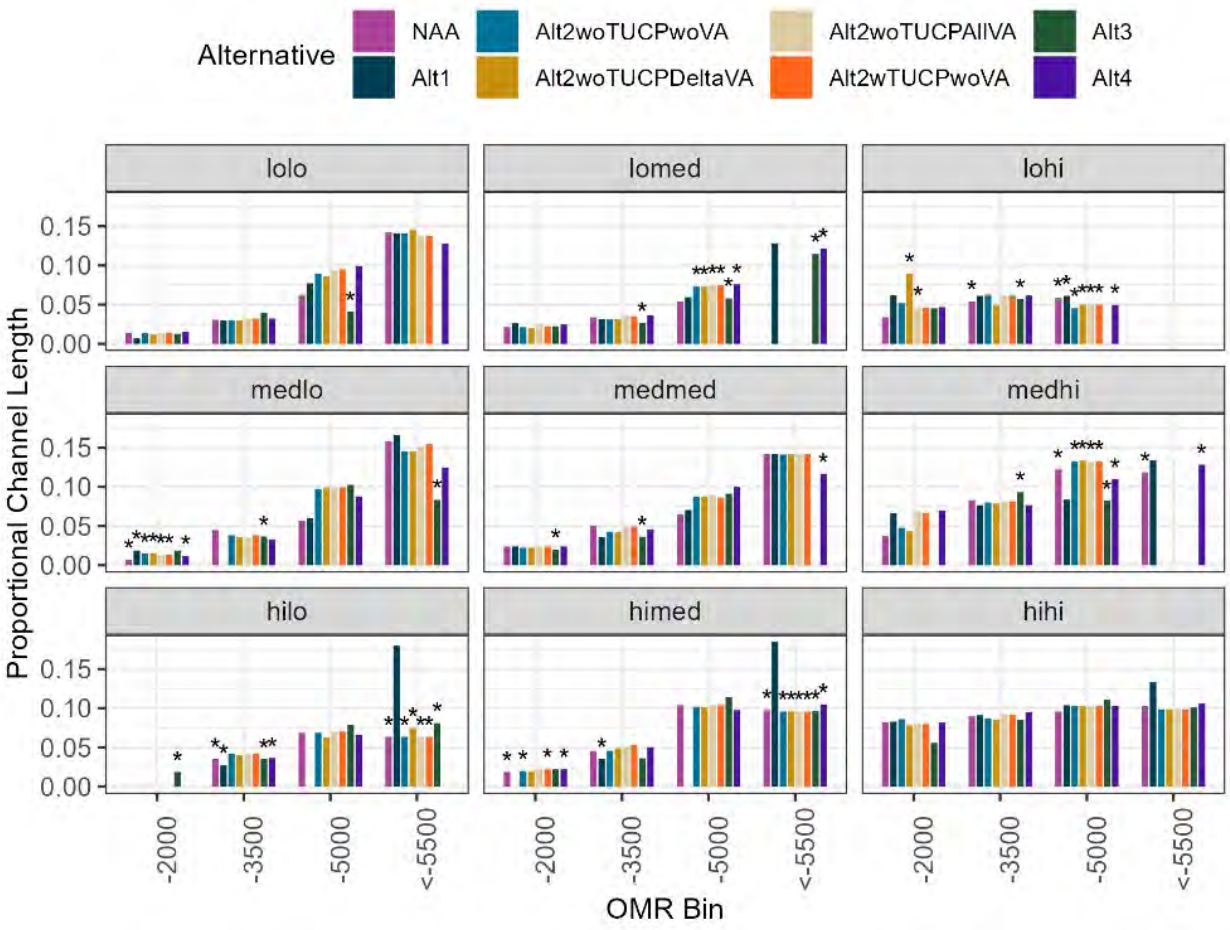



Figure I.3-132. Proportion of total channel length in the Delta (DSM2 grid) that experiences medium (25-75% proportional overlap) hydrologic influence at standardized inflow groups and across OMR flows of -2000, -3500, -5000, and less than -5500 cfs. Results are displayed across alternatives. Stars indicate combinations with five or less samples (months).

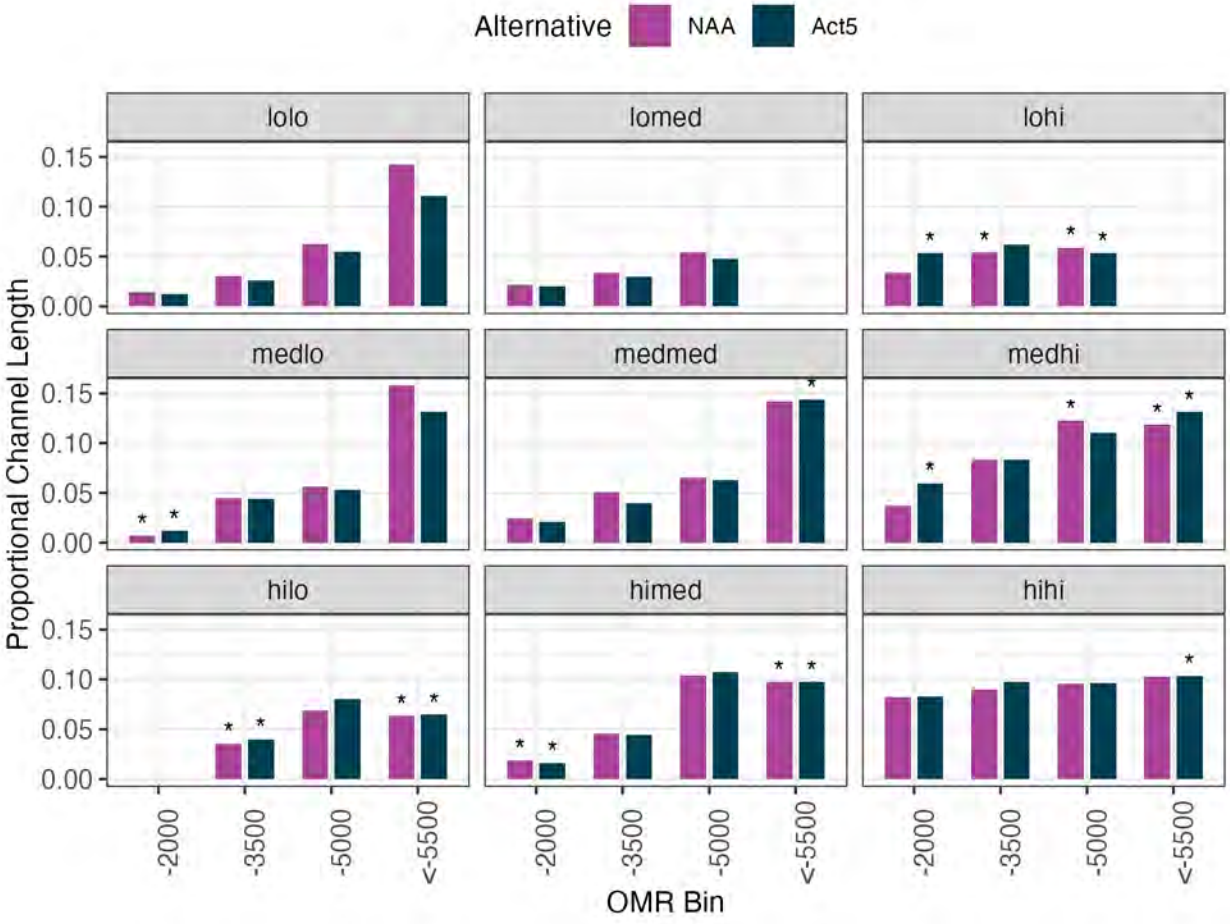



Figure I.3-132a. Proportion of total channel length in the Delta (DSM2 grid) that experiences medium (25-75% proportional overlap) hydrologic influence at standardized inflow groups and across OMR flows of -2000, -3500, -5000, and less than -5500 cfs. Results are displayed for the NAA and Action 5. Stars indicate combinations with five or less samples (months).

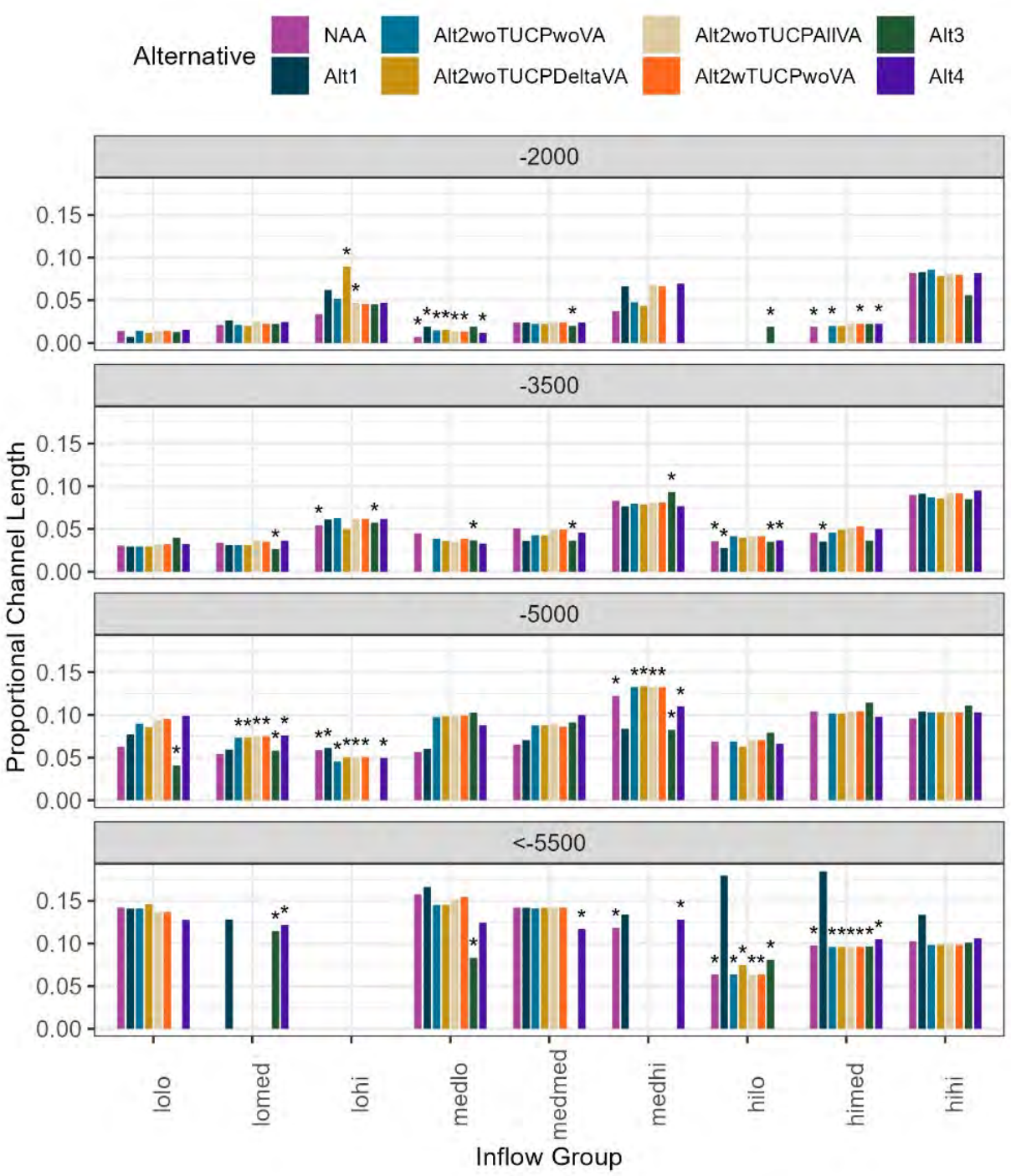



Figure I.3-133. Proportion of total channel length in the Delta (DSM2 grid) that experiences medium (25-75% proportional overlap) hydrologic influence at standardized inflow groups and across OMR flows of -2000, -3500, -5000, and less than -5500 cfs. Results are displayed across alternatives. Stars indicate combinations with five or less samples (months).

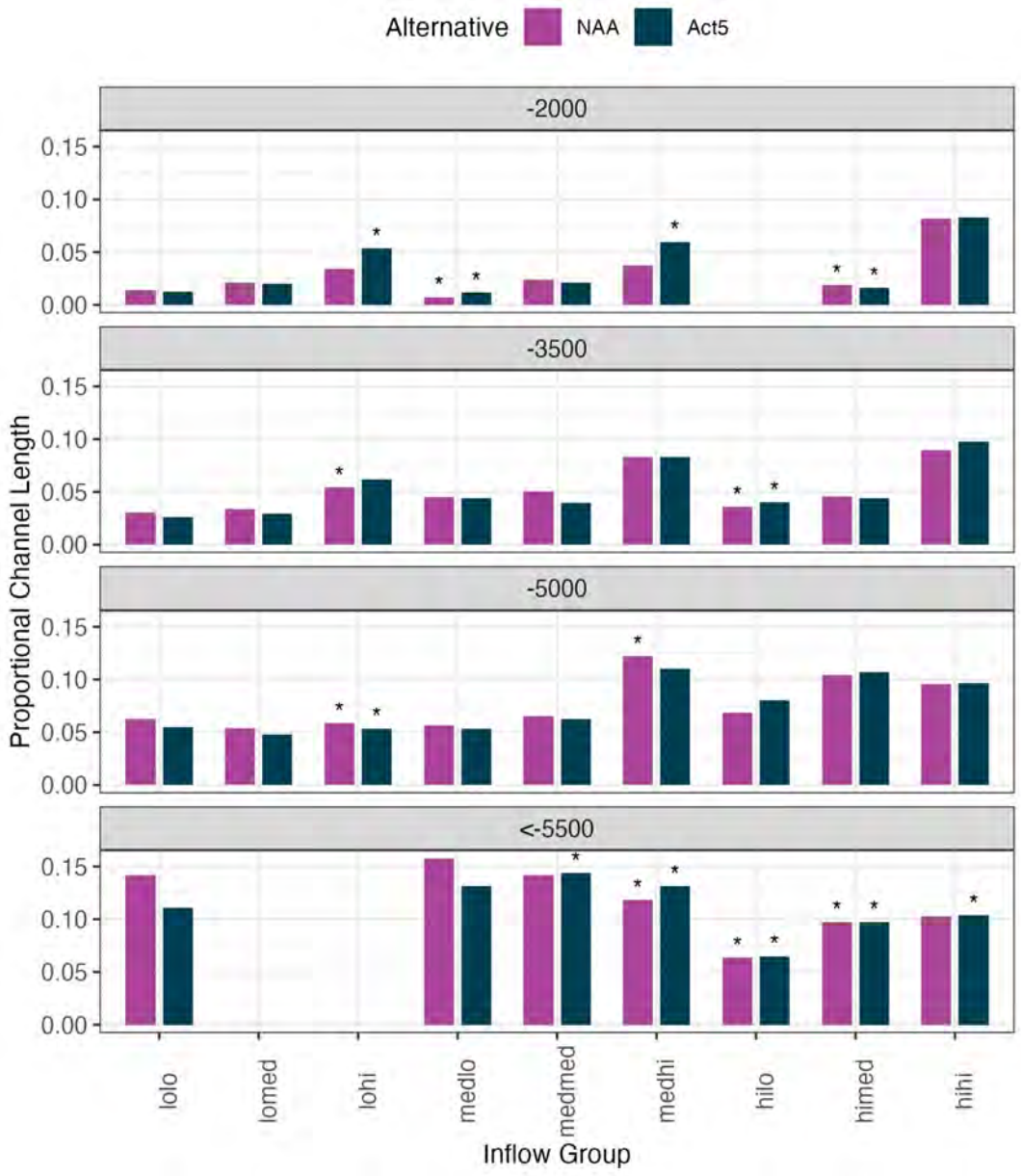



Figure I.3-133a. Proportion of total channel length in the Delta (DSM2 grid) that experiences medium (25-75% proportional overlap) hydrologic influence at standardized inflow groups and across OMR flows of -2000, -3500, -5000, and less than -5500 cfs. Results are displayed for the NAA and Action 5. Stars indicate combinations with five or less samples (months).

Appendix I, Old and Middle River Flow Management

# Attachment I.6 Delta Passage Model: A Simulation Model of Chinook Salmon Survival, Routing, and Travel Time in the Sacramento–San Joaquin Delta

## I.6.1 Model Overview

The DPM simulates migration of Chinook salmon smolts entering the Delta from the Sacramento River, Mokelumne River, and San Joaquin River and estimates survival to Chipps Island. For this application, only survival of fish entering the Delta from the Sacramento River are evaluated. The DPM uses available time-series data and values taken from empirical studies or other sources to parameterize model relationships and inform uncertainty, thereby using the greatest amount of data available to dynamically simulate responses of smolt survival to changes in water management.

Survival estimates generated by the DPM are not intended to predict current or future outcomes. Instead, the DPM provides a simulation tool that compares the effects of different water management operations on smolt migration survival, with accompanying estimates of uncertainty. It is possible that underlying relationships (e.g., flow-survival) that are used to inform the DPM will change in the future; there is an assumption these basic relationships are static to allow scenarios to be compared for the current analysis, recognizing that it may be necessary to re-examine the relationships as new information becomes available.

The major model functions in the DPM are as follows.

1. Delta Entry Timing, which models the temporal distribution of smolts entering the Delta for each race of Chinook salmon.
2. Fish Behavior at Junctions, which models fish movement as they approach river junctions.
3. Migration Speed, which models reach-specific smolt migration speed and travel time.

4. Route-Specific Survival, which models route-specific survival response to non-flow factors.
5. Flow-Dependent Survival, which models reach-specific survival response to flow.
6. Export-Dependent Survival, which models survival response to water export levels in the interior Delta reach (see Table I.6-1 for reach description).

# I.6.2 Model Development

## I.6.2.1 Methods

## I.6.2.2 Model Timestep

The DPM operates on a daily timestep using simulated daily average flows and south Delta exports as model inputs. The DPM does not attempt to represent sub-daily flows or diel salmon smolt behavior in response to the interaction of tides, flows, and specific channel features. The DPM is intended to represent the net outcome of migration and mortality occurring over one day, not three-dimensional movements occurring over minutes or hours (e.g., Blake and Horn 2003). It is acknowledged that finer scale modeling with a shorter timestep may match the biological processes governing fish movement better than a daily timestep (e.g., because of diel activity patterns; Plumb et al. 2015) and that sub-daily differences in flow proportions into junctions make daily estimates somewhat coarse (Cavallo et al. 2015).

## I.6.2.3 Spatial Framework

The DPM is composed of nine reaches and four junctions (Figure I.6-1; Table I.6-1) selected to represent primary salmonid migration corridors for fish originating from the Sacramento River basin where high-quality data were available for fish and hydrodynamics. For simplification, Sutter Slough and Steamboat Slough are combined as the reach "SS," and Georgiana Slough and the Delta Cross Channel (DCC) are a combined junction. Sacramento River Chinook salmon that enter the DCC migrate through the Forks of the Mokelumne River, and fish entering Georgiana Slough migrate only through that route. The interior Delta reach can be entered from the Mokelumne River or Georgiana Slough route. The entire interior Delta region is treated as a single model reach. The three distributary junctions (channel splits) depicted in the DPM are (A) Sacramento River at Fremont Weir (head of Yolo Bypass), (B) Sacramento River at head of Sutter and Steamboat Sloughs, and (C) Sacramento River at the combined junction with Georgiana Slough and DCC (Figure I.6-1, Table I.6-1).

Table I.6-1. Description of Modeled Reaches and Junctions in the Delta Passage Model (Yolo and interior Delta reach lengths are not defined because multiple migration pathways are possible)

| Reach/ Junction | Description | Approximate Reach Length (km) | Final Receiver name/location |
|---|---|---|---|
| Verona | Sacramento River between Fremont Weir and Freeport | 57 | Freeport |
| Sac_1 | Sacramento River between Freeport and the combined junction of Steamboat and Sutter Slough | 19 | Sacramento River below Steamboat Slough |
| Sac_2 | Sacramento River from Sutter/Steamboat Sloughs junction to junction with Delta Cross Channel/Georgiana Slough | 11 | Sacramento River below Georgiana Slough |
| Sac_3 | Sacramento River from below Georgiana Slough to Rio Vista | 16 | Chipps Island |
| SS | Steamboat and Sutter Sloughs from their junction with the Sacramento River to Chipps Island | 21 | Chipps Island |
| Yolo Bypass | Fremont Weir to Highway 84 Ferry | NA | Highway 84 Ferry |
| Sac_4 | Rio Vista to Chipps Island | 30 | Chipps Island |
| Geo/DCC | Georgiana Slough from the junction with the Sacramento River to the base of the Mokelumne River. Includes fish that migrate through the Mokelumne River via the Delta Cross Channel | 25 | Mokelumne Base |
| Interior Delta | Confluence of Mokelumne and San Joaquin Rivers to Chipps Island | NA | Chipps Island |
| A | Junction of Yolo Bypass and Sacramento River | NA | NA |
| B | Combined junction of Sutter Slough and Steamboat Slough with the Sacramento River | NA | NA |
| C | Combined junction of the Delta Cross Channel and Georgiana Slough with the Sacramento River | NA | NA |

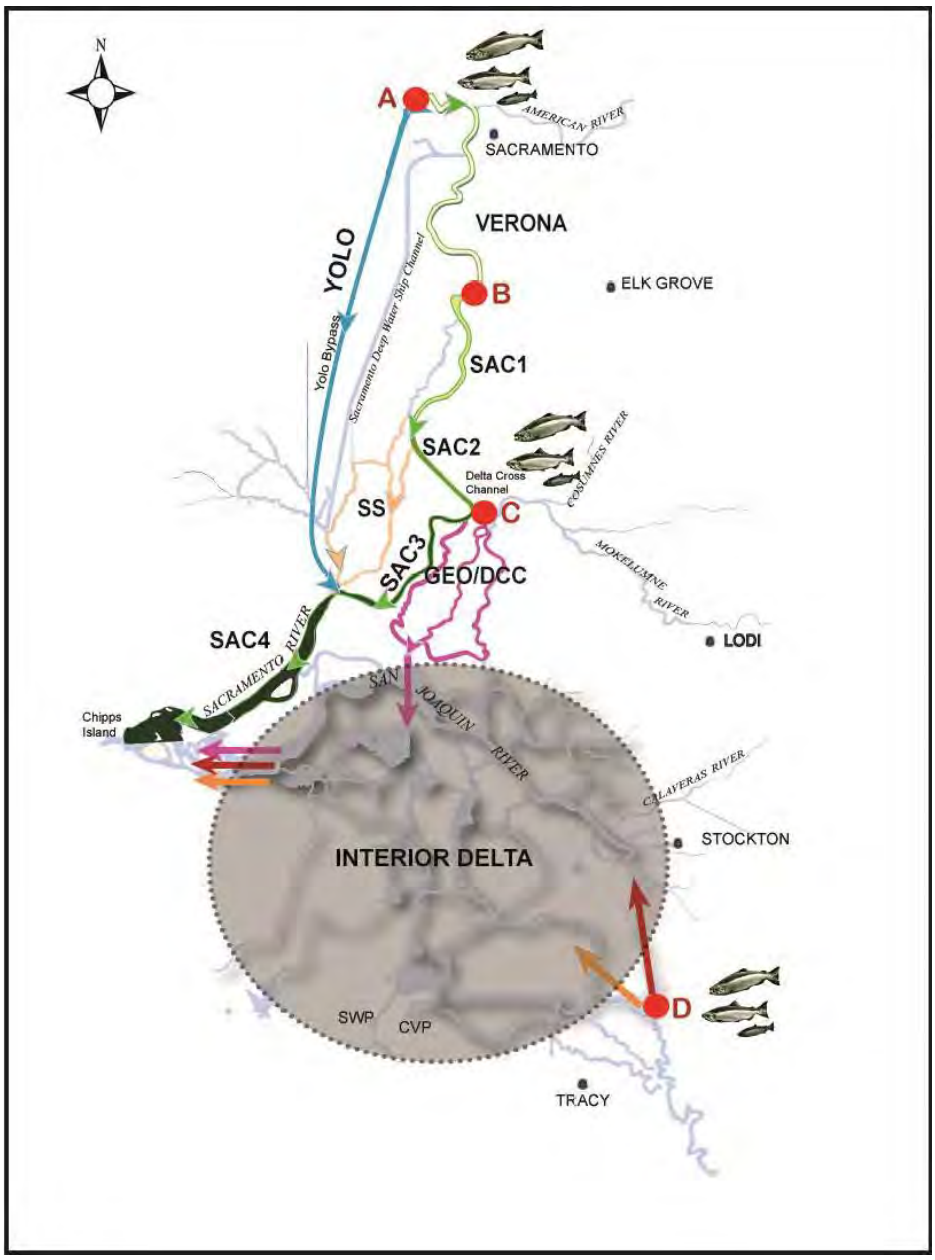



Figure I.6-1. Map of the Sacramento–San Joaquin River Delta Showing the Modeled Reaches and Junctions of the Delta Applied in the Delta Passage Model

### I.6.2.4 Flow Input Data

Water movement through the Delta as input to the DPM is derived from daily (tidally averaged) flow output produced by the hydrology module of the Delta Simulation Model II (DSM2-HYDRO; http://baydeltaoffice.water.ca.gov/modeling/deltamodeling/) or from CalSim 3.

The nodes in the DSM2-HYDRO and CalSim 3 models that were used to provide flow for specific reaches in the DPM are shown in Table I.6-2.

Table I.6-2. Delta Passage Model Reaches and Associated Output Locations from DSM2-HYDRO and CalSim 3 Models

| DPM Reach or Model Component | DSM2 Output Locations | CalSim 3 Node |
|---|---|---|
| Sac1 | rsac155 | NA |
| Sac2 | rsac128 | NA |
| Sac3 | rsac123 | NA |
| Sac4 | rsac101 | NA |
| Yolo | NA | Fremont Spill + Sac Weir Spill |
| Verona | NA | C160a |
| SS | slsbt011 | NA |
| Geo/DCC | dcc+georg_sl | NA |
| South Delta Export Flow | Clifton Court Forebay - CHDMC006 | NA |
| Sacramento River Flow at Fremont Weir | NA | Sac @ Fremont Weir |

### I.6.2.5 Delta Entry Timing

Catch data for emigrating juvenile smolts for four Central Valley Chinook salmon runs were used to inform the daily proportion of juveniles entering the Delta for each run (Table I.6-3). Because the DPM models the survival of smolt-sized juvenile salmon, pre-smolts were removed from catch data before creating entry timing distributions. The lower 95th percentile of the range of salmon fork lengths visually identified as smolts by the USFWS in Sacramento trawls was used to determine the lower length cutoff for smolts. A lower fork length cutoff of 70 mm for smolts was applied, and all catch data of fish smaller than 70 mm were eliminated. To isolate wild production, all fish identified as having an adipose-fin clip (hatchery production) were eliminated, recognizing that most (75%) of the fall-run hatchery fish released upstream of Sacramento are not marked. Daily catch data for each brood year were divided by total annual catch to determine the daily proportion of smolts entering the DPM for each run (Figure I.6-2). Sampling was not conducted daily at most stations and catch was not expanded for fish caught but not measured. Finally, a generic probability density function was fit to the data using the package “sm” in R software (R Core Team 2012). The R fitting procedure estimated the best-fit probability distribution of the daily proportion of fish entering the DPM. Due to the daily timing of delta entry being integrated into results, results cannot be presented based on inflow groups.

For the current analysis, the most recent data from the Sacramento Trawl survey was added to the previous data to determine if entry distributions had shifted since the original fitting. Only late fall–run Chinook Salmon exhibited substantial change from the original fit and the entry distribution for that race was updated.

Table I.6-3. Sampling Gear Used to Create Juvenile Delta Entry Timing Distributions for Each Central Valley Run of Chinook Salmon

| Chinook Salmon Run | Gear | Agency | Brood Years |
|---|---|---|---|
| Sacramento River Winter Run | Trawls at Sacramento | USFWS | 1995–2009 |
| Sacramento River Spring Run | Trawls at Sacramento | USFWS | 1995–2005 |
| Sacramento River Fall Run | Trawls at Sacramento | USFWS | 1995–2005 |
| Sacramento River Late Fall Run | Trawls at Sacramento | USFWS | 1995–2018 |

Agencies that conducted sampling are listed: USFWS = U.S. Fish and Wildlife Service; EBMUD = East Bay Municipal District; CDFW = California Department of Fish and Wildlife.

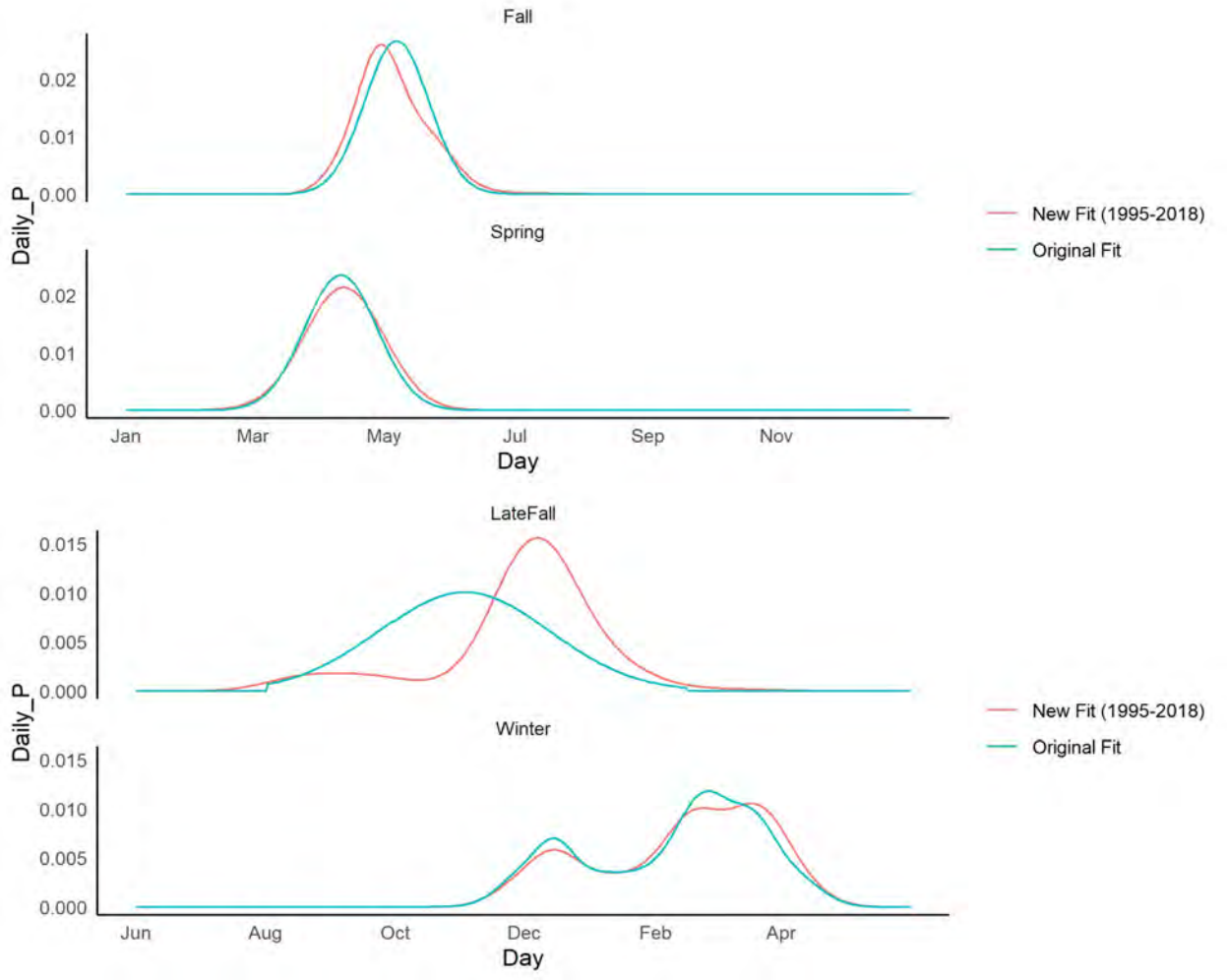



Figure I.6-2. Delta Entry Distributions for Chinook Salmon Smolts Applied in the Delta Passage Model for Sacramento River Winter-Run, Central Valley Spring-Run (Sacramento River), Central Valley Fall-Run (Sacramento River), and Central Valley Late Fall–Run. (Note the change in x axes between the upper and lower panel.)

### I.6.2.6 Migration Speed

The DPM assumes a net daily movement of smolts in the downstream direction. The rate of smolt movement in the DPM affects the timing of arrival at Delta junctions and reaches, which can affect route selection and survival as flow conditions or water project operations change.

Smolt movement in all reaches except Yolo Bypass and the interior Delta is a function of reach-specific length and migration speed, as observed from acoustic-tagging results. Reach-specific length (kilometers [km]) is divided by reach migration speed (km/day) the day smolts enter the reach to calculate the number of days smolts will take to travel through the reach.

For north Delta reaches Verona, Sac1, Sac2, SS, and Geo/DCC, mean migration speed through the reach is predicted as a function of flow. Many studies have found a positive relationship between juvenile Chinook salmon migration rate and flow in the Columbia River Basin (Raymond 1968; Berggren and Filardo 1993; Schreck et al. 1994), with Berggren and Filardo (1993) finding a logarithmic relationship for Snake River yearling Chinook salmon. Ordinary least squares regression was used to test for a logarithmic relationship between reach-specific migration speed (km/day) and average daily reach-specific flow (cubic meters per second [$m^3$/sec]) for the first day smolts entered a particular reach for reaches where acoustic-tagging data was available (Sac1, Sac2, Sac3, Sac4, Geo/DCC, and SS):

$$Speed = \beta_0 \ln(flow) + \beta_1;$$

Where $\beta_0$ is the slope parameter and $\beta_1$ is the intercept.

Individual smolt reach-specific travel times were calculated from detection histories of releases of acoustically tagged smolts conducted in December and January for three consecutive winters (2006/2007, 2007/2008, and 2008/2009) (Perry 2010). Reach-specific migration speed (km/day) for each smolt was calculated by dividing reach length by travel days. Flow data was queried from the DWR's California Data Exchange website (http://cdec.water.ca.gov/).

Migration speed was significantly related to flow for reaches Sac1 ($df = 450$, $F = 164.36$, $P < 0.001$), Sac2 ($df = 292$, $F = 4.17$, $P = 0.042$), and Geo/DCC ($df = 84$, $F = 13.74$, $P < 0.001$). Migration speed increased as flow increased for all three reaches (Table I.6-4, Figure I.6-3). Therefore, for reaches Sac1, Sac2, and Geo/DCC, the regression coefficients shown in Table I.6-4 are used to calculate the expected average migration rate given the input flow for the reach; and the associated standard error of the regressions is used to inform a normal probability distribution that is sampled from the day that smolts enter the reach to determine their migration speed throughout the reach. The minimum migration speed for each reach is set at the minimum reach-specific migration speed observed from the acoustic-tagging data. The flow-migration rate relationship that was used for Sac1 also was applied for the Verona reach.

Table I.6-4. Sample Size and Slope ($\beta_0$) and Intercept ($\beta_1$) Parameter Estimates with Associated Standard Error (in Parenthesis) for the Relationship between Migration Speed and Flow for Reaches Sac1, Sac2, and Geo/DCC

| Reach | *N* | $\beta_0$ | $\beta_1$ |
|---|---|---|---|
| Sac1 | 452 | 21.34 (1.66) | -105.98 (9.31) |
| Sac2 | 294 | 3.25 (1.59) | -8.00 (8.46) |
| Geo/DCC | 86 | 11.08 (2.99) | -33.52 (12.90) |

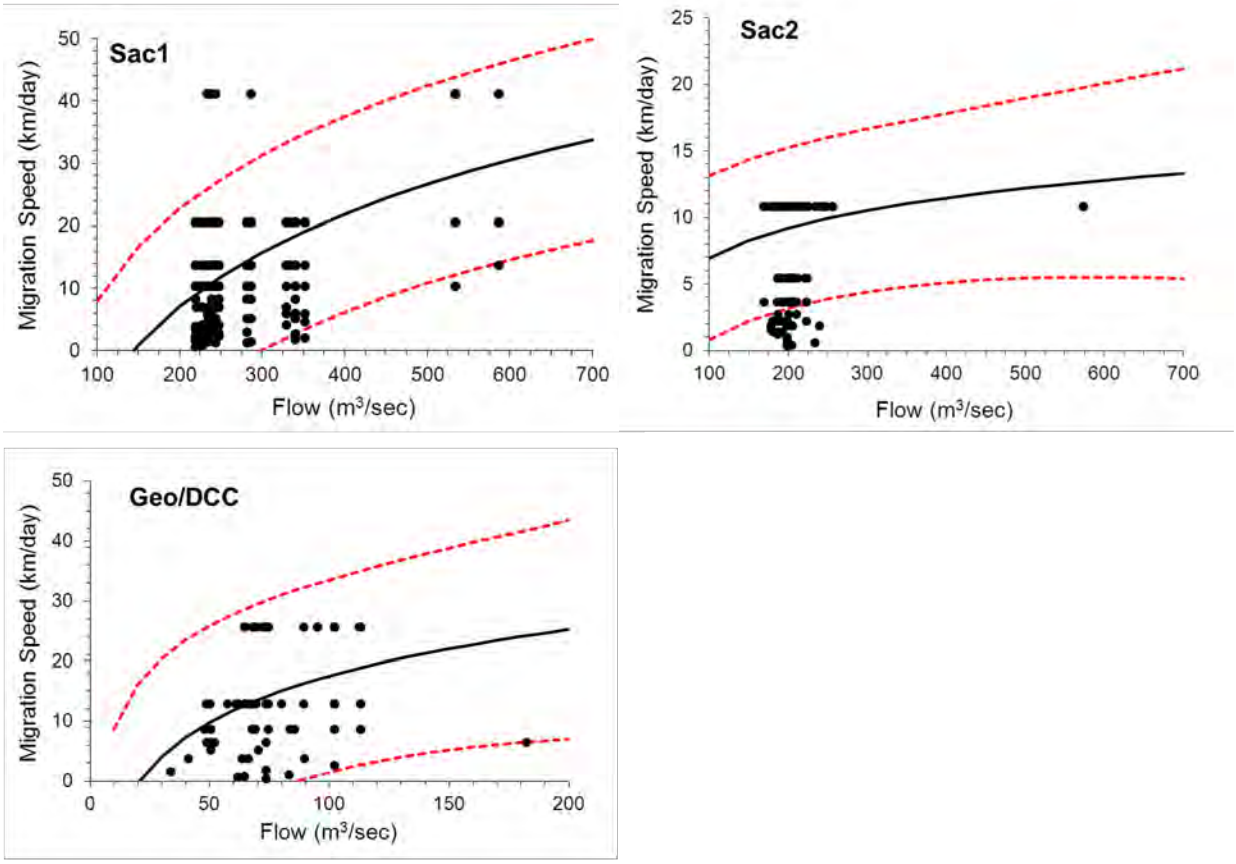



Figure I.6-3. Reach-Specific Migration Speed (km/day) as a Function of Flow ($m^3$/sec) Applied in Reaches Sac1, Sac2, and Geo/DCC

No significant relationship between migration speed and flow was found for reaches Sac3 (df = 100, F = 1.13, P =0.29), Sac4 (df = 60, F = 0.33, P = 0.57), and SS (df = 28, F = 0.86, P = 0.36). Therefore, for these reaches the observed mean migration speed and associated standard deviation is used to inform a normal probability distribution that is sampled from the day smolts enter the reach to determine their migration speed throughout the reach. As applied for reaches Sac1, Sac2, and Geo/DCC, the minimum migration speed for reaches Sac3, Sac4, and SS is set at the minimum reach-specific migration speed observed from the acoustic-tagging data.

Yolo Bypass travel time data from Sommer et al. (2005) for coded wire-tagged, fry-sized (mean size = 57 mm fork length [FL]) Chinook salmon were used to inform travel time through the Yolo Bypass in the DPM. Because the DPM models the migration and survival of smolt-sized juveniles, the range of the shortest travel times observed across all three years (1998–2000) by Sommer et al. (2005) was used to inform the bounds of a uniform distribution of travel times (range = 4–28 days), on the assumption that smolts would spend less time rearing and would travel faster than fry. On the day smolts enter the Yolo Bypass, their travel time through the reach is calculated by sampling from this uniform distribution of travel times.

The travel time of smolts migrating through the interior Delta in the DPM is informed by observed mean travel time (7.95 days) and associated standard deviation (6.74) from north Delta acoustic-tagging studies (Perry 2010). However, the timing of smolt passage through the interior Delta does not affect Delta survival because there are no Delta reaches located downstream of the interior Delta.

### I.6.2.7 Fish Behavior at Junctions (Channel Splits)

Perry (2010) and Cavallo et al. (2015) found that acoustically-tagged smolts arriving at Delta junctions exhibited inconsistent movement patterns in relation to the flow being diverted. For Junction A (entry into the Yolo Bypass at Fremont Weir), the following relationships were used.

- Proportion of smolts entering Yolo Bypass = Fremont Weir spill/ (Fremont Weir spill + Sacramento River at Verona flows).

As noted above in *Flow Input Data*, the flow data informing Yolo Bypass entry were obtained by disaggregating CalSim estimates using historical daily patterns of variability because DSM2 does not provide daily flow data for these locations.

For Junction B (Sacramento River-Sutter/Steamboat Sloughs), both Perry (2010) and Cavallo et al. (2015) found that smolts consistently entered downstream distributaries in proportion to the flow being diverted. Therefore, smolts arriving at Junction B in the model move proportionally with flow according to the linear relationship found in Cavallo et al. (2015):

$$P_{SS} = -0.00203 + P_{flowSS} * 0.775344$$

Where $P_{ss}$ is the proportion of fish entering the SS reach, and $P_{flowSS}$ is the proportion of flow entering Sutter/Steamboat Slough distributaries from the total flow in the mainstem Sacramento River.

For Junction C (Sacramento River–Georgiana Slough/DCC), Perry (2010) found a linear, nonproportional relationship between flow and fish movement. His relationship for Junction C was applied in the DPM:

$$y = 0.22 + 0.47x;$$

where $y$ is the proportion of fish diverted into Geo/DCC and $x$ is the proportion of flow diverted into Geo/DCC (Figure I.6-4).

In the DPM, this linear function is applied to predict the daily proportion of fish movement into Geo/DCC as a function of the proportion of flow into Geo/DCC.

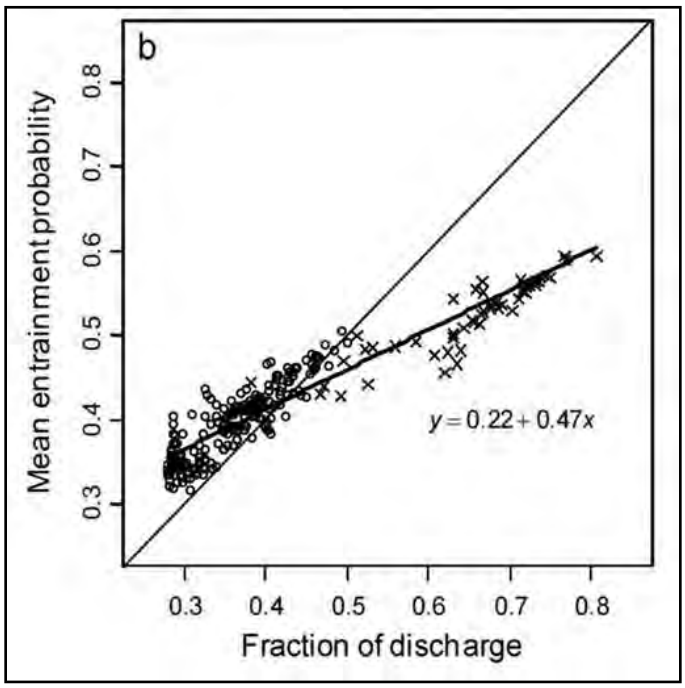



Figure I.6-4. Figure from Perry (2010) Depicting the Mean Entrainment Probability (Proportion of Fish Being Diverted into Reach Geo/DCC) as a Function of Fraction of Discharge (Proportion of Flow Entering Reach Geo/DCC). Circles Depict DCC Gates Closed, Crosses Depict DCC Gates Open.

### I.6.2.8 Reach-Specific Survival

To update survival estimates in the DPM, we analyzed a dataset of detections from >2000 acoustically-tagged (JSATS) fish recorded in the DPM region of the Sacramento–San Joaquin Delta from 2013-2019. To estimate survival from such a large and heterogeneous dataset (receiver combinations, monitored reaches, and release locations differed from year to year), we used only detections from receivers at the endpoint of reaches in the DPM and constructed binary detection histories along DPM routes. Moving downstream from receiver to receiver along a route, we assumed that if a fish was not seen again in the route after a given receiver, the fish did not survive. The probability of being detected again downstream (assumed to be a direct proxy for survival) was then modeled as a function of an individual's detection history and time-specific covariates associated with reach entry. From this analysis, four reaches were associated with a consistent relationship between flow and survival: Sac1, Sac2, Sac3, and Sac4 (see Figure I.6-5 to Figure I.6-8); all other reaches had no consistent flow-survival relationship, and survival in those reaches of the DPM is drawn from a normal distribution derived from a reach-specific, intercept-only model of survival and standard deviation from the JSATS data.

### I.6.2.9 Flow-Dependent Survival

Survival through a given reach is estimated and applied the first day smolts enter that reach. For reaches where analysis of the JSATS detections supported a consistent flow-survival relationship, flow on the day fish enter the reach is used to predict survival through the entire reach even if migration through the reach takes place over more than one day.

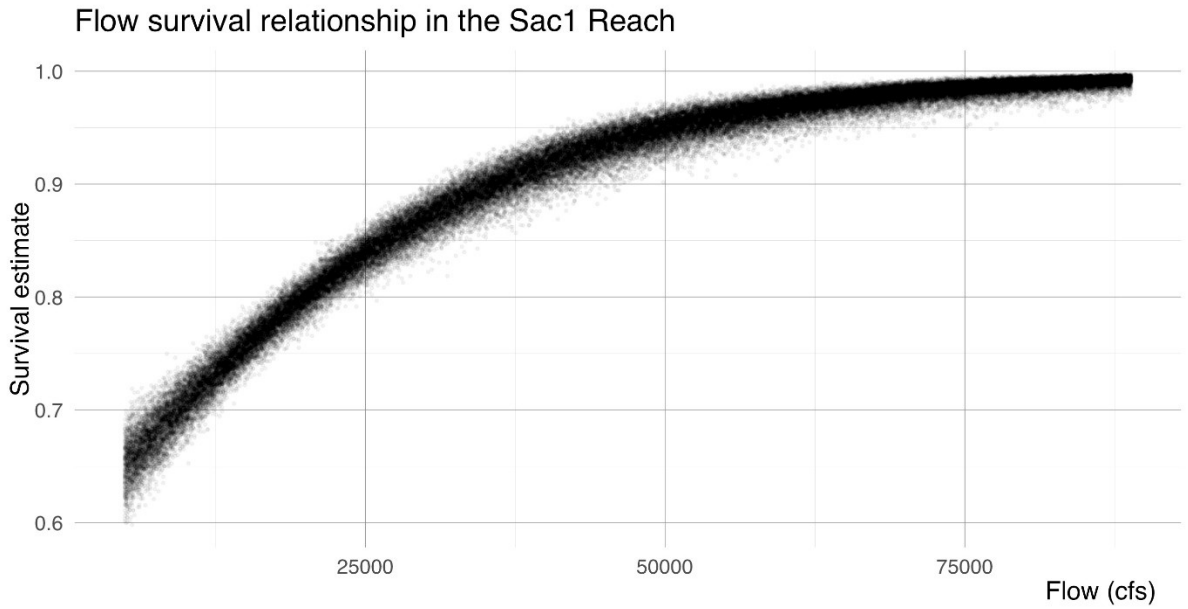



Figure I.6-6. Relationship between Sacramento River Discharge and Survival through the Sac 1 Reach Modeled with JSATS Releases of Multiple Runs of Chinook Salmon

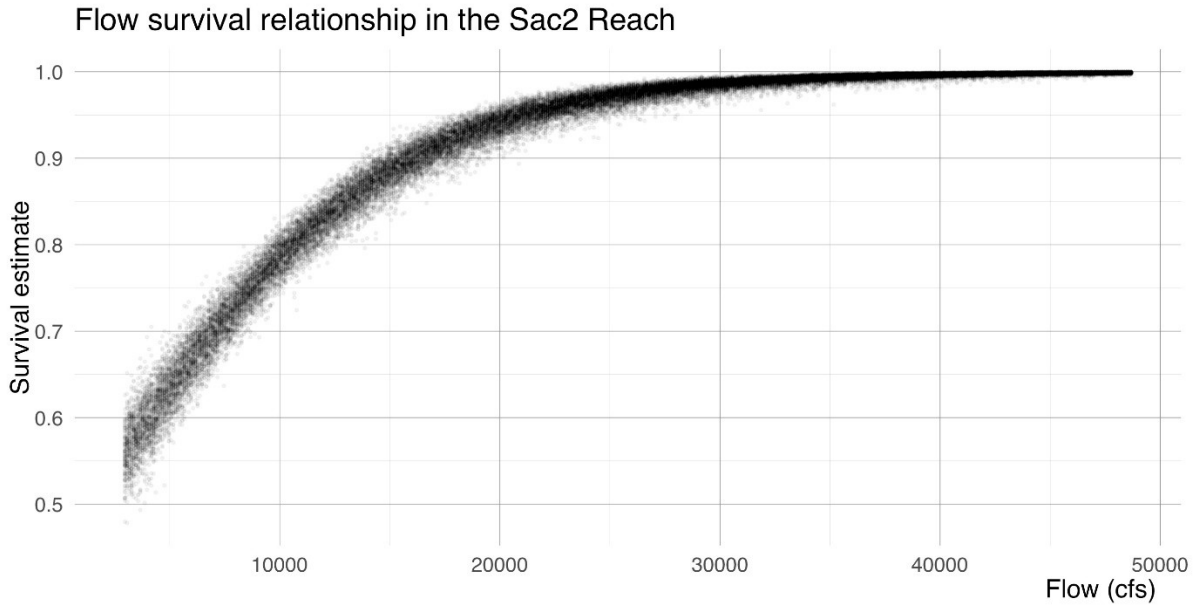



Figure I.6-7. Relationship between Sacramento River Discharge and Survival through the Sac 2 Reach Modeled with JSATS Releases of Multiple Runs of Chinook Salmon

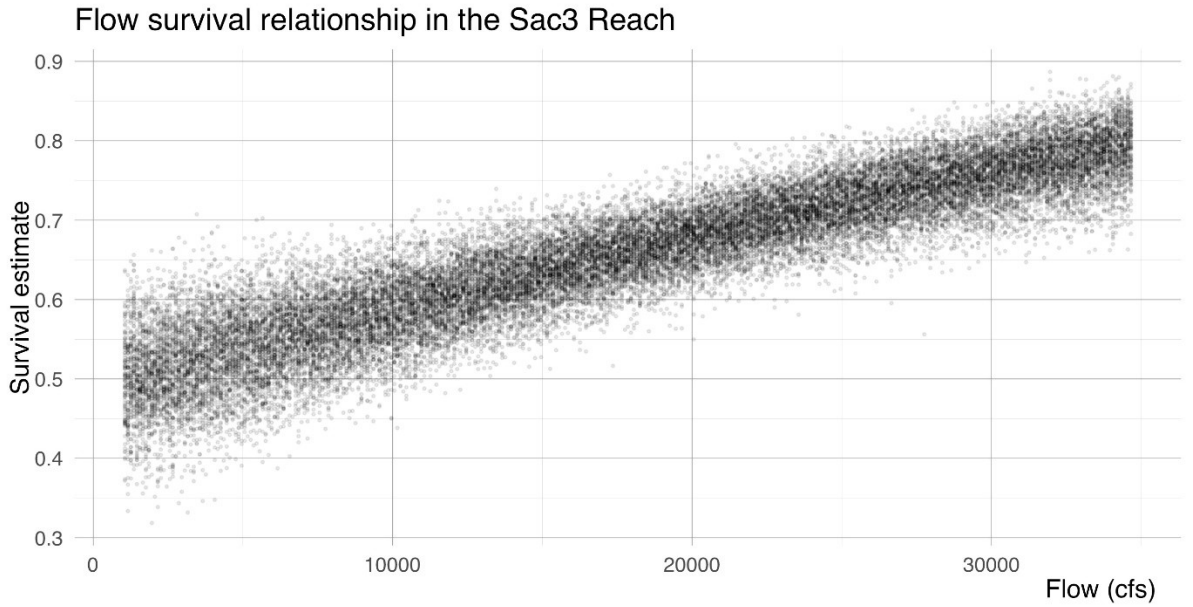



Figure I.6-8. Relationship between Sacramento River Discharge and Survival through the Sac 3 Reach Modeled with JSATS Releases of Multiple Runs of Chinook Salmon

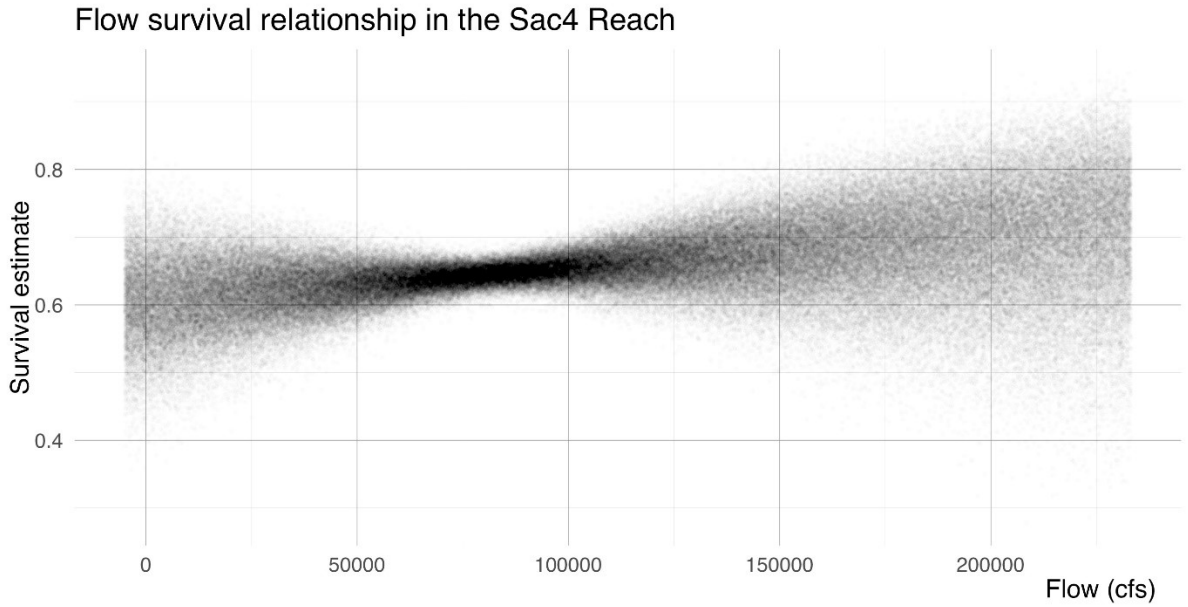



Figure I.6-9. Relationship between Sacramento River Discharge and Survival through the Sac 4 Reach Modeled with JSATS Releases of Multiple Runs of Chinook Salmon

### I.6.2.10 Export-Dependent Survival

An export-survival relationship was tested for fish entering the interior Delta from the Mokelumne River and Georgiana Slough. Hydrodynamic data for exports covering the period of JSATS detection data (2013 – 2019) was queried from Dayflow (https://data.cnra.ca.gov/dataset/dayflow/resource/21c377fe-53b8-4bd6-9e1f-2025221be095). A model that included exports and Freeport flow was also tested. Exports observed over the data period ranged from 1,038 to 14650 cfs. For the interior Delta route, the export value (cfs) on the day the fish enters the reach and the effect of exports from the JSATs model is used to predict survival through the entire reach, even if migration through the reach takes place over more than one day.

For the model that included exports only, the coefficient for the export effect was positive and well-supported, indicating higher survival probabilities with greater exports. In the model including both exports and flow, the export coefficient remained positive but was not well-supported with a mean effect that included zero in the distribution. This positive effect of exports may seem contradictory based on coded wire tag studies used in the previous model version that includes a weak, yet negative effect (Newman and Brandes 2010). Hydrodynamic analysis indicates that there is little effect of exports on hydrodynamics in the Sacramento River (Cavallo et al. 2015), and only fish entering the interior Delta, and the Old-Middle River corridor specifically, are likely to be exposed to the hydrodynamic effects of exports (Reclamation 2019). Previous studies of export effects relied on the relative survival of coded wire tagged salmon released into Georgiana Slough relative to the Sacramento River (Newman and Brandes 2010). Thus, export effects in the coded wire tag studies are not directly estimated for fish in the area of interest. In previous workshops and comments, it was suggested that modeling potential effects of exports on individually tagged fish would be a superior approach. The JSATS data analyzed

here represents the best dataset available and covers a wide range of export conditions. Thus, the data strongly suggest the absence of a negative effect of exports on survival of Sacramento River-origin Chinook salmon that enter the interior Delta.

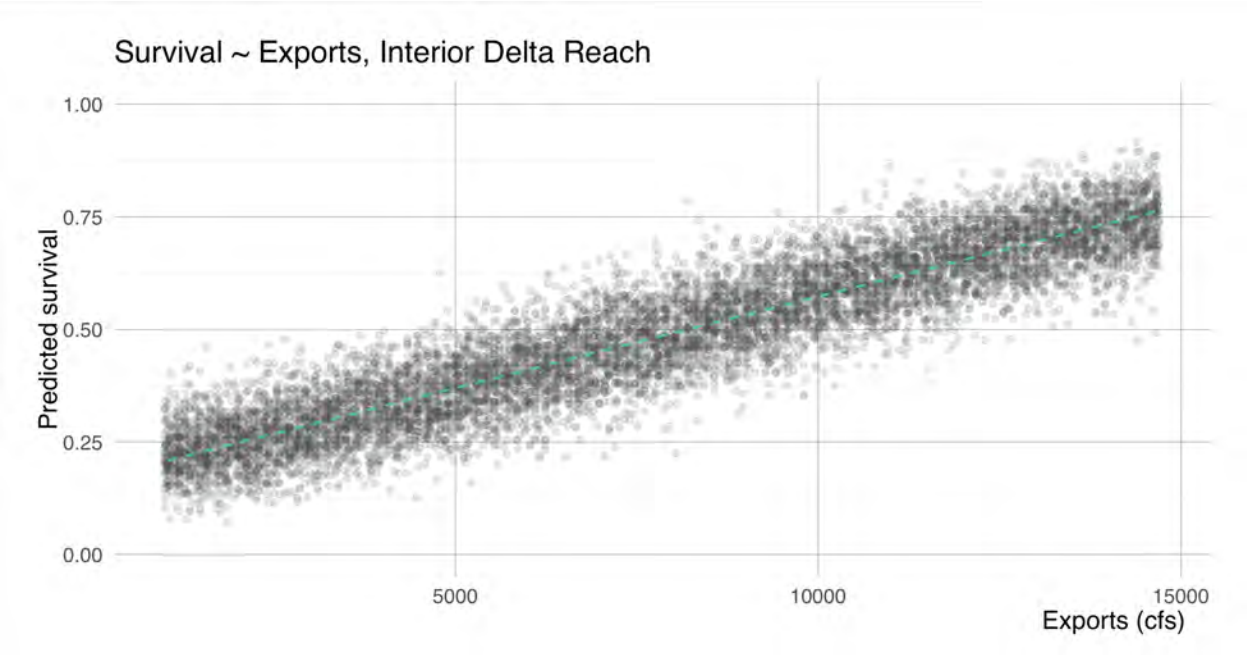



Figure I.6-10. Relationship between Exports and Survival of JSATS-Tagged Juvenile Chinook Salmon. The coefficient for the effect of exports was well-supported with a credible interval that did not include zero.

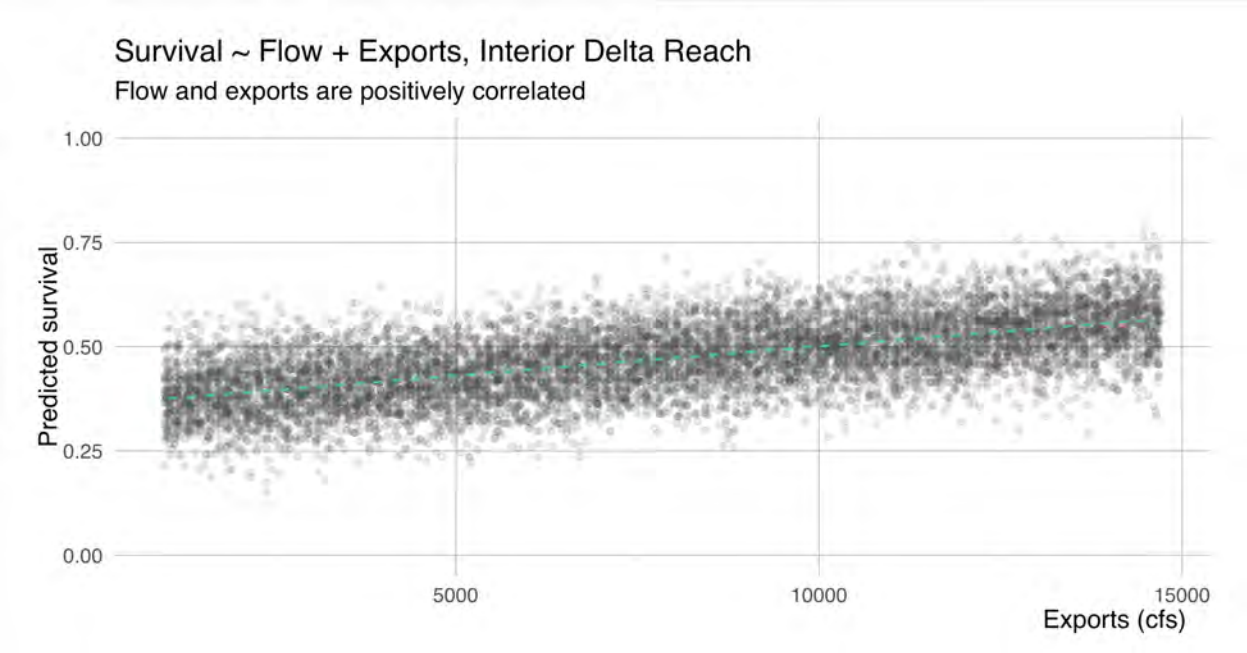



Figure I.6-11. Relationship between Exports and Survival of JSATS-Tagged Juvenile Chinook Salmon with Freeport Flow Was Held at the Mean Value. When flow is included in the model, the effect of exports on survival remains positive but is no longer well-supported.

### I.6.2.11 Assumptions / Uncertainty

The DPM is based primarily on studies of winter-run Chinook salmon smolt surrogates (late fall–run Chinook salmon), it is applied here for winter-run, spring-run, fall-run, and late fall–run Chinook salmon by adjusting emigration timing and assuming that all migrating Chinook salmon smolts will respond similarly to Delta conditions. The DPM results presented here reflect the current version of the model, which continues to be reviewed and refined, and for which a sensitivity analysis has been completed to examine various aspects of uncertainty related to the model's inputs and parameters.

Although studies have shown considerable variation in emigrant size, with Central Valley Chinook salmon migrating as fry, parr, or smolts (Brandes and McLain 2001; Williams 2001), the DPM relies predominantly on data from acoustic-tagging studies of large (>140 mm) smolts, and therefore should be applied very cautiously to pre-smolt migrants. Salmon juveniles less than 70 mm are more likely to exhibit rearing behavior in the Delta (Moyle 2002) and thus likely will be represented poorly by the DPM. It has been assumed that the downstream emigration of fry, when spawning grounds are well upstream, is probably a dispersal mechanism that helps distribute fry among suitable rearing habitats. However, even when rearing habitat does not appear to be a limiting factor, downstream movement of fry still may be observed, suggesting that fry emigration is a viable alternative life-history strategy (Healy 1980; Healey and Jordan 1982; Miller et al. 2010). Unfortunately, survival data are lacking for small (fry-sized) juvenile emigrants because of the difficulty of tagging such small individuals. Therefore, the DPM should be viewed as a smolt survival model only, with its survival relationships generally having been

derived from larger smolts (>140 mm), with the fate of pre-smolt emigrants not incorporated into model results.

The DPM has undergone substantial revisions based on comments received through the Bay Delta Conservation Plan (BDCP) preliminary proposal anadromous team meetings and in particular through feedback received during a workshop held on August 24, 2010, a 2-day workshop held June 23–24, 2011, and since then from various meetings of a workgroup consisting of agency biologists and consultants. This analysis uses the most recent version of the DPM as of September 2015. The DPM is viewed as a simulation framework that can be changed as more data or new hypotheses regarding smolt migration and survival become available. The results are based on these revisions. Uncertainty is explicitly modeled in the DPM by incorporating environmental stochasticity and estimation error whenever available.

#### I.6.2.12 Code and Data Repository

Analysis files for DPM input data and DPM analysis are available upon request.

## I.6.3 Results

### I.6.3.1 EIS: Narrative, Tables, and Figure Results

Under Alt1, mean annual predicted survival to Chipps Island is lower than NAA, ranging from 3.5% higher in 1977 to 8.6% lower in 1988 compared to the NAA for Winter-run Chinook salmon. (Figure I.6-11 and Table I.6-5).

Under Alt2 With TUCP Without VA, mean annual predicted survival to Chipps Island is lower than NAA, ranging from 3% higher in 1990 to 2.3% lower in 1972 compared to the NAA for Winter-run Chinook salmon.

Under Alt2 Without TUCP Delta VA, mean annual predicted survival to Chipps Island is higher than NAA, ranging from 4.1% higher in 1924 to 5.3% lower in 1988 compared to the NAA for Winter-run Chinook salmon.

Under Alt2 Without TUCP Systemwide VA, mean annual predicted survival to Chipps Island is higher than NAA, ranging from 8% higher in 1991 to 2.6% lower in 1993 compared to the NAA for Winter-run Chinook salmon.

Under Alt2 Without TUCP Without VA, mean annual predicted survival to Chipps Island is higher than NAA, ranging from 4.7% higher in 1924 to 2.9% lower in 1993 compared to the NAA for Winter-run Chinook salmon.

Under Alt3, mean annual predicted survival to Chipps Island is higher than NAA, ranging from 14% higher in 1972 to 0.4% lower in 1949 compared to the NAA for Winter-run Chinook salmon.

Under Alt4, mean annual predicted survival to Chipps Island is higher than NAA, ranging from 2.8% higher in 1992 to 2.2% lower in 1929 compared to the NAA for Winter-run Chinook salmon.

Under Act5, mean annual predicted survival to Chipps Island is higher than NAA, ranging from 5.7% higher in 2010 to 4.3% lower in 1988 compared to the NAA for Winter-run Chinook salmon.

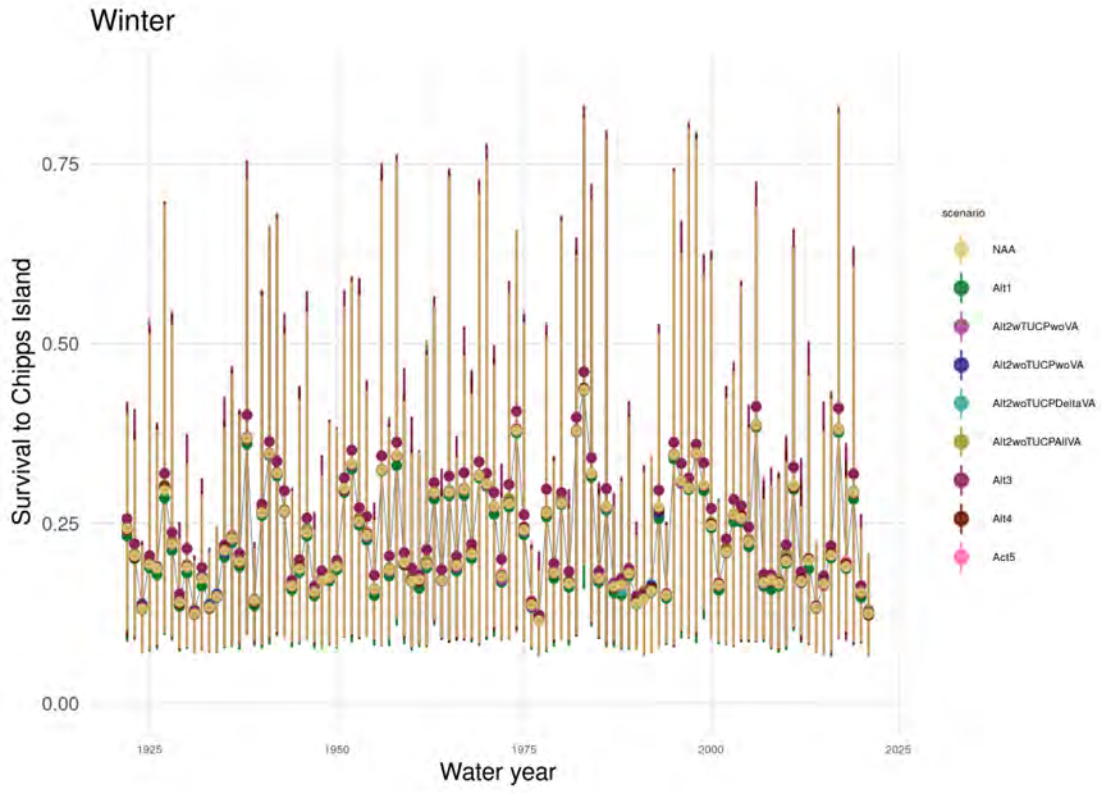



Figure I.6-12. Predicted annual winter-run Chinook salmon survival to Chipps Island.

Table I.6-5. Mean predicted annual winter-run Chinook salmon survival to Chipps Island. Percentage difference from NAA in parenthesis.

| Water Year | Water Year Type | Run | NAA | Alt1 | Alt2wTUCPwoVA | Alt2woTUCPwoVA | Alt2woTUCPDeltaVA | Alt2woTUCPAllVA | Alt3 | Alt4 | Act5 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1922 | Above Normal | Winter | 0.24 | 0.233 (-4.14%) | 0.241 (-0.70%) | 0.241 (-0.60%) | 0.243 (0.05%) | 0.246 (1.12%) | 0.257 (5.64%) | 0.240 (-1.15%) | 0.242 (-0.21%) |
| 1923 | Below Normal | Winter | 0.21 | 0.202 (-1.53%) | 0.204 (-0.25%) | 0.205 (-0.14%) | 0.205 (-0.01%) | 0.209 (1.88%) | 0.222 (8.24%) | 0.202 (-1.16%) | 0.208 (1.47%) |
| 1924 | Critical | Winter | 0.13 | 0.130 (-1.06%) | 0.133 (0.72%) | 0.138 (4.65%) | 0.137 (4.14%) | 0.138 (4.73%) | 0.136 (2.81%) | 0.131 (-0.29%) | 0.134 (1.93%) |
| 1925 | Dry | Winter | 0.19 | 0.188 (-2.70%) | 0.196 (1.19%) | 0.195 (0.67%) | 0.196 (1.14%) | 0.199 (2.80%) | 0.205 (6.14%) | 0.195 (0.60%) | 0.200 (3.48%) |
| 1926 | Dry | Winter | 0.19 | 0.179 (-4.60%) | 0.189 (0.52%) | 0.189 (0.67%) | 0.189 (0.55%) | 0.190 (1.06%) | 0.190 (1.03%) | 0.188 (0.16%) | 0.190 (1.28%) |
| 1927 | Wet | Winter | 0.3 | 0.286 (-3.65%) | 0.300 (1.32%) | 0.300 (1.23%) | 0.300 (1.29%) | 0.304 (2.38%) | 0.319 (7.65%) | 0.301 (1.47%) | 0.304 (2.60%) |
| 1928 | Above Normal | Winter | 0.22 | 0.212 (-4.18%) | 0.221 (-0.35%) | 0.221 (-0.33%) | 0.222 (0.30%) | 0.225 (1.65%) | 0.237 (7.00%) | 0.223 (0.50%) | 0.226 (1.91%) |
| 1929 | Critical | Winter | 0.14 | 0.135 (-4.14%) | 0.141 (0.35%) | 0.144 (2.41%) | 0.144 (2.09%) | 0.144 (2.36%) | 0.152 (7.91%) | 0.138 (-2.18%) | 0.140 (-0.38%) |
| 1930 | Dry | Winter | 0.19 | 0.181 (-4.52%) | 0.192 (0.96%) | 0.190 (0.30%) | 0.190 (0.41%) | 0.193 (1.49%) | 0.215 (13.31%) | 0.191 (0.74%) | 0.191 (0.93%) |
| 1931 | Critical | Winter | 0.13 | 0.126 (1.28%) | 0.124 (-0.31%) | 0.128 (3.10%) | 0.129 (3.52%) | 0.130 (4.65%) | 0.128 (2.98%) | 0.124 (-0.63%) | 0.125 (0.69%) |
| 1932 | Critical | Winter | 0.17 | 0.163 (-5.93%) | 0.174 (0.04%) | 0.176 (1.63%) | 0.176 (1.51%) | 0.177 (1.89%) | 0.189 (8.85%) | 0.174 (0.14%) | 0.172 (-0.66%) |
| 1933 | Critical | Winter | 0.13 | 0.132 (-1.01%) | 0.133 (-0.67%) | 0.137 (2.69%) | 0.138 (2.84%) | 0.138 (3.10%) | 0.133 (-0.39%) | 0.132 (-1.34%) | 0.133 (-0.47%) |
| 1934 | Critical | Winter | 0.15 | 0.147 (-0.82%) | 0.149 (-0.04%) | 0.152 (2.01%) | 0.151 (1.69%) | 0.151 (1.88%) | 0.149 (0.10%) | 0.148 (-0.20%) | 0.149 (0.02%) |

| Water Year | Water Year Type | Run | NAA | Alt1 | Alt2wTUCPwoVA | Alt2woTUCPwoVA | Alt2woTUCPDeltaVA | Alt2woTUCPAllVA | Alt3 | Alt4 | Act5 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1935 | Below Normal | Winter | 0.21 | 0.203 (-4.26%) | 0.215 (1.18%) | 0.210 (-1.16%) | 0.210 (-1.17%) | 0.212 (-0.35%) | 0.220 (3.52%) | 0.214 (0.82%) | 0.216 (1.58%) |
| 1936 | Below Normal | Winter | 0.23 | 0.223 (-2.69%) | 0.229 (-0.21%) | 0.228 (-0.46%) | 0.227 (-0.96%) | 0.233 (1.36%) | 0.231 (0.54%) | 0.230 (0.10%) | 0.235 (2.27%) |
| 1937 | Below Normal | Winter | 0.2 | 0.190 (-3.51%) | 0.195 (-0.84%) | 0.196 (-0.34%) | 0.197 (-0.11%) | 0.200 (1.27%) | 0.208 (5.52%) | 0.196 (-0.69%) | 0.200 (1.69%) |
| 1938 | Wet | Winter | 0.37 | 0.361 (-2.10%) | 0.370 (0.42%) | 0.369 (0.10%) | 0.368 (0.00%) | 0.370 (0.40%) | 0.401 (8.84%) | 0.367 (-0.36%) | 0.368 (-0.14%) |
| 1939 | Dry | Winter | 0.14 | 0.136 (-5.11%) | 0.143 (0.15%) | 0.144 (0.42%) | 0.144 (0.31%) | 0.144 (0.81%) | 0.144 (0.80%) | 0.141 (-1.87%) | 0.143 (-0.36%) |
| 1940 | Above Normal | Winter | 0.27 | 0.261 (-1.68%) | 0.264 (-0.47%) | 0.264 (-0.43%) | 0.265 (-0.10%) | 0.268 (1.08%) | 0.277 (4.26%) | 0.266 (0.23%) | 0.269 (1.31%) |
| 1941 | Wet | Winter | 0.35 | 0.344 (-0.81%) | 0.346 (-0.33%) | 0.346 (-0.41%) | 0.346 (-0.47%) | 0.346 (-0.44%) | 0.364 (4.76%) | 0.348 (0.13%) | 0.348 (0.35%) |
| 1942 | Wet | Winter | 0.32 | 0.316 (-1.14%) | 0.319 (-0.18%) | 0.319 (-0.22%) | 0.320 (-0.04%) | 0.319 (-0.26%) | 0.337 (5.16%) | 0.321 (0.29%) | 0.321 (0.17%) |
| 1943 | Wet | Winter | 0.27 | 0.266 (-0.70%) | 0.266 (-0.43%) | 0.267 (-0.30%) | 0.267 (-0.16%) | 0.269 (0.54%) | 0.295 (10.44%) | 0.268 (0.25%) | 0.269 (0.71%) |
| 1944 | Dry | Winter | 0.16 | 0.158 (-3.55%) | 0.163 (-0.10%) | 0.164 (0.09%) | 0.164 (0.55%) | 0.166 (1.49%) | 0.171 (4.84%) | 0.163 (-0.55%) | 0.165 (0.85%) |
| 1945 | Dry | Winter | 0.19 | 0.182 (-2.66%) | 0.189 (0.97%) | 0.189 (0.80%) | 0.190 (1.29%) | 0.194 (3.44%) | 0.200 (6.62%) | 0.190 (1.47%) | 0.195 (4.22%) |
| 1946 | Below Normal | Winter | 0.24 | 0.233 (-1.93%) | 0.238 (0.30%) | 0.238 (0.39%) | 0.239 (0.71%) | 0.243 (2.69%) | 0.257 (8.59%) | 0.237 (0.08%) | 0.240 (1.43%) |
| 1947 | Dry | Winter | 0.16 | 0.150 (-3.24%) | 0.154 (-0.21%) | 0.155 (-0.03%) | 0.155 (0.37%) | 0.156 (1.03%) | 0.162 (5.01%) | 0.154 (-0.68%) | 0.156 (1.15%) |
| 1948 | Dry | Winter | 0.17 | 0.171 (0.23%) | 0.173 (1.32%) | 0.172 (1.28%) | 0.171 (0.63%) | 0.173 (1.84%) | 0.185 (8.35%) | 0.170 (-0.24%) | 0.174 (2.41%) |

| Water Year | Water Year Type | Run | NAA | Alt1 | Alt2wTUCPwoVA | Alt2woTUCPwoVA | Alt2woTUCPDeltaVA | Alt2woTUCPAllVA | Alt3 | Alt4 | Act5 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1949 | Dry | Winter | 0.18 | 0.170 (-2.75%) | 0.174 (-0.50%) | 0.175 (-0.30%) | 0.175 (-0.29%) | 0.177 (1.08%) | 0.174 (-0.42%) | 0.175 (-0.07%) | 0.176 (0.43%) |
| 1950 | Dry | Winter | 0.19 | 0.186 (-2.44%) | 0.191 (0.34%) | 0.191 (0.27%) | 0.191 (0.46%) | 0.195 (2.38%) | 0.199 (4.39%) | 0.191 (0.34%) | 0.195 (2.42%) |
| 1951 | Above Normal | Winter | 0.3 | 0.294 (-1.69%) | 0.296 (-0.83%) | 0.296 (-0.82%) | 0.297 (-0.57%) | 0.298 (-0.20%) | 0.313 (4.83%) | 0.297 (-0.60%) | 0.297 (-0.70%) |
| 1952 | Wet | Winter | 0.33 | 0.326 (-2.24%) | 0.331 (-0.71%) | 0.331 (-0.70%) | 0.331 (-0.64%) | 0.331 (-0.57%) | 0.352 (5.70%) | 0.332 (-0.28%) | 0.333 (-0.09%) |
| 1953 | Above Normal | Winter | 0.25 | 0.248 (-2.17%) | 0.252 (-0.28%) | 0.252 (-0.24%) | 0.254 (0.27%) | 0.258 (2.05%) | 0.272 (7.50%) | 0.254 (0.37%) | 0.259 (2.35%) |
| 1954 | Above Normal | Winter | 0.23 | 0.227 (-2.97%) | 0.231 (-1.11%) | 0.232 (-0.86%) | 0.233 (-0.28%) | 0.236 (0.94%) | 0.260 (10.92%) | 0.235 (0.65%) | 0.239 (1.94%) |
| 1955 | Dry | Winter | 0.16 | 0.150 (-5.38%) | 0.158 (-0.17%) | 0.158 (-0.35%) | 0.158 (-0.43%) | 0.159 (0.34%) | 0.178 (12.14%) | 0.158 (-0.28%) | 0.160 (0.62%) |
| 1956 | Wet | Winter | 0.32 | 0.323 (-0.41%) | 0.325 (0.10%) | 0.325 (0.13%) | 0.324 (-0.13%) | 0.324 (-0.02%) | 0.344 (6.05%) | 0.325 (0.13%) | 0.325 (0.02%) |
| 1957 | Below Normal | Winter | 0.19 | 0.177 (-4.54%) | 0.184 (-0.99%) | 0.184 (-1.03%) | 0.185 (-0.23%) | 0.189 (1.73%) | 0.205 (10.37%) | 0.186 (0.04%) | 0.188 (1.06%) |
| 1958 | Wet | Winter | 0.34 | 0.330 (-4.07%) | 0.344 (-0.15%) | 0.344 (-0.25%) | 0.344 (-0.15%) | 0.344 (-0.08%) | 0.363 (5.30%) | 0.344 (-0.07%) | 0.343 (-0.46%) |
| 1959 | Below Normal | Winter | 0.2 | 0.192 (-1.83%) | 0.194 (-0.98%) | 0.194 (-0.78%) | 0.194 (-0.88%) | 0.196 (0.11%) | 0.209 (6.81%) | 0.193 (-1.46%) | 0.198 (0.90%) |
| 1960 | Dry | Winter | 0.17 | 0.169 (-0.62%) | 0.172 (1.10%) | 0.172 (0.93%) | 0.172 (1.14%) | 0.175 (3.06%) | 0.188 (10.55%) | 0.172 (0.96%) | 0.171 (0.67%) |
| 1961 | Dry | Winter | 0.17 | 0.160 (-7.03%) | 0.172 (-0.25%) | 0.172 (-0.31%) | 0.171 (-0.97%) | 0.172 (-0.23%) | 0.178 (3.47%) | 0.169 (-1.94%) | 0.171 (-0.77%) |
| 1962 | Dry | Winter | 0.19 | 0.189 (-2.52%) | 0.194 (0.33%) | 0.194 (0.41%) | 0.195 (0.79%) | 0.199 (2.87%) | 0.214 (10.42%) | 0.195 (0.54%) | 0.198 (2.50%) |

| Water Year | Water Year Type | Run | NAA | Alt1 | Alt2wTUCPwoVA | Alt2woTUCPwoVA | Alt2woTUCPDeltaVA | Alt2woTUCPAllVA | Alt3 | Alt4 | Act5 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1963 | Wet | Winter | 0.29 | 0.284 (-3.08%) | 0.292 (-0.45%) | 0.292 (-0.47%) | 0.293 (-0.10%) | 0.294 (0.28%) | 0.307 (4.73%) | 0.293 (-0.18%) | 0.292 (-0.20%) |
| 1964 | Dry | Winter | 0.17 | 0.171 (-0.22%) | 0.170 (-0.31%) | 0.170 (-0.29%) | 0.170 (-0.71%) | 0.171 (0.05%) | 0.186 (8.71%) | 0.172 (0.52%) | 0.171 (-0.24%) |
| 1965 | Wet | Winter | 0.29 | 0.289 (-1.66%) | 0.294 (-0.08%) | 0.294 (-0.03%) | 0.295 (0.44%) | 0.296 (0.78%) | 0.316 (7.65%) | 0.294 (0.19%) | 0.296 (0.62%) |
| 1966 | Below Normal | Winter | 0.19 | 0.184 (-4.39%) | 0.189 (-1.82%) | 0.189 (-1.93%) | 0.190 (-1.35%) | 0.193 (0.27%) | 0.204 (6.26%) | 0.194 (0.70%) | 0.193 (0.53%) |
| 1967 | Wet | Winter | 0.3 | 0.289 (-2.64%) | 0.297 (-0.19%) | 0.297 (-0.14%) | 0.297 (-0.02%) | 0.299 (0.53%) | 0.320 (7.84%) | 0.297 (-0.09%) | 0.299 (0.64%) |
| 1968 | Below Normal | Winter | 0.21 | 0.201 (-3.28%) | 0.209 (0.41%) | 0.209 (0.24%) | 0.210 (0.74%) | 0.212 (1.90%) | 0.222 (6.53%) | 0.211 (1.34%) | 0.214 (2.97%) |
| 1969 | Wet | Winter | 0.32 | 0.314 (-0.91%) | 0.316 (-0.07%) | 0.316 (-0.18%) | 0.316 (-0.16%) | 0.316 (-0.19%) | 0.336 (6.06%) | 0.317 (0.05%) | 0.316 (-0.25%) |
| 1970 | Wet | Winter | 0.31 | 0.302 (-1.18%) | 0.304 (-0.58%) | 0.304 (-0.47%) | 0.304 (-0.32%) | 0.304 (-0.57%) | 0.320 (4.70%) | 0.305 (-0.11%) | 0.305 (0.01%) |
| 1971 | Wet | Winter | 0.27 | 0.263 (-4.08%) | 0.273 (-0.32%) | 0.273 (-0.40%) | 0.273 (-0.33%) | 0.273 (-0.32%) | 0.293 (6.85%) | 0.273 (-0.29%) | 0.274 (0.01%) |
| 1972 | Below Normal | Winter | 0.18 | 0.168 (-4.20%) | 0.172 (-2.30%) | 0.172 (-2.22%) | 0.174 (-0.85%) | 0.178 (1.29%) | 0.200 (14.00%) | 0.177 (0.61%) | 0.181 (2.93%) |
| 1973 | Above Normal | Winter | 0.28 | 0.273 (-1.72%) | 0.279 (0.54%) | 0.279 (0.47%) | 0.280 (0.68%) | 0.284 (2.37%) | 0.304 (9.51%) | 0.279 (0.42%) | 0.282 (1.56%) |
| 1974 | Wet | Winter | 0.38 | 0.376 (-1.05%) | 0.380 (-0.02%) | 0.380 (0.07%) | 0.379 (-0.24%) | 0.379 (-0.07%) | 0.406 (6.99%) | 0.381 (0.39%) | 0.383 (0.77%) |
| 1975 | Above Normal | Winter | 0.24 | 0.235 (-2.75%) | 0.239 (-0.78%) | 0.240 (-0.67%) | 0.242 (0.17%) | 0.244 (1.26%) | 0.262 (8.71%) | 0.244 (1.38%) | 0.245 (1.67%) |
| 1976 | Critical | Winter | 0.14 | 0.133 (-2.98%) | 0.135 (-1.91%) | 0.135 (-1.93%) | 0.135 (-1.63%) | 0.135 (-1.51%) | 0.141 (2.76%) | 0.139 (1.54%) | 0.143 (3.99%) |

| Water Year | Water Year Type | Run | NAA | Alt1 | Alt2wTUCPwoVA | Alt2woTUCPwoVA | Alt2woTUCPDeltaVA | Alt2woTUCPAllVA | Alt3 | Alt4 | Act5 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1977 | Critical | Winter | 0.12 | 0.119 (3.49%) | 0.115 (0.00%) | 0.120 (4.49%) | 0.118 (2.26%) | 0.118 (2.90%) | 0.123 (6.67%) | 0.117 (1.17%) | 0.121 (5.22%) |
| 1978 | Above Normal | Winter | 0.27 | 0.259 (-2.07%) | 0.265 (0.26%) | 0.263 (-0.49%) | 0.265 (0.18%) | 0.267 (0.92%) | 0.298 (12.52%) | 0.263 (-0.48%) | 0.266 (0.66%) |
| 1979 | Dry | Winter | 0.18 | 0.174 (-4.30%) | 0.182 (0.03%) | 0.182 (0.44%) | 0.183 (0.59%) | 0.185 (2.07%) | 0.194 (7.09%) | 0.181 (-0.37%) | 0.184 (1.36%) |
| 1980 | Above Normal | Winter | 0.28 | 0.276 (-0.84%) | 0.279 (0.10%) | 0.280 (0.29%) | 0.280 (0.54%) | 0.285 (2.29%) | 0.293 (5.05%) | 0.279 (-0.02%) | 0.282 (1.17%) |
| 1981 | Dry | Winter | 0.17 | 0.161 (-3.45%) | 0.168 (0.35%) | 0.168 (0.45%) | 0.169 (1.22%) | 0.171 (2.01%) | 0.183 (9.78%) | 0.169 (1.09%) | 0.169 (0.97%) |
| 1982 | Wet | Winter | 0.38 | 0.378 (-0.34%) | 0.378 (-0.28%) | 0.378 (-0.20%) | 0.377 (-0.60%) | 0.378 (-0.18%) | 0.397 (4.86%) | 0.380 (0.25%) | 0.378 (-0.27%) |
| 1983 | Wet | Winter | 0.44 | 0.435 (-0.24%) | 0.436 (0.03%) | 0.436 (0.10%) | 0.437 (0.13%) | 0.437 (0.25%) | 0.461 (5.77%) | 0.438 (0.55%) | 0.437 (0.32%) |
| 1984 | Wet | Winter | 0.32 | 0.315 (-1.52%) | 0.319 (-0.07%) | 0.319 (-0.04%) | 0.319 (-0.01%) | 0.319 (-0.06%) | 0.341 (6.84%) | 0.319 (-0.23%) | 0.319 (-0.16%) |
| 1985 | Below Normal | Winter | 0.17 | 0.168 (-3.13%) | 0.173 (-0.66%) | 0.172 (-0.80%) | 0.173 (-0.58%) | 0.174 (-0.07%) | 0.183 (5.49%) | 0.174 (0.08%) | 0.174 (0.04%) |
| 1986 | Wet | Winter | 0.27 | 0.269 (-1.87%) | 0.273 (-0.41%) | 0.272 (-0.56%) | 0.273 (-0.50%) | 0.272 (-0.54%) | 0.299 (9.09%) | 0.274 (-0.08%) | 0.272 (-0.63%) |
| 1987 | Dry | Winter | 0.16 | 0.154 (-5.21%) | 0.167 (2.94%) | 0.167 (3.14%) | 0.166 (2.28%) | 0.168 (3.25%) | 0.165 (1.70%) | 0.160 (-1.40%) | 0.163 (0.74%) |
| 1988 | Critical | Winter | 0.17 | 0.151 (-8.57%) | 0.165 (-0.00%) | 0.165 (-0.27%) | 0.156 (-5.27%) | 0.167 (1.04%) | 0.173 (5.06%) | 0.166 (0.42%) | 0.158 (-4.34%) |
| 1989 | Dry | Winter | 0.18 | 0.176 (-2.28%) | 0.180 (-0.06%) | 0.180 (-0.19%) | 0.182 (0.51%) | 0.182 (0.91%) | 0.188 (3.83%) | 0.181 (0.37%) | 0.179 (-1.04%) |
| 1990 | Critical | Winter | 0.14 | 0.138 (-0.81%) | 0.143 (3.03%) | 0.143 (3.19%) | 0.143 (3.30%) | 0.145 (4.41%) | 0.149 (7.39%) | 0.142 (2.18%) | 0.145 (4.06%) |

| Water Year | Water Year Type | Run | NAA | Alt1 | Alt2wTUCPwoVA | Alt2woTUCPwoVA | Alt2woTUCPDeltaVA | Alt2woTUCPAllVA | Alt3 | Alt4 | Act5 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1991 | Critical | Winter | 0.15 | 0.147 (1.38%) | 0.146 (0.73%) | 0.150 (3.36%) | 0.145 (0.08%) | 0.157 (7.95%) | 0.154 (5.77%) | 0.147 (1.22%) | 0.153 (5.42%) |
| 1992 | Critical | Winter | 0.16 | 0.155 (-0.97%) | 0.159 (1.99%) | 0.162 (3.73%) | 0.162 (3.90%) | 0.161 (2.89%) | 0.160 (2.13%) | 0.161 (2.84%) | 0.160 (2.11%) |
| 1993 | Above Normal | Winter | 0.27 | 0.257 (-5.78%) | 0.271 (-0.66%) | 0.265 (-2.88%) | 0.266 (-2.68%) | 0.266 (-2.64%) | 0.296 (8.50%) | 0.269 (-1.28%) | 0.269 (-1.39%) |
| 1994 | Critical | Winter | 0.15 | 0.146 (-2.59%) | 0.151 (0.53%) | 0.151 (0.33%) | 0.150 (0.02%) | 0.152 (0.75%) | 0.153 (1.51%) | 0.150 (-0.17%) | 0.152 (1.10%) |
| 1995 | Wet | Winter | 0.35 | 0.340 (-1.85%) | 0.346 (-0.11%) | 0.346 (-0.13%) | 0.345 (-0.32%) | 0.346 (-0.12%) | 0.363 (4.79%) | 0.347 (0.18%) | 0.344 (-0.61%) |
| 1996 | Wet | Winter | 0.31 | 0.307 (-0.76%) | 0.306 (-1.17%) | 0.306 (-1.14%) | 0.307 (-0.94%) | 0.307 (-0.93%) | 0.333 (7.70%) | 0.310 (-0.02%) | 0.309 (-0.12%) |
| 1997 | Wet | Winter | 0.3 | 0.298 (-0.88%) | 0.299 (-0.23%) | 0.300 (-0.03%) | 0.300 (-0.16%) | 0.300 (-0.18%) | 0.313 (4.28%) | 0.301 (0.30%) | 0.301 (0.36%) |
| 1998 | Wet | Winter | 0.35 | 0.347 (-0.35%) | 0.347 (-0.33%) | 0.347 (-0.28%) | 0.347 (-0.13%) | 0.347 (-0.32%) | 0.360 (3.63%) | 0.348 (0.05%) | 0.349 (0.33%) |
| 1999 | Wet | Winter | 0.3 | 0.296 (-2.59%) | 0.302 (-0.40%) | 0.302 (-0.50%) | 0.302 (-0.55%) | 0.302 (-0.44%) | 0.334 (10.14%) | 0.303 (-0.34%) | 0.302 (-0.62%) |
| 2000 | Above Normal | Winter | 0.25 | 0.244 (-1.44%) | 0.248 (0.42%) | 0.249 (0.51%) | 0.249 (0.69%) | 0.252 (1.70%) | 0.271 (9.56%) | 0.250 (1.00%) | 0.252 (1.69%) |
| 2001 | Dry | Winter | 0.16 | 0.157 (-4.36%) | 0.165 (0.07%) | 0.165 (0.36%) | 0.165 (0.34%) | 0.166 (1.18%) | 0.167 (1.79%) | 0.164 (-0.27%) | 0.166 (0.77%) |
| 2002 | Below Normal | Winter | 0.21 | 0.209 (-0.74%) | 0.210 (-0.40%) | 0.210 (-0.26%) | 0.210 (-0.22%) | 0.217 (2.75%) | 0.229 (8.43%) | 0.213 (0.95%) | 0.215 (2.01%) |
| 2003 | Above Normal | Winter | 0.26 | 0.252 (-3.83%) | 0.262 (-0.08%) | 0.262 (-0.14%) | 0.262 (-0.17%) | 0.263 (0.39%) | 0.284 (8.12%) | 0.262 (-0.11%) | 0.260 (-1.00%) |
| 2004 | Above Normal | Winter | 0.26 | 0.252 (-2.06%) | 0.256 (-0.48%) | 0.256 (-0.52%) | 0.257 (-0.32%) | 0.261 (1.28%) | 0.275 (6.83%) | 0.261 (1.43%) | 0.265 (2.79%) |

| Water Year | Water Year Type | Run | NAA | Alt1 | Alt2wTUCPwoVA | Alt2woTUCPwoVA | Alt2woTUCPDeltaVA | Alt2woTUCPAllVA | Alt3 | Alt4 | Act5 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2005 | Below Normal | Winter | 0.23 | 0.218 (-3.09%) | 0.224 (-0.30%) | 0.224 (-0.29%) | 0.225 (0.30%) | 0.227 (1.11%) | 0.245 (9.06%) | 0.226 (0.40%) | 0.229 (1.92%) |
| 2006 | Wet | Winter | 0.39 | 0.384 (-0.66%) | 0.386 (-0.17%) | 0.386 (-0.20%) | 0.388 (0.24%) | 0.386 (-0.08%) | 0.412 (6.61%) | 0.386 (-0.24%) | 0.387 (0.18%) |
| 2007 | Below Normal | Winter | 0.17 | 0.163 (-3.26%) | 0.167 (-0.75%) | 0.167 (-0.80%) | 0.167 (-0.70%) | 0.169 (0.52%) | 0.179 (6.59%) | 0.169 (0.47%) | 0.173 (2.70%) |
| 2008 | Dry | Winter | 0.17 | 0.158 (-7.71%) | 0.171 (-0.68%) | 0.171 (-0.36%) | 0.170 (-0.91%) | 0.171 (-0.65%) | 0.179 (4.12%) | 0.169 (-1.34%) | 0.170 (-0.80%) |
| 2009 | Dry | Winter | 0.17 | 0.162 (-2.34%) | 0.167 (0.44%) | 0.167 (0.69%) | 0.168 (0.85%) | 0.172 (3.69%) | 0.169 (1.32%) | 0.167 (0.59%) | 0.165 (-0.72%) |
| 2010 | Below Normal | Winter | 0.2 | 0.194 (-1.75%) | 0.200 (0.95%) | 0.199 (0.62%) | 0.201 (1.79%) | 0.206 (3.95%) | 0.220 (11.49%) | 0.200 (1.31%) | 0.209 (5.70%) |
| 2011 | Wet | Winter | 0.3 | 0.297 (-1.69%) | 0.300 (-0.79%) | 0.301 (-0.58%) | 0.301 (-0.55%) | 0.300 (-0.69%) | 0.328 (8.61%) | 0.300 (-0.85%) | 0.302 (-0.04%) |
| 2012 | Below Normal | Winter | 0.17 | 0.168 (-1.20%) | 0.169 (-0.57%) | 0.169 (-0.69%) | 0.170 (-0.22%) | 0.173 (1.79%) | 0.183 (7.63%) | 0.173 (1.99%) | 0.177 (4.32%) |
| 2013 | Dry | Winter | 0.2 | 0.187 (-5.98%) | 0.200 (0.54%) | 0.200 (0.41%) | 0.200 (0.80%) | 0.201 (1.19%) | 0.201 (1.36%) | 0.200 (0.76%) | 0.202 (1.39%) |
| 2014 | Critical | Winter | 0.13 | 0.133 (-0.26%) | 0.133 (-0.04%) | 0.135 (1.26%) | 0.135 (1.09%) | 0.134 (0.93%) | 0.135 (1.67%) | 0.132 (-0.56%) | 0.133 (0.24%) |
| 2015 | Critical | Winter | 0.17 | 0.168 (1.33%) | 0.165 (-0.72%) | 0.171 (3.36%) | 0.171 (3.41%) | 0.172 (3.62%) | 0.177 (6.73%) | 0.165 (-0.38%) | 0.164 (-1.26%) |
| 2016 | Below Normal | Winter | 0.21 | 0.202 (-1.83%) | 0.207 (0.68%) | 0.206 (-0.15%) | 0.206 (0.15%) | 0.210 (2.14%) | 0.219 (6.25%) | 0.208 (1.24%) | 0.212 (2.72%) |
| 2017 | Wet | Winter | 0.38 | 0.377 (-1.33%) | 0.382 (0.01%) | 0.381 (-0.18%) | 0.380 (-0.49%) | 0.380 (-0.39%) | 0.411 (7.65%) | 0.382 (0.01%) | 0.381 (-0.21%) |
| 2018 | Below Normal | Winter | 0.19 | 0.187 (-1.49%) | 0.191 (0.56%) | 0.191 (0.61%) | 0.192 (1.20%) | 0.195 (2.58%) | 0.194 (2.26%) | 0.193 (1.63%) | 0.198 (4.21%) |

| Water Year | Water Year Type | Run | NAA | Alt1 | Alt2wTUCPwoVA | Alt2woTUCPwoVA | Alt2woTUCPDeltaVA | Alt2woTUCPAllVA | Alt3 | Alt4 | Act5 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2019 | Wet | Winter | 0.29 | 0.284 (-3.19%) | 0.293 (-0.05%) | 0.293 (-0.12%) | 0.295 (0.49%) | 0.294 (0.38%) | 0.319 (8.70%) | 0.292 (-0.55%) | 0.292 (-0.53%) |
| 2020 | Dry | Winter | 0.15 | 0.148 (-4.49%) | 0.153 (-0.99%) | 0.153 (-1.16%) | 0.153 (-1.05%) | 0.154 (-0.61%) | 0.163 (5.73%) | 0.153 (-0.87%) | 0.153 (-0.64%) |
| 2021 | Critical | Winter | 0.13 | 0.123 (-2.18%) | 0.124 (-1.15%) | 0.127 (1.47%) | 0.127 (1.49%) | 0.129 (3.30%) | 0.127 (1.12%) | 0.123 (-1.50%) | 0.125 (-0.43%) |

- **Above Normal**
    - Under Alt1, mean predicted survival to Chipps Island is lower than NAA, ranging from 0.8% lower in Above Normal water years to 5.8% lower in Above Normal water years compared to the NAA for Winter-run Chinook salmon (Figure I.6-12 and Table I.6-6).
    - Under Alt2 With TUCP Without VA, mean predicted survival to Chipps Island is lower than NAA, ranging from 0.5% higher in Above Normal water years to 1.1% lower in Above Normal water years compared to the NAA for Winter-run Chinook salmon.
    - Under Alt2 Without TUCP Delta VA, mean predicted survival to Chipps Island is lower than NAA, ranging from 0.7% higher in Above Normal water years to 2.7% lower in Above Normal water years compared to the NAA for Winter-run Chinook salmon.
    - Under Alt2 Without TUCP Systemwide VA, mean predicted survival to Chipps Island is higher than NAA, ranging from 2.4% higher in Above Normal water years to 2.6% lower in Above Normal water years compared to the NAA for Winter-run Chinook salmon.
    - Under Alt2 Without TUCP Without VA, mean predicted survival to Chipps Island is lower than NAA, ranging from 0.5% higher in Above Normal water years to 2.9% lower in Above Normal water years compared to the NAA for Winter-run Chinook salmon. Under Alt3, mean predicted survival to Chipps Island is higher than NAA, ranging from 12.5% higher in Above Normal water years to 4.3% higher in Above Normal water years compared to the NAA for Winter-run Chinook salmon.
    - Under Alt4, mean predicted survival to Chipps Island is higher than NAA, ranging from 1.4% higher in Above Normal water years to 1.3% lower in Above Normal water years compared to the NAA for Winter-run Chinook salmon.
    - Under Act5, mean predicted survival to Chipps Island is higher than NAA, ranging from 2.8% higher in Above Normal water years to 1.4% lower in Above Normal water years compared to the NAA for Winter-run Chinook salmon.
- **Below Normal**
    - Under Alt1, mean predicted survival to Chipps Island is lower than NAA, ranging from 0.7% lower in Below Normal water years to 4.5% lower in Below Normal water years compared to the NAA for Winter-run Chinook salmon (Figure I.6-12 and Table I.6-6).
    - Under Alt2 With TUCP Without VA, mean predicted survival to Chipps Island is lower than NAA, ranging from 1.2% higher in Below Normal water years to 2.3% lower in Below Normal water years compared to the NAA for Winter-run Chinook salmon.

- Under Alt2 Without TUCP Delta VA, mean predicted survival to Chipps Island is lower than NAA, ranging from 1.8% higher in Below Normal water years to 1.4% lower in Below Normal water years compared to the NAA for Winter-run Chinook salmon.
- Under Alt2 Without TUCP Systemwide VA, mean predicted survival to Chipps Island is higher than NAA, ranging from 4% higher in Below Normal water years to 0.3% lower in Below Normal water years compared to the NAA for Winter-run Chinook salmon.
- Under Alt2 Without TUCP Without VA, mean predicted survival to Chipps Island is lower than NAA, ranging from 0.6% higher in Below Normal water years to 2.2% lower in Below Normal water years compared to the NAA for Winter-run Chinook salmon. Under Alt3, mean predicted survival to Chipps Island is higher than NAA, ranging from 14% higher in Below Normal water years to 0.5% higher in Below Normal water years compared to the NAA for Winter-run Chinook salmon.
- Under Alt4, mean predicted survival to Chipps Island is higher than NAA, ranging from 2% higher in Below Normal water years to 1.5% lower in Below Normal water years compared to the NAA for Winter-run Chinook salmon.
- Under Act5, mean predicted survival to Chipps Island is higher than NAA, ranging from 5.7% higher in Below Normal water years to 0% higher in Below Normal water years compared to the NAA for Winter-run Chinook salmon.

- **Critical**
  - Under Alt1, mean predicted survival to Chipps Island is lower than NAA, ranging from 3.5% higher in Critical water years to 8.6% lower in Critical water years compared to the NAA for Winter-run Chinook salmon (Figure I.6-12 and Table I.6-6).
  - Under Alt2 With TUCP Without VA, mean predicted survival to Chipps Island is higher than NAA, ranging from 3% higher in Critical water years to 1.9% lower in Critical water years compared to the NAA for Winter-run Chinook salmon.
  - Under Alt2 Without TUCP Delta VA, mean predicted survival to Chipps Island is higher than NAA, ranging from 4.1% higher in Critical water years to 5.3% lower in Critical water years compared to the NAA for Winter-run Chinook salmon.
  - Under Alt2 Without TUCP Systemwide VA, mean predicted survival to Chipps Island is higher than NAA, ranging from 8% higher in Critical water years to 1.5% lower in Critical water years compared to the NAA for Winter-run Chinook salmon.
  - Under Alt2 Without TUCP Without VA, mean predicted survival to Chipps Island is higher than NAA, ranging from 4.7% higher in Critical water years to 1.9% lower in Critical water years compared to the NAA for Winter-run Chinook salmon. Under Alt3, mean predicted survival to Chipps Island is higher than

NAA, ranging from 8.8% higher in Critical water years to 0.4% lower in Critical water years compared to the NAA for Winter-run Chinook salmon.

- Under Alt4, mean predicted survival to Chipps Island is higher than NAA, ranging from 2.8% higher in Critical water years to 2.2% lower in Critical water years compared to the NAA for Winter-run Chinook salmon.
- Under Act5, mean predicted survival to Chipps Island is higher than NAA, ranging from 5.4% higher in Critical water years to 4.3% lower in Critical water years compared to the NAA for Winter-run Chinook salmon.

- **Dry**
  - Under Alt1, mean predicted survival to Chipps Island is lower than NAA, ranging from 0.2% higher in Dry water years to 7.7% lower in Dry water years compared to the NAA for Winter-run Chinook salmon (Figure I.6-12 and Table I.6-6).
  - Under Alt2 With TUCP Without VA, mean predicted survival to Chipps Island is higher than NAA, ranging from 2.9% higher in Dry water years to 1% lower in Dry water years compared to the NAA for Winter-run Chinook salmon.
  - Under Alt2 Without TUCP Delta VA, mean predicted survival to Chipps Island is higher than NAA, ranging from 2.3% higher in Dry water years to 1% lower in Dry water years compared to the NAA for Winter-run Chinook salmon.
  - Under Alt2 Without TUCP Systemwide VA, mean predicted survival to Chipps Island is higher than NAA, ranging from 3.7% higher in Dry water years to 0.7% lower in Dry water years compared to the NAA for Winter-run Chinook salmon.
  - Under Alt2 Without TUCP Without VA, mean predicted survival to Chipps Island is higher than NAA, ranging from 3.1% higher in Dry water years to 1.2% lower in Dry water years compared to the NAA for Winter-run Chinook salmon. Under Alt3, mean predicted survival to Chipps Island is higher than NAA, ranging from 13.3% higher in Dry water years to 0.4% lower in Dry water years compared to the NAA for Winter-run Chinook salmon.
  - Under Alt4, mean predicted survival to Chipps Island is lower than NAA, ranging from 1.5% higher in Dry water years to 1.9% lower in Dry water years compared to the NAA for Winter-run Chinook salmon.
  - Under Act5, mean predicted survival to Chipps Island is higher than NAA, ranging from 4.2% higher in Dry water years to 1% lower in Dry water years compared to the NAA for Winter-run Chinook salmon.

- **Wet**
  - Under Alt1, mean predicted survival to Chipps Island is lower than NAA, ranging from 0.2% lower in Wet water years to 4.1% lower in Wet water years compared to the NAA for Winter-run Chinook salmon (Figure I.6-12 and Table I.6-6).

- Under Alt2 With TUCP Without VA, mean predicted survival to Chipps Island is lower than NAA, ranging from 1.3% higher in Wet water years to 1.2% lower in Wet water years compared to the NAA for Winter-run Chinook salmon.
- Under Alt2 Without TUCP Delta VA, mean predicted survival to Chipps Island is lower than NAA, ranging from 1.3% higher in Wet water years to 0.9% lower in Wet water years compared to the NAA for Winter-run Chinook salmon.
- Under Alt2 Without TUCP Systemwide VA, mean predicted survival to Chipps Island is lower than NAA, ranging from 2.4% higher in Wet water years to 0.9% lower in Wet water years compared to the NAA for Winter-run Chinook salmon.
- Under Alt2 Without TUCP Without VA, mean predicted survival to Chipps Island is lower than NAA, ranging from 1.2% higher in Wet water years to 1.1% lower in Wet water years compared to the NAA for Winter-run Chinook salmon. Under Alt3, mean predicted survival to Chipps Island is higher than NAA, ranging from 10.4% higher in Wet water years to 3.6% higher in Wet water years compared to the NAA for Winter-run Chinook salmon.
- Under Alt4, mean predicted survival to Chipps Island is higher than NAA, ranging from 1.5% higher in Wet water years to 0.8% lower in Wet water years compared to the NAA for Winter-run Chinook salmon.
- Under Act5, mean predicted survival to Chipps Island is higher than NAA, ranging from 2.6% higher in Wet water years to 0.6% lower in Wet water years compared to the NAA for Winter-run Chinook salmon.

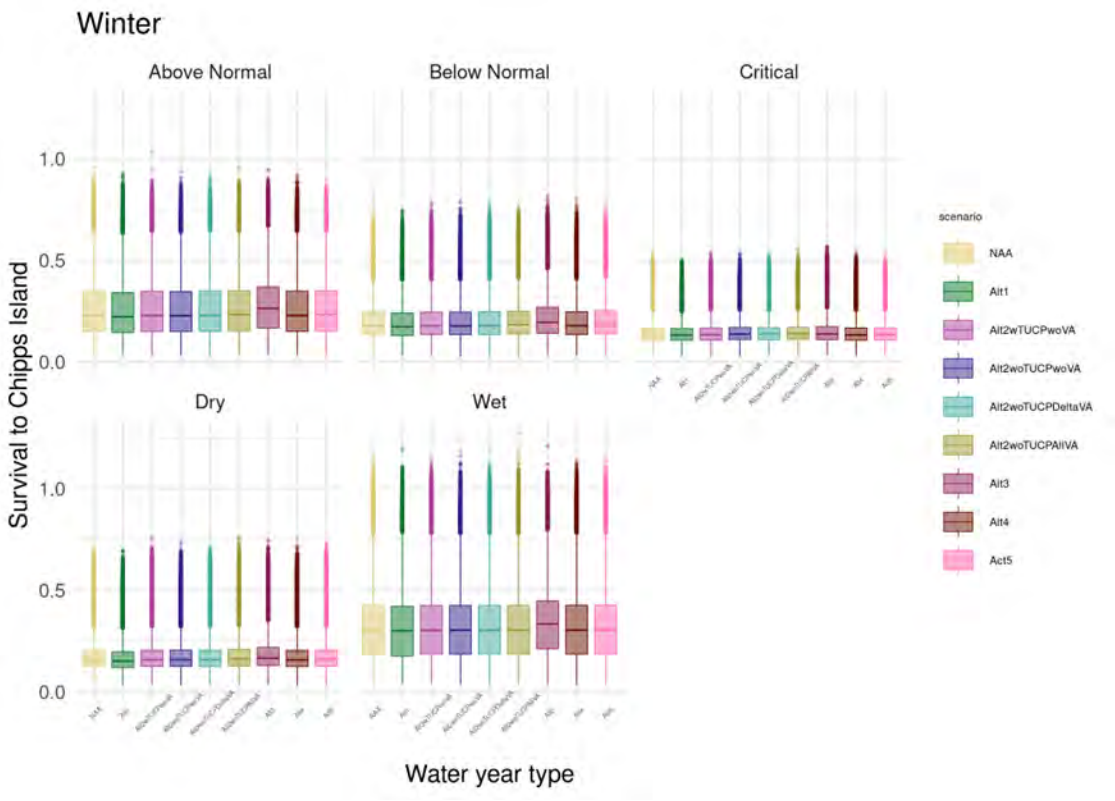



Figure I.6-13. Predicted winter-run Chinook salmon survival to Chipps Island averaged by water year type.

Table I.6-6. Mean predicted Chinook salmon survival to Chipps Island averaged by run and water year type. Parentheses indicate % difference from NAA (negative values indicate a decrease in survival).

| Water Year Type | Run | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Act5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Above Normal | Fall | 0.208 | 0.206 (-0.68%) | 0.206 (-0.81%) | 0.205 (-1.14%) | 0.207 (-0.33%) | 0.212 (2.07%) | 0.225 (8.34%) | 0.206 (-0.75%) | 0.212 (2.12%) |
| Below Normal | Fall | 0.174 | 0.175 (0.42%) | 0.172 (-0.98%) | 0.172 (-1.09%) | 0.172 (-0.79%) | 0.179 (2.75%) | 0.181 (4.33%) | 0.173 (-0.46%) | 0.179 (3.21%) |
| Critical | Fall | 0.122 | 0.129 (5.85%) | 0.123 (0.50%) | 0.129 (5.82%) | 0.129 (6.09%) | 0.131 (7.39%) | 0.130 (6.24%) | 0.122 (0.24%) | 0.124 (1.41%) |
| Dry | Fall | 0.158 | 0.157 (-0.57%) | 0.157 (-0.51%) | 0.157 (-0.52%) | 0.157 (-0.48%) | 0.161 (2.13%) | 0.163 (3.21%) | 0.158 (-0.29%) | 0.161 (1.66%) |
| Wet | Fall | 0.25 | 0.250 (-0.16%) | 0.249 (-0.56%) | 0.249 (-0.60%) | 0.249 (-0.26%) | 0.250 (-0.16%) | 0.272 (8.81%) | 0.249 (-0.55%) | 0.250 (-0.12%) |
| Above Normal | Late Fall | 0.213 | 0.203 (-4.55%) | 0.214 (0.47%) | 0.213 (0.27%) | 0.213 (0.23%) | 0.214 (0.45%) | 0.220 (3.28%) | 0.211 (-1.01%) | 0.207 (-2.63%) |
| Below Normal | Late Fall | 0.173 | 0.168 (-2.93%) | 0.173 (0.19%) | 0.173 (-0.13%) | 0.173 (0.04%) | 0.173 (0.23%) | 0.180 (4.06%) | 0.174 (0.67%) | 0.174 (0.67%) |
| Critical | Late Fall | 0.137 | 0.131 (-4.43%) | 0.138 (0.11%) | 0.137 (-0.26%) | 0.136 (-0.97%) | 0.137 (-0.20%) | 0.141 (2.79%) | 0.138 (0.13%) | 0.138 (0.30%) |
| Dry | Late Fall | 0.151 | 0.144 (-4.49%) | 0.151 (0.56%) | 0.151 (0.46%) | 0.151 (0.49%) | 0.151 (0.43%) | 0.159 (5.51%) | 0.150 (-0.17%) | 0.151 (0.29%) |
| Wet | Late Fall | 0.264 | 0.254 (-3.60%) | 0.264 (0.21%) | 0.264 (0.12%) | 0.264 (-0.00%) | 0.264 (0.13%) | 0.272 (2.93%) | 0.262 (-0.81%) | 0.260 (-1.42%) |
| Above Normal | Spring | 0.271 | 0.265 (-2.33%) | 0.269 (-0.72%) | 0.268 (-1.08%) | 0.270 (-0.16%) | 0.275 (1.69%) | 0.296 (9.31%) | 0.269 (-0.66%) | 0.276 (1.78%) |
| Below Normal | Spring | 0.202 | 0.200 (-0.79%) | 0.201 (-0.62%) | 0.200 (-0.85%) | 0.202 (-0.12%) | 0.208 (3.08%) | 0.219 (8.40%) | 0.203 (0.25%) | 0.210 (3.98%) |

| Water Year Type | Run | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Act5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Critical | Spring | 0.134 | 0.139 (3.80%) | 0.134 (0.12%) | 0.141 (5.19%) | 0.140 (5.13%) | 0.143 (6.70%) | 0.141 (5.60%) | 0.133 (-0.08%) | 0.136 (1.49%) |
| Dry | Spring | 0.182 | 0.179 (-1.51%) | 0.182 (-0.25%) | 0.181 (-0.32%) | 0.182 (0.08%) | 0.187 (2.51%) | 0.191 (5.16%) | 0.182 (-0.11%) | 0.186 (1.90%) |
| Wet | Spring | 0.328 | 0.326 (-0.89%) | 0.327 (-0.60%) | 0.326 (-0.64%) | 0.327 (-0.32%) | 0.328 (-0.29%) | 0.356 (8.40%) | 0.326 (-0.67%) | 0.327 (-0.36%) |
| Above Normal | Winter | 0.258 | 0.252 (-2.63%) | 0.258 (-0.31%) | 0.257 (-0.48%) | 0.258 (-0.10%) | 0.261 (0.99%) | 0.278 (7.73%) | 0.259 (0.14%) | 0.261 (0.94%) |
| Below Normal | Winter | 0.199 | 0.194 (-2.68%) | 0.198 (-0.29%) | 0.198 (-0.48%) | 0.199 (-0.12%) | 0.202 (1.52%) | 0.213 (7.02%) | 0.200 (0.46%) | 0.203 (2.23%) |
| Critical | Winter | 0.143 | 0.140 (-1.67%) | 0.143 (0.18%) | 0.146 (2.17%) | 0.145 (1.45%) | 0.147 (2.77%) | 0.149 (4.04%) | 0.143 (0.17%) | 0.144 (0.95%) |
| Dry | Winter | 0.174 | 0.167 (-3.62%) | 0.174 (0.35%) | 0.174 (0.35%) | 0.174 (0.43%) | 0.176 (1.55%) | 0.183 (5.54%) | 0.174 (-0.03%) | 0.175 (0.96%) |
| Wet | Winter | 0.326 | 0.321 (-1.62%) | 0.326 (-0.19%) | 0.326 (-0.20%) | 0.326 (-0.16%) | 0.326 (-0.04%) | 0.348 (6.62%) | 0.327 (0.03%) | 0.327 (0.09%) |

- Under Alt1, mean annual predicted survival to Chipps Island is lower than NAA, ranging from 15% higher in 1934 to 6.5% lower in 1993 compared to the NAA for Spring-run Chinook salmon (Figure I.6-13 and Table I.6-7).
- Under Alt2 With TUCP Without VA, mean annual predicted survival to Chipps Island is lower than NAA, ranging from 7.3% higher in 1990 to 3.6% lower in 1976 compared to the NAA for Spring-run Chinook salmon.
- Under Alt2 Without TUCP Delta VA, mean annual predicted survival to Chipps Island is higher than NAA, ranging from 14.6% higher in 1934 to 5.2% lower in 1993 compared to the NAA for Spring-run Chinook salmon.
- Under Alt2 Without TUCP Systemwide VA, mean annual predicted survival to Chipps Island is higher than NAA, ranging from 14.8% higher in 1934 to 4.9% lower in 1993 compared to the NAA for Spring-run Chinook salmon.
- Under Alt2 Without TUCP Without VA, mean annual predicted survival to Chipps Island is higher than NAA, ranging from 14.5% higher in 1934 to 4.8% lower in 1993 compared to the NAA for Spring-run Chinook salmon.
- Under Alt3, mean annual predicted survival to Chipps Island is higher than NAA, ranging from 19.8% higher in 1965 to 1.6% lower in 2013 compared to the NAA for Spring-run Chinook salmon.
- Under Alt4, mean annual predicted survival to Chipps Island is lower than NAA, ranging from 6.8% higher in 2012 to 4.4% lower in 1923 compared to the NAA for Spring-run Chinook salmon.
- Under NAA, mean annual predicted survival to Chipps Island is lower than NAA, ranging from 0% lower in 1922 to 0% lower in 1922 compared to the NAA for Spring-run Chinook salmon.
    - Under Act5, mean annual predicted survival to Chipps Island is higher than NAA, ranging from 10% higher in 1990 to 2.5% lower in 2009 compared to the NAA for Spring-run Chinook salmon.

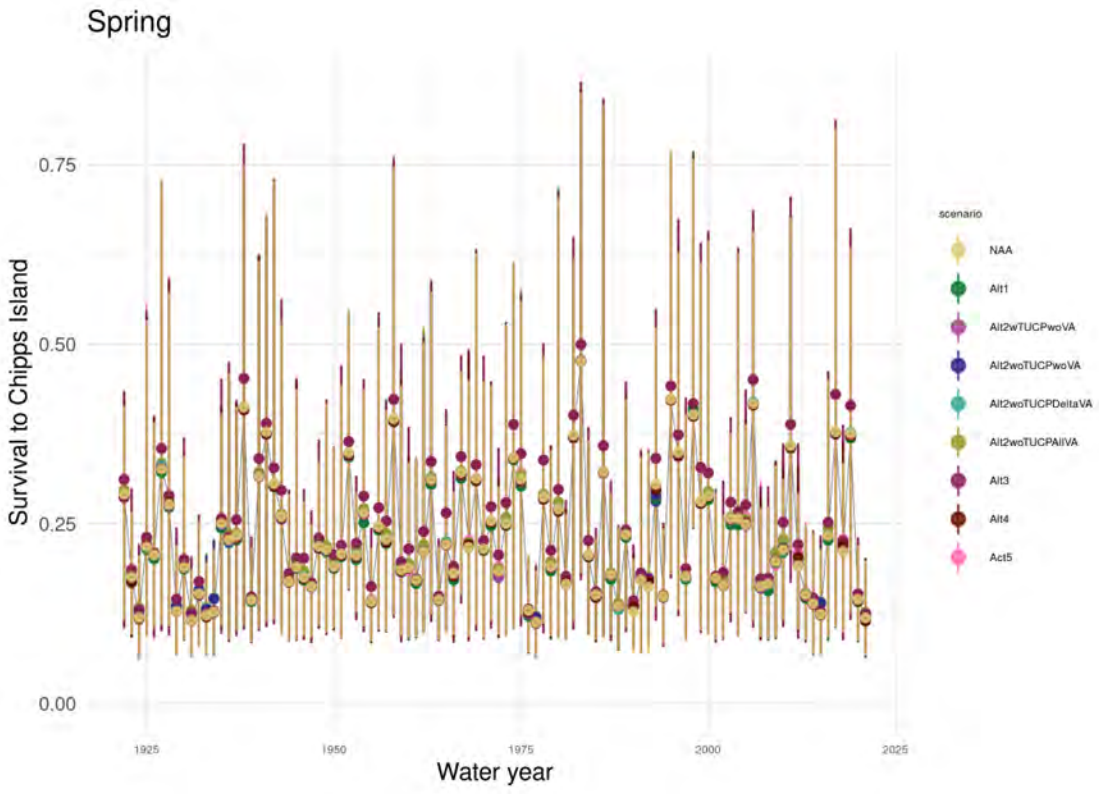



Figure I.6-14. Predicted annual spring-run Chinook salmon survival to Chipps Island.

Table I.6-7. Mean predicted spring-run Chinook salmon survival to Chipps Island averaged by run and water year type. Parentheses indicate % difference from NAA (negative values indicate a decrease in survival).

| Water Year | Water Year Type | Run | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Act5 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1922 | Above Normal | Spring | 0.29 | 0.289 (-0.60%) | 0.286 (-1.62%) | 0.287 (-1.51%) | 0.291 (-0.10%) | 0.296 (1.73%) | 0.312 (7.04%) | 0.289 (-0.83%) | 0.298 (2.38%) |
| 1923 | Below Normal | Spring | 0.18 | 0.171 (-2.53%) | 0.174 (-0.84%) | 0.174 (-0.76%) | 0.175 (-0.15%) | 0.182 (3.60%) | 0.186 (6.12%) | 0.168 (-4.37%) | 0.180 (2.70%) |
| 1924 | Critical | Spring | 0.12 | 0.128 (6.97%) | 0.120 (0.10%) | 0.130 (8.90%) | 0.130 (8.68%) | 0.133 (11.53%) | 0.131 (9.33%) | 0.117 (-1.86%) | 0.122 (1.67%) |
| 1925 | Dry | Spring | 0.22 | 0.215 (-1.54%) | 0.221 (1.29%) | 0.220 (0.61%) | 0.222 (1.57%) | 0.228 (4.31%) | 0.231 (5.96%) | 0.220 (0.75%) | 0.229 (5.08%) |
| 1926 | Dry | Spring | 0.21 | 0.201 (-2.70%) | 0.207 (-0.18%) | 0.206 (-0.33%) | 0.206 (-0.51%) | 0.210 (1.54%) | 0.209 (1.24%) | 0.207 (-0.18%) | 0.210 (1.53%) |
| 1927 | Wet | Spring | 0.33 | 0.322 (-1.39%) | 0.327 (0.33%) | 0.327 (0.31%) | 0.332 (1.64%) | 0.334 (2.28%) | 0.355 (8.66%) | 0.326 (0.02%) | 0.334 (2.37%) |
| 1928 | Above Normal | Spring | 0.28 | 0.273 (-1.55%) | 0.275 (-0.67%) | 0.276 (-0.46%) | 0.279 (0.67%) | 0.286 (3.14%) | 0.289 (4.45%) | 0.279 (0.66%) | 0.289 (4.35%) |
| 1929 | Critical | Spring | 0.13 | 0.135 (5.33%) | 0.128 (0.08%) | 0.136 (6.07%) | 0.136 (6.21%) | 0.137 (7.00%) | 0.145 (13.20%) | 0.128 (-0.07%) | 0.130 (1.61%) |
| 1930 | Dry | Spring | 0.19 | 0.187 (-1.15%) | 0.189 (-0.20%) | 0.189 (-0.04%) | 0.189 (-0.18%) | 0.194 (2.26%) | 0.201 (5.91%) | 0.189 (-0.39%) | 0.193 (1.84%) |
| 1931 | Critical | Spring | 0.12 | 0.125 (7.45%) | 0.115 (-0.91%) | 0.125 (7.40%) | 0.125 (7.63%) | 0.129 (11.10%) | 0.126 (8.76%) | 0.116 (-0.33%) | 0.119 (2.53%) |
| 1932 | Critical | Spring | 0.15 | 0.152 (-0.23%) | 0.151 ( -1.28%) | 0.158 (3.36%) | 0.158 (3.54%) | 0.159 (4.07%) | 0.170 (11.31%) | 0.151 (-1.03%) | 0.151 (-0.99%) |
| 1933 | Critical | Spring | 0.12 | 0.130 (5.89%) | 0.121 (-1.70%) | 0.131 (6.80%) | 0.132 (7.56%) | 0.133 (8.10%) | 0.127 (3.26%) | 0.120 (-2.44%) | 0.122 (-1.01%) |

| Water Year | Water Year Type | Run | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Act5 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1934 | Critical | Spring | 0.13 | 0.147 (15.01%) | 0.127 (-0.74%) | 0.146 (14.46%) | 0.146 (14.43%) | 0.146 (14.84%) | 0.129 (1.35%) | 0.127 (-0.50%) | 0.127 (-0.40%) |
| 1935 | Below Normal | Spring | 0.25 | 0.244 (-2.53%) | 0.252 (0.47%) | 0.248 (-0.93%) | 0.248 (-0.89%) | 0.252 (0.64%) | 0.257 (2.84%) | 0.252 (0.71%) | 0.253 (1.22%) |
| 1936 | Below Normal | Spring | 0.23 | 0.224 (-1.77%) | 0.227 (-0.27%) | 0.225 (-1.13%) | 0.224 (-1.95%) | 0.235 (2.95%) | 0.232 (1.92%) | 0.229 (0.47%) | 0.235 (3.24%) |
| 1937 | Below Normal | Spring | 0.23 | 0.228 (-2.23%) | 0.230 (-1.24%) | 0.230 (-1.18%) | 0.231 (-0.74%) | 0.236 (1.36%) | 0.256 (9.74%) | 0.231 (-0.99%) | 0.237 (1.51%) |
| 1938 | Wet | Spring | 0.41 | 0.412 (-0.16%) | 0.409 (-0.91%) | 0.410 (-0.65%) | 0.409 (-0.82%) | 0.409 (-0.80%) | 0.453 (9.69%) | 0.408 (-1.02%) | 0.409 (-0.94%) |
| 1939 | Dry | Spring | 0.14 | 0.142 (-1.86%) | 0.144 (-0.19%) | 0.144 (-0.18%) | 0.144 (-0.19%) | 0.146 (1.29%) | 0.148 (2.67%) | 0.145 (0.19%) | 0.147 (1.76%) |
| 1940 | Above Normal | Spring | 0.32 | 0.316 (-0.02%) | 0.316 (-0.13%) | 0.315 (-0.32%) | 0.318 (0.45%) | 0.321 (1.53%) | 0.341 (7.84%) | 0.318 (0.36%) | 0.322 (1.77%) |
| 1941 | Wet | Spring | 0.38 | 0.375 (-0.94%) | 0.375 (-0.85%) | 0.375 (-0.81%) | 0.375 (-0.73%) | 0.375 (-0.89%) | 0.390 (3.02%) | 0.375 (-0.81%) | 0.375 (-0.95%) |
| 1942 | Wet | Spring | 0.31 | 0.302 (-1.34%) | 0.304 (-0.68%) | 0.303 (-0.95%) | 0.303 (-0.84%) | 0.304 (-0.70%) | 0.328 (7.27%) | 0.302 (-1.10%) | 0.302 (-1.22%) |
| 1943 | Wet | Spring | 0.26 | 0.261 (0.28%) | 0.257 (-1.30%) | 0.257 (-1.16%) | 0.258 (-0.67%) | 0.262 (0.76%) | 0.297 (14.10%) | 0.258 (-0.79%) | 0.264 (1.60%) |
| 1944 | Dry | Spring | 0.17 | 0.170 (-0.32%) | 0.169 (-0.54%) | 0.169 (-0.48%) | 0.170 (-0.21%) | 0.173 (1.78%) | 0.181 (6.29%) | 0.171 (0.73%) | 0.177 (3.78%) |
| 1945 | Dry | Spring | 0.19 | 0.188 (-0.97%) | 0.190 (-0.03%) | 0.190 (-0.25%) | 0.192 (1.01%) | 0.200 (4.97%) | 0.203 (6.66%) | 0.191 (0.47%) | 0.199 (4.57%) |
| 1946 | Below Normal | Spring | 0.18 | 0.172 (-2.07%) | 0.175 (-0.33%) | 0.174 (-0.55%) | 0.177 (0.82%) | 0.184 (4.85%) | 0.202 (15.26%) | 0.174 (-0.86%) | 0.182 (3.97%) |
| 1947 | Dry | Spring | 0.16 | 0.162 (-0.56%) | 0.162 (-0.60%) | 0.162 (-0.48%) | 0.162 (-0.44%) | 0.165 (1.38%) | 0.168 (3.23%) | 0.163 (-0.18%) | 0.165 (1.27%) |

| Water Year | Water Year Type | Run | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Act5 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1948 | Dry | Spring | 0.22 | 0.218 (-0.49%) | 0.216 (-1.20%) | 0.216 (-1.33%) | 0.220 (0.75%) | 0.225 (2.99%) | 0.230 (5.25%) | 0.216 (-0.98%) | 0.225 (3.14%) |
| 1949 | Dry | Spring | 0.21 | 0.211 (-1.45%) | 0.213 (-0.60%) | 0.213 (-0.40%) | 0.214 (0.01%) | 0.219 (2.32%) | 0.214 (-0.38%) | 0.214 (0.07%) | 0.218 (1.93%) |
| 1950 | Dry | Spring | 0.19 | 0.188 (-1.44%) | 0.190 (-0.26%) | 0.190 (-0.13%) | 0.191 (0.37%) | 0.200 (4.91%) | 0.207 (8.58%) | 0.189 (-0.62%) | 0.200 (4.80%) |
| 1951 | Above Normal | Spring | 0.21 | 0.204 (-1.74%) | 0.207 (-0.46%) | 0.207 (-0.34%) | 0.209 (0.48%) | 0.208 (-0.24%) | 0.220 (5.78%) | 0.206 (-0.97%) | 0.207 (-0.56%) |
| 1952 | Wet | Spring | 0.35 | 0.343 (-1.79%) | 0.346 (-0.94%) | 0.345 (-1.06%) | 0.346 (-0.84%) | 0.346 (-0.88%) | 0.365 (4.42%) | 0.346 (-0.79%) | 0.347 (-0.73%) |
| 1953 | Above Normal | Spring | 0.21 | 0.200 (-2.99%) | 0.204 (-1.17%) | 0.204 (-1.23%) | 0.207 (0.06%) | 0.216 (4.53%) | 0.223 (7.89%) | 0.204 (-1.11%) | 0.215 (4.31%) |
| 1954 | Above Normal | Spring | 0.27 | 0.252 (-5.17%) | 0.262 (-1.11%) | 0.263 (-1.07%) | 0.266 (0.21%) | 0.271 (2.16%) | 0.289 (8.77%) | 0.265 (-0.21%) | 0.269 (1.26%) |
| 1955 | Dry | Spring | 0.14 | 0.140 (-1.46%) | 0.141 (-0.46%) | 0.141 (-0.59%) | 0.141 (-0.83%) | 0.143 (0.97%) | 0.163 (14.63%) | 0.141 (-0.94%) | 0.144 (1.83%) |
| 1956 | Wet | Spring | 0.25 | 0.241 (-2.16%) | 0.245 (-0.76%) | 0.244 (-1.08%) | 0.245 (-0.54%) | 0.244 (-0.88%) | 0.273 (10.58%) | 0.244 (-0.97%) | 0.243 (-1.35%) |
| 1957 | Below Normal | Spring | 0.23 | 0.223 (-2.43%) | 0.226 (-1.18%) | 0.225 (-1.38%) | 0.228 (-0.04%) | 0.237 (3.57%) | 0.254 (10.96%) | 0.224 (-1.83%) | 0.235 (2.62%) |
| 1958 | Wet | Spring | 0.4 | 0.393 (-1.01%) | 0.393 (-1.01%) | 0.392 (-1.14%) | 0.393 (-0.92%) | 0.392 (-1.08%) | 0.423 (6.74%) | 0.392 (-1.05%) | 0.394 (-0.69%) |
| 1959 | Below Normal | Spring | 0.19 | 0.192 (3.39%) | 0.183 (-1.43%) | 0.183 (-1.45%) | 0.184 (-0.97%) | 0.188 (1.26%) | 0.197 (6.11%) | 0.184 (-0.76%) | 0.194 (4.26%) |
| 1960 | Dry | Spring | 0.19 | 0.193 (1.92%) | 0.189 (-0.18%) | 0.188 (-0.42%) | 0.188 (-0.22%) | 0.195 (3.33%) | 0.215 (13.94%) | 0.188 (-0.42%) | 0.185 (-1.95%) |
| 1961 | Dry | Spring | 0.17 | 0.167 (-3.06%) | 0.171 (-0.48%) | 0.171 (-0.69%) | 0.170 (-1.04%) | 0.173 (0.41%) | 0.174 (1.03%) | 0.171 (-0.78%) | 0.173 (0.46%) |

| Water Year | Water Year Type | Run | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Act5 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1962 | Dry | Spring | 0.21 | 0.211 (-0.02%) | 0.212 (0.19%) | 0.212 (0.42%) | 0.213 (0.82%) | 0.221 (4.43%) | 0.239 (13.30%) | 0.212 (0.37%) | 0.220 (4.24%) |
| 1963 | Wet | Spring | 0.31 | 0.305 (-2.11%) | 0.310 (-0.43%) | 0.310 (-0.49%) | 0.313 (0.42%) | 0.315 (1.16%) | 0.336 (8.02%) | 0.310 (-0.32%) | 0.313 (0.53%) |
| 1964 | Dry | Spring | 0.14 | 0.145 (0.44%) | 0.144 (-0.15%) | 0.144 (-0.33%) | 0.143 (-0.62%) | 0.146 (1.27%) | 0.149 (3.41%) | 0.144 (-0.07%) | 0.146 (1.59%) |
| 1965 | Wet | Spring | 0.22 | 0.221 (-0.02%) | 0.221 (-0.27%) | 0.221 (-0.29%) | 0.225 (1.70%) | 0.225 (1.50%) | 0.265 (19.83%) | 0.222 (0.07%) | 0.226 (1.87%) |
| 1966 | Below Normal | Spring | 0.18 | 0.172 (-4.91%) | 0.178 (-1.76%) | 0.177 (-1.94%) | 0.179 (-0.86%) | 0.185 (2.38%) | 0.191 (5.52%) | 0.177 (-1.97%) | 0.183 (1.39%) |
| 1967 | Wet | Spring | 0.32 | 0.313 (-2.57%) | 0.318 (-1.12%) | 0.318 (-1.05%) | 0.322 (0.01%) | 0.323 (0.56%) | 0.344 (6.85%) | 0.318 (-1.13%) | 0.323 (0.34%) |
| 1968 | Below Normal | Spring | 0.22 | 0.219 (0.88%) | 0.218 (0.59%) | 0.218 (0.57%) | 0.219 (0.98%) | 0.224 (3.24%) | 0.220 (1.51%) | 0.221 (1.97%) | 0.228 (4.90%) |
| 1969 | Wet | Spring | 0.31 | 0.310 (-0.98%) | 0.312 (-0.30%) | 0.312 (-0.39%) | 0.311 (-0.53%) | 0.312 (-0.47%) | 0.332 (6.11%) | 0.310 (-1.06%) | 0.311 (-0.53%) |
| 1970 | Wet | Spring | 0.22 | 0.213 (-1.17%) | 0.215 (-0.21%) | 0.215 (-0.05%) | 0.215 (-0.26%) | 0.215 (-0.03%) | 0.227 (5.30%) | 0.214 (-0.41%) | 0.214 (-0.66%) |
| 1971 | Wet | Spring | 0.26 | 0.247 (-2.91%) | 0.252 (-0.94%) | 0.252 (-1.03%) | 0.253 (-0.54%) | 0.253 (-0.57%) | 0.274 (7.57%) | 0.252 (-1.18%) | 0.251 (-1.26%) |
| 1972 | Below Normal | Spring | 0.18 | 0.180 (-2.18%) | 0.176 (-4.25%) | 0.175 (-4.57%) | 0.181 (-1.34%) | 0.188 (2.42%) | 0.207 (12.56%) | 0.184 (0.15%) | 0.192 (4.25%) |
| 1973 | Above Normal | Spring | 0.25 | 0.248 (-0.99%) | 0.249 (-0.35%) | 0.249 (-0.47%) | 0.252 (0.58%) | 0.259 (3.65%) | 0.279 (11.68%) | 0.249 (-0.55%) | 0.258 (3.08%) |
| 1974 | Wet | Spring | 0.34 | 0.339 (-0.98%) | 0.341 (-0.30%) | 0.341 (-0.35%) | 0.341 (-0.44%) | 0.341 (-0.38%) | 0.388 (13.38%) | 0.341 (-0.45%) | 0.340 (-0.69%) |
| 1975 | Above Normal | Spring | 0.31 | 0.302 (-3.01%) | 0.309 (-1.02%) | 0.308 (-1.13%) | 0.312 (0.16%) | 0.318 (2.04%) | 0.348 (11.58%) | 0.310 (-0.49%) | 0.321 (3.06%) |

| Water Year | Water Year Type | Run | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Act5 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1976 | Critical | Spring | 0.13 | 0.122 (-6.18%) | 0.125 (-3.55%) | 0.125 (-3.80%) | 0.125 (-3.58%) | 0.126 (-2.93%) | 0.132 (1.57%) | 0.126 (-2.51%) | 0.128 (-1.07%) |
| 1977 | Critical | Spring | 0.11 | 0.120 (6.58%) | 0.111 (-1.33%) | 0.120 (6.43%) | 0.120 (6.25%) | 0.120 (6.72%) | 0.114 (1.20%) | 0.112 (-0.58%) | 0.117 (3.76%) |
| 1978 | Above Normal | Spring | 0.29 | 0.285 (-0.69%) | 0.285 (-0.89%) | 0.284 (-1.03%) | 0.287 (-0.11%) | 0.291 (1.37%) | 0.339 (18.02%) | 0.284 (-1.14%) | 0.289 (0.82%) |
| 1979 | Dry | Spring | 0.19 | 0.184 (-3.32%) | 0.189 (-0.90%) | 0.188 (-1.10%) | 0.190 (-0.26%) | 0.197 (3.54%) | 0.213 (11.97%) | 0.189 (-0.73%) | 0.198 (4.08%) |
| 1980 | Above Normal | Spring | 0.27 | 0.269 (-0.52%) | 0.269 (-0.42%) | 0.269 (-0.68%) | 0.272 (0.49%) | 0.280 (3.49%) | 0.298 (10.14%) | 0.267 (-1.23%) | 0.278 (2.76%) |
| 1981 | Dry | Spring | 0.17 | 0.169 (1.31%) | 0.166 (-0.26%) | 0.166 (-0.19%) | 0.167 (0.23%) | 0.170 (2.19%) | 0.177 (6.23%) | 0.169 (1.72%) | 0.170 (2.13%) |
| 1982 | Wet | Spring | 0.37 | 0.369 (-1.03%) | 0.371 (-0.69%) | 0.370 (-0.79%) | 0.370 (-0.86%) | 0.370 (-0.97%) | 0.402 (7.59%) | 0.370 (-0.81%) | 0.369 (-1.11%) |
| 1983 | Wet | Spring | 0.48 | 0.477 (-0.03%) | 0.477 (0.10%) | 0.477 (0.10%) | 0.478 (0.13%) | 0.477 (-0.06%) | 0.500 (4.88%) | 0.478 (0.14%) | 0.477 (0.04%) |
| 1984 | Wet | Spring | 0.21 | 0.204 (-1.33%) | 0.205 (-0.67%) | 0.206 (-0.49%) | 0.205 (-0.66%) | 0.206 (-0.47%) | 0.227 (9.89%) | 0.204 (-1.08%) | 0.204 (-1.24%) |
| 1985 | Below Normal | Spring | 0.15 | 0.147 (-2.66%) | 0.147 (-2.41%) | 0.148 (-1.86%) | 0.149 (-1.71%) | 0.151 (0.08%) | 0.156 (2.94%) | 0.148 (-1.89%) | 0.152 (0.29%) |
| 1986 | Wet | Spring | 0.32 | 0.322 (-0.19%) | 0.321 (-0.38%) | 0.322 (-0.33%) | 0.323 (-0.05%) | 0.322 (-0.14%) | 0.360 (11.44%) | 0.322 (-0.30%) | 0.321 (-0.58%) |
| 1987 | Dry | Spring | 0.18 | 0.173 (-3.82%) | 0.179 (-0.43%) | 0.179 (-0.55%) | 0.179 (-0.40%) | 0.182 (1.37%) | 0.179 (-0.12%) | 0.179 (-0.41%) | 0.182 (1.32%) |
| 1988 | Critical | Spring | 0.14 | 0.131 (-3.46%) | 0.135 (0.05%) | 0.136 (0.16%) | 0.131 (-3.04%) | 0.140 (3.05%) | 0.136 (0.52%) | 0.136 (0.07%) | 0.135 (-0.44%) |
| 1989 | Dry | Spring | 0.24 | 0.231 (-1.66%) | 0.236 (0.36%) | 0.236 (0.39%) | 0.237 (0.82%) | 0.240 (2.24%) | 0.241 (2.80%) | 0.235 (-0.04%) | 0.232 (-1.34%) |

| Water Year | Water Year Type | Run | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Act5 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1990 | Critical | Spring | 0.13 | 0.134 (4.97%) | 0.136 (6.66%) | 0.137 (7.47%) | 0.136 (6.75%) | 0.140 (10.16%) | 0.143 (12.18%) | 0.135 (5.87%) | 0.140 (9.95%) |
| 1991 | Critical | Spring | 0.17 | 0.174 (0.78%) | 0.173 (0.34%) | 0.178 (3.47%) | 0.179 (3.89%) | 0.179 (3.86%) | 0.182 (5.29%) | 0.173 (0.05%) | 0.173 (0.42%) |
| 1992 | Critical | Spring | 0.16 | 0.172 (5.87%) | 0.171 (5.56%) | 0.174 (7.35%) | 0.174 (7.58%) | 0.176 (8.73%) | 0.174 (7.17%) | 0.169 (4.52%) | 0.172 (6.07%) |
| 1993 | Above Normal | Spring | 0.31 | 0.285 (-6.47%) | 0.302 (-0.98%) | 0.290 (-4.78%) | 0.292 (-4.27%) | 0.290 (-4.86%) | 0.341 (11.97%) | 0.297 (-2.44%) | 0.299 (-2.01%) |
| 1994 | Critical | Spring | 0.15 | 0.148 (-0.35%) | 0.148 (-0.58%) | 0.148 (-0.68%) | 0.148 (-0.41%) | 0.151 (1.32%) | 0.148 (-0.18%) | 0.149 (0.43%) | 0.152 (2.07%) |
| 1995 | Wet | Spring | 0.42 | 0.423 (-0.18%) | 0.422 (-0.38%) | 0.422 (-0.35%) | 0.422 (-0.20%) | 0.422 (-0.30%) | 0.442 (4.44%) | 0.422 (-0.25%) | 0.422 (-0.34%) |
| 1996 | Wet | Spring | 0.35 | 0.346 (-1.09%) | 0.345 (-1.43%) | 0.344 (-1.65%) | 0.345 (-1.44%) | 0.345 (-1.44%) | 0.374 (6.92%) | 0.345 (-1.18%) | 0.344 (-1.55%) |
| 1997 | Wet | Spring | 0.18 | 0.173 (-2.11%) | 0.177 (0.23%) | 0.177 (-0.03%) | 0.177 (0.07%) | 0.176 (-0.34%) | 0.188 (6.09%) | 0.177 (0.15%) | 0.176 (-0.31%) |
| 1998 | Wet | Spring | 0.4 | 0.409 (1.67%) | 0.400 (-0.45%) | 0.400 (-0.50%) | 0.400 (-0.46%) | 0.400 (-0.67%) | 0.418 (3.91%) | 0.400 (-0.45%) | 0.402 (-0.01%) |
| 1999 | Wet | Spring | 0.28 | 0.278 (-1.07%) | 0.279 (-1.03%) | 0.278 (-1.18%) | 0.279 (-1.02%) | 0.278 (-1.06%) | 0.328 (16.65%) | 0.279 (-0.98%) | 0.278 (-1.27%) |
| 2000 | Above Normal | Spring | 0.29 | 0.283 (-2.07%) | 0.288 (-0.25%) | 0.287 (-0.52%) | 0.289 (0.16%) | 0.295 (1.99%) | 0.321 (11.05%) | 0.287 (-0.65%) | 0.295 (1.93%) |
| 2001 | Dry | Spring | 0.17 | 0.169 (-2.69%) | 0.174 (-0.10%) | 0.174 (-0.30%) | 0.174 (0.03%) | 0.177 (1.62%) | 0.177 (1.88%) | 0.173 (-0.54%) | 0.177 (1.54%) |
| 2002 | Below Normal | Spring | 0.16 | 0.164 (0.05%) | 0.165 (0.27%) | 0.163 (-0.49%) | 0.164 (0.05%) | 0.174 (6.10%) | 0.182 (11.18%) | 0.164 (-0.12%) | 0.171 (4.20%) |
| 2003 | Above Normal | Spring | 0.26 | 0.249 (-3.30%) | 0.256 (-0.63%) | 0.256 (-0.67%) | 0.255 (-0.88%) | 0.260 (0.76%) | 0.280 (8.54%) | 0.256 (-0.52%) | 0.255 (-1.16%) |

| Water Year | Water Year Type | Run | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Act5 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2004 | Above Normal | Spring | 0.26 | 0.248 (-3.69%) | 0.257 (-0.31%) | 0.257 (-0.39%) | 0.259 (0.41%) | 0.267 (3.48%) | 0.267 (3.44%) | 0.257 (-0.28%) | 0.266 (3.27%) |
| 2005 | Below Normal | Spring | 0.25 | 0.249 (-0.22%) | 0.248 (-0.62%) | 0.248 (-0.58%) | 0.250 (0.25%) | 0.256 (2.63%) | 0.277 (10.92%) | 0.252 (1.02%) | 0.261 (4.51%) |
| 2006 | Wet | Spring | 0.42 | 0.419 (0.25%) | 0.416 (-0.42%) | 0.417 (-0.33%) | 0.418 (0.01%) | 0.417 (-0.20%) | 0.451 (7.83%) | 0.415 (-0.65%) | 0.418 (-0.05%) |
| 2007 | Below Normal | Spring | 0.16 | 0.162 (-0.26%) | 0.161 (-1.37%) | 0.161 (-1.33%) | 0.161 (-1.17%) | 0.165 (1.12%) | 0.173 (6.53%) | 0.163 (-0.14%) | 0.170 (4.51%) |
| 2008 | Dry | Spring | 0.17 | 0.157 (-5.74%) | 0.166 (-0.53%) | 0.166 (-0.45%) | 0.166 (-0.33%) | 0.168 (0.63%) | 0.175 (4.85%) | 0.166 (-0.12%) | 0.168 (1.11%) |
| 2009 | Dry | Spring | 0.2 | 0.196 (-0.88%) | 0.199 (0.32%) | 0.198 (0.15%) | 0.199 (0.66%) | 0.209 (5.69%) | 0.199 (0.62%) | 0.199 (0.52%) | 0.193 (-2.53%) |
| 2010 | Below Normal | Spring | 0.21 | 0.211 (-1.53%) | 0.215 (0.36%) | 0.214 (0.05%) | 0.218 (1.79%) | 0.227 (6.00%) | 0.252 (17.69%) | 0.216 (0.73%) | 0.227 (6.17%) |
| 2011 | Wet | Spring | 0.36 | 0.355 (-1.05%) | 0.356 (-0.80%) | 0.357 (-0.58%) | 0.357 (-0.64%) | 0.357 (-0.53%) | 0.388 (8.23%) | 0.356 (-0.82%) | 0.358 (-0.31%) |
| 2012 | Below Normal | Spring | 0.19 | 0.202 (5.29%) | 0.194 (1.13%) | 0.194 (1.14%) | 0.194 (0.86%) | 0.201 (4.53%) | 0.221 (15.23%) | 0.205 (6.77%) | 0.210 (9.36%) |
| 2013 | Dry | Spring | 0.15 | 0.146 (-3.27%) | 0.150 (-0.57%) | 0.150 (-0.73%) | 0.152 (0.55%) | 0.154 (1.45%) | 0.149 (-1.64%) | 0.151 (-0.17%) | 0.155 (2.09%) |
| 2014 | Critical | Spring | 0.14 | 0.142 (1.87%) | 0.139 (-0.04%) | 0.142 (2.27%) | 0.143 (2.56%) | 0.143 (2.92%) | 0.147 (5.93%) | 0.138 (-0.99%) | 0.139 (0.07%) |
| 2015 | Critical | Spring | 0.12 | 0.139 (12.10%) | 0.123 (-0.87%) | 0.140 (12.92%) | 0.140 (13.14%) | 0.141 (13.76%) | 0.128 (3.55%) | 0.123 (-0.48%) | 0.123 (-0.47%) |
| 2016 | Below Normal | Spring | 0.23 | 0.227 (-2.48%) | 0.233 (0.01%) | 0.233 (-0.11%) | 0.235 (0.61%) | 0.244 (4.40%) | 0.252 (8.02%) | 0.233 (0.03%) | 0.243 (4.36%) |
| 2017 | Wet | Spring | 0.38 | 0.376 (-0.57%) | 0.377 (-0.45%) | 0.375 (-0.89%) | 0.377 (-0.37%) | 0.376 (-0.60%) | 0.430 (13.69%) | 0.376 (-0.63%) | 0.377 (-0.34%) |

| Water Year | Water Year Type | Run | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Act5 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2018 | Below Normal | Spring | 0.21 | 0.221 (4.18%) | 0.213 (0.41%) | 0.212 (0.34%) | 0.215 (1.76%) | 0.221 (4.24%) | 0.226 (6.92%) | 0.220 (3.99%) | 0.229 (8.02%) |
| 2019 | Wet | Spring | 0.38 | 0.369 (-1.58%) | 0.373 (-0.55%) | 0.372 (-0.77%) | 0.377 (0.39%) | 0.376 (0.25%) | 0.415 (10.57%) | 0.372 (-0.82%) | 0.374 (-0.27%) |
| 2020 | Dry | Spring | 0.15 | 0.142 (-2.21%) | 0.144 (-0.97%) | 0.143 (-1.01%) | 0.143 (-1.04%) | 0.145 (0.26%) | 0.153 (5.29%) | 0.143 (-1.22%) | 0.146 (0.73%) |
| 2021 | Critical | Spring | 0.12 | 0.121 (1.93%) | 0.117 (-1.40%) | 0.123 (3.25%) | 0.123 (3.55%) | 0.127 (6.40%) | 0.125 (4.78%) | 0.116 (-3.03%) | 0.119 (-0.01%) |

- **Above Normal**
    - Under Alt1, mean predicted survival to Chipps Island is lower than NAA, ranging from 0% lower in Above Normal water years to 6.5% lower in Above Normal water years compared to the NAA for Spring-run Chinook salmon (Figure I.6-14 and Table I.6-6).
    - Under Alt2 With TUCP Without VA, mean predicted survival to Chipps Island is lower than NAA, ranging from 0.1% lower in Above Normal water years to 1.6% lower in Above Normal water years compared to the NAA for Spring-run Chinook salmon.
    - Under Alt2 Without TUCP Delta VA, mean predicted survival to Chipps Island is lower than NAA, ranging from 0.7% higher in Above Normal water years to 4.3% lower in Above Normal water years compared to the NAA for Spring-run Chinook salmon.
    - Under Alt2 Without TUCP Systemwide VA, mean predicted survival to Chipps Island is higher than NAA, ranging from 4.5% higher in Above Normal water years to 4.9% lower in Above Normal water years compared to the NAA for Spring-run Chinook salmon.
    - Under Alt2 Without TUCP Without VA, mean predicted survival to Chipps Island is lower than NAA, ranging from 0.3% lower in Above Normal water years to 4.8% lower in Above Normal water years compared to the NAA for Spring-run Chinook salmon. Under Alt3, mean predicted survival to Chipps Island is higher than NAA, ranging from 18% higher in Above Normal water years to 3.4% higher in Above Normal water years compared to the NAA for Spring-run Chinook salmon.
    - Under Alt4, mean predicted survival to Chipps Island is lower than NAA, ranging from 0.7% higher in Above Normal water years to 2.4% lower in Above Normal water years compared to the NAA for Spring-run Chinook salmon.
    - Under Act5, mean predicted survival to Chipps Island is higher than NAA, ranging from 4.3% higher in Above Normal water years to 2% lower in Above Normal water years compared to the NAA for Spring-run Chinook salmon.
- **Below Normal**
    - Under Alt1, mean predicted survival to Chipps Island is lower than NAA, ranging from 5.3% higher in Below Normal water years to 4.9% lower in Below Normal water years compared to the NAA for Spring-run Chinook salmon (Figure I.6-14 and Table I.6-6).
    - Under Alt2 With TUCP Without VA, mean predicted survival to Chipps Island is lower than NAA, ranging from 1.1% higher in Below Normal water years to 4.3% lower in Below Normal water years compared to the NAA for Spring-run Chinook salmon.

- Under Alt2 Without TUCP Delta VA, mean predicted survival to Chipps Island is lower than NAA, ranging from 1.8% higher in Below Normal water years to 1.9% lower in Below Normal water years compared to the NAA for Spring-run Chinook salmon.
- Under Alt2 Without TUCP Systemwide VA, mean predicted survival to Chipps Island is higher than NAA, ranging from 6.1% higher in Below Normal water years to 0.1% higher in Below Normal water years compared to the NAA for Spring-run Chinook salmon.
- Under Alt2 Without TUCP Without VA, mean predicted survival to Chipps Island is lower than NAA, ranging from 1.1% higher in Below Normal water years to 4.6% lower in Below Normal water years compared to the NAA for Spring-run Chinook salmon. Under Alt3, mean predicted survival to Chipps Island is higher than NAA, ranging from 17.7% higher in Below Normal water years to 1.5% higher in Below Normal water years compared to the NAA for Spring-run Chinook salmon.
- Under Alt4, mean predicted survival to Chipps Island is higher than NAA, ranging from 6.8% higher in Below Normal water years to 4.4% lower in Below Normal water years compared to the NAA for Spring-run Chinook salmon.
- Under Act5, mean predicted survival to Chipps Island is higher than NAA, ranging from 9.4% higher in Below Normal water years to 0.3% higher in Below Normal water years compared to the NAA for Spring-run Chinook salmon.

- **Critical**
  - Under Alt1, mean predicted survival to Chipps Island is higher than NAA, ranging from 15% higher in Critical water years to 6.2% lower in Critical water years compared to the NAA for Spring-run Chinook salmon (Figure I.6-14 and Table I.6-6).
  - Under Alt2 With TUCP Without VA, mean predicted survival to Chipps Island is higher than NAA, ranging from 6.7% higher in Critical water years to 3.5% lower in Critical water years compared to the NAA for Spring-run Chinook salmon.
  - Under Alt2 Without TUCP Delta VA, mean predicted survival to Chipps Island is higher than NAA, ranging from 14.4% higher in Critical water years to 3.6% lower in Critical water years compared to the NAA for Spring-run Chinook salmon.
  - Under Alt2 Without TUCP Systemwide VA, mean predicted survival to Chipps Island is higher than NAA, ranging from 14.8% higher in Critical water years to 2.9% lower in Critical water years compared to the NAA for Spring-run Chinook salmon.
  - Under Alt2 Without TUCP Without VA, mean predicted survival to Chipps Island is higher than NAA, ranging from 14.5% higher in Critical water years to 3.8% lower in Critical water years compared to the NAA for Spring-run Chinook

salmon. Under Alt3, mean predicted survival to Chipps Island is higher than NAA, ranging from 13.2% higher in Critical water years to 0.2% lower in Critical water years compared to the NAA for Spring-run Chinook salmon.

- Under Alt4, mean predicted survival to Chipps Island is lower than NAA, ranging from 5.9% higher in Critical water years to 3% lower in Critical water years compared to the NAA for Spring-run Chinook salmon.
- Under Act5, mean predicted survival to Chipps Island is higher than NAA, ranging from 10% higher in Critical water years to 1.1% lower in Critical water years compared to the NAA for Spring-run Chinook salmon.

- **Dry**
  - Under Alt1, mean predicted survival to Chipps Island is lower than NAA, ranging from 1.9% higher in Dry water years to 5.7% lower in Dry water years compared to the NAA for Spring-run Chinook salmon (Figure I.6-14 and Table I.6-6).
  - Under Alt2 With TUCP Without VA, mean predicted survival to Chipps Island is lower than NAA, ranging from 1.3% higher in Dry water years to 1.2% lower in Dry water years compared to the NAA for Spring-run Chinook salmon.
  - Under Alt2 Without TUCP Delta VA, mean predicted survival to Chipps Island is higher than NAA, ranging from 1.6% higher in Dry water years to 1% lower in Dry water years compared to the NAA for Spring-run Chinook salmon.
  - Under Alt2 Without TUCP Systemwide VA, mean predicted survival to Chipps Island is higher than NAA, ranging from 5.7% higher in Dry water years to 0.3% higher in Dry water years compared to the NAA for Spring-run Chinook salmon.
  - Under Alt2 Without TUCP Without VA, mean predicted survival to Chipps Island is lower than NAA, ranging from 0.6% higher in Dry water years to 1.3% lower in Dry water years compared to the NAA for Spring-run Chinook salmon. Under Alt3, mean predicted survival to Chipps Island is higher than NAA, ranging from 14.6% higher in Dry water years to 1.6% lower in Dry water years compared to the NAA for Spring-run Chinook salmon.
  - Under Alt4, mean predicted survival to Chipps Island is lower than NAA, ranging from 1.7% higher in Dry water years to 1.2% lower in Dry water years compared to the NAA for Spring-run Chinook salmon.
  - Under Act5, mean predicted survival to Chipps Island is higher than NAA, ranging from 5.1% higher in Dry water years to 2.5% lower in Dry water years compared to the NAA for Spring-run Chinook salmon.

- **Wet**
  - Under Alt1, mean predicted survival to Chipps Island is lower than NAA, ranging from 1.7% higher in Wet water years to 2.9% lower in Wet water years compared to the NAA for Spring-run Chinook salmon (Figure I.6-14 and Table I.6-6).

- Under Alt2 With TUCP Without VA, mean predicted survival to Chipps Island is lower than NAA, ranging from 0.3% higher in Wet water years to 1.4% lower in Wet water years compared to the NAA for Spring-run Chinook salmon.
- Under Alt2 Without TUCP Delta VA, mean predicted survival to Chipps Island is lower than NAA, ranging from 1.7% higher in Wet water years to 1.4% lower in Wet water years compared to the NAA for Spring-run Chinook salmon.
- Under Alt2 Without TUCP Systemwide VA, mean predicted survival to Chipps Island is lower than NAA, ranging from 2.3% higher in Wet water years to 1.4% lower in Wet water years compared to the NAA for Spring-run Chinook salmon.
- Under Alt2 Without TUCP Without VA, mean predicted survival to Chipps Island is lower than NAA, ranging from 0.3% higher in Wet water years to 1.7% lower in Wet water years compared to the NAA for Spring-run Chinook salmon. Under Alt3, mean predicted survival to Chipps Island is higher than NAA, ranging from 19.8% higher in Wet water years to 3% higher in Wet water years compared to the NAA for Spring-run Chinook salmon.
- Under Alt4, mean predicted survival to Chipps Island is lower than NAA, ranging from 0.2% higher in Wet water years to 1.2% lower in Wet water years compared to the NAA for Spring-run Chinook salmon.
- Under Act5, mean predicted survival to Chipps Island is lower than NAA, ranging from 2.4% higher in Wet water years to 1.5% lower in Wet water years compared to the NAA for Spring-run Chinook salmon.

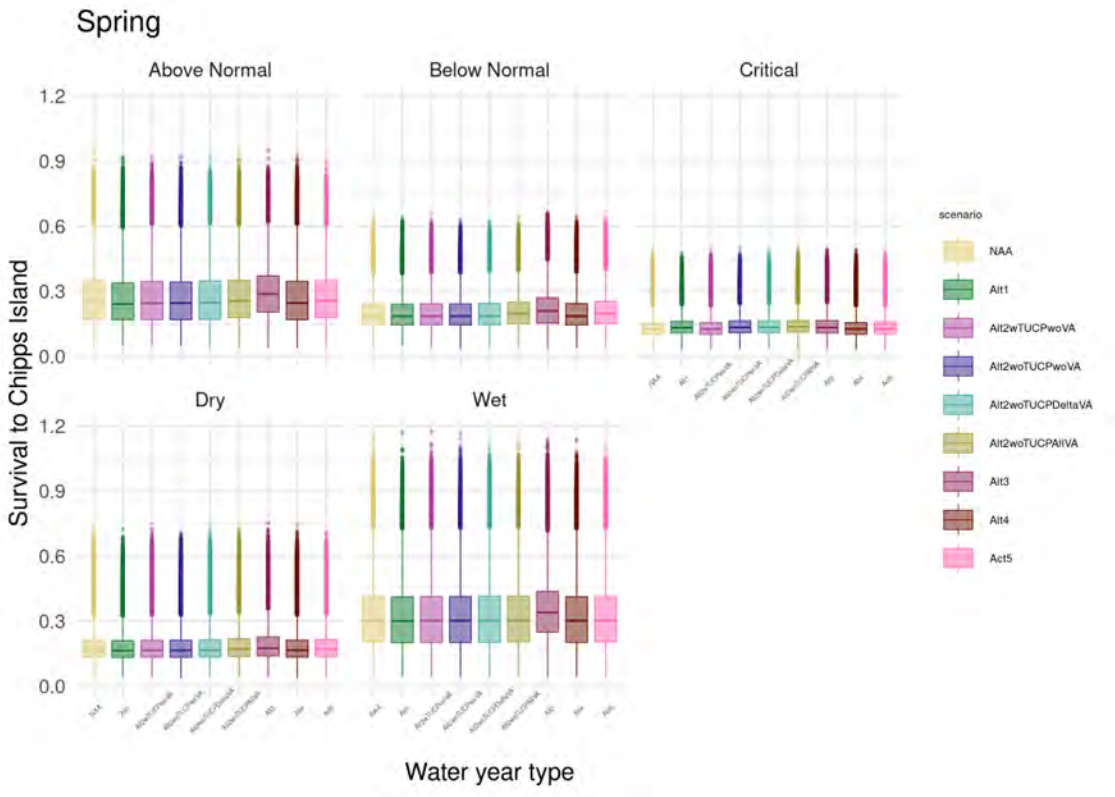



Figure I.6-15. Predicted spring-run Chinook salmon survival to Chipps Island averaged by water year type.

- Under Alt1, mean annual predicted survival to Chipps Island is higher than NAA, ranging from 17.9% higher in 1934 to 5.9% lower in 1993 compared to the NAA for Fall-run Chinook salmon.
- Under Alt2 With TUCP Without VA, mean annual predicted survival to Chipps Island is lower than NAA, ranging from 11.6% higher in 1992 to 5% lower in 1972 compared to the NAA for Fall-run Chinook salmon.
- Under Alt2 Without TUCP Delta VA, mean annual predicted survival to Chipps Island is higher than NAA, ranging from 17.7% higher in 1934 to 4.6% lower in 1993 compared to the NAA for Fall-run Chinook salmon.
- Under Alt2 Without TUCP Systemwide VA, mean annual predicted survival to Chipps Island is higher than NAA, ranging from 19% higher in 1934 to 5% lower in 1993 compared to the NAA for Fall-run Chinook salmon.
- Under Alt2 Without TUCP Without VA, mean annual predicted survival to Chipps Island is higher than NAA, ranging from 18.2% higher in 1934 to 5% lower in 1972 compared to the NAA for Fall-run Chinook salmon.
- Under Alt3, mean annual predicted survival to Chipps Island is higher than NAA, ranging from 21.7% higher in 1999 to 3.8% lower in 1994 compared to the NAA for Fall-run Chinook salmon.
- Under Alt4, mean annual predicted survival to Chipps Island is lower than NAA, ranging from 11.4% higher in 1992 to 4% lower in 1923 compared to the NAA for Fall-run Chinook salmon.
- Under NAA, mean annual predicted survival to Chipps Island is lower than NAA, ranging from 0% lower in 1922 to 0% lower in 1922 compared to the NAA for Fall-run Chinook salmon. (Figure I.6-15, Table I.6-8).
- Under Act5, mean annual predicted survival to Chipps Island is higher than NAA, ranging from 13.1% higher in 1990 to 3.5% lower in 2009 compared to the NAA for Fall-run Chinook salmon.

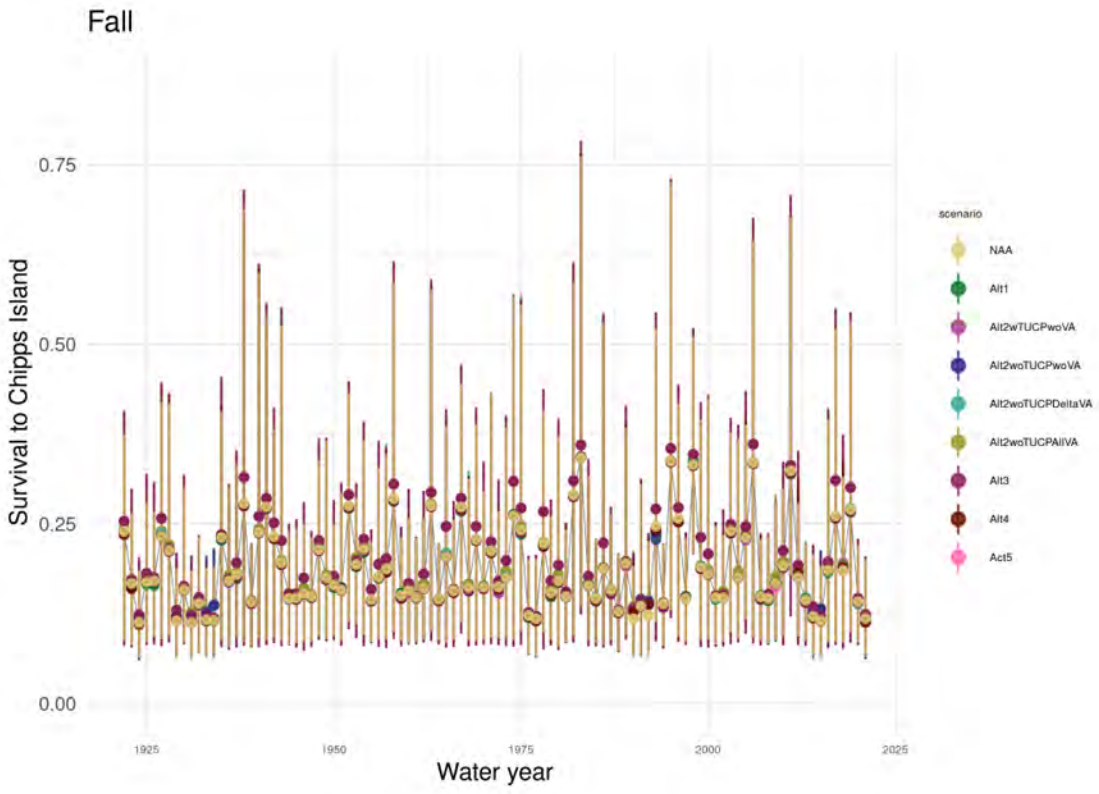



Figure I.6-16. Predicted annual fall-run Chinook salmon survival to Chipps Island. Parentheses indicate % difference from NAA (negative values indicate a decrease in survival).

Table I.6-8. Mean predicted fall-run Chinook salmon survival to Chipps Island averaged by run and water year type. Parentheses indicate % difference from NAA (negative values indicate a decrease in survival).

| Water Year | Water Year Type | Run | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP Delta VA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Act5 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1922 | Above Normal | Fall | 0.24 | 0.237 (-0.90%) | 0.235 (-1.67%) | 0.235 (-1.65%) | 0.238 (-0.72%) | 0.244 (1.78%) | 0.254 (6.11%) | 0.236 (-1.22%) | 0.245 (2.25%) |
| 1923 | Below Normal | Fall | 0.17 | 0.164 (-1.57%) | 0.166 (-0.50%) | 0.167 (-0.27%) | 0.167 (0.03%) | 0.173 (3.32%) | 0.172 (3.18%) | 0.160 (-4.03%) | 0.172 (2.93%) |
| 1924 | Critical | Fall | 0.11 | 0.118 (4.38%) | 0.113 (-0.15%) | 0.119 (5.17%) | 0.118 (5.09%) | 0.123 (8.80%) | 0.123 (9.52%) | 0.110 (-2.82%) | 0.113 (0.28%) |
| 1925 | Dry | Fall | 0.17 | 0.166 (-1.62%) | 0.171 (1.24%) | 0.171 (0.94%) | 0.172 (1.45%) | 0.177 (4.71%) | 0.181 (7.08%) | 0.171 (0.85%) | 0.180 (6.37%) |
| 1926 | Dry | Fall | 0.17 | 0.165 (-3.53%) | 0.170 (-0.48%) | 0.170 (-0.71%) | 0.170 (-0.67%) | 0.173 (1.59%) | 0.175 (2.57%) | 0.170 (-0.61%) | 0.173 (1.46%) |
| 1927 | Wet | Fall | 0.23 | 0.236 (1.32%) | 0.233 (-0.09%) | 0.233 (0.21%) | 0.237 (1.84%) | 0.239 (2.64%) | 0.258 (10.67%) | 0.233 (-0.05%) | 0.240 (3.03%) |
| 1928 | Above Normal | Fall | 0.21 | 0.214 (0.55%) | 0.212 (-0.50%) | 0.212 (-0.67%) | 0.214 (0.34%) | 0.221 (3.57%) | 0.216 (1.33%) | 0.213 (-0.17%) | 0.221 (3.76%) |
| 1929 | Critical | Fall | 0.12 | 0.121 (4.88%) | 0.115 (-0.14%) | 0.121 (5.12%) | 0.121 (5.34%) | 0.122 (5.90%) | 0.130 (12.77%) | 0.117 (1.19%) | 0.119 (2.84%) |
| 1930 | Dry | Fall | 0.16 | 0.161 (1.43%) | 0.158 (-0.12%) | 0.158 (-0.11%) | 0.157 (-0.93%) | 0.162 (2.13%) | 0.163 (3.22%) | 0.158 (-0.45%) | 0.162 (2.62%) |
| 1931 | Critical | Fall | 0.11 | 0.122 (8.53%) | 0.113 (-0.00%) | 0.122 (8.13%) | 0.122 (8.31%) | 0.126 (12.00%) | 0.123 (9.51%) | 0.113 (0.12%) | 0.114 (1.58%) |
| 1932 | Critical | Fall | 0.14 | 0.144 (3.82%) | 0.137 (-1.25%) | 0.141 (1.36%) | 0.142 (1.86%) | 0.142 (2.49%) | 0.148 (6.32%) | 0.137 (-1.03%) | 0.136 (-1.81%) |

| Water Year | Water Year Type | Run | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP Delta VA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Act5 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1933 | Critical | Fall | 0.12 | 0.126 (8.72%) | 0.115 (-0.84%) | 0.127 (8.88%) | 0.128 (10.34%) | 0.129 (10.68%) | 0.123 (5.73%) | 0.115 (-1.36%) | 0.116 (-0.02%) |
| 1934 | Critical | Fall | 0.12 | 0.136 (17.86%) | 0.115 (-0.52%) | 0.137 (18.22%) | 0.136 (17.70%) | 0.138 (19.00%) | 0.119 (2.81%) | 0.115 (-0.36%) | 0.116 (-0.14%) |
| 1935 | Below Normal | Fall | 0.23 | 0.227 (-1.58%) | 0.231 (0.05%) | 0.229 (-0.77%) | 0.230 (-0.30%) | 0.234 (1.04%) | 0.235 (1.60%) | 0.232 (0.53%) | 0.235 (1.53%) |
| 1936 | Below Normal | Fall | 0.17 | 0.172 (0.65%) | 0.170 (-0.15%) | 0.169 (-1.19%) | 0.169 (-0.84%) | 0.179 (4.95%) | 0.174 (1.87%) | 0.172 (0.95%) | 0.178 (4.23%) |
| 1937 | Below Normal | Fall | 0.18 | 0.173 (-3.27%) | 0.176 (-2.05%) | 0.176 (-2.06%) | 0.177 (-1.18%) | 0.182 (1.64%) | 0.196 (9.12%) | 0.176 (-1.94%) | 0.182 (1.63%) |
| 1938 | Wet | Fall | 0.28 | 0.277 (-0.36%) | 0.276 (-0.65%) | 0.276 (-0.76%) | 0.276 (-0.81%) | 0.275 (-0.99%) | 0.315 (13.21%) | 0.275 (-0.98%) | 0.274 (-1.38%) |
| 1939 | Dry | Fall | 0.14 | 0.140 (-0.75%) | 0.141 (-0.27%) | 0.141 (-0.05%) | 0.141 (0.17%) | 0.143 (1.54%) | 0.139 (-1.81%) | 0.141 (0.28%) | 0.144 (2.25%) |
| 1940 | Above Normal | Fall | 0.24 | 0.242 (1.62%) | 0.237 (-0.32%) | 0.237 (-0.37%) | 0.239 (0.29%) | 0.242 (1.59%) | 0.260 (9.36%) | 0.238 (-0.13%) | 0.243 (2.06%) |
| 1941 | Wet | Fall | 0.27 | 0.272 (-0.64%) | 0.271 (-0.83%) | 0.271 (-0.95%) | 0.272 (-0.60%) | 0.272 (-0.70%) | 0.285 (4.27%) | 0.272 (-0.64%) | 0.272 (-0.46%) |
| 1942 | Wet | Fall | 0.23 | 0.230 (-0.88%) | 0.230 (-0.88%) | 0.230 (-0.85%) | 0.231 (-0.68%) | 0.230 (-0.94%) | 0.251 (8.30%) | 0.229 (-1.17%) | 0.230 (-0.81%) |
| 1943 | Wet | Fall | 0.2 | 0.196 (0.31%) | 0.193 (-1.39%) | 0.193 (-1.25%) | 0.194 (-0.75%) | 0.199 (1.50%) | 0.227 (15.87%) | 0.194 (-1.17%) | 0.199 (1.73%) |
| 1944 | Dry | Fall | 0.15 | 0.146 (-0.11%) | 0.146 (-0.67%) | 0.146 (-0.62%) | 0.145 (-1.16%) | 0.148 (1.21%) | 0.152 (3.97%) | 0.149 (1.32%) | 0.153 (4.07%) |
| 1945 | Dry | Fall | 0.15 | 0.146 (-0.53%) | 0.145 (-1.15%) | 0.145 (-1.06%) | 0.146 (-0.39%) | 0.153 (4.29%) | 0.153 (4.19%) | 0.145 (-1.03%) | 0.153 (4.42%) |

| Water Year | Water Year Type | Run | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP Delta VA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Act5 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1946 | Below Normal | Fall | 0.15 | 0.155 (1.56%) | 0.152 (-0.44%) | 0.153 (-0.19%) | 0.153 (0.06%) | 0.161 (5.02%) | 0.175 (14.05%) | 0.152 (-0.71%) | 0.160 (4.74%) |
| 1947 | Dry | Fall | 0.15 | 0.147 (-1.24%) | 0.148 (-0.73%) | 0.148 (-0.81%) | 0.148 (-0.66%) | 0.151 (1.47%) | 0.147 (-1.18%) | 0.149 (-0.14%) | 0.151 (1.41%) |
| 1948 | Dry | Fall | 0.21 | 0.216 (0.69%) | 0.213 (-0.76%) | 0.212 (-0.92%) | 0.217 (1.33%) | 0.222 (3.47%) | 0.227 (5.86%) | 0.213 (-0.48%) | 0.221 (3.26%) |
| 1949 | Dry | Fall | 0.18 | 0.174 (-0.74%) | 0.173 (-1.03%) | 0.173 (-1.01%) | 0.175 (-0.23%) | 0.179 (2.43%) | 0.172 (-1.67%) | 0.174 (-0.33%) | 0.179 (2.40%) |
| 1950 | Dry | Fall | 0.17 | 0.161 (-2.19%) | 0.164 (-0.83%) | 0.164 (-0.82%) | 0.165 (-0.17%) | 0.172 (4.25%) | 0.177 (7.03%) | 0.164 (-0.82%) | 0.172 (4.19%) |
| 1951 | Above Normal | Fall | 0.16 | 0.162 (2.55%) | 0.158 (0.10%) | 0.157 (-0.34%) | 0.159 (0.61%) | 0.157 (-0.25%) | 0.160 (1.56%) | 0.158 (-0.17%) | 0.158 (0.25%) |
| 1952 | Wet | Fall | 0.28 | 0.271 (-1.37%) | 0.272 (-0.99%) | 0.272 (-1.28%) | 0.272 (-1.15%) | 0.272 (-1.05%) | 0.290 (5.51%) | 0.273 (-0.78%) | 0.273 (-0.82%) |
| 1953 | Above Normal | Fall | 0.19 | 0.191 (-1.41%) | 0.192 (-0.80%) | 0.192 (-0.73%) | 0.195 (1.03%) | 0.204 (5.49%) | 0.199 (2.93%) | 0.192 (-0.71%) | 0.203 (5.18%) |
| 1954 | Above Normal | Fall | 0.22 | 0.210 (-2.24%) | 0.213 (-1.13%) | 0.213 (-1.12%) | 0.215 (-0.02%) | 0.221 (2.45%) | 0.229 (6.30%) | 0.214 (-0.47%) | 0.218 (1.15%) |
| 1955 | Dry | Fall | 0.15 | 0.142 (-1.77%) | 0.143 (-1.25%) | 0.143 (-1.14%) | 0.142 (-1.84%) | 0.144 (-0.54%) | 0.159 (9.92%) | 0.143 (-1.18%) | 0.144 (-0.07%) |
| 1956 | Wet | Fall | 0.18 | 0.174 (-1.02%) | 0.175 (-0.42%) | 0.175 (-0.41%) | 0.175 (-0.43%) | 0.175 (-0.60%) | 0.194 (10.16%) | 0.175 (-0.57%) | 0.175 (-0.58%) |
| 1957 | Below Normal | Fall | 0.19 | 0.183 (-1.96%) | 0.183 (-2.25%) | 0.183 (-2.21%) | 0.184 (-1.61%) | 0.192 (2.88%) | 0.202 (7.83%) | 0.182 (-2.55%) | 0.191 (2.14%) |
| 1958 | Wet | Fall | 0.28 | 0.282 (-0.78%) | 0.282 (-0.80%) | 0.282 (-0.96%) | 0.283 (-0.69%) | 0.282 (-0.87%) | 0.305 (7.25%) | 0.282 (-0.76%) | 0.283 (-0.46%) |

| Water Year | Water Year Type | Run | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP Delta VA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Act5 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1959 | Below Normal | Fall | 0.15 | 0.154 (2.82%) | 0.147 (-1.89%) | 0.147 (-1.53%) | 0.147 (-2.10%) | 0.151 (0.58%) | 0.146 (-2.40%) | 0.147 (-1.59%) | 0.152 (1.62%) |
| 1960 | Dry | Fall | 0.16 | 0.162 (3.01%) | 0.156 (-0.61%) | 0.156 (-0.77%) | 0.156 (-0.67%) | 0.162 (3.44%) | 0.167 (6.32%) | 0.156 (-0.84%) | 0.153 (-2.81%) |
| 1961 | Dry | Fall | 0.15 | 0.148 (0.08%) | 0.147 (-0.38%) | 0.147 (-0.27%) | 0.146 (-0.90%) | 0.149 (0.67%) | 0.149 (1.07%) | 0.147 (-0.46%) | 0.149 (1.16%) |
| 1962 | Dry | Fall | 0.16 | 0.163 (1.87%) | 0.160 (-0.16%) | 0.160 (-0.22%) | 0.160 (-0.16%) | 0.167 (4.31%) | 0.180 (12.39%) | 0.160 (-0.30%) | 0.167 (4.27%) |
| 1963 | Wet | Fall | 0.28 | 0.275 (-0.13%) | 0.274 (-0.58%) | 0.274 (-0.55%) | 0.276 (0.04%) | 0.277 (0.75%) | 0.294 (6.60%) | 0.274 (-0.41%) | 0.277 (0.67%) |
| 1964 | Dry | Fall | 0.15 | 0.144 (-0.96%) | 0.144 (-0.99%) | 0.144 (-1.03%) | 0.142 (-2.19%) | 0.145 (-0.00%) | 0.142 (-2.02%) | 0.144 (-0.80%) | 0.146 (0.34%) |
| 1965 | Wet | Fall | 0.2 | 0.207 (1.19%) | 0.204 (-0.14%) | 0.205 (0.16%) | 0.209 (2.18%) | 0.208 (1.92%) | 0.246 (20.49%) | 0.204 (-0.20%) | 0.209 (2.37%) |
| 1966 | Below Normal | Fall | 0.16 | 0.155 (-1.19%) | 0.154 (-1.58%) | 0.154 (-1.60%) | 0.155 (-1.37%) | 0.160 (1.75%) | 0.158 (0.69%) | 0.154 (-1.55%) | 0.159 (1.58%) |
| 1967 | Wet | Fall | 0.27 | 0.268 (-1.97%) | 0.269 (-1.49%) | 0.269 (-1.57%) | 0.271 (-0.78%) | 0.274 (0.17%) | 0.285 (4.52%) | 0.270 (-1.13%) | 0.274 (0.23%) |
| 1968 | Below Normal | Fall | 0.16 | 0.166 (2.41%) | 0.161 (-0.20%) | 0.161 (-0.32%) | 0.161 (-0.53%) | 0.165 (2.32%) | 0.156 (-3.38%) | 0.162 (-0.10%) | 0.166 (2.85%) |
| 1969 | Wet | Fall | 0.23 | 0.226 (-0.67%) | 0.227 (-0.21%) | 0.227 (-0.21%) | 0.227 (-0.27%) | 0.227 (-0.24%) | 0.246 (8.12%) | 0.227 (-0.49%) | 0.227 (-0.31%) |
| 1970 | Wet | Fall | 0.16 | 0.163 (0.88%) | 0.162 (-0.04%) | 0.162 (-0.00%) | 0.162 (0.09%) | 0.162 (0.01%) | 0.160 (-1.35%) | 0.162 (0.29%) | 0.161 (-0.62%) |
| 1971 | Wet | Fall | 0.21 | 0.214 (0.86%) | 0.210 (-0.99%) | 0.210 (-0.99%) | 0.211 (-0.59%) | 0.211 (-0.66%) | 0.225 (6.15%) | 0.210 (-1.08%) | 0.210 (-0.89%) |

| Water Year | Water Year Type | Run | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP Delta VA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Act5 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1972 | Below Normal | Fall | 0.16 | 0.161 (-0.60%) | 0.154 (-4.95%) | 0.154 (-5.02%) | 0.159 (-2.13%) | 0.165 (1.63%) | 0.171 (5.20%) | 0.160 (-1.53%) | 0.165 (2.02%) |
| 1973 | Above Normal | Fall | 0.18 | 0.179 (1.88%) | 0.175 (-0.02%) | 0.175 (0.10%) | 0.177 (0.90%) | 0.185 (5.37%) | 0.199 (13.55%) | 0.175 (0.08%) | 0.184 (4.89%) |
| 1974 | Wet | Fall | 0.26 | 0.263 (0.69%) | 0.262 (0.21%) | 0.262 (0.23%) | 0.262 (0.25%) | 0.261 (0.02%) | 0.309 (18.38%) | 0.261 (0.14%) | 0.262 (0.25%) |
| 1975 | Above Normal | Fall | 0.24 | 0.236 (-2.52%) | 0.238 (-1.57%) | 0.238 (-1.55%) | 0.241 (-0.29%) | 0.246 (1.74%) | 0.272 (12.49%) | 0.239 (-1.00%) | 0.248 (2.62%) |
| 1976 | Critical | Fall | 0.12 | 0.119 (-2.94%) | 0.121 (-1.43%) | 0.121 (-1.52%) | 0.121 (-1.08%) | 0.122 (-0.75%) | 0.127 (3.12%) | 0.121 (-1.73%) | 0.121 (-1.44%) |
| 1977 | Critical | Fall | 0.12 | 0.122 (2.92%) | 0.115 (-2.76%) | 0.121 (2.35%) | 0.121 (2.15%) | 0.121 (2.75%) | 0.121 (2.15%) | 0.115 (-2.19%) | 0.115 (-2.68%) |
| 1978 | Above Normal | Fall | 0.22 | 0.223 (0.38%) | 0.219 (-1.73%) | 0.219 (-1.46%) | 0.220 (-1.12%) | 0.224 (0.89%) | 0.267 (20.13%) | 0.219 (-1.67%) | 0.223 (0.34%) |
| 1979 | Dry | Fall | 0.15 | 0.149 (-3.43%) | 0.151 (-1.69%) | 0.151 (-1.59%) | 0.152 (-1.12%) | 0.159 (3.26%) | 0.171 (11.05%) | 0.151 (-1.84%) | 0.160 (4.10%) |
| 1980 | Above Normal | Fall | 0.17 | 0.168 (-1.44%) | 0.170 (-0.70%) | 0.169 (-0.86%) | 0.172 (0.61%) | 0.180 (5.30%) | 0.193 (12.80%) | 0.169 (-1.14%) | 0.179 (4.60%) |
| 1981 | Dry | Fall | 0.15 | 0.150 (0.93%) | 0.148 (-0.36%) | 0.148 (-0.34%) | 0.148 (-0.64%) | 0.151 (1.32%) | 0.155 (4.45%) | 0.150 (1.03%) | 0.152 (2.21%) |
| 1982 | Wet | Fall | 0.29 | 0.288 (-0.87%) | 0.288 (-0.76%) | 0.288 (-0.86%) | 0.288 (-0.75%) | 0.288 (-0.93%) | 0.311 (6.96%) | 0.288 (-0.78%) | 0.288 (-0.70%) |
| 1983 | Wet | Fall | 0.34 | 0.343 (0.29%) | 0.343 (0.30%) | 0.343 (0.35%) | 0.343 (0.34%) | 0.343 (0.26%) | 0.360 (5.27%) | 0.343 (0.41%) | 0.343 (0.40%) |
| 1984 | Wet | Fall | 0.16 | 0.167 (1.90%) | 0.164 (0.14%) | 0.164 (-0.06%) | 0.164 (-0.03%) | 0.164 (0.11%) | 0.177 (8.03%) | 0.164 (-0.00%) | 0.164 (-0.11%) |

| Water Year | Water Year Type | Run | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP Delta VA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Act5 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1985 | Below Normal | Fall | 0.15 | 0.147 (0.49%) | 0.143 (-2.08%) | 0.143 (-2.18%) | 0.142 (-2.60%) | 0.145 (-0.62%) | 0.143 (-1.85%) | 0.143 (-1.94%) | 0.146 (0.00%) |
| 1986 | Wet | Fall | 0.19 | 0.189 (0.86%) | 0.188 (0.40%) | 0.188 (0.43%) | 0.189 (0.58%) | 0.189 (0.83%) | 0.223 (19.06%) | 0.188 (0.50%) | 0.188 (0.10%) |
| 1987 | Dry | Fall | 0.16 | 0.153 (-2.73%) | 0.155 (-1.32%) | 0.156 (-0.99%) | 0.156 (-1.21%) | 0.158 (0.54%) | 0.152 (-3.23%) | 0.156 (-0.80%) | 0.159 (1.03%) |
| 1988 | Critical | Fall | 0.13 | 0.128 (-0.11%) | 0.126 (-1.25%) | 0.126 (-1.49%) | 0.128 (-0.05%) | 0.130 (1.29%) | 0.130 (1.44%) | 0.126 (-1.40%) | 0.132 (2.86%) |
| 1989 | Dry | Fall | 0.2 | 0.194 (-0.68%) | 0.195 (-0.13%) | 0.194 (-0.52%) | 0.195 (-0.01%) | 0.198 (1.73%) | 0.197 (1.01%) | 0.194 (-0.51%) | 0.190 ( -2.52%) |
| 1990 | Critical | Fall | 0.12 | 0.128 (8.82%) | 0.128 (8.67%) | 0.130 (10.37%) | 0.130 (10.21%) | 0.134 (13.52%) | 0.133 (12.36%) | 0.128 (8.08%) | 0.134 (13.11%) |
| 1991 | Critical | Fall | 0.14 | 0.142 (4.93%) | 0.136 (0.01%) | 0.143 (5.23%) | 0.144 (5.88%) | 0.143 (5.48%) | 0.143 (5.63%) | 0.135 (-0.61%) | 0.136 (-0.14%) |
| 1992 | Critical | Fall | 0.12 | 0.142 (15.28%) | 0.138 (11.58%) | 0.142 (15.51%) | 0.143 (15.70%) | 0.144 (16.51%) | 0.140 (13.35%) | 0.137 (11.42%) | 0.138 (11.95%) |
| 1993 | Above Normal | Fall | 0.25 | 0.232 (-5.93%) | 0.244 (-1.16%) | 0.236 (-4.58%) | 0.236 (-4.63%) | 0.235 (-4.96%) | 0.271 (9.58%) | 0.241 (-2.29%) | 0.242 (-1.98%) |
| 1994 | Critical | Fall | 0.14 | 0.139 (0.20%) | 0.138 (-0.79%) | 0.138 (-0.52%) | 0.138 (-0.93%) | 0.140 (0.86%) | 0.134 (-3.80%) | 0.140 (0.42%) | 0.141 (1.61%) |
| 1995 | Wet | Fall | 0.34 | 0.338 (0.22%) | 0.337 (-0.06%) | 0.336 (-0.43%) | 0.336 (-0.20%) | 0.336 (-0.19%) | 0.355 (5.34%) | 0.336 (-0.34%) | 0.336 (-0.33%) |
| 1996 | Wet | Fall | 0.26 | 0.252 (-2.16%) | 0.253 (-2.11%) | 0.253 (-2.08%) | 0.253 (-2.08%) | 0.253 (-1.89%) | 0.272 (5.50%) | 0.253 (-1.83%) | 0.253 (-2.06%) |
| 1997 | Wet | Fall | 0.15 | 0.149 (1.84%) | 0.147 (0.43%) | 0.147 (0.50%) | 0.147 (0.10%) | 0.147 (-0.08%) | 0.148 (0.66%) | 0.147 (0.46%) | 0.146 (-0.28%) |

| Water Year | Water Year Type | Run | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP Delta VA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Act5 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1998 | Wet | Fall | 0.33 | 0.337 (1.50%) | 0.331 (-0.33%) | 0.331 (-0.38%) | 0.332 (-0.04%) | 0.332 (-0.25%) | 0.346 (4.21%) | 0.331 (-0.28%) | 0.333 (0.23%) |
| 1999 | Wet | Fall | 0.19 | 0.192 (0.86%) | 0.188 (-1.08%) | 0.188 (-1.06%) | 0.188 (-1.00%) | 0.188 (-1.09%) | 0.231 (21.71%) | 0.188 (-1.10%) | 0.188 (-1.24%) |
| 2000 | Above Normal | Fall | 0.18 | 0.182 (1.22%) | 0.180 (-0.06%) | 0.180 (-0.11%) | 0.182 (0.88%) | 0.186 (3.39%) | 0.208 (15.49%) | 0.179 (-0.34%) | 0.186 (3.12%) |
| 2001 | Dry | Fall | 0.15 | 0.145 (-1.64%) | 0.148 (0.44%) | 0.148 (0.36%) | 0.147 (-0.63%) | 0.149 (0.96%) | 0.150 (1.30%) | 0.149 (0.63%) | 0.150 (1.79%) |
| 2002 | Below Normal | Fall | 0.15 | 0.151 (2.20%) | 0.148 (0.72%) | 0.148 (0.65%) | 0.147 (-0.55%) | 0.156 (5.70%) | 0.152 (2.95%) | 0.149 (0.80%) | 0.154 (4.65%) |
| 2003 | Above Normal | Fall | 0.24 | 0.237 (-1.01%) | 0.237 (-0.97%) | 0.237 (-1.20%) | 0.237 (-1.00%) | 0.242 (0.74%) | 0.249 (3.96%) | 0.238 (-0.72%) | 0.238 (-0.87%) |
| 2004 | Above Normal | Fall | 0.18 | 0.175 (0.11%) | 0.175 (0.11%) | 0.175 (0.00%) | 0.176 (0.41%) | 0.184 (4.95%) | 0.175 (-0.17%) | 0.176 (0.19%) | 0.184 (4.83%) |
| 2005 | Below Normal | Fall | 0.23 | 0.234 (1.18%) | 0.229 (-1.00%) | 0.229 (-0.87%) | 0.230 (-0.55%) | 0.235 (1.99%) | 0.247 (6.80%) | 0.232 (0.53%) | 0.241 (4.22%) |
| 2006 | Wet | Fall | 0.34 | 0.335 (0.00%) | 0.334 (-0.31%) | 0.334 (-0.34%) | 0.335 (-0.12%) | 0.335 (-0.03%) | 0.361 (7.82%) | 0.334 (-0.43%) | 0.335 ( -0.08%) |
| 2007 | Below Normal | Fall | 0.15 | 0.150 (1.40%) | 0.146 (-1.69%) | 0.145 (-1.98%) | 0.145 (-2.42%) | 0.149 (0.46%) | 0.147 (-1.05%) | 0.145 (-1.83%) | 0.149 (0.70%) |
| 2008 | Dry | Fall | 0.15 | 0.143 (-2.12%) | 0.146 (-0.28%) | 0.146 (-0.15%) | 0.145 (-1.24%) | 0.146 (-0.36%) | 0.152 (3.67%) | 0.146 (-0.19%) | 0.147 (0.31%) |
| 2009 | Dry | Fall | 0.17 | 0.169 (1.37%) | 0.167 (0.24%) | 0.168 (0.52%) | 0.168 (0.68%) | 0.177 (6.24%) | 0.166 (-0.10%) | 0.168 (0.58%) | 0.161 (-3.45%) |
| 2010 | Below Normal | Fall | 0.19 | 0.189 (-1.13%) | 0.189 (-0.93%) | 0.189 (-1.00%) | 0.191 (-0.21%) | 0.198 (3.82%) | 0.213 (11.33%) | 0.190 (-0.63%) | 0.198 (3.51%) |

| Water Year | Water Year Type | Run | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP Delta VA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Act5 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2011 | Wet | Fall | 0.32 | 0.319 (-1.51%) | 0.321 (-1.04%) | 0.321 (-1.11%) | 0.321 (-1.08%) | 0.321 (-1.03%) | 0.331 (2.07%) | 0.321 (-0.86%) | 0.322 (-0.69%) |
| 2012 | Below Normal | Fall | 0.18 | 0.184 (4.73%) | 0.175 (-0.07%) | 0.175 (-0.13%) | 0.176 (0.40%) | 0.184 (4.53%) | 0.193 (9.71%) | 0.182 (3.63%) | 0.188 (7.25%) |
| 2013 | Dry | Fall | 0.14 | 0.147 (1.93%) | 0.143 (-0.38%) | 0.143 (-0.52%) | 0.144 (-0.14%) | 0.145 (0.62%) | 0.140 (-2.73%) | 0.143 (-0.37%) | 0.146 (1.19%) |
| 2014 | Critical | Fall | 0.12 | 0.127 (4.97%) | 0.120 (-1.21%) | 0.126 (4.35%) | 0.126 (4.35%) | 0.127 (4.94%) | 0.135 (11.07%) | 0.119 (-1.74%) | 0.120 (-0.69%) |
| 2015 | Critical | Fall | 0.12 | 0.131 (13.29%) | 0.116 (-0.16%) | 0.132 (13.62%) | 0.132 (13.57%) | 0.132 (13.81%) | 0.122 (5.45%) | 0.115 (-0.73%) | 0.114 (-1.21%) |
| 2016 | Below Normal | Fall | 0.19 | 0.183 (-1.53%) | 0.186 (0.33%) | 0.186 (-0.00%) | 0.186 (-0.07%) | 0.195 (4.92%) | 0.197 (6.29%) | 0.186 (0.23%) | 0.195 (5.12%) |
| 2017 | Wet | Fall | 0.26 | 0.258 (-0.94%) | 0.260 (-0.36%) | 0.258 (-0.98%) | 0.260 (-0.39%) | 0.260 (-0.42%) | 0.311 (19.25%) | 0.259 (-0.85%) | 0.260 (-0.41%) |
| 2018 | Below Normal | Fall | 0.19 | 0.193 (4.29%) | 0.186 (0.24%) | 0.186 (0.48%) | 0.186 (0.64%) | 0.192 (3.55%) | 0.190 (2.30%) | 0.189 (2.15%) | 0.196 (6.04%) |
| 2019 | Wet | Fall | 0.27 | 0.267 (-1.14%) | 0.267 (-0.91%) | 0.268 (-0.76%) | 0.271 (0.57%) | 0.271 (0.53%) | 0.301 (11.58%) | 0.268 (-0.55%) | 0.271 (0.47%) |
| 2020 | Dry | Fall | 0.14 | 0.140 (-1.22%) | 0.141 (-0.84%) | 0.141 (-0.65%) | 0.140 (-1.58%) | 0.141 (-0.17%) | 0.146 (3.34%) | 0.141 (-0.26%) | 0.142 (-0.07%) |
| 2021 | Critical | Fall | 0.12 | 0.119 (0.53%) | 0.116 (-1.54%) | 0.120 (1.44%) | 0.121 (1.89%) | 0.123 (4.34%) | 0.124 (4.72%) | 0.114 (-3.53%) | 0.114 (-3.31%) |

- **Above Normal**
    - Under Alt1, mean predicted survival to Chipps Island is lower than NAA, ranging from 2.6% higher in Above Normal water years to 5.9% lower in Above Normal water years compared to the NAA for Fall-run Chinook salmon (Figure I.6-16 and Table I.6-6).
    - Under Alt2 With TUCP Without VA, mean predicted survival to Chipps Island is lower than NAA, ranging from 0.1% higher in Above Normal water years to 1.7% lower in Above Normal water years compared to the NAA for Fall-run Chinook salmon.
    - Under Alt2 Without TUCP Delta VA, mean predicted survival to Chipps Island is lower than NAA, ranging from 1% higher in Above Normal water years to 4.6% lower in Above Normal water years compared to the NAA for Fall-run Chinook salmon.
    - Under Alt2 Without TUCP Systemwide VA, mean predicted survival to Chipps Island is higher than NAA, ranging from 5.5% higher in Above Normal water years to 5% lower in Above Normal water years compared to the NAA for Fall-run Chinook salmon.
    - Under Alt2 Without TUCP Without VA, mean predicted survival to Chipps Island is lower than NAA, ranging from 0.1% higher in Above Normal water years to 4.6% lower in Above Normal water years compared to the NAA for Fall-run Chinook salmon. Under Alt3, mean predicted survival to Chipps Island is higher than NAA, ranging from 20.1% higher in Above Normal water years to 0.2% lower in Above Normal water years compared to the NAA for Fall-run Chinook salmon.
    - Under Alt4, mean predicted survival to Chipps Island is lower than NAA, ranging from 0.2% higher in Above Normal water years to 2.3% lower in Above Normal water years compared to the NAA for Fall-run Chinook salmon.
    - Under Act5, mean predicted survival to Chipps Island is higher than NAA, ranging from 5.2% higher in Above Normal water years to 2% lower in Above Normal water years compared to the NAA for Fall-run Chinook salmon.
- **Below Normal**
    - Under Alt1, mean predicted survival to Chipps Island is higher than NAA, ranging from 4.7% higher in Below Normal water years to 3.3% lower in Below Normal water years compared to the NAA for Fall-run Chinook salmon (Figure I.6-16 and Table I.6-6).
    - Under Alt2 With TUCP Without VA, mean predicted survival to Chipps Island is lower than NAA, ranging from 0.7% higher in Below Normal water years to 5% lower in Below Normal water years compared to the NAA for Fall-run Chinook salmon.

- Under Alt2 Without TUCP Delta VA, mean predicted survival to Chipps Island is lower than NAA, ranging from 0.6% higher in Below Normal water years to 2.6% lower in Below Normal water years compared to the NAA for Fall-run Chinook salmon.
- Under Alt2 Without TUCP Systemwide VA, mean predicted survival to Chipps Island is higher than NAA, ranging from 5.7% higher in Below Normal water years to 0.6% lower in Below Normal water years compared to the NAA for Fall-run Chinook salmon.
- Under Alt2 Without TUCP Without VA, mean predicted survival to Chipps Island is lower than NAA, ranging from 0.7% higher in Below Normal water years to 5% lower in Below Normal water years compared to the NAA for Fall-run Chinook salmon. Under Alt3, mean predicted survival to Chipps Island is higher than NAA, ranging from 14.1% higher in Below Normal water years to 3.4% lower in Below Normal water years compared to the NAA for Fall-run Chinook salmon.
- Under Alt4, mean predicted survival to Chipps Island is lower than NAA, ranging from 3.6% higher in Below Normal water years to 4% lower in Below Normal water years compared to the NAA for Fall-run Chinook salmon.
- Under Act5, mean predicted survival to Chipps Island is higher than NAA, ranging from 7.2% higher in Below Normal water years to 0% higher in Below Normal water years compared to the NAA for Fall-run Chinook salmon.

- **Critical**
  - Under Alt1, mean predicted survival to Chipps Island is higher than NAA, ranging from 17.9% higher in Critical water years to 2.9% lower in Critical water years compared to the NAA for Fall-run Chinook salmon (Figure I.6-16 and Table I.6-6).
  - Under Alt2 With TUCP Without VA, mean predicted survival to Chipps Island is higher than NAA, ranging from 11.6% higher in Critical water years to 2.8% lower in Critical water years compared to the NAA for Fall-run Chinook salmon.
  - Under Alt2 Without TUCP Delta VA, mean predicted survival to Chipps Island is higher than NAA, ranging from 17.7% higher in Critical water years to 1.1% lower in Critical water years compared to the NAA for Fall-run Chinook salmon. Under Alt2 Without TUCP Systemwide VA, mean predicted survival to Chipps Island is higher than NAA, ranging from 19% higher in Critical water years to 0.7% lower in Critical water years compared to the NAA for Fall-run Chinook salmon.
  - Under Alt2 Without TUCP Without VA, mean predicted survival to Chipps Island is higher than NAA, ranging from 18.2% higher in Critical water years to 1.5% lower in Critical water years compared to the NAA for Fall-run Chinook salmon. Under Alt3, mean predicted survival to Chipps Island is higher than NAA,

ranging from 13.3% higher in Critical water years to 3.8% lower in Critical water years compared to the NAA for Fall-run Chinook salmon.

- Under Alt4, mean predicted survival to Chipps Island is higher than NAA, ranging from 11.4% higher in Critical water years to 3.5% lower in Critical water years compared to the NAA for Fall-run Chinook salmon.
- Under Act5, mean predicted survival to Chipps Island is higher than NAA, ranging from 13.1% higher in Critical water years to 3.3% lower in Critical water years compared to the NAA for Fall-run Chinook salmon.

- **Dry**
  - Under Alt1, mean predicted survival to Chipps Island is lower than NAA, ranging from 3% higher in Dry water years to 3.5% lower in Dry water years compared to the NAA for Fall-run Chinook salmon (Figure I.6-16 and Table I.6-6).
  - Under Alt2 With TUCP Without VA, mean predicted survival to Chipps Island is lower than NAA, ranging from 1.2% higher in Dry water years to 1.7% lower in Dry water years compared to the NAA for Fall-run Chinook salmon.
  - Under Alt2 Without TUCP Delta VA, mean predicted survival to Chipps Island is lower than NAA, ranging from 1.5% higher in Dry water years to 2.2% lower in Dry water years compared to the NAA for Fall-run Chinook salmon. Under Alt2 Without TUCP Systemwide VA, mean predicted survival to Chipps Island is higher than NAA, ranging from 6.2% higher in Dry water years to 0.5% lower in Dry water years compared to the NAA for Fall-run Chinook salmon.
  - Under Alt2 Without TUCP Without VA, mean predicted survival to Chipps Island is lower than NAA, ranging from 0.9% higher in Dry water years to 1.6% lower in Dry water years compared to the NAA for Fall-run Chinook salmon. Under Alt3, mean predicted survival to Chipps Island is higher than NAA, ranging from 12.4% higher in Dry water years to 3.2% lower in Dry water years compared to the NAA for Fall-run Chinook salmon.
  - Under Alt4, mean predicted survival to Chipps Island is lower than NAA, ranging from 1.3% higher in Dry water years to 1.8% lower in Dry water years compared to the NAA for Fall-run Chinook salmon.
  - Under Act5, mean predicted survival to Chipps Island is higher than NAA, ranging from 6.4% higher in Dry water years to 3.5% lower in Dry water years compared to the NAA for Fall-run Chinook salmon.
- **Wet**
  - Under Alt1, mean predicted survival to Chipps Island is lower than NAA, ranging from 1.9% higher in Wet water years to 2.2% lower in Wet water years compared to the NAA for Fall-run Chinook salmon (Figure I.6-16 and Table I.6-6).

- Under Alt2 With TUCP Without VA, mean predicted survival to Chipps Island is lower than NAA, ranging from 0.4% higher in Wet water years to 2.1% lower in Wet water years compared to the NAA for Fall-run Chinook salmon.
- Under Alt2 Without TUCP Delta VA, mean predicted survival to Chipps Island is lower than NAA, ranging from 2.2% higher in Wet water years to 2.1% lower in Wet water years compared to the NAA for Fall-run Chinook salmon. Under Alt2 Without TUCP Systemwide VA, mean predicted survival to Chipps Island is lower than NAA, ranging from 2.6% higher in Wet water years to 1.9% lower in Wet water years compared to the NAA for Fall-run Chinook salmon.
- Under Alt2 Without TUCP Without VA, mean predicted survival to Chipps Island is lower than NAA, ranging from 0.5% higher in Wet water years to 2.1% lower in Wet water years compared to the NAA for Fall-run Chinook salmon. Under Alt3, mean predicted survival to Chipps Island is higher than NAA, ranging from 21.7% higher in Wet water years to 1.3% lower in Wet water years compared to the NAA for Fall-run Chinook salmon.
- Under Alt4, mean predicted survival to Chipps Island is lower than NAA, ranging from 0.5% higher in Wet water years to 1.8% lower in Wet water years compared to the NAA for Fall-run Chinook salmon.
- Under Act5, mean predicted survival to Chipps Island is lower than NAA, ranging from 3% higher in Wet water years to 2.1% lower in Wet water years compared to the NAA for Fall-run Chinook salmon.

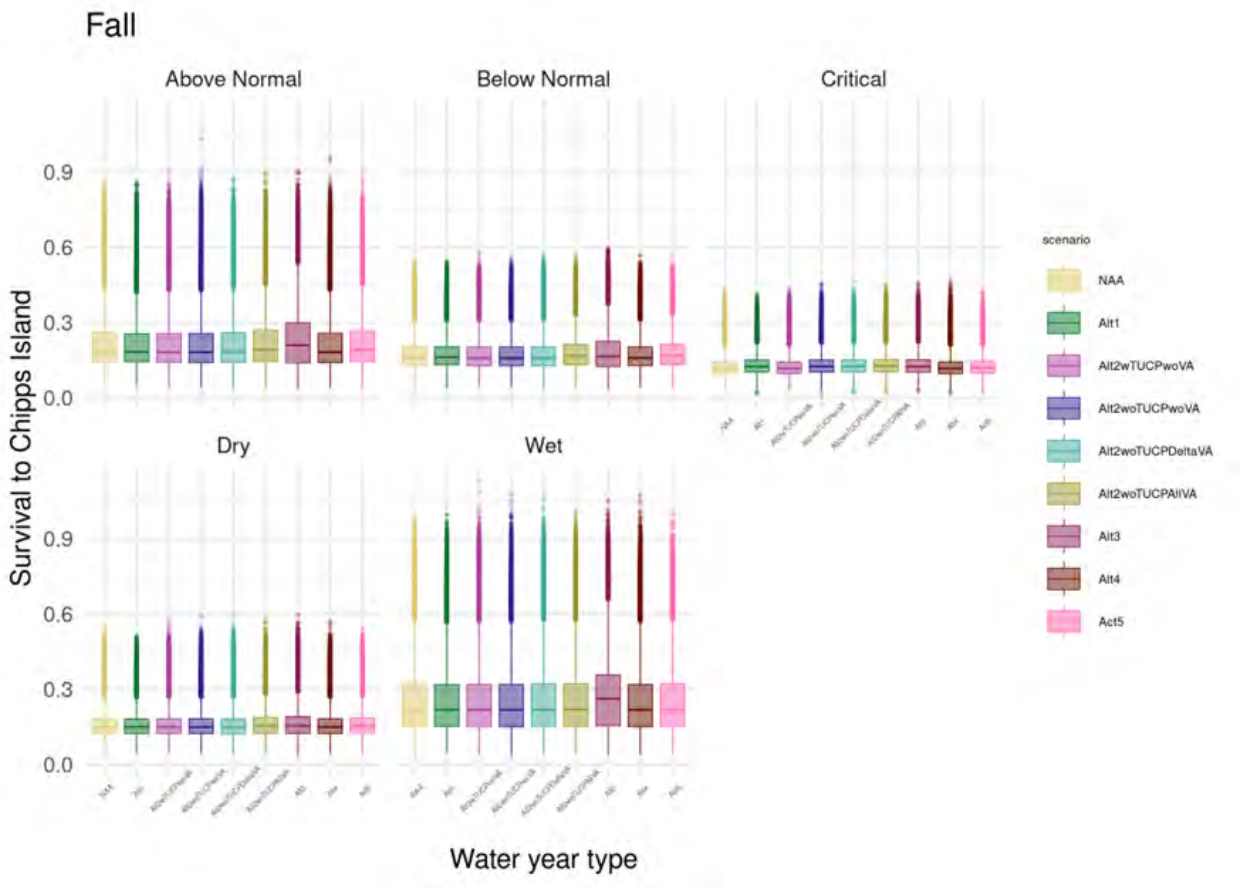



Figure I.6-17. Predicted fall-run Chinook salmon survival to Chipps Island averaged by water year type.

- Under Alt1, mean annual predicted survival to Chipps Island is lower than NAA, ranging from 1.8% higher in 1991 to 9.7% lower in 1922 compared to the NAA for Late Fall-run Chinook salmon (Figure I.6-17 and Table I.6-9).
- Under Alt2 With TUCP Without VA, mean annual predicted survival to Chipps Island is higher than NAA, ranging from 4.4% higher in 1987 to 2% lower in 2012 compared to the NAA for Late Fall-run Chinook salmon.
- Under Alt2 Without TUCP Delta VA, mean annual predicted survival to Chipps Island is higher than NAA, ranging from 3.3% higher in 1987 to 5% lower in 1934 compared to the NAA for Late Fall-run Chinook salmon. Under Alt2 Without TUCP Systemwide VA, mean annual predicted survival to Chipps Island is higher than NAA, ranging from 8% higher in 1991 to 4.7% lower in 1934 compared to the NAA for Late Fall-run Chinook salmon.
- Under Alt2 Without TUCP Without VA, mean annual predicted survival to Chipps Island is higher than NAA, ranging from 4.3% higher in 1987 to 4% lower in 1934 compared to the NAA for Late Fall-run Chinook salmon. Under Alt3, mean annual predicted survival to Chipps Island is higher than NAA, ranging from 15.9% higher in 1930 to 3% lower in 2018 compared to the NAA for Late Fall-run Chinook salmon.
- Under Alt4, mean annual predicted survival to Chipps Island is lower than NAA, ranging from 3.4% higher in 1976 to 3.2% lower in 1939 compared to the NAA for Late Fall-run Chinook salmon.
- Under NAA, mean annual predicted survival to Chipps Island is lower than NAA, ranging from 0% lower in 1922 to 0% lower in 1922 compared to the NAA for Late Fall-run Chinook salmon.
- Under Act5, mean annual predicted survival to Chipps Island is lower than NAA, ranging from 7.3% higher in 1991 to 6% lower in 1922 compared to the NAA for LateFall-run Chinook salmon.

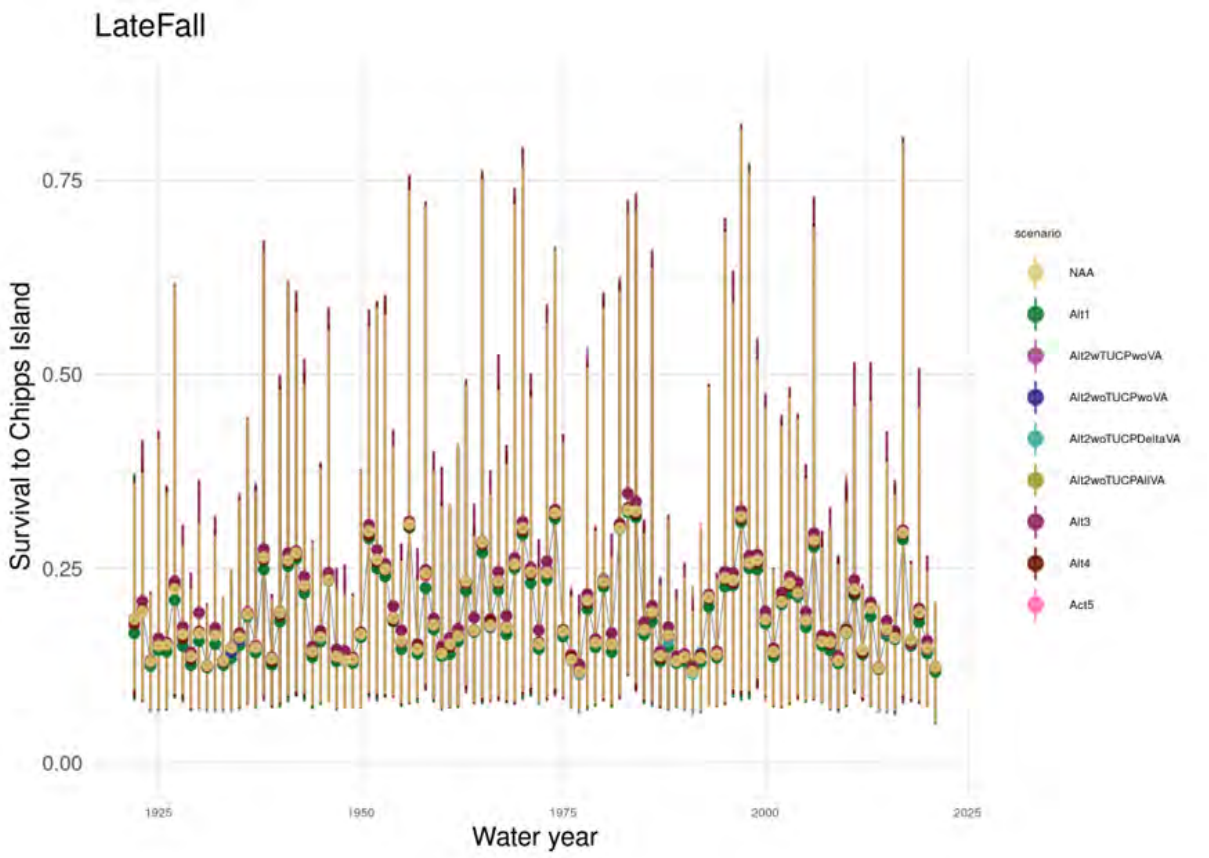



Figure I.6-18. Predicted annual late fall-run Chinook salmon survival to Chipps Island.

Table I.6-9. Predicted annual late fall-run Chinook salmon survival to Chipps Island. Parentheses indicate % difference from NAA (negative values indicate a decrease in survival).

| Water Year | Water Year Type | Run | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Act5 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1922 | Above Normal | Late Fall | 0.19 | 0.167 (-9.73%) | 0.185 (-0.08%) | 0.184 (-0.18%) | 0.185 (0.39%) | 0.185 (0.15%) | 0.185 (-0.06%) | 0.179 (-3.07%) | 0.174 (-5.96%) |
| 1923 | Below Normal | Late Fall | 0.2 | 0.196 (0.36%) | 0.196 (0.39%) | 0.196 (0.44%) | 0.196 (0.46%) | 0.196 (0.32%) | 0.208 (6.47%) | 0.197 (1.13%) | 0.196 (0.59%) |
| 1924 | Critical | Late Fall | 0.13 | 0.125 (-4.61%) | 0.132 (0.88%) | 0.131 (0.31%) | 0.131 (0.10%) | 0.131 (-0.02%) | 0.130 (-0.52%) | 0.131 (0.48%) | 0.132 (0.77%) |
| 1925 | Dry | Late Fall | 0.15 | 0.145 (-4.10%) | 0.152 (0.66%) | 0.152 (0.67%) | 0.152 (1.01%) | 0.152 (0.81%) | 0.160 (6.39%) | 0.151 (0.22%) | 0.153 (1.73%) |
| 1926 | Dry | Late Fall | 0.15 | 0.143 (-5.53%) | 0.152 (0.28%) | 0.153 (0.66%) | 0.153 (0.79%) | 0.152 (-0.22%) | 0.155 (1.80%) | 0.151 (-0.33%) | 0.153 (0.55%) |
| 1927 | Wet | Late Fall | 0.22 | 0.210 (-6.28%) | 0.228 (2.13%) | 0.228 (2.00%) | 0.226 (0.90%) | 0.228 (2.09%) | 0.233 (4.40%) | 0.226 (1.15%) | 0.224 (0.32%) |
| 1928 | Above Normal | Late Fall | 0.17 | 0.150 (-9.25%) | 0.167 (0.70%) | 0.166 (0.20%) | 0.165 (-0.50%) | 0.165 (-0.17%) | 0.175 (5.46%) | 0.161 (-2.95%) | 0.156 (-5.88%) |
| 1929 | Critical | Late Fall | 0.14 | 0.126 (-8.01%) | 0.138 (0.80%) | 0.136 (-0.37%) | 0.136 (-0.18%) | 0.137 (0.04%) | 0.142 (3.85%) | 0.133 (-2.60%) | 0.135 (-0.89%) |
| 1930 | Dry | Late Fall | 0.17 | 0.157 (-5.76%) | 0.168 (1.24%) | 0.167 (0.22%) | 0.167 (0.57%) | 0.167 (0.49%) | 0.193 (15.91%) | 0.168 (1.27%) | 0.168 (0.76%) |
| 1931 | Critical | Late Fall | 0.13 | 0.123 (-2.18%) | 0.125 (-0.24%) | 0.125 (-0.12%) | 0.126 (0.18%) | 0.125 (-0.20%) | 0.125 (-0.30%) | 0.124 (-0.77%) | 0.124 (-1.05%) |
| 1932 | Critical | Late Fall | 0.17 | 0.153 (-7.08%) | 0.167 (1.31%) | 0.166 (0.77%) | 0.166 (0.78%) | 0.166 (0.73%) | 0.174 (5.51%) | 0.166 (0.76%) | 0.165 (0.00%) |
| 1933 | Critical | Late Fall | 0.13 | 0.126 (-4.66%) | 0.132 (-0.20%) | 0.132 (-0.05%) | 0.131 (-0.48%) | 0.131 (-0.50%) | 0.130 (-1.59%) | 0.132 (-0.18%) | 0.132 (-0.24%) |

| Water Year | Water Year Type | Run | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Act5 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1934 | Critical | Late Fall | 0.15 | 0.135 (-8.70%) | 0.148 (0.41%) | 0.142 (-4.02%) | 0.140 (-5.03%) | 0.141 (-4.66%) | 0.148 (-0.16%) | 0.148 (0.24%) | 0.148 (0.05%) |
| 1935 | Below Normal | Late Fall | 0.16 | 0.151 (-6.27%) | 0.163 (0.98%) | 0.158 (-2.22%) | 0.158 (-2.26%) | 0.158 (-2.03%) | 0.167 (3.43%) | 0.162 (0.20%) | 0.163 (0.76%) |
| 1936 | Below Normal | Late Fall | 0.19 | 0.188 (-1.62%) | 0.194 (1.17%) | 0.192 (0.07%) | 0.191 (-0.32%) | 0.192 (0.03%) | 0.191 (-0.20%) | 0.193 (0.59%) | 0.194 (1.27%) |
| 1937 | Below Normal | Late Fall | 0.15 | 0.142 (-4.24%) | 0.149 (0.53%) | 0.149 (0.62%) | 0.150 (1.43%) | 0.150 (1.36%) | 0.150 (1.52%) | 0.148 (0.16%) | 0.152 (2.71%) |
| 1938 | Wet | Late Fall | 0.26 | 0.249 (-5.81%) | 0.268 (1.49%) | 0.266 (0.47%) | 0.265 (0.28%) | 0.267 (0.85%) | 0.275 (3.96%) | 0.262 (-0.96%) | 0.260 (-1.68%) |
| 1939 | Dry | Late Fall | 0.13 | 0.126 (-5.94%) | 0.134 (-0.15%) | 0.134 (0.12%) | 0.134 (0.21%) | 0.134 (0.18%) | 0.136 (1.16%) | 0.130 (-3.19%) | 0.132 (-1.57%) |
| 1940 | Above Normal | Late Fall | 0.19 | 0.182 (-6.09%) | 0.194 (0.23%) | 0.194 (0.06%) | 0.194 (0.26%) | 0.195 (0.53%) | 0.193 (-0.18%) | 0.189 (-2.20%) | 0.188 (-2.95%) |
| 1941 | Wet | Late Fall | 0.26 | 0.253 (-2.91%) | 0.260 (-0.18%) | 0.260 (-0.25%) | 0.261 (0.05%) | 0.261 (-0.01%) | 0.270 (3.50%) | 0.258 (-0.94%) | 0.258 (-1.26%) |
| 1942 | Wet | Late Fall | 0.27 | 0.263 (-2.67%) | 0.269 (-0.26%) | 0.269 (-0.23%) | 0.269 (-0.30%) | 0.269 (-0.44%) | 0.272 (0.81%) | 0.267 (-1.06%) | 0.267 (-1.13%) |
| 1943 | Wet | Late Fall | 0.23 | 0.219 (-4.29%) | 0.229 (0.38%) | 0.229 (0.30%) | 0.229 (0.20%) | 0.229 (0.13%) | 0.240 (5.01%) | 0.227 (-0.71%) | 0.222 (-2.77%) |
| 1944 | Dry | Late Fall | 0.14 | 0.136 (-5.10%) | 0.143 (0.10%) | 0.143 (0.01%) | 0.145 (1.05%) | 0.144 (0.61%) | 0.149 (4.12%) | 0.141 (-1.35%) | 0.142 (-1.17%) |
| 1945 | Dry | Late Fall | 0.16 | 0.156 (-3.61%) | 0.164 (1.24%) | 0.164 (1.05%) | 0.163 (0.69%) | 0.164 (1.18%) | 0.170 (4.81%) | 0.165 (1.93%) | 0.167 (2.85%) |
| 1946 | Below Normal | Late Fall | 0.24 | 0.234 (-0.27%) | 0.237 (0.76%) | 0.237 (0.81%) | 0.237 (0.80%) | 0.238 (1.40%) | 0.244 (3.96%) | 0.236 (0.61%) | 0.235 (0.05%) |
| 1947 | Dry | Late Fall | 0.14 | 0.131 (-4.44%) | 0.137 (0.22%) | 0.137 (-0.21%) | 0.139 (1.13%) | 0.138 (0.54%) | 0.146 (6.64%) | 0.137 (-0.35%) | 0.138 (0.71%) |

| Water Year | Water Year Type | Run | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Act5 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1948 | Dry | Late Fall | 0.13 | 0.132 (-0.38%) | 0.137 (3.54%) | 0.137 (3.50%) | 0.131 (-0.54%) | 0.132 (-0.03%) | 0.144 (8.79%) | 0.132 (-0.06%) | 0.133 (0.45%) |
| 1949 | Dry | Late Fall | 0.13 | 0.129 (-3.73%) | 0.133 (-0.05%) | 0.133 (-0.23%) | 0.133 (-0.58%) | 0.133 (-0.31%) | 0.135 (1.42%) | 0.133 (-0.21%) | 0.133 (-0.68%) |
| 1950 | Dry | Late Fall | 0.17 | 0.162 (-2.57%) | 0.168 (1.10%) | 0.167 (0.84%) | 0.167 (0.62%) | 0.167 (0.60%) | 0.168 (1.34%) | 0.167 (0.86%) | 0.167 (0.53%) |
| 1951 | Above Normal | Late Fall | 0.3 | 0.289 (-2.81%) | 0.296 (-0.58%) | 0.296 (-0.69%) | 0.296 (-0.62%) | 0.298 (-0.09%) | 0.306 (2.73%) | 0.293 (-1.52%) | 0.289 (-3.11%) |
| 1952 | Wet | Late Fall | 0.26 | 0.250 (-4.35%) | 0.261 (-0.20%) | 0.261 (-0.43%) | 0.261 (-0.28%) | 0.261 (-0.16%) | 0.274 (4.65%) | 0.258 (-1.48%) | 0.257 (-1.67%) |
| 1953 | Above Normal | Late Fall | 0.25 | 0.240 (-3.68%) | 0.251 (0.71%) | 0.251 (0.72%) | 0.251 (0.64%) | 0.251 (0.63%) | 0.256 (2.67%) | 0.249 (-0.27%) | 0.246 (-1.15%) |
| 1954 | Above Normal | Late Fall | 0.19 | 0.182 (-2.39%) | 0.185 (-0.56%) | 0.185 (-0.59%) | 0.185 (-0.84%) | 0.186 (-0.19%) | 0.202 (8.32%) | 0.183 (-1.60%) | 0.183 (-1.86%) |
| 1955 | Dry | Late Fall | 0.16 | 0.146 (-6.73%) | 0.156 (-0.77%) | 0.155 (-0.92%) | 0.156 (-0.80%) | 0.156 (-0.78%) | 0.171 (8.72%) | 0.156 (-0.53%) | 0.156 (-0.76%) |
| 1956 | Wet | Late Fall | 0.31 | 0.303 (-1.47%) | 0.307 (-0.22%) | 0.306 (-0.27%) | 0.306 (-0.37%) | 0.307 (-0.25%) | 0.310 (0.96%) | 0.304 (-1.07%) | 0.304 (-1.21%) |
| 1957 | Below Normal | Late Fall | 0.15 | 0.140 (-4.42%) | 0.147 (0.09%) | 0.147 (0.35%) | 0.147 (-0.04%) | 0.147 (-0.01%) | 0.153 (4.04%) | 0.150 (2.33%) | 0.147 (0.15%) |
| 1958 | Wet | Late Fall | 0.24 | 0.225 (-7.84%) | 0.246 (0.66%) | 0.246 (0.72%) | 0.246 (0.63%) | 0.247 (1.04%) | 0.248 (1.55%) | 0.243 (-0.61%) | 0.240 (-1.90%) |
| 1959 | Below Normal | Late Fall | 0.18 | 0.172 (-3.27%) | 0.178 (0.21%) | 0.178 (0.07%) | 0.178 (0.47%) | 0.178 (0.18%) | 0.186 (4.65%) | 0.177 (-0.58%) | 0.177 (-0.42%) |
| 1960 | Dry | Late Fall | 0.14 | 0.137 (-2.51%) | 0.143 (1.62%) | 0.143 (1.54%) | 0.143 (1.38%) | 0.143 (1.92%) | 0.150 (6.51%) | 0.143 (1.78%) | 0.145 (2.91%) |
| 1961 | Dry | Late Fall | 0.15 | 0.140 (-8.40%) | 0.152 (-0.56%) | 0.152 (-0.59%) | 0.152 (-0.60%) | 0.152 (-0.48%) | 0.162 (5.69%) | 0.149 (-2.36%) | 0.150 (-1.55%) |

| Water Year | Water Year Type | Run | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Act5 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1962 | Dry | Late Fall | 0.16 | 0.156 (-4.22%) | 0.164 (0.55%) | 0.164 (0.38%) | 0.164 (0.33%) | 0.164 (0.52%) | 0.172 (5.69%) | 0.164 (0.27%) | 0.164 (0.42%) |
| 1963 | Wet | Late Fall | 0.23 | 0.222 (-5.05%) | 0.233 (0.01%) | 0.233 (0.01%) | 0.233 (-0.26%) | 0.233 (-0.14%) | 0.232 (-0.65%) | 0.231 (-1.12%) | 0.227 (-2.52%) |
| 1964 | Dry | Late Fall | 0.17 | 0.168 (-1.49%) | 0.170 (-0.50%) | 0.170 (-0.54%) | 0.170 (-0.10%) | 0.170 (-0.37%) | 0.187 (9.70%) | 0.171 (0.18%) | 0.169 (-0.79%) |
| 1965 | Wet | Late Fall | 0.28 | 0.271 (-4.70%) | 0.284 (0.08%) | 0.284 (0.00%) | 0.285 (0.27%) | 0.285 (0.35%) | 0.284 (0.19%) | 0.280 (-1.23%) | 0.278 (-1.90%) |
| 1966 | Below Normal | Late Fall | 0.18 | 0.174 (-1.48%) | 0.176 (-0.66%) | 0.175 (-0.76%) | 0.175 (-0.79%) | 0.176 (-0.42%) | 0.185 (4.66%) | 0.182 (3.24%) | 0.177 (-0.08%) |
| 1967 | Wet | Late Fall | 0.23 | 0.222 (-4.72%) | 0.235 (0.65%) | 0.234 (0.58%) | 0.233 (-0.23%) | 0.233 (0.12%) | 0.246 (5.54%) | 0.231 (-0.82%) | 0.229 (-1.84%) |
| 1968 | Below Normal | Late Fall | 0.17 | 0.165 (-5.06%) | 0.175 (0.28%) | 0.174 (0.02%) | 0.175 (0.23%) | 0.175 (0.44%) | 0.189 (8.65%) | 0.174 (-0.18%) | 0.176 (0.99%) |
| 1969 | Wet | Late Fall | 0.26 | 0.250 (-2.03%) | 0.257 (0.52%) | 0.256 (0.37%) | 0.257 (0.43%) | 0.257 (0.58%) | 0.264 (3.15%) | 0.254 (-0.54%) | 0.251 (-1.81%) |
| 1970 | Wet | Late Fall | 0.3 | 0.294 (-2.74%) | 0.301 (-0.39%) | 0.301 (-0.36%) | 0.300 (-0.57%) | 0.300 (-0.62%) | 0.310 (2.79%) | 0.299 (-1.07%) | 0.296 (-1.99%) |
| 1971 | Wet | Late Fall | 0.25 | 0.231 (-5.84%) | 0.246 (0.18%) | 0.246 (0.22%) | 0.246 (-0.04%) | 0.246 (0.17%) | 0.251 (2.22%) | 0.243 (-1.26%) | 0.243 (-1.20%) |
| 1972 | Below Normal | Late Fall | 0.15 | 0.147 (-4.42%) | 0.154 (0.04%) | 0.154 (0.10%) | 0.154 (0.06%) | 0.153 (-0.19%) | 0.171 (11.24%) | 0.155 (1.15%) | 0.155 (1.16%) |
| 1973 | Above Normal | Late Fall | 0.25 | 0.236 (-3.56%) | 0.248 (1.39%) | 0.248 (1.41%) | 0.248 (1.15%) | 0.248 (1.21%) | 0.260 (6.10%) | 0.244 (-0.42%) | 0.240 (-1.80%) |
| 1974 | Wet | Late Fall | 0.32 | 0.314 (-2.07%) | 0.322 (0.24%) | 0.322 (0.27%) | 0.321 (-0.16%) | 0.322 (0.16%) | 0.326 (1.52%) | 0.320 (-0.45%) | 0.320 (-0.21%) |
| 1975 | Above Normal | Late Fall | 0.17 | 0.163 (-3.96%) | 0.169 (-0.12%) | 0.169 (-0.12%) | 0.169 (-0.07%) | 0.169 (-0.03%) | 0.171 (0.94%) | 0.172 (1.30%) | 0.165 (-2.55%) |

| Water Year | Water Year Type | Run | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Act5 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1976 | Critical | Late Fall | 0.13 | 0.132 (-0.53%) | 0.133 (-0.15%) | 0.133 (-0.19%) | 0.133 (0.26%) | 0.133 (0.13%) | 0.138 (3.51%) | 0.137 (3.42%) | 0.140 (5.56%) |
| 1977 | Critical | Late Fall | 0.12 | 0.116 (-1.29%) | 0.117 (-0.75%) | 0.117 (-0.07%) | 0.114 (-2.78%) | 0.115 (-2.32%) | 0.127 (7.77%) | 0.118 (0.34%) | 0.120 (1.86%) |
| 1978 | Above Normal | Late Fall | 0.21 | 0.198 (-5.42%) | 0.211 (1.08%) | 0.209 (-0.21%) | 0.208 (-0.28%) | 0.209 (0.14%) | 0.217 (3.87%) | 0.205 (-1.84%) | 0.205 (-2.00%) |
| 1979 | Dry | Late Fall | 0.16 | 0.149 (-4.09%) | 0.156 (0.80%) | 0.156 (0.60%) | 0.155 (0.36%) | 0.155 (0.39%) | 0.159 (2.89%) | 0.155 (0.22%) | 0.155 (0.35%) |
| 1980 | Above Normal | Late Fall | 0.23 | 0.226 (-2.84%) | 0.235 (0.86%) | 0.235 (1.05%) | 0.235 (0.99%) | 0.237 (1.64%) | 0.232 (-0.45%) | 0.231 (-0.63%) | 0.229 (-1.80%) |
| 1981 | Dry | Late Fall | 0.15 | 0.143 (-6.31%) | 0.153 (0.27%) | 0.153 (0.36%) | 0.154 (1.02%) | 0.154 (1.06%) | 0.167 (9.42%) | 0.152 (-0.23%) | 0.152 (-0.12%) |
| 1982 | Wet | Late Fall | 0.3 | 0.301 (-0.40%) | 0.303 (0.26%) | 0.303 (0.33%) | 0.302 ( -0.16%) | 0.304 (0.42%) | 0.308 (1.70%) | 0.305 (0.88%) | 0.303 (0.28%) |
| 1983 | Wet | Late Fall | 0.33 | 0.323 (-0.73%) | 0.326 (0.15%) | 0.325 (0.01%) | 0.326 (0.10%) | 0.325 (-0.01%) | 0.347 (6.56%) | 0.328 (0.73%) | 0.327 (0.60%) |
| 1984 | Wet | Late Fall | 0.32 | 0.316 (-2.59%) | 0.325 (0.17%) | 0.324 (0.07%) | 0.325 (0.18%) | 0.325 (0.23%) | 0.336 (3.77%) | 0.320 (-1.19%) | 0.319 (-1.42%) |
| 1985 | Below Normal | Late Fall | 0.17 | 0.165 (-4.00%) | 0.172 (-0.04%) | 0.172 (-0.06%) | 0.172 (0.15%) | 0.172 (-0.04%) | 0.180 (5.10%) | 0.173 (0.53%) | 0.171 (-0.51%) |
| 1986 | Wet | Late Fall | 0.19 | 0.182 (-5.89%) | 0.193 (-0.33%) | 0.193 (-0.38%) | 0.193 (-0.52%) | 0.192 (-0.67%) | 0.202 (4.37%) | 0.192 (-1.09%) | 0.189 (-2.48%) |
| 1987 | Dry | Late Fall | 0.14 | 0.130 (-5.35%) | 0.144 (4.37%) | 0.144 (4.29%) | 0.142 (3.27%) | 0.143 (3.57%) | 0.142 (3.54%) | 0.134 (-2.53%) | 0.137 (-0.32%) |
| 1988 | Critical | Late Fall | 0.17 | 0.149 (-9.34%) | 0.163 (-0.67%) | 0.163 (-0.71%) | 0.156 (-4.94%) | 0.164 (-0.55%) | 0.175 (6.15%) | 0.164 (-0.13%) | 0.157 (-4.60%) |
| 1989 | Dry | Late Fall | 0.13 | 0.129 (-1.90%) | 0.131 (0.06%) | 0.131 (0.07%) | 0.133 (1.35%) | 0.132 (0.77%) | 0.137 (4.67%) | 0.132 (1.03%) | 0.133 (1.28%) |

| Water Year | Water Year Type | Run | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Act5 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1990 | Critical | Late Fall | 0.14 | 0.130 (-4.35%) | 0.136 (-0.14%) | 0.135 (-0.60%) | 0.137 (0.26%) | 0.136 (-0.25%) | 0.140 (3.03%) | 0.135 (-0.93%) | 0.136 (-0.19%) |
| 1991 | Critical | Late Fall | 0.12 | 0.120 (1.83%) | 0.118 (0.52%) | 0.120 (2.01%) | 0.115 (-2.37%) | 0.127 (7.99%) | 0.124 (5.22%) | 0.119 (1.25%) | 0.126 (7.34%) |
| 1992 | Critical | Late Fall | 0.14 | 0.129 (-4.36%) | 0.136 (0.51%) | 0.137 (1.06%) | 0.138 (2.10%) | 0.135 (-0.13%) | 0.136 (0.47%) | 0.138 (2.28%) | 0.135 (0.01%) |
| 1993 | Above Normal | Late Fall | 0.21 | 0.201 (-5.90%) | 0.216 (1.00%) | 0.214 (0.46%) | 0.214 (0.30%) | 0.215 (0.48%) | 0.216 (1.38%) | 0.211 (-0.96%) | 0.209 (-2.31%) |
| 1994 | Critical | Late Fall | 0.14 | 0.135 (-2.99%) | 0.141 (0.77%) | 0.141 (0.67%) | 0.141 (0.68%) | 0.140 (0.51%) | 0.143 (2.76%) | 0.139 (-0.46%) | 0.141 (1.18%) |
| 1995 | Wet | Late Fall | 0.24 | 0.226 (-4.84%) | 0.239 (0.68%) | 0.240 (0.82%) | 0.238 (0.11%) | 0.239 (0.67%) | 0.246 (3.32%) | 0.236 (-0.61%) | 0.232 (-2.31%) |
| 1996 | Wet | Late Fall | 0.24 | 0.228 (-2.96%) | 0.232 (-1.35%) | 0.232 (-1.16%) | 0.232 (-1.43%) | 0.232 (-1.29%) | 0.244 (4.03%) | 0.231 (-1.46%) | 0.230 (-2.04%) |
| 1997 | Wet | Late Fall | 0.32 | 0.310 (-2.43%) | 0.317 (-0.15%) | 0.317 (-0.17%) | 0.318 (-0.03%) | 0.317 (-0.12%) | 0.325 (2.34%) | 0.314 (-1.10%) | 0.313 (-1.62%) |
| 1998 | Wet | Late Fall | 0.26 | 0.251 (-2.55%) | 0.257 (-0.27%) | 0.257 (-0.44%) | 0.257 (-0.20%) | 0.257 (-0.26%) | 0.267 (3.48%) | 0.258 (0.10%) | 0.259 (0.31%) |
| 1999 | Wet | Late Fall | 0.26 | 0.248 (-4.71%) | 0.260 (-0.33%) | 0.260 (-0.27%) | 0.260 (-0.29%) | 0.260 (-0.17%) | 0.268 (2.70%) | 0.257 (-1.50%) | 0.255 (-2.28%) |
| 2000 | Above Normal | Late Fall | 0.19 | 0.179 (-2.98%) | 0.187 (1.45%) | 0.188 (1.59%) | 0.187 (1.35%) | 0.188 (1.51%) | 0.195 (5.35%) | 0.185 (0.11%) | 0.180 (-2.46%) |
| 2001 | Dry | Late Fall | 0.14 | 0.137 (-4.55%) | 0.143 (-0.01%) | 0.143 (0.04%) | 0.144 (0.30%) | 0.144 (0.54%) | 0.147 (3.04%) | 0.142 (-1.10%) | 0.144 (0.75%) |
| 2002 | Below Normal | Late Fall | 0.21 | 0.204 (-1.67%) | 0.207 (-0.42%) | 0.207 (-0.26%) | 0.208 (0.35%) | 0.210 (1.14%) | 0.219 (5.39%) | 0.210 (1.16%) | 0.211 (1.40%) |
| 2003 | Above Normal | Late Fall | 0.23 | 0.218 (-5.50%) | 0.232 (0.40%) | 0.232 (0.26%) | 0.232 (0.47%) | 0.232 (0.36%) | 0.240 (3.67%) | 0.228 (-1.31%) | 0.224 (-3.09%) |

| Water Year | Water Year Type | Run | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Act5 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2004 | Above Normal | Late Fall | 0.22 | 0.214 (-2.08%) | 0.219 (0.16%) | 0.218 (-0.21%) | 0.218 (-0.13%) | 0.219 (-0.01%) | 0.233 (6.38%) | 0.221 (0.89%) | 0.216 (-1.19%) |
| 2005 | Below Normal | Late Fall | 0.18 | 0.175 (-5.05%) | 0.183 (-0.31%) | 0.183 (-0.44%) | 0.182 (-0.83%) | 0.184 (-0.10%) | 0.194 (5.65%) | 0.184 (-0.07%) | 0.184 (-0.14%) |
| 2006 | Wet | Late Fall | 0.29 | 0.278 (-2.80%) | 0.287 (0.48%) | 0.287 (0.48%) | 0.288 (0.63%) | 0.287 (0.42%) | 0.296 (3.30%) | 0.283 (-0.94%) | 0.282 (-1.45%) |
| 2007 | Below Normal | Late Fall | 0.16 | 0.151 (-3.46%) | 0.157 (0.37%) | 0.157 (0.54%) | 0.157 (0.52%) | 0.158 (0.74%) | 0.164 (4.86%) | 0.158 (1.13%) | 0.158 (1.00%) |
| 2008 | Dry | Late Fall | 0.16 | 0.145 (-6.86%) | 0.155 (-0.45%) | 0.155 (-0.36%) | 0.154 (-0.80%) | 0.154 (-1.08%) | 0.162 (4.58%) | 0.153 (-1.64%) | 0.153 (-1.32%) |
| 2009 | Dry | Late Fall | 0.13 | 0.128 (-2.95%) | 0.132 (0.51%) | 0.132 (0.31%) | 0.133 (0.82%) | 0.133 (0.61%) | 0.137 (4.14%) | 0.132 (0.22%) | 0.133 (1.04%) |
| 2010 | Below Normal | Late Fall | 0.17 | 0.167 (-0.77%) | 0.169 (0.68%) | 0.170 (0.70%) | 0.169 (0.57%) | 0.171 (1.30%) | 0.171 (1.41%) | 0.171 (1.67%) | 0.174 (3.63%) |
| 2011 | Wet | Late Fall | 0.22 | 0.215 (-3.45%) | 0.224 (0.19%) | 0.223 (0.05%) | 0.223 (0.17%) | 0.223 (0.07%) | 0.235 (5.44%) | 0.218 (-2.27%) | 0.220 (-1.21%) |
| 2012 | Below Normal | Late Fall | 0.15 | 0.140 (-4.05%) | 0.143 (-1.95%) | 0.142 (-2.19%) | 0.144 (-0.70%) | 0.144 (-0.92%) | 0.144 (-1.17%) | 0.142 (-2.64%) | 0.143 (-1.38%) |
| 2013 | Dry | Late Fall | 0.2 | 0.188 (-5.46%) | 0.201 (0.76%) | 0.201 (0.63%) | 0.202 (1.34%) | 0.202 (1.27%) | 0.206 (3.52%) | 0.202 (1.16%) | 0.202 (1.51%) |
| 2014 | Critical | Late Fall | 0.12 | 0.120 (-1.33%) | 0.122 (-0.01%) | 0.122 (0.10%) | 0.121 (-0.42%) | 0.121 (-0.38%) | 0.122 (0.48%) | 0.121 (-0.74%) | 0.122 (0.33%) |
| 2015 | Critical | Late Fall | 0.17 | 0.164 (-4.55%) | 0.170 (-0.96%) | 0.169 (-1.69%) | 0.168 (-2.13%) | 0.168 (-2.25%) | 0.183 (6.27%) | 0.171 (-0.43%) | 0.169 (-1.90%) |
| 2016 | Below Normal | Late Fall | 0.16 | 0.159 (-1.07%) | 0.163 (1.31%) | 0.161 (-0.24%) | 0.162 (0.57%) | 0.162 (0.39%) | 0.169 (5.28%) | 0.165 (2.31%) | 0.163 (1.56%) |
| 2017 | Wet | Late Fall | 0.3 | 0.288 (-3.02%) | 0.299 (0.69%) | 0.298 (0.36%) | 0.297 (0.01%) | 0.297 (-0.05%) | 0.298 (0.51%) | 0.295 (-0.73%) | 0.291 (-2.02%) |

| Water Year | Water Year Type | Run | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Act5 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2018 | Below Normal | Late Fall | 0.16 | 0.151 (-4.70%) | 0.157 (-0.39%) | 0.157 (-0.56%) | 0.157 (-0.32%) | 0.158 (-0.20%) | 0.153 (-3.01%) | 0.156 (-0.98%) | 0.157 (-0.63%) |
| 2019 | Wet | Late Fall | 0.19 | 0.181 (-6.75%) | 0.196 (0.90%) | 0.196 (0.82%) | 0.196 (1.10%) | 0.196 (0.87%) | 0.198 (2.28%) | 0.190 (-1.97%) | 0.188 (-3.03%) |
| 2020 | Dry | Late Fall | 0.15 | 0.141 (-4.79%) | 0.147 (-0.83%) | 0.147 (-0.91%) | 0.147 (-0.82%) | 0.146 (-1.25%) | 0.157 (6.11%) | 0.147 (-0.56%) | 0.146 (-1.07%) |
| 2021 | Critical | Late Fall | 0.12 | 0.117 (-4.85%) | 0.122 (-0.38%) | 0.122 (-0.31%) | 0.122 (-0.53%) | 0.123 (0.27%) | 0.123 (0.01%) | 0.122 (-0.39%) | 0.122 (-0.78%) |

- **Above Normal**
    - Under Alt1, mean predicted survival to Chipps Island is lower than NAA, ranging from 2.1% lower in Above Normal water years to 9.7% lower in Above Normal water years compared to the NAA for Late Fall-run Chinook salmon (Figure I.6-18 and Table I.6-6).
    - Under Alt2 With TUCP Without VA, mean predicted survival to Chipps Island is higher than NAA, ranging from 1.4% higher in Above Normal water years to 0.6% lower in Above Normal water years compared to the NAA for Late Fall-run Chinook salmon.
    - Under Alt2 Without TUCP Delta VA, mean predicted survival to Chipps Island is higher than NAA, ranging from 1.3% higher in Above Normal water years to 0.8% lower in Above Normal water years compared to the NAA for Late Fall-run Chinook salmon.
    - Under Alt2 Without TUCP Systemwide VA, mean predicted survival to Chipps Island is higher than NAA, ranging from 1.6% higher in Above Normal water years to 0.2% lower in Above Normal water years compared to the NAA for Late Fall-run Chinook salmon.
    - Under Alt2 Without TUCP Without VA, mean predicted survival to Chipps Island is higher than NAA, ranging from 1.6% higher in Above Normal water years to 0.7% lower in Above Normal water years compared to the NAA for Late Fall-run Chinook salmon.
    - Under Alt3, mean predicted survival to Chipps Island is higher than NAA, ranging from 8.3% higher in Above Normal water years to 0.4% lower in Above Normal water years compared to the NAA for Late Fall-run Chinook salmon.
    - Under Alt4, mean predicted survival to Chipps Island is lower than NAA, ranging from 1.3% higher in Above Normal water years to 3.1% lower in Above Normal water years compared to the NAA for Late Fall-run Chinook salmon.
    - Under Act5, mean predicted survival to Chipps Island is lower than NAA, ranging from 1.2% lower in Above Normal water years to 6% lower in Above Normal water years compared to the NAA for LateFall-run Chinook salmon.
- **Below Normal**
    - Under Alt1, mean predicted survival to Chipps Island is lower than NAA, ranging from 0.4% higher in Below Normal water years to 6.3% lower in Below Normal water years compared to the NAA for Late Fall-run Chinook salmon (Figure I.6-18 and Table I.6-6).
    - Under Alt2 With TUCP Without VA, mean predicted survival to Chipps Island is higher than NAA, ranging from 1.3% higher in Below Normal water years to 2% lower in Below Normal water years compared to the NAA for Late Fall-run Chinook salmon.

- Under Alt2 Without TUCP Delta VA, mean predicted survival to Chipps Island is higher than NAA, ranging from 1.4% higher in Below Normal water years to 2.3% lower in Below Normal water years compared to the NAA for Late Fall-run Chinook salmon.
- Under Alt2 Without TUCP Systemwide VA, mean predicted survival to Chipps Island is higher than NAA, ranging from 1.4% higher in Below Normal water years to 2% lower in Below Normal water years compared to the NAA for Late Fall-run Chinook salmon.
- Under Alt2 Without TUCP Without VA, mean predicted survival to Chipps Island is lower than NAA, ranging from 0.8% higher in Below Normal water years to 2.2% lower in Below Normal water years compared to the NAA for Late Fall-run Chinook salmon.
- Under Alt3, mean predicted survival to Chipps Island is higher than NAA, ranging from 11.2% higher in Below Normal water years to 3% lower in Below Normal water years compared to the NAA for Late Fall-run Chinook salmon.
- Under Alt4, mean predicted survival to Chipps Island is higher than NAA, ranging from 3.2% higher in Below Normal water years to 2.6% lower in Below Normal water years compared to the NAA for Late Fall-run Chinook salmon.
- Under Act5, mean predicted survival to Chipps Island is higher than NAA, ranging from 3.6% higher in Below Normal water years to 1.4% lower in Below Normal water years compared to the NAA for LateFall-run Chinook salmon.

- **Critical**
  - Under Alt1, mean predicted survival to Chipps Island is lower than NAA, ranging from 1.8% higher in Critical water years to 9.3% lower in Critical water years compared to the NAA for Late Fall-run Chinook salmon (Figure I.6-18 and Table I.6-6).
  - Under Alt2 With TUCP Without VA, mean predicted survival to Chipps Island is higher than NAA, ranging from 1.3% higher in Critical water years to 1% lower in Critical water years compared to the NAA for Late Fall-run Chinook salmon.
  - Under Alt2 Without TUCP Delta VA, mean predicted survival to Chipps Island is lower than NAA, ranging from 2.1% higher in Critical water years to 5% lower in Critical water years compared to the NAA for Late Fall-run Chinook salmon.
  - Under Alt2 Without TUCP Systemwide VA, mean predicted survival to Chipps Island is lower than NAA, ranging from 8% higher in Critical water years to 4.7% lower in Critical water years compared to the NAA for Late Fall-run Chinook salmon.
  - Under Alt2 Without TUCP Without VA, mean predicted survival to Chipps Island is lower than NAA, ranging from 2% higher in Critical water years to 4% lower in Critical water years compared to the NAA for Late Fall-run Chinook salmon.

- Under Alt3, mean predicted survival to Chipps Island is higher than NAA, ranging from 7.8% higher in Critical water years to 1.6% lower in Critical water years compared to the NAA for Late Fall-run Chinook salmon.
- Under Alt4, mean predicted survival to Chipps Island is higher than NAA, ranging from 3.4% higher in Critical water years to 2.6% lower in Critical water years compared to the NAA for Late Fall-run Chinook salmon.
- Under Act5, mean predicted survival to Chipps Island is higher than NAA, ranging from 7.3% higher in Critical water years to 4.6% lower in Critical water years compared to the NAA for LateFall-run Chinook salmon.

- **Dry**
  - Under Alt1, mean predicted survival to Chipps Island is lower than NAA, ranging from 0.4% lower in Dry water years to 8.4% lower in Dry water years compared to the NAA for Late Fall-run Chinook salmon (Figure I.6-18 and Table I.6-6).
  - Under Alt2 With TUCP Without VA, mean predicted survival to Chipps Island is higher than NAA, ranging from 4.4% higher in Dry water years to 0.8% lower in Dry water years compared to the NAA for Late Fall-run Chinook salmon.
  - Under Alt2 Without TUCP Delta VA, mean predicted survival to Chipps Island is higher than NAA, ranging from 3.3% higher in Dry water years to 0.8% lower in Dry water years compared to the NAA for Late Fall-run Chinook salmon.
  - Under Alt2 Without TUCP Systemwide VA, mean predicted survival to Chipps Island is higher than NAA, ranging from 3.6% higher in Dry water years to 1.3% lower in Dry water years compared to the NAA for Late Fall-run Chinook salmon.
  - Under Alt2 Without TUCP Without VA, mean predicted survival to Chipps Island is higher than NAA, ranging from 4.3% higher in Dry water years to 0.9% lower in Dry water years compared to the NAA for Late Fall-run Chinook salmon.
  - Under Alt3, mean predicted survival to Chipps Island is higher than NAA, ranging from 15.9% higher in Dry water years to 1.2% higher in Dry water years compared to the NAA for Late Fall-run Chinook salmon.
  - Under Alt4, mean predicted survival to Chipps Island is lower than NAA, ranging from 1.9% higher in Dry water years to 3.2% lower in Dry water years compared to the NAA for Late Fall-run Chinook salmon.
  - Under Act5, mean predicted survival to Chipps Island is higher than NAA, ranging from 2.9% higher in Dry water years to 1.6% lower in Dry water years compared to the NAA for LateFall-run Chinook salmon.
- **Wet**
  - Under Alt1, mean predicted survival to Chipps Island is lower than NAA, ranging from 0.4% lower in Wet water years to 7.8% lower in Wet water years compared to the NAA for Late Fall-run Chinook salmon (Figure I.6-18 and Table I.6-6).

- Under Alt2 With TUCP Without VA, mean predicted survival to Chipps Island is higher than NAA, ranging from 2.1% higher in Wet water years to 1.3% lower in Wet water years compared to the NAA for Late Fall-run Chinook salmon.
- Under Alt2 Without TUCP Delta VA, mean predicted survival to Chipps Island is higher than NAA, ranging from 1.1% higher in Wet water years to 1.4% lower in Wet water years compared to the NAA for Late Fall-run Chinook salmon.
- Under Alt2 Without TUCP Systemwide VA, mean predicted survival to Chipps Island is higher than NAA, ranging from 2.1% higher in Wet water years to 1.3% lower in Wet water years compared to the NAA for Late Fall-run Chinook salmon.
- Under Alt2 Without TUCP Without VA, mean predicted survival to Chipps Island is higher than NAA, ranging from 2% higher in Wet water years to 1.2% lower in Wet water years compared to the NAA for Late Fall-run Chinook salmon.
- Under Alt3, mean predicted survival to Chipps Island is higher than NAA, ranging from 6.6% higher in Wet water years to 0.7% lower in Wet water years compared to the NAA for Late Fall-run Chinook salmon.
- Under Alt4, mean predicted survival to Chipps Island is lower than NAA, ranging from 1.2% higher in Wet water years to 2.3% lower in Wet water years compared to the NAA for Late Fall-run Chinook salmon.
- Under Act5, mean predicted survival to Chipps Island is lower than NAA, ranging from 0.6% higher in Wet water years to 3% lower in Wet water years compared to the NAA for LateFall-run Chinook salmon.

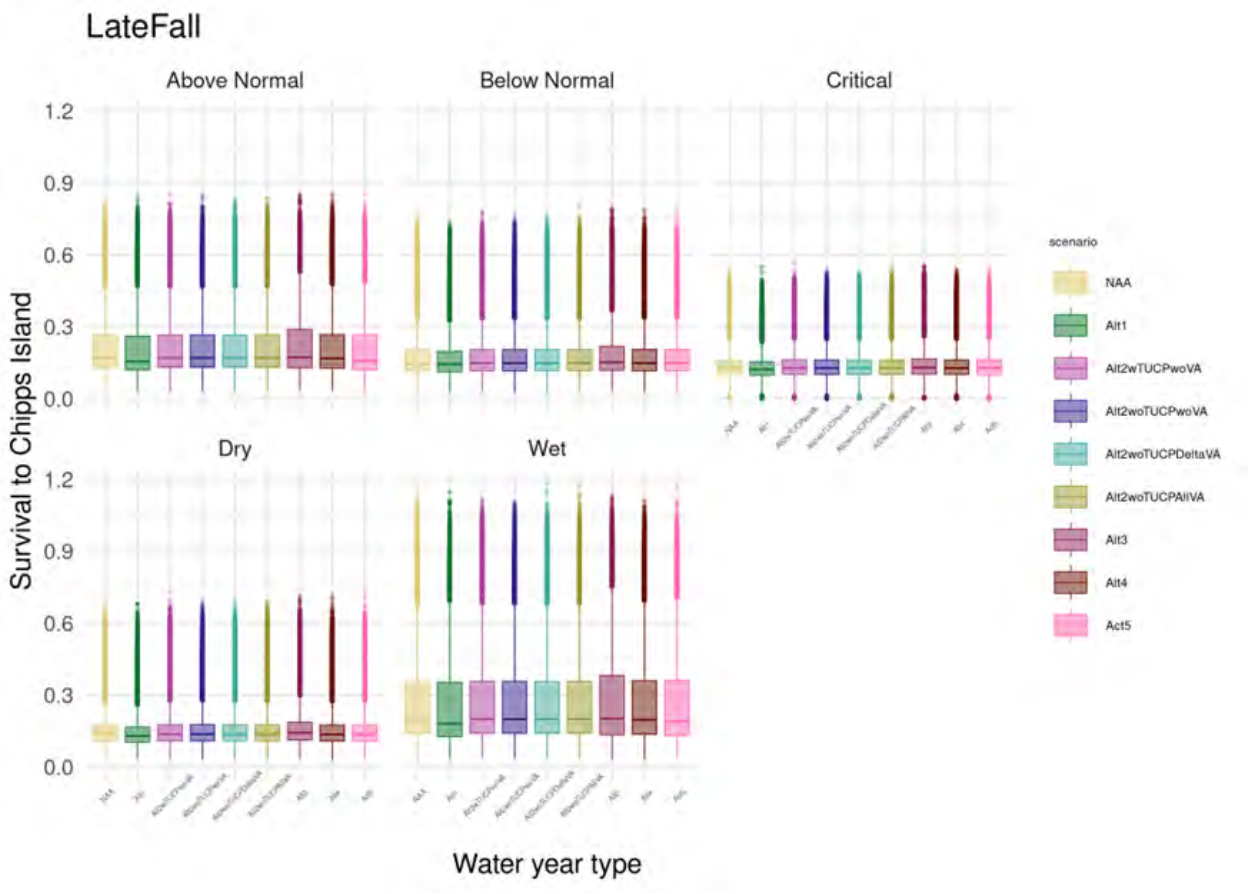



Figure I.6-19. Predicted late fall-run Chinook salmon survival to Chipps Island averaged by water year type.

### I.6.3.2 BA: Narrative, Tables, and Figure Results

Mean predicted survival was very similar across alternatives, and the highest mean predicted survival to Chipps Island for Winter-run Chinook salmon occurred under NAA in wet water years, followed by wet water years under Alt2 Without TUCP Systemwide VA. The lowest survival of Winter-run Chinook salmon occurred under NAA in critical water years followed by critical water years under Alt2 With TUCP Without VA. (Figure I.6-19, Table I.6-10).

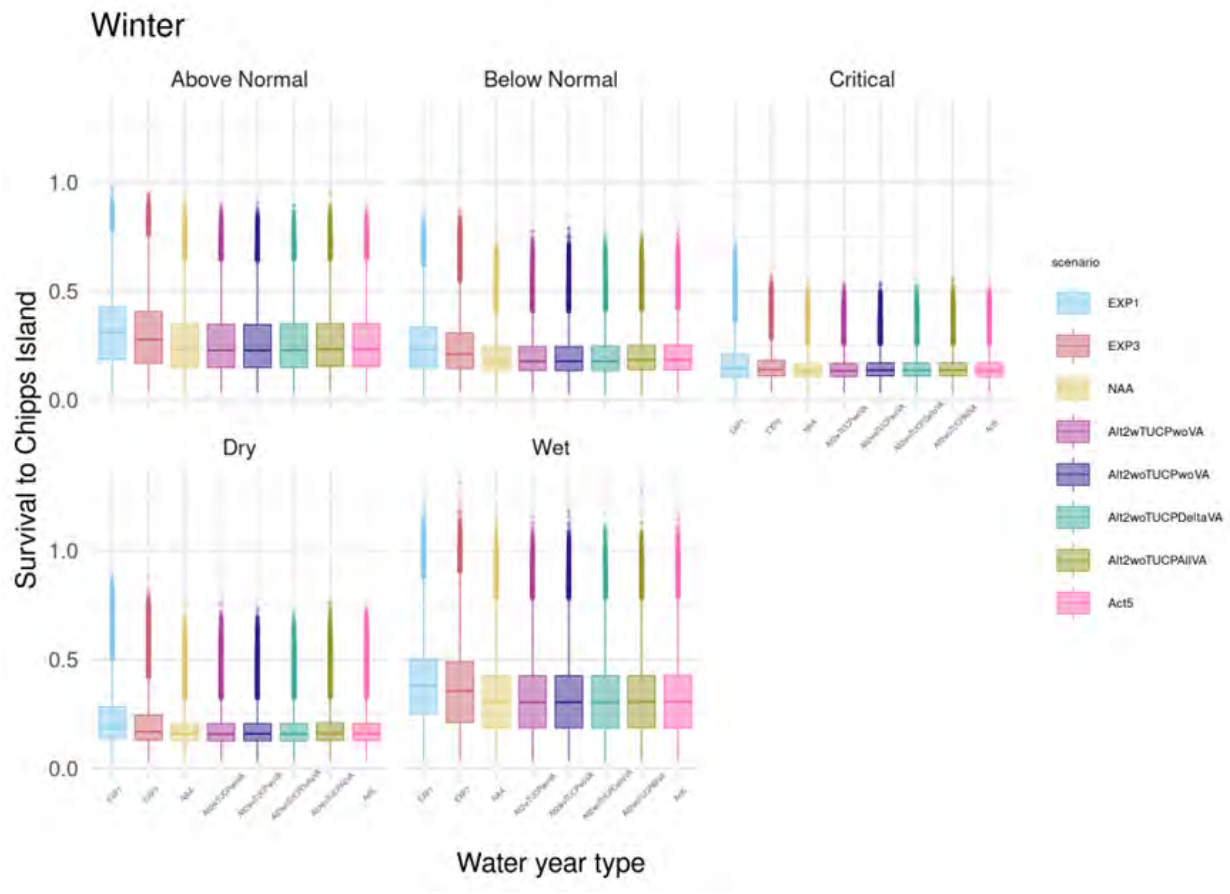



Figure I.6-20. Predicted winter-run Chinook salmon survival to Chipps Island averaged by water year type for Alt2 phases, Act5, EXP 1, EXP 3, and NAA.

Table I.6-10. Mean predicted winter-run Chinook salmon survival to Chipps Island averaged by water year type for Alt2 phases, Act5, EXP 1, EXP 3, and NAA.

| Water Year Type | Run | EXP1 | EXP3 | NAA | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Act5 |
|---|---|---|---|---|---|---|---|---|---|
| Above Normal | Winter | 0.32 | 0.3 | 0.26 | 0.26 | 0.26 | 0.26 | 0.26 | 0.26 |
| Below Normal | Winter | 0.25 | 0.23 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 |
| Critical | Winter | 0.17 | 0.15 | 0.14 | 0.14 | 0.15 | 0.15 | 0.15 | 0.14 |
| Dry | Winter | 0.22 | 0.2 | 0.17 | 0.17 | 0.17 | 0.17 | 0.18 | 0.18 |
| Wet | Winter | 0.39 | 0.37 | 0.33 | 0.33 | 0.33 | 0.33 | 0.33 | 0.33 |

The highest mean predicted survival to Chipps Island for Spring-run Chinook salmon occurred under NAA in wet water years, followed by wet water years under Alt2 Without TUCP Systemwide VA. The lowest survival of Spring-run Chinook salmon occurred under NAA in critical water years followed by critical water years under Alt2 With TUCP Without VA. (Figure I.6-20, Table I.6-11).

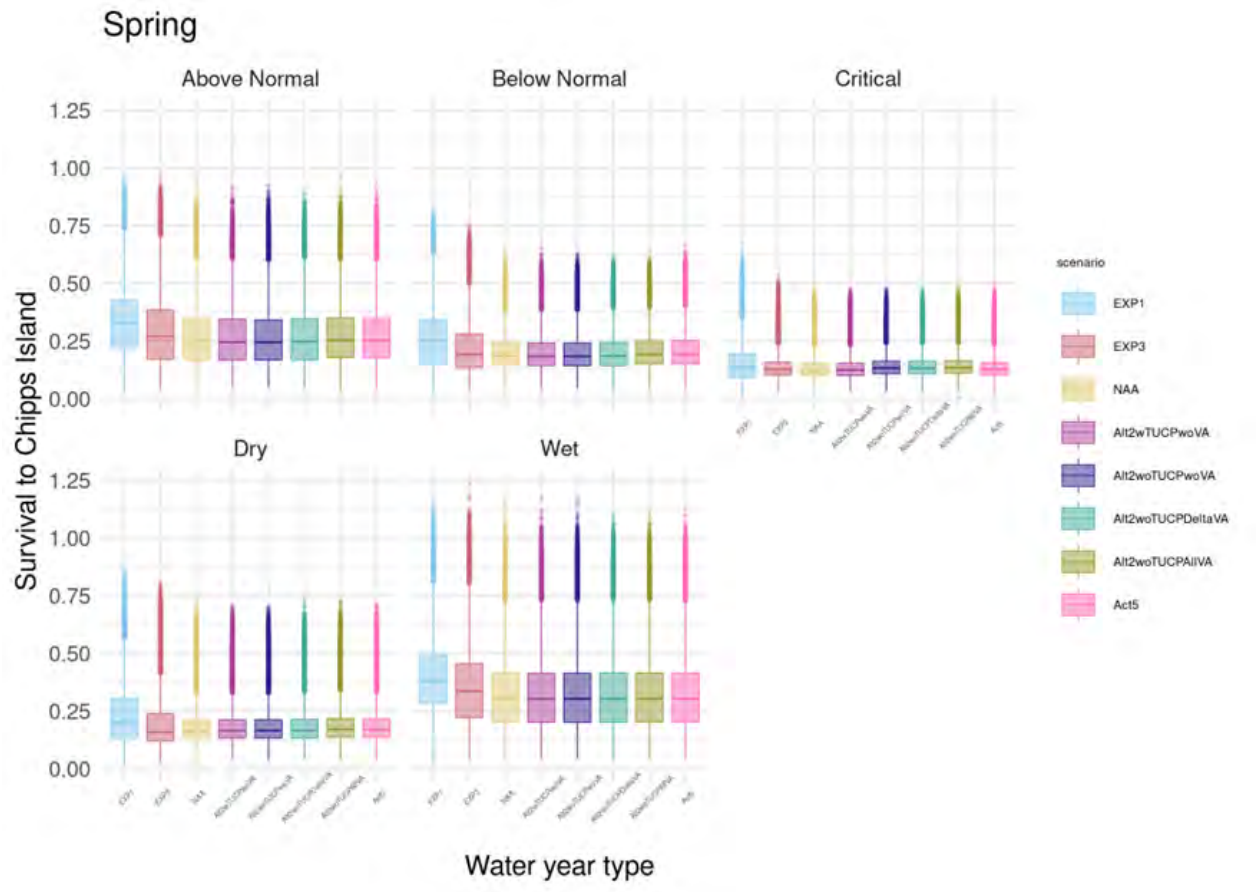



Figure I.6-21. Predicted spring-run Chinook salmon survival to Chipps Island averaged by water year type for Alt2 phases, Act5, EXP 1, EXP 3, and NAA.

Table I.6-11. Mean spring-run Chinook salmon survival to Chipps Island averaged by water year type for Alt2 phases, Act5, EXP 1, EXP 3, and NAA.

| Water Year Type | Run | EXP1 | EXP3 | NAA | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Act5 |
|---|---|---|---|---|---|---|---|---|---|
| Above Normal | Spring | 0.33 | 0.29 | 0.27 | 0.27 | 0.27 | 0.27 | 0.28 | 0.28 |
| Below Normal | Spring | 0.26 | 0.22 | 0.2 | 0.2 | 0.2 | 0.2 | 0.21 | 0.21 |

| Water Year Type | Run | EXP1 | EXP3 | NAA | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Act5 |
|---|---|---|---|---|---|---|---|---|---|
| Critical | Spring | 0.15 | 0.14 | 0.13 | 0.13 | 0.14 | 0.14 | 0.14 | 0.14 |
| Dry | Spring | 0.23 | 0.19 | 0.18 | 0.18 | 0.18 | 0.18 | 0.19 | 0.19 |
| Wet | Spring | 0.39 | 0.36 | 0.33 | 0.33 | 0.33 | 0.33 | 0.33 | 0.33 |

## I.6.4 References


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Appendix I, Old and Middle River Flow Management

# Attachment I.7 ECO-PTM

## I.7.1 Model Overview

ECO-PTM is an enhanced version of the particle tracking model (PTM) that includes user-imparted swimming behaviors for the simulated neutrally buoyant particles (Pope et al. in review). The PTM is a module of the Delta Simulation Model 2 (DSM2) that uses hydrodynamics simulated by DSM2 to simulate the movement of neutrally buoyant particles in the Delta. The DSM2 model, in turn, relies on hydrological inputs generated by CalSim (CalSim II or 3). Additional swimming behaviors assigned to the neutrally buoyant particles in ECO-PTM include upstream or downstream movement, holding behaviors, and swimming velocity at 15-minute intervals; these behaviors were parameterized by calibrating ECO-PTM to observed travel time data through multiple reaches in the Delta from acoustic telemetry studies on Chinook salmon smolts. ECO-PTM also includes probabilistic particle routing at several junctions along the mainstem of the Sacramento River (i.e., Sutter Bypass, Steamboat Slough, DCC, and Georgiana Slough), informed by observed routing data from acoustic telemetry studies on Chinook salmon smolts. Furthermore, the model characterizes the following particles fates: proportional routing through either the Sutter Bypass, Steamboat Slough, DCC, Georgiana Slough, or mainstem Sacramento River, travel times through each route based on the timing of both entry into each reach and exit past Chipps Island (i.e., only particles that exit the Delta are included), and survival. Survival for each reach is modeled using an XT model, in which survival is modeled as a function of travel time and reach length, that was parameterized using estimated survival from acoustic telemetry data.

## I.7.2 Methods

### I.7.2.1 Model Runs

ECO-PTM was run by releasing 9600 particles from Sacramento River at Freeport at the start of each month between December and March under the DSM2-Hydro conditions for that month.

ECO-PTM was used to estimate routing and survival for each inflow bin and OMR bin using modeled monthly CalSim 3 scenarios: EXP1, EXP3, NAA, Alternative 1, four phases of Alternative 2 (Alternative 2 With TUCP Without VA, Alternative 2 Without TUCP Without VA, Alternative 2 Without TUCP Delta VA, Alternative 2 Without TUCP Systemwide VA), Alternative 3, Alternative 4, and Action 5.

Junctions included: Sutter Slough, Steamboat Slough, Sacramento River, Georgiana Slough, the Delta Cross Channel, and combined (for survival estimates only). Sacramento / San Joaquin Inflow and OMR bins were used as groupings for predicted routing and survival values. For detailed information on Sacramento / San Joaquin Inflow and OMR bins, refer to Appendix I – Old and Middle River Flow Management.

The following model outputs were summarized for each modeled scenario and reach: routing and survival grouped by OMR bin and by Inflow bin.

### I.7.2.2 Model Capacity and Assumptions

ECO-PTM (Wang 2019) is an individual-based juvenile salmon migration model that tracks the movement of individual fish particles as they migrate through the Delta. The model is developed at California Department of Water Resources (DWR), in collaboration with the US Geological Survey (USGS).

The model incorporates three key aspects of salmon migration: swimming, routing, and survival.

- **Swimming Behavior:** The swimming behavior simulated the tidal confusion (swimming in the opposite direction toward the ocean), diel holding (resting during the day), selective tidal stream transport (holding during flood tides), and differential swimming velocities at different times for different juvenile salmonids.
- **Routing Behavior:** At junctions, the model employs hydrodynamic data and other factors to calculate routing probabilities the salmon might take. Three models are implemented:
    - *Statistical Model based on the Critical Streakline Entrainment Zone:* This model considers the fish distribution across the channel, streakline location, and fish positions relative to the streakline. This model is used at Georgiana Slough Junction when the flows entering the junction are greater than 14,000cfs.
    - *Generalized Linear Model (GLM):* This model considers the flow rate, flow rate change, and flow direction in the Sacramento River and the diversion flows. The model is applied to the Georgiana Slough junction when the incoming flow rate is less than 14,000cfs and also to Delta Cross Channel (DCC).
    - *Similarly Structured GLM:* This is used applied to the Sutter Slough and Stream Slough.
- The **survival behavior** module uses an XT predator-prey model that associates the survival of migration juvenile salmon as a function of both distance traveled (X) and travel time (T).

The ECO-PTM model was calibrated using acoustic telemetry data from 17 groups of juvenile Chinook salmon released into the Delta between 2007 and 2011. A stochastic optimization tool, Particle Swarm Optimization, is used to calibrate the swimming behavior parameters. The goal of the calibration was to understand how travel time, migration routing, and survival vary among reaches in the Delta.

Currently, the ECO-PTM model is calibrated for the north delta area, but not for the south delta area.

ECO-PTM modeling results serve as a proxy for juvenile Salmonids, particularly Chinook salmon.

### I.7.2.3 Code and Data Repository

Data (DSM2 Hydro result file as input files, model parameter input files, python code to run the ECO-PTM model, python code to postprocess ECO-PTM results, and result files) are available upon request.

## I.7.3 Results

### I.7.3.1 BA narrative

Mean December through March routing estimates are highest in the Sacramento River compared with Sutter, Steamboat, or Georgiana slough routes and ranged from 49% (OMR bin -5,000 under Action 5) to 64% (OMR bin -2,000 under Alternative 2 with TUCP without VA) and from 41% (Inflow bin "hihi" under the No Action Alternative and all phases of Alternative 2) to 70% (Inflow bin "lohi" under all phases of Alternative 2 except Alternative 2 without TUCP All VA and Action 5). Mean December through March survival estimates are highest through Steamboat Slough followed by the Sacramento River in all OMR bins for the No Action Alternative and all four phases of Alternative 2 ranging from 46% (OMR bin -2,000 under Alternative 2 without TUCP without VA and with TUCP without VA) to 59% (OMR bin -5,000 under Action 5) and from 40% (Inflow bin "lohi" Alternative 2 without TUCP All VA) to 67% (Inflow bin "hihi" the No Action Alternative and Alternative 2 without TUCP without VA and without TUCP Delta VA). Projections for mean December through March routing and survival through the Delta Cross Channel are 0% because the Delta Cross Channel gates remain closed during that period.

#### *I.7.3.1.1 Routing, OMR Bins (Table I.7-1, Figure I.7-1 through Figure I.7-4):*

The Sacramento River route had the greatest estimated route entrainment for all OMR bins. For the least negative OMR bin (-2,000), mean routing estimates through the Sacramento River ranged from 57% (Alternative 2 without TUCP Delta VA and without TUCP All VA) to 64% (Alternative 2 with TUCP without VA). For the most negative OMR bin (-5,500), mean routing estimates through the Sacramento River ranged from 60% (No Action Alternative, all phases of Alternative 2 except Alternative 2 without TUCP Delta VA, and Action 5) to 61% (Alternative 2 without TUCP Delta VA). For the -5,500 and -2,000 OMR bins, mean routing estimates are greater through Georgiana Slough than Sutter and Steamboat sloughs across all phases of Alternative 2, Action 5, and the No Action Alternative both (range 11% - 18%) and across all phases of Alternative 2 except Alternative 2 without TUCP without VA and without TUCP All VA (range 10% - 18%), respectively. For the -5,000 OMR bin, mean routing estimates follow an opposite pattern and are greater through Steamboat and Sutter sloughs than Georgiana Slough across all phases of Alternative 2, Action 5, and the No Action Alternative (range 13% - 20%). for OMR bin -3,500, the highest and lowest mean routing estimates for Steamboat, Sutter, and Georgiana slough vary among alternatives and do not have a clear pattern like the other four OMR bins (range 13% - 17%).

#### *I.7.3.1.2 Survival, OMR Bins (Table I.7-3, Figure I.7-9 through Figure I.7-12):*

Mean through-Delta survival estimates were similar across alternatives for all OMR bins except -2,000 where there is more variation. Mean survival estimates through Steamboat Slough for the least negative OMR bin (-2,000) ranged from 46% (Alternative 2 without TUCP without VA and with TUCP without VA) to 52% (Alternative 2 without TUCP All VA). Mean survival estimates through Steamboat Slough for the most negative OMR bin (-5,500) were similar across all alternatives and ranged from 48% - 49%. For OMR bin -5,500, mean survival estimates are greater or equal through the Sacramento River compared to Sutter Slough and Georgiana Slough under all phases of Alternative and the No Action Alternative ranging from 20%-21% (Georgiana Slough) to 40%-42% (Sacramento River and Sutter Slough). For OMR bin -5,000, mean survival estimates are greater through the Sacramento River compared to Sutter Slough and Georgiana Slough for all phases of Alternative and the No Action Alternative ranging from 25%-27% (Georgiana Slough) and 49%-50% (Sutter Slough) to 52%-55% (Sacramento River). For OMR bin -3,500, mean survival estimates are greater through the Sacramento River compared to Sutter Slough and Georgiana Slough under all phases of Alternative 2 and the No Action Alternative ranging from 23%-25% (Georgiana Slough) to 45%-51% (Sacramento River and Sutter Slough). For OMR bin -2,000, mean survival estimates are greater or equal through the Sacramento River compared to Sutter Slough and Georgiana Slough for all phases of Alternative 2, Action 5, and the No Action Alternative from 18%-22% (Georgiana Slough) to 37%-46% (Sacramento River and Sutter Slough).

#### *I.7.3.1.3 Routing, Inflow Bins (Table I.7-5, Figure I.7-17 through Figure I.7-25):*

For Inflow bin "hihi" (high inflow from both Sacramento River and San Joaquin River), mean routing estimates through the Sacramento River was 41% under the No Action Alternative, all phases of Alternative 2, and Action 5. For Inflow bin "lolo" (low inflow from both Sacramento River and San Joaquin River), mean routing estimates through the Sacramento River ranged from 64% (No Action Alternative. Alternative 2 without TUCP without VA and with TUCP without VA, and Action 5) to 65% (Alternative 2 without TUCP Delta VA and without TUCP All VA). For Inflow bin "hilo" (high inflow from Sacramento River and low inflow from San Joaquin River), mean routing estimates through the Sacramento River was 50% under the No Action Alternative, all phases of Alternative 2, and Action 5. For Inflow bin "lohi" (low inflow from Sacramento River and high inflow from San Joaquin River), mean routing estimates through the Sacramento River ranged from 67% (Action 5) to 70% (Alternative 2 without TUCP without VA, with TUCP without VA, and without TUCP Delta VA). Under No Action Alternative and all phases of Alternative 2 and Action 5, when inflow from the Sacramento River is high (Inflow bins "hihi," "hilo," and "himed"), mean routing is greatest in the Sacramento River and greater into Sutter and Steamboat sloughs than Georgiana Slough. Under No Action Alternative and all phases of Alternative 2, when inflow from the Sacramento River is medium or low (Inflow bins "medlo," "medmed," "medhi," "lolo," "lomed," and "lohi"), mean routing is greatest in the Sacramento River and Georgiana Slough is greater than Sutter or Steamboat sloughs. For Georgiana Slough, the lowest routing was estimated in the Inflow bin "hihi" and is equal for the No Action Alternative and all phases of Alternative 2 (9%) while the greatest routing (19%) is in the Inflow bin "lomed" for No Action Alternative, all phases of Alternative 2 and Action 5, and in the Inflow bin "medlo" under the No Action Alternative. For Sutter Slough, the lowest routing is in Inflow bin "lohi" under the No Action Alternative, all phases of Alternative 2, and Action 5 (range 8%-9%) while the greatest routing is in Inflow "hihi" for No Action Alternative. all phases

of Alternative 2, and Action 5 (24%). For Steamboat Slough, the lowest routing is in Inflow bin "lohi" under the No Action Alternative, all phases of Alternative 2, and Action 5 (range 7-8%) while the greatest routing is in Inflow "hihi" for Alternative 2 without TUCP without VA and Action 5 (27%).

#### *I.7.3.1.4 Survival, Inflow Bins (Table I.7-7, Figure I.7-35 through Figure I.7-43):*

For Steamboat Slough, mean survival estimates for Inflow bin "hihi" (high inflow from both Sacramento River and San Joaquin River) ranged from 66% (Alternative 2 with TUCP without VA, and without TUCP without VA, and Action 5) to 67% (No Action Alternative, Alternative 2 without TUCP without VA, and without TUCP Delta VA). For Steamboat Slough, mean survival estimates for Inflow bin "lolo" (low inflow from both Sacramento River and San Joaquin River) ranged from 45% (Alternative 2 without TUCP All VA) to 46% (No Action Alternative and remaining three phases of Alternative 2, and Action 5). For Steamboat Slough, mean survival estimates for Inflow bin "hilo" (high inflow from Sacramento River and low inflow from San Joaquin River) ranged from 59%-60% under the No Action Alternative, all phases of Alternative 2, and Action 5. For Steamboat Slough, mean survival estimates for Inflow bin "lohi" (low inflow from Sacramento River and high inflow from San Joaquin River) ranged from 40% (Alternative 2 without TUCP All VA) to 41% (No Action Alternative, three other phases of Alternative 2, and Action 5). When inflow from the Sacramento River is high (Inflow bins "hihi," "hilo," and "himed"), mean survival is greatest through Steamboat Slough, then Sutter Slough or the Sacramento River, and lowest through Georgiana Slough in the No Action Alternative and all phases of Alternative 2. When inflow from the Sacramento River is medium or low (Inflow bins "medlo," "medmed," "medhi," "lolo," "lomed," and "lohi"), mean survival is greatest in Steamboat Slough, then Sacramento River and Sutter Slough routes, and in Georgiana Slough mean survival is the lowest in the No Action Alternative and all phases of Alternative 2 and Action 5. In Sutter Slough, the lowest survival is in Inflow bin "lohi" under Alternative 2 without TUCP with VA and without TUCP Delta VA (30%) while the greatest survival is in "hihi" for Alternative 2 without TUCP without VA (59%). In the Sacramento River, the lowest survival is in Inflow bin "lohi" under the No Action Alternative (27%), while the greatest survival is in "hihi" for No Action, Alternative 2 without TUCP without VA, without TUCP Delta VA, and without TUCP All VA, and Action 5 (64%). In the Georgiana Slough route, the lowest survival is in Inflow bin "lohi" under Alternative 2 without TUCP without VA (12%), while the greatest survival is in "hihi" for all four phases of Alternative 2 (33%). For through-Delta survival, the lowest mean survival is in “lohi” under No Action Alternative and 4 phases of Alternative 2 and Action 5 (27%), while the greatest mean survival is in “hihi” under 3 of the 4 phases of Alternative 2 excluding Alternative 2 with TUCP without VA (61%).

For discussion purposes, ECO-PTM modeling results serve as a proxy for juvenile Salmonids.

Under all OMR bin conditions, the median routing of particles through the Sacramento River route remains relatively consistent (about 55% to 65% for the No Action Alternative, four phases of Alternative 2, and Action 5). Under all OMR conditions, the median routing of particles through Sutter Slough, Steamboat Slough, and Georgiana Slough remains consistent but lower (about 10% to 20% for the No Action Alternative, four phases of Alternative 2, and Action 5). These results suggest varying OMR conditions may have a small impact on the percent of particles routed through the discussed Delta pathways. Under model conditions, the median

percent of particles routed through the Sacramento River is consistently higher than the median percent of particles routed through other routes.

Under all OMR bin conditions, the median survival of particles through the Steamboat Slough route and Sacramento River route remain higher than Sutter Slough and Georgiana Slough. However, median survival of particles through Sutter Slough, Steamboat Slough, and Georgiana Slough remains relatively close in value. These results suggest varying OMR conditions may have an impact on the survival percent of particles. Under model conditions, the median percent survival of particles routed through Georgiana Slough is consistently lower than the median percent survival of particles routed through other routes.

### I.7.3.2 EIS narrative

#### *I.7.3.2.1 Routing, OMR Bins (Table I.7-2, Figure I.7-5 through Figure I.7-8):*

Under OMR bin -5,500 conditions, mean predicted Sutter Slough routing ranged from 55% greater (Alternative 1, 17% routing) to 2% lower (Alternative 2 without TUCP Delta VA, 10% routing) compared with the No Action Alternative.

Under OMR bin -5,000 conditions, mean predicted Sutter Slough routing ranged from 23% greater (Alternative 3, 20% routing) to 18% lower (Alternative 1, 13% routing) compared with the No Action Alternative.

Under OMR bin -3,500 cfs conditions, mean predicted Sutter Slough routing ranged from 7% lower (Alternative 2 with TUCP without VA, 15% routing) to 23% lower (Alternative 1, 12% routing) compared with the No Action Alternative.

Under OMR bin -2,000 cfs conditions, mean predicted Sutter Slough routing ranged from 21% greater (Alternative 2 without TUCP All VA, 13% routing) to 8% lower (Alternative 2 with TUCP without VA and Alternative 4, 10% routing) compared with the No Action Alternative.

Under OMR bin -5,500 cfs conditions, mean predicted Steamboat Slough routing ranged from 63% greater (Alternative 1, 18% routing) compared with the No Action Alternative to 1% greater (Alternative 2 without TUCP All VA, Alternative 3, and Action 5, 11% routing) compared with the No Action Alternative.

Under OMR bin -5,000 cfs conditions, mean predicted Steamboat Slough routing ranged from 25% greater (Alternative 3, 23% routing) to 26% lower (Alternative 1, 13% routing) compared with the No Action Alternative.

Under OMR bin -3,500 cfs conditions, mean predicted Steamboat Slough routing ranged from 4% lower (Alternative 2 with TUCP without VA, 17% routing) to 30% lower (Alternative 1, 12% routing) compared with the No Action Alternative.

Under OMR bin -2,000 cfs conditions, mean predicted Steamboat Slough routing ranged from 29% greater (Alternative 2 without TUCP All VA, 14% routing) to 12% lower (Alternative 4, 10% routing) compared with the No Action Alternative.

Under OMR bin -5,500 cfs conditions, mean predicted Sacramento River routing ranged from 16% less (Alternative 1, 50% routing) compared with the No Action Alternative to equal to (Alternative 3, all phases of Alternative 2, and Action 5, 60% routing) the No Action Alternative.

Under OMR bin -5,000 cfs conditions, mean predicted Sacramento River routing ranged from 7% greater (Alternative 1, 56% routing) to 11% lower (Alternative 3, 46% routing) compared with the No Action Alternative.

Under OMR bin -3,500 cfs conditions, mean predicted Sacramento River routing ranged from 10% greater (Alternative 1, 57% routing) to 2% greater (Alternative 2 without TUCP without VA and with TUCP without VA, 53% routing) compared with the No Action Alternative.

Under OMR bin -2,000 cfs conditions, mean predicted Sacramento River routing ranged from 3% greater (Alternative 4, 64% routing) to 9% lower (Alternative 2 without TUCP All VA, 57% routing) compared with the No Action Alternative.

Under OMR bin -5,500 cfs conditions, mean predicted Georgiana Slough routing ranged from 34% lower (Alternative 1, 12% routing) compared with the No Action Alternative to equal to (Alternative 2 with TUCP without VA and Alternative 2 without TUCP Delta VA, 18% routing) the No Action Alternative.

Under OMR bin -5,000 cfs conditions, mean predicted Georgiana Slough routing ranged from 18% lower (Alternative 3, 11% routing) compared with the No Action Alternative to equal to (Alternative 1, 14% routing) the No Action Alternative.

Under OMR bin -3,500 cfs conditions, mean predicted Georgiana slough routing ranged from 12% greater (Alternative 4, 16% routing) to 10% lower (Alternative 1, 13% routing) compared with the No Action Alternative.

Under OMR bin -2,000 cfs conditions, mean predicted Georgiana Slough routing ranged from 8% greater (Action 5, 17% routing) to 26% lower (Alternative 1, 11% routing) compared with the No Action Alternative.

#### *I.7.3.2.2 Survival, OMR Bins (Table I.7-4, Figure I.7-13 through Figure I.7-16):*

Under OMR bin -5,500 cfs conditions, mean predicted Sutter Slough survival ranged from 19% greater (Alternative 1, 49% survival) to 1% lower (Action 5, 41% survival) compared with the No Action Alternative.

Under OMR bin -5,000 cfs conditions, mean predicted Sutter Slough survival ranged from 10% greater (Alternative 3, 53% survival) to 14% lower (Alternative 1, 42% survival) compared with the No Action Alternative.

Under OMR bin -3,500 cfs conditions, mean predicted Sutter Slough survival ranged from 1% lower (Alternative 2 without TUCP without VA and with TUCP without VA, 46% survival) to 16% lower (Alternative 1, 39% survival) compared with the No Action Alternative.

Under OMR bin -2,000 cfs conditions, mean predicted Sutter Slough survival ranged from 14% greater (Alternative 3, 43% survival) to 2% lower (Alternative 4, 37% survival) compared with the No Action Alternative.

Under OMR bin -5,500 cfs conditions, mean predicted Steamboat Slough survival ranged from 18% greater (Alternative 1, 57% survival) compared with the No Action Alternative to equal to (Alternative 2 without TUCP All VA and Alternative 3, 48% survival) the No Action Alternative.

Under OMR bin -5,000 cfs conditions, mean predicted Steamboat Slough survival ranged from 9% greater (Alternative 3, 62% survival) to 10% lower (Alternative 1, 51% survival) compared with the No Action Alternative.

Under OMR bin -3,500 cfs conditions, mean predicted Steamboat Slough survival ranged from 1% lower (Alternative 2 with TUCP without VA, 55% survival) to 12% lower (Alternative 1, 49% survival) compared with the No Action Alternative.

Under OMR bin -2,000 cfs conditions, mean predicted Steamboat Slough survival ranged from 12% greater (Alternative 2 without TUCP All VA, 53% survival) to 3% lower (Alternative 2 with TUCP without VA and with TUCP without VA, 46% survival) compared with the No Action Alternative.

Under OMR bin -5,500 cfs conditions, mean predicted Sacramento River survival ranged from 23% greater (Alternative 1, 52% survival) to 2% lower (Alternative 3, 41% survival) compared with the No Action Alternative.

Under OMR bin -5,000 cfs conditions, mean predicted Sacramento River survival ranged from 12% greater (Alternative 3, 59% survival) to 17% lower (Alternative 1, 43% survival) compared with the No Action Alternative.

Under OMR bin -3,500 cfs conditions, mean predicted Sacramento River survival ranged from 1% lower (Alternative 2 with TUCP without VA, 51% survival) to 22% lower (Alternative 1, 40% survival) compared with the No Action Alternative.

Under OMR bin -2,000 cfs conditions, mean predicted Sacramento River survival ranged from 20% greater (Alternative 2 without TUCP All VA, 47% survival) to 5% lower (Alternative 2 with TUCP without VA, 37% survival) compared with the No Action Alternative.

Under OMR bin -5,500 cfs conditions, mean predicted Georgiana Slough survival ranged from 29% greater (Alternative 1, 26% survival) to 2% lower (Alternative 2 with TUCP without VA and Alternative 2 without TUCP without VA, 20% survival) compared with the No Action Alternative.

Under OMR bin -5,000 cfs conditions, mean predicted Georgiana Slough survival ranged from 12% greater (Alternative 3, 28% survival) to 12% lower (Alternative 1, 22% survival) compared with the No Action Alternative.

Under OMR bin -3,500 cfs conditions, mean predicted Georgiana Slough survival ranged from 22% lower (Alternative 1, 20% survival) to 3% lower (Alternative 2 with TUCP without VA and with TUCP without VA, 25% survival) compared with the No Action Alternative.

Under OMR bin -2,000 cfs conditions, mean predicted Georgiana Slough survival ranged from 27% greater (Alternative 2 without TUCP Delta VA, 23% survival) to 3% lower (Alternative 4, 18% survival) compared with the No Action Alternative.

Under OMR bin -5,500 cfs conditions, mean predicted through Delta survival ranged from 25% greater (Alternative 1, 48% survival) to equal to (Alternative 2 with TUCP without VA, Alternative 2 without TUCP Delta VA, Alternative 2 without TUCP All VA and Alternative 3, 39% survival) the No Action Alternative.

Under OMR bin -5,000 cfs conditions, mean predicted through Delta survival ranged from 13% greater (Alternative 3, 55% survival) to 17% lower (Alternative 1, 40% survival) compared with the No Action Alternative.

Under OMR bin -3,500 cfs conditions, mean predicted through Delta survival ranged from 2% lower (Alternative 2 with TUCP without VA, 47% survival) to 22% lower (Alternative 1, 37% survival) compared with the No Action Alternative.

Under OMR bin -2,000 cfs conditions, mean through Delta survival ranged from 18% greater (Alternative 2 without TUCP All VA, 43% survival) to 4% lower (Alternative 2 with TUCP without VA, 35% survival) compared with the No Action Alternative.

#### *I.7.3.2.3 Routing, Inflow Bins (Table I.7-6, Figure I.7-26 through Figure I.7-34):*

Under high Sacramento inflow bins (“hihi, “himed,” and “hilo”), mean predicted Sutter Slough routing ranged from 1% greater (Alternative 1 and Alternative 3, under “hilo,” 17%; Alternative 1 and Alternative 3, under “hihi”) to 3% lower (Alternative 3, under “himed,” 19%) compared with the No Action Alternative.

Under medium Sacramento inflow bins (“medhi,” “medmed,” “medlo”), mean predicted Sutter Slough routing ranged from 2% greater (Action 5, under “medhi,” 14%) to 6% lower (Alternative 1, under “medlo,” 11%) compared with the No Action Alternative.

Under low Sacramento inflow bins (“lohi,” “lomed,” “lolo”), mean predicted Sutter Slough routing ranged from 5% greater (Action 5, under “lohi,” 9%) to 16% lower (Alternative 1, under “lohi,” 7%) compared with the No Action Alternative.

Under high Sacramento inflow bins (“hihi, “himed,” and “hilo”), mean predicted Steamboat Slough routing ranged from 1% greater (Alternative 1, Alternative 2 with TUCP without VA, Alternative 3, and Action 5 under “hihi,” 27%; Alternative 3, under “hilo,” 21%) to 3% lower (Action 5, under “hilo,” 20%;) compared with the No Action Alternative.

Under medium Sacramento inflow bins (“medhi,” “medmed,” “medlo”), mean predicted Steamboat Slough routing ranged from 4% greater (Action 5, under “medhi,” 16%) to 16% lower (Alternative 1, under “medlo,” 11%) compared with the No Action Alternative.

Under low Sacramento inflow bins (“lohi,” “lomed,” “lolo”), mean predicted Steamboat Slough routing ranged from 11% greater (Action 5, under “lohi,” 8%) to 26% lower (Alternative 1, under “lohi,” 8%) compared with the No Action Alternative.

Under high Sacramento inflow bins (“hihi, “himed,” and “hilo”), mean predicted Sacramento River routing ranged from 17% greater (Alternative 2 without TUCP without VA, under “hihi,” 48%) to 1% lower (Alternative 1 and Alternative 3, under “hihi,” 41%; Alternative 4 under “himed,” 47%) compared with the No Action Alternative.

Under medium Sacramento inflow bins (“medhi,” “medmed,” “medlo”), mean predicted Sacramento River routing ranged from 25% greater (Alternative 2 without TUCP without VA, under “medlo,” 70%) to 1% lower (Alternative 1 and Alternative 4, under “medmed,” 55%) compared with the No Action Alternative.

Under low Sacramento inflow bins (“lohi,” “lomed,” “lolo”), mean predicted Sacramento River routing ranged from 3% greater (Alternative 2 without TUCP without VA, under “lomed,” 64%) to 9% lower (Alternative 1 and Alternative 2 without TUCP without VA, under “lohi,” 63%) compared with the No Action Alternative.

Under high Sacramento inflow bins (“hihi, “himed,” and “hilo”), mean predicted Georgiana Slough routing ranged from 33% greater (Alternative 2 without TUCP without VA, under “hilo,” 17%) to 6% lower (Alternative 3, under “hilo,” 12%) compared with the No Action Alternative.

Under medium Sacramento inflow bins (“medhi,” “medmed,” “medlo”), mean predicted Georgiana Slough routing ranged from 2% greater (Alternative 2 without TUCP Delta VA and Action 5, under “medmed,” 19%) to 31% lower (Alternative 1, under “medlo,” 13%) compared with the No Action Alternative.

Under low Sacramento inflow bins (“lohi,” “lomed,” “lolo”), mean predicted Georgiana Slough routing ranged from 30% greater (Alternative 2 with TUCP without VA, under “lohi,” 19%) to 48% lower (Alternative 2 without TUCP without VA, under “lolo,” 9%) compared with the No Action Alternative.

#### *I.7.3.2.4 Survival, Inflow Bins (Table I.7-8, Figure I.7-44 through Figure I.7-52):*

Under high Sacramento inflow bins (“hihi, “himed,” and “hilo”), mean predicted Sutter Slough survival ranged from 1% greater (Alternative 1 and Alternative 4 under “hihi,” 59%; Alternative 2 with TUCP without VA, under “hilo,” 52%) to 2% lower (Alternative 2 without TUCP All VA, under “himed,” 52%) compared with the No Action Alternative.

Under medium Sacramento inflow bins (“medhi,” “medmed,” “medlo”), mean predicted Sutter Slough survival ranged from 4% greater (Alternative 2 without TUCP without VA, under “medhi,” 45%) to 5% lower (Alternative 1, under “medlo,” 40%) compared with the No Action Alternative.

Under low Sacramento inflow bins (“lohi,” “lomed,” “lolo”), mean predicted Sutter Slough survival ranged from 8% greater (Alternative 4, under “lohi,” 33%) to 8% lower (Alternative 1,

under “lomed,” 33%; and Alternative 2 without TUCP All VA under “lohi,” 28%) compared with the No Action Alternative.

Under high Sacramento inflow bins (“hihi, “himed,” and “hilo”), mean predicted Steamboat Slough survival ranged from 1% lower (Action 5 under “hilo,” 59%, Alternative 2 with TUCP without VA,without TUCP Delta VA,without TUCP All VA, Alternative 3 and Action 5, under “himed,” 61%) compared with the No Action Alternative to equal to the No Action Alternative (all other alternatives in other inflow bins).

Under medium Sacramento inflow bins (“medhi,” “medmed,” “medlo”), mean predicted Steamboat Slough survival ranged from 2% greater (Alternative 1 and Alternative 2 without TUCP without VA, under “medhi,” 54%; Alternative 3 under “medlo”) to 4% lower (Alternative 1, under “medlo,” 48%) compared with the No Action Alternative.

Under low Sacramento inflow bins (“lohi,” “lomed,” “lolo”), mean predicted Steamboat Slough survival ranged from 6% greater (Alternative 2 without TUCP without VA, under “lohi,” 42%) to 6% lower (Alternative 2 without TUCP All VA, under “lohi,” 38%) compared with the No Action Alternative.

Under high Sacramento inflow bins (“hihi, “himed,” and “hilo”), mean predicted Sacramento River survival ranged from 1% lower (Action 5, under “hilo,” 56%, Alternative 2 without TUCP Delta VA, Alternative 2 without TUCP All VA, Alternative 3, under “himed,” 58%, and Action 5, under “himed, 59%) compared with the No Action Alternative to equal to the No Action Alternative (all alternatives, under all other bins, 57-64%).

Under medium Sacramento inflow bins (“medhi,” “medmed,” “medlo”), mean predicted Sacramento River survival ranged from 4% greater (Action 5, under “medhi,” 48%) to 17% lower (Alternative 1, under “medlo,” 38%) compared with the No Action Alternative.

Under low Sacramento inflow bins (“lohi,” “lomed,” “lolo”), mean predicted Sacramento River survival ranged from 9% greater (Alternative 2 without TUCP without VA, under “lohi,” 29%) to 16% lower (Alternative 1, under “lolo,” 32%) compared with the No Action Alternative.

Under high Sacramento inflow bins (“hihi, “himed,” and “hilo”), mean predicted Georgiana Slough survival ranged from 3% greater (Alternative 2 without TUCP All VA, under “hilo,” 29%; Alternative 4, under “himed,” 30%) to 5% lower (Alternative 1, under “hilo,” 26%) compared with the No Action Alternative.

Under medium Sacramento inflow bins (“medhi,” “medmed,” “medlo”), mean predicted Georgiana Slough survival ranged from 14% greater (Alternative 2 with TUCP without VA, under “medhi,” 24%) to 7% lower (Alternative 1, under “medlo,” 20%) compared with the No Action Alternative.

Under low Sacramento inflow bins (“lohi,” “lomed,” “lolo”), mean predicted Georgiana Slough survival ranged from 5% greater (Alternative 2 without TUCP All VA, under “lomed,” 19%) to 28% lower (Alternative 1, under “lohi,” 13%) compared with the No Action Alternative.

Under high Sacramento inflow bins (“hihi, “himed,” and “hilo”), mean predicted through-Delta survival ranged from 2% lower (Alternative 2 without TUCP without VA and Alternative 3, under “himed,” 55%) compared with the No Action Alternative to equal to the No Action Alternative (Alternative 1, all four phases of Alternative 2, Alternative 3, Alternative 4, and Action 5, under “hihi,” 60-61%; Alternative 4 under “himed,” 56%; all four phases of Alternative 2, Alternative 3 and Alternative 4, under “hilo,” 53%).

Under medium Sacramento inflow bins (“medhi,” “medmed,” “medlo”), mean predicted through-Delta survival ranged from 4% greater (Alternative 2 without TUCP without VA, and Action 5, under “medhi,” 44%) to 14% lower (Alternative 1, under “medlo,” 35%) compared with the No Action Alternative.

Under low Sacramento inflow bins (“lohi,” “lomed,” “lolo”), mean predicted through-Delta survival ranged from 7% greater (Alternative 2 without TUCP without VA, under “lohi,” 29%) to 15% lower (Alternative 1, under “lolo,” 30%) compared with the No Action Alternative.

### I.7.3.3 Tables

Table I.7-1. Mean December through March route-specific percent routing by OMR bin for NAA, EXP1, EXP3, four phases of Alternative 2, and Action 5. Note that NA values result from no data falling into that OMR bin (BA scenarios).

| Reach | OMR Bin | NAA | EXP1 | EXP3 | Alt2woTUCP woVA | Alt2wTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | Action 5 |
|---|---|---|---|---|---|---|---|---|---|
| Sutter Slough | -2000 | 11% | NA | NA | 10% | 11% | 13% | 14% | 11% |
| Sutter Slough | -3500 | 16% | NA | NA | 15% | 15% | 14% | 14% | 13% |
| Sutter Slough | -5000 | 16% | NA | NA | 17% | 17% | 17% | 17% | 18% |
| Sutter Slough | -5500 | 11% | NA | NA | 11% | 11% | 11% | 11% | 11% |
| Steamboat Slough | -2000 | 11% | NA | NA | 10% | 10% | 14% | 15% | 11% |
| Steamboat Slough | -3500 | 17% | NA | NA | 17% | 17% | 16% | 16% | 15% |
| Steamboat Slough | -5000 | 18% | NA | NA | 19% | 19% | 19% | 19% | 20% |
| Steamboat Slough | -5500 | 11% | NA | NA | 12% | 12% | 11% | 11% | 11% |
| Sacramento River | -2000 | 62% | NA | NA | 63% | 64% | 57% | 57% | 62% |
| Sacramento River | -3500 | 52% | NA | NA | 53% | 53% | 54% | 54% | 56% |
| Sacramento River | -5000 | 52% | NA | NA | 51% | 51% | 50% | 51% | 49% |
| Sacramento River | -5500 | 60% | NA | NA | 60% | 60% | 61% | 60% | 60% |
| Georgiana Slough | -2000 | 15% | NA | NA | 16% | 16% | 16% | 15% | 17% |
| Georgiana Slough | -3500 | 15% | NA | NA | 16% | 16% | 16% | 16% | 16% |
| Georgiana Slough | -5000 | 14% | NA | NA | 13% | 13% | 13% | 13% | 13% |
| Georgiana Slough | -5500 | 18% | NA | NA | 18% | 18% | 18% | 18% | 18% |
| Delta Cross Channel | -2000 | 0% | NA | NA | 0% | 0% | 0% | 0% | 0% |
| Delta Cross Channel | -3500 | 0% | NA | NA | 0% | 0% | 0% | 0% | 0% |
| Delta Cross Channel | -5000 | 0% | NA | NA | 0% | 0% | 0% | 0% | 0% |
| Delta Cross Channel | -5500 | 0% | NA | NA | 0% | 0% | 0% | 0% | 0% |

Table I.7-2. Mean December through March route-specific percent routing by OMR bin for NAA, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4, and Action 5. Percent difference from NAA is in parentheses. Note that NA values result from no data falling into that OMR bin (EIS scenarios).

| Reach | OMR Bin | NAA | Alt1 | Alt2 woTUCP woVA | Alt2 wTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Sutter Slough | -2000 | 11% | 13 (13%) | 10 (-8%) | 11 (-6%) | 13 (16%) | 13 (21%) | 13 (17%) | 10 (-8%) | 11 (-3%) |
| Sutter Slough | -3500 | 16% | 12 (-23%) | 15 (-7%) | 15 (-8%) | 14 (-11%) | 14 (-11%) | 13 (-17%) | 14 (-12%) | 13 (-16%) |
| Sutter Slough | -5000 | 16% | 13 (-18%) | 17 (10%) | 17 (9%) | 17 (8%) | 17 (8%) | 20 (23%) | 16 (2%) | 18 (11%) |
| Sutter Slough | -5500 | 11% | 17 (55%) | 11 (1%) | 11 (1%) | 10 (-2%) | 11 (-1%) | 11 (2%) | 12 (13%) | 11 (-1%) |
| Steamboat Slough | -2000 | 11% | 12 (11%) | 10 (-9%) | 10 (-8%) | 13 (19%) | 14 (29%) | 14 (24%) | 10 (-14%) | 11 (-4%) |
| Steamboat Slough | -3500 | 17% | 12 (-30%) | 17 (-4%) | 16 (-5%) | 16 (-9%) | 16 (-7%) | 15 (-16%) | 16 (-11%) | 15 (-14%) |
| Steamboat Slough | -5000 | 18% | 13 (-26%) | 20 (10%) | 20 (9%) | 19 (8%) | 20 (9%) | 23 (25%) | 18 (2%) | 20 (11%) |
| Steamboat Slough | -5500 | 11% | 18 (63%) | 11 (2%) | 12 (2%) | 12 (2%) | 11 (1%) | 11 (1%) | 13 (15%) | 11 (1%) |
| Sacramento River | -2000 | 62% | 57 (-8%) | 63 (2%) | 63 (2%) | 58 (-7%) | 57 (-9%) | 57 (-8%) | 64 (3%) | 62 (-1%) |
| Sacramento River | -3500 | 52% | 57 (10%) | 53 (2%) | 53 (2%) | 54 (4%) | 54 (4%) | 57 (9%) | 54 (4%) | 56 (7%) |
| Sacramento River | -5000 | 52% | 56 (7%) | 50 (-4%) | 50 (-4%) | 50 (-4%) | 50 (-4%) | 46 (-11%) | 51 (-1%) | 49 (-5%) |
| Sacramento River | -5500 | 60% | 50 (-16%) | 60 (0%) | 60 (0%) | 60 (0%) | 60 (0%) | 60 (0%) | 58 (-3%) | 60 (0%) |
| Georgiana Slough | -2000 | 15% | 11 (-26%) | 16 (5%) | 16 (3%) | 16 (4%) | 15 (0%) | 16 (2%) | 16 (2%) | 17 (8%) |
| Georgiana Slough | -3500 | 15% | 13 (-10%) | 16 (7%) | 16 (8%) | 16 (9%) | 16 (7%) | 15 (5%) | 16 (12%) | 16 (9%) |
| Georgiana Slough | -5000 | 14% | 14 (0%) | 13 (-7%) | 13 (-7%) | 13 (-6%) | 13 (-6%) | 11 (-18%) | 14 (-1%) | 13 (-7%) |
| Georgiana Slough | -5500 | 18% | 12 (-34%) | 18 (-1%) | 18 (0%) | 18 (0%) | 18 (-1%) | 17 (-2%) | 17 (-7%) | 18 (-1%) |
| Delta Cross Channel | -2000 | 0% | 6 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) |
| Delta Cross Channel | -3500 | 0% | 5 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) |
| Delta Cross Channel | -5000 | 0% | 4 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) |
| Delta Cross Channel | -5500 | 0% | 3 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) |

Table I.7-3. Mean December through March route-specific percent survival by OMR bin for NAA, EXP1, EXP3, four phases of Alternative 2, and Action 5. Note that NA values for EXP1 and EXP3 result from no data falling into that OMR bin (BA scenarios).

| Reach | OMR Bin | NAA | EXP1 | EXP3 | Alt2woTUCPwoVA | Alt2wTUCPwoVA | Alt2woTUCPDeltaVA | Alt2woTUCPAllVA | Action 5 |
|---|---|---|---|---|---|---|---|---|---|
| Sutter Slough | -2000 | 37% | NA | NA | 37% | 37% | 41% | 42% | 38% |
| Sutter Slough | -3500 | 47% | NA | NA | 46% | 46% | 45% | 45% | 44% |
| Sutter Slough | -5000 | 49% | NA | NA | 49% | 49% | 50% | 50% | 50% |
| Sutter Slough | -5500 | 41% | NA | NA | 41% | 41% | 40% | 41% | 41% |
| Steamboat Slough | -2000 | 47% | NA | NA | 46% | 46% | 51% | 52% | 47% |
| Steamboat Slough | -3500 | 56% | NA | NA | 56% | 55% | 54% | 54% | 53% |
| Steamboat Slough | -5000 | 57% | NA | NA | 57% | 57% | 58% | 58% | 59% |
| Steamboat Slough | -5500 | 48% | NA | NA | 48% | 49% | 49% | 48% | 49% |
| Sacramento River | -2000 | 39% | NA | NA | 37% | 37% | 45% | 46% | 40% |
| Sacramento River | -3500 | 51% | NA | NA | 51% | 51% | 49% | 49% | 48% |
| Sacramento River | -5000 | 52% | NA | NA | 53% | 53% | 54% | 53% | 55% |
| Sacramento River | -5500 | 42% | NA | NA | 42% | 42% | 42% | 41% | 42% |
| Georgiana Slough | -2000 | 18% | NA | NA | 18% | 18% | 22% | 22% | 20% |
| Georgiana Slough | -3500 | 25% | NA | NA | 24% | 24% | 24% | 24% | 23% |
| Georgiana Slough | -5000 | 25% | NA | NA | 27% | 26% | 26% | 27% | 27% |
| Georgiana Slough | -5500 | 20% | NA | NA | 20% | 20% | 20% | 21% | 21% |
| Delta Cross Channel | -2000 | 0% | NA | NA | 0% | 0% | 0% | 0% | 0% |
| Delta Cross Channel | -3500 | 0% | NA | NA | 0% | 0% | 0% | 0% | 0% |
| Delta Cross Channel | -5000 | 0% | NA | NA | 0% | 0% | 0% | 0% | 0% |
| Delta Cross Channel | -5500 | 0% | NA | NA | 0% | 0% | 0% | 0% | 0% |
| Combined | -2000 | 37% | NA | NA | 35% | 35% | 42% | 43% | 37% |
| Combined | -3500 | 48% | NA | NA | 47% | 47% | 45% | 45% | 44% |
| Combined | -5000 | 49% | NA | NA | 50% | 50% | 51% | 50% | 51% |
| Combined | -5500 | 39% | NA | NA | 39% | 39% | 38% | 38% | 39% |

Table I.7-4. Mean December through March route-specific percent survival by OMR bin for NAA, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4, and Action 5. Percent difference from NAA is in parentheses. Note that NA values result from no data falling into that OMR bin (EIS scenarios).

| Reach | OMR Bin | NAA | Alt1 | Alt2woTUCP woVA | Alt2wTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Sutter Slough | -2000 | 37% | 40 (7%) | 37 (-1%) | 37 (0%) | 40 (7%) | 42 (13%) | 43 (14%) | 37 (-2%) | 38 (1%) |
| Sutter Slough | -3500 | 47% | 39 (-16%) | 46 (-1%) | 45 (-3%) | 45 (-4%) | 45 (-3%) | 43 (-8%) | 44 (-5%) | 44 (-6%) |
| Sutter Slough | -5000 | 49% | 42 (-14%) | 50 (4%) | 50 (3%) | 50 (3%) | 50 (3%) | 53 (10%) | 48 (-1%) | 50 (4%) |
| Sutter Slough | -5500 | 41% | 49 (19%) | 41 (1%) | 42 (3%) | 41 (0%) | 41 (0%) | 43 (4%) | 43 (5%) | 41 (-1%) |
| Steamboat Slough | -2000 | 47% | 50 (6%) | 46 (-3%) | 46 (-2%) | 51 (7%) | 53 (12%) | 52 (9%) | 46 (-2%) | 47 (0%) |
| Steamboat Slough | -3500 | 56% | 49 (-12%) | 55 (-1%) | 55 (-2%) | 54 (-4%) | 54 (-3%) | 52 (-7%) | 54 (-4%) | 53 (-6%) |
| Steamboat Slough | -5000 | 57% | 51 (-10%) | 58 (3%) | 58 (3%) | 58 (2%) | 58 (3%) | 62 (9%) | 57 (0%) | 59 (4%) |
| Steamboat Slough | -5500 | 48% | 57 (18%) | 49 (1%) | 50 (3%) | 49 (1%) | 48 (0%) | 48 (0%) | 51 (5%) | 49 (0%) |
| Sacramento River | -2000 | 39% | 40 (3%) | 37 (-5%) | 38 (-3%) | 45 (13%) | 47 (20%) | 46 (17%) | 38 (-3%) | 40 (1%) |
| Sacramento River | -3500 | 51% | 40 (-22%) | 51 (-1%) | 51 (-2%) | 49 (-4%) | 50 (-3%) | 47 (-9%) | 49 (-4%) | 48 (-7%) |
| Sacramento River | -5000 | 52% | 43 (-17%) | 54 (4%) | 54 (3%) | 54 (3%) | 54 (3%) | 59 (12%) | 53 (0%) | 55 (4%) |
| Sacramento River | -5500 | 42% | 52 (23%) | 42 (0%) | 43 (2%) | 42 (0%) | 42 (0%) | 41 (-2%) | 44 (5%) | 42 (1%) |
| Georgiana Slough | -2000 | 18% | 20 (8%) | 19 (2%) | 19 (1%) | 23 (27%) | 23 (25%) | 22 (21%) | 18 (-3%) | 20 (6%) |
| Georgiana Slough | -3500 | 25% | 20 (-22%) | 25 (-3%) | 24 (-4%) | 24 (-6%) | 24 (-5%) | 23 (-10%) | 24 (-6%) | 23 (-9%) |
| Georgiana Slough | -5000 | 25% | 22 (-12%) | 27 (6%) | 26 (4%) | 27 (6%) | 27 (5%) | 28 (12%) | 26 (2%) | 27 (7%) |
| Georgiana Slough | -5500 | 20% | 26 (29%) | 20 (-2%) | 20 (-2%) | 20 (1%) | 20 (1%) | 21 (6%) | 21 (5%) | 21 (3%) |
| Delta Cross Channel | -2000 | 0% | 7 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) |
| Delta Cross Channel | -3500 | 0% | 6 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) |
| Delta Cross Channel | -5000 | 0% | 5 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) |
| Delta Cross Channel | -5500 | 0% | 6 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) |
| Combined | -2000 | 37% | 38 (3%) | 35 (-4%) | 36 (-3%) | 41 (12%) | 43 (18%) | 42 (16%) | 36 (-3%) | 37 (0%) |
| Combined | -3500 | 48% | 37 (-22%) | 47 (-2%) | 46 (-3%) | 45 (-5%) | 46 (-4%) | 43 (-9%) | 45 (-5%) | 44 (-7%) |
| Combined | -5000 | 49% | 40 (-17%) | 51 (4%) | 51 (4%) | 50 (3%) | 51 (4%) | 55 (13%) | 49 (0%) | 51 (5%) |
| Combined | -5500 | 39% | 48 (25%) | 39 (0%) | 40 (2%) | 39 (0%) | 39 (0%) | 39 (0%) | 41 (6%) | 39 (1%) |

Table I.7-5. Mean December through March route-specific percent routing by Inflow bin for NAA, EXP1, EXP3, four phases of Alternative 2, and Action 5. Note that NA values result from no data falling into that Inflow bin (BA scenarios).

| Reach | Inflow Bin | NAA | EXP1 | EXP3 | Alt2woTUCP woVA | Alt2wTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | Action 5 |
|---|---|---|---|---|---|---|---|---|---|
| Sutter Slough | lolo | 10% | 10% | 10% | 10% | 10% | 10% | 10% | 10% |
| Sutter Slough | lomed | 10% | 10% | 10% | 10% | 10% | 10% | 10% | 10% |
| Sutter Slough | lohi | 9% | NA | 10% | 8% | 8% | 8% | 8% | 9% |
| Sutter Slough | medlo | 12% | 12% | 12% | 12% | 12% | 12% | 12% | 12% |
| Sutter Slough | medmed | 13% | 12% | 13% | 12% | 12% | 12% | 12% | 12% |
| Sutter Slough | medhi | 14% | 13% | 15% | 14% | 14% | 14% | 14% | 14% |
| Sutter Slough | hilo | 17% | 17% | 17% | 17% | 17% | 17% | 17% | 17% |
| Sutter Slough | himed | 19% | 19% | 18% | 19% | 19% | 19% | 19% | 19% |
| Sutter Slough | hihi | 24% | 24% | 24% | 24% | 24% | 24% | 24% | 24% |
| Steamboat Slough | lolo | 10% | 10% | 10% | 10% | 10% | 10% | 10% | 10% |
| Steamboat Slough | lomed | 9% | 8% | 9% | 9% | 8% | 8% | 9% | 8% |
| Steamboat Slough | lohi | 7% | NA | 9% | 8% | 7% | 7% | 8% | 8% |
| Steamboat Slough | medlo | 14% | 13% | 13% | 13% | 13% | 13% | 13% | 13% |
| Steamboat Slough | medmed | 14% | 13% | 15% | 14% | 14% | 14% | 14% | 14% |
| Steamboat Slough | medhi | 15% | 15% | 16% | 15% | 15% | 15% | 15% | 16% |
| Steamboat Slough | hilo | 20% | 19% | 20% | 20% | 20% | 20% | 20% | 20% |
| Steamboat Slough | himed | 22% | 22% | 22% | 22% | 22% | 22% | 22% | 22% |
| Steamboat Slough | hihi | 26% | 27% | 27% | 27% | 26% | 26% | 26% | 27% |
| Sacramento River | lolo | 64% | 66% | 64% | 64% | 64% | 65% | 65% | 64% |
| Sacramento River | lomed | 63% | 68% | 63% | 63% | 63% | 63% | 63% | 63% |
| Sacramento River | lohi | 69% | NA | 65% | 70% | 70% | 70% | 69% | 67% |
| Sacramento River | medlo | 56% | 57% | 57% | 57% | 56% | 57% | 57% | 57% |
| Sacramento River | medmed | 55% | 57% | 55% | 55% | 55% | 55% | 55% | 55% |

| Reach | Inflow Bin | NAA | EXP1 | EXP3 | Alt2woTUCPwoVA | Alt2wTUCPwoVA | Alt2woTUCPDeltaVA | Alt2woTUCPAllVA | Action 5 |
|---|---|---|---|---|---|---|---|---|---|
| Sacramento River | medhi | 54% | 54% | 54% | 54% | 54% | 54% | 54% | 53% |
| Sacramento River | hilo | 50% | 52% | 51% | 50% | 50% | 50% | 50% | 50% |
| Sacramento River | himed | 48% | 49% | 48% | 48% | 48% | 48% | 48% | 48% |
| Sacramento River | hihi | 41% | 40% | 41% | 41% | 41% | 41% | 41% | 41% |
| Georgiana Slough | lolo | 17% | 16% | 17% | 17% | 17% | 17% | 17% | 17% |
| Georgiana Slough | lomed | 19% | 15% | 17% | 19% | 19% | 19% | 19% | 19% |
| Georgiana Slough | lohi | 15% | NA | 17% | 14% | 14% | 14% | 15% | 16% |
| Georgiana Slough | medlo | 19% | 18% | 17% | 18% | 18% | 18% | 18% | 18% |
| Georgiana Slough | medmed | 18% | 18% | 17% | 18% | 18% | 19% | 19% | 19% |
| Georgiana Slough | medhi | 17% | 17% | 16% | 17% | 17% | 17% | 17% | 17% |
| Georgiana Slough | hilo | 13% | 12% | 13% | 13% | 13% | 13% | 13% | 13% |
| Georgiana Slough | himed | 11% | 11% | 11% | 12% | 12% | 12% | 11% | 11% |
| Georgiana Slough | hihi | 9% | 9% | 9% | 9% | 9% | 9% | 9% | 9% |
| Delta Cross Channel | lolo | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| Delta Cross Channel | lomed | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| Delta Cross Channel | lohi | 0% | NA | 0% | 0% | 0% | 0% | 0% | 0% |
| Delta Cross Channel | medlo | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| Delta Cross Channel | medmed | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| Delta Cross Channel | medhi | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| Delta Cross Channel | hilo | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| Delta Cross Channel | himed | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| Delta Cross Channel | hihi | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |

Table I.7-6. Mean December through March route-specific percent routing by Inflow bin for NAA, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4, and Action 5. Percent difference from NAA is in parentheses. Note that NA values result from no data falling into that Inflow bin (EIS scenarios).

| Reach | Inflow Bin | NAA | Alt1 | Alt2 woTUCP woVA | Alt2 wTUCP wo VA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Sutter Slough | lolo | 10% | 9 (-11%) | 10 (0%) | 10 (0%) | 10 (0%) | 10 (0%) | 10 (0%) | 10 (0%) | 10 (-1%) |
| Sutter Slough | lomed | 10% | 9 (-6%) | 10 (-3%) | 10 (-1%) | 10 (-2%) | 10 (-2%) | 10 (0%) | 10 (-1%) | 10 (-2%) |
| Sutter Slough | lohi | 9% | 7 (-16%) | 8 (-5%) | 8 (-7%) | 9 (-1%) | 8 (-11%) | 9 (1%) | 8 (-5%) | 9 (5%) |
| Sutter Slough | medlo | 12% | 11 (-6%) | 12 (-1%) | 12 (-1%) | 12 (-2%) | 12 (-3%) | 12 (-1%) | 12 (-1%) | 12 (-3%) |
| Sutter Slough | medmed | 13% | 12 (-1%) | 12 (-1%) | 12 (-1%) | 12 (-1%) | 13 (0%) | 13 (1%) | 13 (1%) | 12 (-1%) |
| Sutter Slough | medhi | 14% | 14 (0%) | 14 (-1%) | 14 (-1%) | 14 (-1%) | 14 (-1%) | 14 (0%) | 14 (0%) | 14 (2%) |
| Sutter Slough | hilo | 17% | 17 (1%) | 17 (1%) | 17 (1%) | 17 (0%) | 17 (-1%) | 17 (1%) | 17 (1%) | 17 (0%) |
| Sutter Slough | himed | 19% | 19 (-1%) | 19 (-2%) | 19 (-2%) | 19 (-1%) | 19 (-2%) | 19 (-3%) | 19 (0%) | 19 (-1%) |
| Sutter Slough | hihi | 24% | 24 (1%) | 24 (0%) | 24 (0%) | 24 (0%) | 24 (0%) | 24 (1%) | 24 (0%) | 24 (0%) |
| Steamboat Slough | lolo | 10% | 9 (-11%) | 10 (0%) | 10 (0%) | 10 (0%) | 10 (0%) | 10 (0%) | 10 (0%) | 10 (-1%) |
| Steamboat Slough | lomed | 9% | 8 (-14%) | 9 (-2%) | 8 (-5%) | 8 (-4%) | 9 (-1%) | 9 (5%) | 8 (-5%) | 8 (-6%) |
| Steamboat Slough | lohi | 7% | 5 (-26%) | 7 (-2%) | 8 (3%) | 8 (4%) | 8 (2%) | 8 (2%) | 8 (2%) | 8 (11%) |
| Steamboat Slough | medlo | 14% | 11 (-16%) | 13 (0%) | 13 (-1%) | 13 (0%) | 13 (-3%) | 13 (0%) | 13 (-2%) | 13 (-4%) |
| Steamboat Slough | medmed | 14% | 14 (-3%) | 14 (-1%) | 14 (0%) | 14 (0%) | 14 (0%) | 14 (2%) | 14 (2%) | 14 (-1%) |
| Steamboat Slough | medhi | 15% | 15 (1%) | 15 (1%) | 15 (1%) | 15 (0%) | 15 (2%) | 15 (1%) | 15 (2%) | 16 (4%) |
| Steamboat Slough | hilo | 20% | 20 (-1%) | 20 (0%) | 20 (-1%) | 20 (-1%) | 20 (-2%) | 21 (1%) | 20 (0%) | 20 (-3%) |
| Steamboat Slough | himed | 22% | 22 (-1%) | 22 (-2%) | 22 (-1%) | 22 (-1%) | 22 (-1%) | 22 (-2%) | 22 (1%) | 22 (-1%) |
| Steamboat Slough | hihi | 26% | 27 (1%) | 26 (0%) | 27 (1%) | 26 (0%) | 26 (0%) | 27 (1%) | 26 (0%) | 27 (1%) |
| Sacramento River | lolo | 64% | 62 (-3%) | 41 (-36%) | 65 (0%) | 64 (0%) | 65 (0%) | 65 (1%) | 64 (0%) | 64 (0%) |
| Sacramento River | lomed | 63% | 63 (0%) | 64 (3%) | 63 (1%) | 63 (0%) | 63 (0%) | 63 (0%) | 63 (1%) | 63 (0%) |
| Sacramento River | lohi | 69% | 63 (-9%) | 63 (-9%) | 70 (0%) | 70 (0%) | 70 (0%) | 69 (0%) | 70 (1%) | 67 (-4%) |

| Reach | Inflow Bin | NAA | Alt1 | Alt2 woTUCP woVA | Alt2 wTUCP wo VA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Sacramento River | medlo | 56% | 57 (2%) | 70 (25%) | 56 (1%) | 56 (1%) | 57 (2%) | 56 (1%) | 57 (1%) | 57 (2%) |
| Sacramento River | medmed | 55% | 55 (-1%) | 56 (2%) | 55 (0%) | 55 (0%) | 55 (0%) | 55 (0%) | 55 (-1%) | 55 (0%) |
| Sacramento River | medhi | 54% | 54 (0%) | 55 (3%) | 54 (1%) | 54 (1%) | 54 (0%) | 54 (1%) | 54 (0%) | 53 (-1%) |
| Sacramento River | hilo | 50% | 50 (0%) | 54 (8%) | 50 (0%) | 50 (1%) | 50 (0%) | 50 (1%) | 50 (0%) | 50 (1%) |
| Sacramento River | himed | 48% | 48 (0%) | 50 (4%) | 48 (0%) | 48 (0%) | 48 (1%) | 48 (1%) | 47 (-1%) | 48 (0%) |
| Sacramento River | hihi | 41% | 41 (-1%) | 48 (17%) | 41 (0%) | 41 (0%) | 41 (0%) | 41 (-1%) | 41 (0%) | 41 (0%) |
| Georgiana Slough | lolo | 17% | 11 (-36%) | 9 (-48%) | 17 (-1%) | 17 (-1%) | 17 (-2%) | 17 (-1%) | 17 (0%) | 17 (-1%) |
| Georgiana Slough | lomed | 19% | 16 (-12%) | 17 (-9%) | 19 (1%) | 19 (2%) | 19 (1%) | 18 (-2%) | 19 (0%) | 19 (3%) |
| Georgiana Slough | Lohi | 15% | 11 (-25%) | 19 (30%) | 15 (1%) | 14 (-3%) | 15 (4%) | 14 (-3%) | 14 (-3%) | 16 (9%) |
| Georgiana Slough | medlo | 19% | 13 (-31%) | 14 (-22%) | 18 (-1%) | 18 (-2%) | 18 (-2%) | 18 (-3%) | 18 (-2%) | 18 (-2%) |
| Georgiana Slough | Medmed | 18% | 16 (-10%) | 18 (0%) | 19 (1%) | 19 (2%) | 18 (1%) | 18 (-2%) | 18 (1%) | 19 (2%) |
| Georgiana Slough | Medhi | 17% | 16 (-5%) | 18 (6%) | 17 (-3%) | 17 (-2%) | 17 (-1%) | 17 (-4%) | 17 (-1%) | 17 (-2%) |
| Georgiana Slough | Hilo | 13% | 13 (-1%) | 17 (33%) | 13 (-2%) | 13 (-1%) | 13 (3%) | 12 (-6%) | 12 (-3%) | 13 (1%) |
| Georgiana Slough | Himed | 11% | 12 (4%) | 12 (12%) | 12 (4%) | 11 (3%) | 11 (3%) | 12 (6%) | 11 (0%) | 11 (3%) |
| Georgiana Slough | Hihi | 9% | 9 (-1%) | 12 (31%) | 9 (0%) | 9 (1%) | 9 (0%) | 9 (-2%) | 9 (0%) | 9 (-1%) |
| Delta Cross Channel | Lolo | 0% | 11 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) |
| Delta Cross Channel | Lomed | 0% | 4 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) |
| Delta Cross Channel | Lohi | 0% | 13 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) |
| Delta Cross Channel | Medlo | 0% | 7 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) |
| Delta Cross Channel | Medmed | 0% | 3 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) |
| Delta Cross Channel | Medhi | 0% | 1 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) |
| Delta Cross Channel | Hilo | 0% | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) |
| Delta Cross Channel | Himed | 0% | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) |
| Delta Cross Channel | hihi | 0% | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) |

Table I.7-7. Mean December through March route-specific percent survival by Inflow bin for NAA, EXP1, EXP3, four phases of Alternative 2, and Action 5. Note that NA values result from no data falling into that Inflow bin (BA scenarios).

| Reach | Inflow Bin | NAA | EXP1 | EXP3 | Alt2woTUCP woVA | Alt2wTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | Action 5 |
|---|---|---|---|---|---|---|---|---|---|
| Sutter Slough | lolo | 36% | 34% | 35% | 36% | 36% | 36% | 36% | 37% |
| Sutter Slough | lomed | 36% | 37% | 36% | 34% | 35% | 34% | 35% | 34% |
| Sutter Slough | lohi | 31% | NA | 38% | 30% | 31% | 30% | 33% | 32% |
| Sutter Slough | medlo | 42% | 40% | 41% | 42% | 41% | 41% | 41% | 42% |
| Sutter Slough | medmed | 43% | 41% | 43% | 43% | 43% | 42% | 43% | 42% |
| Sutter Slough | medhi | 44% | 44% | 44% | 43% | 44% | 45% | 44% | 45% |
| Sutter Slough | hilo | 52% | 50% | 52% | 52% | 52% | 51% | 51% | 52% |
| Sutter Slough | himed | 53% | 52% | 53% | 52% | 53% | 53% | 53% | 53% |
| Sutter Slough | hihi | 58% | 59% | 59% | 59% | 58% | 58% | 58% | 58% |
| Steamboat Slough | lolo | 46% | 44% | 45% | 46% | 46% | 46% | 45% | 46% |
| Steamboat Slough | lomed | 47% | 47% | 47% | 46% | 46% | 45% | 46% | 46% |
| Steamboat Slough | lohi | 41% | NA | 49% | 41% | 41% | 41% | 40% | 41% |
| Steamboat Slough | medlo | 50% | 49% | 50% | 50% | 50% | 49% | 50% | 50% |
| Steamboat Slough | medmed | 52% | 49% | 53% | 53% | 52% | 52% | 52% | 52% |
| Steamboat Slough | medhi | 53% | 50% | 53% | 53% | 53% | 53% | 54% | 54% |
| Steamboat Slough | hilo | 60% | 59% | 60% | 59% | 60% | 59% | 59% | 59% |
| Steamboat Slough | himed | 62% | 61% | 61% | 61% | 61% | 62% | 61% | 61% |
| Steamboat Slough | hihi | 67% | 67% | 67% | 67% | 66% | 67% | 66% | 66% |
| Sacramento River | lolo | 37% | 35% | 37% | 37% | 37% | 37% | 37% | 37% |
| Sacramento River | lomed | 39% | 36% | 40% | 38% | 39% | 38% | 38% | 38% |
| Sacramento River | lohi | 27% | NA | 38% | 28% | 28% | 28% | 28% | 28% |
| Sacramento River | medlo | 45% | 44% | 45% | 45% | 45% | 45% | 44% | 45% |
| Sacramento River | medmed | 47% | 44% | 48% | 48% | 48% | 48% | 47% | 47% |
| Sacramento River | medhi | 46% | 45% | 48% | 47% | 47% | 47% | 47% | 48% |
| Sacramento River | hilo | 57% | 56% | 57% | 56% | 57% | 56% | 57% | 56% |
| Sacramento River | himed | 59% | 58% | 58% | 59% | 58% | 59% | 58% | 59% |

| Reach | Inflow Bin | NAA | EXP1 | EXP3 | Alt2woTUCPwoVA | Alt2wTUCPwoVA | Alt2woTUCPDeltaVA | Alt2woTUCPAllVA | Action 5 |
|---|---|---|---|---|---|---|---|---|---|
| Sacramento River | hihi | 64% | 64% | 64% | 64% | 63% | 64% | 64% | 64% |
| Georgiana Slough | lolo | 18% | 18% | 18% | 18% | 19% | 19% | 18% | 18% |
| Georgiana Slough | lomed | 18% | 18% | 19% | 19% | 19% | 20% | 19% | 19% |
| Georgiana Slough | lohi | 18% | NA | 20% | 12% | 13% | 15% | 16% | 15% |
| Georgiana Slough | medlo | 21% | 21% | 21% | 21% | 22% | 21% | 21% | 21% |
| Georgiana Slough | medmed | 23% | 22% | 23% | 22% | 22% | 22% | 22% | 22% |
| Georgiana Slough | medhi | 21% | 25% | 22% | 22% | 22% | 22% | 23% | 23% |
| Georgiana Slough | hilo | 28% | 28% | 29% | 27% | 27% | 28% | 29% | 28% |
| Georgiana Slough | himed | 29% | 29% | 28% | 29% | 28% | 28% | 29% | 29% |
| Georgiana Slough | hihi | 32% | 33% | 33% | 33% | 33% | 33% | 33% | 32% |
| Delta Cross Channel | lolo | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| Delta Cross Channel | lomed | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| Delta Cross Channel | lohi | 0% | NA | 0% | 0% | 0% | 0% | 0% | 0% |
| Delta Cross Channel | medlo | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| Delta Cross Channel | medmed | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| Delta Cross Channel | medhi | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| Delta Cross Channel | hilo | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| Delta Cross Channel | himed | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| Delta Cross Channel | hihi | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| Combined | lolo | 35% | 33% | 34% | 35% | 35% | 35% | 34% | 35% |
| Combined | lomed | 36% | 34% | 37% | 35% | 36% | 35% | 35% | 35% |
| Combined | lohi | 27% | NA | 36% | 27% | 27% | 27% | 27% | 28% |
| Combined | medlo | 41% | 40% | 41% | 41% | 41% | 41% | 40% | 41% |
| Combined | medmed | 43% | 41% | 44% | 43% | 43% | 43% | 43% | 42% |
| Combined | medhi | 43% | 42% | 44% | 43% | 43% | 43% | 43% | 44% |
| Combined | hilo | 53% | 52% | 53% | 52% | 53% | 52% | 53% | 52% |
| Combined | himed | 55% | 54% | 55% | 55% | 55% | 55% | 55% | 55% |
| Combined | hihi | 60% | 61% | 61% | 61% | 60% | 61% | 61% | 60% |

Table I.7-8. Mean December through March route-specific percent survival by Inflow bin for NAA, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4, and Action 5. Percent difference from NAA is in parentheses. Note that NA values result from no data falling into that Inflow bin (EIS scenarios).

| Reach | Inflow Bin | NAA | Alt1 | Alt2 woTUCP woVA | Alt2 wTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Sutter Slough | lolo | 36% | 34 (-5%) | 36 (1%) | 36 (0%) | 36 (1%) | 36 (0%) | 36 (-1%) | 36 (1%) | 37 (2%) |
| Sutter Slough | lomed | 36% | 33 (-8%) | 35 (-4%) | 34 (-7%) | 34 (-6%) | 35 (-4%) | 36 (0%) | 36 (-1%) | 34 (-6%) |
| Sutter Slough | lohi | 31% | 32 (4%) | 32 (5%) | 31 (1%) | 32 (3%) | 28 (-8%) | 31 (-1%) | 33 (8%) | 32 (5%) |
| Sutter Slough | medlo | 42% | 40 (-5%) | 42 (-1%) | 42 (-1%) | 42 (0%) | 42 (0%) | 42 (0%) | 42 (-1%) | 42 (0%) |
| Sutter Slough | medmed | 43% | 42 (-2%) | 43 (0%) | 43 (0%) | 42 (-1%) | 43 (-1%) | 43 (0%) | 43 (-1%) | 42 (-1%) |
| Sutter Slough | medhi | 44% | 44 (1%) | 45 (4%) | 43 (0%) | 44 (1%) | 45 (2%) | 45 (3%) | 45 (2%) | 45 (2%) |
| Sutter Slough | hilo | 52% | 52 (0%) | 52 (0%) | 52 (1%) | 51 (0%) | 52 (0%) | 52 (0%) | 52 (0%) | 52 (0%) |
| Sutter Slough | himed | 53% | 53 (-1%) | 53 (-1%) | 53 (-1%) | 53 (-1%) | 52 (-2%) | 53 (-1%) | 53 (0%) | 53 (-1%) |
| Sutter Slough | hihi | 58% | 59 (1%) | 59 (0%) | 58 (0%) | 58 (0%) | 58 (0%) | 58 (0%) | 59 (1%) | 58 (0%) |
| Steamboat Slough | lolo | 46% | 45 (-2%) | 46 (0%) | 46 (0%) | 46 (0%) | 46 (0%) | 45 (-1%) | 46 (0%) | 46 (0%) |
| Steamboat Slough | lomed | 47% | 45 (-2%) | 46 (-1%) | 46 (-1%) | 45 (-2%) | 46 (-2%) | 46 (-2%) | 47 (1%) | 46 (-1%) |
| Steamboat Slough | lohi | 41% | 42 (4%) | 43 (6%) | 42 (2%) | 39 (-4%) | 38 (-6%) | 41 (0%) | 40 (-2%) | 41 (1%) |
| Steamboat Slough | medlo | 50% | 48 (-4%) | 50 (0%) | 50 (0%) | 50 (1%) | 50 (0%) | 51 (2%) | 50 (0%) | 50 (0%) |
| Steamboat Slough | medmed | 52% | 52 (-2%) | 53 (0%) | 53 (1%) | 52 (0%) | 52 (0%) | 53 (0%) | 52 (0%) | 52 (-1%) |
| Steamboat Slough | medhi | 53% | 54 (2%) | 54 (2%) | 52 (-1%) | 52 (-1%) | 53 (0%) | 52 (-2%) | 53 (0%) | 54 (2%) |
| Steamboat Slough | hilo | 60% | 60 (0%) | 60 (0%) | 60 (0%) | 59 (0%) | 60 (0%) | 60 (0%) | 59 (0%) | 59 (-1%) |
| Steamboat Slough | himed | 62% | 62 (0%) | 62 (0%) | 62 (-1%) | 61 (-1%) | 61 (-1%) | 61 (-1%) | 62 (0%) | 61 (-1%) |
| Steamboat Slough | hihi | 67% | 67 (0%) | 67 (0%) | 67 (0%) | 66 (0%) | 66 (0%) | 66 (0%) | 67 (0%) | 66 (0%) |
| Sacramento River | lolo | 37% | 32 (-16%) | 37 (-1%) | 37 (-1%) | 37 (0%) | 37 (-1%) | 37 (-1%) | 37 (-1%) | 37 (-1%) |
| Sacramento River | lomed | 39% | 35 (-11%) | 39 (-2%) | 39 (-2%) | 38 (-3%) | 38 (-4%) | 38 (-4%) | 40 (0%) | 38 (-3%) |
| Sacramento River | lohi | 27% | 25 (-5%) | 29 (9%) | 28 (6%) | 27 (2%) | 27 (0%) | 28 (7%) | 26 (-1%) | 28 (7%) |
| Sacramento River | medlo | 45% | 38 (-17%) | 45 (0%) | 45 (0%) | 45 (0%) | 45 (-1%) | 46 (2%) | 45 (-1%) | 45 (-1%) |
| Sacramento River | medmed | 47% | 45 (-5%) | 48 (0%) | 48 (1%) | 47 (0%) | 47 (0%) | 48 (1%) | 47 (0%) | 47 (-1%) |

| Reach | Inflow Bin | NAA | Alt1 | Alt2 woTUCP woVA | Alt2 wTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Sacramento River | medhi | 46% | 47 (2%) | 48 (3%) | 46 (-1%) | 46 (0%) | 47 (1%) | 46 (0%) | 47 (1%) | 48 (4%) |
| Sacramento River | hilo | 57% | 57 (0%) | 57 (0%) | 57 (0%) | 57 (0%) | 57 (0%) | 57 (0%) | 57 (0%) | 56 (-1%) |
| Sacramento River | himed | 59% | 59 (0%) | 59 (0%) | 59 (0%) | 59 (-1%) | 58 (-1%) | 58 (-1%) | 59 (0%) | 59 (-1%) |
| Sacramento River | hihi | 64% | 64 (0%) | 64 (0%) | 64 (0%) | 63 (0%) | 64 (0%) | 64 (0%) | 64 (0%) | 64 (0%) |
| Georgiana Slough | lolo | 18% | 16 (-12%) | 19 (3%) | 18 (0%) | 19 (2%) | 19 (1%) | 18 (0%) | 18 (0%) | 18 (-1%) |
| Georgiana Slough | lomed | 18% | 17 (-7%) | 19 (3%) | 19 (4%) | 19 (2%) | 19 (5%) | 19 (3%) | 19 (4%) | 19 (3%) |
| Georgiana Slough | lohi | 18% | 13 (-28%) | 18 (4%) | 15 (-11%) | 17 (-5%) | 14 (-19%) | 13 (-25%) | 17 (-6%) | 15 (-13%) |
| Georgiana Slough | medlo | 21% | 20 (-7%) | 21 (-4%) | 21 (-4%) | 21 (-2%) | 21 (-2%) | 21 (0%) | 22 (0%) | 21 (0%) |
| Georgiana Slough | medmed | 23% | 23 (0%) | 23 (1%) | 23 (2%) | 22 (-1%) | 23 (1%) | 23 (1%) | 23 (2%) | 22 (-5%) |
| Georgiana Slough | medhi | 21% | 23 (8%) | 23 (7%) | 24 (14%) | 22 (6%) | 22 (6%) | 22 (6%) | 22 (6%) | 23 (10%) |
| Georgiana Slough | hilo | 28% | 26 (-5%) | 27 (-2%) | 27 (-3%) | 28 (2%) | 29 (3%) | 28 (-1%) | 27 (-1%) | 28 (2%) |
| Georgiana Slough | himed | 29% | 29 (-2%) | 29 (-1%) | 29 (-2%) | 29 (-1%) | 28 (-3%) | 29 (-2%) | 30 (3%) | 29 (-1%) |
| Georgiana Slough | hihi | 32% | 33 (0%) | 33 (2%) | 32 (0%) | 33 (2%) | 33 (1%) | 33 (0%) | 32 (-1%) | 32 (0%) |
| Delta Cross Channel | lolo | 0% | 14 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) |
| Delta Cross Channel | lomed | 0% | 6 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) |
| Delta Cross Channel | lohi | 0% | 14 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) |
| Delta Cross Channel | medlo | 0% | 14 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) |
| Delta Cross Channel | medmed | 0% | 6 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) |
| Delta Cross Channel | medhi | 0% | 2 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) |
| Delta Cross Channel | hilo | 0% | 1 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) |
| Delta Cross Channel | himed | 0% | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) |
| Delta Cross Channel | hihi | 0% | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) |
| Combined | lolo | 35% | 30 (-15%) | 35 (0%) | 35 (0%) | 35 (0%) | 35 (0%) | 34 (-1%) | 35 (0%) | 35 (0%) |
| Combined | lomed | 36% | 32 (-10%) | 35 (-2%) | 35 (-2%) | 35 (-3%) | 35 (-3%) | 35 (-2%) | 36 (1%) | 35 (-3%) |
| Combined | lohi | 27% | 24 (-10%) | 29 (7%) | 28 (4%) | 27 (1%) | 26 (-3%) | 27 (3%) | 27 (-1%) | 28 (4%) |
| Combined | medlo | 41% | 35 (-14%) | 41 (-1%) | 41 (-1%) | 41 (0%) | 41 (-1%) | 42 (2%) | 41 (0%) | 41 (0%) |
| Combined | medmed | 43% | 41 (-4%) | 43 (0%) | 43 (1%) | 43 (-1%) | 43 (0%) | 44 (1%) | 43 (0%) | 42 (-1%) |

| Reach | Inflow Bin | NAA | Alt1 | Alt2 woTUCP woVA | Alt2 wTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Action 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Combined | medhi | 43% | 44 (2%) | 44 (4%) | 43 (1%) | 43 (1%) | 43 (2%) | 43 (1%) | 43 (2%) | 44 (4%) |
| Combined | hilo | 53% | 53 (-1%) | 53 (0%) | 53 (0%) | 53 (0%) | 53 (0%) | 53 (0%) | 53 (0%) | 52 (-1%) |
| Combined | himed | 55% | 55 (-1%) | 55 (-1%) | 55 (-1%) | 55 (-1%) | 55 (-2%) | 55 (-2%) | 56 (0%) | 55 (-1%) |
| Combined | hihi | 60% | 61 (0%) | 61 (0%) | 61 (0%) | 60 (0%) | 60 (0%) | 61 (0%) | 61 (0%) | 60 (0%) |

### I.7.3.4 Figures

#### *I.7.3.4.1 ROUTING, OMR BINS*

**BA**

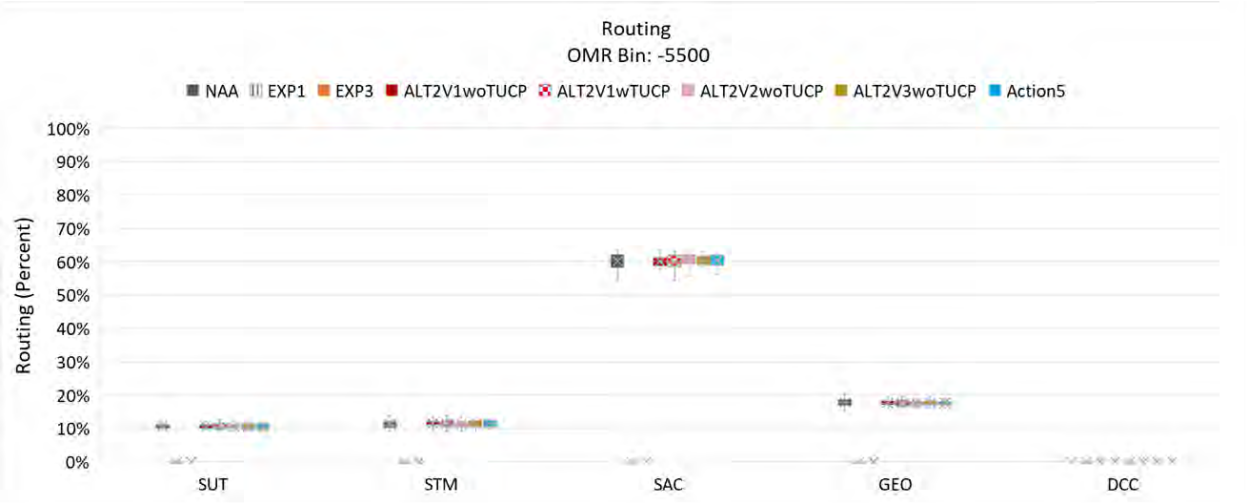



Figure I.7-1. Box and whisker of mean December through March route-specific percent routing by OMR bin -5,500 for NAA, EXP1, EXP3, four phases of Alternative 2 (BA scenarios), and Action 5.

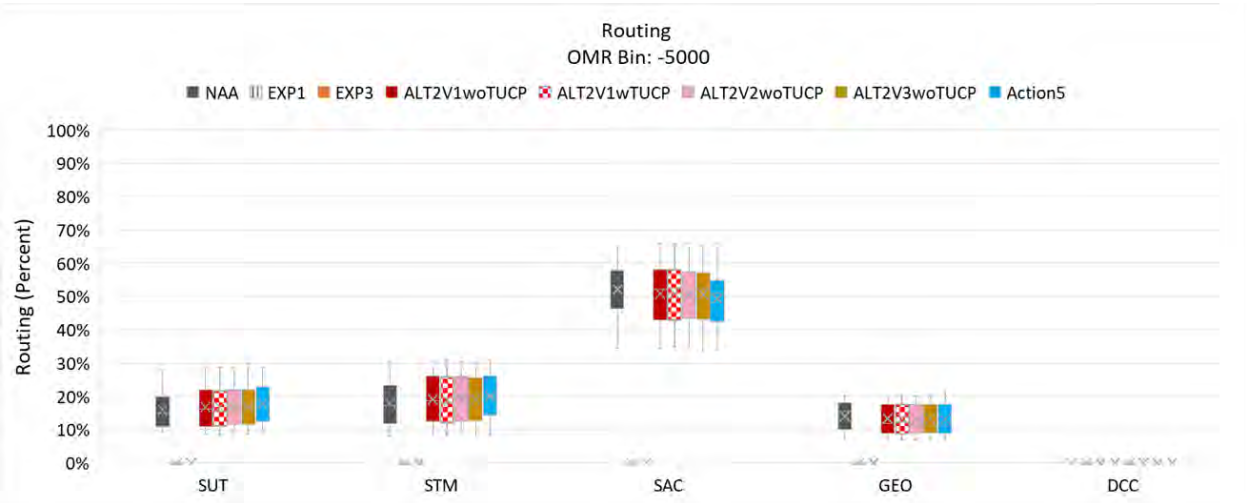



Figure I.7-2. Box and whisker of mean December through March route-specific percent routing by OMR bin -5,000 for NAA, EXP1, EXP3, four phases of Alternative 2 (BA scenarios), and Action 5.

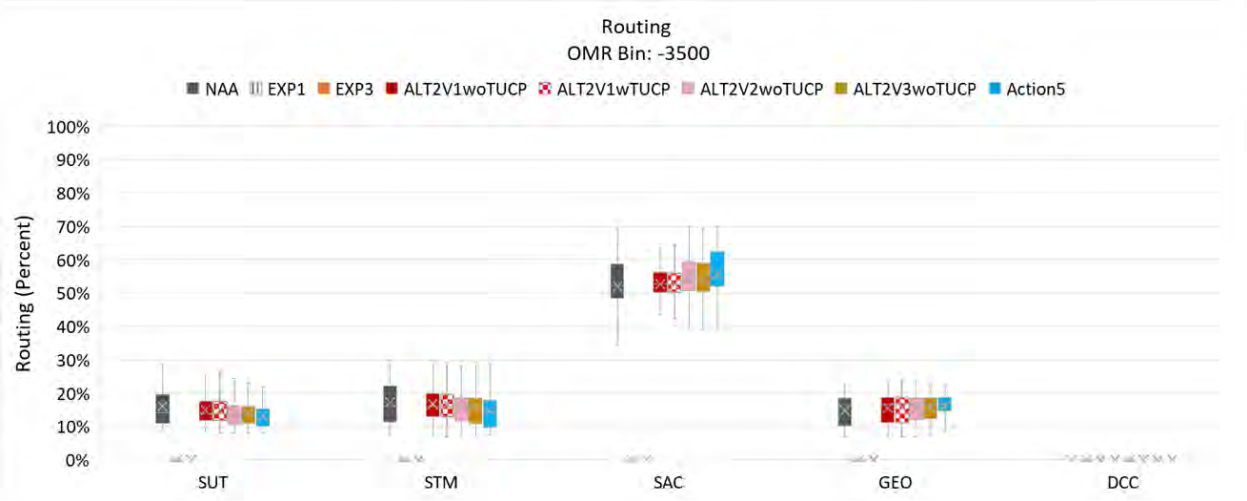



Figure I.7-3. Box and whisker of mean December through March route-specific percent routing by OMR bin -3,500 for NAA, EXP1, EXP3, four phases of Alternative 2 (BA scenarios), and Action 5.

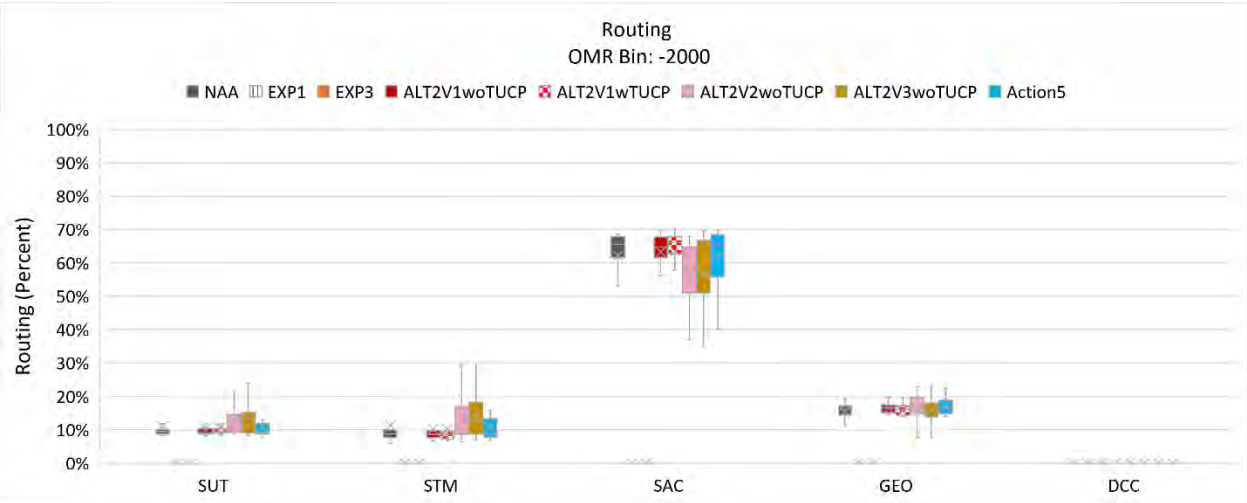



Figure I.7-4. Box and whisker of mean December through March route-specific percent routing by OMR bin -2,000 for NAA, EXP1, EXP3, four phases of Alternative 2 (BA scenarios), and Action 5.

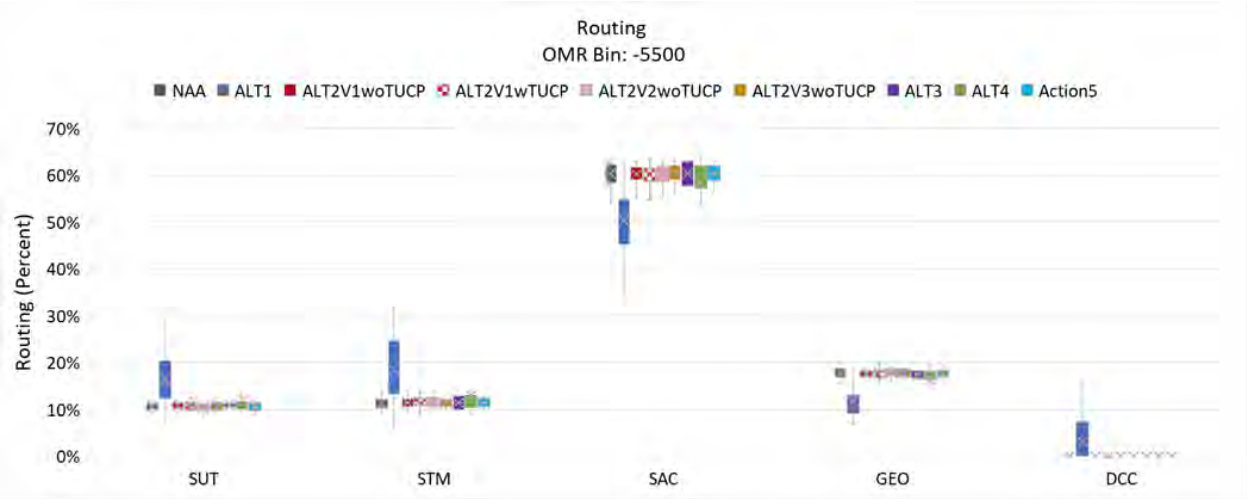



Figure I.7-5. Box and whisker of mean December through March route-specific percent routing by OMR bin -5,500 for NAA, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4 (EIS scenarios), and Action 5.

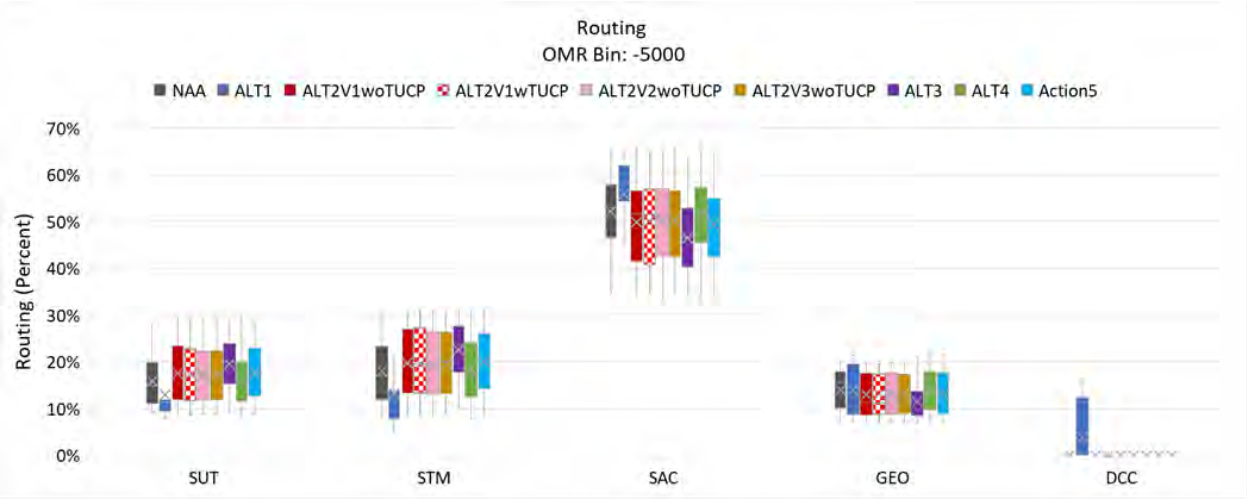



Figure I.7-6. Box and whisker of mean December through March route-specific percent routing by OMR bin -5,000 for NAA, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4 (EIS scenarios), and Action 5.

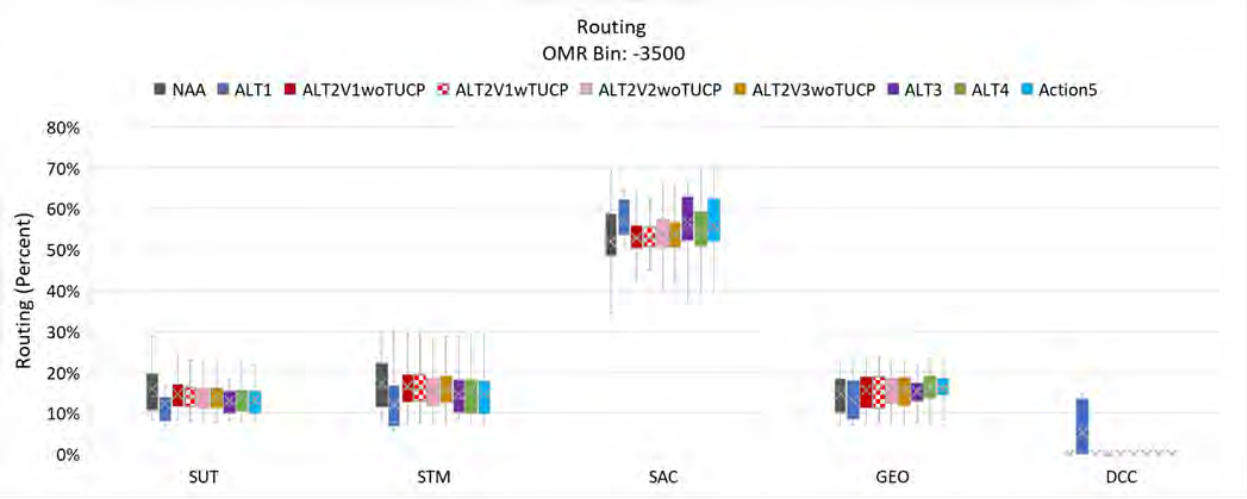



Figure I.7-7. Box and whisker of mean December through March route-specific percent routing by OMR bin -3,500 for NAA, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4 (EIS scenarios), and Action 5.

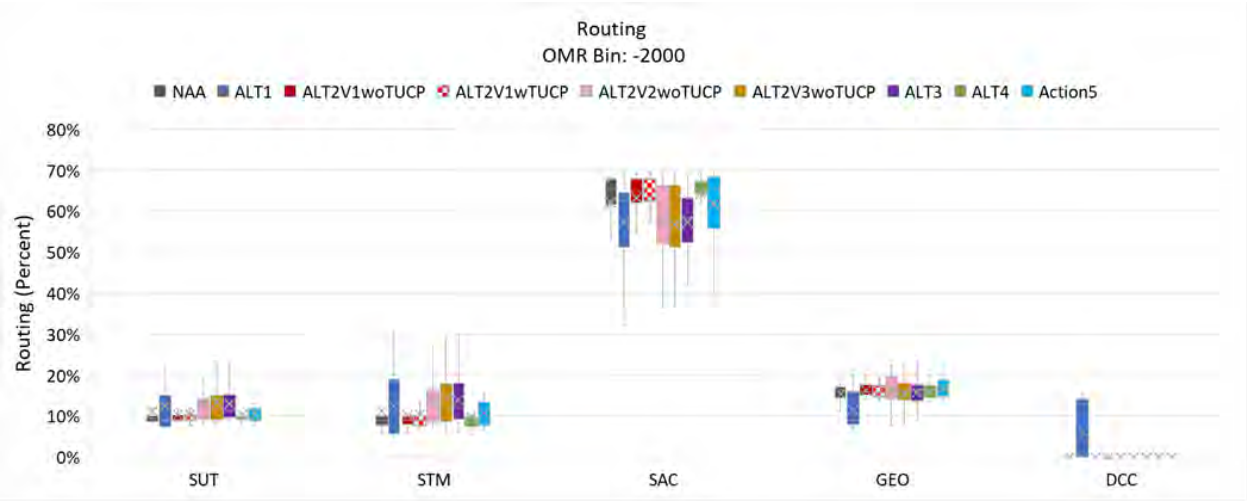



Figure I.7-8. Box and whisker of mean December through March route-specific percent routing by OMR bin -2,000 for NAA, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4 (EIS scenarios), and Action 5.

### *I.7.3.4.2 SURVIVAL, OMR BINS*

**BA**

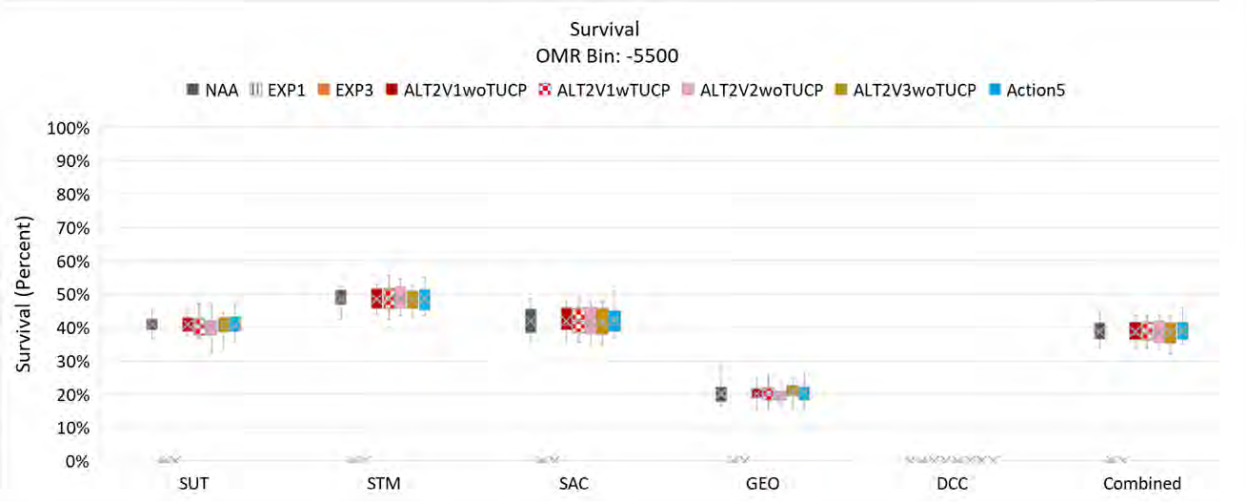



Figure I.7-9. Box and whisker of mean December through March route-specific percent survival by OMR bin -5,500 for NAA, EXP1, EXP3, four phases of Alternative 2 (BA scenarios), and Action 5.

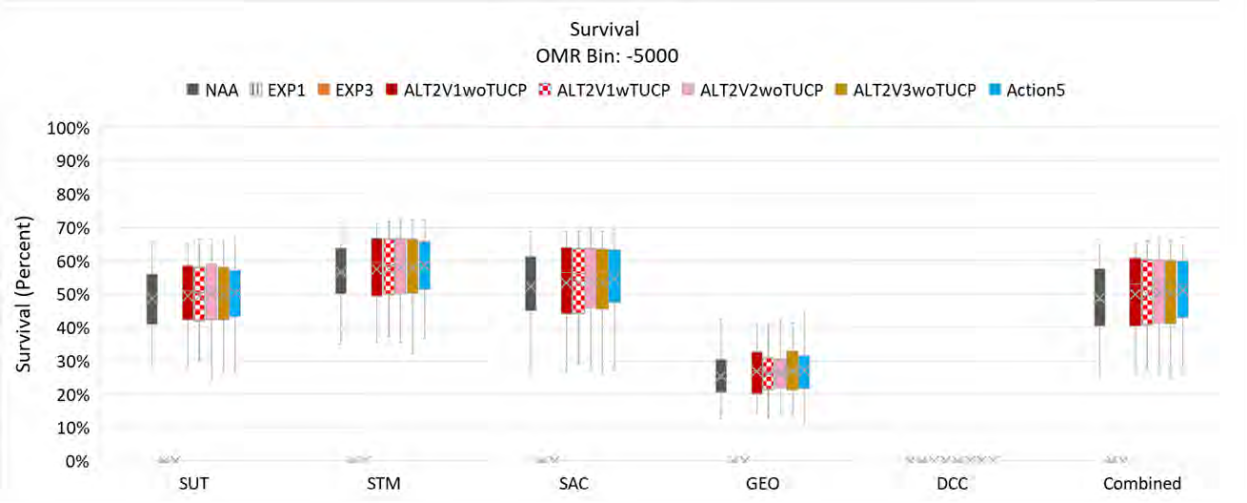



Figure I.7-10. Box and whisker of mean December through March route-specific percent survival by OMR bin -5,000 for NAA, EXP1, EXP3, four phases of Alternative 2 (BA scenarios), and Action 5.

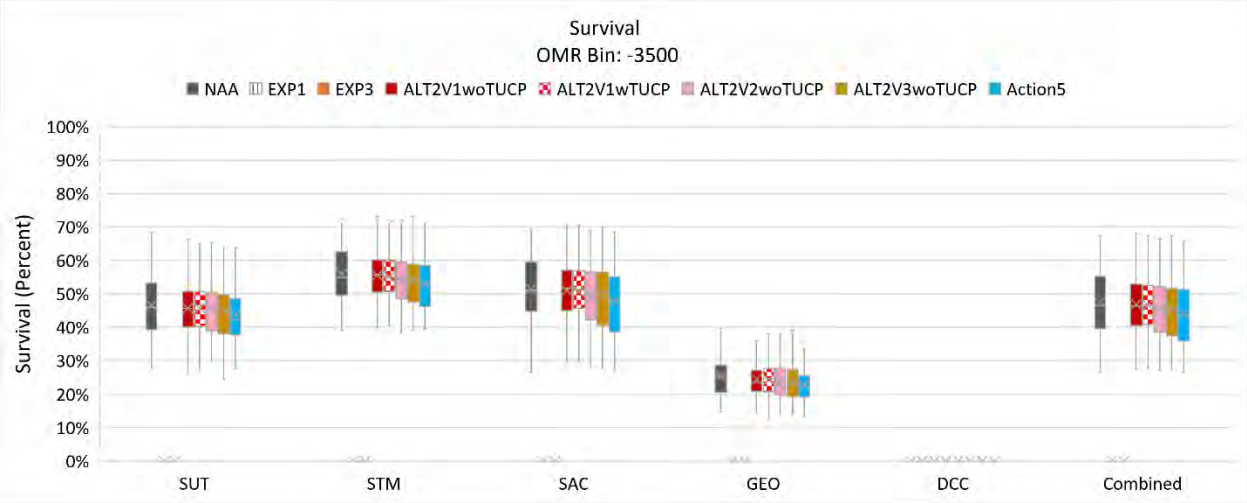



Figure I.7-11. Box and whisker of mean December through March route-specific percent survival by OMR bin -3,500 for NAA, EXP1, EXP3, four phases of Alternative 2 (BA scenarios), and Action 5.

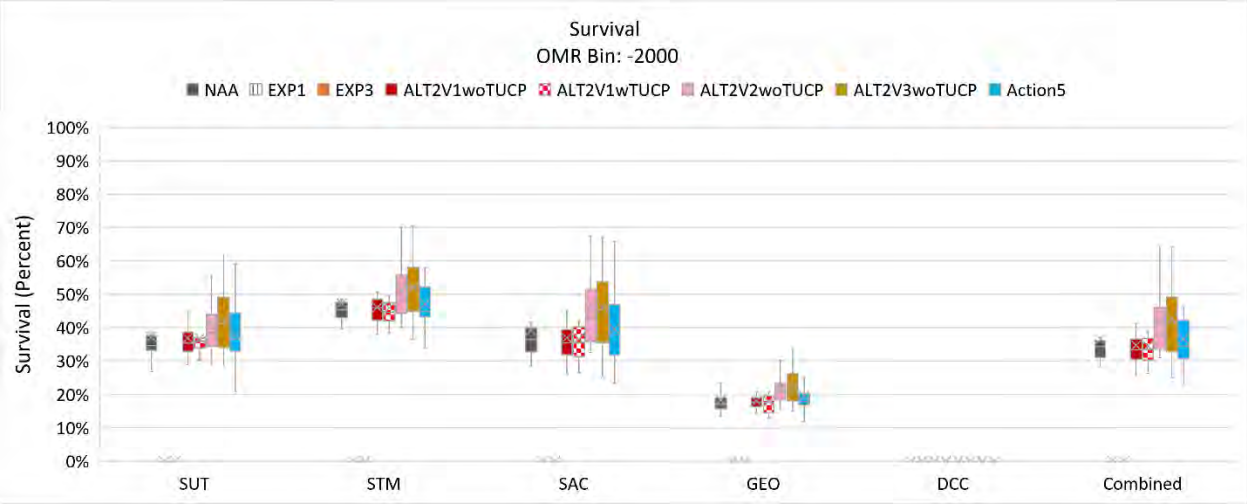



Figure I.7-12. Box and whisker of mean December through March route-specific percent survival by OMR bin -2,000 for NAA, EXP1, EXP3, four phases of Alternative 2 (BA scenarios), and Action 5.

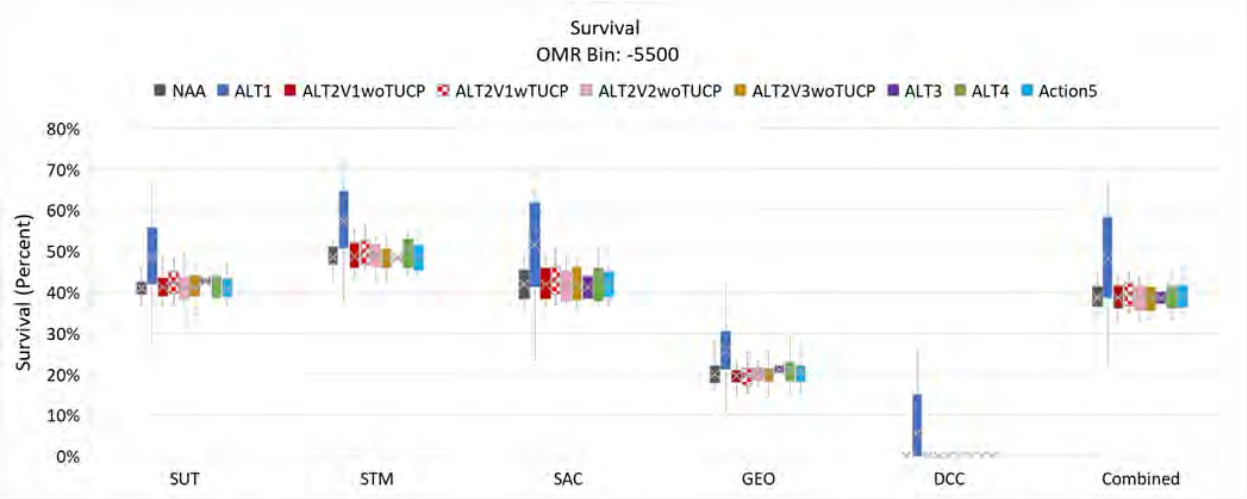



Figure I.7-13. Box and whisker of mean December through March route-specific percent survival by OMR bin -5,500 for NAA, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4 (EIS scenarios), and Action 5.

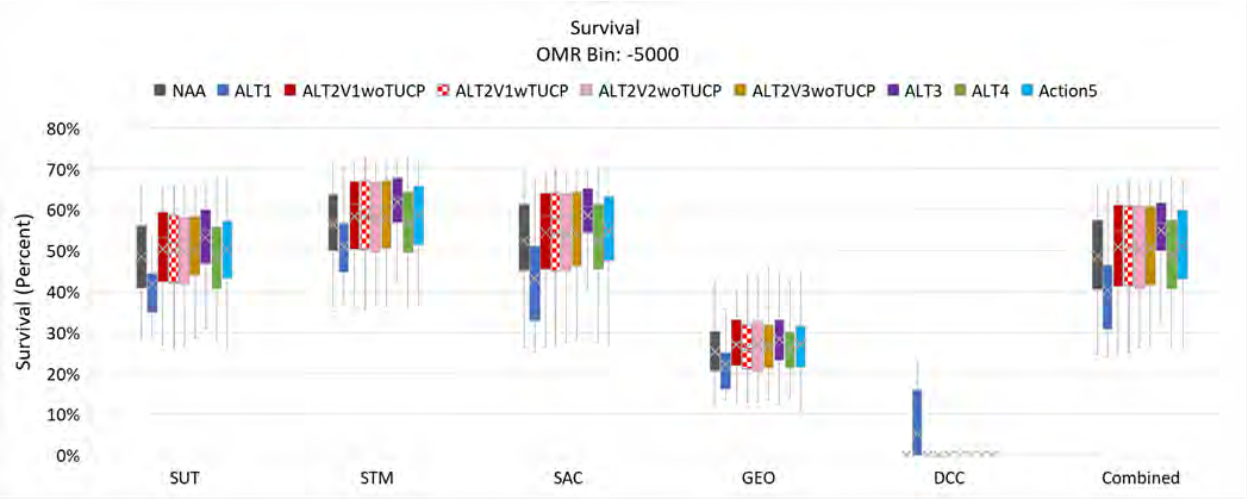



Figure I.7-14. Box and whisker of mean December through March route-specific percent survival by OMR bin -5,000 for NAA, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4 (EIS scenarios), and Action 5.

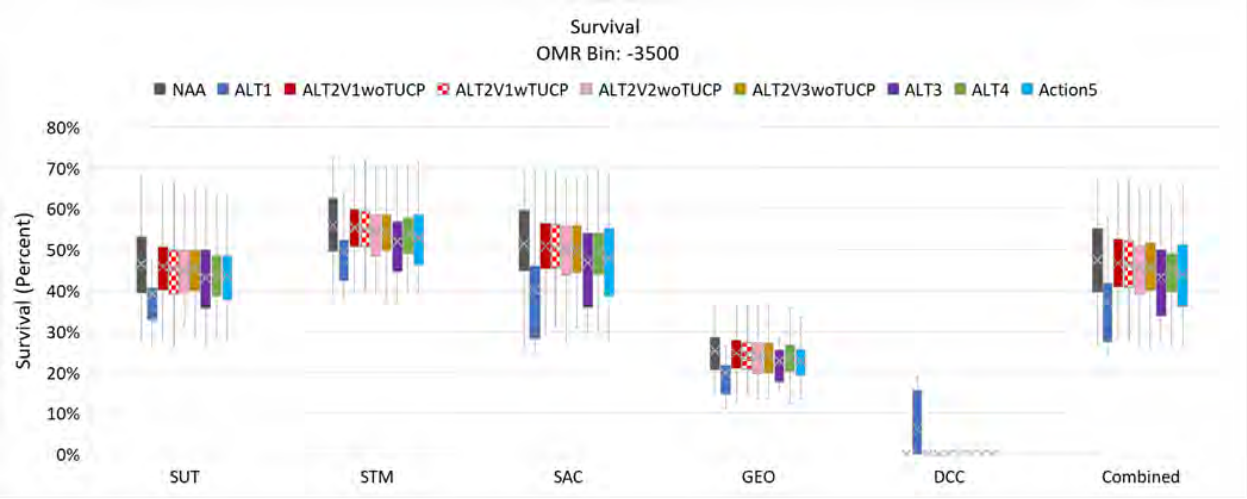



Figure I.7-15. Box and whisker of mean December through March route-specific percent survival by OMR bin -3,500 for NAA, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4 (EIS scenarios), and Action 5.

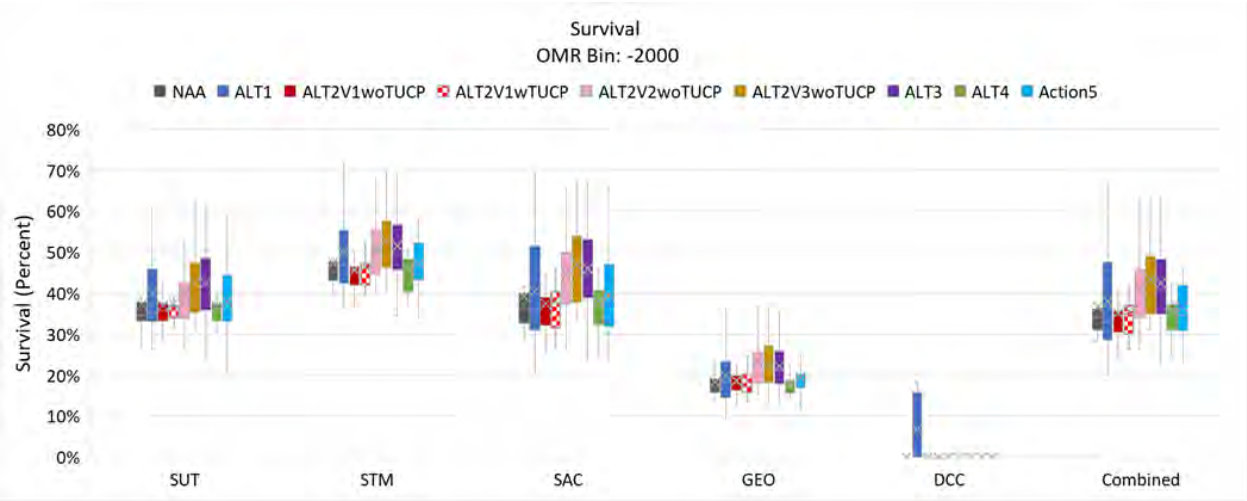



Figure I.7-16. Box and whisker of mean December through March route-specific percent survival by OMR bin -2,000 for NAA, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4 (EIS scenarios), and Action 5.

### *I.7.3.4.3 ROUTING, INFLOW BINS*

**BA**

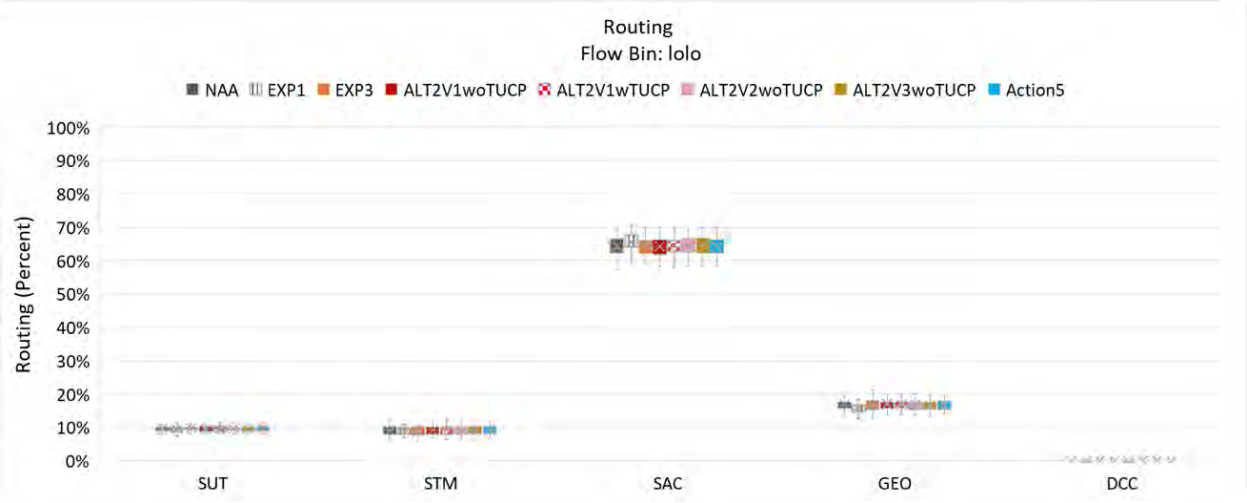



Figure I.7-17. Box and whisker of mean December through March route-specific percent routing by Inflow bin "lolo" for NAA, EXP1, EXP3, four phases of Alternative 2 (BA scenarios), and Action 5.

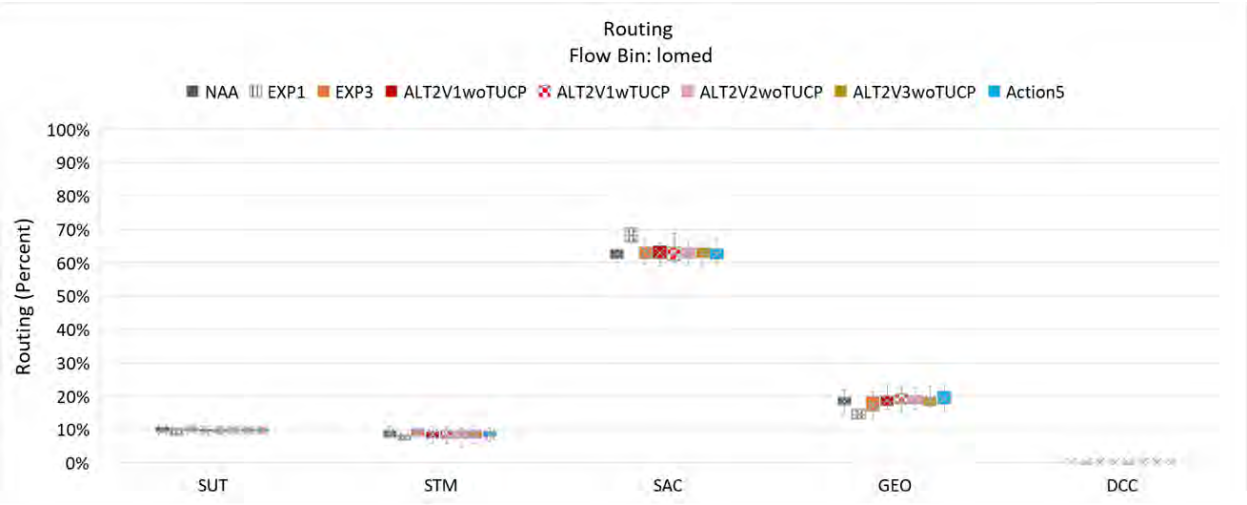



Figure I.7-18. Box and whisker of mean December through March route-specific percent routing by Inflow bin "lomed" for NAA, EXP1, EXP3, four phases of Alternative 2 (BA scenarios), and Action 5.

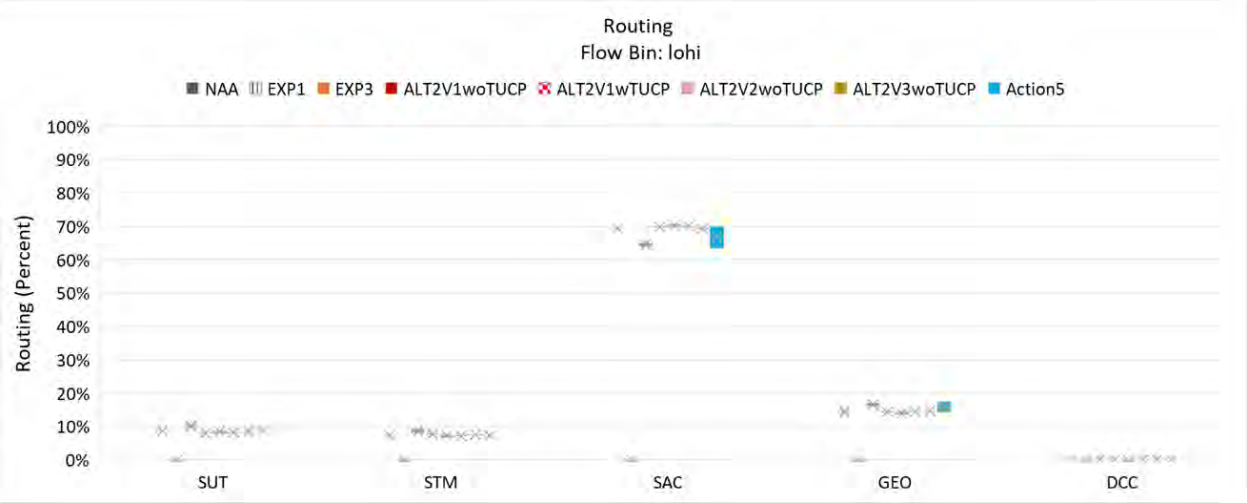



Figure I.7-19. Box and whisker of mean December through March route-specific percent routing by Inflow bin "lohi" for NAA, EXP1, EXP3, four phases of Alternative 2 (BA scenarios), and Action 5.

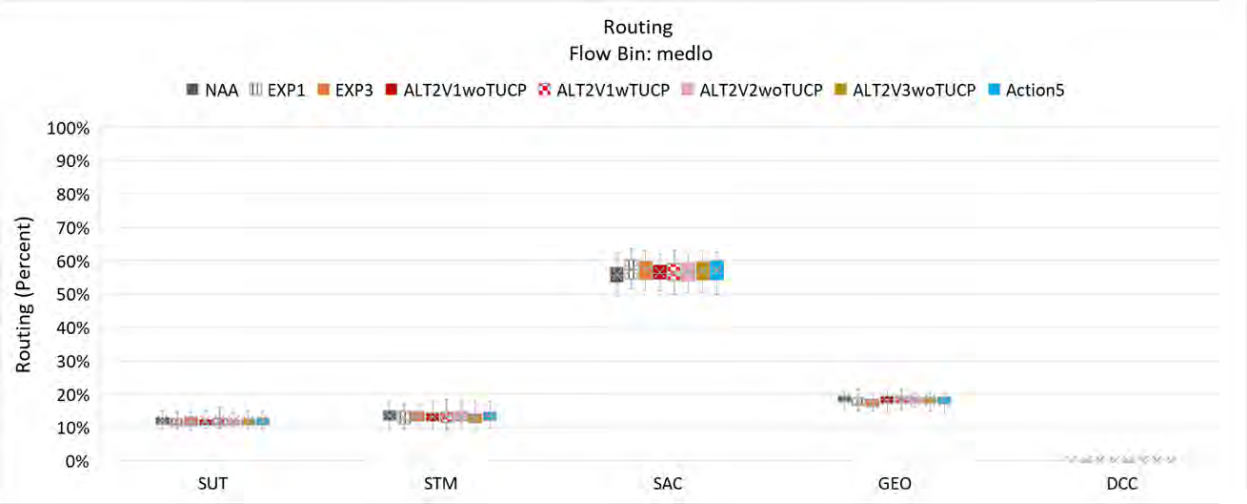



Figure I.7-20. Box and whisker of mean December through March route-specific percent routing by Inflow bin "medlo" for NAA, EXP1, EXP3, four phases of Alternative 2 (BA scenarios), and Action 5.

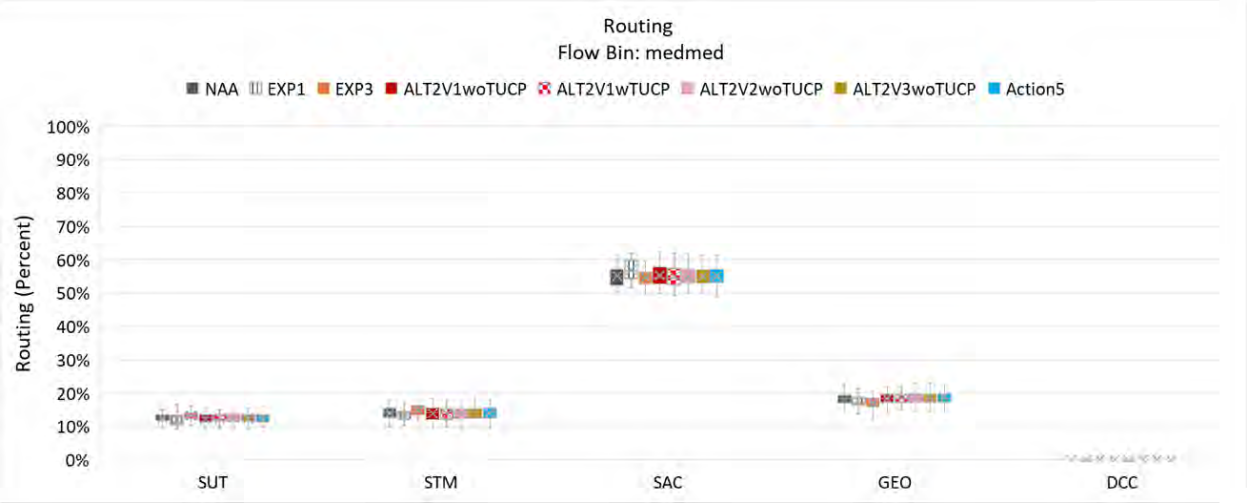



Figure I.7-21. Box and whisker of mean December through March route-specific percent routing by Inflow bin "medmed" for NAA, EXP1, EXP3, four phases of Alternative 2 (BA scenarios), and Action 5.

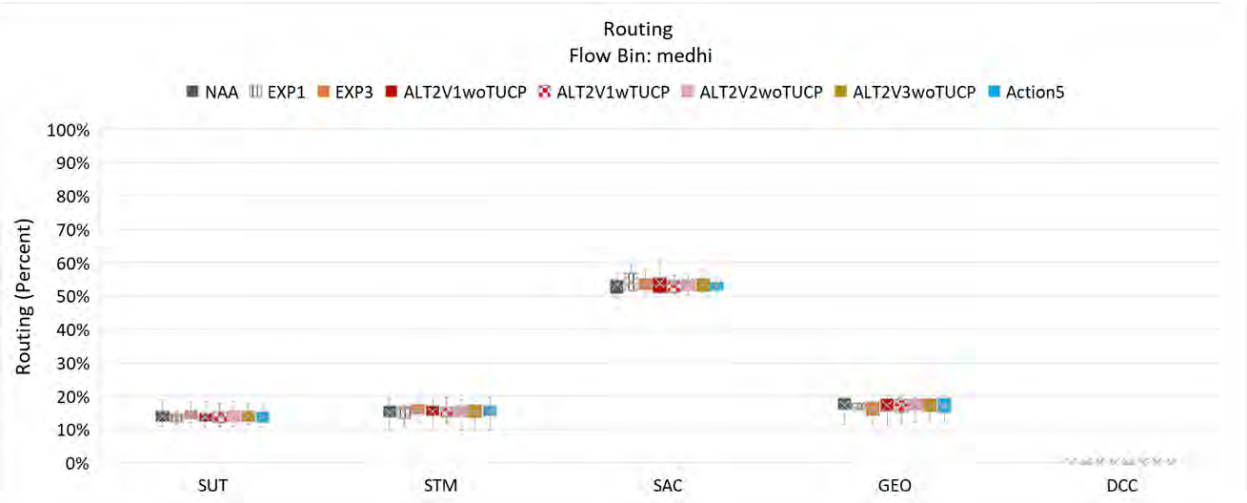



Figure I.7-22. Box and whisker of mean December through March route-specific percent routing by Inflow bin "medhi" for NAA, EXP1, EXP3, four phases of Alternative 2 (BA scenarios), and Action 5.

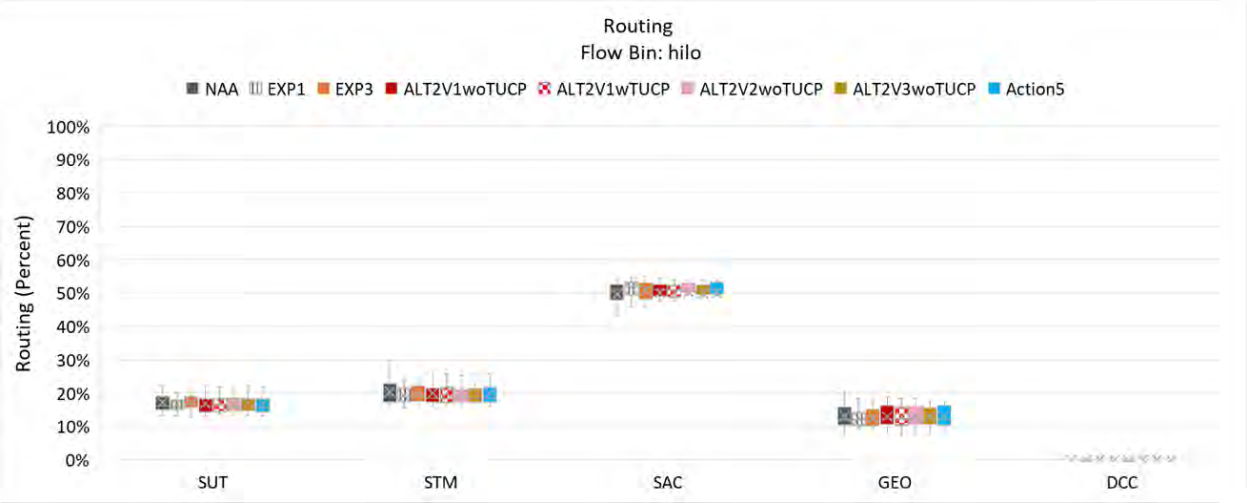



Figure I.7-23. Box and whisker of mean December through March route-specific percent routing by Inflow bin "hilo" for NAA, EXP1, EXP3, four phases of Alternative 2 (BA scenarios), and Action 5.

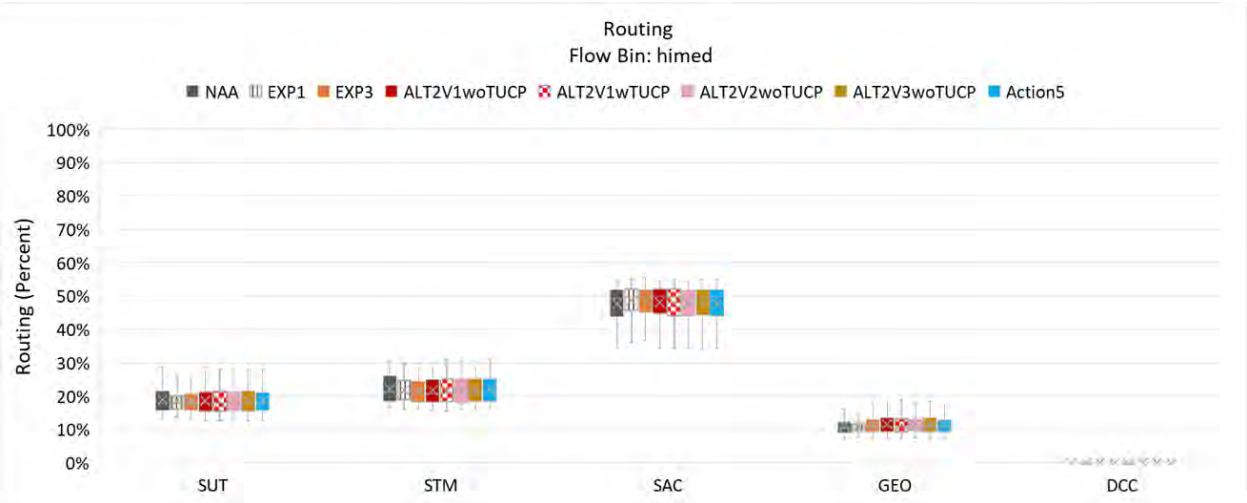



Figure I.7-24. Box and whisker of mean December through March route-specific percent routing by Inflow bin "himed" for NAA, EXP1, EXP3, four phases of Alternative 2 (BA scenarios), and Action 5.

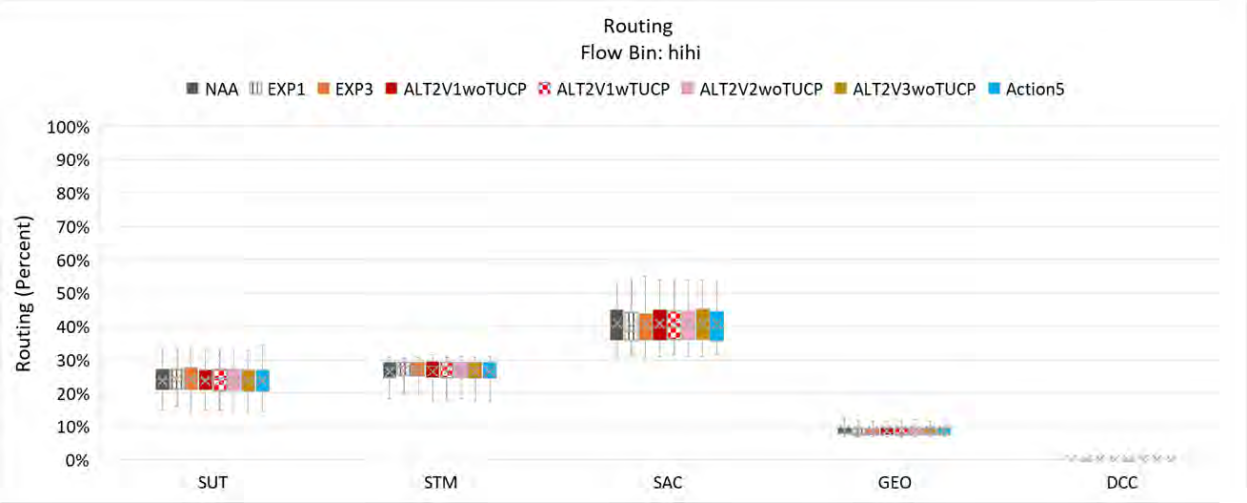



Figure I.7-25. Box and whisker of mean December through March route-specific percent routing by Inflow bin "hihi" for NAA, EXP1, EXP3, four phases of Alternative 2 (BA scenarios), and Action 5.

**EIS**

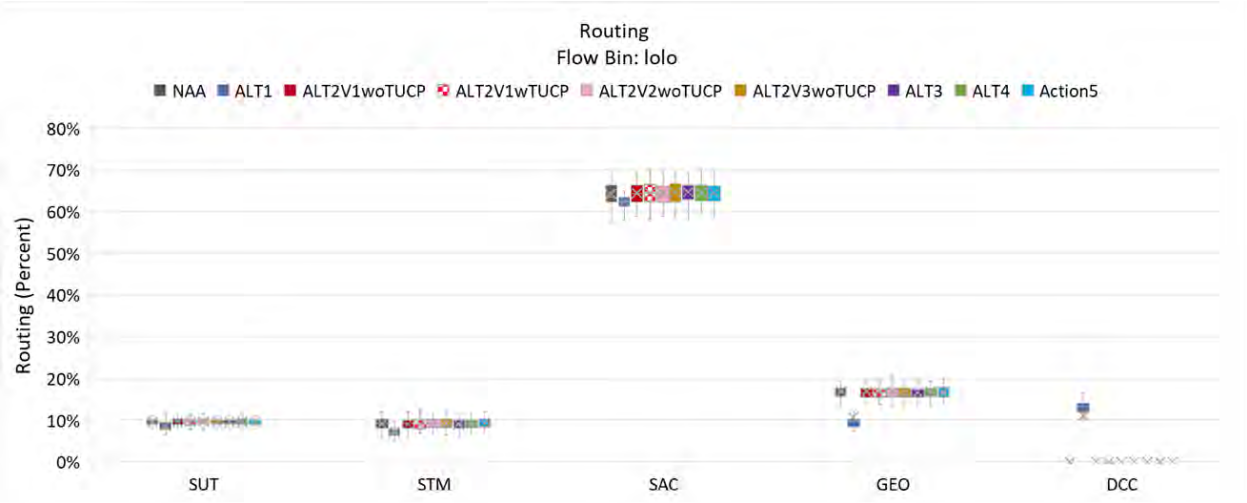



Figure I.7-26. Box and whisker of mean December through March route-specific percent routing by Inflow bin "lolo" for NAA, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4 (EIS scenarios), and Action 5.

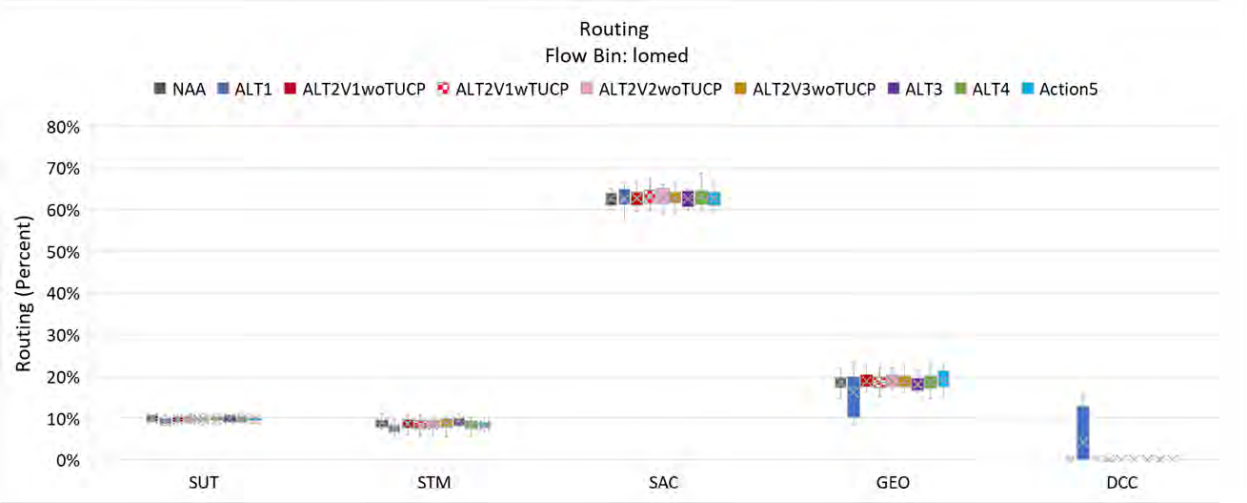



Figure I.7-27. Box and whisker of mean December through March route-specific percent routing by Inflow bin "lomed" for NAA, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4 (EIS scenarios), and Action 5.




Figure I.7-28. Box and whisker of mean December through March route-specific percent routing by Inflow bin "lohi" for NAA, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4 (EIS scenarios), and Action 5.

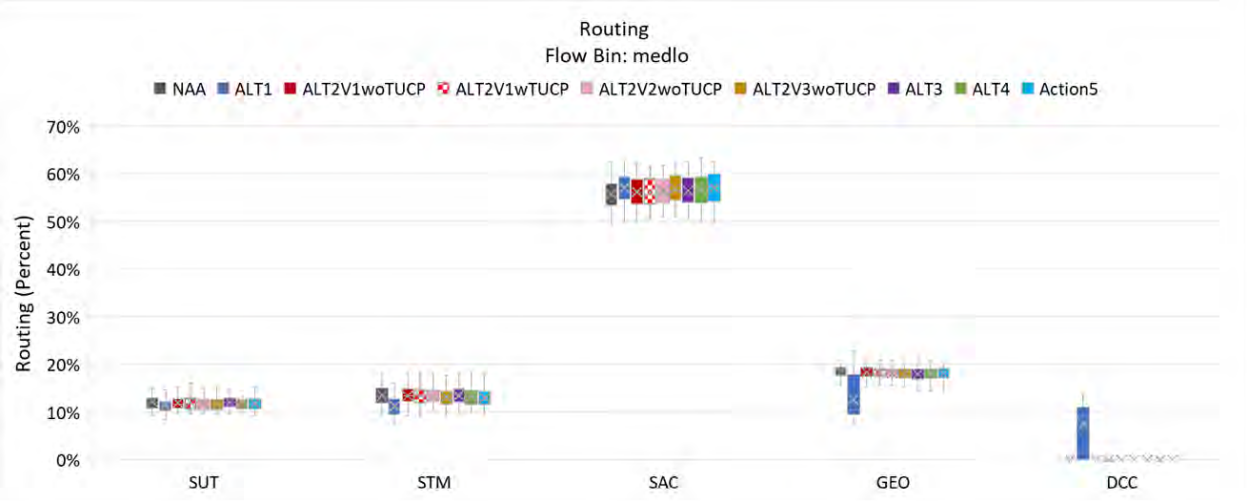



Figure I.7-29. Box and whisker of mean December through March route-specific percent routing by Inflow bin "medlo" for NAA, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4 (EIS scenarios), and Action 5.

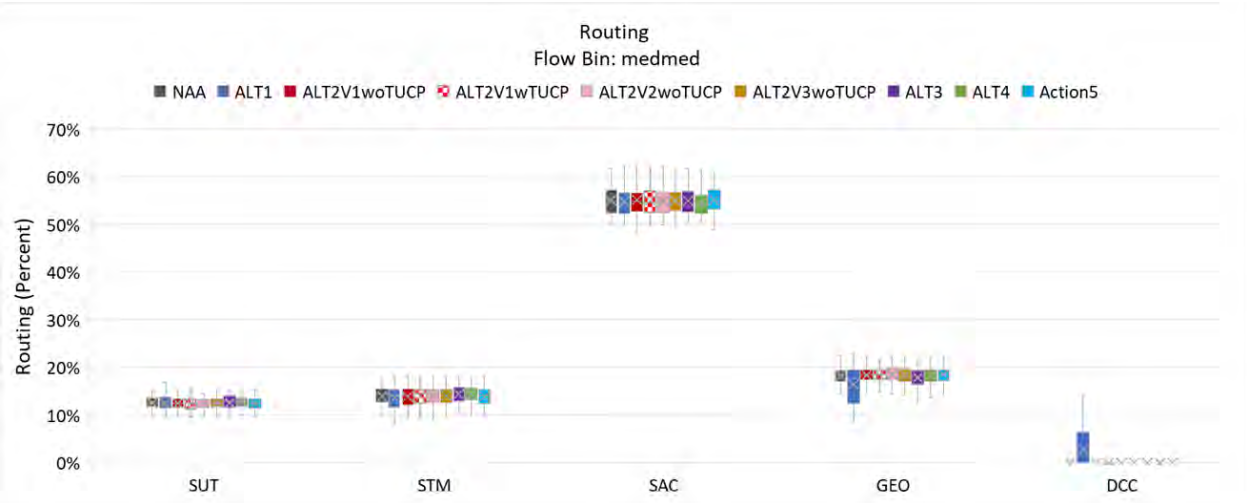



Figure I.7-30. Box and whisker of mean December through March route-specific percent routing by Inflow bin "medmed" for NAA, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4 (EIS scenarios), and Action 5.

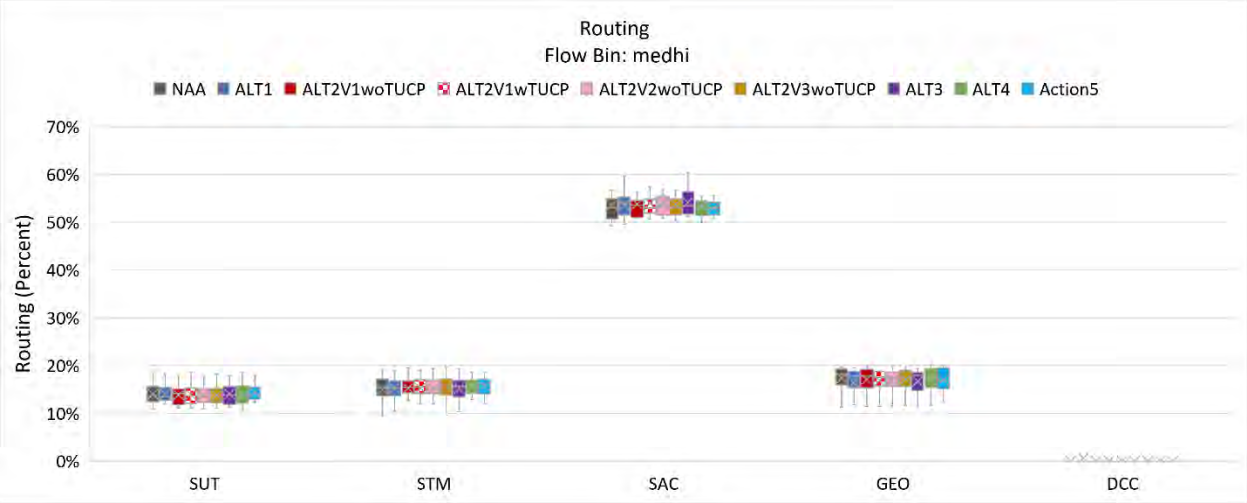



Figure I.7-31. Box and whisker of mean December through March route-specific percent routing by Inflow bin "medhi" for NAA, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4 (EIS scenarios), and Action 5.

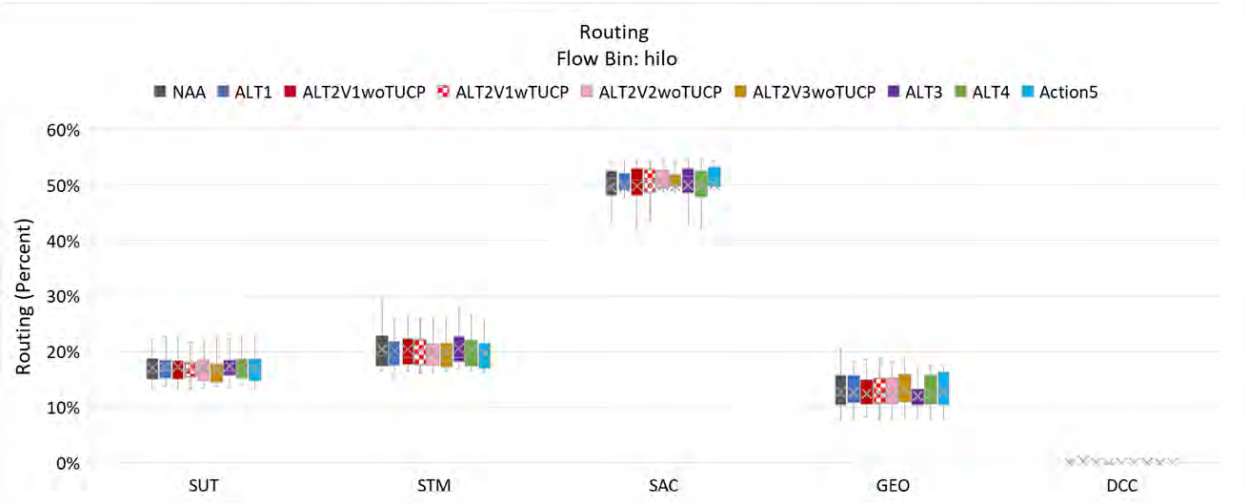



Figure I.7-32. Box and whisker of mean December through March route-specific percent routing by Inflow bin "hilo" for NAA, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4 (EIS scenarios), and Action 5.

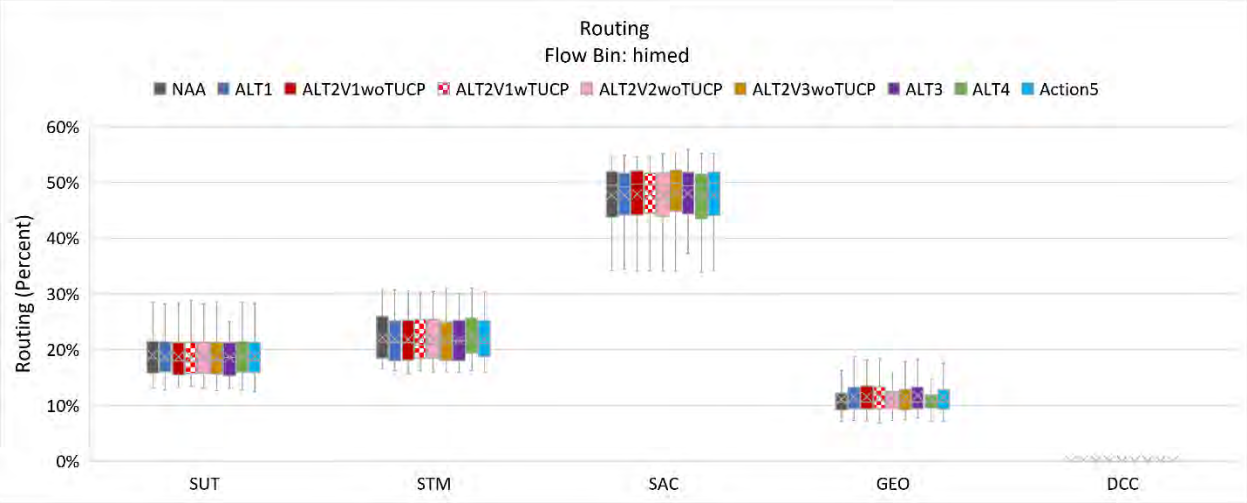



Figure I.7-33. Box and whisker of mean December through March route-specific percent routing by Inflow bin "himed" for NAA, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4 (EIS scenarios), and Action 5.

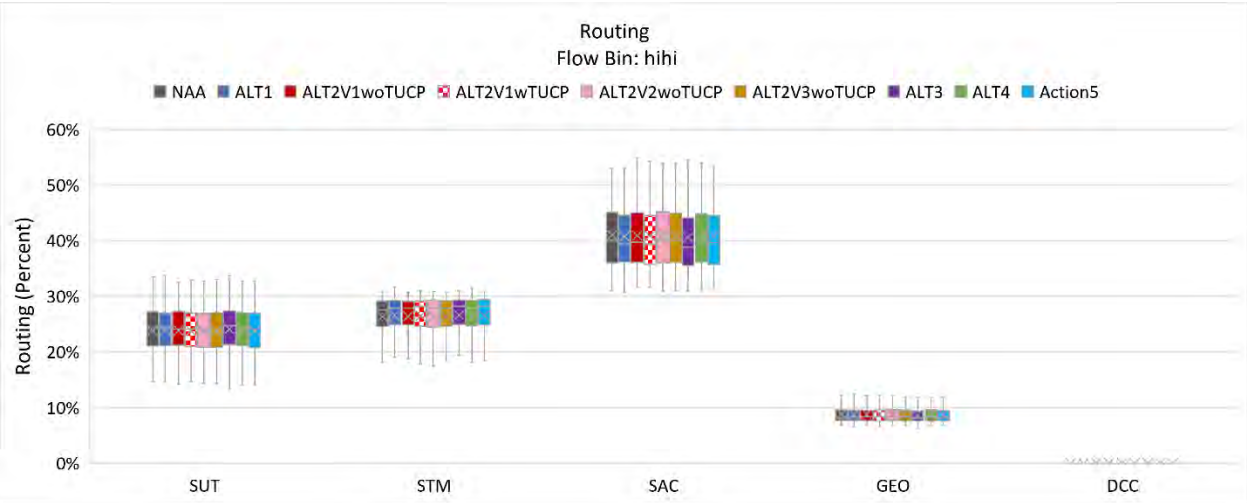



Figure I.7-34. Box and whisker of mean December through March route-specific percent routing by Inflow bin "hihi" for NAA, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4 (EIS scenarios), and Action 5.

### *I.7.3.4.4 SURVIVAL, INFLOW BINS*

**BA**

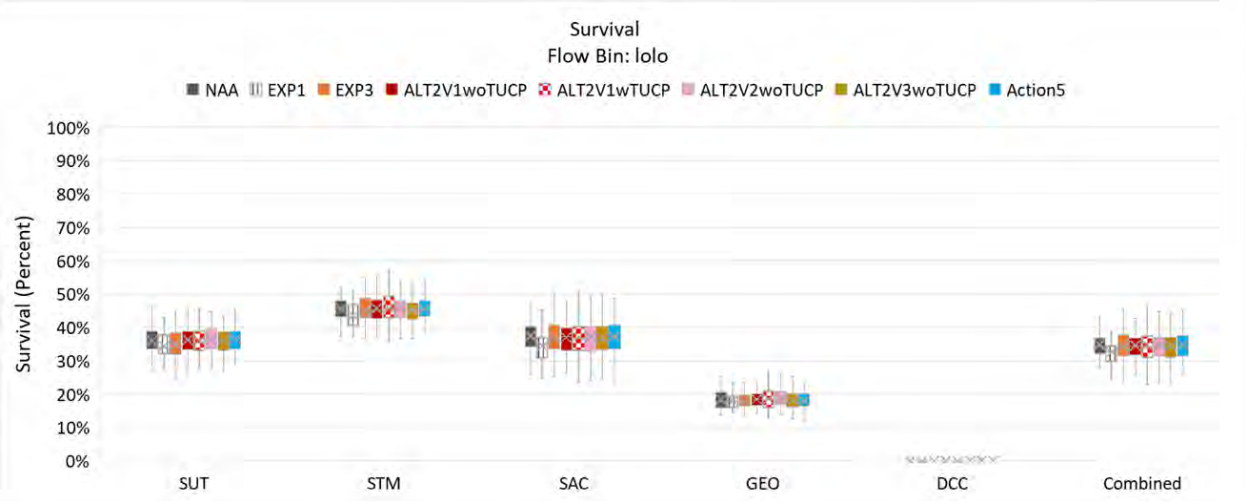



Figure I.7-35. Box and whisker of mean December through March route-specific percent survival by Inflow bin "lolo" for NAA, EXP1, EXP3, four phases of Alternative 2 (BA scenarios), and Action 5.

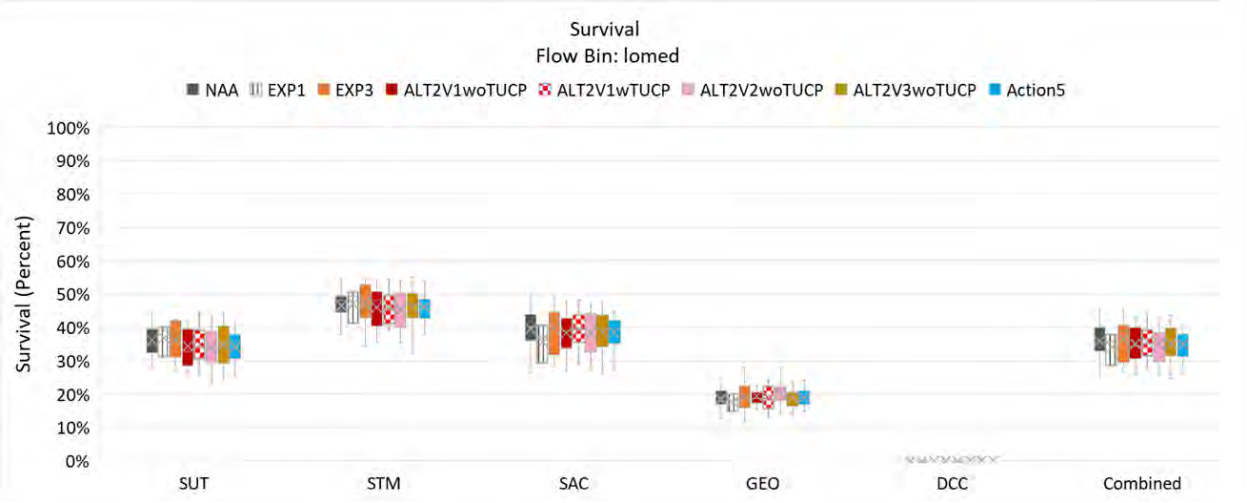



Figure I.7-36. Box and whisker of mean December through March route-specific percent survival by Inflow bin "lomed" for NAA, EXP1, EXP3, four phases of Alternative 2 (BA scenarios), and Action 5.

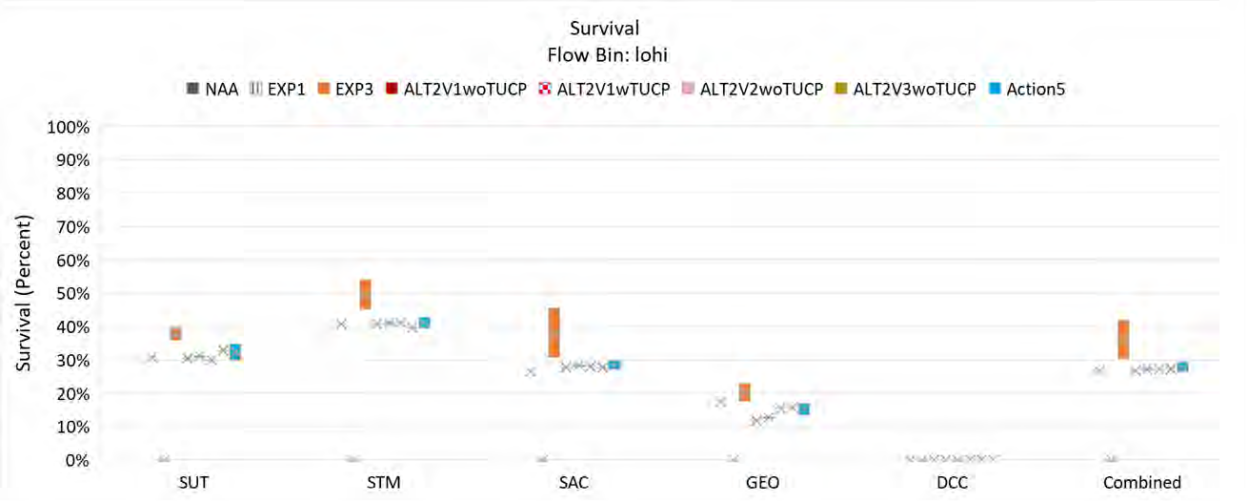



Figure I.7-37. Box and whisker of mean December through March route-specific percent survival by Inflow bin "lohi" for NAA, EXP1, EXP3, four phases of Alternative 2 (BA scenarios), and Action 5.

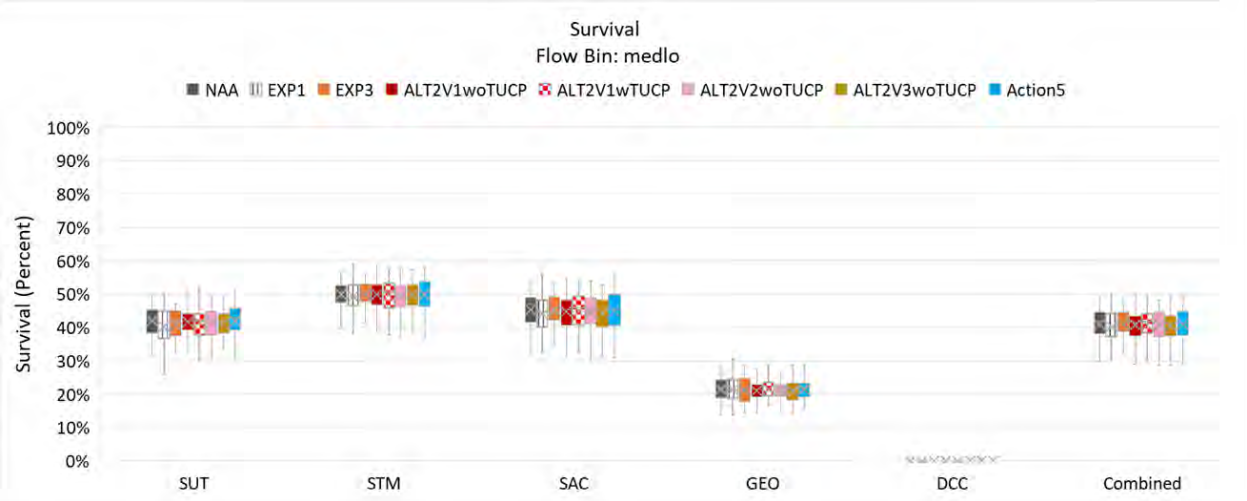



Figure I.7-38. Box and whisker of mean December through March route-specific percent survival by Inflow bin "medlo" for NAA, EXP1, EXP3, four phases of Alternative 2 (BA scenarios), and Action 5.

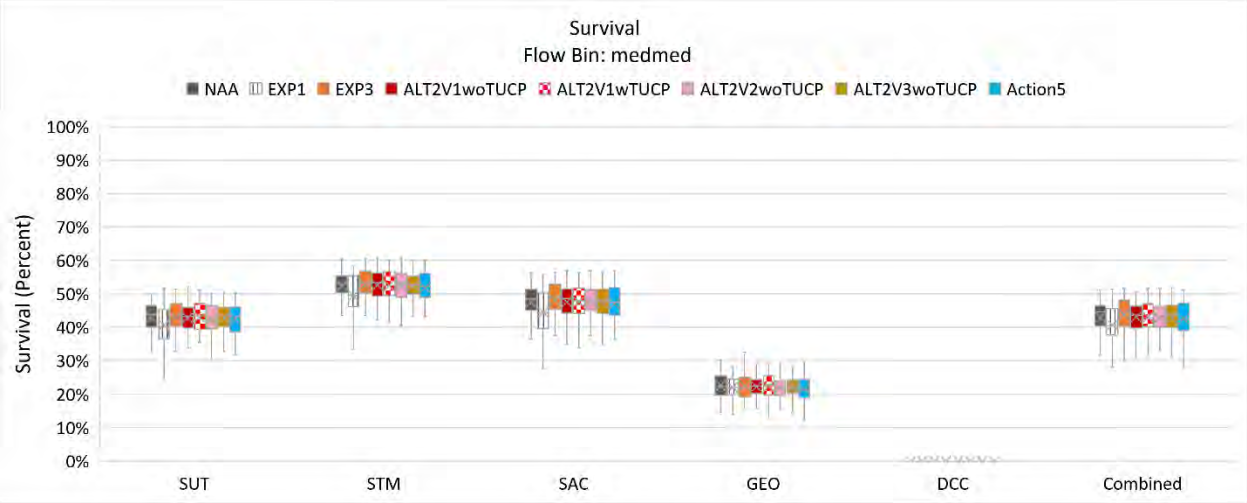



Figure I.7-39. Box and whisker of mean December through March route-specific percent survival by Inflow bin "medmed" for NAA, EXP1, EXP3, four phases of Alternative 2 (BA scenarios), and Action 5.

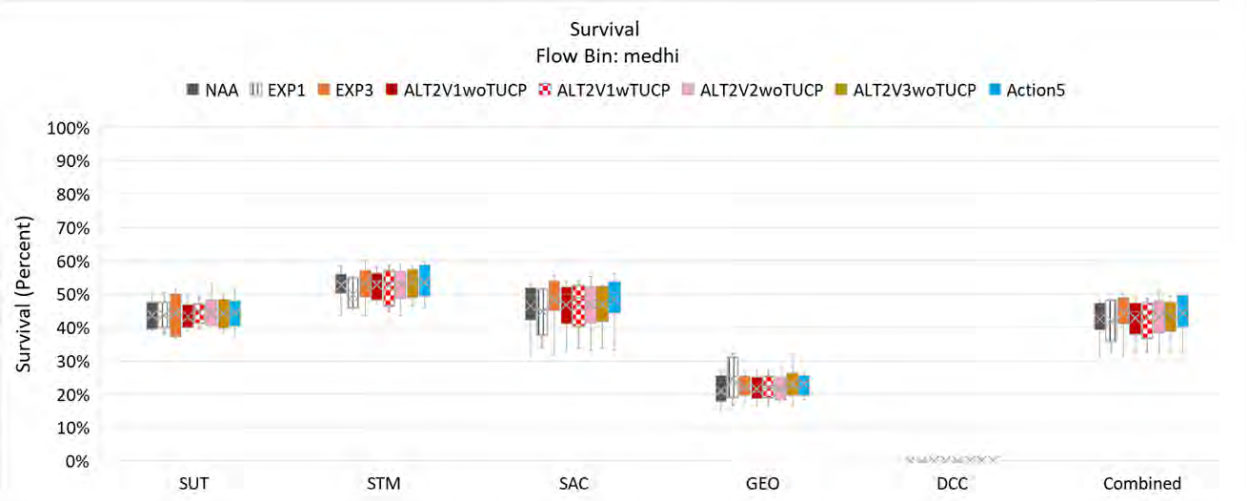



Figure I.7-40. Box and whisker of mean December through March route-specific percent survival by Inflow bin "medhi" for NAA, EXP1, EXP3, four phases of Alternative 2 (BA scenarios), and Action 5.

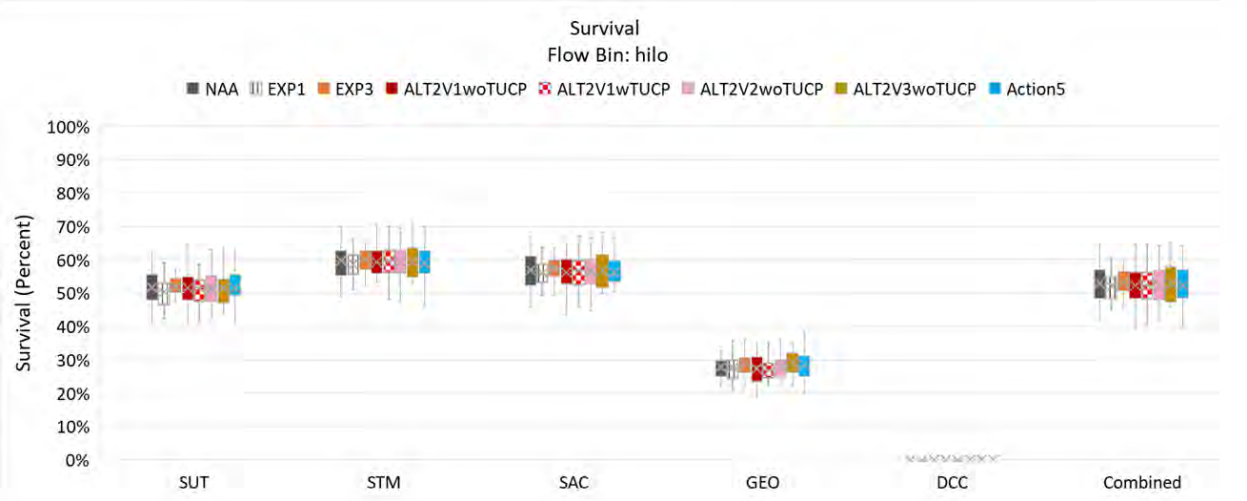



Figure I.7-41. Box and whisker of mean December through March route-specific percent survival by Inflow bin "hilo" for NAA, EXP1, EXP3, four phases of Alternative 2 (BA scenarios), and Action 5.

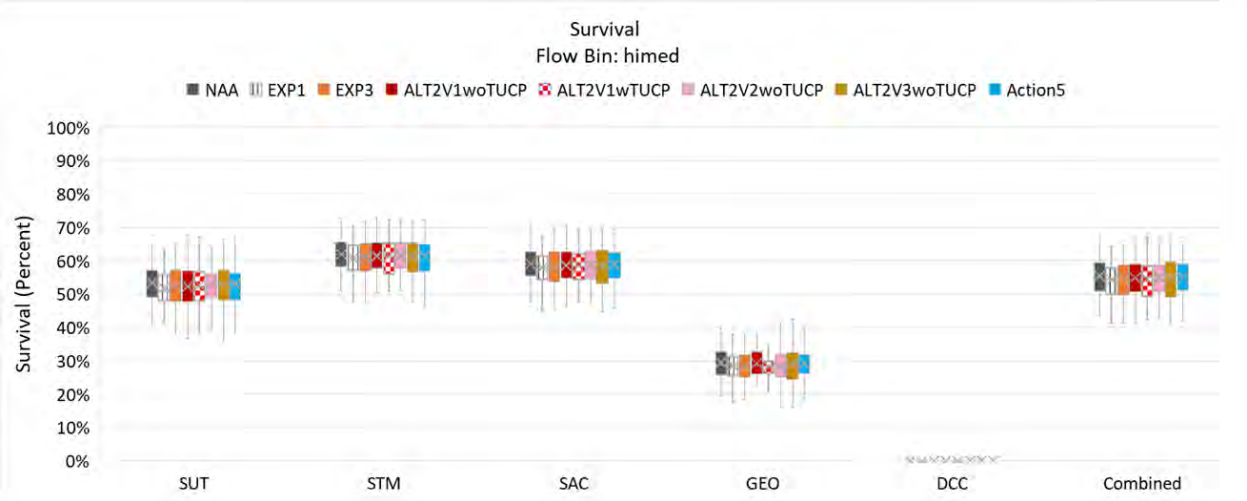



Figure I.7-42. Box and whisker of mean December through March route-specific percent survival by Inflow bin "himed" for NAA, EXP1, EXP3, four phases of Alternative 2 (BA scenarios), and Action 5.

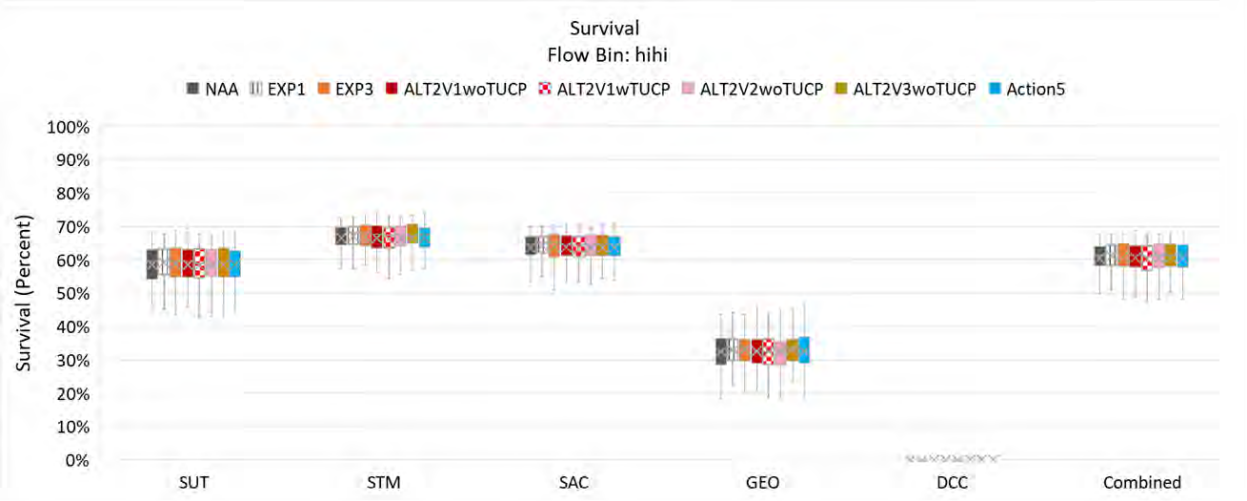



Figure I.7-43. Box and whisker of mean December through March route-specific percent survival by Inflow bin "hihi" for NAA, EXP1, EXP3, four phases of Alternative 2 (BA scenarios), and Action 5.

**EIS**

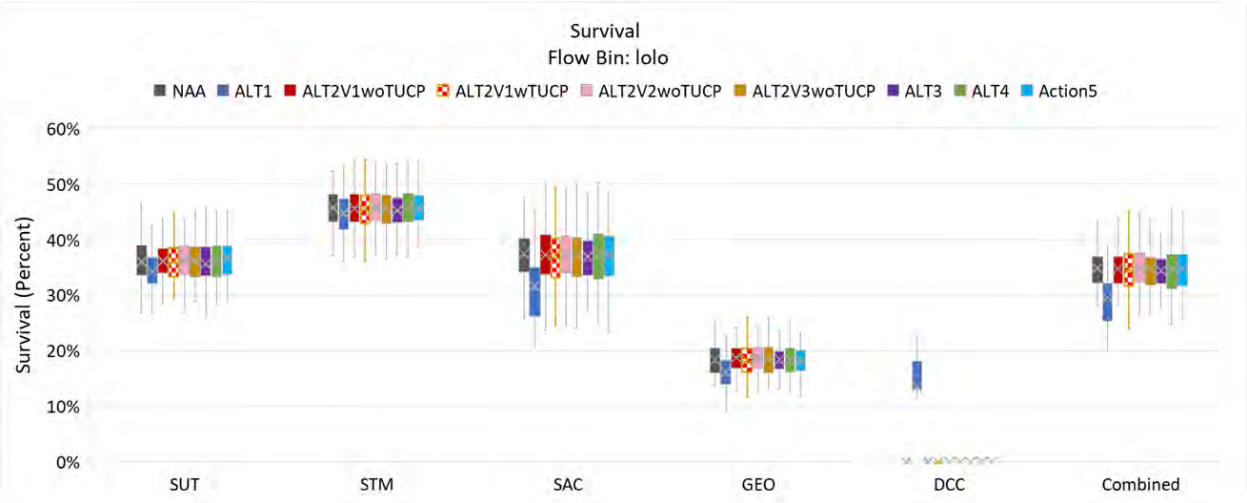



Figure I.7-44. Box and whisker of mean December through March route-specific percent survival by Inflow bin "lolo" for NAA, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4 (EIS scenarios), and Action 5.

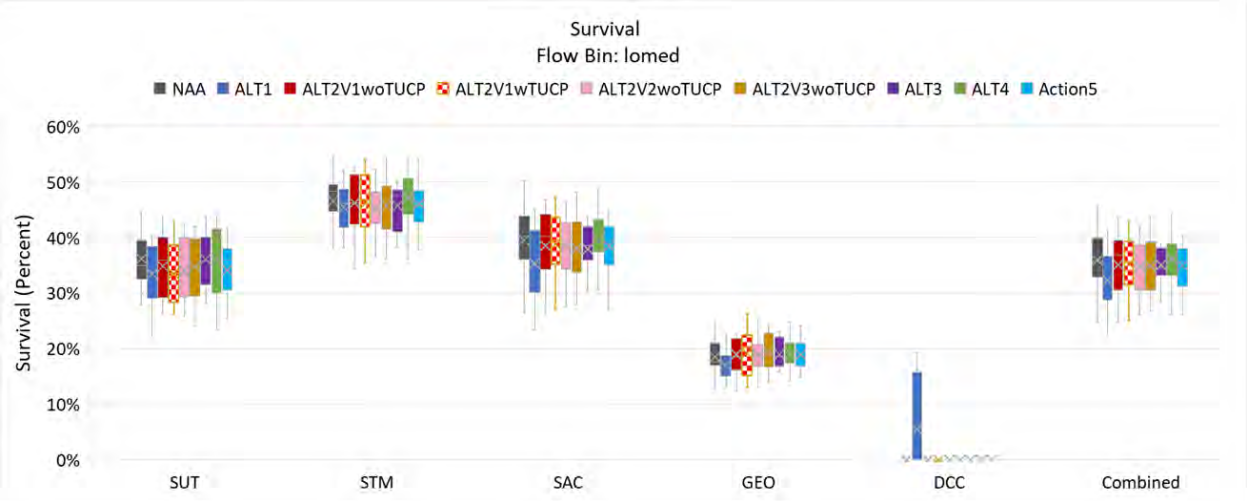



Figure I.7-45. Box and whisker of mean December through March route-specific percent survival by Inflow bin "lomed" for NAA, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4 (EIS scenarios), and Action 5.

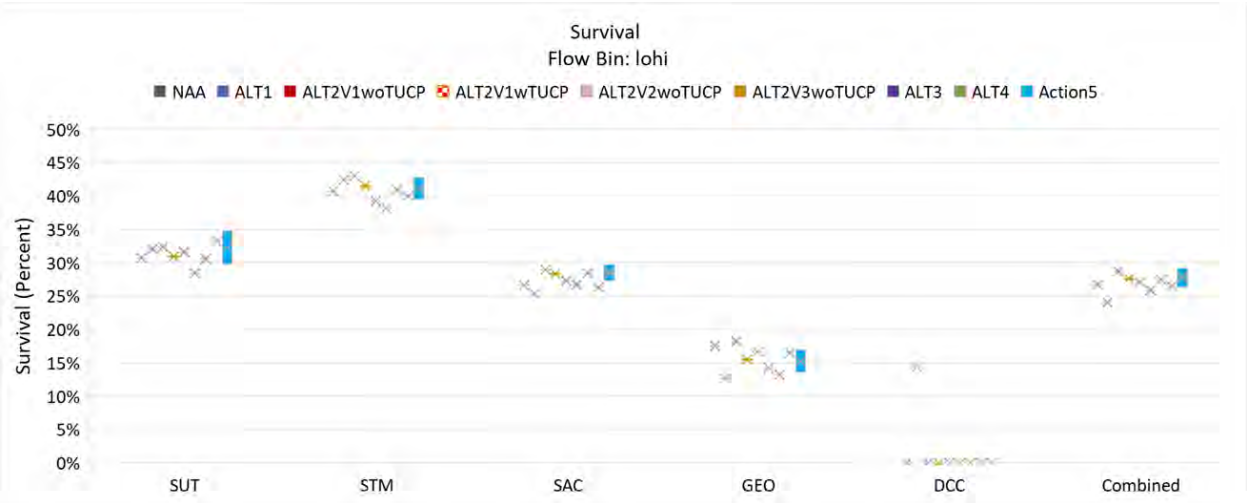



Figure I.7-46. Box and whisker of mean December through March route-specific percent survival by Inflow bin "lohi" for NAA, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4 (EIS scenarios), and Action 5.

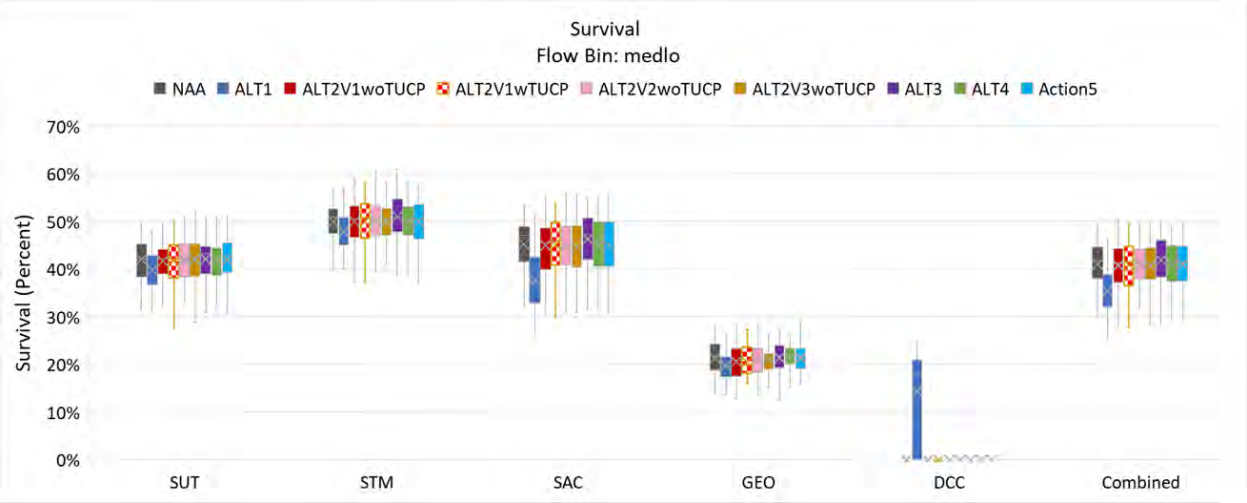



Figure I.7-47. Box and whisker of mean December through March route-specific percent survival by Inflow bin "medlo" for NAA, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4 (EIS scenarios), and Action 5.

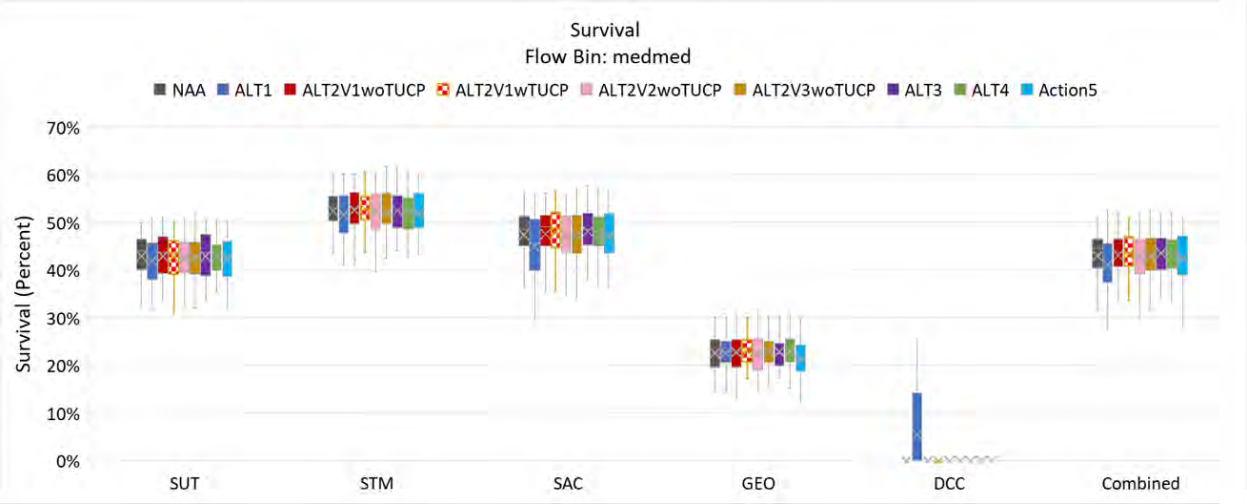



Figure I.7-48. Box and whisker of mean December through March route-specific percent survival by Inflow bin "medmed" for NAA, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4 (EIS scenarios), and Action 5.

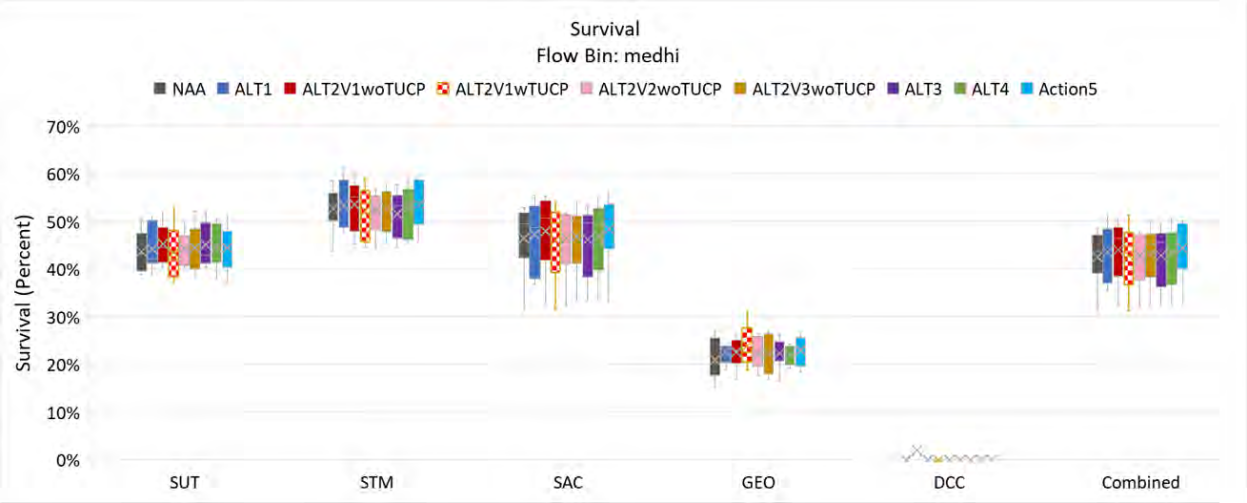



Figure I.7-49. Box and whisker of mean December through March route-specific percent survival by Inflow bin "medhi" for NAA, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4 (EIS scenarios), and Action 5.

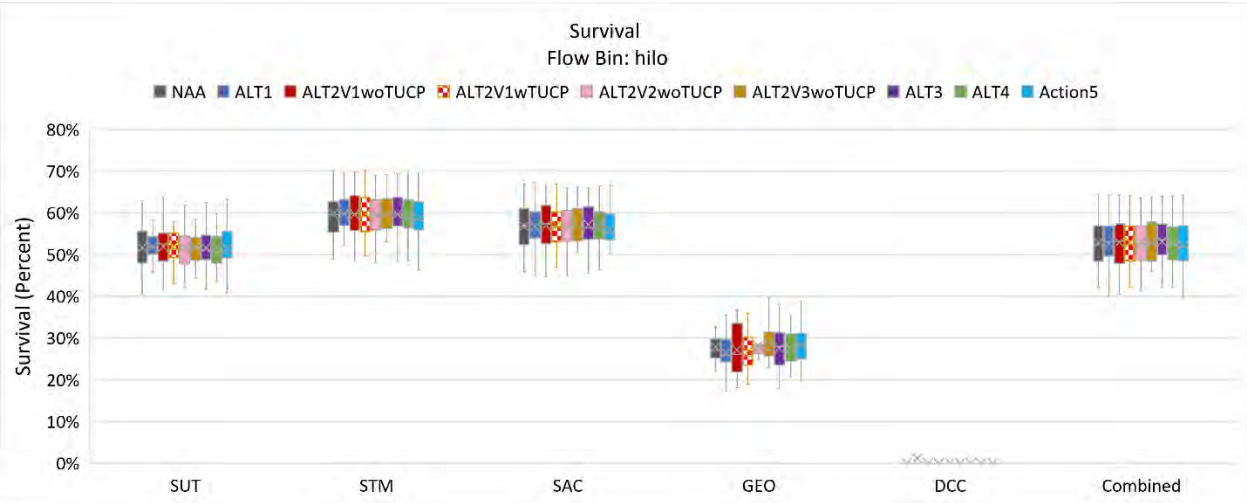



Figure I.7-50. Box and whisker of mean December through March route-specific percent survival by Inflow bin "hilo" for NAA, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4 (EIS scenarios), and Action 5.

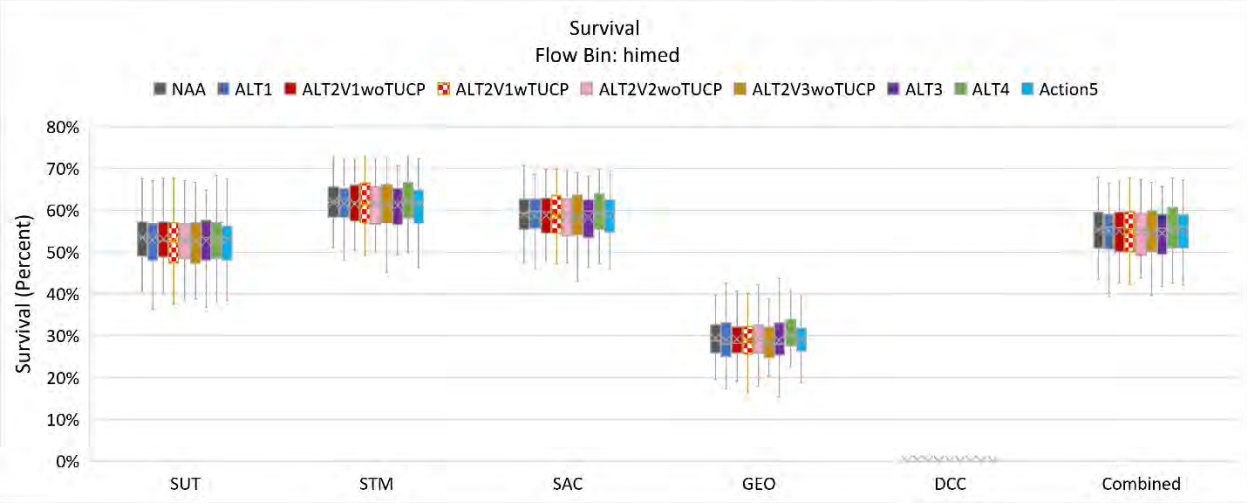



Figure I.7-51. Box and whisker of mean December through March route-specific percent survival by Inflow bin "himed" for NAA, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4 (EIS scenarios), and Action 5.

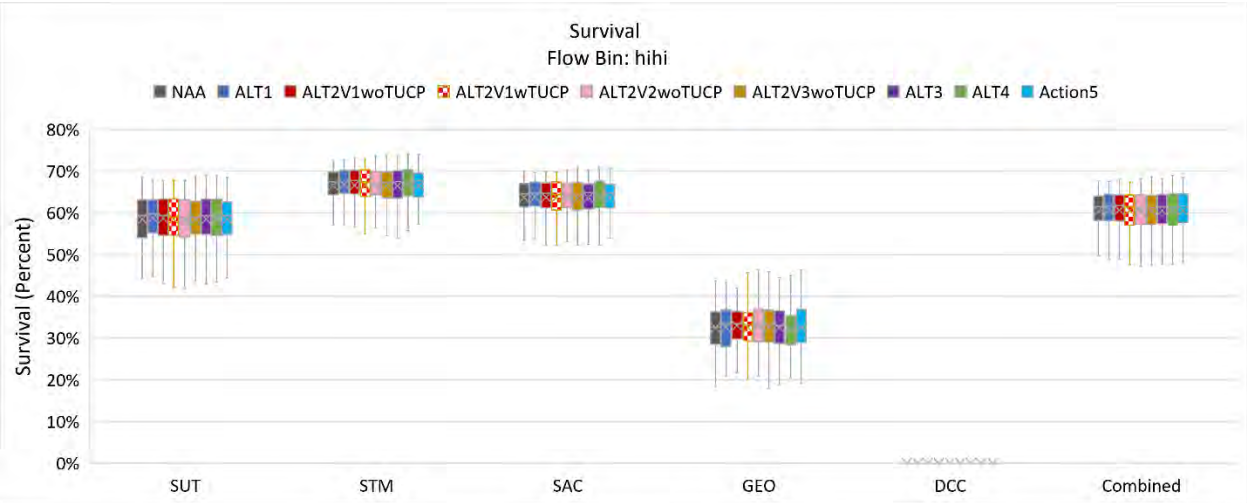



Figure I.7-52. Box and whisker of mean December through March route-specific percent survival by Inflow bin "hihi" for NAA, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4 (EIS scenarios), and Action 5.

## I.7.4 References

Wang, Xiaochun, (2019) Chapter 1, ECO_PTM Model Development, Methodology for Flow and Salinity Estimates in the Sacramento-San Joaquin Delta and Suisun Marsh, 40th Annual Progress Report, California Department of Water Resources.

Appendix I, Old and Middle River Flow Management

# Attachment I.8 Particle Tracking Fate Modeling of Larval Smelt Entrainment

## I.8.1 Delta Particle Tracking Modeling under Varying OMR Conditions

A sensitivity analysis using CalSim 3 and DSM2 Hydro and PTM models was conducted to assess relative risk of species at the export facilities and water supply effects under a set of different OMR limits on Delta operations. The CalSim 3 model simulated operational conditions (flows into the Delta and exports) under a range of OMR and Inflow (from Sacramento River and San Joaquin River) conditions. Using results of these CalSim 3 scenarios, DSM2 Hydro was used to determine Delta flow conditions, and respectively, DSM2 PTM module was used to assess entrainment of particles at export facilities under these varying conditions. DSM2 PTM was run in two modes: one assuming neutrally buoyant and one assuming surface-oriented particles. For each year in the 100-year CalSim 3 simulation period and for each mode, the model was run at 39 particle insertion locations in the Delta. For each month between December and June, each insertion location was started at the beginning of each month and run for 45 days. The resulting 40,000+ simulations provided a wide variety of flow, particle insertion, and particle behavior conditions from which to draw conclusions.

## I.8.2 Methods

### I.8.2.1 DSM2 – PTM

DSM2-PTM simulates pseudo-3D transport of neutrally buoyant particles based on the flow field simulated by HYDRO. The PTM module simulates the transport and fate of individual particles traveling throughout the Delta. The model uses geometry files, velocity, flow, and stage output from the HYDRO module to monitor the location of each individual particle using assumed vertical and lateral velocity profiles and specified random movement to simulate mixing. The location of a particle in a channel is determined as the distance from the downstream end of the channel segment (x), the distance from the centerline of the channel (y), and the distance above the channel bottom (z). PTM has multiple applications ranging from visualization of flow patterns to simulation of discrete organisms such as fish eggs and larvae.

The longitudinal distance traveled by a particle is determined from a combination of the lateral and vertical velocity profiles in each channel. The transverse velocity profile simulates the

effects of channel shear that occurs along the sides of a channel. The result is varying velocities across the width of the channel. The average cross-sectional velocity is multiplied by a factor based on the particle's transverse location in the channel. The model uses a fourth order polynomial to represent the velocity profile. The vertical velocity profile shows that particles located near the bottom of the channel move more slowly than particles located near the surface. The model uses the Von Karman logarithmic profile to create the velocity profile. Particles also move as a result of random mixing. The mixing rates (i.e., distances) are a function of the water depth and the velocity in the channel. Higher velocities and deeper water result in greater mixing.

At a junction, the path of a particle is determined randomly based on the proportion of flow. The proportion of flow determines the probability of movement into each reach. A random number, based on this determined probability, then governs where the particle will go. A particle that moves into an open water area, such as a reservoir, no longer retains its position information. A DSM2 open water area is considered a fully mixed reactor. The path out of the open water area is a decision based on the volume in the open water area, the time step, and the flow out of the area. At the beginning of a time step, the volume of the open water area, the volume of water leaving at each opening of the open water area, is determined. From that, the probability of the particle leaving the open water area is calculated. Particles entering exports or agricultural diversions are considered "lost" from the system. Their final destination is recorded. Once particles pass the Martinez boundary, they have no opportunity to return to the Delta (Smith 1998; Wilbur 2001; Miller 2002).

Particle tracking models (PTM) are excellent tools to visualize and summarize the impacts of modified hydrodynamics in the Delta. These tools can simulate the movement of passive particles or particles with behavior representing either larval or adult fish through the Delta. The PTM tools can provide important information relating hydrodynamic results to the analysis needs of biologists that are essential in assessing the impacts to habitat in the Delta.

### I.8.2.2 DSM2 – PTM Metrics

Fate Mapping is an indicator of entrainment. It is the percent of particles that go past various exit points in the system at the end of a given number of days after insertion.

### I.8.2.3 PTM Particle Behavior

PTM simulations were conducted with passive particles (neutrally buoyant) and surface-oriented particles. Passive particles, representing behavior of larval Delta smelt and larger larval longfin smelt (>10mm in length), are distributed throughout the water column. Surface-oriented particles, representing behavior of yolk-sac and larval longfin smelt <10mm in length, tend towards the top 10% of the water column.

### I.8.2.4 PTM Period Selection

PTM simulation periods for the fate computations were in December through June in all the 100 years of the planning simulation period. The frequency of inflow pairings during December through March was calculated, and this reflects the timing for larval longfin smelt. As such, passive and surface-oriented particle simulations were conducted during this period. The frequency of inflow pairing during March through June was calculated, and this period reflects timing of larval Delta smelt. As such, passive particle simulations were conducted during this period.

### I.8.2.5 PTM Simulations

PTM simulations are performed to derive the metrics described above. The particles are inserted at the 39 locations listed in Table I.8-1. The locations were identified based on the 20-mm Delta Smelt Survey Stations. Figure I.8-1 displays 20-mm Delta Smelt Survey Stations and particle insertion locations.

A total of 39 PTM simulations are performed in a batch mode for each insertion period. For each insertion period, 4,000 particles are inserted at the identified locations over a 24.75-hour period, starting on the 1st of the selected month. The fate of the inserted particles is tracked continuously over a 90-day simulation period. The particle flux is tracked at the key exit locations – exports, Delta agricultural intakes, past Chipps Island, to Suisun Marsh and past Martinez, and at several internal tracking locations. Generally, the fate of particles at the end (45 days after insertion) is computed for the fate mapping analysis.

Table I.8-1. List of Particle Insertion Locations for Residence Time and Fate Computations

| Location | DSM2 Node |
|---|---|
| San Joaquin River at Vernalis | 1 |
| San Joaquin River at Mossdale | 7 |
| San Joaquin River d/s of Rough and Ready Island | 21 |
| San Joaquin River at Buckley Cove | 25 |
| San Joaquin River near Medford Island | 34 |
| San Joaquin River at Potato Slough | 39 |
| San Joaquin River at Twitchell Island | 41 |
| Old River near Victoria Canal | 75 |
| Old River at Railroad Cut | 86 |
| Old River near Quimby Island | 99 |
| Middle River at Victoria Canal | 113 |
| Middle River u/s of Mildred Island | 145 |
| Grant Line Canal | 174 |
| Frank's Tract East | 232 |
| Threemile Slough | 240 |

| Location | DSM2 Node |
|---|---|
| Little Potato Slough | 249 |
| Mokelumne River d/s of Cosumnes confluence | 258 |
| South Fork Mokelumne | 261 |
| Mokelumne River d/s of Georgiana confluence | 272 |
| North Fork Mokelumne | 281 |
| Georgiana Slough | 291 |
| Miner Slough | 307 |
| Sacramento Deep Water Ship Channel | 314 |
| Cache Slough at Shag Slough | 321 |
| Cache Slough at Liberty Island | 323 |
| Lindsey Slough at Barker Slough | 322 |
| Sacramento River at Sacramento | 330 |
| Sacramento River at Sutter Slough | 339 |
| Sacramento River at Ryde | 344 |
| Sacramento River near Cache Slough confluence | 350 |
| Sacramento River at Rio Vista | 351 |
| Sacramento River d/s of Decker Island | 353 |
| Sacramento River at Sherman Lake | 354 |
| Sacramento River at Port Chicago | 359 |
| Montezuma Slough at Head | 418 |
| Montezuma Slough at Suisun Slough | 428 |
| San Joaquin River d/s of Dutch Slough | 461 |
| Sacramento River at Pittsburg | 465 |
| San Joaquin River near Jersey Point | 469 |

### I.8.2.6 Output Parameters

The PTMs can be used to assist in understanding passive fate and transport, or through consideration of behavior or residence time. In general, the following outputs are generated:

- Fate of particles and cut lines or regions.
- Time of travel breakthrough curves.
- Residence time.

For the purposes of this effort, only particle fate outputs were assessed.

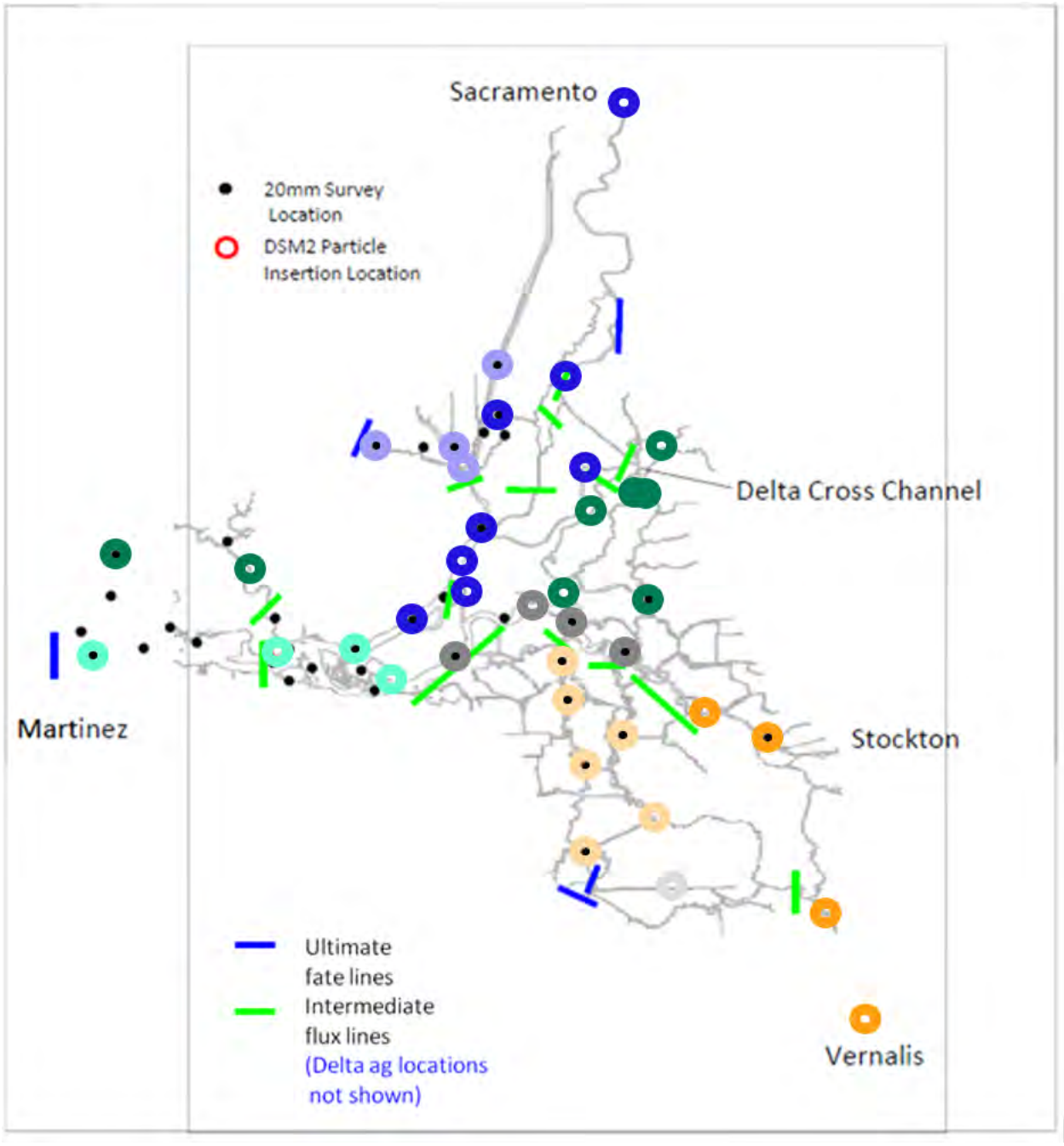



Figure I.8-1. Particle Insertion Locations for Fate Computations, Color-Coded by Yolo (purple), Sacramento River (dark blue), Mokelumne River (green), Central (dark gray), Old and Middle River (OMR) (light orange), San Joaquin River (orange), South Delta (light gray), West Delta (turquoise), and Suisun Marsh Regions (green)

## I.8.3 Assumptions / Uncertainty

PTM modeling results of neutrally buoyant particles serve as a proxy for larval Delta smelt, which can be found distributed throughout the water column and throughout the Delta. PTM results for neutrally buoyant particles representative of larval Delta smelt behavior are aggregated March through June.

PTM modeling results of surface-oriented particles serve as a proxy for smaller larval longfin smelt (<10mm), which tend to be found towards the top 10% of the water column and throughout the Delta. PTM modeling results of neutrally buoyant particles serve as a proxy for larger larval longfin smelt (>10mm), which can be found distributed throughout the water column and throughout the Delta. Those results representative of larval longfin smelt are aggregated December through March.

## I.8.4 BA and EIS Results

NMFS 2019 Biological Opinion criteria for proportion and frequency were applied to identify which injection site regions were highlighted in the narrative discussion. Injection regions and particle fate locations not discussed in the narratives were identified as locations where there was less variability in particle fate across bins.

- Proportion thresholds are as follows: low 0% – 2%, medium 2% - 70%, high 70% - 100%.
- Frequency thresholds are as follows: low 0% - 25%, medium 25% - 75%, high 75% - 100%.

Both types of particles (neutrally buoyant, surface oriented) and both bin types (Inflow, OMR) were assessed.

For each BA modeled scenario (excluding EXP1 and EXP3) and bin, the predicted percent of particles injected at a certain location with a fate at the facilities (reducing OMR and inflow bins) was assessed using this method:

- Remove all fate locations that are not *Entrained at Exports*, which are *West of Chipps*, *Remaining in Delta*, and *Crossed the San Joaquin River to South Delta*.
- Identify which of the fate percentages fall in the medium NMFS proportion category (2% - 70%) across all OMR or inflow bins for modeled scenarios (No Action Alternative, 4 phases of Alternative 2, and Action 5).
- Identify the percentage of those instances (from above) where the medium proportion categories occurred out of the total possible predictions.
- Identify the regions which had a low, medium, and high NMFS frequency category (25% - 75%) for instances of medium proportion category (2% - 70%).

- Use identified regions for narrative discussion including descriptions of those regions that fall inside or outside the above conditions.

As an example, from the method for BA modeled scenarios, neutrally buoyant particles (1 particle type) injected in the *Sacramento River Region* (1 region) binned across Inflow bins (9 groups) and considering a single fate location (*Entrained at Exports*, 1 location) for modeled scenarios (5 scenarios) results in consideration of 45 possible estimates. Thirty-two of the 45 possible values (71%) for particles injected in the Sacramento River Region fall into the medium proportion category (2% - 70%). A 71% frequency of medium proportion falls inside the medium frequency bounds (25% - 75%); thus, the Sacramento River Region injection site was included in the narrative discussion. This suggests that regardless of inflows and OMR considered, a medium proportion of particles always arrive at the facilities from the Sacramento River.

For each EIS modeled scenario and bin, the predicted percent of particles injected at a certain location with a fate at the facilities (reducing OMR or inflow bins) was assessed using this method:

- Remove all fate locations that are not *Entrained at Exports*, which are *West of Chipps*, *Remaining in Delta*, and *Crossed the San Joaquin River to South Delta*.
- Identify which of the fate percentages fall in the medium NMFS proportion category (2% - 70%) reducing OMR and inflow bins, and modeled scenarios.
- Identify the percentage of those instances (from above) where the medium proportion categories occurred out of the total possible predictions.
- Identify the regions which had a low, medium, and high NMFS frequency category (25% - 75%) for instances of medium proportion category (2% - 70%).
- Use identified regions for narrative discussion including descriptions of those regions that fall inside or outside the above conditions.

As an example, from the method for EIS modeled scenarios, neutrally buoyant particles (1 particle type) injected in the *Sacramento River Region* (1 region) binned across Inflow bins (9 groups) and considering a single fate location (*Entrained at Exports*, 1 location) for modeled scenarios (8 scenarios) results in consideration of 72 possible estimates. Fifty of the 72 possible values (69%) for particles injected in the Sacramento River Region fall into the medium proportion category (2% - 70%). A 69% frequency of medium proportion falls inside the medium frequency bounds (25% - 75%); thus, the Sacramento River Region injection site was included in the narrative discussion. This suggests that regardless of inflows and OMR considered, a medium proportion of particles always arrive at the facilities from the Sacramento River.

All model results are provided in the tables and figures below.

The following regions were identified for discussion in the Biological Assessment (BA) narratives:

- For neutrally buoyant particles grouped by Inflow bins
    - 3 out of the 9 injection regions are representative of medium frequency of medium proportion in the Bay Delta: *Sacramento River Region*, *San Joaquin River Region*, and *Yolo Bypass Region*.
    - 4 out of the 9 injection regions are representative of low frequency of medium proportion in the Bay Delta: *Old and Middle River Region*, *Western Delta Region*, *Southern Delta Region*, and *Suisun Bay Region*
    - 2 out of the 9 injection regions are representative of high frequency of medium proportion in the Bay Delta: *Central Delta Region* and *Mokelumne River Region*
    - 3 medium injection regions are discussed in the narrative below. The impacts of regions with either low or high, representing fate with a low effect (< 2%, impacts of export facilities consistently low) or high effect (> 70%, impacts of export facilities consistently high) respectively, were not included in narratives.
- For surface-oriented particles grouped by Inflow bins
    - 3 out of the 9 injection regions are representative of medium frequency of medium proportion in the Bay Delta: *Sacramento River Region*, *Western Delta Region*, and *Yolo Bypass Region*.
    - 4 out of the 9 injection regions are representative of low frequency of medium proportion in the Bay Delta: *San Joaquin River Region*, *Old and Middle River Region*, *Southern Delta Region*, *Suisun Bay Region*
    - 2 out of the 9 injection regions are representative of high frequency of medium proportion in the Bay Delta: *Central Delta Region* and *Mokelumne River Region*
    - 3 medium injection regions are discussed in the narrative below. The impacts of regions with either low or high, representing fate with a low effect (< 2%, impacts of export facilities consistently low) or high effect (> 70%, impacts of export facilities consistently high) respectively, were not included in narratives.
- For neutrally buoyant particles grouped by OMR bins
    - 4 out of the 9 injection regions is representative of medium frequency of medium proportion in the Bay Delta: *San Joaquin River Region*, *Central Delta Region*, *Mokelumne River Region*, and *Sacramento River Region*
    - 5 out of the 9 injection regions are representative of low frequency of medium proportion in the Bay Delta: *Yolo Bypass*, *Old and Middle River Region*, *Southern Delta Region*, *Suisun Bay Region*, and *Western Delta Region*
    - None of the 9 injection regions are representative of high frequency of medium proportion in the Bay Delta.
    - 4 medium injection regions are discussed in the narrative below. The impacts of regions with either low or high, representing fate with a low effect (< 2%, impacts of

export facilities consistently low) or high effect (> 70%, impacts of export facilities consistently high) respectively, were not included in narratives.

- For surface-oriented particles grouped by OMR bins
    - 3 out of the 9 injection regions are representative of medium frequency of medium proportion in the Bay Delta: *Central Delta Region*, *Mokelumne River Region*, and *Yolo Bypass Region*
    - 5 out of the 9 injection regions are representative of low frequency of medium proportion in the Bay Delta: *Western Delta Region*, *Suisun Bay Region*, *Southern Delta Region*, *San Joaquin River Region*, and *Old and Middle River Region*
    - 1 out of the 9 injection regions is representative of high frequency of medium proportion in the Bay Delta: *Sacramento River*
    - 3 medium injection regions are discussed in the narrative below. The impacts of regions with either low or high, representing fate with a low effect (< 2%, impacts of export facilities consistently low) or high effect (> 70%, impacts of export facilities consistently high) respectively, were not included in narratives.

The following regions were identified for discussion in the Environmental Impact Statement (EIS) narratives:

- For neutrally buoyant particles grouped by Inflow bins
    - 3 out of the 9 injection regions are representative of medium frequency of medium proportion in the Bay Delta: *Sacramento River Region*, *San Joaquin River Region*, and *Yolo Bypass Region*.
    - 4 out of the 9 injection regions are representative of low frequency of medium proportion in the Bay Delta: *Western Delta Region*, *Suisun Bay Region*, *Old and Middle River Region*, and *Southern Delta Region*
    - 2 out of the 9 injection regions are representative of high frequency of medium proportion in the Bay Delta: *Central Delta Region* and *Mokelumne River Region*
    - 3 medium injection regions are discussed in the narrative below. The impacts of regions with either low or high, representing fate with a low effect (< 2%, impacts of export facilities consistently low) or high effect (> 70%, impacts of export facilities consistently high) respectively, were not included in narratives.
- For surface-oriented particles grouped by Inflow bins
    - 2 out of the 9 injection regions are representative of medium frequency of medium proportion in the Bay Delta: *Western Delta Region* and *Yolo Bypass Region*.
    - 4 out of the 9 injection regions are representative of low frequency of medium proportion in the Bay Delta: *Old and Middle River Region*, *San Joaquin River Region*, *Southern Delta Region*, and *Suisun Bay Region*

    - 3 out of the 9 injection regions are representative of high frequency of medium proportion in the Bay Delta: *Central Delta Region*, *Mokelumne River Region*, and *Sacramento River Region*
    - 2 medium injection regions are discussed in the narrative below. The impacts of regions with either low or high, representing fate with a low effect (< 2%, impacts of export facilities consistently low) or high effect (> 70%, impacts of export facilities consistently high) respectively, were not included in narratives.
- For neutrally buoyant particles grouped by OMR bins
    - 1 out of the 9 injection regions is representative of medium frequency of medium proportion in the Bay Delta: *San Joaquin River Region*.
    - 5 out of the 9 injection regions are representative of low frequency of medium proportion in the Bay Delta: *Old and Middle River Region*, *Southern Delta Region*, *Suisun Bay Region*, *Western Delta Region*, and *Yolo Bypass Region*
    - 3 out of the 9 injection regions are representative of high frequency of medium proportion in the Bay Delta: *Central Delta Region*, *Mokelumne River Region*, and *Sacramento River Region*
    - 1 medium injection region is discussed in the narrative below. The impacts of regions with either a low or high proportion, representing fate with a low effect (< 2%, impacts of export facilities consistently low) or high effect (> 70%, impacts of export facilities consistently high) respectively, were not included in narratives.
- For surface-oriented particles grouped by OMR bins
    - 1 out of the 9 injection regions is representative of medium frequency of medium proportion in the Bay Delta: *Western Delta Region*.
    - 4 out of the 9 injection regions are representative of low frequency of medium proportion in the Bay Delta: *Old and Middle River Region*, *San Joaquin River Region*, *Southern Delta Region*, and *Suisun Bay Region*
    - 4 out of the 9 injection regions are representative of high frequency of medium proportion in the Bay Delta: *Central Delta Region*, *Mokelumne River Region*, *Sacramento River Region*, and *Yolo Bypass Region*
    - 1 medium injection region is discussed in the narrative below. The impacts of regions with either a low or high proportion, representing fate with a low effect (< 2%, impacts of export facilities consistently low) or high effect (> 70%, impacts of export facilities consistently high) respectively, were not included in narratives.

### I.8.4.1 Narrative: BA

#### *I.8.4.1.1 Neutrally Buoyant, Inflow Bins: Table I.8-2 through Table I.8-10 (BA) || Figure I.8-1 through Figure I.8-10*

Neutrally buoyant particle percent of particle fate is an average over the months of March through June. Three regions were selected out of the 9 injection regions for neutrally buoyant particles grouped by Inflow bins as representative of medium frequency of a medium proportion in the Bay Delta: *Sacramento River Region*, *San Joaquin River Region*, and *Yolo Bypass Region*.

- **Injection Point:** *Sacramento River Region*; **Particle Fate:** *Entrained at Exports*
    - For the Inflow bins with high Sacramento River influence ("hihi", "himed", and "hilo"), mean particle percentage ranged from 0% (No Action Alternative, all four phases of Alternative 2, and Action 5 under Inflow bin "hihi") to 3% (No Action Alternative under Inflow bin "hilo").
    - For the Inflow bins with medium Sacramento River influence ("medhi", "medmed", and "medlo"), mean particle percentage ranged from 2% (No Action Alternative, all four phases of Alternative 2, and Action 5 under Inflow bin "medhi") to 16% (No Action Alternative under Inflow bin "medlo").
    - For the Inflow bins with low Sacramento River influence ("lohi", "lomed", and "lolo"), mean particle percentage ranged from 4% (No Action Alternative under Inflow bin "lohi") to 9% (Alternative 2 without TUCP Delta VA and without TUCP All VA under Inflow bin "lolo").
- **Injection Point:** *San Joaquin River Region*; **Particle Fate:** *Entrained at Exports*
    - For the Inflow bins with high Sacramento River influence ("hihi", "himed", and "hilo"), mean particle percentage ranged from 45% (No Action Alternative and Alternative 2 without TUCP Delta VA under Inflow bin "hihi") to 90% (Alternative 2 with TUCP without VA and without TUCP without VA under Inflow bin "hilo").
    - For the Inflow bins with medium Sacramento River influence ("medhi", "medmed", and "medlo"), mean particle percentage ranged from 53% (No Action Alternative under Inflow bin "medhi") to 86% (No Action Alternative under Inflow bin "medlo").
    - For the Inflow bins with low Sacramento River influence ("lohi", "lomed", and "lolo"), mean particle percentage ranged from 61% (No Action Alternative under Inflow bin "lolo") to 71% (Alternative 2 with TUCP without VA under Inflow bin "lohi" and Alternative 2 without TUCP without VA under Inflow bin "lomed").
- **Injection Point:** *Yolo Bypass Region*; **Particle Fate:** *Entrained at Exports*
    - For the Inflow bins with high Sacramento River influence ("hihi", "himed", and "hilo"), mean particle percentage ranged from 0% (No Action Alternative, all phases of Alternative 2, and Action 5 under Inflow bin "hihi" and "himed", Alternative 2 with TUCP without VA and without TUCP without VA under Inflow bin "hilo") to 1% (No Action Alternative under Inflow bin "hilo").

- For the Inflow bins with medium Sacramento River influence ("medhi", "medmed", and "medlo"), mean particle percentage ranged from 1% (No Action Alternative, all phases of Alternative 2, and Action 5 under Inflow bin "medhi", Alternative 2 with TUCP without VA, Alternative 2 without TUCP without VA, Alternative 2 without TUCP All VA, and Action 5 under Inflow bin "medmed") to 6% (No Action Alternative under Inflow bin "medlo").
- For the Inflow bins with low Sacramento River influence ("lohi", "lomed", and "lolo"), mean particle percentage ranged from 2% (No Action Alternative, all phases of Alternative 2, and Action 5 under Inflow bin "lohi"; Alternative 2 with TUCP without VA, without TUCP without VA, and without TUCP Delta VA and Action 5 under Inflow bin "lomed"; No Action Alternative, Alternative 2 with TUCP without VA and without TUCP without VA under Inflow bin "lolo") to 4% (Alternative 2 with TUCP All VA under Inflow bin "lolo").

There are several injection regions for neutrally buoyant particles grouped by Inflow bins which technically are classified as low frequency of a medium proportion. However, these regions fall into this classification bin because there are no instances of a medium proportion. Regions that fall into this category are *Southern Delta Region* and *Suisun Bay Region*. *Southern Delta Region* and *Suisun Bay Region* show a high frequency of a high proportion and a high frequency of low proportion, respectively, of particle entrainment at the facilities. Particles injected in the *Southern Delta Region* are highly likely to become entrained at facilities while those injected in *Suisun Bay Region* are highly unlikely to become entrained at facilities.

#### *I.8.4.1.2 Surface Oriented, Inflow Bins: Table I.8-11 through Table I.8-19 (BA) || Figure I.8-20 through Figure I.8-28*

Surface-oriented particle percent of particle fate is an average over the months of December through March. Three regions were selected out of 9 injection regions for surface-oriented particles grouped by Inflow bins as representative of medium frequency of a medium proportion in the Bay Delta: *Sacramento River Region*, *Western Delta Region*, and *Yolo Bypass Region*.

- **Injection Point:** *Sacramento River Region*; **Particle Fate:** *Entrained at Exports*
  - For the Inflow bins with high Sacramento River influence ("hihi", "himed", and "hilo"), mean particle percentage ranged from 1% (No Action Alternative, all phases of Alternative 2, and Action 5 under Inflow bin "hihi") to 6% (Action 5 under Inflow bin "hilo").
  - For the Inflow bins with medium Sacramento River influence ("medhi", "medmed", and "medlo"), mean particle percentage ranged from 3% (No Action Alternative and Alternative 2 without TUCP Delta VA and without TUCP All VA under Inflow bin "medhi") to 15% (No Action Alternative and Action 5 under Inflow bin "medlo").
  - For the Inflow bins with low Sacramento River influence ("lohi", "lomed", and "lolo"), mean particle percentage ranged from 7% (Alternative 2 without TUCP Delta VA and without TUCP All VA under Inflow bin "lomed") to 16% (No Action Alternative under Inflow bin "lohi").

- **Injection Point:** *Western Delta Region*; **Particle Fate:** *Entrained at Exports*
    - For the Inflow bins with high Sacramento River influence ("hihi", "himed", and "hilo"), mean particle percentage ranged from 0% (No Action Alternative, all phases of Alternative 2, and Action 5 under Inflow bin "hihi" and "himed"; No Action Alternative, Alternative 2 with TUCP without VA, Alternative 2 without TUCP without VA, and Alternative 2 without TUCP Delta VA under Inflow bin "hilo") to 1% (Alternative 2 without TUCP All VA and Action 5 under Inflow bin "hilo").
    - For the Inflow bins with medium Sacramento River influence ("medhi", "medmed", and "medlo"), mean particle percentage ranged from 0% (No Action Alternative, all phases of Alternative 2, and Action 5 under Inflow bin "medhi") to 4% (No Action Alternative, all phases of Alternative 2, and Action 5 under Inflow bin "medlo").
    - For the Inflow bins with low Sacramento River influence ("lohi", "lomed", and "lolo"), mean particle percentage ranged from 1% (Alternative 2 without TUCP Delta VA and without TUCP All VA under Inflow bin "lomed") to 4% (No Action Alternative, all phases of Alternative 2, and Action 5 under Inflow bin "lolo"; No Action Alternative, Alternative 2 without TUCP Delta VA, Alternative 2 without TUCP All VA under Inflow bin "lohi").
- **Injection Point:** *Yolo Bypass Region*; **Particle Fate:** *Entrained at Exports*
    - For the Inflow bins with high Sacramento River influence ("hihi", "himed", and "hilo"), mean particle percentage ranged from 0% (No Action Alternative, all phases of Alternative 2, and Action 5 under Inflow bin "hihi") to 2% (Alternative 2 without TUCP without VA and without TUCP Delta VA and Action 5 under Inflow bin "hilo").
    - For the Inflow bins with medium Sacramento River influence ("medhi", "medmed", and "medlo"), mean particle percentage ranged from 1% (No Action Alternative, all phases of Alternative 2, and Action 5 under Inflow bin "medhi") to 7% (Action 5 under Inflow bin "medlo").
    - For the Inflow bins with low Sacramento River influence ("lohi", "lomed", and "lolo"), mean particle percentage ranged from 3% (Alternative 2 without TUCP Delta VA and without TUCP All VA and Action 5 under Inflow bin "lomed" and Action 5 under Inflow bin "lohi") to 8% (No Action Alternative under Inflow bin "lohi").

There are several injection regions for surface-oriented particles grouped by Inflow bins which technically are classified as low frequency of a medium proportion. However, these regions fall into this classification bin because there are no instances of a medium proportion. Regions that fall into this category are *Old and Middle River Region*, *Southern Delta Region*, and *Suisun Bay Region*. *Old and Middle River Region,* and *Southern Delta Region* show a high frequency of a high proportion of particle entrainment at the facilities. Suisun Bay Region shows a high frequency of a low proportion of particle entrainment at the facilities. Particles injected in the *Old and Middle River Region* and *Southern Delta Region* are highly likely to become entrained at facilities while those injected in *Suisun Bay Region* are highly unlikely to become entrained at facilities.

#### *I.8.4.1.3 Neutrally Buoyant, OMR Bins: Table I.8-20 through Table I.8-28 (BA) || Figure I.8-11 through Figure I.8-19*

Neutrally buoyant particle percent of particle fate is an average over the months of March through June. Four regions were selected out of the 9 injection regions for neutrally buoyant particles grouped by OMR bins as representative of medium frequency of a medium proportion in the Bay Delta: *San Joaquin River Region*, *Central Delta Region*, *Mokelumne River Region*, and *Sacramento River Region*. The most negative OMR bin (-5,500) resulted in "NA" for all regions, fate locations, and alternatives.

- **Injection Point:** *San Joaquin River Region*; **Particle Fate:** *Entrained at Exports*
    - For the least negative OMR bin (-2,000), mean particle percentage ranged from 56% (Alternative 2 with TUCP without VA and Action 5) to 59% (No Action Alternative). For OMR bin -3,500, mean particle percentage ranged from 69% (No Action Alternative and Alternative 2 without TUCP Delta VA) to 72% (Alternative 2 with TUCP without VA and without TUCP without VA). For OMR bin -5,000, mean particle percentage ranged from 76% (Alternative 2 without TUCP without VA) to 88% (No Action Alternative).
- **Injection Point:** *Central Delta Region*; **Particle Fate:** *Entrained at Exports*
    - For the least negative OMR bin (-2,000), mean particle percentage ranged from 13% (Action 5) to 15% (No Action Alternative and Alternative 2 without TUCP without VA). For OMR bin -3,500, mean particle percentage ranged from 19% (No Action Alternative) to 22% (Alternative 2 with TUCP without VA, Alternative 2 without TUCP All VA, and Action 5). For OMR bin -5,000, mean particle percentage ranged from 23% (Alternative 2 without TUCP without VA and with TUCP without VA) to 44% (No Action Alternative).
- **Injection Point:** *Mokelumne River Region*; **Particle Fate:** *Entrained at Exports*
    - For the least negative OMR bin (-2,000), mean particle percentage ranged from 13% (Alternative 2 with TUCP without VA) to 16% (No Action Alternative). For OMR bin -3,500, mean particle percentage ranged from 24% (No Action Alternative) to 28% (Alternative 2 without TUCP All VA). For OMR bin -5,000, mean particle percentage ranged from 34% (Alternative 2 with TUCP without VA and without TUCP without VA) to 59% (No Action Alternative).
- **Injection Point:** *Sacramento River Region*; **Particle Fate:** *Entrained at Exports*
    - For the least negative OMR bin (-2,000), mean particle percentage ranged from 2% (Action 5) to 3% (No Action Alternative and all four phases of Alternative 2). For OMR bin -3,500, mean particle percentage ranged from 3% (No Action Alternative, Alternative 2 with TUCP without VA and without TUCP without VA) to 4% (Alternative 2 without TUCP Delta VA and without TUCP All VA and Action 5). For OMR bin -5,000, mean particle percentage ranged from 5% (Alternative 2 with TUCP without VA and without TUCP without VA) to 14% (No Action Alternative).

There are several injection regions for neutrally buoyant particles grouped by OMR bins which technically are classified as low frequency of a medium proportion. However, these regions fall into this classification bin because there are no instances of a medium proportion. Regions that fall into this category are *Old and Middle River Region*, *Southern Delta Region*, *Western Delta Region*, and *Suisun Bay Region*. *Old and Middle River Region* and *Southern Delta Region* show a medium frequency of a high proportion of particle entrainment at the facilities. *Western Delta Region* and *Suisun Bay Region* show a medium frequency of a low proportion of particle entrainment at the facilities. Particles injected in the *Old and Middle River Region* and *Southern Delta Region* are somewhat likely to become entrained at facilities while those injected in *Western Delta Region* and *Suisun Bay Region* are somewhat unlikely to become entrained at facilities.

#### *I.8.4.1.4 Surface Oriented, OMR Bins: Table I.829 through Table I.8-37 (BA) || Figure I.8-29 through Figure I.8-37*

Surface-oriented particle percent of particle fate is an average over the months of December through March. Three regions were selected out of the 9 injection regions for surface-oriented particles grouped by OMR bins as representative of medium frequency of a medium proportion in the Bay Delta: *Central Delta Region*, *Mokelumne River Region*, and *Yolo Bypass Region*.

- **Injection Point:** *Central Delta Region*; **Particle Fate:** *Entrained at Exports*
    - For the least negative OMR bin (-2,000), mean particle percentage ranged from 15% (Alternative 2 without TUCP Delta VA) to 26% (Alternative 2 with TUCP without VA). For OMR bin -3,500, mean particle percentage ranged from 28% (No Action Alternative) to 35% (Action 5). For OMR bin -5,000, mean particle percentage ranged from 36% (Action 5) to 42% (No Action Alternative). For the most negative OMR bin (-5,500), mean particle percentage ranged from 78% (Action 5) to 81% (No Action Alternative).
- **Injection Point:** *Mokelumne River Region*; **Particle Fate:** *Entrained at Exports*
    - For the least negative OMR bin (-2,000), mean particle percentage ranged from 16% (Alternative 2 without TUCP Delta VA) to 27% (Alternative 2 without TUCP without VA). For OMR bin -3,500, mean particle percentage ranged from 34% (No Action Alternative) to 43% (Action 5). For OMR bin -5,000, mean particle percentage ranged from 47% (Action 5) to 53% (No Action Alternative). For the most negative OMR bin (-5,500), mean particle percentage ranged from 77% (Action 5) to 79% (Alternative 2 without TUCP Delta VA).

- **Injection Point:** *Yolo Bypass Region*; **Particle Fate:** *Entrained at Exports*
    - For the least negative OMR bin (-2,000), mean particle percentage ranged from 1% (Alternative 2 without TUCP Delta VA and without TUCP All VA) to 3% (No Action Alternative, Alternative 2 with TUCP without VA, Alternative 2 without TUCP without VA). For OMR bin -3,500, mean particle percentage ranged from 2% (No Action Alternative and all four phases of Alternative 2) to 3% (Action 5). For OMR bin -5,000, mean particle percentage ranged from 2% (Action 5) to 3% (No Action Alternative and all four phases of Alternative 2). For the most negative OMR bin (-5,500), mean particle percentage ranged from 15% (Action 5) to 16% (No Action Alternative and all four phases of Alternative 2).

There are several injection regions for surface-oriented particles grouped by OMR bins which technically are classified as low frequency of a medium proportion. However, these regions fall into this classification bin because there are no instances of a medium proportion. Regions that fall into this category are *Old and Middle River Region*, *Southern Delta Region*, and *Suisun Bay Region*. *Old and Middle River Region* and *Southern Delta Region* show a high frequency of a high proportion of particle entrainment at the facilities. *Suisun Bay Region* shows a high frequency of a low proportion particle entrainment at the facilities. Particles injected in the *Old and Middle River Region* and *Southern Delta Region* are highly likely to become entrained at facilities while those injected in *Suisun Bay Region* are highly unlikely to become entrained at facilities.

### I.8.4.2 Narrative: EIS

#### *I.8.4.2.1 Neutrally Buoyant, Inflow Bins, March through June: Neutrally Buoyant Inflow Bins, March through June [EIS, Table I.8-38 through Table I.8-46]*

Three injection regions were selected for neutrally buoyant particles grouped by Inflow bins as representative of medium frequency of a medium proportion in the Bay Delta: the *Sacramento River Region*, *San Joaquin River Region*, and *Yolo Bypass Region*. The following narrative is percent of particles injected in the *Sacramento River Region*, *San Joaquin River Region*, and *Yolo Bypass Region* with a fate at *Entrained at Exports*.

- **Injection region:** *Sacramento River Region*
    - Under high Sacramento inflow bins (“hihi, “himed”, and “hilo”), mean particle percentage ranged from 406% greater (Alternative 1 under inflow bin “himed”, 8%) to 52% less (Alternative 3 under inflow bin “hihi”, 0%) compared to the No Action Alternative.
    - Under medium Sacramento inflow bins (“medhi”, “medmed”, “medlo”), mean particle percentage ranged from 160% greater (Alternative 1 under inflow bin “medhi”, 3%) to 87% less (Alternative 3 under inflow bin “medmed”, 1%) compared to the No Action Alternative.
    - Under low Sacramento inflow bins (“lohi”, “lomed”, “lolo”), mean particle percentage ranged from 45% greater (Alternative 2 without TUCP All VA under

inflow bin “lolo”, 8%) to 80% less (Alternative 3 under inflow bin “lomed”, 1%) compared to the No Action Alternative.

- **Injection region:** *San Joaquin River Region*
    - Under high Sacramento inflow bins (“hihi, “himed”, and “hilo”), mean particle percentage ranged from 22% greater (Alternative 1 under inflow bin “hihi”, 55%) to 51% less (Alternative 3 under inflow bin “hihi”, 22%) compared with the No Action Alternative.
    - Under medium Sacramento inflow bins (“medhi”, “medmed”, “medlo”), mean particle percentage ranged from 40% greater (Alternative 1 under inflow bin “medhi”, 73%) to 59% less (Alternative 3 under inflow bin “medhi”, 21%) compared with the No Action Alternative.
    - Under low Sacramento inflow bins (“lohi”, “lomed”, “lolo”), mean particle percentage ranged from 14% greater (Alternative 2 with TUCP without VA and Alternative 4 under Inflow bin “lohi”, 71%) to 44% less (Alternative 3 under Inflow bin “lomed”, 38%) compared with the No Action Alternative.
- **Injection region:** *Yolo Bypass Region*
    - Under high Sacramento inflow bins (“hihi, “himed”, and “hilo”), mean particle percentage ranged from 784% greater (Alternative 1 under inflow bin “himed”, 2%) to 52% less (Alternative 3 under inflow bin“"hihi”, 0%) compared to the No Action Alternative. Note that a 784% increase and 52% decrease reflect a percent different calculation.
    - Under medium Sacramento inflow bins (“medhi”, “medmed”, “medlo”), mean particle percentage ranged from 166% greater (Alternative 1 under inflow bin “medhi”, 1%) to 94% less (Alternative 3 under inflow bin “medhi”, 0%) compared to the No Action Alternative.
    - Under low Sacramento inflow bins (“lohi”, “lomed”, “lolo”), mean particle percentage ranged from 50% greater (Alternative 2 without TUCP All VA under inflow bin “lolo”, 3%) to 87% less (Alternative 3 under inflow bin “lomed”, 0%) compared to the No Action Alternative.

#### *I.8.4.2.2 Surface Oriented, Inflow Bins, December through March: Table I.8-47 through Table I.8-55 (EIS) || Figure I.8-56 through Figure I.8-64*

Two injection regions were selected for surface-oriented particles grouped by inflow bins as representative of medium frequency of a medium proportion in the Bay Delta: the *Western Delta Region* and *Yolo Bypass Region*. The following narrative details percent of particles injected in the *Western Delta Region* and *Yolo Bypass Region* with a fate at Entrained at Exports.

- **Injection region:** *Western Delta Region*
    - Under high Sacramento inflow bins (“hihi, “himed”, and “hilo”), mean particle percentage ranged from 2262% greater (Alternative 1 under Inflow bin “hihi”, 0%) to 64% less (Alternative 3 under Inflow bin “hihi”, 0%) compared to the No Action

Alternative. Note that a 2262% increase and 64% decrease reflect a percent difference calculation.

- Under medium Sacramento inflow bins ("medhi", "medmed", "medlo"), mean particle percentage ranged from 211% greater (Alternative 1 under Inflow bin "medhi", 1%) to 98% less (Alternative 3 under Inflow bin "medhi", 0%) compared to the No Action Alternative. Note that a 211% increase and 98% decrease reflect a percent difference calculation.

- Under low Sacramento inflow bins ("lohi", "lomed", "lolo"), mean particle percentage ranged from 31% greater (Alternative 1 under Inflow bin "lomed", 3%) to 93% less (Alternative 3 under inflow bin "lohi", 0%) compared to the No Action Alternative.

- **Injection region:** *Yolo Bypass Region*

  - Under high Sacramento inflow bins ("hihi, "himed", and "hilo"), mean particle percentage ranged from 517% (Alternative 1 under inflow bin "himed", 4%) to 40% less (Alternative 3 under inflow bin "hilo", 1%) compared to the No Action Alternative.

  - Under medium Sacramento inflow bins ("medhi", "medmed", "medlo"), mean particle percentage ranged from 131% greater (Alternative 1 under Inflow bin "medmed", 8%) to 96% less (Alternative 3 under inflow bin "medhi", 0%) compared to the No Action Alternative.

  - Under low Sacramento inflow bins ("lohi", "lomed", "lolo"), mean particle percentage ranged from 42% greater (Alternative 1 under inflow bin "lolo", 10%) to 84% less (Alternative 3 under inflow bin "lohi", 1%) compared to the No Action Alternative.

#### *I.8.4.2.3 Neutrally Buoyant, Inflow Bins, December through March: Table I.8-74 through Table I.8-82 (EIS) || Figure I.8-74 through Figure I.8-82*

To allow for direct comparison to the December through March model outputs for surface-oriented particles, the following narrative focuses on the same two injection regions, *Western Delta Region* and *Yolo Bypass Region* and discusses the percentage of particles with a fate of Entrained at Exports.

- **Injection region:** *Western Delta Region*

  - Under high Sacramento inflow bins ("hihi, "himed", and "hilo"), mean particle percentage ranged from 6244 greater (Alternative 1 under Inflow bin "hihi", 0%) to 56% less (Alternative 3 under Inflow bin "hilo", 0%) compared to the No Action Alternative. Note that a 6244% increase and 56% decrease reflect a percent difference calculation.

  - Under medium Sacramento inflow bins ("medhi", "medmed", "medlo"), mean particle percentage ranged from 277% greater (Alternative 1 under Inflow bin "medhi", 0%) to 99% less (Alternative 3 under Inflow bin "medhi", 0%) compared to

the No Action Alternative. Note that a 277% increase and 99% decrease reflect a percent difference calculation.

- Under low Sacramento inflow bins ("lohi", "lomed", "lolo"), mean particle percentage ranged from 36% greater (Alternative 1 under Inflow bin "lomed", 2%) to 96% less (Alternative 3 under inflow bin "lohi", 0%) compared to the No Action Alternative.

- **Injection region:** *Yolo Bypass Region*
  - Under high Sacramento inflow bins ("hihi, "himed", and "hilo"), mean particle percentage ranged from 659% (Alternative 1 under inflow bin "himed", 3%) to 39% less (Alternative 3 under inflow bin "hilo", 1%) compared to the No Action Alternative.
  - Under medium Sacramento inflow bins ("medhi", "medmed", "medlo"), mean particle percentage ranged from 153% greater (Alternative 1 under Inflow bin "medmed", 2%) to 97% less (Alternative 3 under inflow bin "medhi", 0%) compared to the No Action Alternative.
  - Under low Sacramento inflow bins ("lohi", "lomed", "lolo"), mean particle percentage ranged from 47% greater (Alternative 1 under inflow bin "lolo", 8%) to 83% less (Alternative 3 under inflow bin "lohi", 1%) compared to the No Action Alternative.

#### *I.8.4.2.4 Neutrally Buoyant, OMR Bins, March through June: Table I.8-56 through Table I.8-64 (EIS) || Figure I.8-47 through Figure I.8-55*

One injection region was selected for neutrally buoyant particles grouped by OMR bins as representative of medium frequency of a medium proportion in the Bay Delta: the *San Joaquin River Region*. The following narrative is percent of particles injected in the *San Joaquin River Region* with a fate at *Entrained at Exports*.

- Under OMR bin -5,500 conditions, mean particle percentage was "NA" for all alternatives including the No Action Alternative excepting Alternative 1 (91%).
- Under OMR bin -5,000 conditions, mean particle percentage ranged from 5% lower (Action 5, 82%) to 14% lower (Alternative 2 without TUCP without VA, 75%) compared with the No Action Alternative.
- Under OMR bin -3,500 conditions, mean particle percentage ranged from 9% greater (Alternative 4, 74%) compared with the No Action Alternative to 2% greater compared to the No Action Alternative (Alternative 2 without TUCP Delta VA and Alternative 3, 69%).
- Under OMR bin -2,000 conditions, mean particle percentage ranged from equal to the No Action Alternative (Alternative 2 with TUCP without VA, Alternative 2 without TUCP without VA and Alternative 4, 57%) to 11% lower (Alternative 3, 51%) than the No Action Alternative.

#### *I.8.4.2.5 Surface Oriented, OMR Bins, December through March: Table I.8-65 through Table I.8-73 (EIS) || Figure I.8-65 through Figure I.8-55*

One injection region was selected for surface-oriented particles grouped by OMR bins as representative of medium frequency of a medium proportion in the Bay Delta: the *Western Delta Region*. The following narrative is percent of particles injected in the *Western Delta Region* with a fate at *Entrained at Exports*.

- Under OMR bin -5,500 conditions, mean particle percentage ranged from equal to the No Action Alternative (Alternative 2 without TUCP Delta VA, 14%) to 74% less (Alternative 1, 4%) than the No Action Alternative.
- Under OMR bin -5,000 conditions, mean particle percentage ranged from 48% greater (Alternative 1, 3%) to 74% less (Alternative 3, 0%) compared with the No Action Alternative.
- Under OMR bin -3,500 conditions, mean particle percentage ranged from 177% greater (Alternative 1, 2%) to 21% less (Alternative 2 with TUCP without VA, 1%) compared with the No Action Alternative.
- Under OMR bin -2,000 conditions, mean particle percentage ranged from 18% greater (Alternative 2 with TUCP without VA, 1%) to 65% less (Alternative 2 without TUCP Delta VA and Alternative 3, 0%) compared with the No Action Alternative.

#### *I.8.4.2.6 Neutrally Buoyant, OMR Bins, December through March: Table I.8-83 through Table I.8-91 (EIS) || Figure I.8-83 through Figure I.8-92*

To allow for direct comparison to the December through March model outputs for surface-oriented particles, the following narrative focuses on the same injection region, *Western Delta Region* and discusses the percentage of particles with a fate of Entrained at Exports.

- Under OMR bin -5,500 conditions, mean particle percentage ranged from equal to the No Action Alternative (Alternative 2 without TUCP Delta VA, 12%) to 75% less (Alternative 1, 3%) compared with the No Action Alternative.
- Under OMR bin -5,000 conditions, mean particle percentage ranged from 41% greater (Alternative 1, 2%) to 76% less (Alternative 3, 0%) compared with the No Action Alternative.
- Under OMR bin -3,500 conditions, mean particle percentage ranged from 197% greater (Alternative 1, 1%) to 22% less (Alternative 2 with TUCP without VA, 0%) compared with the No Action Alternative.
- Under OMR bin -2,000 conditions, mean particle percentage ranged from 14% greater (Alternative 2 with TUCP without VA, 1%) to 66% less (Alternative 3, 0%) compared with the No Action Alternative.

### I.8.4.3 Tables

#### *I.8.4.3.1 Neutrally Buoyant, Inflow Bins, March through June [BA, Table I.8-2 through Table I.8-10]*

Table I.8-2. Mean March through June neutrally buoyant particle fate by Inflow bin for NAA, EXP1, EXP3, four phases of Alternative 2, and Action 5 – particle insertion location at San Joaquin River for all particle system exit points. Note that NA values result from no data falling into that Inflow bin.

| Exit Point | Flow Bin | NAA | EXP1 | EXP3 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | ACT5 |
|---|---|---|---|---|---|---|---|---|---|
| West of Chipps | lolo | 0% | 3% | 4% | 0% | 0% | 0% | 0% | 0% |
| West of Chipps | lomed | 2% | 8% | 13% | 1% | 1% | 2% | 2% | 1% |
| West of Chipps | lohi | 17% | 64% | 59% | 11% | 11% | 15% | 16% | 15% |
| West of Chipps | medlo | 0% | 17% | 25% | 0% | 0% | 0% | 0% | 0% |
| West of Chipps | medmed | 3% | 32% | 38% | 1% | 2% | 6% | 6% | 3% |
| West of Chipps | medhi | 33% | 80% | 79% | 20% | 21% | 29% | 27% | 25% |
| West of Chipps | hilo | 1% | 26% | N/A | 0% | 0% | N/A | N/A | #N/A |
| West of Chipps | himed | 7% | 67% | 53% | 4% | 4% | 12% | 13% | 6% |
| West of Chipps | hihi | 50% | 96% | 95% | 44% | 43% | 50% | 50% | 46% |
| Entrained at Exports | lolo | 61% | 0% | 1% | 62% | 65% | 67% | 68% | 64% |
| Entrained at Exports | lomed | 70% | 0% | 0% | 70% | 71% | 68% | 68% | 67% |
| Entrained at Exports | lohi | 63% | 0% | 0% | 71% | 70% | 68% | 68% | 69% |
| Entrained at Exports | medlo | 86% | 0% | 0% | 84% | 84% | 85% | 83% | 84% |
| Entrained at Exports | medmed | 77% | 0% | 0% | 80% | 80% | 69% | 69% | 73% |
| Entrained at Exports | medhi | 53% | 0% | 0% | 66% | 66% | 59% | 60% | 61% |
| Entrained at Exports | hilo | 89% | 0% | N/A | 90% | 90% | N/A | N/A | #N/A |

| Exit Point | Flow Bin | NAA | EXP1 | EXP3 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | ACT5 |
|---|---|---|---|---|---|---|---|---|---|
| Entrained at Exports | himed | 80% | 0% | 0% | 82% | 82% | 70% | 70% | 77% |
| Entrained at Exports | hihi | 45% | 0% | 0% | 52% | 52% | 45% | 46% | 49% |
| Remaining in Delta | lolo | 39% | 97% | 96% | 38% | 35% | 32% | 31% | 36% |
| Remaining in Delta | lomed | 28% | 92% | 87% | 29% | 29% | 30% | 30% | 32% |
| Remaining in Delta | lohi | 20% | 36% | 41% | 17% | 18% | 17% | 15% | 17% |
| Remaining in Delta | medlo | 13% | 82% | 75% | 16% | 16% | 15% | 16% | 16% |
| Remaining in Delta | medmed | 19% | 68% | 62% | 18% | 19% | 25% | 25% | 24% |
| Remaining in Delta | medhi | 14% | 20% | 21% | 13% | 13% | 12% | 13% | 14% |
| Remaining in Delta | hilo | 10% | 74% | N/A | 10% | 10% | N/A | N/A | #N/A |
| Remaining in Delta | himed | 13% | 33% | 47% | 13% | 13% | 17% | 17% | 17% |
| Remaining in Delta | hihi | 5% | 4% | 5% | 5% | 5% | 5% | 5% | 5% |
| Crossed SJR to South Delta | lolo | 54% | 21% | 25% | 55% | 56% | 58% | 58% | 56% |
| Crossed SJR to South Delta | lomed | 55% | 14% | 15% | 55% | 55% | 54% | 54% | 53% |
| Crossed SJR to South Delta | lohi | 46% | -16% | -11% | 53% | 52% | 49% | 49% | 50% |
| Crossed SJR to South Delta | medlo | 67% | 11% | 8% | 65% | 65% | 66% | 65% | 65% |
| Crossed SJR to South Delta | medmed | 57% | 1% | -1% | 59% | 59% | 53% | 53% | 56% |
| Crossed SJR to South Delta | medhi | 33% | -20% | -17% | 46% | 45% | 38% | 39% | 41% |
| Crossed SJR to South Delta | hilo | 58% | 4% | N/A | 59% | 59% | N/A | N/A | #N/A |
| Crossed SJR to South Delta | himed | 55% | -13% | -6% | 57% | 57% | 48% | 48% | 54% |
| Crossed SJR to South Delta | hihi | 21% | -26% | -25% | 27% | 27% | 21% | 21% | 24% |

Table I.8-3. Mean March through June neutrally buoyant particle fate by Inflow bin for NAA, EXP1, EXP3, four phases of Alternative 2, and Action 5 – particle insertion location at Old and Middle River for all particle system exit points. Note that NA values result from no data falling into that Inflow bin.

| Exit Point | Flow Bin | NAA | EXP1 | EXP3 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ACT5 |
|---|---|---|---|---|---|---|---|---|---|
| West of Chipps | lolo | 7% | 22% | 22% | 6% | 7% | 7% | 7% | 6% |
| West of Chipps | lomed | 9% | 24% | 33% | 8% | 8% | 10% | 10% | 9% |
| West of Chipps | lohi | 14% | 67% | 65% | 10% | 11% | 13% | 13% | 13% |
| West of Chipps | medlo | 5% | 44% | 51% | 5% | 6% | 6% | 6% | 5% |
| West of Chipps | medmed | 10% | 51% | 57% | 9% | 9% | 13% | 14% | 11% |
| West of Chipps | medhi | 25% | 80% | 80% | 15% | 15% | 22% | 21% | 19% |
| West of Chipps | hilo | 9% | 59% | #N/A | 10% | 10% | #N/A | #N/A | #N/A |
| West of Chipps | himed | 13% | 73% | 66% | 12% | 12% | 16% | 16% | 13% |
| West of Chipps | hihi | 35% | 96% | 95% | 31% | 30% | 35% | 35% | 33% |
| Entrained at Exports | lolo | 75% | 0% | 1% | 77% | 78% | 78% | 78% | 77% |
| Entrained at Exports | lomed | 79% | 0% | 0% | 79% | 80% | 78% | 78% | 77% |
| Entrained at Exports | lohi | 77% | 0% | 0% | 82% | 81% | 78% | 78% | 78% |
| Entrained at Exports | medlo | 88% | 0% | 0% | 87% | 87% | 87% | 86% | 88% |
| Entrained at Exports | medmed | 83% | 0% | 0% | 84% | 84% | 77% | 77% | 79% |
| Entrained at Exports | medhi | 63% | 0% | 0% | 79% | 79% | 70% | 71% | 72% |
| Entrained at Exports | hilo | 90% | 0% | #N/A | 89% | 89% | #N/A | #N/A | #N/A |
| Entrained at Exports | himed | 83% | 0% | 0% | 85% | 85% | 79% | 79% | 83% |
| Entrained at Exports | hihi | 59% | 0% | 0% | 65% | 65% | 60% | 60% | 61% |
| Remaining in Delta | lolo | 18% | 78% | 77% | 17% | 15% | 15% | 15% | 17% |
| Remaining in Delta | lomed | 13% | 76% | 67% | 13% | 12% | 12% | 12% | 14% |

| Exit Point | Flow Bin | NAA | EXP1 | EXP3 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ACT5 |
|---|---|---|---|---|---|---|---|---|---|
| Remaining in Delta | lohi | 10% | 33% | 35% | 8% | 8% | 9% | 9% | 9% |
| Remaining in Delta | medlo | 7% | 56% | 49% | 8% | 7% | 8% | 8% | 7% |
| Remaining in Delta | medmed | 7% | 49% | 43% | 7% | 7% | 9% | 9% | 9% |
| Remaining in Delta | medhi | 12% | 20% | 20% | 6% | 6% | 8% | 8% | 9% |
| Remaining in Delta | hilo | 1% | 41% | #N/A | 1% | 1% | #N/A | #N/A | #N/A |
| Remaining in Delta | himed | 4% | 27% | 33% | 3% | 3% | 5% | 5% | 4% |
| Remaining in Delta | hihi | 6% | 4% | 5% | 4% | 4% | 5% | 5% | 5% |
| Crossed SJR to South Delta | lolo | -13% | -50% | -47% | -12% | -12% | -12% | -12% | -12% |
| Crossed SJR to South Delta | lomed | -13% | -61% | -60% | -12% | -12% | -14% | -14% | -14% |
| Crossed SJR to South Delta | lohi | -16% | -88% | -83% | -12% | -13% | -16% | -16% | -16% |
| Crossed SJR to South Delta | medlo | -7% | -66% | -69% | -8% | -8% | -8% | -8% | -7% |
| Crossed SJR to South Delta | medmed | -12% | -74% | -75% | -11% | -11% | -16% | -16% | -14% |
| Crossed SJR to South Delta | medhi | -27% | -92% | -89% | -17% | -17% | -24% | -23% | -21% |
| Crossed SJR to South Delta | hilo | -10% | -77% | #N/A | -10% | -10% | #N/A | #N/A | #N/A |
| Crossed SJR to South Delta | himed | -13% | -84% | -80% | -12% | -12% | -17% | -17% | -13% |
| Crossed SJR to South Delta | hihi | -36% | -98% | -97% | -31% | -31% | -36% | -36% | -34% |

Table I.8-4. Mean March through June neutrally buoyant particle fate by Inflow bin for NAA, EXP1, EXP3, four phases of Alternative 2, and Action 5 – particle insertion location at Southern Delta for all particle system exit points. Note that NA values result from no data falling into that Inflow bin.

| Exit Point | Flow Bin | NAA | EXP1 | EXP3 | Alt2wTUCPwoVA | Alt2woTUCPwoVA | Alt2woTUCPDeltaVA | Alt2woTUCPAllVA | ACT5 |
|---|---|---|---|---|---|---|---|---|---|
| West of Chipps | lolo | 0% | 5% | 5% | 0% | 0% | 0% | 0% | 0% |
| West of Chipps | lomed | 0% | 8% | 13% | 0% | 0% | 0% | 0% | 0% |
| West of Chipps | lohi | 0% | 54% | 49% | 0% | 0% | 1% | 1% | 1% |
| West of Chipps | medlo | 0% | 22% | 29% | 0% | 0% | 0% | 0% | 0% |
| West of Chipps | medmed | 0% | 30% | 35% | 0% | 0% | 0% | 0% | 0% |
| West of Chipps | medhi | 2% | 68% | 68% | 1% | 1% | 2% | 2% | 2% |
| West of Chipps | hilo | 0% | 38% | #N/A | 0% | 0% | #N/A | #N/A | #N/A |
| West of Chipps | himed | 0% | 56% | 47% | 0% | 0% | 0% | 0% | 0% |
| West of Chipps | hihi | 6% | 92% | 89% | 5% | 5% | 6% | 6% | 5% |
| Entrained at Exports | lolo | 98% | 1% | 3% | 98% | 98% | 98% | 98% | 98% |
| Entrained at Exports | lomed | 100% | 0% | 0% | 100% | 100% | 100% | 100% | 100% |
| Entrained at Exports | lohi | 100% | 0% | 0% | 100% | 100% | 98% | 98% | 98% |
| Entrained at Exports | medlo | 99% | 1% | 0% | 98% | 99% | 98% | 99% | 99% |
| Entrained at Exports | medmed | 100% | 0% | 0% | 100% | 100% | 100% | 100% | 100% |
| Entrained at Exports | medhi | 95% | 0% | 0% | 99% | 99% | 96% | 96% | 97% |
| Entrained at Exports | hilo | 100% | 0% | #N/A | 100% | 100% | #N/A | #N/A | #N/A |
| Entrained at Exports | himed | 100% | 0% | 0% | 100% | 100% | 100% | 100% | 100% |
| Entrained at Exports | hihi | 94% | 0% | 0% | 94% | 94% | 93% | 93% | 94% |
| Remaining in Delta | lolo | 2% | 94% | 92% | 2% | 2% | 2% | 2% | 2% |
| Remaining in Delta | lomed | 0% | 92% | 87% | 0% | 0% | 0% | 0% | 0% |

| Exit Point | Flow Bin | NAA | EXP1 | EXP3 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ACT5 |
|---|---|---|---|---|---|---|---|---|---|
| Remaining in Delta | lohi | 0% | 46% | 51% | 0% | 0% | 1% | 1% | 1% |
| Remaining in Delta | medlo | 1% | 77% | 71% | 2% | 1% | 2% | 1% | 1% |
| Remaining in Delta | medmed | 0% | 70% | 65% | 0% | 0% | 0% | 0% | 0% |
| Remaining in Delta | medhi | 2% | 32% | 32% | 0% | 0% | 2% | 2% | 2% |
| Remaining in Delta | hilo | 0% | 62% | #N/A | 0% | 0% | #N/A | #N/A | #N/A |
| Remaining in Delta | himed | 0% | 44% | 53% | 0% | 0% | 0% | 0% | 0% |
| Remaining in Delta | hihi | 1% | 8% | 11% | 1% | 1% | 1% | 1% | 1% |
| Crossed SJR to South Delta | lolo | 0% | -22% | -20% | 0% | 0% | 0% | 0% | 0% |
| Crossed SJR to South Delta | lomed | 0% | -38% | -36% | 0% | 0% | 0% | 0% | 0% |
| Crossed SJR to South Delta | lohi | 0% | -79% | -70% | 0% | 0% | -1% | -1% | -1% |
| Crossed SJR to South Delta | medlo | 0% | -42% | -47% | 0% | 0% | 0% | 0% | 0% |
| Crossed SJR to South Delta | medmed | 0% | -55% | -57% | 0% | 0% | 0% | 0% | 0% |
| Crossed SJR to South Delta | medhi | -3% | -83% | -80% | -1% | -1% | -3% | -2% | -2% |
| Crossed SJR to South Delta | hilo | 0% | -59% | #N/A | 0% | 0% | #N/A | #N/A | #N/A |
| Crossed SJR to South Delta | himed | 0% | -71% | -64% | 0% | 0% | 0% | 0% | 0% |
| Crossed SJR to South Delta | hihi | -6% | -94% | -93% | -6% | -6% | -6% | -6% | -6% |

Table I.8-5. Mean March through June neutrally buoyant particle fate by Inflow bin for NAA, EXP1, EXP3, four phases of Alternative 2, and Action 5 – particle insertion location at Central Delta for all particle system exit points. Note that NA values result from no data falling into that Inflow bin.

| Exit Point | Flow Bin | NAA | EXP1 | EXP3 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ACT5 |
|---|---|---|---|---|---|---|---|---|---|
| West of Chipps | lolo | 30% | 49% | 48% | 28% | 31% | 33% | 34% | 28% |
| West of Chipps | lomed | 40% | 51% | 65% | 36% | 37% | 43% | 44% | 39% |
| West of Chipps | lohi | 65% | 89% | 90% | 57% | 57% | 61% | 62% | 60% |
| West of Chipps | medlo | 32% | 79% | 86% | 34% | 35% | 35% | 37% | 32% |
| West of Chipps | medmed | 53% | 86% | 91% | 48% | 49% | 59% | 60% | 53% |
| West of Chipps | medhi | 81% | 97% | 96% | 72% | 72% | 77% | 76% | 74% |
| West of Chipps | hilo | 62% | 93% | #N/A | 69% | 68% | #N/A | #N/A | #N/A |
| West of Chipps | himed | 73% | 97% | 96% | 69% | 69% | 78% | 78% | 71% |
| West of Chipps | hihi | 93% | 100% | 100% | 91% | 91% | 93% | 93% | 91% |
| Entrained at Exports | lolo | 22% | 0% | 0% | 24% | 25% | 27% | 28% | 26% |
| Entrained at Exports | lomed | 25% | 0% | 0% | 25% | 25% | 23% | 23% | 23% |
| Entrained at Exports | lohi | 17% | 0% | 0% | 22% | 21% | 21% | 21% | 21% |
| Entrained at Exports | medlo | 47% | 0% | 0% | 41% | 41% | 43% | 40% | 44% |
| Entrained at Exports | medmed | 27% | 0% | 0% | 29% | 28% | 22% | 21% | 24% |
| Entrained at Exports | medhi | 10% | 0% | 0% | 16% | 16% | 14% | 14% | 14% |
| Entrained at Exports | hilo | 31% | 0% | #N/A | 27% | 27% | #N/A | #N/A | #N/A |
| Entrained at Exports | himed | 21% | 0% | 0% | 22% | 22% | 15% | 15% | 21% |
| Entrained at Exports | hihi | 5% | 0% | 0% | 7% | 7% | 5% | 5% | 6% |
| Remaining in Delta | lolo | 48% | 51% | 52% | 48% | 44% | 40% | 38% | 46% |
| Remaining in Delta | lomed | 35% | 49% | 35% | 40% | 38% | 34% | 33% | 39% |

| Exit Point | Flow Bin | NAA | EXP1 | EXP3 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ACT5 |
|---|---|---|---|---|---|---|---|---|---|
| Remaining in Delta | lohi | 18% | 11% | 10% | 21% | 21% | 18% | 17% | 19% |
| Remaining in Delta | medlo | 21% | 21% | 14% | 25% | 24% | 22% | 23% | 24% |
| Remaining in Delta | medmed | 20% | 14% | 9% | 23% | 23% | 19% | 19% | 23% |
| Remaining in Delta | medhi | 9% | 3% | 4% | 12% | 12% | 9% | 10% | 12% |
| Remaining in Delta | hilo | 7% | 7% | #N/A | 5% | 5% | #N/A | #N/A | #N/A |
| Remaining in Delta | himed | 7% | 3% | 4% | 9% | 8% | 7% | 7% | 8% |
| Remaining in Delta | hihi | 2% | 0% | 0% | 2% | 2% | 2% | 2% | 2% |
| Crossed SJR to South Delta | lolo | 43% | 16% | 18% | 44% | 44% | 45% | 45% | 45% |
| Crossed SJR to South Delta | lomed | 40% | 13% | 11% | 41% | 41% | 38% | 38% | 39% |
| Crossed SJR to South Delta | lohi | 24% | 2% | 2% | 30% | 29% | 28% | 28% | 28% |
| Crossed SJR to South Delta | medlo | 57% | 7% | 5% | 51% | 51% | 53% | 51% | 55% |
| Crossed SJR to South Delta | medmed | 37% | 4% | 3% | 39% | 39% | 31% | 30% | 34% |
| Crossed SJR to South Delta | medhi | 14% | 1% | 1% | 21% | 21% | 18% | 19% | 19% |
| Crossed SJR to South Delta | hilo | 35% | 2% | #N/A | 29% | 30% | #N/A | #N/A | #N/A |
| Crossed SJR to South Delta | himed | 24% | 1% | 1% | 27% | 27% | 19% | 19% | 25% |
| Crossed SJR to South Delta | hihi | 6% | 0% | 0% | 8% | 8% | 6% | 6% | 8% |

Table I.8-6. Mean March through June neutrally buoyant particle fate by Inflow bin for NAA, EXP1, EXP3, four phases of Alternative 2, and Action 5 – particle insertion location at Sacramento River for all particle system exit points. Note that NA values result from no data falling into that Inflow bin.

| Exit Point | Flow Bin | NAA | EXP1 | EXP3 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ACT5 |
|---|---|---|---|---|---|---|---|---|---|
| West of Chipps | lolo | 51% | 68% | 65% | 51% | 56% | 57% | 58% | 52% |
| West of Chipps | lomed | 68% | 66% | 79% | 67% | 69% | 71% | 72% | 69% |
| West of Chipps | lohi | 82% | 88% | 91% | 80% | 80% | 81% | 80% | 80% |
| West of Chipps | medlo | 62% | 93% | 95% | 65% | 66% | 64% | 67% | 64% |
| West of Chipps | medmed | 84% | 95% | 97% | 83% | 84% | 86% | 87% | 85% |
| West of Chipps | medhi | 94% | 97% | 97% | 92% | 92% | 93% | 92% | 92% |
| West of Chipps | hilo | 95% | 98% | #N/A | 96% | 96% | #N/A | #N/A | #N/A |
| West of Chipps | himed | 96% | 99% | 99% | 96% | 96% | 97% | 97% | 96% |
| West of Chipps | hihi | 99% | 100% | 100% | 99% | 99% | 99% | 99% | 99% |
| Entrained at Exports | lolo | 7% | 0% | 0% | 7% | 7% | 9% | 9% | 7% |
| Entrained at Exports | lomed | 7% | 0% | 0% | 6% | 6% | 6% | 6% | 5% |
| Entrained at Exports | lohi | 4% | 0% | 0% | 5% | 5% | 5% | 5% | 5% |
| Entrained at Exports | medlo | 16% | 0% | 0% | 11% | 11% | 14% | 12% | 12% |
| Entrained at Exports | medmed | 5% | 0% | 0% | 5% | 5% | 4% | 4% | 4% |
| Entrained at Exports | medhi | 2% | 0% | 0% | 2% | 2% | 2% | 2% | 2% |
| Entrained at Exports | hilo | 3% | 0% | #N/A | 2% | 2% | #N/A | #N/A | #N/A |
| Entrained at Exports | himed | 2% | 0% | 0% | 2% | 2% | 1% | 1% | 2% |
| Entrained at Exports | hihi | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| Remaining in Delta | lolo | 42% | 32% | 35% | 42% | 37% | 35% | 33% | 40% |
| Remaining in Delta | lomed | 25% | 34% | 21% | 28% | 25% | 22% | 22% | 26% |

| Exit Point | Flow Bin | NAA | EXP1 | EXP3 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ACT5 |
|---|---|---|---|---|---|---|---|---|---|
| Remaining in Delta | lohi | 14% | 12% | 9% | 16% | 16% | 14% | 15% | 16% |
| Remaining in Delta | medlo | 23% | 7% | 5% | 24% | 23% | 22% | 21% | 24% |
| Remaining in Delta | medmed | 10% | 5% | 3% | 12% | 12% | 9% | 9% | 11% |
| Remaining in Delta | medhi | 5% | 3% | 3% | 6% | 6% | 5% | 6% | 6% |
| Remaining in Delta | hilo | 2% | 2% | #N/A | 1% | 2% | #N/A | #N/A | #N/A |
| Remaining in Delta | himed | 2% | 1% | 1% | 2% | 2% | 2% | 2% | 2% |
| Remaining in Delta | hihi | 1% | 0% | 0% | 1% | 1% | 1% | 1% | 1% |
| Crossed SJR to South Delta | lolo | 17% | 7% | 8% | 16% | 15% | 18% | 18% | 17% |
| Crossed SJR to South Delta | lomed | 13% | 6% | 4% | 12% | 12% | 12% | 12% | 11% |
| Crossed SJR to South Delta | lohi | 7% | 1% | 1% | 8% | 7% | 8% | 8% | 7% |
| Crossed SJR to South Delta | medlo | 22% | 1% | 1% | 17% | 16% | 20% | 18% | 18% |
| Crossed SJR to South Delta | medmed | 8% | 1% | 0% | 8% | 8% | 7% | 7% | 7% |
| Crossed SJR to South Delta | medhi | 2% | 0% | 0% | 3% | 3% | 3% | 3% | 3% |
| Crossed SJR to South Delta | hilo | 4% | 0% | #N/A | 3% | 3% | #N/A | #N/A | #N/A |
| Crossed SJR to South Delta | himed | 2% | 0% | 0% | 2% | 3% | 2% | 2% | 2% |
| Crossed SJR to South Delta | hihi | 0% | 0% | 0% | 1% | 1% | 0% | 0% | 1% |

Table I.8-7. Mean March through June neutrally buoyant particle fate by Inflow bin for NAA, EXP1, EXP3, four phases of Alternative 2, and Action 5 – particle insertion location at Mokelumne River for all particle system exit points. Note that NA values result from no data falling into that Inflow bin.

| Exit Point | Flow Bin | NAA | EXP1 | EXP3 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ACT5 |
|---|---|---|---|---|---|---|---|---|---|
| West of Chipps | lolo | 10% | 19% | 19% | 9% | 11% | 13% | 13% | 10% |
| West of Chipps | lomed | 17% | 20% | 34% | 13% | 14% | 19% | 20% | 15% |
| West of Chipps | lohi | 44% | 65% | 69% | 35% | 35% | 40% | 43% | 40% |
| West of Chipps | medlo | 13% | 50% | 63% | 14% | 14% | 15% | 16% | 12% |
| West of Chipps | medmed | 28% | 62% | 76% | 23% | 24% | 36% | 37% | 28% |
| West of Chipps | medhi | 67% | 87% | 90% | 54% | 55% | 63% | 61% | 57% |
| West of Chipps | hilo | 41% | 72% | #N/A | 49% | 49% | #N/A | #N/A | #N/A |
| West of Chipps | himed | 54% | 90% | 88% | 48% | 49% | 61% | 62% | 51% |
| West of Chipps | hihi | 88% | 98% | 98% | 84% | 84% | 88% | 88% | 85% |
| Entrained at Exports | lolo | 24% | 0% | 0% | 27% | 29% | 32% | 34% | 31% |
| Entrained at Exports | lomed | 30% | 0% | 0% | 28% | 28% | 27% | 27% | 26% |
| Entrained at Exports | lohi | 23% | 0% | 0% | 30% | 29% | 29% | 29% | 29% |
| Entrained at Exports | medlo | 62% | 0% | 0% | 55% | 55% | 57% | 53% | 58% |
| Entrained at Exports | medmed | 36% | 0% | 0% | 37% | 37% | 28% | 27% | 30% |
| Entrained at Exports | medhi | 15% | 0% | 0% | 23% | 22% | 19% | 20% | 20% |
| Entrained at Exports | hilo | 43% | 0% | #N/A | 40% | 41% | #N/A | #N/A | #N/A |
| Entrained at Exports | himed | 31% | 0% | 0% | 33% | 33% | 22% | 22% | 30% |
| Entrained at Exports | hihi | 8% | 0% | 0% | 11% | 11% | 8% | 8% | 10% |
| Remaining in Delta | lolo | 66% | 81% | 81% | 63% | 61% | 56% | 53% | 60% |
| Remaining in Delta | lomed | 53% | 80% | 66% | 59% | 58% | 54% | 53% | 59% |

| Exit Point | Flow Bin | NAA | EXP1 | EXP3 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ACT5 |
|---|---|---|---|---|---|---|---|---|---|
| Remaining in Delta | lohi | 33% | 35% | 31% | 35% | 36% | 31% | 28% | 31% |
| Remaining in Delta | medlo | 25% | 50% | 37% | 31% | 31% | 28% | 32% | 30% |
| Remaining in Delta | medmed | 36% | 38% | 24% | 39% | 39% | 36% | 36% | 41% |
| Remaining in Delta | medhi | 18% | 13% | 10% | 24% | 23% | 18% | 19% | 23% |
| Remaining in Delta | hilo | 15% | 28% | #N/A | 11% | 11% | #N/A | #N/A | #N/A |
| Remaining in Delta | himed | 16% | 10% | 12% | 19% | 19% | 16% | 16% | 19% |
| Remaining in Delta | hihi | 4% | 2% | 2% | 5% | 5% | 4% | 4% | 5% |
| Crossed SJR to South Delta | lolo | 52% | 23% | 21% | 53% | 54% | 55% | 56% | 55% |
| Crossed SJR to South Delta | lomed | 53% | 21% | 19% | 54% | 54% | 51% | 51% | 51% |
| Crossed SJR to South Delta | lohi | 36% | 6% | 6% | 43% | 42% | 41% | 40% | 40% |
| Crossed SJR to South Delta | medlo | 74% | 15% | 12% | 69% | 69% | 70% | 68% | 72% |
| Crossed SJR to South Delta | medmed | 53% | 10% | 7% | 56% | 55% | 44% | 44% | 49% |
| Crossed SJR to South Delta | medhi | 22% | 2% | 2% | 32% | 31% | 27% | 28% | 29% |
| Crossed SJR to South Delta | hilo | 52% | 8% | #N/A | 46% | 46% | #N/A | #N/A | #N/A |
| Crossed SJR to South Delta | himed | 39% | 3% | 4% | 42% | 42% | 31% | 31% | 40% |
| Crossed SJR to South Delta | hihi | 10% | 0% | 0% | 13% | 13% | 10% | 10% | 12% |

Table I.8-8. Mean March through June neutrally buoyant particle fate by Inflow bin for NAA, EXP1, EXP3, four phases of Alternative 2, and Action 5 – particle insertion location at Yolo Bypass for all particle system exit points. Note that NA values result from no data falling into that Inflow bin.

| Exit Point | Flow Bin | NAA | EXP1 | EXP3 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ACT5 |
|---|---|---|---|---|---|---|---|---|---|
| West of Chipps | lolo | 24% | 32% | 31% | 23% | 25% | 27% | 27% | 23% |
| West of Chipps | lomed | 35% | 28% | 39% | 32% | 33% | 37% | 37% | 33% |
| West of Chipps | lohi | 41% | 42% | 47% | 37% | 37% | 40% | 39% | 37% |
| West of Chipps | medlo | 31% | 54% | 62% | 32% | 33% | 33% | 35% | 31% |
| West of Chipps | medmed | 50% | 55% | 61% | 46% | 46% | 51% | 51% | 47% |
| West of Chipps | medhi | 53% | 55% | 57% | 49% | 50% | 53% | 52% | 49% |
| West of Chipps | hilo | 70% | 69% | #N/A | 66% | 66% | #N/A | #N/A | #N/A |
| West of Chipps | himed | 68% | 68% | 68% | 63% | 63% | 68% | 68% | 63% |
| West of Chipps | hihi | 68% | 68% | 69% | 62% | 62% | 68% | 68% | 62% |
| Entrained at Exports | lolo | 2% | 0% | 0% | 2% | 2% | 3% | 4% | 3% |
| Entrained at Exports | lomed | 3% | 0% | 0% | 2% | 2% | 2% | 3% | 2% |
| Entrained at Exports | lohi | 2% | 0% | 0% | 2% | 2% | 2% | 2% | 2% |
| Entrained at Exports | medlo | 6% | 0% | 0% | 4% | 4% | 5% | 4% | 4% |
| Entrained at Exports | medmed | 2% | 0% | 0% | 1% | 1% | 2% | 1% | 1% |
| Entrained at Exports | medhi | 1% | 0% | 0% | 1% | 1% | 1% | 1% | 1% |
| Entrained at Exports | hilo | 1% | 0% | #N/A | 0% | 0% | #N/A | #N/A | #N/A |
| Entrained at Exports | himed | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| Entrained at Exports | hihi | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| Remaining in Delta | lolo | 74% | 68% | 69% | 75% | 73% | 70% | 69% | 74% |
| Remaining in Delta | lomed | 62% | 72% | 61% | 66% | 65% | 61% | 60% | 65% |

| Exit Point | Flow Bin | NAA | EXP1 | EXP3 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ACT5 |
|---|---|---|---|---|---|---|---|---|---|
| Remaining in Delta | lohi | 58% | 58% | 53% | 61% | 61% | 58% | 59% | 61% |
| Remaining in Delta | medlo | 63% | 46% | 38% | 64% | 64% | 62% | 61% | 65% |
| Remaining in Delta | medmed | 48% | 45% | 39% | 52% | 52% | 47% | 47% | 52% |
| Remaining in Delta | medhi | 46% | 45% | 43% | 50% | 50% | 46% | 47% | 50% |
| Remaining in Delta | hilo | 30% | 31% | #N/A | 34% | 34% | #N/A | #N/A | #N/A |
| Remaining in Delta | himed | 32% | 32% | 32% | 37% | 37% | 32% | 31% | 37% |
| Remaining in Delta | hihi | 32% | 32% | 31% | 38% | 38% | 32% | 32% | 38% |
| Crossed SJR to South Delta | lolo | 9% | 5% | 5% | 8% | 7% | 9% | 9% | 8% |
| Crossed SJR to South Delta | lomed | 7% | 4% | 3% | 6% | 6% | 7% | 7% | 6% |
| Crossed SJR to South Delta | lohi | 4% | 1% | 1% | 4% | 4% | 5% | 5% | 4% |
| Crossed SJR to South Delta | medlo | 11% | 1% | 1% | 7% | 7% | 10% | 8% | 8% |
| Crossed SJR to South Delta | medmed | 4% | 1% | 1% | 4% | 4% | 4% | 3% | 3% |
| Crossed SJR to South Delta | medhi | 1% | 0% | 0% | 2% | 1% | 2% | 2% | 2% |
| Crossed SJR to South Delta | hilo | 1% | 0% | #N/A | 1% | 1% | #N/A | #N/A | #N/A |
| Crossed SJR to South Delta | himed | 1% | 0% | 0% | 1% | 1% | 1% | 1% | 1% |
| Crossed SJR to South Delta | hihi | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |

Table I.8-9. Mean March through June neutrally buoyant particle fate by Inflow bin for NAA, EXP1, EXP3, four phases of Alternative 2, and Action 5 – particle insertion location at Western Delta for all particle system exit points. Note that NA values result from no data falling into that Inflow bin.

| Exit Point | Flow Bin | NAA | EXP1 | EXP3 | Alt2wTUCPwoVA | Alt2woTUCPwoVA | Alt2woTUCPDeltaVA | Alt2woTUCPAllVA | ACT5 |
|---|---|---|---|---|---|---|---|---|---|
| West of Chipps | lolo | 86% | 93% | 93% | 86% | 89% | 89% | 90% | 87% |
| West of Chipps | lomed | 93% | 93% | 97% | 93% | 93% | 94% | 94% | 93% |
| West of Chipps | lohi | 98% | 99% | 99% | 97% | 97% | 97% | 97% | 97% |
| West of Chipps | medlo | 91% | 99% | 99% | 92% | 92% | 92% | 93% | 92% |
| West of Chipps | medmed | 97% | 99% | 99% | 97% | 97% | 98% | 98% | 98% |
| West of Chipps | medhi | 99% | 99% | 99% | 99% | 99% | 99% | 99% | 99% |
| West of Chipps | hilo | 99% | 100% | #N/A | 100% | 100% | #N/A | #N/A | #N/A |
| West of Chipps | himed | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% |
| West of Chipps | hihi | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% |
| Entrained at Exports | lolo | 1% | 0% | 0% | 1% | 1% | 1% | 1% | 1% |
| Entrained at Exports | lomed | 1% | 0% | 0% | 1% | 1% | 1% | 1% | 1% |
| Entrained at Exports | lohi | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| Entrained at Exports | medlo | 2% | 0% | 0% | 1% | 1% | 2% | 1% | 1% |
| Entrained at Exports | medmed | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| Entrained at Exports | medhi | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| Entrained at Exports | hilo | 0% | 0% | #N/A | 0% | 0% | #N/A | #N/A | #N/A |
| Entrained at Exports | himed | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| Entrained at Exports | hihi | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| Remaining in Delta | lolo | 13% | 7% | 7% | 13% | 10% | 10% | 9% | 12% |
| Remaining in Delta | lomed | 6% | 7% | 3% | 7% | 6% | 5% | 5% | 6% |

| Exit Point | Flow Bin | NAA | EXP1 | EXP3 | Alt2wTUCPwoVA | Alt2woTUCPwoVA | Alt2woTUCPDeltaVA | Alt2woTUCPAllVA | ACT5 |
|---|---|---|---|---|---|---|---|---|---|
| Remaining in Delta | lohi | 2% | 1% | 1% | 3% | 3% | 2% | 2% | 3% |
| Remaining in Delta | medlo | 7% | 1% | 1% | 7% | 7% | 6% | 5% | 7% |
| Remaining in Delta | medmed | 2% | 1% | 1% | 2% | 2% | 2% | 2% | 2% |
| Remaining in Delta | medhi | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% |
| Remaining in Delta | hilo | 0% | 0% | #N/A | 0% | 0% | #N/A | #N/A | #N/A |
| Remaining in Delta | himed | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| Remaining in Delta | hihi | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| Crossed SJR to South Delta | lolo | 3% | 1% | 1% | 2% | 2% | 3% | 3% | 3% |
| Crossed SJR to South Delta | lomed | 2% | 1% | 0% | 1% | 1% | 2% | 2% | 1% |
| Crossed SJR to South Delta | lohi | 0% | 0% | 0% | 1% | 1% | 1% | 1% | 1% |
| Crossed SJR to South Delta | medlo | 3% | 0% | 0% | 2% | 2% | 3% | 2% | 2% |
| Crossed SJR to South Delta | medmed | 1% | 0% | 0% | 1% | 1% | 1% | 1% | 1% |
| Crossed SJR to South Delta | medhi | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| Crossed SJR to South Delta | hilo | 0% | 0% | #N/A | 0% | 0% | #N/A | #N/A | #N/A |
| Crossed SJR to South Delta | himed | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| Crossed SJR to South Delta | hihi | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |

Table I.8-10. Mean March through June neutrally buoyant particle fate by Inflow bin for NAA, EXP1, EXP3, four phases of Alternative 2, and Action 5 – particle insertion location at Suisun Bay for all particle system exit points. Note that NA values result from no data falling into that Inflow bin.

| Exit Point | Flow Bin | NAA | EXP1 | EXP3 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ACT5 |
|---|---|---|---|---|---|---|---|---|---|
| West of Chipps | lolo | 67% | 60% | 58% | 64% | 61% | 65% | 65% | 64% |
| West of Chipps | lomed | 64% | 57% | 60% | 63% | 62% | 64% | 63% | 61% |
| West of Chipps | lohi | 63% | 66% | 67% | 61% | 61% | 62% | 63% | 62% |
| West of Chipps | medlo | 73% | 73% | 78% | 73% | 74% | 76% | 72% | 69% |
| West of Chipps | medmed | 73% | 76% | 82% | 71% | 71% | 74% | 74% | 72% |
| West of Chipps | medhi | 77% | 82% | 84% | 75% | 75% | 77% | 75% | 75% |
| West of Chipps | hilo | 93% | 92% | #N/A | 95% | 95% | #N/A | #N/A | #N/A |
| West of Chipps | himed | 94% | 95% | 95% | 93% | 93% | 94% | 95% | 94% |
| West of Chipps | hihi | 97% | 98% | 98% | 97% | 97% | 97% | 97% | 97% |
| Entrained at Exports | lolo | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| Entrained at Exports | lomed | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| Entrained at Exports | lohi | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| Entrained at Exports | medlo | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| Entrained at Exports | medmed | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| Entrained at Exports | medhi | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| Entrained at Exports | hilo | 0% | 0% | #N/A | 0% | 0% | #N/A | #N/A | #N/A |
| Entrained at Exports | himed | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| Entrained at Exports | hihi | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| Remaining in Delta | lolo | 33% | 40% | 42% | 36% | 39% | 35% | 35% | 36% |
| Remaining in Delta | lomed | 36% | 43% | 40% | 37% | 38% | 36% | 37% | 39% |

| Exit Point | Flow Bin | NAA | EXP1 | EXP3 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ACT5 |
|---|---|---|---|---|---|---|---|---|---|
| Remaining in Delta | lohi | 37% | 34% | 33% | 39% | 39% | 38% | 37% | 38% |
| Remaining in Delta | medlo | 27% | 27% | 22% | 27% | 26% | 24% | 28% | 31% |
| Remaining in Delta | medmed | 27% | 24% | 18% | 29% | 29% | 26% | 26% | 28% |
| Remaining in Delta | medhi | 23% | 18% | 16% | 25% | 25% | 23% | 25% | 25% |
| Remaining in Delta | hilo | 7% | 8% | #N/A | 5% | 5% | #N/A | #N/A | #N/A |
| Remaining in Delta | himed | 6% | 5% | 5% | 7% | 7% | 6% | 5% | 6% |
| Remaining in Delta | hihi | 3% | 2% | 2% | 3% | 3% | 3% | 3% | 3% |
| Crossed SJR to South Delta | lolo | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| Crossed SJR to South Delta | lomed | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| Crossed SJR to South Delta | lohi | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| Crossed SJR to South Delta | medlo | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| Crossed SJR to South Delta | medmed | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| Crossed SJR to South Delta | medhi | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| Crossed SJR to South Delta | hilo | 0% | 0% | #N/A | 0% | 0% | #N/A | #N/A | #N/A |
| Crossed SJR to South Delta | himed | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| Crossed SJR to South Delta | hihi | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |

#### *I.8.4.3.2 Surface Oriented, Inflow Bins, December through March [BA, Table I.8-11 through Table I.8-19]*

Table I.8-11. Mean December through March surface-oriented particle fate by Inflow bin for NAA, EXP1, EXP3, four phases of Alternative 2, and Action 5 – particle insertion location at San Joaquin River for all particle system exit points. Note that NA values result from no data falling into that Inflow bin.

| Exit Point | Flow Bin | NAA | EXP1 | EXP3 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ACT5 |
|---|---|---|---|---|---|---|---|---|---|
| West of Chipps | lolo | 0% | 17% | 20% | 1% | 1% | 1% | 1% | 1% |
| West of Chipps | lomed | 1% | 35% | 37% | 1% | 1% | 2% | 2% | 2% |
| West of Chipps | lohi | 1% | #N/A | 61% | 3% | 4% | 2% | 2% | 18% |
| West of Chipps | medlo | 0% | 33% | 30% | 1% | 1% | 1% | 1% | 0% |
| West of Chipps | medmed | 2% | 51% | 46% | 2% | 2% | 5% | 5% | 3% |
| West of Chipps | medhi | 13% | 92% | 90% | 12% | 12% | 19% | 19% | 12% |
| West of Chipps | hilo | 2% | 45% | 43% | 2% | 2% | 2% | 2% | 2% |
| West of Chipps | himed | 6% | 76% | 69% | 6% | 6% | 8% | 8% | 6% |
| West of Chipps | hihi | 39% | 98% | 96% | 37% | 38% | 40% | 39% | 35% |
| Entrained at Exports | lolo | 78% | 0% | 0% | 78% | 77% | 77% | 77% | 80% |
| Entrained at Exports | lomed | 84% | 0% | 0% | 80% | 80% | 71% | 71% | 73% |
| Entrained at Exports | lohi | 86% | #N/A | 0% | 80% | 76% | 85% | 84% | 63% |
| Entrained at Exports | medlo | 90% | 0% | 0% | 88% | 88% | 88% | 87% | 89% |
| Entrained at Exports | medmed | 88% | 0% | 0% | 88% | 87% | 78% | 78% | 85% |
| Entrained at Exports | medhi | 79% | 0% | 0% | 81% | 81% | 71% | 71% | 81% |
| Entrained at Exports | hilo | 91% | 0% | 0% | 91% | 91% | 91% | 91% | 92% |
| Entrained at Exports | himed | 89% | 0% | 0% | 89% | 89% | 85% | 85% | 89% |
| Entrained at Exports | hihi | 59% | 0% | 0% | 61% | 61% | 58% | 58% | 62% |
| Remaining in Delta | lolo | 22% | 83% | 80% | 21% | 23% | 22% | 22% | 19% |

| Exit Point | Flow Bin | NAA | EXP1 | EXP3 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ACT5 |
|---|---|---|---|---|---|---|---|---|---|
| Remaining in Delta | lomed | 16% | 65% | 63% | 20% | 20% | 27% | 27% | 25% |
| Remaining in Delta | lohi | 12% | #N/A | 39% | 17% | 19% | 13% | 14% | 19% |
| Remaining in Delta | medlo | 10% | 67% | 70% | 12% | 12% | 12% | 12% | 11% |
| Remaining in Delta | medmed | 10% | 49% | 54% | 10% | 11% | 17% | 17% | 12% |
| Remaining in Delta | medhi | 8% | 8% | 10% | 7% | 7% | 10% | 10% | 7% |
| Remaining in Delta | hilo | 7% | 54% | 56% | 7% | 7% | 7% | 7% | 6% |
| Remaining in Delta | himed | 5% | 23% | 31% | 5% | 5% | 7% | 7% | 5% |
| Remaining in Delta | hihi | 2% | 2% | 4% | 2% | 2% | 2% | 2% | 2% |
| Crossed SJR to South Delta | lolo | 51% | 10% | 6% | 51% | 50% | 50% | 50% | 52% |
| Crossed SJR to South Delta | lomed | 56% | -6% | -5% | 55% | 55% | 51% | 51% | 52% |
| Crossed SJR to South Delta | lohi | 61% | #N/A | -15% | 57% | 54% | 60% | 60% | 41% |
| Crossed SJR to South Delta | medlo | 54% | 3% | 4% | 54% | 54% | 54% | 54% | 54% |
| Crossed SJR to South Delta | medmed | 59% | -9% | -5% | 60% | 59% | 54% | 54% | 58% |
| Crossed SJR to South Delta | medhi | 55% | -24% | -23% | 56% | 56% | 48% | 48% | 55% |
| Crossed SJR to South Delta | hilo | 56% | -1% | 1% | 56% | 56% | 56% | 56% | 56% |
| Crossed SJR to South Delta | himed | 57% | -17% | -14% | 57% | 57% | 55% | 55% | 57% |
| Crossed SJR to South Delta | hihi | 32% | -26% | -25% | 33% | 33% | 31% | 31% | 35% |

Table I.8-12. Mean December through March surface-oriented particle fate by Inflow bin for NAA, EXP1, EXP3, four phases of Alternative 2, and Action 5 – particle insertion location at Old and Middle River for all particle system exit points. Note that NA values result from no data falling into that Inflow bin.

| Exit Point | Flow Bin | NAA | EXP1 | EXP3 | Alt2wTUCPwoVA | Alt2woTUCPwoVA | Alt2woTUCPDeltaVA | Alt2woTUCPAllVA | ACT5 |
|---|---|---|---|---|---|---|---|---|---|
| West of Chipps | lolo | 6% | 47% | 49% | 6% | 6% | 6% | 6% | 5% |
| West of Chipps | lomed | 5% | 55% | 58% | 6% | 7% | 10% | 10% | 8% |
| West of Chipps | lohi | 4% | #N/A | 72% | 5% | 6% | 4% | 4% | 14% |
| West of Chipps | medlo | 5% | 59% | 57% | 5% | 5% | 5% | 5% | 5% |
| West of Chipps | medmed | 7% | 67% | 64% | 7% | 8% | 10% | 11% | 8% |
| West of Chipps | medhi | 11% | 93% | 90% | 11% | 11% | 13% | 13% | 11% |
| West of Chipps | hilo | 8% | 65% | 64% | 8% | 8% | 8% | 8% | 7% |
| West of Chipps | himed | 10% | 80% | 76% | 10% | 10% | 11% | 11% | 10% |
| West of Chipps | hihi | 26% | 97% | 96% | 26% | 26% | 27% | 27% | 24% |
| Entrained at Exports | lolo | 86% | 0% | 0% | 87% | 86% | 86% | 86% | 88% |
| Entrained at Exports | lomed | 89% | 0% | 0% | 87% | 85% | 82% | 82% | 85% |
| Entrained at Exports | lohi | 92% | #N/A | 0% | 88% | 86% | 91% | 91% | 74% |
| Entrained at Exports | medlo | 92% | 0% | 0% | 91% | 91% | 91% | 91% | 92% |
| Entrained at Exports | medmed | 90% | 0% | 0% | 90% | 89% | 85% | 85% | 89% |
| Entrained at Exports | medhi | 87% | 0% | 0% | 88% | 88% | 84% | 84% | 87% |
| Entrained at Exports | hilo | 90% | 0% | 0% | 89% | 90% | 89% | 89% | 90% |
| Entrained at Exports | himed | 88% | 0% | 0% | 88% | 88% | 87% | 87% | 88% |
| Entrained at Exports | hihi | 72% | 0% | 0% | 73% | 72% | 71% | 71% | 74% |
| Remaining in Delta | lolo | 9% | 53% | 51% | 8% | 8% | 8% | 8% | 7% |
| Remaining in Delta | lomed | 5% | 45% | 42% | 7% | 8% | 8% | 8% | 7% |

| Exit Point | Flow Bin | NAA | EXP1 | EXP3 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ACT5 |
|---|---|---|---|---|---|---|---|---|---|
| Remaining in Delta | lohi | 5% | #N/A | 28% | 7% | 8% | 5% | 5% | 11% |
| Remaining in Delta | medlo | 3% | 41% | 43% | 3% | 3% | 3% | 3% | 3% |
| Remaining in Delta | medmed | 3% | 33% | 36% | 3% | 3% | 4% | 4% | 3% |
| Remaining in Delta | medhi | 2% | 7% | 10% | 2% | 2% | 3% | 3% | 2% |
| Remaining in Delta | hilo | 2% | 34% | 36% | 2% | 2% | 3% | 3% | 2% |
| Remaining in Delta | himed | 2% | 20% | 24% | 2% | 2% | 2% | 2% | 2% |
| Remaining in Delta | hihi | 2% | 2% | 4% | 2% | 2% | 2% | 2% | 2% |
| Crossed SJR to South Delta | lolo | -9% | -66% | -71% | -9% | -10% | -9% | -10% | -8% |
| Crossed SJR to South Delta | lomed | -8% | -80% | -80% | -9% | -11% | -14% | -14% | -11% |
| Crossed SJR to South Delta | lohi | -6% | #N/A | -88% | -10% | -11% | -6% | -6% | -18% |
| Crossed SJR to South Delta | medlo | -6% | -74% | -73% | -6% | -6% | -6% | -6% | -6% |
| Crossed SJR to South Delta | medmed | -8% | -82% | -80% | -8% | -9% | -12% | -12% | -9% |
| Crossed SJR to South Delta | medhi | -11% | -97% | -95% | -11% | -11% | -14% | -14% | -12% |
| Crossed SJR to South Delta | hilo | -8% | -76% | -75% | -8% | -8% | -8% | -8% | -8% |
| Crossed SJR to South Delta | himed | -10% | -88% | -85% | -11% | -11% | -12% | -12% | -11% |
| Crossed SJR to South Delta | hihi | -27% | -98% | -98% | -26% | -26% | -27% | -27% | -25% |

Table I.8-13. Mean December through March surface-oriented particle fate by Inflow bin for NAA, EXP1, EXP3, four phases of Alternative 2, and Action 5 – particle insertion location at Southern Delta for all particle system exit points. Note that NA values result from no data falling into that Inflow bin.

| Exit Point | Flow Bin | NAA | EXP1 | EXP3 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ACT5 |
|---|---|---|---|---|---|---|---|---|---|
| West of Chipps | lolo | 0% | 20% | 25% | 0% | 0% | 0% | 0% | 0% |
| West of Chipps | lomed | 0% | 37% | 39% | 0% | 0% | 0% | 0% | 0% |
| West of Chipps | lohi | 0% | #N/A | 60% | 0% | 0% | 0% | 0% | 0% |
| West of Chipps | medlo | 0% | 34% | 31% | 0% | 0% | 0% | 0% | 0% |
| West of Chipps | medmed | 0% | 48% | 43% | 0% | 0% | 0% | 0% | 0% |
| West of Chipps | medhi | 0% | 87% | 83% | 0% | 0% | 0% | 0% | 0% |
| West of Chipps | hilo | 0% | 41% | 39% | 0% | 0% | 0% | 0% | 0% |
| West of Chipps | himed | 0% | 65% | 58% | 0% | 0% | 0% | 0% | 0% |
| West of Chipps | hihi | 5% | 94% | 92% | 4% | 4% | 4% | 4% | 4% |
| Entrained at Exports | lolo | 100% | 1% | 0% | 100% | 100% | 100% | 100% | 100% |
| Entrained at Exports | lomed | 100% | 4% | 1% | 100% | 100% | 100% | 100% | 100% |
| Entrained at Exports | lohi | 100% | #N/A | 0% | 100% | 100% | 100% | 100% | 100% |
| Entrained at Exports | medlo | 100% | 1% | 1% | 100% | 100% | 100% | 100% | 100% |
| Entrained at Exports | medmed | 100% | 0% | 1% | 100% | 100% | 100% | 100% | 100% |
| Entrained at Exports | medhi | 100% | 0% | 0% | 100% | 100% | 100% | 100% | 100% |
| Entrained at Exports | hilo | 100% | 1% | 1% | 100% | 100% | 100% | 100% | 100% |
| Entrained at Exports | himed | 100% | 2% | 2% | 100% | 100% | 100% | 100% | 100% |
| Entrained at Exports | hihi | 95% | 1% | 1% | 96% | 96% | 96% | 96% | 96% |
| Remaining in Delta | lolo | 0% | 79% | 74% | 0% | 0% | 0% | 0% | 0% |
| Remaining in Delta | lomed | 0% | 59% | 60% | 0% | 0% | 0% | 0% | 0% |

| Exit Point | Flow Bin | NAA | EXP1 | EXP3 | Alt2wTUCPwoVA | Alt2woTUCPwoVA | Alt2woTUCPDeltaVA | Alt2woTUCPAllVA | ACT5 |
|---|---|---|---|---|---|---|---|---|---|
| Remaining in Delta | lohi | 0% | #N/A | 40% | 0% | 0% | 0% | 0% | 0% |
| Remaining in Delta | medlo | 0% | 65% | 68% | 0% | 0% | 0% | 0% | 0% |
| Remaining in Delta | medmed | 0% | 52% | 56% | 0% | 0% | 0% | 0% | 0% |
| Remaining in Delta | medhi | 0% | 13% | 17% | 0% | 0% | 0% | 0% | 0% |
| Remaining in Delta | hilo | 0% | 58% | 60% | 0% | 0% | 0% | 0% | 0% |
| Remaining in Delta | himed | 0% | 34% | 40% | 0% | 0% | 0% | 0% | 0% |
| Remaining in Delta | hihi | 0% | 6% | 8% | 0% | 0% | 0% | 0% | 0% |
| Crossed SJR to South Delta | lolo | 0% | -38% | -47% | 0% | 0% | 0% | 0% | 0% |
| Crossed SJR to South Delta | lomed | 0% | -65% | -64% | 0% | 0% | 0% | 0% | 0% |
| Crossed SJR to South Delta | lohi | 0% | #N/A | -79% | 0% | 0% | 0% | 0% | 0% |
| Crossed SJR to South Delta | medlo | 0% | -51% | -49% | 0% | 0% | 0% | 0% | 0% |
| Crossed SJR to South Delta | medmed | 0% | -67% | -62% | 0% | 0% | 0% | 0% | 0% |
| Crossed SJR to South Delta | medhi | 0% | -93% | -90% | 0% | 0% | 0% | 0% | 0% |
| Crossed SJR to South Delta | hilo | 0% | -54% | -52% | 0% | 0% | 0% | 0% | 0% |
| Crossed SJR to South Delta | himed | 0% | -76% | -71% | 0% | 0% | 0% | 0% | 0% |
| Crossed SJR to South Delta | hihi | -5% | -95% | -94% | -4% | -4% | -4% | -4% | -4% |

Table I.8-14. Mean December through March surface-oriented particle fate by Inflow bin for NAA, EXP1, EXP3, four phases of Alternative 2, and Action 5 – particle insertion location at Central Delta for all particle system exit points. Note that NA values result from no data falling into that Inflow bin.

| Exit Point | Flow Bin | NAA | EXP1 | EXP3 | Alt2wTUCPwoVA | Alt2woTUCPwoVA | Alt2woTUCPDeltaVA | Alt2woTUCPAllVA | ACT5 |
|---|---|---|---|---|---|---|---|---|---|
| West of Chipps | lolo | 27% | 77% | 80% | 27% | 29% | 27% | 27% | 26% |
| West of Chipps | lomed | 31% | 82% | 86% | 33% | 35% | 43% | 44% | 41% |
| West of Chipps | lohi | 25% | #N/A | 92% | 28% | 31% | 26% | 26% | 58% |
| West of Chipps | medlo | 33% | 90% | 89% | 33% | 34% | 34% | 33% | 30% |
| West of Chipps | medmed | 46% | 93% | 93% | 46% | 47% | 54% | 54% | 47% |
| West of Chipps | medhi | 67% | 99% | 99% | 67% | 67% | 72% | 73% | 65% |
| West of Chipps | hilo | 56% | 95% | 95% | 55% | 55% | 55% | 55% | 52% |
| West of Chipps | himed | 68% | 98% | 98% | 69% | 69% | 70% | 70% | 67% |
| West of Chipps | hihi | 89% | 100% | 100% | 88% | 88% | 89% | 89% | 87% |
| Entrained at Exports | lolo | 46% | 0% | 0% | 46% | 44% | 46% | 45% | 48% |
| Entrained at Exports | lomed | 43% | 0% | 0% | 38% | 38% | 29% | 29% | 31% |
| Entrained at Exports | lohi | 49% | #N/A | 0% | 36% | 31% | 48% | 47% | 25% |
| Entrained at Exports | medlo | 56% | 0% | 0% | 53% | 53% | 54% | 54% | 57% |
| Entrained at Exports | medmed | 42% | 0% | 0% | 41% | 40% | 33% | 33% | 39% |
| Entrained at Exports | medhi | 26% | 0% | 0% | 27% | 27% | 21% | 21% | 29% |
| Entrained at Exports | hilo | 39% | 0% | 0% | 39% | 39% | 39% | 40% | 43% |
| Entrained at Exports | himed | 28% | 0% | 0% | 27% | 27% | 25% | 25% | 29% |
| Entrained at Exports | hihi | 10% | 0% | 0% | 11% | 11% | 10% | 10% | 12% |
| Remaining in Delta | lolo | 27% | 23% | 20% | 26% | 27% | 27% | 28% | 26% |
| Remaining in Delta | lomed | 25% | 18% | 14% | 29% | 27% | 28% | 27% | 28% |

| Exit Point | Flow Bin | NAA | EXP1 | EXP3 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ACT5 |
|---|---|---|---|---|---|---|---|---|---|
| Remaining in Delta | lohi | 26% | #N/A | 8% | 36% | 37% | 27% | 27% | 17% |
| Remaining in Delta | medlo | 12% | 10% | 11% | 13% | 13% | 13% | 13% | 13% |
| Remaining in Delta | medmed | 13% | 7% | 7% | 13% | 13% | 14% | 13% | 13% |
| Remaining in Delta | medhi | 6% | 1% | 1% | 6% | 6% | 6% | 6% | 6% |
| Remaining in Delta | hilo | 5% | 5% | 5% | 6% | 6% | 6% | 6% | 5% |
| Remaining in Delta | himed | 4% | 2% | 2% | 4% | 4% | 4% | 4% | 4% |
| Remaining in Delta | hihi | 1% | 0% | 0% | 1% | 1% | 1% | 1% | 1% |
| Crossed SJR to South Delta | lolo | 57% | 8% | 6% | 57% | 55% | 57% | 56% | 58% |
| Crossed SJR to South Delta | lomed | 54% | 4% | 4% | 50% | 48% | 40% | 40% | 43% |
| Crossed SJR to South Delta | lohi | 60% | #N/A | 2% | 46% | 42% | 59% | 58% | 32% |
| Crossed SJR to South Delta | medlo | 61% | 4% | 4% | 60% | 59% | 60% | 60% | 63% |
| Crossed SJR to South Delta | medmed | 48% | 2% | 2% | 47% | 47% | 39% | 39% | 46% |
| Crossed SJR to South Delta | medhi | 30% | 0% | 0% | 30% | 30% | 25% | 25% | 32% |
| Crossed SJR to South Delta | hilo | 42% | 2% | 2% | 42% | 42% | 43% | 43% | 46% |
| Crossed SJR to South Delta | himed | 30% | 1% | 1% | 30% | 30% | 28% | 28% | 31% |
| Crossed SJR to South Delta | hihi | 11% | 0% | 0% | 11% | 11% | 10% | 11% | 12% |

Table I.8-15. Mean December through March surface-oriented particle fate by Inflow bin for NAA, EXP1, EXP3, four phases of Alternative 2, and Action 5 – particle insertion location at Sacramento River for all particle system exit points. Note that NA values result from no data falling into that Inflow bin.

| Exit Point | Flow Bin | NAA | EXP1 | EXP3 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ACT5 |
|---|---|---|---|---|---|---|---|---|---|
| West of Chipps | lolo | 58% | 90% | 91% | 59% | 60% | 58% | 58% | 59% |
| West of Chipps | lomed | 68% | 89% | 94% | 67% | 69% | 75% | 75% | 73% |
| West of Chipps | lohi | 50% | #N/A | 96% | 46% | 48% | 51% | 51% | 73% |
| West of Chipps | medlo | 76% | 97% | 97% | 76% | 76% | 77% | 76% | 74% |
| West of Chipps | medmed | 84% | 97% | 98% | 85% | 85% | 87% | 87% | 84% |
| West of Chipps | medhi | 94% | 99% | 99% | 94% | 93% | 94% | 94% | 93% |
| West of Chipps | hilo | 93% | 99% | 99% | 93% | 93% | 92% | 92% | 92% |
| West of Chipps | himed | 96% | 99% | 99% | 96% | 96% | 96% | 96% | 96% |
| West of Chipps | hihi | 99% | 100% | 100% | 99% | 99% | 99% | 99% | 99% |
| Entrained at Exports | lolo | 15% | 0% | 0% | 15% | 14% | 15% | 15% | 15% |
| Entrained at Exports | lomed | 11% | 0% | 0% | 9% | 9% | 7% | 7% | 8% |
| Entrained at Exports | lohi | 16% | #N/A | 0% | 12% | 10% | 15% | 15% | 8% |
| Entrained at Exports | medlo | 15% | 0% | 0% | 14% | 14% | 14% | 14% | 15% |
| Entrained at Exports | medmed | 8% | 0% | 0% | 8% | 8% | 7% | 7% | 8% |
| Entrained at Exports | medhi | 3% | 0% | 0% | 4% | 4% | 3% | 3% | 4% |
| Entrained at Exports | hilo | 5% | 0% | 0% | 5% | 5% | 5% | 5% | 6% |
| Entrained at Exports | himed | 3% | 0% | 0% | 3% | 3% | 2% | 3% | 3% |
| Entrained at Exports | hihi | 1% | 0% | 0% | 1% | 1% | 1% | 1% | 1% |
| Remaining in Delta | lolo | 27% | 10% | 9% | 26% | 26% | 27% | 27% | 26% |
| Remaining in Delta | lomed | 21% | 11% | 6% | 24% | 22% | 18% | 18% | 19% |

| Exit Point | Flow Bin | NAA | EXP1 | EXP3 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ACT5 |
|---|---|---|---|---|---|---|---|---|---|
| Remaining in Delta | lohi | 34% | #N/A | 4% | 42% | 42% | 34% | 34% | 19% |
| Remaining in Delta | medlo | 9% | 3% | 3% | 10% | 10% | 9% | 10% | 11% |
| Remaining in Delta | medmed | 7% | 3% | 2% | 7% | 7% | 7% | 7% | 8% |
| Remaining in Delta | medhi | 3% | 1% | 1% | 3% | 3% | 3% | 3% | 3% |
| Remaining in Delta | hilo | 2% | 1% | 1% | 2% | 2% | 2% | 2% | 2% |
| Remaining in Delta | himed | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% |
| Remaining in Delta | hihi | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| Crossed SJR to South Delta | lolo | 22% | 2% | 2% | 21% | 21% | 22% | 21% | 21% |
| Crossed SJR to South Delta | lomed | 16% | 2% | 1% | 15% | 14% | 11% | 11% | 13% |
| Crossed SJR to South Delta | lohi | 26% | #N/A | 0% | 20% | 18% | 25% | 24% | 13% |
| Crossed SJR to South Delta | medlo | 17% | 1% | 1% | 17% | 17% | 17% | 17% | 18% |
| Crossed SJR to South Delta | medmed | 10% | 0% | 0% | 10% | 10% | 9% | 9% | 10% |
| Crossed SJR to South Delta | medhi | 4% | 0% | 0% | 4% | 4% | 3% | 3% | 4% |
| Crossed SJR to South Delta | hilo | 6% | 0% | 0% | 6% | 6% | 6% | 6% | 7% |
| Crossed SJR to South Delta | himed | 3% | 0% | 0% | 3% | 3% | 3% | 3% | 3% |
| Crossed SJR to South Delta | hihi | 1% | 0% | 0% | 1% | 1% | 1% | 1% | 1% |

Table I.8-16. Mean December through March surface-oriented particle fate by Inflow bin for NAA, EXP1, EXP3, four phases of Alternative 2, and Action 5 – particle insertion location at Mokelumne River for all particle system exit points. Note that NA values result from no data falling into that Inflow bin.

| Exit Point | Flow Bin | NAA | EXP1 | EXP3 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ACT5 |
|---|---|---|---|---|---|---|---|---|---|
| West of Chipps | lolo | 10% | 50% | 53% | 10% | 11% | 10% | 10% | 9% |
| West of Chipps | lomed | 13% | 57% | 66% | 13% | 16% | 21% | 22% | 19% |
| West of Chipps | lohi | 14% | #N/A | 79% | 16% | 19% | 13% | 14% | 46% |
| West of Chipps | medlo | 14% | 72% | 70% | 14% | 15% | 14% | 14% | 11% |
| West of Chipps | medmed | 25% | 80% | 80% | 25% | 26% | 34% | 34% | 27% |
| West of Chipps | medhi | 50% | 96% | 96% | 49% | 49% | 57% | 58% | 47% |
| West of Chipps | hilo | 34% | 83% | 82% | 33% | 34% | 33% | 32% | 29% |
| West of Chipps | himed | 51% | 94% | 93% | 51% | 51% | 54% | 54% | 49% |
| West of Chipps | hihi | 82% | 99% | 99% | 81% | 81% | 83% | 83% | 80% |
| Entrained at Exports | lolo | 45% | 0% | 0% | 45% | 44% | 45% | 44% | 48% |
| Entrained at Exports | lomed | 47% | 0% | 0% | 41% | 41% | 31% | 31% | 33% |
| Entrained at Exports | lohi | 53% | #N/A | 0% | 43% | 38% | 51% | 48% | 27% |
| Entrained at Exports | medlo | 65% | 0% | 0% | 61% | 61% | 61% | 61% | 65% |
| Entrained at Exports | medmed | 52% | 0% | 0% | 51% | 50% | 39% | 39% | 48% |
| Entrained at Exports | medhi | 36% | 0% | 0% | 37% | 37% | 28% | 28% | 39% |
| Entrained at Exports | hilo | 54% | 0% | 0% | 54% | 54% | 54% | 55% | 59% |
| Entrained at Exports | himed | 41% | 0% | 0% | 40% | 40% | 37% | 37% | 43% |
| Entrained at Exports | hihi | 16% | 0% | 0% | 16% | 16% | 15% | 15% | 18% |
| Remaining in Delta | lolo | 45% | 50% | 47% | 44% | 46% | 45% | 46% | 26% |
| Remaining in Delta | lomed | 40% | 43% | 34% | 46% | 43% | 47% | 47% | 19% |

| Exit Point | Flow Bin | NAA | EXP1 | EXP3 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ACT5 |
|---|---|---|---|---|---|---|---|---|---|
| Remaining in Delta | lohi | 34% | #N/A | 21% | 41% | 44% | 36% | 38% | 19% |
| Remaining in Delta | medlo | 21% | 28% | 30% | 25% | 25% | 24% | 25% | 11% |
| Remaining in Delta | medmed | 24% | 20% | 20% | 24% | 24% | 27% | 27% | 8% |
| Remaining in Delta | medhi | 14% | 4% | 4% | 14% | 14% | 14% | 14% | 3% |
| Remaining in Delta | hilo | 12% | 17% | 18% | 13% | 12% | 13% | 13% | 2% |
| Remaining in Delta | himed | 8% | 6% | 7% | 9% | 9% | 9% | 9% | 1% |
| Remaining in Delta | hihi | 3% | 1% | 1% | 2% | 2% | 3% | 3% | 0% |
| Crossed SJR to South Delta | lolo | 63% | 13% | 12% | 63% | 62% | 63% | 62% | 65% |
| Crossed SJR to South Delta | lomed | 66% | 11% | 8% | 62% | 61% | 52% | 52% | 55% |
| Crossed SJR to South Delta | lohi | 68% | #N/A | 5% | 59% | 54% | 68% | 66% | 40% |
| Crossed SJR to South Delta | medlo | 75% | 9% | 9% | 72% | 72% | 73% | 73% | 75% |
| Crossed SJR to South Delta | medmed | 63% | 5% | 6% | 63% | 62% | 53% | 52% | 60% |
| Crossed SJR to South Delta | medhi | 43% | 1% | 1% | 43% | 44% | 35% | 35% | 46% |
| Crossed SJR to South Delta | hilo | 61% | 5% | 5% | 61% | 61% | 61% | 62% | 65% |
| Crossed SJR to South Delta | himed | 46% | 2% | 2% | 45% | 45% | 42% | 42% | 48% |
| Crossed SJR to South Delta | hihi | 17% | 0% | 0% | 17% | 17% | 16% | 16% | 19% |

Table I.8-17. Mean December through March surface-oriented particle fate by Inflow bin for NAA, EXP1, EXP3, four phases of Alternative 2, and Action 5 – particle insertion location at Yolo Bypass for all particle system exit points. Note that NA values result from no data falling into that Inflow bin.

| Exit Point | Flow Bin | NAA | EXP1 | EXP3 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ACT5 |
|---|---|---|---|---|---|---|---|---|---|
| West of Chipps | lolo | 36% | 59% | 60% | 37% | 38% | 37% | 37% | 37% |
| West of Chipps | lomed | 40% | 55% | 59% | 39% | 41% | 45% | 46% | 43% |
| West of Chipps | lohi | 32% | #N/A | 61% | 26% | 28% | 33% | 34% | 48% |
| West of Chipps | medlo | 54% | 68% | 68% | 53% | 54% | 55% | 53% | 52% |
| West of Chipps | medmed | 58% | 66% | 68% | 58% | 58% | 59% | 60% | 58% |
| West of Chipps | medhi | 67% | 73% | 72% | 66% | 66% | 67% | 68% | 67% |
| West of Chipps | hilo | 72% | 75% | 74% | 72% | 72% | 72% | 72% | 71% |
| West of Chipps | himed | 76% | 75% | 75% | 75% | 75% | 76% | 76% | 75% |
| West of Chipps | hihi | 78% | 80% | 80% | 78% | 78% | 78% | 78% | 78% |
| Entrained at Exports | lolo | 7% | 0% | 0% | 7% | 6% | 7% | 6% | 7% |
| Entrained at Exports | lomed | 5% | 0% | 0% | 4% | 4% | 3% | 3% | 3% |
| Entrained at Exports | lohi | 8% | #N/A | 0% | 7% | 6% | 7% | 6% | 3% |
| Entrained at Exports | medlo | 6% | 0% | 0% | 6% | 6% | 6% | 6% | 7% |
| Entrained at Exports | medmed | 3% | 0% | 0% | 3% | 3% | 3% | 3% | 3% |
| Entrained at Exports | medhi | 1% | 0% | 0% | 1% | 1% | 1% | 1% | 1% |
| Entrained at Exports | hilo | 1% | 0% | 0% | 1% | 2% | 2% | 1% | 2% |
| Entrained at Exports | himed | 1% | 0% | 0% | 1% | 1% | 1% | 1% | 1% |
| Entrained at Exports | hihi | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| Remaining in Delta | lolo | 57% | 41% | 40% | 56% | 56% | 56% | 57% | 56% |
| Remaining in Delta | lomed | 55% | 45% | 41% | 57% | 55% | 52% | 51% | 54% |

| Exit Point | Flow Bin | NAA | EXP1 | EXP3 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ACT5 |
|---|---|---|---|---|---|---|---|---|---|
| Remaining in Delta | lohi | 60% | #N/A | 39% | 67% | 67% | 60% | 60% | 49% |
| Remaining in Delta | medlo | 39% | 32% | 32% | 41% | 40% | 39% | 40% | 41% |
| Remaining in Delta | medmed | 39% | 34% | 32% | 39% | 39% | 38% | 38% | 39% |
| Remaining in Delta | medhi | 32% | 27% | 28% | 32% | 32% | 32% | 32% | 32% |
| Remaining in Delta | hilo | 27% | 25% | 26% | 27% | 27% | 27% | 27% | 27% |
| Remaining in Delta | himed | 24% | 25% | 25% | 24% | 24% | 24% | 24% | 24% |
| Remaining in Delta | hihi | 22% | 20% | 20% | 22% | 22% | 22% | 22% | 22% |
| Crossed SJR to South Delta | lolo | 12% | 2% | 2% | 12% | 11% | 12% | 12% | 12% |
| Crossed SJR to South Delta | lomed | 9% | 1% | 1% | 8% | 8% | 6% | 6% | 7% |
| Crossed SJR to South Delta | lohi | 14% | #N/A | 1% | 12% | 12% | 13% | 13% | 7% |
| Crossed SJR to South Delta | medlo | 9% | 1% | 1% | 9% | 9% | 9% | 9% | 10% |
| Crossed SJR to South Delta | medmed | 5% | 0% | 0% | 5% | 5% | 4% | 4% | 5% |
| Crossed SJR to South Delta | medhi | 2% | 0% | 0% | 2% | 2% | 2% | 2% | 2% |
| Crossed SJR to South Delta | hilo | 2% | 0% | 0% | 2% | 2% | 2% | 2% | 2% |
| Crossed SJR to South Delta | himed | 1% | 0% | 0% | 1% | 1% | 1% | 1% | 1% |
| Crossed SJR to South Delta | hihi | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |

Table I.8-18. Mean December through March surface-oriented particle fate by Inflow bin for NAA, EXP1, EXP3, four phases of Alternative 2, and Action 5 – particle insertion location at Western Delta for all particle system exit points. Note that NA values result from no data falling into that Inflow bin.

| Exit Point | Flow Bin | NAA | EXP1 | EXP3 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ACT5 |
|---|---|---|---|---|---|---|---|---|---|
| West of Chipps | lolo | 86% | 98% | 99% | 87% | 87% | 86% | 86% | 86% |
| West of Chipps | lomed | 92% | 99% | 99% | 91% | 92% | 94% | 94% | 94% |
| West of Chipps | lohi | 84% | #N/A | 99% | 83% | 84% | 84% | 84% | 91% |
| West of Chipps | medlo | 93% | 99% | 99% | 93% | 93% | 93% | 93% | 92% |
| West of Chipps | medmed | 96% | 99% | 99% | 96% | 96% | 97% | 97% | 96% |
| West of Chipps | medhi | 99% | 100% | 100% | 99% | 99% | 99% | 99% | 99% |
| West of Chipps | hilo | 99% | 100% | 100% | 99% | 99% | 99% | 99% | 99% |
| West of Chipps | himed | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% |
| West of Chipps | hihi | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% |
| Entrained at Exports | lolo | 4% | 0% | 0% | 4% | 4% | 4% | 4% | 4% |
| Entrained at Exports | lomed | 2% | 0% | 0% | 2% | 2% | 1% | 1% | 2% |
| Entrained at Exports | lohi | 4% | #N/A | 0% | 2% | 2% | 4% | 4% | 2% |
| Entrained at Exports | medlo | 4% | 0% | 0% | 4% | 4% | 4% | 4% | 4% |
| Entrained at Exports | medmed | 2% | 0% | 0% | 2% | 2% | 1% | 2% | 2% |
| Entrained at Exports | medhi | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| Entrained at Exports | hilo | 0% | 0% | 0% | 0% | 0% | 0% | 1% | 1% |
| Entrained at Exports | himed | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| Entrained at Exports | hihi | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| Remaining in Delta | lolo | 10% | 2% | 1% | 9% | 9% | 10% | 10% | 10% |
| Remaining in Delta | lomed | 6% | 1% | 1% | 7% | 6% | 5% | 4% | 5% |

| Exit Point | Flow Bin | NAA | EXP1 | EXP3 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ACT5 |
|---|---|---|---|---|---|---|---|---|---|
| Remaining in Delta | lohi | 12% | #N/A | 1% | 15% | 14% | 12% | 12% | 7% |
| Remaining in Delta | medlo | 3% | 1% | 1% | 3% | 3% | 3% | 3% | 4% |
| Remaining in Delta | medmed | 2% | 1% | 1% | 2% | 2% | 2% | 2% | 2% |
| Remaining in Delta | medhi | 1% | 0% | 0% | 1% | 1% | 1% | 1% | 1% |
| Remaining in Delta | hilo | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| Remaining in Delta | himed | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| Remaining in Delta | hihi | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| Crossed SJR to South Delta | lolo | 6% | 0% | 0% | 6% | 6% | 6% | 6% | 6% |
| Crossed SJR to South Delta | lomed | 3% | 0% | 0% | 3% | 3% | 2% | 2% | 2% |
| Crossed SJR to South Delta | lohi | 7% | #N/A | 0% | 4% | 3% | 7% | 7% | 3% |
| Crossed SJR to South Delta | medlo | 5% | 0% | 0% | 5% | 5% | 5% | 5% | 5% |
| Crossed SJR to South Delta | medmed | 2% | 0% | 0% | 2% | 2% | 2% | 2% | 2% |
| Crossed SJR to South Delta | medhi | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| Crossed SJR to South Delta | hilo | 0% | 0% | 0% | 1% | 1% | 1% | 1% | 1% |
| Crossed SJR to South Delta | himed | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| Crossed SJR to South Delta | hihi | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |

Table I.8-19. Mean December through March surface-oriented particle fate by Inflow bin for NAA, EXP1, EXP3, four phases of Alternative 2, and Action 5 – particle insertion location at Suisun Bay for all particle system exit points. Note that NA values result from no data falling into that Inflow bin.

| Exit Point | Flow Bin | NAA | EXP1 | EXP3 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ACT5 |
|---|---|---|---|---|---|---|---|---|---|
| West of Chipps | lolo | 89% | 67% | 69% | 89% | 89% | 90% | 91% | 91% |
| West of Chipps | lomed | 78% | 62% | 70% | 79% | 81% | 78% | 78% | 75% |
| West of Chipps | lohi | 83% | #N/A | 70% | 96% | 97% | 83% | 83% | 76% |
| West of Chipps | medlo | 86% | 82% | 80% | 87% | 87% | 87% | 87% | 87% |
| West of Chipps | medmed | 83% | 82% | 84% | 82% | 81% | 82% | 83% | 83% |
| West of Chipps | medhi | 82% | 92% | 91% | 81% | 81% | 83% | 83% | 85% |
| West of Chipps | hilo | 95% | 94% | 94% | 95% | 95% | 94% | 95% | 95% |
| West of Chipps | himed | 97% | 97% | 96% | 97% | 97% | 97% | 97% | 97% |
| West of Chipps | hihi | 98% | 99% | 99% | 98% | 98% | 98% | 98% | 98% |
| Entrained at Exports | lolo | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| Entrained at Exports | lomed | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| Entrained at Exports | lohi | 0% | #N/A | 0% | 0% | 0% | 0% | 0% | 0% |
| Entrained at Exports | medlo | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| Entrained at Exports | medmed | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| Entrained at Exports | medhi | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| Entrained at Exports | hilo | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| Entrained at Exports | himed | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| Entrained at Exports | hihi | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| Remaining in Delta | lolo | 11% | 33% | 31% | 11% | 11% | 10% | 9% | 9% |
| Remaining in Delta | lomed | 22% | 38% | 30% | 21% | 19% | 22% | 22% | 25% |

| Exit Point | Flow Bin | NAA | EXP1 | EXP3 | Alt2wTUCPwoVA | Alt2woTUCPwoVA | Alt2woTUCPDeltaVA | Alt2woTUCPAllVA | ACT5 |
|---|---|---|---|---|---|---|---|---|---|
| Remaining in Delta | lohi | 17% | #N/A | 30% | 4% | 3% | 17% | 17% | 24% |
| Remaining in Delta | medlo | 14% | 18% | 20% | 13% | 13% | 13% | 13% | 13% |
| Remaining in Delta | medmed | 17% | 18% | 16% | 18% | 18% | 18% | 17% | 17% |
| Remaining in Delta | medhi | 18% | 8% | 9% | 19% | 19% | 17% | 17% | 15% |
| Remaining in Delta | hilo | 5% | 6% | 6% | 5% | 5% | 6% | 5% | 5% |
| Remaining in Delta | himed | 3% | 3% | 4% | 3% | 3% | 3% | 3% | 3% |
| Remaining in Delta | hihi | 2% | 1% | 1% | 2% | 2% | 2% | 2% | 2% |
| Crossed SJR to South Delta | lolo | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| Crossed SJR to South Delta | lomed | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| Crossed SJR to South Delta | lohi | 0% | #N/A | 0% | 0% | 0% | 0% | 0% | 0% |
| Crossed SJR to South Delta | medlo | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| Crossed SJR to South Delta | medmed | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| Crossed SJR to South Delta | medhi | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| Crossed SJR to South Delta | hilo | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| Crossed SJR to South Delta | himed | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| Crossed SJR to South Delta | hihi | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |

#### *I.8.4.3.3 Neutrally Buoyant, OMR Bins, March through June [BA, Table I.8-20 through Table I.8-28]*

Table I.8-20. Mean March through June neutrally buoyant particle fate by OMR bin for NAA, EXP1, EXP3, four phases of Alternative 2, and Action 5 – particle insertion location at San Joaquin River for all particle system exit points. Note that NA values result from no data falling into that OMR bin.

| Exit Point | OMR Bin | NAA | EXP1 | EXP3 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ACT5 |
|---|---|---|---|---|---|---|---|---|---|
| West of Chipps | -2000 | 10% | #N/A | #N/A | 3% | 4% | 10% | 12% | 7% |
| West of Chipps | -3500 | 20% | #N/A | #N/A | 13% | 13% | 17% | 16% | 14% |
| West of Chipps | -5000 | 2% | #N/A | #N/A | 17% | 17% | 16% | 15% | 8% |
| West of Chipps | -5500 | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |
| Entrained at Exports | -2000 | 59% | #N/A | #N/A | 56% | 58% | 57% | 58% | 56% |
| Entrained at Exports | -3500 | 69% | #N/A | #N/A | 72% | 72% | 69% | 71% | 70% |
| Entrained at Exports | -5000 | 88% | #N/A | #N/A | 77% | 76% | 78% | 79% | 83% |
| Entrained at Exports | -5500 | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |
| Remaining in Delta | -2000 | 31% | #N/A | #N/A | 41% | 38% | 32% | 30% | 37% |
| Remaining in Delta | -3500 | 11% | #N/A | #N/A | 15% | 15% | 14% | 13% | 16% |
| Remaining in Delta | -5000 | 10% | #N/A | #N/A | 7% | 7% | 6% | 6% | 9% |
| Remaining in Delta | -5500 | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |
| Crossed SJR to South Delta | -2000 | 46% | #N/A | #N/A | 49% | 48% | 46% | 45% | 48% |
| Crossed SJR to South Delta | -3500 | 46% | #N/A | #N/A | 50% | 50% | 48% | 49% | 50% |
| Crossed SJR to South Delta | -5000 | 67% | #N/A | #N/A | 53% | 53% | 54% | 55% | 60% |
| Crossed SJR to South Delta | -5500 | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |

Table I.8-21. Mean March through June neutrally buoyant particle fate by OMR bin for NAA, EXP1, EXP3, four phases of Alternative 2, and Action 5– particle insertion location at Old and Middle River for all particle system exit points. Note that NA values result from no data falling into that OMR bin.

| Exit Point | OMR Bin | NAA | EXP1 | EXP3 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ACT5 |
|---|---|---|---|---|---|---|---|---|---|
| West of Chipps | -2000 | 13% | #N/A | #N/A | 10% | 10% | 13% | 14% | 12% |
| West of Chipps | -3500 | 13% | #N/A | #N/A | 11% | 12% | 13% | 12% | 11% |
| West of Chipps | -5000 | 6% | #N/A | #N/A | 10% | 10% | 10% | 10% | 8% |
| West of Chipps | -5500 | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |
| Entrained at Exports | -2000 | 73% | #N/A | #N/A | 74% | 75% | 74% | 73% | 73% |
| Entrained at Exports | -3500 | 83% | #N/A | #N/A | 83% | 83% | 81% | 82% | 81% |
| Entrained at Exports | -5000 | 88% | #N/A | #N/A | 85% | 85% | 86% | 86% | 87% |
| Entrained at Exports | -5500 | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |
| Remaining in Delta | -2000 | 14% | #N/A | #N/A | 17% | 15% | 13% | 13% | 15% |
| Remaining in Delta | -3500 | 4% | #N/A | #N/A | 6% | 5% | 7% | 6% | 8% |
| Remaining in Delta | -5000 | 6% | #N/A | #N/A | 4% | 4% | 4% | 4% | 5% |
| Remaining in Delta | -5500 | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |
| Crossed SJR to South Delta | -2000 | -17% | #N/A | #N/A | -15% | -15% | -17% | -17% | -17% |
| Crossed SJR to South Delta | -3500 | -14% | #N/A | #N/A | -13% | -13% | -14% | -14% | -13% |
| Crossed SJR to South Delta | -5000 | -7% | #N/A | #N/A | -11% | -11% | -11% | -11% | -9% |
| Crossed SJR to South Delta | -5500 | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |

Table I.8-22. Mean March through June neutrally buoyant particle fate by OMR bin for NAA, EXP1, EXP3, four phases of Alternative 2, and Action 5 – particle insertion location at Southern Delta for all particle system exit points. Note that NA values result from no data falling into that OMR bin.

| Exit Point | OMR Bin | NAA | EXP1 | EXP3 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ACT5 |
|---|---|---|---|---|---|---|---|---|---|
| West of Chipps | -2000 | 0% | #N/A | #N/A | 0% | 0% | 0% | 0% | 0% |
| West of Chipps | -3500 | 0% | #N/A | #N/A | 0% | 0% | 0% | 0% | 0% |
| West of Chipps | -5000 | 0% | #N/A | #N/A | 0% | 0% | 0% | 0% | 0% |
| West of Chipps | -5500 | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |
| Entrained at Exports | -2000 | 99% | #N/A | #N/A | 99% | 99% | 99% | 99% | 99% |
| Entrained at Exports | -3500 | 100% | #N/A | #N/A | 100% | 100% | 100% | 100% | 100% |
| Entrained at Exports | -5000 | 99% | #N/A | #N/A | 100% | 100% | 100% | 100% | 100% |
| Entrained at Exports | -5500 | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |
| Remaining in Delta | -2000 | 1% | #N/A | #N/A | 1% | 1% | 1% | 1% | 1% |
| Remaining in Delta | -3500 | 0% | #N/A | #N/A | 0% | 0% | 0% | 0% | 0% |
| Remaining in Delta | -5000 | 1% | #N/A | #N/A | 0% | 0% | 0% | 0% | 0% |
| Remaining in Delta | -5500 | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |
| Crossed SJR to South Delta | -2000 | 0% | #N/A | #N/A | 0% | 0% | 0% | 0% | 0% |
| Crossed SJR to South Delta | -3500 | 0% | #N/A | #N/A | 0% | 0% | 0% | 0% | 0% |
| Crossed SJR to South Delta | -5000 | 0% | #N/A | #N/A | 0% | 0% | 0% | 0% | 0% |
| Crossed SJR to South Delta | -5500 | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |

Table I.8-23. Mean March through June neutrally buoyant particle fate by OMR bin for NAA, EXP1, EXP3, four phases of Alternative 2, and Action 5 – particle insertion location at Central Delta for all particle system exit points. Note that NA values result from no data falling into that OMR bin.

| Exit Point | OMR Bin | NAA | EXP1 | EXP3 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ACT5 |
|---|---|---|---|---|---|---|---|---|---|
| West of Chipps | -2000 | 55% | #N/A | #N/A | 38% | 42% | 55% | 57% | 49% |
| West of Chipps | -3500 | 71% | #N/A | #N/A | 62% | 63% | 64% | 64% | 57% |
| West of Chipps | -5000 | 38% | #N/A | #N/A | 67% | 67% | 66% | 65% | 52% |
| West of Chipps | -5500 | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |
| Entrained at Exports | -2000 | 15% | #N/A | #N/A | 14% | 15% | 14% | 14% | 13% |
| Entrained at Exports | -3500 | 19% | #N/A | #N/A | 22% | 21% | 21% | 22% | 22% |
| Entrained at Exports | -5000 | 44% | #N/A | #N/A | 23% | 23% | 25% | 26% | 33% |
| Entrained at Exports | -5500 | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |
| Remaining in Delta | -2000 | 31% | #N/A | #N/A | 48% | 44% | 31% | 29% | 38% |
| Remaining in Delta | -3500 | 11% | #N/A | #N/A | 16% | 16% | 15% | 15% | 21% |
| Remaining in Delta | -5000 | 18% | #N/A | #N/A | 10% | 10% | 9% | 9% | 15% |
| Remaining in Delta | -5500 | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |
| Crossed SJR to South Delta | -2000 | 29% | #N/A | #N/A | 35% | 34% | 28% | 27% | 30% |
| Crossed SJR to South Delta | -3500 | 24% | #N/A | #N/A | 29% | 28% | 28% | 29% | 31% |
| Crossed SJR to South Delta | -5000 | 52% | #N/A | #N/A | 27% | 27% | 29% | 30% | 39% |
| Crossed SJR to South Delta | -5500 | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |

Table I.8-24. Mean March through June neutrally buoyant particle fate by OMR bin for NAA, EXP1, EXP3, four phases of Alternative 2, and Action 5 – particle insertion location at Sacramento River for all particle system exit points. Note that NA values result from no data falling into that OMR bin.

| Exit Point | OMR Bin | NAA | EXP1 | EXP3 | Alt2wTUCPwoVA | Alt2woTUCPwoVA | Alt2woTUCPDeltaVA | Alt2woTUCPAllVA | ACT5 |
|---|---|---|---|---|---|---|---|---|---|
| West of Chipps | -2000 | 77% | #N/A | #N/A | 64% | 69% | 76% | 79% | 73% |
| West of Chipps | -3500 | 90% | #N/A | #N/A | 87% | 88% | 86% | 87% | 83% |
| West of Chipps | -5000 | 65% | #N/A | #N/A | 86% | 86% | 85% | 84% | 78% |
| West of Chipps | -5500 | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |
| Entrained at Exports | -2000 | 3% | #N/A | #N/A | 3% | 3% | 3% | 3% | 2% |
| Entrained at Exports | -3500 | 3% | #N/A | #N/A | 3% | 3% | 4% | 4% | 4% |
| Entrained at Exports | -5000 | 14% | #N/A | #N/A | 5% | 5% | 6% | 7% | 8% |
| Entrained at Exports | -5500 | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |
| Remaining in Delta | -2000 | 20% | #N/A | #N/A | 34% | 28% | 21% | 19% | 25% |
| Remaining in Delta | -3500 | 7% | #N/A | #N/A | 9% | 9% | 10% | 9% | 14% |
| Remaining in Delta | -5000 | 20% | #N/A | #N/A | 9% | 9% | 9% | 9% | 14% |
| Remaining in Delta | -5500 | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |
| Crossed SJR to South Delta | -2000 | 8% | #N/A | #N/A | 11% | 10% | 9% | 8% | 8% |
| Crossed SJR to South Delta | -3500 | 5% | #N/A | #N/A | 5% | 5% | 6% | 6% | 7% |
| Crossed SJR to South Delta | -5000 | 20% | #N/A | #N/A | 7% | 7% | 8% | 9% | 11% |
| Crossed SJR to South Delta | -5500 | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |

Table I.8-25. Mean March through June neutrally buoyant particle fate by OMR bin for NAA, EXP1, EXP3, four phases of Alternative 2, and Action 5 – particle insertion location at Mokelumne River for all particle system exit points. Note that NA values result from no data falling into that OMR bin.

| Exit Point | OMR Bin | NAA | EXP1 | EXP3 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ACT5 |
|---|---|---|---|---|---|---|---|---|---|
| West of Chipps | -2000 | 33% | #N/A | #N/A | 17% | 19% | 34% | 38% | 27% |
| West of Chipps | -3500 | 56% | #N/A | #N/A | 43% | 44% | 46% | 46% | 39% |
| West of Chipps | -5000 | 19% | #N/A | #N/A | 52% | 52% | 52% | 50% | 34% |
| West of Chipps | -5500 | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |
| Entrained at Exports | -2000 | 16% | #N/A | #N/A | 13% | 14% | 15% | 15% | 14% |
| Entrained at Exports | -3500 | 24% | #N/A | #N/A | 27% | 27% | 27% | 28% | 27% |
| Entrained at Exports | -5000 | 59% | #N/A | #N/A | 34% | 34% | 36% | 37% | 46% |
| Entrained at Exports | -5500 | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |
| Remaining in Delta | -2000 | 50% | #N/A | #N/A | 70% | 67% | 51% | 48% | 59% |
| Remaining in Delta | -3500 | 19% | #N/A | #N/A | 29% | 28% | 27% | 25% | 34% |
| Remaining in Delta | -5000 | 21% | #N/A | #N/A | 15% | 15% | 13% | 14% | 20% |
| Remaining in Delta | -5500 | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |
| Crossed SJR to South Delta | -2000 | 38% | #N/A | #N/A | 42% | 42% | 37% | 36% | 39% |
| Crossed SJR to South Delta | -3500 | 34% | #N/A | #N/A | 40% | 40% | 39% | 40% | 42% |
| Crossed SJR to South Delta | -5000 | 69% | #N/A | #N/A | 40% | 40% | 41% | 43% | 55% |
| Crossed SJR to South Delta | -5500 | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |

Table I.8-26. Mean March through June neutrally buoyant particle fate by OMR bin for NAA, EXP1, EXP3, four phases of Alternative 2, and Action 5 – particle insertion location at Yolo Bypass for all particle system exit points. Note that NA values result from no data falling into that OMR bin.

| Exit Point | OMR Bin | NAA | EXP1 | EXP3 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ACT5 |
|---|---|---|---|---|---|---|---|---|---|
| West of Chipps | -2000 | 42% | #N/A | #N/A | 31% | 34% | 43% | 45% | 38% |
| West of Chipps | -3500 | 59% | #N/A | #N/A | 51% | 51% | 52% | 52% | 44% |
| West of Chipps | -5000 | 33% | #N/A | #N/A | 46% | 46% | 49% | 47% | 43% |
| West of Chipps | -5500 | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |
| Entrained at Exports | -2000 | 1% | #N/A | #N/A | 1% | 1% | 1% | 1% | 1% |
| Entrained at Exports | -3500 | 1% | #N/A | #N/A | 1% | 1% | 1% | 1% | 1% |
| Entrained at Exports | -5000 | 6% | #N/A | #N/A | 2% | 2% | 2% | 3% | 3% |
| Entrained at Exports | -5500 | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |
| Remaining in Delta | -2000 | 57% | #N/A | #N/A | 68% | 65% | 56% | 54% | 62% |
| Remaining in Delta | -3500 | 40% | #N/A | #N/A | 48% | 48% | 47% | 46% | 55% |
| Remaining in Delta | -5000 | 61% | #N/A | #N/A | 52% | 52% | 49% | 51% | 54% |
| Remaining in Delta | -5500 | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |
| Crossed SJR to South Delta | -2000 | 5% | #N/A | #N/A | 5% | 5% | 5% | 4% | 4% |
| Crossed SJR to South Delta | -3500 | 2% | #N/A | #N/A | 2% | 2% | 3% | 3% | 3% |
| Crossed SJR to South Delta | -5000 | 10% | #N/A | #N/A | 3% | 3% | 4% | 4% | 5% |
| Crossed SJR to South Delta | -5500 | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |

Table I.8-27. Mean March through June neutrally buoyant particle fate by OMR bin for NAA, EXP1, EXP3, four phases of Alternative 2, and Action 5 – particle insertion location at Western Delta for all particle system exit points. Note that NA values result from no data falling into that OMR bin.

| Exit Point | OMR Bin | NAA | EXP1 | EXP3 | Alt2wTUCPwoVA | Alt2woTUCPwoVA | Alt2woTUCPDeltaVA | Alt2woTUCPAllVA | ACT5 |
|---|---|---|---|---|---|---|---|---|---|
| West of Chipps | -2000 | 95% | #N/A | #N/A | 90% | 93% | 95% | 95% | 93% |
| West of Chipps | -3500 | 98% | #N/A | #N/A | 98% | 98% | 97% | 98% | 97% |
| West of Chipps | -5000 | 92% | #N/A | #N/A | 98% | 98% | 98% | 98% | 96% |
| West of Chipps | -5500 | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |
| Entrained at Exports | -2000 | 0% | #N/A | #N/A | 0% | 0% | 0% | 0% | 0% |
| Entrained at Exports | -3500 | 0% | #N/A | #N/A | 0% | 0% | 0% | 0% | 0% |
| Entrained at Exports | -5000 | 2% | #N/A | #N/A | 0% | 0% | 1% | 1% | 1% |
| Entrained at Exports | -5500 | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |
| Remaining in Delta | -2000 | 5% | #N/A | #N/A | 10% | 7% | 5% | 4% | 7% |
| Remaining in Delta | -3500 | 2% | #N/A | #N/A | 2% | 2% | 2% | 2% | 3% |
| Remaining in Delta | -5000 | 6% | #N/A | #N/A | 2% | 2% | 2% | 2% | 4% |
| Remaining in Delta | -5500 | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |
| Crossed SJR to South Delta | -2000 | 1% | #N/A | #N/A | 2% | 1% | 1% | 1% | 1% |
| Crossed SJR to South Delta | -3500 | 1% | #N/A | #N/A | 0% | 0% | 1% | 1% | 1% |
| Crossed SJR to South Delta | -5000 | 3% | #N/A | #N/A | 1% | 1% | 1% | 1% | 1% |
| Crossed SJR to South Delta | -5500 | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |

Table I.8-28. Mean March through June neutrally buoyant particle fate by OMR bin for NAA, EXP1, EXP3, four phases of Alternative 2, and Action 5 – particle insertion location at Suisun Bay for all particle system exit points. Note that NA values result from no data falling into that OMR bin.

| Exit Point | OMR Bin | NAA | EXP1 | EXP3 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ACT5 |
|---|---|---|---|---|---|---|---|---|---|
| West of Chipps | -2000 | 69% | #N/A | #N/A | 66% | 62% | 70% | 71% | 69% |
| West of Chipps | -3500 | 86% | #N/A | #N/A | 77% | 78% | 77% | 77% | 71% |
| West of Chipps | -5000 | 73% | #N/A | #N/A | 74% | 74% | 75% | 73% | 76% |
| West of Chipps | -5500 | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |
| Entrained at Exports | -2000 | 0% | #N/A | #N/A | 0% | 0% | 0% | 0% | 0% |
| Entrained at Exports | -3500 | 0% | #N/A | #N/A | 0% | 0% | 0% | 0% | 0% |
| Entrained at Exports | -5000 | 0% | #N/A | #N/A | 0% | 0% | 0% | 0% | 0% |
| Entrained at Exports | -5500 | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |
| Remaining in Delta | -2000 | 31% | #N/A | #N/A | 34% | 38% | 30% | 29% | 31% |
| Remaining in Delta | -3500 | 14% | #N/A | #N/A | 23% | 22% | 23% | 23% | 29% |
| Remaining in Delta | -5000 | 27% | #N/A | #N/A | 26% | 26% | 25% | 27% | 24% |
| Remaining in Delta | -5500 | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |
| Crossed SJR to South Delta | -2000 | 0% | #N/A | #N/A | 0% | 0% | 0% | 0% | 0% |
| Crossed SJR to South Delta | -3500 | 0% | #N/A | #N/A | 0% | 0% | 0% | 0% | 0% |
| Crossed SJR to South Delta | -5000 | 0% | #N/A | #N/A | 0% | 0% | 0% | 0% | 0% |
| Crossed SJR to South Delta | -5500 | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |

#### *I.8.4.3.4 Surface Oriented, OMR Bins, December through March [BA, Table I.8-29 through Table I.8-37]*

Table I.8-29. Mean December through March surface-oriented particle fate by OMR bin for NAA, EXP1, EXP3, four phases of Alternative 2, and Action 5 – particle insertion location at San Joaquin River for all particle system exit points. Note that NA values result from no data falling into that OMR bin.

| Exit Point | OMR Bin | NAA | EXP1 | EXP3 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ACT5 |
|---|---|---|---|---|---|---|---|---|---|
| West of Chipps | -2000 | 9% | #N/A | #N/A | 4% | 4% | 13% | 14% | 6% |
| West of Chipps | -3500 | 12% | #N/A | #N/A | 9% | 9% | 7% | 7% | 6% |
| West of Chipps | -5000 | 6% | #N/A | #N/A | 9% | 10% | 10% | 9% | 9% |
| West of Chipps | -5500 | 0% | #N/A | #N/A | 0% | 0% | 0% | 0% | 0% |
| Entrained at Exports | -2000 | 66% | #N/A | #N/A | 69% | 70% | 61% | 62% | 67% |
| Entrained at Exports | -3500 | 78% | #N/A | #N/A | 81% | 81% | 82% | 82% | 84% |
| Entrained at Exports | -5000 | 88% | #N/A | #N/A | 85% | 85% | 85% | 85% | 86% |
| Entrained at Exports | -5500 | 89% | #N/A | #N/A | 88% | 88% | 88% | 88% | 89% |
| Remaining in Delta | -2000 | 25% | #N/A | #N/A | 27% | 25% | 26% | 25% | 27% |
| Remaining in Delta | -3500 | 10% | #N/A | #N/A | 10% | 10% | 11% | 11% | 10% |
| Remaining in Delta | -5000 | 6% | #N/A | #N/A | 5% | 5% | 5% | 5% | 5% |
| Remaining in Delta | -5500 | 11% | #N/A | #N/A | 12% | 12% | 12% | 12% | 11% |
| Crossed SJR to South Delta | -2000 | 44% | #N/A | #N/A | 47% | 49% | 42% | 42% | 46% |
| Crossed SJR to South Delta | -3500 | 51% | #N/A | #N/A | 53% | 53% | 53% | 53% | 54% |
| Crossed SJR to South Delta | -5000 | 55% | #N/A | #N/A | 53% | 52% | 52% | 52% | 54% |
| Crossed SJR to South Delta | -5500 | 51% | #N/A | #N/A | 51% | 51% | 52% | 51% | 52% |

Table I.8-30. Mean December through March surface-oriented particle fate by OMR bin for NAA, EXP1, EXP3, four phases of Alternative 2, and Action 5 – particle insertion location at Old and Middle River for all particle system exit points. Note that NA values result from no data falling into that OMR bin.

| Exit Point | OMR Bin | NAA | EXP1 | EXP3 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ACT5 |
|---|---|---|---|---|---|---|---|---|---|
| West of Chipps | -2000 | 10% | #N/A | #N/A | 9% | 10% | 15% | 14% | 11% |
| West of Chipps | -3500 | 11% | #N/A | #N/A | 10% | 10% | 9% | 9% | 9% |
| West of Chipps | -5000 | 7% | #N/A | #N/A | 8% | 8% | 8% | 8% | 8% |
| West of Chipps | -5500 | 1% | #N/A | #N/A | 1% | 1% | 1% | 1% | 1% |
| Entrained at Exports | -2000 | 81% | #N/A | #N/A | 81% | 81% | 78% | 78% | 81% |
| Entrained at Exports | -3500 | 86% | #N/A | #N/A | 87% | 87% | 87% | 88% | 88% |
| Entrained at Exports | -5000 | 91% | #N/A | #N/A | 90% | 90% | 90% | 90% | 89% |
| Entrained at Exports | -5500 | 97% | #N/A | #N/A | 97% | 97% | 97% | 97% | 97% |
| Remaining in Delta | -2000 | 9% | #N/A | #N/A | 10% | 9% | 7% | 8% | 8% |
| Remaining in Delta | -3500 | 3% | #N/A | #N/A | 3% | 3% | 3% | 3% | 3% |
| Remaining in Delta | -5000 | 2% | #N/A | #N/A | 2% | 2% | 2% | 2% | 2% |
| Remaining in Delta | -5500 | 2% | #N/A | #N/A | 2% | 2% | 2% | 2% | 2% |
| Crossed SJR to South Delta | -2000 | -15% | #N/A | #N/A | -14% | -14% | -18% | -17% | -15% |
| Crossed SJR to South Delta | -3500 | -12% | #N/A | #N/A | -11% | -11% | -10% | -10% | -10% |
| Crossed SJR to South Delta | -5000 | -7% | #N/A | #N/A | -8% | -8% | -8% | -8% | -9% |
| Crossed SJR to South Delta | -5500 | -2% | #N/A | #N/A | -2% | -2% | -2% | -2% | -2% |

Table I.8-31. Mean December through March surface-oriented particle fate by OMR bin for NAA, EXP1, EXP3, four phases of Alternative 2, and Action 5 – particle insertion location at Southern Delta for all particle system exit points. Note that NA values result from no data falling into that OMR bin.

| Exit Point | OMR Bin | NAA | EXP1 | EXP3 | Alt2wTUCPwoVA | Alt2woTUCPwoVA | Alt2woTUCPDeltaVA | Alt2woTUCPAllVA | ACT5 |
|---|---|---|---|---|---|---|---|---|---|
| West of Chipps | -2000 | 0% | #N/A | #N/A | 0% | 0% | 0% | 0% | 0% |
| West of Chipps | -3500 | 0% | #N/A | #N/A | 0% | 0% | 0% | 0% | 0% |
| West of Chipps | -5000 | 0% | #N/A | #N/A | 0% | 0% | 0% | 0% | 0% |
| West of Chipps | -5500 | 0% | #N/A | #N/A | 0% | 0% | 0% | 0% | 0% |
| Entrained at Exports | -2000 | 100% | #N/A | #N/A | 100% | 100% | 100% | 100% | 100% |
| Entrained at Exports | -3500 | 100% | #N/A | #N/A | 100% | 100% | 100% | 100% | 100% |
| Entrained at Exports | -5000 | 100% | #N/A | #N/A | 100% | 100% | 100% | 100% | 100% |
| Entrained at Exports | -5500 | 100% | #N/A | #N/A | 100% | 100% | 100% | 100% | 100% |
| Remaining in Delta | -2000 | 0% | #N/A | #N/A | 0% | 0% | 0% | 0% | 0% |
| Remaining in Delta | -3500 | 0% | #N/A | #N/A | 0% | 0% | 0% | 0% | 0% |
| Remaining in Delta | -5000 | 0% | #N/A | #N/A | 0% | 0% | 0% | 0% | 0% |
| Remaining in Delta | -5500 | 0% | #N/A | #N/A | 0% | 0% | 0% | 0% | 0% |
| Crossed SJR to South Delta | -2000 | 0% | #N/A | #N/A | 0% | 0% | 0% | 0% | 0% |
| Crossed SJR to South Delta | -3500 | 0% | #N/A | #N/A | 0% | 0% | 0% | 0% | 0% |
| Crossed SJR to South Delta | -5000 | 0% | #N/A | #N/A | 0% | 0% | 0% | 0% | 0% |
| Crossed SJR to South Delta | -5500 | 0% | #N/A | #N/A | 0% | 0% | 0% | 0% | 0% |

Table I.8-32. Mean December through March surface-oriented particle fate by OMR bin for NAA, EXP1, EXP3, four phases of Alternative 2, and Action 5 – particle insertion location at Central Delta for all particle system exit points. Note that NA values result from no data falling into that OMR bin.

| Exit Point | OMR Bin | NAA | EXP1 | EXP3 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ACT5 |
|---|---|---|---|---|---|---|---|---|---|
| West of Chipps | -2000 | 44% | #N/A | #N/A | 40% | 43% | 62% | 59% | 47% |
| West of Chipps | -3500 | 61% | #N/A | #N/A | 60% | 60% | 55% | 55% | 52% |
| West of Chipps | -5000 | 50% | #N/A | #N/A | 54% | 54% | 55% | 55% | 57% |
| West of Chipps | -5500 | 11% | #N/A | #N/A | 12% | 11% | 11% | 11% | 12% |
| Entrained at Exports | -2000 | 24% | #N/A | #N/A | 26% | 25% | 15% | 17% | 23% |
| Entrained at Exports | -3500 | 28% | #N/A | #N/A | 29% | 29% | 32% | 32% | 35% |
| Entrained at Exports | -5000 | 42% | #N/A | #N/A | 39% | 39% | 39% | 39% | 36% |
| Entrained at Exports | -5500 | 81% | #N/A | #N/A | 80% | 80% | 80% | 80% | 78% |
| Remaining in Delta | -2000 | 32% | #N/A | #N/A | 34% | 32% | 23% | 24% | 30% |
| Remaining in Delta | -3500 | 11% | #N/A | #N/A | 11% | 11% | 13% | 13% | 13% |
| Remaining in Delta | -5000 | 8% | #N/A | #N/A | 7% | 7% | 6% | 6% | 6% |
| Remaining in Delta | -5500 | 9% | #N/A | #N/A | 8% | 8% | 9% | 9% | 10% |
| Crossed SJR to South Delta | -2000 | 36% | #N/A | #N/A | 39% | 38% | 25% | 27% | 35% |
| Crossed SJR to South Delta | -3500 | 33% | #N/A | #N/A | 35% | 34% | 38% | 38% | 41% |
| Crossed SJR to South Delta | -5000 | 46% | #N/A | #N/A | 43% | 43% | 42% | 42% | 40% |
| Crossed SJR to South Delta | -5500 | 85% | #N/A | #N/A | 84% | 84% | 84% | 85% | 82% |

Table I.8-33. Mean December through March surface-oriented particle fate by OMR bin for NAA, EXP1, EXP3, four phases of Alternative 2, and Action 5 – particle insertion location at Sacramento River for all particle system exit points. Note that NA values result from no data falling into that OMR bin.

| Exit Point | OMR Bin | NAA | EXP1 | EXP3 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ACT5 |
|---|---|---|---|---|---|---|---|---|---|
| West of Chipps | -2000 | 67% | #N/A | #N/A | 65% | 69% | 82% | 79% | 73% |
| West of Chipps | -3500 | 87% | #N/A | #N/A | 89% | 89% | 85% | 85% | 83% |
| West of Chipps | -5000 | 85% | #N/A | #N/A | 85% | 85% | 86% | 86% | 89% |
| West of Chipps | -5500 | 48% | #N/A | #N/A | 50% | 49% | 49% | 49% | 51% |
| Entrained at Exports | -2000 | 6% | #N/A | #N/A | 7% | 6% | 3% | 4% | 5% |
| Entrained at Exports | -3500 | 5% | #N/A | #N/A | 5% | 5% | 6% | 6% | 7% |
| Entrained at Exports | -5000 | 9% | #N/A | #N/A | 8% | 8% | 8% | 8% | 7% |
| Entrained at Exports | -5500 | 35% | #N/A | #N/A | 34% | 34% | 34% | 34% | 31% |
| Remaining in Delta | -2000 | 27% | #N/A | #N/A | 28% | 25% | 15% | 17% | 22% |
| Remaining in Delta | -3500 | 8% | #N/A | #N/A | 6% | 7% | 9% | 9% | 10% |
| Remaining in Delta | -5000 | 7% | #N/A | #N/A | 7% | 6% | 6% | 6% | 5% |
| Remaining in Delta | -5500 | 17% | #N/A | #N/A | 16% | 17% | 17% | 17% | 17% |
| Crossed SJR to South Delta | -2000 | 12% | #N/A | #N/A | 13% | 12% | 6% | 8% | 11% |
| Crossed SJR to South Delta | -3500 | 7% | #N/A | #N/A | 6% | 6% | 8% | 8% | 9% |
| Crossed SJR to South Delta | -5000 | 11% | #N/A | #N/A | 10% | 10% | 10% | 10% | 8% |
| Crossed SJR to South Delta | -5500 | 40% | #N/A | #N/A | 39% | 40% | 39% | 39% | 37% |

Table I.8-34. Mean December through March surface-oriented particle fate by OMR bin for NAA, EXP1, EXP3, four phases of Alternative 2, and Action 5 – particle insertion location at Mokelumne River for all particle system exit points. Note that NA values result from no data falling into that OMR bin.

| Exit Point | OMR Bin | NAA | EXP1 | EXP3 | Alt2wTUCPwoVA | Alt2woTUCPwoVA | Alt2woTUCPDeltaVA | Alt2woTUCPAllVA | ACT5 |
|---|---|---|---|---|---|---|---|---|---|
| West of Chipps | -2000 | 26% | #N/A | #N/A | 21% | 22% | 44% | 43% | 27% |
| West of Chipps | -3500 | 45% | #N/A | #N/A | 42% | 42% | 38% | 37% | 34% |
| West of Chipps | -5000 | 33% | #N/A | #N/A | 39% | 39% | 40% | 40% | 41% |
| West of Chipps | -5500 | 2% | #N/A | #N/A | 3% | 2% | 2% | 2% | 3% |
| Entrained at Exports | -2000 | 23% | #N/A | #N/A | 25% | 27% | 16% | 17% | 23% |
| Entrained at Exports | -3500 | 34% | #N/A | #N/A | 38% | 37% | 39% | 39% | 43% |
| Entrained at Exports | -5000 | 53% | #N/A | #N/A | 48% | 48% | 48% | 49% | 47% |
| Entrained at Exports | -5500 | 78% | #N/A | #N/A | 78% | 78% | 79% | 78% | 77% |
| Remaining in Delta | -2000 | 50% | #N/A | #N/A | 54% | 51% | 40% | 40% | 50% |
| Remaining in Delta | -3500 | 21% | #N/A | #N/A | 20% | 21% | 23% | 23% | 24% |
| Remaining in Delta | -5000 | 14% | #N/A | #N/A | 13% | 12% | 12% | 12% | 12% |
| Remaining in Delta | -5500 | 20% | #N/A | #N/A | 19% | 19% | 19% | 19% | 20% |
| Crossed SJR to South Delta | -2000 | 43% | #N/A | #N/A | 46% | 48% | 34% | 34% | 44% |
| Crossed SJR to South Delta | -3500 | 45% | #N/A | #N/A | 48% | 47% | 50% | 50% | 54% |
| Crossed SJR to South Delta | -5000 | 59% | #N/A | #N/A | 54% | 54% | 54% | 54% | 53% |
| Crossed SJR to South Delta | -5500 | 85% | #N/A | #N/A | 85% | 86% | 86% | 86% | 85% |

Table I.8-35. Mean December through March surface-oriented particle fate by OMR bin for NAA, EXP1, EXP3, four phases of Alternative 2, and Action 5 – particle insertion location at Yolo Bypass for all particle system exit points. Note that NA values result from no data falling into that OMR bin.

| Exit Point | OMR Bin | NAA | EXP1 | EXP3 | Alt2wTUCPwoVA | Alt2woTUCPwoVA | Alt2woTUCPDeltaVA | Alt2woTUCPAllVA | ACT5 |
|---|---|---|---|---|---|---|---|---|---|
| West of Chipps | -2000 | 42% | #N/A | #N/A | 40% | 43% | 54% | 52% | 47% |
| West of Chipps | -3500 | 61% | #N/A | #N/A | 63% | 63% | 62% | 61% | 60% |
| West of Chipps | -5000 | 65% | #N/A | #N/A | 66% | 66% | 67% | 67% | 68% |
| West of Chipps | -5500 | 34% | #N/A | #N/A | 36% | 36% | 35% | 35% | 36% |
| Entrained at Exports | -2000 | 3% | #N/A | #N/A | 3% | 3% | 1% | 1% | 2% |
| Entrained at Exports | -3500 | 2% | #N/A | #N/A | 2% | 2% | 2% | 2% | 3% |
| Entrained at Exports | -5000 | 3% | #N/A | #N/A | 3% | 3% | 3% | 3% | 2% |
| Entrained at Exports | -5500 | 16% | #N/A | #N/A | 16% | 16% | 16% | 16% | 15% |
| Remaining in Delta | -2000 | 55% | #N/A | #N/A | 56% | 54% | 45% | 46% | 51% |
| Remaining in Delta | -3500 | 37% | #N/A | #N/A | 35% | 35% | 36% | 36% | 37% |
| Remaining in Delta | -5000 | 32% | #N/A | #N/A | 31% | 31% | 30% | 29% | 30% |
| Remaining in Delta | -5500 | 49% | #N/A | #N/A | 48% | 48% | 49% | 49% | 50% |
| Crossed SJR to South Delta | -2000 | 7% | #N/A | #N/A | 8% | 7% | 4% | 4% | 6% |
| Crossed SJR to South Delta | -3500 | 3% | #N/A | #N/A | 3% | 3% | 4% | 4% | 5% |
| Crossed SJR to South Delta | -5000 | 5% | #N/A | #N/A | 5% | 5% | 5% | 5% | 4% |
| Crossed SJR to South Delta | -5500 | 22% | #N/A | #N/A | 21% | 21% | 21% | 21% | 20% |

Table I.8-36. Mean December through March surface-oriented particle fate by OMR bin for NAA, EXP1, EXP3, four phases of Alternative 2, and Action 5 – particle insertion location at Western Delta for all particle system exit points. Note that NA values result from no data falling into that OMR bin.

| Exit Point | OMR Bin | NAA | EXP1 | EXP3 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ACT5 |
|---|---|---|---|---|---|---|---|---|---|
| West of Chipps | -2000 | 90% | #N/A | #N/A | 90% | 91% | 95% | 94% | 92% |
| West of Chipps | -3500 | 97% | #N/A | #N/A | 98% | 98% | 96% | 96% | 96% |
| West of Chipps | -5000 | 96% | #N/A | #N/A | 96% | 96% | 96% | 96% | 97% |
| West of Chipps | -5500 | 77% | #N/A | #N/A | 78% | 78% | 77% | 77% | 79% |
| Entrained at Exports | -2000 | 1% | #N/A | #N/A | 1% | 1% | 0% | 1% | 1% |
| Entrained at Exports | -3500 | 1% | #N/A | #N/A | 1% | 1% | 1% | 1% | 1% |
| Entrained at Exports | -5000 | 2% | #N/A | #N/A | 2% | 2% | 2% | 2% | 1% |
| Entrained at Exports | -5500 | 14% | #N/A | #N/A | 14% | 14% | 14% | 14% | 12% |
| Remaining in Delta | -2000 | 9% | #N/A | #N/A | 9% | 8% | 4% | 6% | 7% |
| Remaining in Delta | -3500 | 2% | #N/A | #N/A | 2% | 2% | 3% | 3% | 3% |
| Remaining in Delta | -5000 | 2% | #N/A | #N/A | 2% | 2% | 2% | 2% | 2% |
| Remaining in Delta | -5500 | 9% | #N/A | #N/A | 8% | 8% | 9% | 9% | 9% |
| Crossed SJR to South Delta | -2000 | 2% | #N/A | #N/A | 3% | 2% | 1% | 1% | 2% |
| Crossed SJR to South Delta | -3500 | 1% | #N/A | #N/A | 1% | 1% | 1% | 1% | 2% |
| Crossed SJR to South Delta | -5000 | 2% | #N/A | #N/A | 2% | 2% | 2% | 2% | 2% |
| Crossed SJR to South Delta | -5500 | 17% | #N/A | #N/A | 16% | 17% | 17% | 17% | 15% |

Table I.8-37. Mean December through March surface-oriented particle fate by OMR bin for NAA, EXP1, EXP3, four phases of Alternative 2, and Action 5 – particle insertion location at Suisun Bay for all particle system exit points. Note that NA values result from no data falling into that OMR bin.

| Exit Point | OMR Bin | NAA | EXP1 | EXP3 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ACT5 |
|---|---|---|---|---|---|---|---|---|---|
| West of Chipps | -2000 | 91% | #N/A | #N/A | 88% | 89% | 86% | 90% | 86% |
| West of Chipps | -3500 | 89% | #N/A | #N/A | 88% | 89% | 91% | 91% | 91% |
| West of Chipps | -5000 | 92% | #N/A | #N/A | 94% | 94% | 94% | 93% | 93% |
| West of Chipps | -5500 | 86% | #N/A | #N/A | 87% | 87% | 87% | 87% | 89% |
| Entrained at Exports | -2000 | 0% | #N/A | #N/A | 0% | 0% | 0% | 0% | 0% |
| Entrained at Exports | -3500 | 0% | #N/A | #N/A | 0% | 0% | 0% | 0% | 0% |
| Entrained at Exports | -5000 | 0% | #N/A | #N/A | 0% | 0% | 0% | 0% | 0% |
| Entrained at Exports | -5500 | 0% | #N/A | #N/A | 0% | 0% | 0% | 0% | 0% |
| Remaining in Delta | -2000 | 9% | #N/A | #N/A | 12% | 11% | 14% | 10% | 14% |
| Remaining in Delta | -3500 | 11% | #N/A | #N/A | 12% | 11% | 9% | 9% | 9% |
| Remaining in Delta | -5000 | 8% | #N/A | #N/A | 6% | 6% | 6% | 7% | 7% |
| Remaining in Delta | -5500 | 14% | #N/A | #N/A | 12% | 12% | 13% | 12% | 10% |
| Crossed SJR to South Delta | -2000 | 0% | #N/A | #N/A | 0% | 0% | 0% | 0% | 0% |
| Crossed SJR to South Delta | -3500 | 0% | #N/A | #N/A | 0% | 0% | 0% | 0% | 0% |
| Crossed SJR to South Delta | -5000 | 0% | #N/A | #N/A | 0% | 0% | 0% | 0% | 0% |
| Crossed SJR to South Delta | -5500 | 0% | #N/A | #N/A | 0% | 0% | 0% | 0% | 0% |

### *I.8.4.3.5 Neutrally Buoyant Inflow Bins, March through June [EIS, Table I.8-38 through Table I.8-46]*

Table I.8-38. Mean March through June neutrally buoyant particle fate by Inflow bin for NAA, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4, and Action 5 – particle insertion location at San Joaquin River for all particle system exit points. The parenthetical value represents the percent difference from the NAA. Values displayed as 0% may represent small nonzero decimals rounded to 0%. Percent-difference values are calculated from the unrounded values. Note that NA values result from no data falling into that Inflow bin.

| Exit Point | Flow Bin | NAA | ALT1 | Alt2wTUCPwoVA | Alt2woTUCPwoVA | Alt2woTUCPDeltaVA | Alt2woTUCPAllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| West of Chipps | lolo | 0% | 0 (33%) | 0 (-10%) | 0 (7%) | 0 (15%) | 0 (11%) | 1 (388%) | 0 (-5%) | 0 (-1%) |
| West of Chipps | lomed | 1% | 1 (1%) | 1 (-33%) | 1 (-22%) | 1 (23%) | 1 (7%) | 4 (313%) | 1 (-36%) | 1 (-1%) |
| West of Chipps | lohi | 15% | 13 (-11%) | 11 (-26%) | 11 (-23%) | 13 (-9%) | 15 (-2%) | 18 (21%) | 11 (-23%) | 14 (-2%) |
| West of Chipps | medlo | 0% | 0 (23%) | 0 (46%) | 0 (60%) | 0 (16%) | 0 (60%) | 3 (5088%) | 0 (23%) | 0 (3%) |
| West of Chipps | medmed | 2% | 1 (-60%) | 1 (-38%) | 2 (-33%) | 4 (85%) | 5 (100%) | 15 (545%) | 1 (-38%) | 3 (30%) |
| West of Chipps | medhi | 32% | 16 (-50%) | 21 (-34%) | 21 (-34%) | 27 (-14%) | 26 (-18%) | 52 (66%) | 21 (-35%) | 24 (-22%) |
| West of Chipps | hilo | 0% | 0 (-73%) | 0 (5%) | 0 (17%) | #N/A | #N/A | 1 (49%) | 0 (-14%) | #N/A |
| West of Chipps | himed | 6% | 1 (-88%) | 4 (-26%) | 4 (-27%) | 11 (82%) | 11 (93%) | 24 (316%) | 4 (-30%) | 6 (11%) |
| West of Chipps | hihi | 49% | 41 (-17%) | 43 (-13%) | 43 (-13%) | 49 (-1%) | 49 (-2%) | 70 (42%) | 43 (-14%) | 46 (-7%) |
| Entrained at Exports | lolo | 58% | 60 (2%) | 63 (7%) | 64 (10%) | 65 (12%) | 66 (13%) | 42 (-29%) | 63 (7%) | 64 (10%) |
| Entrained at Exports | lomed | 68% | 72 (5%) | 70 (3%) | 71 (3%) | 67 (-2%) | 67 (-3%) | 38 (-44%) | 71 (4%) | 67 (-2%) |
| Entrained at Exports | lohi | 63% | 70 (12%) | 71 (14%) | 70 (13%) | 68 (8%) | 68 (9%) | 49 (-21%) | 71 (14%) | 68 (10%) |
| Entrained at Exports | medlo | 85% | 86 (1%) | 83 (-2%) | 84 (-1%) | 83 (-2%) | 81 (-5%) | 49 (-42%) | 84 (-1%) | 83 (-1%) |

| Exit Point | Flow Bin | NAA | ALT1 | Alt2wTUCPwoVA | Alt2woTUCPwoVA | Alt2woTUCPDeltaVA | Alt2woTUCPAllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Entrained at Exports | medmed | 76% | 88 (16%) | 81 (7%) | 80 (6%) | 68 (-10%) | 68 (-11%) | 34 (-55%) | 81 (7%) | 72 (-4%) |
| Entrained at Exports | medhi | 52% | 73 (40%) | 66 (27%) | 66 (27%) | 59 (12%) | 60 (14%) | 21 (-59%) | 66 (27%) | 60 (17%) |
| Entrained at Exports | hilo | 87% | 91 (5%) | 90 (3%) | 90 (3%) | #N/A | #N/A | 82 (-6%) | 91 (5%) | #N/A |
| Entrained at Exports | himed | 79% | 95 (20%) | 82 (5%) | 82 (5%) | 69 (-13%) | 68 (-13%) | 46 (-42%) | 83 (6%) | 77 (-2%) |
| Entrained at Exports | hihi | 45% | 55 (22%) | 52 (17%) | 52 (17%) | 45 (2%) | 46 (3%) | 22 (-51%) | 53 (18%) | 48 (9%) |
| Remaining in Delta | lolo | 41% | 40 (-3%) | 37 (-10%) | 35 (-15%) | 34 (-17%) | 34 (-19%) | 57 (39%) | 37 (-10%) | 35 (-14%) |
| Remaining in Delta | lomed | 31% | 27 (-12%) | 29 (-5%) | 29 (-6%) | 32 (5%) | 32 (6%) | 57 (87%) | 28 (-9%) | 31 (4%) |
| Remaining in Delta | lohi | 23% | 17 (-26%) | 17 (-23%) | 18 (-19%) | 19 (-17%) | 17 (-22%) | 33 (45%) | 17 (-24%) | 16 (-26%) |
| Remaining in Delta | medlo | 15% | 14 (-5%) | 17 (11%) | 16 (8%) | 17 (13%) | 19 (29%) | 48 (223%) | 16 (8%) | 16 (7%) |
| Remaining in Delta | medmed | 22% | 11 (-50%) | 18 (-19%) | 19 (-16%) | 27 (25%) | 28 (26%) | 51 (133%) | 18 (-20%) | 24 (10%) |
| Remaining in Delta | medhi | 16% | 12 (-29%) | 13 (-20%) | 13 (-19%) | 14 (-12%) | 15 (-10%) | 26 (61%) | 13 (-20%) | 14 (-11%) |
| Remaining in Delta | hilo | 13% | 9 (-32%) | 10 (-23%) | 10 (-24%) | #N/A | #N/A | 18 (40%) | 8 (-34%) | #N/A |
| Remaining in Delta | himed | 15% | 4 (-71%) | 13 (-14%) | 13 (-13%) | 21 (35%) | 20 (32%) | 30 (94%) | 13 (-18%) | 16 (7%) |

| Exit Point | Flow Bin | NAA | ALT1 | Alt2wTUCPwoVA | Alt2woTUCPwoVA | Alt2woTUCPDeltaVA | Alt2woTUCPAllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Remaining in Delta | hihi | 6% | 4 (-30%) | 5 (-21%) | 5 (-21%) | 5 (-6%) | 5 (-5%) | 8 (34%) | 5 (-22%) | 5 (-11%) |
| Crossed SJR to South Delta | lolo | 53% | 54 (2%) | 55 (5%) | 56 (7%) | 57 (8%) | 58 (10%) | 48 (-9%) | 55 (5%) | 56 (7%) |
| Crossed SJR to South Delta | lomed | 54% | 55 (2%) | 55 (1%) | 55 (2%) | 54 (-1%) | 54 (-1%) | 42 (-23%) | 55 (2%) | 53 (-2%) |
| Crossed SJR to South Delta | lohi | 46% | 51 (10%) | 53 (14%) | 52 (13%) | 50 (7%) | 49 (6%) | 39 (-16%) | 53 (14%) | 49 (8%) |
| Crossed SJR to South Delta | medlo | 66% | 65 (-2%) | 65 (-2%) | 65 (-2%) | 65 (-1%) | 64 (-4%) | 41 (-38%) | 65 (-1%) | 65 (-1%) |
| Crossed SJR to South Delta | medmed | 57% | 63 (10%) | 60 (5%) | 59 (4%) | 53 (-7%) | 53 (-7%) | 30 (-47%) | 60 (5%) | 55 (-2%) |
| Crossed SJR to South Delta | medhi | 33% | 51 (56%) | 45 (38%) | 45 (38%) | 38 (17%) | 40 (20%) | 7 (-80%) | 45 (38%) | 40 (24%) |
| Crossed SJR to South Delta | hilo | 58% | 58 (0%) | 59 (3%) | 59 (3%) | #N/A | #N/A | 54 (-7%) | 59 (3%) | #N/A |
| Crossed SJR to South Delta | himed | 55% | 60 (10%) | 57 (4%) | 57 (4%) | 48 (-12%) | 48 (-12%) | 33 (-40%) | 57 (4%) | 53 (-2%) |
| Crossed SJR to South Delta | hihi | 21% | 29 (41%) | 27 (32%) | 27 (32%) | 21 (2%) | 22 (4%) | -1 (-106%) | 28 (34%) | 24 (17%) |

Table I.8-39. Mean March through June neutrally buoyant particle fate by Inflow bin for NAA, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4, and Action 5 – particle insertion location at Old and Middle River for all particle system exit points. The parenthetical value represents the percent difference from the NAA. Values displayed as 0% may represent small nonzero decimals rounded to 0%. Percent-difference values are calculated from the unrounded values. Note that NA values result from no data falling into that Inflow bin.

| Exit Point | Flow Bin | NAA | ALT1 | Alt2wTUCPwoVA | Alt2woTUCPwoVA | Alt2woTUCPDeltaVA | Alt2woTUCPAllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| West of Chipps | lolo | 6% | 7 (18%) | 6 (-4%) | 7 (7%) | 7 (8%) | 7 (8%) | 13 (104%) | 6 (-3%) | 6 (-2%) |
| West of Chipps | lomed | 8% | 8 (-5%) | 8 (-9%) | 8 (-3%) | 9 (13%) | 10 (16%) | 16 (94%) | 7 (-12%) | 8 (6%) |
| West of Chipps | lohi | 13% | 11 (-17%) | 10 (-23%) | 11 (-20%) | 12 (-6%) | 13 (-3%) | 19 (45%) | 10 (-22%) | 12 (-3%) |
| West of Chipps | medlo | 5% | 4 (-6%) | 5 (18%) | 5 (19%) | 5 (11%) | 6 (26%) | 18 (284%) | 5 (11%) | 4 (6%) |
| West of Chipps | medmed | 10% | 6 (-41%) | 9 (-12%) | 9 (-8%) | 13 (33%) | 13 (36%) | 27 (176%) | 9 (-12%) | 11 (14%) |
| West of Chipps | medhi | 24% | 12 (-51%) | 15 (-36%) | 15 (-36%) | 21 (-12%) | 21 (-14%) | 49 (103%) | 15 (-38%) | 19 (-21%) |
| West of Chipps | hilo | 9% | 6 (-34%) | 10 (8%) | 10 (8%) | #N/A | #N/A | 9 (0%) | 9 (-3%) | #N/A |
| West of Chipps | himed | 13% | 4 (-67%) | 12 (-9%) | 12 (-9%) | 16 (25%) | 16 (25%) | 28 (119%) | 11 (-13%) | 12 (-3%) |
| West of Chipps | hihi | 35% | 33 (-6%) | 31 (-12%) | 30 (-13%) | 35 (0%) | 35 (-1%) | 68 (94%) | 30 (-15%) | 33 (-5%) |
| Entrained at Exports | lolo | 75% | 76 (1%) | 77 (3%) | 78 (4%) | 78 (3%) | 78 (4%) | 55 (-27%) | 77 (3%) | 77 (3%) |
| Entrained at Exports | lomed | 78% | 81 (3%) | 79 (2%) | 80 (2%) | 78 (-1%) | 78 (-1%) | 46 (-41%) | 80 (2%) | 77 (-2%) |
| Entrained at Exports | lohi | 76% | 81 (6%) | 82 (7%) | 81 (6%) | 78 (2%) | 78 (2%) | 57 (-26%) | 82 (7%) | 78 (2%) |
| Entrained at Exports | medlo | 88% | 89 (2%) | 87 (-1%) | 87 (-1%) | 87 (-1%) | 86 (-2%) | 54 (-38%) | 87 (-1%) | 87 (0%) |
| Entrained at Exports | medmed | 83% | 89 (8%) | 85 (2%) | 84 (2%) | 77 (-7%) | 77 (-7%) | 32 (-61%) | 85 (3%) | 79 (-4%) |

| Exit Point | Flow Bin | NAA | ALT1 | Alt2wTUCPwoVA | Alt2woTUCPwoVA | Alt2woTUCPDeltaVA | Alt2woTUCPAllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Entrained at Exports | medhi | 63% | 82 (30%) | 78 (24%) | 78 (24%) | 69 (10%) | 70 (11%) | 19 (-69%) | 79 (25%) | 72 (14%) |
| Entrained at Exports | hilo | 90% | 90 (1%) | 89 (0%) | 89 (0%) | #N/A | #N/A | 88 (-1%) | 90 (1%) | #N/A |
| Entrained at Exports | himed | 83% | 94 (13%) | 85 (2%) | 85 (2%) | 79 (-5%) | 79 (-5%) | 49 (-41%) | 85 (3%) | 83 (0%) |
| Entrained at Exports | hihi | 59% | 62 (6%) | 65 (11%) | 65 (11%) | 60 (1%) | 60 (2%) | 19 (-67%) | 66 (12%) | 61 (4%) |
| Remaining in Delta | lolo | 19% | 17 (-10%) | 17 (-10%) | 16 (-17%) | 16 (-17%) | 15 (-18%) | 32 (73%) | 17 (-9%) | 16 (-11%) |
| Remaining in Delta | lomed | 13% | 11 (-16%) | 13 (-4%) | 12 (-10%) | 13 (-3%) | 13 (-4%) | 38 (181%) | 13 (-6%) | 14 (5%) |
| Remaining in Delta | lohi | 10% | 8 (-22%) | 8 (-25%) | 8 (-21%) | 10 (-7%) | 9 (-8%) | 24 (132%) | 8 (-27%) | 9 (-12%) |
| Remaining in Delta | medlo | 7% | 6 (-14%) | 8 (4%) | 7 (2%) | 8 (9%) | 8 (10%) | 28 (282%) | 8 (5%) | 7 (2%) |
| Remaining in Delta | medmed | 8% | 5 (-34%) | 7 (-12%) | 7 (-9%) | 10 (29%) | 10 (29%) | 40 (429%) | 7 (-13%) | 9 (22%) |
| Remaining in Delta | medhi | 13% | 6 (-52%) | 6 (-50%) | 6 (-50%) | 9 (-27%) | 9 (-29%) | 32 (147%) | 6 (-51%) | 8 (-31%) |
| Remaining in Delta | hilo | 2% | 4 (158%) | 1 (-23%) | 1 (-22%) | #N/A | #N/A | 3 (72%) | 1 (-24%) | #N/A |
| Remaining in Delta | himed | 4% | 2 (-58%) | 3 (-18%) | 3 (-17%) | 5 (25%) | 5 (25%) | 23 (466%) | 3 (-17%) | 4 (8%) |
| Remaining in Delta | hihi | 6% | 4 (-28%) | 4 (-32%) | 4 (-31%) | 5 (-12%) | 5 (-13%) | 13 (106%) | 4 (-28%) | 5 (-14%) |
| Crossed SJR to South Delta | lolo | -13% | -13 (0%) | -12 (-9%) | -12 (-10%) | -12 (-10%) | -12 (-11%) | -22 (62%) | -12 (-8%) | -13 (-10%) |
| Crossed SJR to South Delta | lomed | -13% | -12 (-10%) | -12 (-6%) | -12 (-6%) | -14 (7%) | -14 (8%) | -26 (96%) | -12 (-9%) | -14 (5%) |
| Crossed SJR to South Delta | lohi | -16% | -13 (-19%) | -12 (-23%) | -13 (-20%) | -16 (-4%) | -16 (-1%) | -26 (62%) | -13 (-23%) | -16 (-2%) |
| Crossed SJR to South Delta | medlo | -7% | -6 (-11%) | -8 (14%) | -8 (14%) | -7 (9%) | -8 (21%) | -23 (242%) | -7 (9%) | -8 (4%) |

| Exit Point | Flow Bin | NAA | ALT1 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Crossed SJR to South Delta | medmed | -12% | -7 (-41%) | -11 (-11%) | -11 (-8%) | -16 (32%) | -16 (33%) | -36 (196%) | -11 (-12%) | -14 (13%) |
| Crossed SJR to South Delta | medhi | -27% | -13 (-51%) | -17 (-38%) | -17 (-38%) | -24 (-12%) | -23 (-14%) | -59 (117%) | -16 (-39%) | -22 (-21%) |
| Crossed SJR to South Delta | hilo | -9% | -7 (-30%) | -10 (6%) | -10 (5%) | #N/A | #N/A | -9 (-2%) | -9 (-4%) | #N/A |
| Crossed SJR to South Delta | himed | -14% | -5 (-66%) | -12 (-9%) | -12 (-9%) | -17 (25%) | -17 (25%) | -32 (135%) | -12 (-13%) | -14 (-2%) |
| Crossed SJR to South Delta | hihi | -36% | -34 (-6%) | -31 (-13%) | -31 (-14%) | -36 (0%) | -35 (-1%) | -72 (100%) | -30 (-15%) | -35 (-4%) |

Table I.8-40. Mean March through June neutrally buoyant particle fate by Inflow bin for NAA, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4, and Action 5 – particle insertion location at Southern Delta for all particle system exit points. The parenthetical value represents the percent difference from the NAA. Values displayed as 0% may represent small nonzero decimals rounded to 0%. Percent-difference values are calculated from the unrounded values. Note that NA values result from no data falling into that Inflow bin.

| Exit Point | Flow Bin | NAA | ALT1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| West of Chipps | lolo | 0% | 0 (185%) | 0 (921%) | 0 (318%) | 0 (-1042%) | 0 (-123%) | 0 (6349678%) | 0 (661%) | 0 (-81%) |
| West of Chipps | lomed | 0% | 0 (332802%) | 0 (-431%) | 0 (1086064%) | 0 (-133%) | 0 (390969%) | 0 (104145241%) | 0 (-86%) | 0 (3517195%) |
| West of Chipps | lohi | 0% | 0 (457%) | 0 (-47%) | 0 (-1209%) | 1 (568474124%) | 1 (681229252%) | 1 (1244977256%) | 0 (-18%) | 0 (590399350%) |

| Exit Point | Flow Bin | NAA | ALT1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| West of Chipps | medlo | 0% | 0 (-156%) | 0 (-112%) | 0 (-61%) | 0 (-247%) | 0 (-140%) | 0 (15267131%) | 0 (-51%) | -1 (-101%) |
| West of Chipps | medmed | 0% | 0 (-151%) | 0 (-51%) | 0 (-22%) | 0 (-11836597%) | 0 (-12509304%) | 1 (-436216725%) | 0 (-77%) | 0 (-9517333%) |
| West of Chipps | medhi | 2% | 0 (-87%) | 1 (-68%) | 1 (-69%) | 2 (-6%) | 2 (-4%) | 20 (758%) | 1 (-70%) | 1 (-21%) |
| West of Chipps | hilo | 0% | 0 (-133%) | 0 (0%) | 0 (-100%) | #N/A | #N/A | 0 (-148%) | 0 (-100%) | #N/A |
| West of Chipps | himed | 0% | 0 (-570%) | 0 (415%) | 0 (-24%) | 0 (-797%) | 0 (-141%) | 2 (-1180699090%) | 0 (-577%) | 0 (-194%) |
| West of Chipps | hihi | 6% | 7 (14%) | 5 (-11%) | 5 (-10%) | 6 (1%) | 6 (0%) | 41 (600%) | 4 (-25%) | 5 (-5%) |
| Entrained at Exports | lolo | 98% | 98 (0%) | 98 (0%) | 98 (0%) | 98 (0%) | 98 (0%) | 94 (-4%) | 98 (0%) | 97 (0%) |
| Entrained at Exports | lomed | 100% | 100 (0%) | 100 (0%) | 100 (0%) | 100 (0%) | 100 (0%) | 93 (-7%) | 100 (0%) | 99 (0%) |
| Entrained at Exports | lohi | 100% | 100 (0%) | 100 (0%) | 100 (0%) | 98 (-1%) | 98 (-2%) | 90 (-10%) | 100 (0%) | 98 (-2%) |
| Entrained at Exports | medlo | 99% | 100 (1%) | 98 (0%) | 98 (0%) | 98 (0%) | 98 (0%) | 95 (-4%) | 98 (0%) | 98 (0%) |
| Entrained at Exports | medmed | 100% | 100 (0%) | 100 (0%) | 100 (0%) | 100 (0%) | 100 (0%) | 89 (-11%) | 100 (0%) | 99 (0%) |
| Entrained at Exports | medhi | 95% | 99 (5%) | 99 (4%) | 99 (4%) | 96 (1%) | 96 (0%) | 60 (-37%) | 99 (4%) | 96 (2%) |
| Entrained at Exports | hilo | 100% | 100 (0%) | 100 (0%) | 100 (0%) | #N/A | #N/A | 100 (0%) | 100 (0%) | #N/A |

| Exit Point | Flow Bin | NAA | ALT1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Entrained at Exports | himed | 100% | 100 (0%) | 100 (0%) | 100 (0%) | 100 (0%) | 100 (0%) | 93 (-7%) | 100 (0%) | 99 (0%) |
| Entrained at Exports | hihi | 93% | 92 (-1%) | 94 (1%) | 94 (1%) | 93 (0%) | 93 (0%) | 49 (-47%) | 95 (2%) | 93 (0%) |
| Remaining in Delta | lolo | 2% | 2 (24%) | 2 (20%) | 2 (15%) | 2 (15%) | 2 (26%) | 6 (211%) | 2 (22%) | 2 (25%) |
| Remaining in Delta | lomed | 0% | 0 (69%) | 0 (-17%) | 0 (53%) | 0 (84%) | 0 (100%) | 7 (6879%) | 0 (-16%) | 0 (158%) |
| Remaining in Delta | lohi | 0% | 0 (-37%) | 0 (-44%) | 0 (-41%) | 1 (445%) | 1 (573%) | 9 (4736%) | 0 (-43%) | 1 (585%) |
| Remaining in Delta | medlo | 1% | 0 (-62%) | 2 (18%) | 2 (16%) | 2 (32%) | 2 (21%) | 5 (291%) | 2 (17%) | 1 (-1%) |
| Remaining in Delta | medmed | 0% | 0 (-61%) | 0 (-65%) | 0 (-33%) | 0 (1188%) | 0 (1007%) | 10 (40574%) | 0 (-66%) | 0 (1019%) |
| Remaining in Delta | medhi | 3% | 0 (-88%) | 0 (-85%) | 0 (-84%) | 2 (-16%) | 2 (-14%) | 20 (666%) | 0 (-86%) | 1 (-39%) |
| Remaining in Delta | hilo | 0% | 0 (NA) | 0 (NA) | 0 (NA) | #N/A | #N/A | 0 (NA) | 0 (NA) | #N/A |
| Remaining in Delta | himed | 0% | 0 (-100%) | 0 (-11%) | 0 (-11%) | 0 (1779%) | 0 (2763%) | 5 (360725%) | 0 (89%) | 0 (1033%) |
| Remaining in Delta | Hihi | 1% | 1 (34%) | 1 (-32%) | 1 (-32%) | 1 (25%) | 1 (23%) | 10 (1153%) | 1 (-35%) | 0 (17%) |
| Crossed SJR to South Delta | Lolo | 0% | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (#N/A) |

| Exit Point | Flow Bin | NAA | ALT1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Crossed SJR to South Delta | lomed | 0% | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | -1 (NA) | 0 (NA) | -1 (#N/A) |
| Crossed SJR to South Delta | lohi | 0% | 0 (NA) | 0 (NA) | 0 (NA) | -1 (NA) | -1 (NA) | -3 (NA) | 0 (NA) | -1 (#N/A) |
| Crossed SJR to South Delta | medlo | 0% | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (#N/A) |
| Crossed SJR to South Delta | medmed | 0% | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | -2 (NA) | 0 (NA) | -1 (#N/A) |
| Crossed SJR to South Delta | medhi | -3% | 0 (-89%) | -1 (-73%) | -1 (-73%) | -3 (-5%) | -3 (-4%) | -26 (791%) | -1 (-74%) | -3 (-22%) |
| Crossed SJR to South Delta | hilo | 0% | 0 (NA) | 0 (NA) | 0 (NA) | #N/A | #N/A | 0 (NA) | 0 (NA) | #N/A |
| Crossed SJR to South Delta | himed | 0% | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | -3 (NA) | 0 (NA) | 0 (#N/A) |
| Crossed SJR to South Delta | hihi | -6% | -7 (15%) | -5 (-12%) | -5 (-10%) | -6 (2%) | -6 (1%) | -43 (631%) | -4 (-26%) | -6 (-5%) |

Table I.8-41. Mean March through June neutrally buoyant particle fate by Inflow bin for NAA, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4, and Action 5 – particle insertion location at Central Delta for all particle system exit points. The parenthetical value represents the percent difference from the NAA. Values displayed as 0% may represent small nonzero decimals rounded to 0%. Percent-difference values are calculated from the unrounded values. Note that NA values result from no data falling into that Inflow bin.

| Exit Point | Flow Bin | NAA | ALT1 | Alt2wTUCPwoVA | Alt2woTUCPwoVA | Alt2woTUCPDeltaVA | Alt2woTUCPAllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| West of Chipps | lolo | 27% | 32 (17%) | 28 (3%) | 31 (13%) | 31 (14%) | 31 (15%) | 44 (63%) | 28 (4%) | 28 (5%) |
| West of Chipps | lomed | 38% | 38 (1%) | 36 (-5%) | 38 (0%) | 40 (7%) | 41 (9%) | 53 (41%) | 35 (-6%) | 38 (3%) |
| West of Chipps | lohi | 63% | 59 (-5%) | 57 (-10%) | 57 (-9%) | 59 (-6%) | 60 (-4%) | 68 (8%) | 57 (-9%) | 59 (-5%) |
| West of Chipps | medlo | 30% | 30 (-1%) | 34 (12%) | 34 (13%) | 32 (7%) | 34 (13%) | 56 (87%) | 32 (7%) | 31 (5%) |
| West of Chipps | medmed | 51% | 39 (-23%) | 48 (-5%) | 49 (-4%) | 58 (13%) | 58 (15%) | 76 (49%) | 48 (-4%) | 53 (5%) |
| West of Chipps | medhi | 80% | 65 (-19%) | 72 (-10%) | 72 (-10%) | 76 (-5%) | 74 (-7%) | 92 (14%) | 71 (-11%) | 73 (-8%) |
| West of Chipps | hilo | 63% | 41 (-35%) | 68 (9%) | 68 (8%) | #N/A | #N/A | 60 (-4%) | 65 (4%) | #N/A |
| West of Chipps | himed | 72% | 40 (-45%) | 69 (-4%) | 69 (-4%) | 77 (7%) | 78 (8%) | 83 (15%) | 69 (-5%) | 70 (-2%) |
| West of Chipps | hihi | 93% | 87 (-7%) | 91 (-3%) | 91 (-3%) | 93 (0%) | 93 (-1%) | 96 (3%) | 90 (-3%) | 91 (-2%) |
| Entrained at Exports | lolo | 21% | 20 (-4%) | 24 (18%) | 25 (22%) | 25 (23%) | 26 (28%) | 7 (-65%) | 24 (18%) | 25 (25%) |
| Entrained at Exports | lomed | 23% | 26 (11%) | 25 (6%) | 25 (6%) | 22 (-6%) | 22 (-7%) | 5 (-78%) | 26 (10%) | 22 (-2%) |
| Entrained at Exports | lohi | 16% | 21 (36%) | 22 (40%) | 21 (36%) | 20 (27%) | 20 (29%) | 9 (-40%) | 22 (40%) | 20 (33%) |
| Entrained at Exports | medlo | 46% | 49 (6%) | 41 (-10%) | 41 (-10%) | 42 (-7%) | 39 (-14%) | 17 (-64%) | 43 (-7%) | 44 (-4%) |
| Entrained at Exports | medmed | 26% | 43 (67%) | 29 (12%) | 29 (10%) | 20 (-21%) | 20 (-24%) | 4 (-83%) | 29 (14%) | 23 (-9%) |
| Entrained at Exports | medhi | 10% | 22 (132%) | 16 (67%) | 16 (66%) | 13 (36%) | 14 (43%) | 1 (-84%) | 17 (71%) | 14 (50%) |
| Entrained at Exports | hilo | 29% | 47 (62%) | 27 (-7%) | 27 (-5%) | #N/A | #N/A | 31 (6%) | 30 (3%) | #N/A |
| Entrained at Exports | himed | 20% | 54 (177%) | 22 (13%) | 22 (14%) | 14 (-27%) | 14 (-28%) | 10 (-52%) | 23 (17%) | 20 (6%) |
| Entrained at Exports | hihi | 5% | 11 (124%) | 7 (52%) | 7 (52%) | 5 (5%) | 5 (10%) | 2 (-52%) | 7 (55%) | 6 (36%) |

| Exit Point | Flow Bin | NAA | ALT1 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Remaining in Delta | lolo | 52% | 48 (-8%) | 48 (-9%) | 44 (-15%) | 44 (-16%) | 42 (-19%) | 49 (-7%) | 48 (-9%) | 45 (-13%) |
| Remaining in Delta | lomed | 39% | 36 (-7%) | 39 (1%) | 38 (-4%) | 38 (-3%) | 37 (-5%) | 42 (6%) | 39 (0%) | 38 (-1%) |
| Remaining in Delta | lohi | 21% | 19 (-10%) | 21 (0%) | 21 (0%) | 21 (-3%) | 20 (-9%) | 23 (6%) | 21 (-2%) | 19 (-9%) |
| Remaining in Delta | medlo | 24% | 22 (-11%) | 25 (3%) | 25 (2%) | 25 (5%) | 27 (11%) | 27 (12%) | 25 (3%) | 24 (0%) |
| Remaining in Delta | medmed | 23% | 18 (-25%) | 23 (-3%) | 22 (-4%) | 22 (-6%) | 22 (-5%) | 20 (-14%) | 22 (-5%) | 22 (-2%) |
| Remaining in Delta | medhi | 10% | 13 (25%) | 12 (17%) | 12 (17%) | 11 (6%) | 12 (17%) | 7 (-34%) | 12 (20%) | 11 (17%) |
| Remaining in Delta | hilo | 8% | 12 (46%) | 5 (-42%) | 5 (-43%) | #N/A | #N/A | 9 (14%) | 5 (-43%) | #N/A |
| Remaining in Delta | himed | 8% | 6 (-28%) | 9 (3%) | 9 (3%) | 8 (-1%) | 8 (-6%) | 8 (-5%) | 9 (3%) | 8 (0%) |
| Remaining in Delta | hihi | 2% | 2 (13%) | 2 (4%) | 2 (5%) | 2 (-3%) | 2 (4%) | 1 (-38%) | 2 (4%) | 2 (6%) |
| Crossed SJR to South Delta | lolo | 42% | 41 (-3%) | 44 (5%) | 44 (5%) | 44 (5%) | 44 (6%) | 26 (-38%) | 44 (5%) | 44 (7%) |
| Crossed SJR to South Delta | lomed | 39% | 41 (5%) | 41 (5%) | 41 (4%) | 37 (-5%) | 37 (-6%) | 20 (-48%) | 42 (6%) | 38 (-2%) |
| Crossed SJR to South Delta | lohi | 23% | 29 (23%) | 30 (29%) | 29 (25%) | 28 (18%) | 27 (16%) | 17 (-26%) | 30 (28%) | 27 (19%) |
| Crossed SJR to South Delta | medlo | 56% | 58 (5%) | 52 (-7%) | 52 (-7%) | 53 (-4%) | 51 (-8%) | 29 (-48%) | 53 (-5%) | 54 (-2%) |
| Crossed SJR to South Delta | medmed | 36% | 52 (42%) | 39 (8%) | 39 (7%) | 30 (-17%) | 30 (-18%) | 13 (-66%) | 40 (9%) | 34 (-6%) |
| Crossed SJR to South Delta | medhi | 14% | 28 (104%) | 21 (54%) | 21 (54%) | 17 (28%) | 19 (37%) | 4 (-73%) | 22 (59%) | 19 (42%) |
| Crossed SJR to South Delta | hilo | 33% | 53 (60%) | 29 (-11%) | 30 (-10%) | #N/A | #N/A | 36 (8%) | 32 (-3%) | #N/A |
| Crossed SJR to South Delta | himed | 24% | 57 (139%) | 27 (11%) | 27 (11%) | 19 (-22%) | 18 (-23%) | 14 (-43%) | 27 (13%) | 25 (5%) |

| Exit Point | Flow Bin | NAA | ALT1 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Crossed SJR to South Delta | hihi | 6% | 12 (102%) | 8 (42%) | 8 (43%) | 6 (3%) | 6 (8%) | 3 (-53%) | 9 (45%) | 7 (29%) |

Table I.8-42. Mean March through June neutrally buoyant particle fate by Inflow bin for NAA, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4, and Action 5 – particle insertion location at Sacramento River for all particle system exit points. The parenthetical value represents the percent difference from the NAA. Values displayed as 0% may represent small nonzero decimals rounded to 0%. Percent-difference values are calculated from the unrounded values. Note that NA values result from no data falling into that Inflow bin.

| Exit Point | Flow Bin | NAA | ALT1 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| West of Chipps | lolo | 50% | 56 (11%) | 52 (2%) | 56 (11%) | 56 (11%) | 56 (12%) | 65 (28%) | 52 (3%) | 52 (4%) |
| West of Chipps | lomed | 68% | 71 (5%) | 67 (-1%) | 70 (3%) | 71 (4%) | 71 (5%) | 73 (7%) | 67 (-2%) | 68 (1%) |
| West of Chipps | lohi | 82% | 82 (0%) | 80 (-2%) | 80 (-2%) | 80 (-2%) | 80 (-2%) | 80 (-2%) | 80 (-2%) | 79 (-2%) |
| West of Chipps | medlo | 61% | 64 (5%) | 65 (7%) | 65 (7%) | 62 (3%) | 65 (8%) | 88 (45%) | 63 (4%) | 63 (5%) |
| West of Chipps | medmed | 84% | 79 (-6%) | 83 (-1%) | 84 (0%) | 86 (2%) | 86 (3%) | 93 (10%) | 84 (0%) | 85 (1%) |
| West of Chipps | medhi | 93% | 90 (-4%) | 92 (-2%) | 92 (-2%) | 93 (-1%) | 92 (-2%) | 96 (2%) | 91 (-2%) | 91 (-2%) |
| West of Chipps | hilo | 95% | 90 (-5%) | 96 (2%) | 96 (2%) | #N/A | #N/A | 95 (0%) | 96 (1%) | #N/A |
| West of Chipps | himed | 96% | 88 (-8%) | 96 (-1%) | 96 (-1%) | 97 (0%) | 97 (1%) | 97 (1%) | 96 (-1%) | 95 (0%) |
| West of Chipps | hihi | 99% | 98 (-1%) | 99 (0%) | 99 (0%) | 99 (0%) | 99 (0%) | 99 (0%) | 99 (0%) | 98 (0%) |
| Entrained at Exports | lolo | 5% | 5 (-4%) | 7 (25%) | 7 (29%) | 7 (35%) | 8 (45%) | 2 (-68%) | 7 (26%) | 7 (41%) |
| Entrained at Exports | lomed | 6% | 5 (-4%) | 6 (1%) | 6 (0%) | 5 (-9%) | 5 (-8%) | 1 (-80%) | 6 (4%) | 5 (-2%) |
| Entrained at Exports | lohi | 3% | 5 (33%) | 5 (35%) | 5 (32%) | 4 (26%) | 4 (31%) | 2 (-36%) | 5 (38%) | 4 (37%) |
| Entrained at Exports | medlo | 14% | 14 (7%) | 11 (-16%) | 11 (-16%) | 12 (-10%) | 11 (-22%) | 3 (-81%) | 12 (-12%) | 12 (-8%) |
| Entrained at Exports | medmed | 5% | 9 (104%) | 5 (9%) | 5 (7%) | 4 (-20%) | 3 (-24%) | 1 (-87%) | 5 (9%) | 4 (-11%) |

| Exit Point | Flow Bin | NAA | ALT1 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Entrained at Exports | medhi | 1% | 3 (160%) | 2 (63%) | 2 (63%) | 2 (37%) | 2 (50%) | 0 (-85%) | 2 (70%) | 1 (55%) |
| Entrained at Exports | hilo | 3% | 6 (136%) | 2 (-18%) | 2 (-18%) | #N/A | #N/A | 3 (0%) | 3 (3%) | #N/A |
| Entrained at Exports | himed | 2% | 8 (406%) | 2 (20%) | 2 (20%) | 1 (-25%) | 1 (-28%) | 1 (-43%) | 2 (19%) | 1 (14%) |
| Entrained at Exports | hihi | 0% | 1 (169%) | 0 (58%) | 0 (55%) | 0 (9%) | 0 (15%) | 0 (-52%) | 0 (63%) | 0 (43%) |
| Remaining in Delta | lolo | 44% | 39 (-12%) | 42 (-6%) | 37 (-16%) | 37 (-16%) | 36 (-19%) | 34 (-24%) | 42 (-6%) | 40 (-9%) |
| Remaining in Delta | lomed | 26% | 23 (-12%) | 27 (3%) | 25 (-7%) | 24 (-8%) | 23 (-12%) | 26 (-1%) | 27 (3%) | 25 (-3%) |
| Remaining in Delta | lohi | 15% | 14 (-8%) | 16 (5%) | 16 (4%) | 15 (3%) | 16 (5%) | 18 (19%) | 16 (4%) | 15 (5%) |
| Remaining in Delta | medlo | 26% | 22 (-16%) | 24 (-7%) | 24 (-8%) | 25 (-2%) | 24 (-8%) | 9 (-64%) | 25 (-3%) | 24 (-7%) |
| Remaining in Delta | medmed | 12% | 12 (1%) | 12 (2%) | 12 (1%) | 11 (-9%) | 10 (-12%) | 7 (-41%) | 11 (-1%) | 10 (-6%) |
| Remaining in Delta | medhi | 5% | 7 (30%) | 6 (12%) | 6 (13%) | 6 (7%) | 6 (18%) | 4 (-24%) | 6 (18%) | 6 (18%) |
| Remaining in Delta | hilo | 3% | 4 (53%) | 1 (-45%) | 1 (-46%) | #N/A | #N/A | 3 (-4%) | 1 (-44%) | #N/A |
| Remaining in Delta | himed | 2% | 3 (54%) | 2 (14%) | 2 (13%) | 2 (-2%) | 2 (-6%) | 2 (4%) | 2 (10%) | 2 (8%) |
| Remaining in Delta | hihi | 1% | 1 (16%) | 1 (6%) | 1 (6%) | 1 (1%) | 1 (5%) | 1 (-8%) | 1 (3%) | 0 (6%) |
| Crossed SJR to South Delta | lolo | 15% | 15 (-4%) | 16 (6%) | 16 (2%) | 16 (4%) | 16 (6%) | 9 (-43%) | 16 (6%) | 16 (9%) |
| Crossed SJR to South Delta | lomed | 12% | 11 (-5%) | 12 (3%) | 11 (-1%) | 11 (-8%) | 11 (-8%) | 6 (-47%) | 12 (4%) | 11 (-2%) |
| Crossed SJR to South Delta | lohi | 6% | 7 (19%) | 8 (26%) | 7 (23%) | 7 (18%) | 7 (20%) | 5 (-14%) | 8 (26%) | 7 (25%) |
| Crossed SJR to South Delta | medlo | 20% | 20 (3%) | 17 (-13%) | 17 (-14%) | 18 (-7%) | 17 (-16%) | 5 (-74%) | 18 (-9%) | 18 (-7%) |
| Crossed SJR to South Delta | medmed | 7% | 12 (70%) | 8 (7%) | 8 (5%) | 6 (-16%) | 6 (-20%) | 2 (-74%) | 8 (6%) | 6 (-8%) |
| Crossed SJR to South Delta | medhi | 2% | 5 (126%) | 3 (51%) | 3 (50%) | 3 (29%) | 3 (45%) | 1 (-73%) | 3 (59%) | 2 (47%) |

| Exit Point | Flow Bin | NAA | ALT1 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Crossed SJR to South Delta | hilo | 3% | 8 (121%) | 3 (-25%) | 3 (-25%) | #N/A | #N/A | 4 (2%) | 3 (-9%) | #N/A |
| Crossed SJR to South Delta | himed | 2% | 9 (330%) | 3 (19%) | 3 (19%) | 2 (-19%) | 2 (-22%) | 1 (-34%) | 3 (18%) | 2 (14%) |
| Crossed SJR to South Delta | hihi | 0% | 1 (138%) | 1 (48%) | 1 (45%) | 0 (6%) | 0 (13%) | 0 (-52%) | 1 (50%) | 0 (36%) |

Table I.8-43. Mean March through June neutrally buoyant particle fate by Inflow bin for NAA, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4, and Action 5 – particle insertion location at Mokelumne River for all particle system exit points. The parenthetical value represents the percent difference from the NAA. Values displayed as 0% may represent small nonzero decimals rounded to 0%. Percent-difference values are calculated from the unrounded values. Note that NA values result from no data falling into that Inflow bin.

| Exit Point | Flow Bin | NAA | ALT1 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| West of Chipps | lolo | 9% | 11 (30%) | 9 (9%) | 11 (22%) | 11 (25%) | 11 (27%) | 19 (121%) | 10 (10%) | 9 (13%) |
| West of Chipps | lomed | 15% | 14 (-3%) | 13 (-9%) | 14 (-2%) | 16 (11%) | 17 (14%) | 26 (81%) | 13 (-11%) | 15 (4%) |
| West of Chipps | lohi | 40% | 37 (-6%) | 34 (-13%) | 35 (-12%) | 37 (-7%) | 40 (0%) | 46 (15%) | 35 (-11%) | 39 (0%) |
| West of Chipps | medlo | 11% | 10 (-7%) | 13 (19%) | 13 (20%) | 12 (10%) | 13 (17%) | 29 (159%) | 12 (11%) | 11 (6%) |
| West of Chipps | medmed | 25% | 16 (-35%) | 23 (-8%) | 24 (-6%) | 33 (30%) | 34 (32%) | 51 (99%) | 24 (-7%) | 28 (12%) |
| West of Chipps | medhi | 65% | 46 (-29%) | 54 (-16%) | 54 (-16%) | 60 (-7%) | 58 (-11%) | 79 (22%) | 54 (-17%) | 56 (-12%) |
| West of Chipps | hilo | 41% | 17 (-58%) | 49 (20%) | 48 (18%) | #N/A | #N/A | 37 (-8%) | 45 (10%) | #N/A |
| West of Chipps | himed | 52% | 19 (-64%) | 48 (-7%) | 48 (-7%) | 60 (15%) | 61 (17%) | 68 (31%) | 47 (-9%) | 51 (-2%) |
| West of Chipps | hihi | 88% | 79 (-11%) | 84 (-5%) | 84 (-5%) | 88 (0%) | 87 (-1%) | 93 (5%) | 84 (-5%) | 85 (-3%) |
| Entrained at Exports | lolo | 22% | 21 (-3%) | 28 (26%) | 29 (31%) | 30 (37%) | 32 (45%) | 9 (-60%) | 28 (27%) | 30 (40%) |
| Entrained at Exports | lomed | 27% | 28 (3%) | 28 (3%) | 28 (3%) | 25 (-8%) | 25 (-8%) | 6 (-77%) | 29 (7%) | 26 (-3%) |

| Exit Point | Flow Bin | NAA | ALT1 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Entrained at Exports | lohi | 22% | 29 (31%) | 30 (34%) | 29 (30%) | 27 (23%) | 28 (27%) | 13 (-41%) | 30 (34%) | 28 (31%) |
| Entrained at Exports | medlo | 60% | 63 (4%) | 55 (-9%) | 55 (-9%) | 56 (-7%) | 51 (-16%) | 18 (-69%) | 57 (-6%) | 57 (-4%) |
| Entrained at Exports | medmed | 33% | 56 (68%) | 38 (13%) | 37 (11%) | 26 (-22%) | 25 (-24%) | 5 (-84%) | 38 (14%) | 30 (-9%) |
| Entrained at Exports | medhi | 14% | 31 (126%) | 23 (64%) | 23 (63%) | 19 (34%) | 19 (39%) | 2 (-83%) | 23 (66%) | 20 (46%) |
| Entrained at Exports | hilo | 40% | 64 (60%) | 40 (1%) | 41 (1%) | #N/A | #N/A | 42 (5%) | 45 (11%) | #N/A |
| Entrained at Exports | himed | 29% | 71 (145%) | 33 (13%) | 33 (13%) | 20 (-30%) | 20 (-30%) | 13 (-56%) | 34 (17%) | 29 (2%) |
| Entrained at Exports | hihi | 7% | 16 (129%) | 11 (55%) | 11 (55%) | 8 (8%) | 8 (12%) | 4 (-49%) | 11 (59%) | 9 (39%) |
| Remaining in Delta | lolo | 69% | 67 (-3%) | 63 (-9%) | 61 (-13%) | 59 (-15%) | 57 (-18%) | 72 (4%) | 63 (-10%) | 59 (-14%) |
| Remaining in Delta | lomed | 58% | 58 (-1%) | 59 (1%) | 58 (-1%) | 59 (1%) | 58 (0%) | 68 (16%) | 58 (-1%) | 58 (1%) |
| Remaining in Delta | lohi | 38% | 34 (-12%) | 36 (-6%) | 36 (-5%) | 36 (-7%) | 32 (-16%) | 41 (8%) | 35 (-8%) | 31 (-18%) |
| Remaining in Delta | medlo | 28% | 27 (-5%) | 32 (12%) | 32 (12%) | 31 (11%) | 36 (27%) | 53 (86%) | 31 (9%) | 30 (6%) |
| Remaining in Delta | medmed | 41% | 27 (-34%) | 39 (-5%) | 39 (-5%) | 41 (-1%) | 41 (0%) | 44 (7%) | 38 (-7%) | 41 (0%) |
| Remaining in Delta | medhi | 21% | 23 (6%) | 23 (7%) | 23 (7%) | 21 (0%) | 23 (6%) | 18 (-14%) | 23 (9%) | 22 (7%) |
| Remaining in Delta | hilo | 19% | 19 (-1%) | 11 (-44%) | 11 (-42%) | #N/A | #N/A | 20 (8%) | 11 (-44%) | #N/A |
| Remaining in Delta | himed | 19% | 10 (-46%) | 19 (0%) | 19 (1%) | 20 (5%) | 19 (1%) | 19 (1%) | 19 (-1%) | 19 (1%) |
| Remaining in Delta | hihi | 5% | 5 (6%) | 5 (2%) | 5 (3%) | 5 (-3%) | 5 (2%) | 4 (-22%) | 5 (3%) | 4 (2%) |
| Crossed SJR to South Delta | lolo | 50% | 49 (-3%) | 54 (7%) | 54 (7%) | 54 (8%) | 55 (10%) | 36 (-28%) | 54 (7%) | 54 (9%) |
| Crossed SJR to South Delta | lomed | 52% | 53 (2%) | 54 (3%) | 54 (2%) | 50 (-4%) | 50 (-4%) | 31 (-41%) | 55 (4%) | 51 (-2%) |
| Crossed SJR to South Delta | lohi | 35% | 41 (16%) | 43 (21%) | 42 (19%) | 40 (13%) | 39 (11%) | 27 (-23%) | 43 (20%) | 40 (13%) |
| Crossed SJR to South Delta | medlo | 73% | 75 (3%) | 69 (-5%) | 69 (-5%) | 71 (-3%) | 68 (-8%) | 41 (-44%) | 71 (-3%) | 71 (-2%) |

| Exit Point | Flow Bin | NAA | ALT1 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Crossed SJR to South Delta | medmed | 52% | 69 (32%) | 56 (7%) | 55 (6%) | 44 (-15%) | 44 (-16%) | 21 (-59%) | 56 (7%) | 49 (-6%) |
| Crossed SJR to South Delta | medhi | 22% | 40 (87%) | 32 (46%) | 32 (46%) | 27 (23%) | 28 (29%) | 7 (-67%) | 32 (49%) | 28 (34%) |
| Crossed SJR to South Delta | hilo | 50% | 73 (47%) | 46 (-8%) | 47 (-7%) | #N/A | #N/A | 54 (7%) | 50 (0%) | #N/A |
| Crossed SJR to South Delta | himed | 39% | 76 (96%) | 42 (9%) | 42 (9%) | 30 (-21%) | 30 (-22%) | 22 (-44%) | 43 (12%) | 39 (3%) |
| Crossed SJR to South Delta | hihi | 9% | 18 (99%) | 13 (42%) | 13 (42%) | 10 (4%) | 10 (9%) | 5 (-50%) | 13 (45%) | 12 (30%) |

Table I.8-44. Mean March through June neutrally buoyant particle fate by Inflow bin for NAA, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4, and Action 5 – particle insertion location at Yolo Bypass for all particle system exit points. The parenthetical value represents the percent difference from the NAA. Values displayed as 0% may represent small nonzero decimals rounded to 0%. Percent-difference values are calculated from the unrounded values. Note that NA values result from no data falling into that Inflow bin.

| Exit Point | Flow Bin | NAA | ALT1 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| West of Chipps | lolo | 22% | 25 (14%) | 23 (4%) | 25 (14%) | 25 (13%) | 25 (15%) | 29 (34%) | 23 (4%) | 22 (4%) |
| West of Chipps | lomed | 33% | 35 (7%) | 32 (-2%) | 34 (4%) | 34 (4%) | 35 (7%) | 33 (2%) | 32 (-2%) | 33 (2%) |
| West of Chipps | lohi | 38% | 39 (3%) | 37 (-2%) | 37 (-2%) | 37 (-2%) | 37 (-4%) | 37 (-4%) | 37 (-2%) | 37 (-3%) |
| West of Chipps | medlo | 29% | 31 (9%) | 32 (11%) | 32 (12%) | 30 (5%) | 33 (13%) | 51 (77%) | 30 (5%) | 30 (8%) |
| West of Chipps | medmed | 47% | 44 (-5%) | 46 (-1%) | 46 (0%) | 48 (3%) | 48 (4%) | 53 (13%) | 47 (0%) | 47 (1%) |
| West of Chipps | medhi | 51% | 48 (-4%) | 50 (-2%) | 50 (-2%) | 50 (-1%) | 49 (-2%) | 53 (4%) | 49 (-3%) | 49 (-3%) |
| West of Chipps | hilo | 63% | 57 (-10%) | 65 (3%) | 66 (4%) | #N/A | #N/A | 65 (2%) | 66 (3%) | #N/A |

| Exit Point | Flow Bin | NAA | ALT1 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| West of Chipps | himed | 63% | 60 (-5%) | 63 (-1%) | 63 (-1%) | 64 (0%) | 64 (1%) | 63 (-1%) | 62 (-2%) | 63 (0%) |
| West of Chipps | hihi | 62% | 62 (0%) | 62 (0%) | 62 (0%) | 62 (0%) | 62 (0%) | 61 (-1%) | 62 (0%) | 61 (0%) |
| Entrained at Exports | lolo | 2% | 2 (-8%) | 2 (25%) | 2 (28%) | 2 (38%) | 3 (50%) | 0 (-73%) | 2 (28%) | 2 (46%) |
| Entrained at Exports | lomed | 2% | 2 (-6%) | 2 (0%) | 2 (-1%) | 2 (-9%) | 2 (-7%) | 0 (-87%) | 2 (4%) | 1 (-2%) |
| Entrained at Exports | lohi | 1% | 2 (32%) | 2 (31%) | 2 (29%) | 2 (26%) | 2 (27%) | 1 (-48%) | 2 (30%) | 1 (34%) |
| Entrained at Exports | medlo | 5% | 5 (4%) | 4 (-16%) | 4 (-17%) | 4 (-9%) | 3 (-27%) | 1 (-82%) | 4 (-12%) | 4 (-10%) |
| Entrained at Exports | medmed | 1% | 3 (121%) | 2 (9%) | 1 (8%) | 1 (-17%) | 1 (-22%) | 0 (-90%) | 1 (7%) | 1 (-9%) |
| Entrained at Exports | medhi | 0% | 1 (166%) | 1 (63%) | 1 (64%) | 1 (35%) | 1 (53%) | 0 (-94%) | 1 (74%) | 0 (60%) |
| Entrained at Exports | hilo | 0% | 1 (219%) | 0 (-41%) | 0 (-42%) | #N/A | #N/A | 0 (23%) | 0 (-32%) | #N/A |
| Entrained at Exports | himed | 0% | 2 (784%) | 0 (24%) | 0 (21%) | 0 (-33%) | 0 (-36%) | 0 (-30%) | 0 (13%) | 0 (13%) |
| Entrained at Exports | hihi | 0% | 0 (276%) | 0 (82%) | 0 (83%) | 0 (27%) | 0 (51%) | 0 (-52%) | 0 (107%) | 0 (81%) |
| Remaining in Delta | lolo | 76% | 73 (-4%) | 75 (-2%) | 73 (-5%) | 73 (-5%) | 72 (-5%) | 70 (-8%) | 75 (-2%) | 74 (-2%) |
| Remaining in Delta | lomed | 65% | 63 (-3%) | 66 (1%) | 64 (-2%) | 64 (-2%) | 64 (-3%) | 66 (1%) | 66 (1%) | 64 (-1%) |
| Remaining in Delta | lohi | 61% | 59 (-2%) | 61 (1%) | 61 (1%) | 61 (1%) | 62 (2%) | 63 (3%) | 61 (0%) | 61 (1%) |
| Remaining in Delta | medlo | 67% | 64 (-4%) | 64 (-4%) | 64 (-4%) | 66 (-2%) | 64 (-4%) | 48 (-28%) | 66 (-1%) | 64 (-3%) |
| Remaining in Delta | medmed | 52% | 53 (1%) | 53 (1%) | 52 (0%) | 51 (-2%) | 51 (-3%) | 47 (-9%) | 52 (-1%) | 51 (-1%) |
| Remaining in Delta | medhi | 49% | 51 (3%) | 50 (1%) | 50 (1%) | 49 (1%) | 50 (2%) | 47 (-4%) | 50 (2%) | 50 (3%) |
| Remaining in Delta | hilo | 36% | 42 (15%) | 34 (-5%) | 34 (-7%) | #N/A | #N/A | 35 (-4%) | 34 (-6%) | #N/A |
| Remaining in Delta | himed | 36% | 38 (4%) | 37 (1%) | 37 (1%) | 36 (-1%) | 36 (-1%) | 37 (2%) | 37 (3%) | 36 (1%) |
| Remaining in Delta | hihi | 38% | 38 (1%) | 38 (0%) | 38 (0%) | 38 (0%) | 38 (0%) | 39 (2%) | 38 (0%) | 37 (0%) |
| Crossed SJR to South Delta | lolo | 7% | 7 (-5%) | 8 (4%) | 7 (-1%) | 8 (2%) | 8 (3%) | 4 (-42%) | 8 (5%) | 7 (7%) |
| Crossed SJR to South Delta | lomed | 6% | 6 (-5%) | 6 (3%) | 6 (-2%) | 6 (-7%) | 6 (-8%) | 3 (-46%) | 6 (4%) | 5 (-2%) |

| Exit Point | Flow Bin | NAA | ALT1 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Crossed SJR to South Delta | lohi | 3% | 4 (15%) | 4 (20%) | 4 (19%) | 4 (15%) | 4 (17%) | 3 (-17%) | 4 (18%) | 3 (18%) |
| Crossed SJR to South Delta | medlo | 9% | 9 (1%) | 8 (-12%) | 8 (-12%) | 8 (-6%) | 7 (-16%) | 3 (-71%) | 8 (-8%) | 8 (-7%) |
| Crossed SJR to South Delta | medmed | 3% | 6 (64%) | 4 (9%) | 4 (6%) | 3 (-12%) | 3 (-17%) | 1 (-69%) | 4 (5%) | 3 (-7%) |
| Crossed SJR to South Delta | medhi | 1% | 2 (94%) | 1 (38%) | 2 (39%) | 1 (23%) | 1 (36%) | 0 (-64%) | 2 (49%) | 1 (40%) |
| Crossed SJR to South Delta | hilo | 1% | 2 (173%) | 1 (-20%) | 1 (-30%) | #N/A | #N/A | 1 (13%) | 1 (-21%) | #N/A |
| Crossed SJR to South Delta | himed | 1% | 3 (410%) | 1 (22%) | 1 (21%) | 0 (-20%) | 0 (-23%) | 0 (-21%) | 1 (16%) | 0 (9%) |
| Crossed SJR to South Delta | hihi | 0% | 0 (91%) | 0 (35%) | 0 (33%) | 0 (8%) | 0 (14%) | 0 (-33%) | 0 (37%) | 0 (26%) |

Table I.8-45. Mean March through June neutrally buoyant particle fate by Inflow bin for NAA, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4, and Action 5 – particle insertion location at Western Delta for all particle system exit points. The parenthetical value represents the percent difference from the NAA. Values displayed as 0% may represent small nonzero decimals rounded to 0%. Percent-difference values are calculated from the unrounded values. Note that NA values result from no data falling into that Inflow bin.

| Exit Point | Flow Bin | NAA | ALT1 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| West of Chipps | lolo | 85% | 89 (4%) | 86 (1%) | 89 (4%) | 89 (4%) | 89 (4%) | 92 (8%) | 86 (1%) | 86 (2%) |
| West of Chipps | lomed | 93% | 94 (1%) | 93 (0%) | 94 (1%) | 94 (1%) | 94 (1%) | 95 (2%) | 92 (0%) | 93 (0%) |
| West of Chipps | lohi | 97% | 97 (0%) | 97 (-1%) | 97 (-1%) | 97 (0%) | 97 (-1%) | 98 (0%) | 97 (-1%) | 96 (-1%) |
| West of Chipps | medlo | 91% | 92 (1%) | 92 (1%) | 92 (2%) | 91 (1%) | 92 (2%) | 98 (8%) | 91 (1%) | 91 (1%) |

| Exit Point | Flow Bin | NAA | ALT1 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| West of Chipps | medmed | 97% | 96 (-1%) | 97 (0%) | 97 (0%) | 98 (0%) | 98 (0%) | 99 (2%) | 97 (0%) | 97 (0%) |
| West of Chipps | medhi | 99% | 99 (-1%) | 99 (0%) | 99 (0%) | 99 (0%) | 99 (0%) | 99 (0%) | 99 (0%) | 98 (0%) |
| West of Chipps | hilo | 100% | 99 (-1%) | 100 (0%) | 100 (0%) | #N/A | #N/A | 100 (0%) | 100 (0%) | #N/A |
| West of Chipps | himed | 100% | 98 (-2%) | 100 (0%) | 100 (0%) | 100 (0%) | 100 (0%) | 100 (0%) | 100 (0%) | 99 (0%) |
| West of Chipps | hihi | 100% | 100 (0%) | 100 (0%) | 100 (0%) | 100 (0%) | 100 (0%) | 100 (0%) | 100 (0%) | 99 (0%) |
| Entrained at Exports | lolo | 1% | 1 (-10%) | 1 (19%) | 1 (20%) | 1 (25%) | 1 (34%) | 0 (-82%) | 1 (23%) | 0 (35%) |
| Entrained at Exports | lomed | 1% | 1 (5%) | 1 (1%) | 1 (1%) | 0 (-11%) | 0 (-12%) | 0 (-89%) | 1 (7%) | 0 (-2%) |
| Entrained at Exports | lohi | 0% | 0 (98%) | 0 (94%) | 0 (92%) | 0 (74%) | 0 (66%) | 0 (-68%) | 0 (95%) | 0 (78%) |
| Entrained at Exports | medlo | 1% | 2 (19%) | 1 (-26%) | 1 (-29%) | 1 (-19%) | 1 (-35%) | 0 (-82%) | 1 (-21%) | 1 (-10%) |
| Entrained at Exports | medmed | 0% | 1 (210%) | 0 (3%) | 0 (2%) | 0 (-18%) | 0 (-28%) | 0 (-85%) | 0 (1%) | 0 (-12%) |
| Entrained at Exports | medhi | 0% | 0 (578%) | 0 (158%) | 0 (179%) | 0 (106%) | 0 (205%) | 0 (-96%) | 0 (228%) | 0 (233%) |
| Entrained at Exports | hilo | 0% | 0 (462%) | 0 (-33%) | 0 (8%) | #N/A | #N/A | 0 (-52%) | 0 (25%) | #N/A |
| Entrained at Exports | himed | 0% | 1 (6500%) | 0 (122%) | 0 (99%) | 0 (25%) | 0 (-26%) | 0 (58%) | 0 (46%) | 0 (143%) |
| Entrained at Exports | hihi | 0% | 0 (5430%) | 0 (400%) | 0 (800%) | 0 (300%) | 0 (1070%) | 0 (78%) | 0 (800%) | 0 (1265%) |
| Remaining in Delta | lolo | 14% | 10 (-25%) | 13 (-6%) | 11 (-24%) | 11 (-24%) | 10 (-27%) | 7 (-47%) | 13 (-8%) | 12 (-11%) |

| Exit Point | Flow Bin | NAA | ALT1 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Remaining in Delta | lomed | 7% | 5 (-18%) | 7 (4%) | 6 (-11%) | 6 (-13%) | 5 (-18%) | 5 (-28%) | 7 (6%) | 6 (-6%) |
| Remaining in Delta | lohi | 2% | 2 (2%) | 3 (21%) | 3 (18%) | 3 (15%) | 3 (19%) | 2 (1%) | 3 (17%) | 2 (21%) |
| Remaining in Delta | medlo | 8% | 7 (-19%) | 7 (-12%) | 7 (-13%) | 8 (-4%) | 7 (-18%) | 2 (-79%) | 8 (-7%) | 6 (-13%) |
| Remaining in Delta | medmed | 2% | 3 (22%) | 2 (2%) | 2 (0%) | 2 (-12%) | 2 (-16%) | 1 (-57%) | 2 (-1%) | 2 (-9%) |
| Remaining in Delta | medhi | 1% | 1 (47%) | 1 (18%) | 1 (18%) | 1 (15%) | 1 (28%) | 1 (-20%) | 1 (26%) | 1 (28%) |
| Remaining in Delta | hilo | 0% | 1 (76%) | 0 (-63%) | 0 (-63%) | #N/A | #N/A | 0 (-9%) | 0 (-59%) | #N/A |
| Remaining in Delta | himed | 0% | 1 (291%) | 0 (26%) | 0 (26%) | 0 (1%) | 0 (-16%) | 0 (10%) | 0 (24%) | 0 (12%) |
| Remaining in Delta | hihi | 0% | 0 (28%) | 0 (9%) | 0 (7%) | 0 (1%) | 0 (2%) | 0 (-16%) | 0 (7%) | 0 (3%) |
| Crossed SJR to South Delta | lolo | 2% | 2 (-11%) | 2 (3%) | 2 (-7%) | 2 (-6%) | 2 (-4%) | 1 (-65%) | 3 (4%) | 2 (5%) |
| Crossed SJR to South Delta | lomed | 1% | 1 (1%) | 1 (5%) | 1 (-1%) | 1 (-12%) | 1 (-14%) | 0 (-68%) | 2 (8%) | 1 (-2%) |
| Crossed SJR to South Delta | lohi | 0% | 1 (77%) | 1 (85%) | 1 (79%) | 1 (64%) | 1 (63%) | 0 (-36%) | 1 (79%) | 0 (66%) |
| Crossed SJR to South Delta | medlo | 3% | 3 (11%) | 2 (-23%) | 2 (-25%) | 2 (-17%) | 2 (-27%) | 1 (-81%) | 2 (-18%) | 2 (-10%) |
| Crossed SJR to South Delta | medmed | 1% | 1 (155%) | 1 (6%) | 1 (4%) | 0 (-17%) | 0 (-24%) | 0 (-83%) | 1 (4%) | 0 (-10%) |

| Exit Point | Flow Bin | NAA | ALT1 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Crossed SJR to South Delta | medhi | 0% | 0 (438%) | 0 (126%) | 0 (136%) | 0 (81%) | 0 (177%) | 0 (-94%) | 0 (187%) | 0 (184%) |
| Crossed SJR to South Delta | hilo | 0% | 1 (394%) | 0 (-45%) | 0 (-9%) | #N/A | #N/A | 0 (-56%) | 0 (-3%) | #N/A |
| Crossed SJR to South Delta | himed | 0% | 1 (5341%) | 0 (89%) | 0 (92%) | 0 (16%) | 0 (-32%) | 0 (46%) | 0 (54%) | 0 (101%) |
| Crossed SJR to South Delta | hihi | 0% | 0 (1579%) | 0 (25%) | 0 (150%) | 0 (0%) | 0 (315%) | 0 (-56%) | 0 (225%) | 0 (412%) |

Table I.8-46. Mean March through June neutrally buoyant particle fate by Inflow bin for NAA, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4, and Action 5 – particle insertion location at Suisun Bay for all particle system exit points. The parenthetical value represents the percent difference from the NAA. Values displayed as 0% may represent small nonzero decimals rounded to 0%. Percent-difference values are calculated from the unrounded values. Note that NA values result from no data falling into that Inflow bin.

| Exit Point | Flow Bin | NAA | ALT1 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| West of Chipps | lolo | 64% | 54 (-16%) | 64 (1%) | 61 (-4%) | 62 (-3%) | 62 (-3%) | 62 (-3%) | 62 (-3%) | 64 (0%) |
| West of Chipps | lomed | 62% | 57 (-8%) | 62 (-1%) | 61 (-2%) | 62 (0%) | 61 (-2%) | 62 (-1%) | 62 (0%) | 61 (-1%) |
| West of Chipps | lohi | 62% | 60 (-3%) | 60 (-2%) | 61 (-2%) | 61 (-1%) | 61 (0%) | 61 (-1%) | 61 (-1%) | 61 (0%) |
| West of Chipps | medlo | 70% | 57 (-19%) | 72 (3%) | 73 (4%) | 73 (4%) | 67 (-5%) | 70 (-1%) | 72 (3%) | 69 (-2%) |
| West of Chipps | medmed | 72% | 67 (-7%) | 71 (-1%) | 71 (-1%) | 73 (1%) | 73 (1%) | 76 (5%) | 72 (-1%) | 71 (0%) |
| West of Chipps | medhi | 77% | 72 (-6%) | 75 (-3%) | 75 (-3%) | 76 (-1%) | 75 (-3%) | 80 (4%) | 75 (-3%) | 74 (-3%) |
| West of Chipps | hilo | 93% | 87 (-6%) | 95 (2%) | 95 (2%) | #N/A | #N/A | 92 (-1%) | 95 (2%) | #N/A |
| West of Chipps | himed | 94% | 91 (-3%) | 93 (-1%) | 93 (-1%) | 94 (0%) | 95 (1%) | 94 (0%) | 94 (-1%) | 94 (0%) |
| West of Chipps | hihi | 97% | 96 (-1%) | 97 (0%) | 97 (0%) | 97 (0%) | 97 (0%) | 97 (0%) | 97 (0%) | 96 (0%) |

| Exit Point | Flow Bin | NAA | ALT1 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Entrained at Exports | lolo | 0% | 0 (-40%) | 0 (-9%) | 0 (-13%) | 0 (3%) | 0 (19%) | 0 (-85%) | 0 (-3%) | 0 (47%) |
| Entrained at Exports | lomed | 0% | 0 (-59%) | 0 (30%) | 0 (-21%) | 0 (-22%) | 0 (-11%) | 0 (-94%) | 0 (10%) | 0 (-9%) |
| Entrained at Exports | lohi | 0% | 0 (107%) | 0 (38%) | 0 (38%) | 0 (72%) | 0 (173%) | 0 (58%) | 0 (7%) | 0 (82%) |
| Entrained at Exports | medlo | 0% | 0 (-42%) | 0 (0%) | 0 (3%) | 0 (-24%) | 0 (-50%) | 0 (-100%) | 0 (0%) | 0 (-39%) |
| Entrained at Exports | medmed | 0% | 0 (152%) | 0 (13%) | 0 (-48%) | 0 (20%) | 0 (-74%) | 0 (-100%) | 0 (-10%) | 0 (-10%) |
| Entrained at Exports | medhi | 0% | 0 (88%) | 0 (-100%) | 0 (100%) | 0 (-100%) | 0 (80%) | 0 (-100%) | 0 (0%) | 0 (-10%) |
| Entrained at Exports | hilo | 0% | 0 (NA) | 0 (NA) | 0 (NA) | #N/A | #N/A | 0 (NA) | 0 (NA) | #N/A |
| Entrained at Exports | himed | 0% | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (#N/A) |
| Entrained at Exports | hihi | 0% | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (#N/A) |
| Remaining in Delta | lolo | 36% | 46 (29%) | 36 (-1%) | 39 (7%) | 38 (6%) | 38 (5%) | 38 (5%) | 38 (6%) | 35 (-1%) |
| Remaining in Delta | lomed | 38% | 43 (13%) | 38 (1%) | 39 (3%) | 38 (0%) | 39 (3%) | 38 (1%) | 38 (0%) | 38 (2%) |
| Remaining in Delta | lohi | 38% | 40 (5%) | 40 (3%) | 39 (2%) | 39 (2%) | 39 (1%) | 39 (1%) | 39 (2%) | 38 (0%) |
| Remaining in Delta | medlo | 30% | 43 (45%) | 28 (-6%) | 27 (-9%) | 27 (-10%) | 33 (12%) | 30 (3%) | 28 (-7%) | 30 (4%) |
| Remaining in Delta | medmed | 28% | 33 (19%) | 29 (4%) | 29 (3%) | 27 (-4%) | 27 (-3%) | 24 (-12%) | 28 (2%) | 28 (1%) |
| Remaining in Delta | medhi | 23% | 28 (21%) | 25 (8%) | 25 (9%) | 24 (4%) | 25 (10%) | 20 (-14%) | 25 (10%) | 25 (10%) |
| Remaining in Delta | hilo | 7% | 13 (86%) | 5 (-31%) | 5 (-31%) | #N/A | #N/A | 8 (12%) | 5 (-24%) | #N/A |
| Remaining in Delta | himed | 6% | 9 (49%) | 7 (14%) | 7 (15%) | 6 (-4%) | 5 (-9%) | 6 (2%) | 6 (10%) | 5 (2%) |
| Remaining in Delta | hihi | 3% | 4 (16%) | 3 (8%) | 3 (8%) | 3 (2%) | 3 (5%) | 3 (-5%) | 3 (7%) | 3 (7%) |
| Crossed SJR to South Delta | lolo | 0% | 0 (-37%) | 0 (-8%) | 0 (-31%) | 0 (-23%) | 0 (-33%) | 0 (-72%) | 0 (-14%) | 0 (-6%) |
| Crossed SJR to South Delta | lomed | 0% | 0 (-30%) | 0 (16%) | 0 (-6%) | 0 (-13%) | 0 (-3%) | 0 (-58%) | 0 (0%) | 0 (2%) |
| Crossed SJR to South Delta | lohi | 0% | 0 (55%) | 0 (133%) | 0 (141%) | 0 (55%) | 0 (36%) | 0 (150%) | 0 (114%) | 0 (127%) |

| Exit Point | Flow Bin | NAA | ALT1 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Crossed SJR to South Delta | medlo | 0% | 0 (-15%) | 0 (-3%) | 0 (-8%) | 0 (-18%) | 0 (-40%) | 0 (-95%) | 0 (-1%) | 0 (-27%) |
| Crossed SJR to South Delta | medmed | 0% | 0 (29%) | 0 (-16%) | 0 (-29%) | 0 (-16%) | 0 (-50%) | 0 (-89%) | 0 (-16%) | 0 (-36%) |
| Crossed SJR to South Delta | medhi | 0% | 0 (19%) | 0 (-91%) | 0 (-36%) | 0 (-55%) | 0 (-75%) | 0 (-77%) | 0 (-64%) | 0 (-10%) |
| Crossed SJR to South Delta | hilo | 0% | 0 (NA) | 0 (NA) | 0 (NA) | #N/A | #N/A | 0 (NA) | 0 (NA) | #N/A |
| Crossed SJR to South Delta | himed | 0% | 0 (0%) | 0 (-100%) | 0 (-100%) | 0 (-100%) | 0 (-100%) | 0 (-100%) | 0 (-100%) | 0 (-100%) |
| Crossed SJR to South Delta | hihi | 0% | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (#N/A) |

### *I.8.4.3.6 Surface Oriented, Inflow Bins, December through March[EIS, Table I.8-47 through Table I.8-55]*

Table I.8-47. Mean December through March surface-oriented particle fate by Inflow bin for NAA, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4, and Action 5 – particle insertion location at San Joaquin River for all particle system exit points. The parenthetical value represents the percent difference from the NAA. Values displayed as 0% may represent small nonzero decimals rounded to 0%. Percent-difference values are calculated from the unrounded values. Note that NA values result from no data falling into that Inflow bin.

| Exit Point | Flow Bin | NAA | ALT1 | Alt2wTUCPwoVA | Alt2woTUCPwoVA | Alt2woTUCPDeltaVA | Alt2woTUCPAllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| West of Chipps | lolo | 0% | 0 (-31%) | 1 (6%) | 1 (22%) | 1 (3%) | 1 (5%) | 2 (302%) | 1 (5%) | 0 (18%) |
| West of Chipps | lomed | 1% | 1 (116%) | 1 (78%) | 1 (146%) | 2 (252%) | 2 (371%) | 5 (895%) | 1 (20%) | 2 (369%) |
| West of Chipps | lohi | 1% | 2 (59%) | 2 (18%) | 2 (13%) | 2 (25%) | 2 (47%) | 13 (800%) | 1 (-7%) | 17 (1142%) |
| West of Chipps | medlo | 0% | 0 (-82%) | 1 (18%) | 1 (20%) | 1 (11%) | 0 (7%) | 5 (1021%) | 0 (0%) | 0 (-20%) |
| West of Chipps | medmed | 2% | 0 (-83%) | 2 (-1%) | 2 (12%) | 5 (167%) | 5 (177%) | 16 (851%) | 2 (-7%) | 3 (86%) |
| West of Chipps | medhi | 13% | 5 (-64%) | 12 (-7%) | 12 (-7%) | 19 (41%) | 19 (43%) | 58 (339%) | 10 (-25%) | 12 (-6%) |
| West of Chipps | hilo | 2% | 1 (-23%) | 2 (16%) | 2 (14%) | 2 (16%) | 2 (-14%) | 8 (339%) | 2 (15%) | 1 (-9%) |
| West of Chipps | himed | 6% | 0 (-92%) | 6 (2%) | 6 (1%) | 8 (32%) | 8 (34%) | 17 (188%) | 6 (2%) | 6 (1%) |
| West of Chipps | hihi | 39% | 30 (-22%) | 37 (-4%) | 37 (-4%) | 39 (1%) | 39 (1%) | 52 (34%) | 36 (-6%) | 35 (-9%) |
| Entrained at Exports | lolo | 78% | 84 (7%) | 78 (0%) | 77 (-1%) | 78 (0%) | 77 (0%) | 63 (-19%) | 79 (1%) | 80 (3%) |
| Entrained at Exports | lomed | 84% | 81 (-3%) | 78 (-7%) | 77 (-7%) | 72 (-14%) | 71 (-16%) | 62 (-26%) | 81 (-3%) | 72 (-13%) |
| Entrained at Exports | lohi | 86% | 90 (4%) | 85 (-2%) | 84 (-2%) | 85 (-2%) | 84 (-3%) | 50 (-42%) | 88 (2%) | 62 (-27%) |
| Entrained at Exports | medlo | 90% | 88 (-2%) | 88 (-2%) | 88 (-2%) | 89 (-1%) | 87 (-3%) | 64 (-28%) | 90 (0%) | 88 (-1%) |
| Entrained at Exports | medmed | 88% | 96 (8%) | 88 (0%) | 87 (-1%) | 78 (-11%) | 78 (-11%) | 57 (-36%) | 90 (1%) | 85 (-4%) |
| Entrained at Exports | medhi | 79% | 92 (16%) | 81 (2%) | 81 (2%) | 71 (-10%) | 71 (-10%) | 27 (-66%) | 84 (6%) | 80 (2%) |
| Entrained at Exports | hilo | 91% | 91 (0%) | 91 (-1%) | 91 (0%) | 91 (-1%) | 91 (0%) | 79 (-14%) | 91 (0%) | 92 (1%) |
| Entrained at Exports | himed | 89% | 99 (10%) | 89 (0%) | 89 (0%) | 85 (-5%) | 85 (-5%) | 71 (-21%) | 89 (0%) | 88 (0%) |

| Exit Point | Flow Bin | NAA | ALT1 | Alt2wTUCPwoVA | Alt2woTUCPwoVA | Alt2woTUCPDeltaVA | Alt2woTUCPAllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Entrained at Exports | hihi | 59% | 69 (16%) | 61 (3%) | 61 (3%) | 59 (-1%) | 59 (-1%) | 46 (-23%) | 62 (4%) | 62 (5%) |
| Remaining in Delta | lolo | 22% | 16 (-26%) | 22 (-1%) | 22 (3%) | 22 (1%) | 22 (2%) | 35 (63%) | 21 (-3%) | 19 (-12%) |
| Remaining in Delta | lomed | 16% | 18 (12%) | 21 (33%) | 21 (35%) | 26 (66%) | 27 (70%) | 33 (107%) | 18 (14%) | 24 (56%) |
| Remaining in Delta | lohi | 12% | 8 (-34%) | 14 (11%) | 14 (15%) | 14 (12%) | 14 (14%) | 37 (205%) | 10 (-16%) | 19 (58%) |
| Remaining in Delta | medlo | 10% | 12 (19%) | 12 (18%) | 11 (17%) | 11 (12%) | 12 (24%) | 30 (211%) | 10 (-2%) | 10 (12%) |
| Remaining in Delta | medmed | 10% | 4 (-59%) | 10 (-1%) | 11 (8%) | 17 (72%) | 17 (71%) | 27 (171%) | 9 (-11%) | 11 (19%) |
| Remaining in Delta | medhi | 8% | 4 (-52%) | 7 (-8%) | 7 (-9%) | 10 (35%) | 10 (30%) | 15 (100%) | 6 (-19%) | 6 (-9%) |
| Remaining in Delta | hilo | 7% | 8 (12%) | 7 (5%) | 7 (3%) | 7 (3%) | 7 (7%) | 13 (93%) | 7 (-6%) | 6 (-14%) |
| Remaining in Delta | himed | 5% | 1 (-80%) | 5 (6%) | 5 (7%) | 7 (44%) | 7 (43%) | 12 (151%) | 5 (-5%) | 5 (8%) |
| Remaining in Delta | hihi | 2% | 1 (-47%) | 2 (-11%) | 2 (-12%) | 2 (14%) | 2 (14%) | 3 (24%) | 2 (-14%) | 2 (12%) |
| Crossed SJR to South Delta | lolo | 51% | 53 (4%) | 51 (0%) | 50 (0%) | 50 (0%) | 50 (-1%) | 46 (-10%) | 51 (1%) | 51 (2%) |
| Crossed SJR to South Delta | lomed | 56% | 55 (-2%) | 54 (-4%) | 54 (-5%) | 51 (-9%) | 51 (-10%) | 46 (-19%) | 56 (-1%) | 52 (-8%) |
| Crossed SJR to South Delta | lohi | 61% | 62 (2%) | 60 (-1%) | 60 (-2%) | 60 (-2%) | 60 (-2%) | 37 (-39%) | 62 (1%) | 41 (-32%) |
| Crossed SJR to South Delta | medlo | 54% | 47 (-13%) | 54 (-1%) | 54 (0%) | 54 (-1%) | 54 (-1%) | 45 (-16%) | 55 (2%) | 53 (-1%) |
| Crossed SJR to South Delta | medmed | 59% | 61 (3%) | 60 (0%) | 59 (-1%) | 54 (-8%) | 54 (-9%) | 40 (-33%) | 60 (1%) | 57 (-3%) |
| Crossed SJR to South Delta | medhi | 55% | 64 (17%) | 56 (2%) | 56 (2%) | 48 (-12%) | 48 (-12%) | 7 (-87%) | 58 (7%) | 55 (1%) |
| Crossed SJR to South Delta | hilo | 56% | 47 (-17%) | 55 (-2%) | 56 (-1%) | 55 (-1%) | 56 (0%) | 50 (-12%) | 57 (0%) | 56 (0%) |
| Crossed SJR to South Delta | himed | 57% | 61 (7%) | 57 (0%) | 57 (0%) | 55 (-4%) | 55 (-4%) | 44 (-22%) | 57 (0%) | 57 (0%) |

| Exit Point | Flow Bin | NAA | ALT1 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Crossed SJR to South Delta | hihi | 32% | 41 (26%) | 34 (5%) | 34 (5%) | 32 (-1%) | 32 (-1%) | 19 (-41%) | 34 (7%) | 35 (9%) |

Table I.8-48. Mean December through March surface-oriented particle fate by Inflow bin for NAA, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4, and Action 5 – particle insertion location at Old and Middle River for all particle system exit points. The parenthetical value represents the percent difference from the NAA. Values displayed as 0% may represent small nonzero decimals rounded to 0%. Percent-difference values are calculated from the unrounded values. Note that NA values result from no data falling into that Inflow bin.

| Exit Point | Flow Bin | NAA | ALT1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| West of Chipps | lolo | 6% | 6 (9%) | 6 (3%) | 6 (13%) | 6 (3%) | 6 (2%) | 12 (119%) | 6 (6%) | 5 (-4%) |
| West of Chipps | lomed | 5% | 7 (28%) | 7 (25%) | 8 (46%) | 9 (70%) | 10 (89%) | 14 (162%) | 6 (6%) | 8 (53%) |
| West of Chipps | lohi | 4% | 4 (6%) | 4 (0%) | 4 (2%) | 4 (-1%) | 4 (3%) | 12 (216%) | 3 (-11%) | 14 (275%) |
| West of Chipps | medlo | 5% | 2 (-53%) | 5 (9%) | 5 (11%) | 5 (5%) | 5 (7%) | 17 (259%) | 5 (4%) | 4 (-6%) |
| West of Chipps | medmed | 7% | 3 (-52%) | 7 (3%) | 8 (7%) | 10 (45%) | 10 (45%) | 24 (231%) | 7 (-1%) | 8 (16%) |
| West of Chipps | medhi | 11% | 6 (-41%) | 11 (-2%) | 10 (-2%) | 13 (24%) | 13 (25%) | 50 (364%) | 10 (-11%) | 11 (4%) |
| West of Chipps | hilo | 8% | 2 (-74%) | 8 (-1%) | 8 (0%) | 8 (-3%) | 8 (0%) | 16 (99%) | 8 (4%) | 7 (-10%) |
| West of Chipps | himed | 10% | 3 (-66%) | 10 (2%) | 10 (2%) | 11 (12%) | 11 (11%) | 20 (101%) | 10 (0%) | 10 (2%) |
| West of Chipps | hihi | 26% | 24 (-9%) | 25 (-4%) | 26 (-4%) | 26 (0%) | 27 (1%) | 46 (73%) | 25 (-6%) | 24 (-8%) |
| Entrained at Exports | lolo | 86% | 89 (3%) | 86 (0%) | 86 (0%) | 86 (0%) | 86 (0%) | 75 (-13%) | 86 (0%) | 87 (2%) |
| Entrained at Exports | lomed | 89% | 87 (-2%) | 87 (-3%) | 85 (-5%) | 82 (-8%) | 81 (-9%) | 74 (-18%) | 88 (-1%) | 85 (-5%) |
| Entrained at Exports | lohi | 92% | 92 (1%) | 91 (-1%) | 91 (0%) | 91 (0%) | 91 (-1%) | 73 (-21%) | 92 (0%) | 74 (-19%) |
| Entrained at Exports | medlo | 92% | 96 (4%) | 92 (-1%) | 92 (-1%) | 92 (0%) | 91 (-1%) | 70 (-24%) | 92 (0%) | 91 (0%) |

| Exit Point | Flow Bin | NAA | ALT1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Entrained at Exports | medmed | 90% | 95 (5%) | 90 (0%) | 89 (-1%) | 85 (-5%) | 85 (-5%) | 61 (-32%) | 90 (0%) | 88 (-1%) |
| Entrained at Exports | medhi | 87% | 93 (6%) | 88 (0%) | 88 (0%) | 84 (-4%) | 84 (-4%) | 37 (-58%) | 89 (2%) | 86 (-1%) |
| Entrained at Exports | hilo | 90% | 97 (8%) | 90 (0%) | 90 (0%) | 89 (0%) | 89 (0%) | 78 (-13%) | 89 (-1%) | 90 (1%) |
| Entrained at Exports | himed | 88% | 96 (9%) | 88 (0%) | 88 (0%) | 86 (-2%) | 87 (-2%) | 74 (-16%) | 88 (0%) | 87 (0%) |
| Entrained at Exports | hihi | 72% | 75 (4%) | 73 (2%) | 73 (1%) | 72 (0%) | 72 (0%) | 51 (-29%) | 73 (2%) | 73 (3%) |
| Remaining in Delta | lolo | 9% | 5 (-37%) | 8 (-6%) | 8 (-4%) | 8 (-5%) | 8 (-6%) | 13 (54%) | 8 (-4%) | 7 (-17%) |
| Remaining in Delta | lomed | 5% | 6 (10%) | 7 (30%) | 8 (46%) | 8 (64%) | 8 (62%) | 12 (138%) | 6 (14%) | 6 (29%) |
| Remaining in Delta | lohi | 5% | 4 (-19%) | 5 (10%) | 5 (7%) | 5 (10%) | 5 (16%) | 15 (229%) | 5 (9%) | 11 (147%) |
| Remaining in Delta | medlo | 3% | 2 (-31%) | 3 (7%) | 3 (7%) | 3 (5%) | 3 (22%) | 12 (336%) | 3 (9%) | 3 (23%) |
| Remaining in Delta | medmed | 3% | 2 (-36%) | 3 (0%) | 3 (10%) | 4 (48%) | 4 (46%) | 15 (433%) | 3 (-6%) | 2 (5%) |
| Remaining in Delta | medhi | 2% | 1 (-36%) | 2 (-7%) | 2 (-5%) | 3 (39%) | 3 (38%) | 14 (635%) | 2 (-16%) | 1 (2%) |
| Remaining in Delta | hilo | 2% | 1 (-53%) | 2 (11%) | 2 (6%) | 3 (21%) | 3 (17%) | 6 (148%) | 2 (10%) | 2 (2%) |
| Remaining in Delta | himed | 2% | 1 (-50%) | 2 (-2%) | 2 (-1%) | 2 (18%) | 2 (15%) | 6 (225%) | 2 (-3%) | 1 (7%) |
| Remaining in Delta | hihi | 2% | 1 (-17%) | 2 (-4%) | 2 (-5%) | 2 (11%) | 2 (8%) | 4 (111%) | 2 (3%) | 1 (9%) |
| Crossed SJR to South Delta | lolo | -9% | -8 (-14%) | -9 (1%) | -10 (6%) | -9 (0%) | -9 (-1%) | -17 (82%) | -10 (4%) | -9 (-10%) |
| Crossed SJR to South Delta | lomed | -8% | -9 (17%) | -10 (27%) | -11 (43%) | -13 (65%) | -14 (74%) | -19 (132%) | -9 (9%) | -12 (41%) |
| Crossed SJR to South Delta | lohi | -6% | -6 (-4%) | -6 (4%) | -6 (5%) | -6 (2%) | -6 (6%) | -20 (244%) | -6 (-4%) | -19 (206%) |
| Crossed SJR to South Delta | medlo | -6% | -3 (-52%) | -6 (9%) | -6 (10%) | -6 (5%) | -6 (10%) | -21 (262%) | -6 (5%) | -6 (0%) |
| Crossed SJR to South Delta | medmed | -8% | -4 (-51%) | -8 (2%) | -9 (7%) | -12 (43%) | -12 (43%) | -27 (235%) | -8 (-2%) | -10 (14%) |

| Exit Point | Flow Bin | NAA | ALT1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Crossed SJR to South Delta | medhi | -11% | -7 (-41%) | -11 (-1%) | -11 (-2%) | -14 (24%) | -14 (25%) | -54 (386%) | -10 (-11%) | -12 (5%) |
| Crossed SJR to South Delta | hilo | -8% | -2 (-73%) | -8 (-1%) | -8 (0%) | -8 (-3%) | -8 (0%) | -17 (101%) | -9 (4%) | -8 (-10%) |
| Crossed SJR to South Delta | himed | -10% | -4 (-65%) | -11 (2%) | -11 (3%) | -12 (12%) | -12 (11%) | -22 (107%) | -10 (0%) | -11 (4%) |
| Crossed SJR to South Delta | hihi | -27% | -24 (-9%) | -26 (-4%) | -26 (-4%) | -27 (0%) | -27 (1%) | -47 (75%) | -25 (-6%) | -25 (-7%) |

Table I.8-49. Mean December through March surface-oriented particle fate by Inflow bin for NAA, Alternative 1, four phases of Alternative 2, Alternative 3, and Alternative 4 – particle insertion location at Southern Delta for all particle system exit points. The parenthetical value represents the percent difference from the NAA. Values displayed as 0% may represent small nonzero decimals rounded to 0%. Percent-difference values are calculated from the unrounded values. Note that NA values result from no data falling into that Inflow bin.

| Exit Point | Flow Bin | NAA | ALT1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | ALT3 | ALT4 |
|---|---|---|---|---|---|---|---|---|---|
| West of Chipps | lolo | 0% | 0 (-100%) | 0 (22%) | 0 (-28%) | 0 (-36%) | 0 (58%) | 0 (-24%) | 0 (13%) |
| West of Chipps | lomed | 0% | 0 (-164041%) | 0 (-91%) | 0 (-849679%) | 0 (-541665%) | 0 (-171951%) | 0 (-41357746%) | 0 (-166%) |
| West of Chipps | lohi | 0% | 0 (23%) | 0 (-100%) | 0 (-100%) | 0 (-50%) | 0 (-150%) | 0 (-198%) | 0 (-150%) |
| West of Chipps | medlo | 0% | 0 (-158%) | 0 (34%) | 0 (-10%) | 0 (123%) | 0 (145%) | 0 (34982051%) | 0 (-101%) |

| Exit Point | Flow Bin | NAA | ALT1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | ALT3 | ALT4 |
|---|---|---|---|---|---|---|---|---|---|
| West of Chipps | medmed | 0% | 0 (-61%) | 0 (1%) | 0 (-134%) | 0 (-10%) | 0 (38%) | 1 (577449102%) | 0 (-204%) |
| West of Chipps | medhi | 0% | 0 (-293%) | 0 (-261%) | 0 (85%) | 0 (-314%) | 0 (-9%) | 19 (-3893364624%) | 0 (-278%) |
| West of Chipps | hilo | 0% | 0 (559%) | 0 (9%) | 0 (-1389%) | 0 (356%) | 0 (-426%) | 0 (-441460324%) | 0 (312%) |
| West of Chipps | himed | 0% | 0 (731%) | 0 (-2356%) | 0 (2163%) | 0 (1300%) | 0 (-335%) | 2 (-9208362078%) | 0 (568%) |
| West of Chipps | hihi | 5% | 5 (15%) | 4 (-11%) | 4 (-9%) | 4 (-11%) | 4 (-9%) | 20 (351%) | 4 (-21%) |
| Entrained at Exports | lolo | 100% | 100 (0%) | 100 (0%) | 100 (0%) | 100 (0%) | 100 (0%) | 100 (0%) | 100 (0%) |
| Entrained at Exports | lomed | 100% | 100 (0%) | 100 (0%) | 100 (0%) | 100 (0%) | 100 (0%) | 96 (-4%) | 100 (0%) |
| Entrained at Exports | lohi | 100% | 100 (0%) | 100 (0%) | 100 (0%) | 100 (0%) | 100 (0%) | 100 (0%) | 100 (0%) |
| Entrained at Exports | medlo | 100% | 100 (0%) | 100 (0%) | 100 (0%) | 100 (0%) | 100 (0%) | 98 (-2%) | 100 (0%) |
| Entrained at Exports | medmed | 100% | 100 (0%) | 100 (0%) | 100 (0%) | 100 (0%) | 100 (0%) | 96 (-4%) | 100 (0%) |
| Entrained at Exports | medhi | 100% | 100 (0%) | 100 (0%) | 100 (0%) | 100 (0%) | 100 (0%) | 73 (-27%) | 100 (0%) |
| Entrained at Exports | hilo | 100% | 100 (0%) | 100 (0%) | 100 (0%) | 100 (0%) | 100 (0%) | 99 (-1%) | 100 (0%) |
| Entrained at Exports | himed | 100% | 100 (0%) | 100 (0%) | 100 (0%) | 100 (0%) | 100 (0%) | 97 (-3%) | 100 (0%) |
| Entrained at Exports | hihi | 95% | 95 (-1%) | 96 (1%) | 96 (0%) | 96 (1%) | 96 (0%) | 77 (-19%) | 96 (1%) |

| Exit Point | Flow Bin | NAA | ALT1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | ALT3 | ALT4 |
|---|---|---|---|---|---|---|---|---|---|
| Remaining in Delta | lolo | 0% | 0 (-94%) | 0 (-39%) | 0 (-32%) | 0 (-34%) | 0 (-32%) | 0 (-13%) | 0 (-37%) |
| Remaining in Delta | lomed | 0% | 0 (15786%) | 0 (650%) | 0 (16665%) | 0 (17225%) | 0 (15329%) | 4 (213445%) | 0 (500%) |
| Remaining in Delta | lohi | 0% | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) |
| Remaining in Delta | medlo | 0% | 0 (-100%) | 0 (278%) | 0 (278%) | 0 (117%) | 0 (1356%) | 1 (302576%) | 0 (400%) |
| Remaining in Delta | medmed | 0% | 0 (10%) | 0 (-445009000220%) | 0 (-1967408260308%) | 0 (-5399442458509%) | 0 (-8870009178669%) | 2 (-1183011899577510%) | 0 (-8744036495510%) |
| Remaining in Delta | medhi | 0% | 0 (-82%) | 0 (-80%) | 0 (-80%) | 0 (60%) | 0 (100%) | 8 (73776%) | 0 (-40%) |
| Remaining in Delta | hilo | 0% | 0 (224%) | 0 (-59%) | 0 (-60%) | 0 (28%) | 0 (-20%) | 1 (-490327014695288%) | 0 (5%) |
| Remaining in Delta | himed | 0% | 0 (-42%) | 0 (-43%) | 0 (11%) | 0 (-1132580694499%) | 0 (-46998269018 7%) | 1 (-580276314184513%) | 0 (12%) |
| Remaining in Delta | hihi | 0% | 0 (59%) | 0 (-1%) | 0 (-6%) | 0 (3%) | 0 (7%) | 2 (1088%) | 0 (12%) |
| Crossed SJR to South Delta | lolo | 0% | 0 (-100%) | 0 (-13%) | 0 (-48%) | 0 (-51%) | 0 (-2%) | 0 (-68%) | 0 (-18%) |
| Crossed SJR to South Delta | lomed | 0% | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | -1 (NA) | 0 (NA) |
| Crossed SJR to South Delta | lohi | 0% | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) |

| Exit Point | Flow Bin | NAA | ALT1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | ALT3 | ALT4 |
|---|---|---|---|---|---|---|---|---|---|
| Crossed SJR to South Delta | medlo | 0% | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) |
| Crossed SJR to South Delta | medmed | 0% | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | -1 (NA) | 0 (NA) |
| Crossed SJR to South Delta | medhi | 0% | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | -21 (NA) | 0 (NA) |
| Crossed SJR to South Delta | hilo | 0% | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) |
| Crossed SJR to South Delta | himed | 0% | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | -2 (NA) | 0 (NA) |
| Crossed SJR to South Delta | hihi | -5% | -5 (15%) | -4 (-11%) | -4 (-9%) | -4 (-11%) | -4 (-9%) | -21 (360%) | -4 (-21%) |

Table I.8-49a. Mean December through March surface-oriented particle fate by Inflow bin for NAA and Action 5 – particle insertion location at Southern Delta for all particle system exit points. The parenthetical value represents the percent difference from the NAA. Values displayed as 0% may represent small nonzero decimals rounded to 0%. Percent-difference values are calculated from the unrounded values. Note that NA values result from no data falling into that Inflow bin.

| Exit Point | Flow Bin | NAA | ACT5 |
|---|---|---|---|
| West of Chipps | lolo | 0% | 0 (-94%) |
| West of Chipps | lomed | 0% | -1 (-88%) |
| West of Chipps | lohi | 0% | 0 (403272%) |
| West of Chipps | medlo | 0% | 0 (88%) |
| West of Chipps | medmed | 0% | -1 (-201%) |
| West of Chipps | medhi | 0% | -1 (-34%) |
| West of Chipps | hilo | 0% | 0 (-811%) |
| West of Chipps | himed | 0% | -1 (209%) |
| West of Chipps | hihi | 5% | 3 (-12%) |
| Entrained at Exports | lolo | 100% | 99 (0%) |
| Entrained at Exports | lomed | 100% | 99 (0%) |
| Entrained at Exports | lohi | 100% | 99 (0%) |
| Entrained at Exports | medlo | 100% | 99 (0%) |
| Entrained at Exports | medmed | 100% | 99 (0%) |
| Entrained at Exports | medhi | 100% | 99 (0%) |
| Entrained at Exports | hilo | 100% | 99 (0%) |
| Entrained at Exports | himed | 100% | 100 (0%) |
| Entrained at Exports | hihi | 95% | 95 (1%) |
| Remaining in Delta | lolo | 0% | 0 (-83%) |
| Remaining in Delta | lomed | 0% | 0 (768%) |
| Remaining in Delta | lohi | 0% | 0 (#N/A) |
| Remaining in Delta | medlo | 0% | 0 (8%) |

| Exit Point | Flow Bin | NAA | ACT5 |
|---|---|---|---|
| Remaining in Delta | medmed | 0% | 0 (-1869037723493%) |
| Remaining in Delta | medhi | 0% | 0 (-56%) |
| Remaining in Delta | hilo | 0% | 0 (-1095745020740%) |
| Remaining in Delta | himed | 0% | -1 (-11%) |
| Remaining in Delta | hihi | 0% | 0 (-10%) |
| Crossed SJR to South Delta | lolo | 0% | 0 (-100%) |
| Crossed SJR to South Delta | lomed | 0% | 0 (#N/A) |
| Crossed SJR to South Delta | lohi | 0% | -1 (#N/A) |
| Crossed SJR to South Delta | medlo | 0% | 0 (#N/A) |
| Crossed SJR to South Delta | medmed | 0% | 0 (#N/A) |
| Crossed SJR to South Delta | medhi | 0% | 0 (#N/A) |
| Crossed SJR to South Delta | hilo | 0% | 0 (#N/A) |
| Crossed SJR to South Delta | himed | 0% | 0 (#N/A) |
| Crossed SJR to South Delta | hihi | -5% | -5 (-12%) |

Table I.8-50. Mean December through March surface-oriented particle fate by Inflow bin for NAA, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4, and Action 5 – particle insertion location at Central Delta for all particle system exit points. The parenthetical value represents the percent difference from the NAA. Values displayed as 0% may represent small nonzero decimals rounded to 0%. Percent-difference values are calculated from the unrounded values. Note that NA values result from no data falling into that Inflow bin.

| Exit Point | Flow Bin | NAA | ALT1 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| West of Chipps | lolo | 27% | 31 (18%) | 27 (3%) | 29 (9%) | 27 (2%) | 27 (3%) | 45 (69%) | 28 (5%) | 26 (-1%) |
| West of Chipps | lomed | 31% | 36 (14%) | 35 (10%) | 37 (19%) | 41 (32%) | 45 (42%) | 54 (72%) | 32 (2%) | 40 (29%) |
| West of Chipps | lohi | 25% | 30 (19%) | 26 (3%) | 26 (3%) | 26 (4%) | 27 (8%) | 50 (97%) | 22 (-12%) | 57 (129%) |
| West of Chipps | medlo | 33% | 21 (-35%) | 34 (4%) | 34 (4%) | 34 (3%) | 33 (1%) | 61 (87%) | 34 (4%) | 29 (-8%) |
| West of Chipps | medmed | 46% | 29 (-35%) | 46 (1%) | 47 (3%) | 54 (18%) | 54 (18%) | 70 (54%) | 46 (1%) | 47 (4%) |
| West of Chipps | medhi | 67% | 51 (-24%) | 67 (-1%) | 67 (-1%) | 72 (8%) | 73 (8%) | 94 (40%) | 64 (-5%) | 64 (-4%) |
| West of Chipps | hilo | 56% | 23 (-58%) | 55 (-1%) | 55 (-1%) | 54 (-3%) | 54 (-2%) | 68 (22%) | 57 (2%) | 51 (-7%) |
| West of Chipps | himed | 68% | 38 (-44%) | 69 (1%) | 69 (1%) | 71 (3%) | 70 (3%) | 76 (11%) | 69 (0%) | 66 (-2%) |
| West of Chipps | hihi | 89% | 78 (-12%) | 88 (0%) | 88 (0%) | 89 (0%) | 89 (0%) | 91 (3%) | 88 (-1%) | 87 (-2%) |
| Entrained at Exports | Lolo | 46% | 49 (7%) | 45 (-1%) | 44 (-5%) | 46 (0%) | 46 (-1%) | 23 (-49%) | 45 (-3%) | 47 (4%) |
| Entrained at Exports | lomed | 43% | 42 (-4%) | 36 (-17%) | 36 (-18%) | 30 (-31%) | 28 (-35%) | 25 (-43%) | 41 (-6%) | 31 (-28%) |
| Entrained at Exports | lohi | 49% | 49 (0%) | 47 (-4%) | 47 (-4%) | 47 (-3%) | 46 (-7%) | 10 (-80%) | 52 (6%) | 24 (-49%) |
| Entrained at Exports | medlo | 56% | 71 (27%) | 54 (-4%) | 54 (-4%) | 54 (-2%) | 54 (-3%) | 22 (-61%) | 53 (-4%) | 57 (3%) |
| Entrained at Exports | medmed | 42% | 62 (48%) | 41 (-1%) | 40 (-3%) | 33 (-22%) | 33 (-21%) | 16 (-61%) | 42 (0%) | 39 (-6%) |
| Entrained at Exports | medhi | 26% | 43 (64%) | 27 (3%) | 27 (2%) | 21 (-19%) | 21 (-19%) | 2 (-94%) | 30 (14%) | 29 (11%) |
| Entrained at Exports | hilo | 39% | 74 (90%) | 40 (2%) | 40 (2%) | 40 (3%) | 40 (2%) | 26 (-33%) | 38 (-3%) | 42 (10%) |
| Entrained at Exports | himed | 28% | 59 (114%) | 27 (-2%) | 27 (-2%) | 25 (-9%) | 26 (-8%) | 19 (-31%) | 28 (-1%) | 29 (5%) |
| Entrained at Exports | hihi | 10% | 21 (101%) | 11 (5%) | 11 (5%) | 10 (-3%) | 10 (-3%) | 8 (-25%) | 11 (9%) | 11 (15%) |

| Exit Point | Flow Bin | NAA | ALT1 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Remaining in Delta | lolo | 27% | 19 (-29%) | 27 (-1%) | 27 (0%) | 27 (-2%) | 27 (-2%) | 32 (16%) | 28 (1%) | 26 (-5%) |
| Remaining in Delta | lomed | 25% | 22 (-12%) | 29 (16%) | 27 (7%) | 29 (14%) | 27 (7%) | 21 (-16%) | 27 (7%) | 28 (13%) |
| Remaining in Delta | lohi | 26% | 21 (-19%) | 27 (5%) | 27 (5%) | 26 (3%) | 27 (5%) | 40 (58%) | 26 (1%) | 17 (-33%) |
| Remaining in Delta | medlo | 12% | 8 (-30%) | 13 (7%) | 12 (6%) | 12 (4%) | 13 (13%) | 17 (46%) | 13 (8%) | 12 (9%) |
| Remaining in Delta | medmed | 13% | 9 (-31%) | 13 (-1%) | 13 (-1%) | 13 (5%) | 13 (5%) | 13 (6%) | 12 (-6%) | 13 (4%) |
| Remaining in Delta | medhi | 6% | 6 (-10%) | 6 (-2%) | 6 (-2%) | 6 (-3%) | 6 (-6%) | 4 (-37%) | 6 (-3%) | 6 (-3%) |
| Remaining in Delta | hilo | 5% | 3 (-51%) | 6 (3%) | 5 (1%) | 6 (8%) | 6 (8%) | 6 (9%) | 5 (1%) | 5 (1%) |
| Remaining in Delta | himed | 4% | 3 (-30%) | 4 (4%) | 4 (5%) | 4 (7%) | 4 (7%) | 5 (21%) | 4 (1%) | 3 (4%) |
| Remaining in Delta | hihi | 1% | 1 (-3%) | 1 (-6%) | 1 (-6%) | 1 (3%) | 1 (2%) | 1 (-20%) | 1 (-2%) | 1 (-1%) |
| Crossed SJR to South Delta | lolo | 57% | 58 (2%) | 56 (-1%) | 55 (-4%) | 57 (0%) | 56 (-1%) | 37 (-35%) | 55 (-3%) | 58 (2%) |
| Crossed SJR to South Delta | lomed | 54% | 52 (-4%) | 48 (-11%) | 46 (-14%) | 41 (-23%) | 39 (-27%) | 34 (-37%) | 52 (-3%) | 42 (-21%) |
| Crossed SJR to South Delta | lohi | 60% | 58 (-4%) | 58 (-3%) | 58 (-3%) | 58 (-3%) | 57 (-4%) | 20 (-66%) | 62 (3%) | 32 (-46%) |
| Crossed SJR to South Delta | medlo | 61% | 75 (22%) | 60 (-3%) | 60 (-3%) | 60 (-2%) | 60 (-2%) | 30 (-51%) | 60 (-3%) | 63 (3%) |
| Crossed SJR to South Delta | medmed | 48% | 66 (39%) | 47 (-1%) | 47 (-3%) | 39 (-18%) | 40 (-17%) | 23 (-52%) | 48 (0%) | 45 (-4%) |
| Crossed SJR to South Delta | medhi | 30% | 46 (56%) | 30 (1%) | 30 (1%) | 25 (-17%) | 25 (-17%) | 4 (-88%) | 33 (12%) | 32 (9%) |
| Crossed SJR to South Delta | hilo | 42% | 76 (80%) | 43 (2%) | 43 (2%) | 44 (4%) | 43 (3%) | 30 (-30%) | 41 (-2%) | 46 (10%) |
| Crossed SJR to South Delta | himed | 30% | 61 (103%) | 29 (-2%) | 29 (-2%) | 28 (-8%) | 28 (-7%) | 22 (-27%) | 30 (-1%) | 31 (5%) |

| Exit Point | Flow Bin | NAA | ALT1 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Crossed SJR to South Delta | hihi | 11% | 21 (93%) | 11 (4%) | 11 (4%) | 11 (-3%) | 11 (-3%) | 8 (-25%) | 12 (8%) | 12 (14%) |

Table I.8-51. Mean December through March surface-oriented particle fate by Inflow bin for NAA, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4, and Action 5 – particle insertion location at Sacramento River for all particle system exit points. The parenthetical value represents the percent difference from the NAA. Values displayed as 0% may represent small nonzero decimals rounded to 0%. Percent-difference values are calculated from the unrounded values. Note that NA values result from no data falling into that Inflow bin.

| Exit Point | Flow Bin | NAA | ALT1 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| West of Chipps | lolo | 58% | 59 (2%) | 59 (1%) | 60 (4%) | 59 (1%) | 58 (1%) | 73 (26%) | 59 (2%) | 58 (1%) |
| West of Chipps | lomed | 68% | 69 (2%) | 68 (1%) | 71 (4%) | 73 (8%) | 75 (11%) | 81 (21%) | 67 (-1%) | 72 (8%) |
| West of Chipps | lohi | 50% | 52 (5%) | 50 (1%) | 50 (0%) | 50 (0%) | 51 (3%) | 62 (24%) | 44 (-11%) | 72 (46%) |
| West of Chipps | medlo | 76% | 63 (-17%) | 76 (0%) | 76 (0%) | 76 (0%) | 76 (-1%) | 89 (17%) | 78 (2%) | 73 (-3%) |
| West of Chipps | medmed | 84% | 75 (-10%) | 85 (0%) | 85 (1%) | 87 (3%) | 87 (3%) | 92 (10%) | 86 (2%) | 84 (0%) |
| West of Chipps | medhi | 94% | 90 (-4%) | 93 (0%) | 94 (0%) | 94 (1%) | 94 (1%) | 98 (5%) | 93 (-1%) | 93 (0%) |
| West of Chipps | hilo | 93% | 79 (-15%) | 93 (0%) | 93 (0%) | 92 (-1%) | 92 (-1%) | 95 (2%) | 93 (0%) | 91 (-1%) |
| West of Chipps | himed | 96% | 88 (-8%) | 96 (0%) | 96 (0%) | 96 (0%) | 96 (0%) | 97 (1%) | 96 (0%) | 95 (0%) |
| West of Chipps | hihi | 99% | 98 (-1%) | 99 (0%) | 99 (0%) | 99 (0%) | 99 (0%) | 99 (0%) | 99 (0%) | 98 (0%) |
| Entrained at Exports | lolo | 15% | 21 (35%) | 15 (-4%) | 14 (-8%) | 15 (-1%) | 15 (-2%) | 6 (-61%) | 14 (-7%) | 15 (-1%) |
| Entrained at Exports | lomed | 11% | 14 (26%) | 9 (-19%) | 9 (-19%) | 7 (-33%) | 7 (-37%) | 7 (-40%) | 11 (2%) | 8 (-28%) |
| Entrained at Exports | lohi | 16% | 19 (18%) | 15 (-8%) | 15 (-9%) | 16 (-5%) | 15 (-10%) | 3 (-84%) | 19 (19%) | 8 (-51%) |
| Entrained at Exports | medlo | 15% | 28 (90%) | 14 (-4%) | 14 (-3%) | 14 (-2%) | 14 (-2%) | 4 (-72%) | 12 (-15%) | 15 (5%) |
| Entrained at Exports | medmed | 8% | 17 (104%) | 8 (-1%) | 8 (-4%) | 7 (-20%) | 7 (-20%) | 3 (-70%) | 8 (-11%) | 8 (-5%) |

| Exit Point | Flow Bin | NAA | ALT1 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Entrained at Exports | medhi | 3% | 7 (107%) | 4 (3%) | 4 (2%) | 3 (-20%) | 3 (-19%) | 0 (-96%) | 4 (16%) | 3 (10%) |
| Entrained at Exports | hilo | 5% | 19 (273%) | 5 (6%) | 5 (5%) | 5 (8%) | 5 (9%) | 3 (-39%) | 5 (-4%) | 6 (20%) |
| Entrained at Exports | himed | 3% | 10 (277%) | 3 (-1%) | 3 (-1%) | 2 (-10%) | 3 (-7%) | 2 (-33%) | 3 (-2%) | 2 (10%) |
| Entrained at Exports | hihi | 1% | 2 (182%) | 1 (3%) | 1 (4%) | 1 (-3%) | 1 (-3%) | 0 (-27%) | 1 (14%) | 0 (20%) |
| Remaining in Delta | lolo | 27% | 20 (-25%) | 27 (-1%) | 26 (-3%) | 26 (-1%) | 27 (0%) | 21 (-21%) | 27 (0%) | 26 (-2%) |
| Remaining in Delta | lomed | 21% | 17 (-21%) | 23 (6%) | 21 (-4%) | 20 (-7%) | 18 (-17%) | 12 (-45%) | 22 (1%) | 19 (-10%) |
| Remaining in Delta | lohi | 34% | 29 (-16%) | 35 (3%) | 35 (4%) | 34 (2%) | 34 (1%) | 35 (5%) | 36 (7%) | 19 (-43%) |
| Remaining in Delta | medlo | 9% | 9 (1%) | 10 (5%) | 10 (5%) | 9 (1%) | 10 (8%) | 7 (-25%) | 10 (6%) | 10 (16%) |
| Remaining in Delta | medmed | 7% | 7 (1%) | 7 (-3%) | 7 (-3%) | 7 (-10%) | 7 (-10%) | 5 (-31%) | 7 (-7%) | 7 (4%) |
| Remaining in Delta | medhi | 3% | 3 (11%) | 3 (0%) | 3 (-1%) | 3 (-6%) | 3 (-6%) | 2 (-30%) | 3 (1%) | 2 (0%) |
| Remaining in Delta | hilo | 2% | 2 (13%) | 2 (2%) | 2 (1%) | 2 (6%) | 2 (9%) | 2 (-13%) | 2 (-3%) | 2 (10%) |
| Remaining in Delta | himed | 1% | 2 (50%) | 1 (7%) | 1 (8%) | 1 (2%) | 1 (4%) | 1 (10%) | 1 (1%) | 1 (6%) |
| Remaining in Delta | hihi | 0% | 0 (22%) | 0 (-1%) | 0 (-2%) | 0 (4%) | 0 (2%) | 0 (-19%) | 0 (4%) | 0 (3%) |
| Crossed SJR to South Delta | lolo | 22% | 27 (24%) | 21 (-3%) | 20 (-6%) | 22 (0%) | 21 (-1%) | 11 (-48%) | 20 (-6%) | 21 (-1%) |
| Crossed SJR to South Delta | lomed | 16% | 19 (18%) | 14 (-13%) | 14 (-16%) | 12 (-28%) | 11 (-32%) | 10 (-40%) | 17 (3%) | 12 (-22%) |
| Crossed SJR to South Delta | lohi | 26% | 28 (9%) | 25 (-4%) | 25 (-4%) | 25 (-3%) | 24 (-6%) | 8 (-71%) | 29 (13%) | 13 (-49%) |
| Crossed SJR to South Delta | medlo | 17% | 31 (80%) | 17 (-3%) | 17 (-2%) | 17 (-1%) | 17 (0%) | 6 (-65%) | 15 (-12%) | 18 (6%) |
| Crossed SJR to South Delta | medmed | 10% | 20 (89%) | 10 (-1%) | 10 (-3%) | 9 (-17%) | 9 (-17%) | 4 (-63%) | 9 (-10%) | 10 (-3%) |

| Exit Point | Flow Bin | NAA | ALT1 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Crossed SJR to South Delta | medhi | 4% | 8 (92%) | 4 (1%) | 4 (1%) | 3 (-19%) | 3 (-18%) | 0 (-91%) | 5 (13%) | 4 (7%) |
| Crossed SJR to South Delta | hilo | 6% | 20 (242%) | 6 (6%) | 6 (5%) | 6 (9%) | 6 (9%) | 4 (-36%) | 6 (-3%) | 6 (19%) |
| Crossed SJR to South Delta | himed | 3% | 11 (254%) | 3 (-1%) | 3 (-1%) | 3 (-9%) | 3 (-6%) | 2 (-29%) | 3 (-3%) | 3 (9%) |
| Crossed SJR to South Delta | hihi | 1% | 2 (170%) | 1 (2%) | 1 (3%) | 1 (-2%) | 1 (-3%) | 1 (-27%) | 1 (13%) | 0 (19%) |

Table I.8-52. Mean December through March surface-oriented particle fate by Inflow bin for NAA, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4, and Action 5 – particle insertion location at Mokelumne River for all particle system exit points. The parenthetical value represents the percent difference from the NAA. Values displayed as 0% may represent small nonzero decimals rounded to 0%. Percent-difference values are calculated from the unrounded values. Note that NA values result from no data falling into that Inflow bin.

| Exit Point | Flow Bin | NAA | ALT1 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| West of Chipps | lolo | 10% | 13 (38%) | 10 (6%) | 11 (15%) | 10 (5%) | 10 (5%) | 22 (125%) | 10 (6%) | 9 (-3%) |
| West of Chipps | lomed | 13% | 16 (22%) | 15 (15%) | 17 (31%) | 20 (55%) | 22 (76%) | 32 (154%) | 13 (4%) | 19 (49%) |
| West of Chipps | lohi | 14% | 17 (27%) | 14 (2%) | 14 (2%) | 13 (-1%) | 15 (8%) | 34 (150%) | 10 (-23%) | 45 (236%) |
| West of Chipps | medlo | 14% | 7 (-53%) | 15 (7%) | 15 (8%) | 15 (5%) | 14 (-1%) | 38 (175%) | 14 (1%) | 11 (-18%) |
| West of Chipps | medmed | 25% | 11 (-54%) | 25 (2%) | 26 (5%) | 34 (37%) | 34 (38%) | 52 (110%) | 25 (1%) | 26 (9%) |
| West of Chipps | medhi | 50% | 30 (-39%) | 49 (-2%) | 49 (-2%) | 57 (14%) | 58 (15%) | 89 (77%) | 45 (-11%) | 47 (-6%) |
| West of Chipps | hilo | 34% | 7 (-78%) | 33 (-1%) | 33 (-1%) | 32 (-4%) | 32 (-4%) | 49 (47%) | 35 (4%) | 29 (-13%) |
| West of Chipps | himed | 51% | 19 (-63%) | 51 (1%) | 51 (1%) | 54 (7%) | 54 (6%) | 61 (21%) | 51 (0%) | 48 (-4%) |
| West of Chipps | hihi | 82% | 68 (-17%) | 81 (-1%) | 81 (-1%) | 82 (0%) | 82 (0%) | 86 (5%) | 80 (-2%) | 79 (-3%) |

| Exit Point | Flow Bin | NAA | ALT1 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Entrained at Exports | lolo | 45% | 60 (31%) | 45 (-2%) | 43 (-5%) | 45 (-1%) | 45 (-2%) | 23 (-49%) | 45 (-1%) | 47 (5%) |
| Entrained at Exports | lomed | 47% | 48 (2%) | 39 (-17%) | 39 (-17%) | 32 (-32%) | 31 (-35%) | 26 (-45%) | 44 (-7%) | 33 (-30%) |
| Entrained at Exports | lohi | 53% | 59 (12%) | 49 (-7%) | 49 (-7%) | 50 (-5%) | 48 (-9%) | 11 (-79%) | 59 (12%) | 27 (-48%) |
| Entrained at Exports | medlo | 65% | 82 (26%) | 62 (-5%) | 61 (-6%) | 62 (-4%) | 61 (-6%) | 26 (-59%) | 63 (-3%) | 65 (1%) |
| Entrained at Exports | medmed | 52% | 75 (45%) | 51 (-1%) | 50 (-3%) | 39 (-24%) | 39 (-24%) | 20 (-61%) | 53 (3%) | 47 (-8%) |
| Entrained at Exports | medhi | 36% | 59 (66%) | 37 (4%) | 37 (4%) | 28 (-21%) | 28 (-20%) | 2 (-95%) | 41 (16%) | 39 (10%) |
| Entrained at Exports | hilo | 54% | 88 (62%) | 55 (1%) | 55 (1%) | 55 (2%) | 55 (1%) | 37 (-32%) | 53 (-2%) | 59 (9%) |
| Entrained at Exports | himed | 41% | 77 (89%) | 40 (-2%) | 40 (-2%) | 37 (-10%) | 37 (-10%) | 28 (-32%) | 41 (-1%) | 42 (4%) |
| Entrained at Exports | hihi | 16% | 30 (93%) | 16 (5%) | 16 (6%) | 15 (-4%) | 15 (-3%) | 12 (-25%) | 17 (10%) | 17 (15%) |
| Remaining in Delta | lolo | 45% | 27 (-40%) | 45 (1%) | 46 (2%) | 45 (0%) | 45 (1%) | 55 (23%) | 45 (0%) | 43 (-4%) |
| Remaining in Delta | lomed | 40% | 36 (-9%) | 46 (16%) | 44 (11%) | 48 (20%) | 47 (17%) | 41 (3%) | 43 (7%) | 47 (20%) |
| Remaining in Delta | lohi | 34% | 24 (-30%) | 37 (11%) | 37 (10%) | 36 (8%) | 38 (11%) | 55 (62%) | 30 (-10%) | 26 (-20%) |
| Remaining in Delta | medlo | 21% | 12 (-45%) | 24 (10%) | 24 (12%) | 23 (7%) | 25 (18%) | 36 (66%) | 23 (9%) | 23 (9%) |
| Remaining in Delta | medmed | 24% | 14 (-42%) | 24 (0%) | 24 (2%) | 27 (15%) | 27 (14%) | 28 (19%) | 22 (-7%) | 25 (7%) |
| Remaining in Delta | medhi | 14% | 11 (-26%) | 14 (-4%) | 14 (-3%) | 14 (1%) | 14 (-2%) | 10 (-33%) | 14 (-4%) | 13 (-5%) |
| Remaining in Delta | hilo | 12% | 5 (-60%) | 12 (-1%) | 12 (-2%) | 12 (2%) | 13 (7%) | 14 (13%) | 12 (-1%) | 11 (-5%) |
| Remaining in Delta | himed | 8% | 4 (-51%) | 9 (5%) | 9 (5%) | 9 (10%) | 9 (11%) | 11 (30%) | 8 (0%) | 8 (4%) |
| Remaining in Delta | hihi | 3% | 2 (-16%) | 2 (-5%) | 2 (-6%) | 3 (5%) | 3 (5%) | 2 (-17%) | 2 (-3%) | 2 (-1%) |
| Crossed SJR to South Delta | lolo | 63% | 71 (13%) | 63 (-1%) | 61 (-3%) | 63 (-1%) | 63 (-1%) | 45 (-28%) | 63 (-1%) | 64 (3%) |
| Crossed SJR to South Delta | lomed | 66% | 65 (-1%) | 60 (-9%) | 59 (-10%) | 53 (-19%) | 52 (-21%) | 44 (-33%) | 63 (-4%) | 54 (-17%) |
| Crossed SJR to South Delta | lohi | 68% | 69 (1%) | 66 (-2%) | 66 (-2%) | 67 (-2%) | 65 (-4%) | 29 (-57%) | 72 (6%) | 40 (-41%) |

| Exit Point | Flow Bin | NAA | ALT1 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Crossed SJR to South Delta | medlo | 75% | 87 (17%) | 72 (-3%) | 72 (-3%) | 73 (-2%) | 72 (-3%) | 42 (-43%) | 74 (-2%) | 75 (1%) |
| Crossed SJR to South Delta | medmed | 63% | 82 (29%) | 63 (-1%) | 62 (-2%) | 53 (-17%) | 53 (-17%) | 33 (-47%) | 64 (1%) | 60 (-5%) |
| Crossed SJR to South Delta | medhi | 43% | 64 (50%) | 43 (2%) | 44 (3%) | 35 (-17%) | 35 (-17%) | 6 (-87%) | 48 (12%) | 45 (7%) |
| Crossed SJR to South Delta | hilo | 61% | 90 (48%) | 61 (1%) | 61 (1%) | 62 (2%) | 62 (2%) | 44 (-27%) | 60 (-2%) | 65 (7%) |
| Crossed SJR to South Delta | himed | 46% | 80 (74%) | 45 (-2%) | 45 (-2%) | 42 (-8%) | 42 (-7%) | 34 (-26%) | 45 (-1%) | 47 (4%) |
| Crossed SJR to South Delta | hihi | 17% | 31 (84%) | 18 (4%) | 18 (4%) | 17 (-3%) | 17 (-3%) | 13 (-25%) | 18 (9%) | 19 (13%) |

Table I.8-53. Mean December through March surface-oriented particle fate by Inflow bin for NAA, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4, and Action 5 – particle insertion location at Yolo Bypass for all particle system exit points. The parenthetical value represents the percent difference from the NAA. Values displayed as 0% may represent small nonzero decimals rounded to 0%. Percent-difference values are calculated from the unrounded values. Note that NA values result from no data falling into that Inflow bin.

| Exit Point | Flow Bin | NAA | ALT1 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| West of Chipps | lolo | 36% | 39 (8%) | 37 (2%) | 38 (4%) | 37 (3%) | 37 (3%) | 46 (27%) | 37 (1%) | 36 (2%) |
| West of Chipps | lomed | 40% | 42 (5%) | 40 (-1%) | 42 (5%) | 43 (7%) | 46 (13%) | 55 (35%) | 40 (-1%) | 42 (6%) |
| West of Chipps | lohi | 32% | 35 (7%) | 33 (2%) | 33 (2%) | 33 (1%) | 33 (3%) | 35 (8%) | 28 (-12%) | 48 (48%) |
| West of Chipps | medlo | 54% | 45 (-17%) | 54 (0%) | 54 (0%) | 55 (1%) | 54 (-1%) | 61 (13%) | 55 (1%) | 52 (-4%) |
| West of Chipps | medmed | 58% | 53 (-8%) | 58 (1%) | 58 (1%) | 60 (3%) | 59 (3%) | 63 (9%) | 59 (3%) | 57 (0%) |

| Exit Point | Flow Bin | NAA | ALT1 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| West of Chipps | medhi | 67% | 64 (-4%) | 67 (0%) | 66 (-1%) | 67 (1%) | 67 (1%) | 69 (4%) | 66 (-1%) | 66 (0%) |
| West of Chipps | hilo | 72% | 64 (-11%) | 72 (0%) | 72 (0%) | 71 (-1%) | 72 (0%) | 73 (2%) | 72 (0%) | 71 (-1%) |
| West of Chipps | himed | 76% | 72 (-6%) | 75 (-1%) | 75 (-1%) | 76 (0%) | 76 (0%) | 76 (0%) | 76 (0%) | 75 (-1%) |
| West of Chipps | hihi | 78% | 77 (-1%) | 78 (0%) | 78 (0%) | 78 (0%) | 78 (0%) | 78 (0%) | 78 (0%) | 77 (0%) |
| Entrained at Exports | lolo | 7% | 10 (42%) | 6 (-6%) | 6 (-10%) | 7 (-3%) | 7 (-5%) | 3 (-63%) | 6 (-7%) | 6 (-1%) |
| Entrained at Exports | lomed | 5% | 6 (33%) | 4 (-22%) | 4 (-20%) | 3 (-34%) | 3 (-38%) | 3 (-36%) | 5 (4%) | 3 (-28%) |
| Entrained at Exports | lohi | 8% | 8 (12%) | 6 (-19%) | 6 (-18%) | 6 (-15%) | 6 (-15%) | 1 (-84%) | 9 (17%) | 3 (-54%) |
| Entrained at Exports | medlo | 6% | 14 (117%) | 6 (-5%) | 6 (-2%) | 6 (-2%) | 6 (-1%) | 2 (-75%) | 5 (-17%) | 6 (6%) |
| Entrained at Exports | medmed | 3% | 8 (131%) | 3 (0%) | 3 (-4%) | 3 (-20%) | 3 (-20%) | 1 (-76%) | 3 (-16%) | 3 (-4%) |
| Entrained at Exports | medhi | 1% | 3 (126%) | 1 (-2%) | 1 (4%) | 1 (-25%) | 1 (-28%) | 0 (-96%) | 1 (14%) | 1 (5%) |
| Entrained at Exports | hilo | 1% | 8 (514%) | 1 (8%) | 1 (8%) | 2 (15%) | 2 (13%) | 1 (-40%) | 1 (-5%) | 1 (29%) |
| Entrained at Exports | himed | 1% | 4 (517%) | 1 (-6%) | 1 (-4%) | 1 (-15%) | 1 (-9%) | 0 (-38%) | 1 (-7%) | 0 (10%) |
| Entrained at Exports | hihi | 0% | 0 (412%) | 0 (0%) | 0 (5%) | 0 (-1%) | 0 (-4%) | 0 (-31%) | 0 (31%) | 0 (34%) |
| Remaining in Delta | lolo | 57% | 51 (-10%) | 57 (0%) | 56 (-2%) | 56 (-1%) | 56 (-1%) | 51 (-10%) | 57 (0%) | 56 (-1%) |
| Remaining in Delta | lomed | 55% | 51 (-6%) | 56 (2%) | 54 (-2%) | 54 (-3%) | 51 (-7%) | 43 (-23%) | 55 (1%) | 53 (-2%) |
| Remaining in Delta | lohi | 60% | 57 (-5%) | 61 (1%) | 61 (1%) | 61 (1%) | 60 (0%) | 64 (6%) | 63 (5%) | 48 (-19%) |
| Remaining in Delta | medlo | 39% | 41 (4%) | 40 (1%) | 40 (1%) | 39 (-1%) | 40 (2%) | 37 (-6%) | 40 (2%) | 40 (4%) |
| Remaining in Delta | medmed | 39% | 39 (1%) | 38 (-1%) | 38 (-1%) | 38 (-3%) | 38 (-2%) | 36 (-8%) | 38 (-3%) | 39 (1%) |
| Remaining in Delta | medhi | 32% | 33 (4%) | 32 (0%) | 32 (1%) | 32 (0%) | 32 (-1%) | 31 (-3%) | 32 (1%) | 31 (-1%) |
| Remaining in Delta | hilo | 27% | 28 (4%) | 27 (0%) | 27 (0%) | 27 (1%) | 27 (0%) | 26 (-2%) | 27 (0%) | 27 (2%) |
| Remaining in Delta | himed | 24% | 25 (5%) | 24 (2%) | 24 (2%) | 24 (1%) | 24 (1%) | 24 (1%) | 24 (1%) | 24 (2%) |
| Remaining in Delta | hihi | 22% | 23 (1%) | 22 (0%) | 22 (0%) | 22 (0%) | 22 (0%) | 22 (-2%) | 22 (0%) | 22 (0%) |
| Crossed SJR to South Delta | lolo | 12% | 15 (25%) | 12 (-3%) | 11 (-7%) | 12 (-2%) | 12 (-3%) | 6 (-46%) | 12 (-5%) | 11 (-1%) |

| Exit Point | Flow Bin | NAA | ALT1 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Crossed SJR to South Delta | lomed | 9% | 11 (19%) | 8 (-11%) | 8 (-13%) | 7 (-25%) | 6 (-30%) | 5 (-39%) | 9 (6%) | 7 (-18%) |
| Crossed SJR to South Delta | lohi | 14% | 15 (7%) | 13 (-8%) | 13 (-8%) | 13 (-8%) | 13 (-6%) | 5 (-65%) | 16 (14%) | 7 (-49%) |
| Crossed SJR to South Delta | medlo | 9% | 18 (94%) | 9 (-3%) | 9 (-2%) | 9 (-2%) | 9 (0%) | 3 (-65%) | 8 (-12%) | 9 (7%) |
| Crossed SJR to South Delta | medmed | 5% | 10 (97%) | 5 (0%) | 5 (-3%) | 4 (-17%) | 4 (-17%) | 2 (-63%) | 5 (-13%) | 5 (-2%) |
| Crossed SJR to South Delta | medhi | 2% | 4 (97%) | 2 (-4%) | 2 (1%) | 2 (-23%) | 1 (-25%) | 0 (-86%) | 2 (8%) | 1 (-1%) |
| Crossed SJR to South Delta | hilo | 2% | 10 (392%) | 2 (10%) | 2 (9%) | 2 (14%) | 2 (13%) | 1 (-33%) | 2 (-4%) | 2 (25%) |
| Crossed SJR to South Delta | himed | 1% | 5 (388%) | 1 (-3%) | 1 (-1%) | 1 (-13%) | 1 (-9%) | 1 (-30%) | 1 (-3%) | 1 (8%) |
| Crossed SJR to South Delta | hihi | 0% | 1 (257%) | 0 (4%) | 0 (8%) | 0 (-2%) | 0 (-4%) | 0 (-33%) | 0 (28%) | 0 (22%) |

Table I.8-54. Mean December through March surface-oriented particle fate by Inflow bin for NAA, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4, and Action 5 – particle insertion location at Western Delta for all particle system exit points. The parenthetical value represents the percent difference from the NAA. Values displayed as 0% may represent small nonzero decimals rounded to 0%. Percent-difference values are calculated from the unrounded values. Note that NA values result from no data falling into that Inflow bin.

| Exit Point | Flow Bin | NAA | ALT1 | Alt2wTUCPwoVA | Alt2woTUCPwoVA | Alt2woTUCPDeltaVA | Alt2woTUCPAllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| West of Chipps | lolo | 86% | 90 (4%) | 86 (0%) | 87 (1%) | 86 (0%) | 86 (0%) | 93 (8%) | 87 (1%) | 86 (0%) |
| West of Chipps | lomed | 92% | 93 (1%) | 92 (1%) | 93 (1%) | 93 (2%) | 94 (3%) | 96 (4%) | 91 (-1%) | 93 (2%) |
| West of Chipps | lohi | 84% | 87 (4%) | 84 (0%) | 84 (0%) | 84 (0%) | 84 (1%) | 91 (9%) | 81 (-3%) | 91 (9%) |
| West of Chipps | medlo | 93% | 89 (-4%) | 93 (0%) | 93 (0%) | 93 (0%) | 93 (0%) | 98 (5%) | 94 (1%) | 92 (-1%) |
| West of Chipps | medmed | 96% | 93 (-3%) | 96 (0%) | 96 (0%) | 97 (1%) | 97 (0%) | 99 (2%) | 97 (1%) | 96 (0%) |
| West of Chipps | medhi | 99% | 99 (-1%) | 99 (0%) | 99 (0%) | 99 (0%) | 99 (0%) | 100 (0%) | 99 (0%) | 99 (0%) |
| West of Chipps | hilo | 99% | 94 (-5%) | 99 (0%) | 99 (0%) | 99 (0%) | 99 (0%) | 99 (0%) | 99 (0%) | 98 (0%) |
| West of Chipps | himed | 100% | 98 (-2%) | 100 (0%) | 100 (0%) | 100 (0%) | 100 (0%) | 100 (0%) | 100 (0%) | 99 (0%) |
| West of Chipps | hihi | 100% | 100 (0%) | 100 (0%) | 100 (0%) | 100 (0%) | 100 (0%) | 100 (0%) | 100 (0%) | 99 (0%) |
| Entrained at Exports | lolo | 4% | 4 (3%) | 4 (-10%) | 4 (-13%) | 4 (-2%) | 4 (-4%) | 1 (-75%) | 4 (-18%) | 3 (-10%) |
| Entrained at Exports | lomed | 2% | 3 (31%) | 2 (-24%) | 2 (-23%) | 1 (-36%) | 1 (-41%) | 2 (-27%) | 3 (18%) | 1 (-28%) |
| Entrained at Exports | lohi | 4% | 4 (-4%) | 4 (-10%) | 4 (-10%) | 4 (-13%) | 4 (-13%) | 0 (-93%) | 5 (19%) | 1 (-54%) |
| Entrained at Exports | medlo | 4% | 8 (87%) | 4 (-2%) | 4 (1%) | 4 (0%) | 4 (-2%) | 1 (-83%) | 3 (-34%) | 4 (5%) |
| Entrained at Exports | medmed | 2% | 4 (135%) | 2 (0%) | 2 (-2%) | 1 (-14%) | 2 (-11%) | 0 (-84%) | 1 (-36%) | 1 (-4%) |

| Exit Point | Flow Bin | NAA | ALT1 | Alt2wTUCPwoVA | Alt2woTUCPwoVA | Alt2woTUCPDeltaVA | Alt2woTUCPAllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Entrained at Exports | medhi | 0% | 1 (211%) | 0 (-5%) | 0 (12%) | 0 (-20%) | 0 (-8%) | 0 (-98%) | 0 (31%) | 0 (33%) |
| Entrained at Exports | hilo | 0% | 5 (1302%) | 0 (30%) | 0 (31%) | 1 (40%) | 1 (37%) | 0 (-56%) | 0 (-3%) | 0 (53%) |
| Entrained at Exports | himed | 0% | 2 (1628%) | 0 (-5%) | 0 (-2%) | 0 (-16%) | 0 (-4%) | 0 (-48%) | 0 (-21%) | 0 (7%) |
| Entrained at Exports | hihi | 0% | 0 (2262%) | 0 (-7%) | 0 (-13%) | 0 (62%) | 0 (33%) | 0 (-64%) | 0 (82%) | 0 (125%) |
| Remaining in Delta | lolo | 10% | 6 (-37%) | 10 (1%) | 9 (-3%) | 10 (0%) | 10 (1%) | 6 (-40%) | 9 (-2%) | 9 (0%) |
| Remaining in Delta | lomed | 6% | 4 (-30%) | 6 (0%) | 6 (-8%) | 5 (-16%) | 4 (-30%) | 3 (-56%) | 6 (1%) | 4 (-21%) |
| Remaining in Delta | lohi | 12% | 9 (-27%) | 12 (1%) | 12 (2%) | 12 (1%) | 12 (-2%) | 9 (-27%) | 14 (12%) | 6 (-45%) |
| Remaining in Delta | medlo | 3% | 4 (15%) | 3 (4%) | 3 (4%) | 3 (-2%) | 3 (5%) | 1 (-55%) | 3 (0%) | 3 (16%) |
| Remaining in Delta | medmed | 2% | 3 (30%) | 2 (-3%) | 2 (-4%) | 2 (-14%) | 2 (-13%) | 1 (-48%) | 2 (-9%) | 2 (7%) |
| Remaining in Delta | medhi | 1% | 1 (30%) | 1 (-3%) | 1 (-2%) | 1 (-6%) | 1 (-7%) | 0 (-26%) | 1 (4%) | 0 (4%) |
| Remaining in Delta | hilo | 0% | 1 (147%) | 0 (24%) | 0 (14%) | 1 (29%) | 0 (25%) | 0 (-14%) | 0 (7%) | 0 (23%) |
| Remaining in Delta | himed | 0% | 1 (224%) | 0 (5%) | 0 (10%) | 0 (-4%) | 0 (-2%) | 0 (2%) | 0 (-1%) | 0 (-1%) |
| Remaining in Delta | hihi | 0% | 0 (61%) | 0 (-1%) | 0 (3%) | 0 (3%) | 0 (2%) | 0 (-18%) | 0 (9%) | 0 (5%) |

| Exit Point | Flow Bin | NAA | ALT1 | Alt2wTUCPwoVA | Alt2woTUCPwoVA | Alt2woTUCPDeltaVA | Alt2woTUCPAllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Crossed SJR to South Delta | lolo | 6% | 6 (1%) | 6 (-6%) | 6 (-10%) | 6 (0%) | 6 (-2%) | 2 (-66%) | 5 (-14%) | 5 (-7%) |
| Crossed SJR to South Delta | lomed | 3% | 4 (25%) | 3 (-19%) | 3 (-20%) | 2 (-35%) | 2 (-40%) | 2 (-32%) | 4 (17%) | 2 (-24%) |
| Crossed SJR to South Delta | lohi | 7% | 7 (-9%) | 7 (-4%) | 7 (-4%) | 7 (-7%) | 7 (-9%) | 1 (-88%) | 8 (10%) | 3 (-52%) |
| Crossed SJR to South Delta | medlo | 5% | 9 (83%) | 5 (-1%) | 5 (1%) | 5 (0%) | 5 (0%) | 1 (-80%) | 3 (-30%) | 5 (7%) |
| Crossed SJR to South Delta | medmed | 2% | 5 (126%) | 2 (-1%) | 2 (-2%) | 2 (-15%) | 2 (-12%) | 0 (-81%) | 1 (-33%) | 2 (-3%) |
| Crossed SJR to South Delta | medhi | 0% | 1 (198%) | 0 (-4%) | 0 (9%) | 0 (-20%) | 0 (-12%) | 0 (-97%) | 0 (27%) | 0 (28%) |
| Crossed SJR to South Delta | hilo | 0% | 6 (1140%) | 1 (33%) | 1 (30%) | 1 (42%) | 1 (38%) | 0 (-53%) | 0 (-2%) | 0 (51%) |
| Crossed SJR to South Delta | himed | 0% | 2 (1578%) | 0 (-3%) | 0 (1%) | 0 (-14%) | 0 (0%) | 0 (-44%) | 0 (-19%) | 0 (8%) |
| Crossed SJR to South Delta | hihi | 0% | 0 (2112%) | 0 (-16%) | 0 (-16%) | 0 (52%) | 0 (35%) | 0 (-64%) | 0 (73%) | 0 (107%) |

Table I.8-55. Mean December through March surface-oriented particle fate by Inflow bin for NAA, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4, and Action 5 – particle insertion location at Suisun Bay for all particle system exit points. The parenthetical value represents the percent difference from the NAA. Values displayed as 0% may represent small nonzero decimals rounded to 0%. Percent-difference values are calculated from the unrounded values. Note that NA values result from no data falling into that Inflow bin.

| Exit Point | Flow Bin | NAA | ALT1 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| West of Chipps | lolo | 89% | 61 (-32%) | 88 (0%) | 89 (1%) | 90 (1%) | 91 (2%) | 81 (-9%) | 90 (1%) | 91 (3%) |
| West of Chipps | lomed | 78% | 61 (-21%) | 77 (0%) | 79 (1%) | 80 (3%) | 78 (1%) | 79 (1%) | 76 (-2%) | 75 (-3%) |
| West of Chipps | lohi | 83% | 58 (-30%) | 82 (0%) | 83 (1%) | 82 (0%) | 83 (0%) | 98 (18%) | 82 (-1%) | 75 (-8%) |
| West of Chipps | medlo | 86% | 66 (-23%) | 87 (1%) | 87 (1%) | 87 (1%) | 87 (0%) | 83 (-4%) | 85 (-1%) | 87 (1%) |
| West of Chipps | medmed | 83% | 72 (-14%) | 82 (-1%) | 82 (-1%) | 82 (-1%) | 83 (0%) | 82 (-1%) | 83 (-1%) | 83 (0%) |
| West of Chipps | medhi | 82% | 78 (-5%) | 81 (0%) | 82 (0%) | 83 (1%) | 83 (2%) | 87 (6%) | 81 (-1%) | 85 (5%) |
| West of Chipps | hilo | 95% | 90 (-6%) | 94 (-1%) | 94 (-1%) | 94 (-1%) | 95 (-1%) | 94 (-1%) | 95 (0%) | 94 (0%) |
| West of Chipps | himed | 97% | 94 (-3%) | 97 (0%) | 96 (0%) | 97 (0%) | 97 (0%) | 96 (-1%) | 97 (0%) | 96 (0%) |
| West of Chipps | hihi | 98% | 98 (0%) | 98 (0%) | 98 (0%) | 98 (0%) | 98 (0%) | 98 (0%) | 98 (0%) | 98 (0%) |
| Entrained at Exports | lolo | 0% | 0 (55%) | 0 (-4%) | 0 (-10%) | 0 (3%) | 0 (5%) | 0 (-83%) | 0 (-15%) | 0 (-3%) |
| Entrained at Exports | lomed | 0% | 0 (71%) | 0 (-24%) | 0 (-47%) | 0 (-53%) | 0 (-44%) | 0 (-62%) | 0 (1%) | 0 (-43%) |
| Entrained at Exports | lohi | 0% | 0 (10%) | 0 (-70%) | 0 (-70%) | 0 (-30%) | 0 (-50%) | 0 (-100%) | 0 (-10%) | 0 (-80%) |
| Entrained at Exports | medlo | 0% | 0 (141%) | 0 (2%) | 0 (-1%) | 0 (-3%) | 0 (-9%) | 0 (-92%) | 0 (-61%) | 0 (-18%) |
| Entrained at Exports | medmed | 0% | 0 (111%) | 0 (12%) | 0 (-6%) | 0 (-8%) | 0 (13%) | 0 (-100%) | 0 (-79%) | 0 (6%) |
| Entrained at Exports | medhi | 0% | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (#N/A) |
| Entrained at Exports | hilo | 0% | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (#N/A) |
| Entrained at Exports | himed | 0% | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (#N/A) |
| Entrained at Exports | hihi | 0% | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (#N/A) |

| Exit Point | Flow Bin | NAA | ALT1 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Remaining in Delta | lolo | 11% | 39 (250%) | 12 (3%) | 11 (-4%) | 10 (-10%) | 9 (-19%) | 19 (71%) | 10 (-10%) | 8 (-24%) |
| Remaining in Delta | lomed | 22% | 39 (72%) | 23 (1%) | 21 (-4%) | 20 (-11%) | 22 (-3%) | 21 (-4%) | 24 (8%) | 24 (10%) |
| Remaining in Delta | lohi | 17% | 42 (142%) | 18 (2%) | 17 (-3%) | 18 (2%) | 17 (-2%) | 2 (-86%) | 18 (5%) | 23 (38%) |
| Remaining in Delta | medlo | 14% | 34 (145%) | 13 (-7%) | 13 (-5%) | 13 (-9%) | 13 (-3%) | 17 (23%) | 15 (5%) | 12 (-8%) |
| Remaining in Delta | medmed | 17% | 28 (67%) | 18 (6%) | 18 (7%) | 17 (4%) | 17 (2%) | 18 (7%) | 17 (3%) | 16 (0%) |
| Remaining in Delta | medhi | 18% | 22 (21%) | 19 (1%) | 18 (0%) | 17 (-6%) | 17 (-7%) | 13 (-26%) | 19 (3%) | 14 (-20%) |
| Remaining in Delta | hilo | 5% | 10 (106%) | 6 (13%) | 6 (14%) | 6 (12%) | 5 (10%) | 6 (12%) | 5 (6%) | 5 (6%) |
| Remaining in Delta | himed | 3% | 6 (94%) | 3 (5%) | 4 (9%) | 3 (-5%) | 3 (-8%) | 4 (19%) | 3 (-5%) | 3 (-3%) |
| Remaining in Delta | hihi | 2% | 2 (21%) | 2 (-1%) | 2 (1%) | 2 (4%) | 2 (0%) | 2 (-11%) | 2 (4%) | 1 (1%) |
| Crossed SJR to South Delta | lolo | 0% | 0 (31%) | 0 (-2%) | 0 (-2%) | 0 (6%) | 0 (15%) | 0 (-72%) | 0 (-9%) | 0 (2%) |
| Crossed SJR to South Delta | lomed | 0% | 0 (53%) | 0 (-26%) | 0 (-25%) | 0 (-46%) | 0 (-49%) | 0 (-65%) | 0 (9%) | 0 (-35%) |
| Crossed SJR to South Delta | lohi | 0% | 0 (-4%) | 0 (-56%) | 0 (0%) | 0 (-19%) | 0 (-48%) | 0 (-67%) | 0 (-4%) | 0 (-67%) |
| Crossed SJR to South Delta | medlo | 0% | 0 (119%) | 0 (8%) | 0 (1%) | 0 (-3%) | 0 (-7%) | 0 (-91%) | 0 (-57%) | 0 (-19%) |
| Crossed SJR to South Delta | medmed | 0% | 0 (123%) | 0 (12%) | 0 (-11%) | 0 (-10%) | 0 (-2%) | 0 (-97%) | 0 (-66%) | 0 (2%) |
| Crossed SJR to South Delta | medhi | 0% | 0 (-8%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (-100%) | 0 (-100%) | 0 (-100%) | 0 (-100%) |
| Crossed SJR to South Delta | hilo | 0% | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (#N/A) |
| Crossed SJR to South Delta | himed | 0% | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (#N/A) |

| Exit Point | Flow Bin | NAA | ALT1 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Crossed SJR to South Delta | hihi | 0% | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (#N/A) |

### *I.8.4.3.7 Neutrally Buoyant, OMR Bins, March through June [EIS, Table I.8-56 through Table I.8-64]*

Table I.8-56. Mean March through June neutrally buoyant particle fate by OMR bin for NAA, Alternative 1, four phases of Alternative 2, Alternative 3, and Alternative 4 – particle insertion location at San Joaquin River for all particle system exit points. The parenthetical value represents the percent difference from the NAA. Values displayed as 0% may represent small nonzero decimals rounded to 0%. Percent-difference values are calculated from the unrounded values. Note that NA values result from no data falling into that OMR bin.

| Exit Point | OMR Bin | NAA | ALT1 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| West of Chipps | -2000 | 9% | 7 (-28%) | 2 (-78%) | 4 (-55%) | 10 (7%) | 11 (21%) | 6 (-39%) | 3 (-64%) | 6 (-29%) |
| West of Chipps | -3500 | 19% | 12 (-39%) | 12 (-37%) | 13 (-35%) | 15 (-25%) | 15 (-24%) | 5 (-75%) | 10 (-47%) | 14 (-28%) |
| West of Chipps | -5000 | 2% | 13 (631%) | 17 (863%) | 18 (912%) | 17 (812%) | 16 (776%) | 11 (499%) | 12 (576%) | 8 (343%) |
| West of Chipps | -5500 | #N/A | 3 (NA) | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |
| Entrained at Exports | -2000 | 57% | 56 (-2%) | 57 (0%) | 57 (0%) | 56 (-3%) | 56 (-2%) | 51 (-11%) | 57 (0%) | 56 (-2%) |
| Entrained at Exports | -3500 | 68% | 72 (7%) | 73 (7%) | 73 (7%) | 69 (2%) | 70 (4%) | 69 (2%) | 74 (9%) | 69 (3%) |
| Entrained at Exports | -5000 | 87% | 77 (-11%) | 76 (-13%) | 75 (-14%) | 76 (-12%) | 77 (-11%) | 80 (-9%) | 80 (-8%) | 82 (-5%) |
| Entrained at Exports | -5500 | #N/A | 91 (NA) | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |
| Remaining in Delta | -2000 | 34% | 38 (11%) | 41 (21%) | 39 (16%) | 35 (3%) | 33 (-2%) | 43 (29%) | 40 (18%) | 37 (11%) |
| Remaining in Delta | -3500 | 13% | 16 (25%) | 15 (16%) | 15 (14%) | 16 (24%) | 15 (17%) | 26 (101%) | 16 (21%) | 16 (27%) |
| Remaining in Delta | -5000 | 11% | 9 (-17%) | 6 (-42%) | 6 (-43%) | 7 (-37%) | 7 (-38%) | 10 (-14%) | 8 (-32%) | 9 (-16%) |
| Remaining in Delta | -5500 | #N/A | 5 (NA) | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |
| Crossed SJR to South Delta | -2000 | 46% | 48 (4%) | 50 (8%) | 48 (5%) | 45 (-3%) | 44 (-3%) | 52 (13%) | 49 (7%) | 47 (3%) |
| Crossed SJR to South Delta | -3500 | 46% | 51 (13%) | 51 (12%) | 51 (12%) | 49 (8%) | 50 (9%) | 60 (31%) | 52 (14%) | 49 (9%) |
| Crossed SJR to South Delta | -5000 | 66% | 55 (-17%) | 52 (-20%) | 52 (-22%) | 53 (-19%) | 54 (-18%) | 53 (-20%) | 56 (-16%) | 59 (-10%) |

| Exit Point | OMR Bin | NAA | ALT1 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Crossed SJR to South Delta | -5500 | #N/A | 64 (NA) | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |

Table I.8-57. Mean March through June neutrally buoyant particle fate by OMR bin for NAA, Alternative 1, four phases of Alternative 2, Alternative 3, and Alternative 4 – particle insertion location at Old and Middle River for all particle system exit points. The parenthetical value represents the percent difference from the NAA. Values displayed as 0% may represent small nonzero decimals rounded to 0%. Percent-difference values are calculated from the unrounded values. Note that NA values result from no data falling into that OMR bin.

| Exit Point | OMR Bin | NAA | ALT1 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| West of Chipps | -2000 | 13% | 11 (-14%) | 9 (-33%) | 10 (-21%) | 13 (3%) | 14 (8%) | 12 (-9%) | 9 (-30%) | 11 (-8%) |
| West of Chipps | -3500 | 13% | 11 (-20%) | 11 (-15%) | 12 (-13%) | 12 (-10%) | 12 (-11%) | 9 (-35%) | 10 (-22%) | 11 (-16%) |
| West of Chipps | -5000 | 5% | 9 (72%) | 11 (108%) | 11 (118%) | 11 (102%) | 10 (96%) | 10 (82%) | 10 (85%) | 7 (51%) |
| West of Chipps | -5500 | #N/A | 5 (NA) | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |
| Entrained at Exports | -2000 | 73% | 73 (0%) | 75 (3%) | 74 (2%) | 73 (0%) | 73 (0%) | 72 (-1%) | 75 (2%) | 73 (0%) |
| Entrained at Exports | -3500 | 83% | 82 (-1%) | 83 (0%) | 83 (0%) | 81 (-2%) | 82 (-1%) | 81 (-2%) | 84 (1%) | 81 (-2%) |
| Entrained at Exports | -5000 | 88% | 86 (-3%) | 85 (-4%) | 84 (-4%) | 85 (-4%) | 85 (-3%) | 88 (0%) | 86 (-2%) | 87 (-1%) |
| Entrained at Exports | -5500 | #N/A | 92 (NA) | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |

| Exit Point | OMR Bin | NAA | ALT1 | Alt2wTUCPwoVA | Alt2woTUCPwoVA | Alt2woTUCPDeltaVA | Alt2woTUCPAllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Remaining in Delta | -2000 | 14% | 16 (11%) | 16 (13%) | 16 (11%) | 14 (-4%) | 14 (-5%) | 16 (13%) | 16 (14%) | 15 (6%) |
| Remaining in Delta | -3500 | 4% | 7 (84%) | 6 (43%) | 6 (40%) | 7 (72%) | 7 (66%) | 10 (161%) | 6 (49%) | 7 (94%) |
| Remaining in Delta | -5000 | 6% | 5 (-22%) | 4 (-37%) | 4 (-37%) | 4 (-35%) | 4 (-32%) | 2 (-64%) | 4 (-39%) | 4 (-28%) |
| Remaining in Delta | -5500 | #N/A | 3 (NA) | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |
| Crossed SJR to South Delta | -2000 | -17% | -16 (-4%) | -14 (-16%) | -15 (-10%) | -18 (3%) | -18 (5%) | -17 (-1%) | -15 (-14%) | -17 (-3%) |
| Crossed SJR to South Delta | -3500 | -14% | -12 (-14%) | -13 (-11%) | -13 (-10%) | -14 (-4%) | -14 (-6%) | -12 (-17%) | -12 (-16%) | -14 (-8%) |
| Crossed SJR to South Delta | -5000 | -7% | -10 (43%) | -12 (66%) | -12 (73%) | -12 (62%) | -11 (59%) | -10 (43%) | -11 (50%) | -10 (29%) |
| Crossed SJR to South Delta | -5500 | #N/A | -5 (NA) | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |

Table I.8-58. Mean March through June neutrally buoyant particle fate by OMR bin for NAA, Alternative 1, four phases of Alternative 2, Alternative 3, and Alternative 4 – particle insertion location at Southern Delta for all particle system exit points. The parenthetical value represents the percent difference from the NAA. Values displayed as 0% may represent small nonzero decimals rounded to 0%. Percent-difference values are calculated from the unrounded values. Note that NA values result from no data falling into that OMR bin.

| Exit Point | OMR Bin | NAA | ALT1 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| West of Chipps | -2000 | 0% | 0 (-13%) | 0 (-100%) | 0 (-96%) | 0 (98%) | 0 (340%) | 0 (-100%) | 0 (-100%) | 0 (145%) |
| West of Chipps | -3500 | 0% | 0 (-201%) | 0 (-63%) | 0 (-47%) | 0 (44%) | 0 (-106087%) | 0 (-578%) | 0 (-114%) | 0 (-103%) |
| West of Chipps | -5000 | 0% | 0 (-178%) | 0 (-216%) | 0 (-125%) | 0 (-127%) | 0 (-26%) | 0 (-305%) | 0 (-88%) | 0 (-39%) |
| West of Chipps | -5500 | #N/A | 0 (NA) | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |
| Entrained at Exports | -2000 | 99% | 98 (-1%) | 99 (-1%) | 99 (0%) | 99 (0%) | 99 (-1%) | 96 (-3%) | 99 (-1%) | 98 (-1%) |
| Entrained at Exports | -3500 | 100% | 100 (0%) | 100 (0%) | 100 (0%) | 100 (0%) | 100 (0%) | 100 (0%) | 100 (0%) | 99 (0%) |
| Entrained at Exports | -5000 | 99% | 100 (0%) | 100 (1%) | 100 (1%) | 100 (1%) | 100 (1%) | 100 (1%) | 100 (1%) | 99 (0%) |
| Entrained at Exports | -5500 | #N/A | 100 (NA) | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |
| Remaining in Delta | -2000 | 1% | 2 (140%) | 1 (88%) | 1 (48%) | 1 (30%) | 1 (63%) | 4 (480%) | 1 (100%) | 1 (93%) |
| Remaining in Delta | -3500 | 0% | 0 (-15%) | 0 (0%) | 0 (8%) | 0 (96%) | 0 (101%) | 0 (268%) | 0 (-13%) | 0 (167%) |

| Exit Point | OMR Bin | NAA | ALT1 | Alt2wTUCPwoVA | Alt2woTUCPwoVA | Alt2woTUCPDeltaVA | Alt2woTUCPAllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Remaining in Delta | -5000 | 1% | 0 (-55%) | 0 (-91%) | 0 (-92%) | 0 (-82%) | 0 (-89%) | 0 (-99%) | 0 (-85%) | 0 (-27%) |
| Remaining in Delta | -5500 | #N/A | 0 (NA) | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |
| Crossed SJR to South Delta | -2000 | 0% | 0 (-26%) | 0 (-100%) | 0 (-95%) | 0 (126%) | 0 (354%) | 0 (-100%) | 0 (-100%) | -1 (100%) |
| Crossed SJR to South Delta | -3500 | 0% | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (#N/A) |
| Crossed SJR to South Delta | -5000 | 0% | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (#N/A) |
| Crossed SJR to South Delta | -5500 | #N/A | 0 (NA) | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |

Table I.8-59. Mean March through June neutrally buoyant particle fate by OMR bin for NAA, Alternative 1, four phases of Alternative 2, Alternative 3, and Alternative 4 – particle insertion location at Central Delta for all particle system exit points. The parenthetical value represents the percent difference from the NAA. Values displayed as 0% may represent small nonzero decimals rounded to 0%. Percent-difference values are calculated from the unrounded values. Note that NA values result from no data falling into that OMR bin.

| Exit Point | OMR Bin | NAA | ALT1 | Alt2wTUCPwoVA | Alt2woTUCPwoVA | Alt2woTUCPDeltaVA | Alt2woTUCPAllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| West of Chipps | -2000 | 53% | 41 (-23%) | 37 (-29%) | 41 (-22%) | 54 (2%) | 56 (6%) | 50 (-5%) | 38 (-28%) | 48 (-7%) |

| Exit Point | OMR Bin | NAA | ALT1 | Alt2wTUCPwoVA | Alt2woTUCPwoVA | Alt2woTUCPDeltaVA | Alt2woTUCPAllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| West of Chipps | -3500 | 70% | 57 (-18%) | 61 (-12%) | 63 (-11%) | 61 (-13%) | 61 (-12%) | 47 (-32%) | 58 (-18%) | 57 (-18%) |
| West of Chipps | -5000 | 36% | 59 (60%) | 68 (86%) | 69 (88%) | 66 (81%) | 65 (79%) | 64 (76%) | 62 (71%) | 52 (43%) |
| West of Chipps | -5500 | #N/A | 41 (NA) | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |
| Entrained at Exports | -2000 | 13% | 15 (14%) | 15 (16%) | 15 (11%) | 12 (-8%) | 12 (-9%) | 12 (-13%) | 15 (14%) | 12 (-2%) |
| Entrained at Exports | -3500 | 18% | 23 (31%) | 22 (24%) | 21 (22%) | 21 (18%) | 21 (20%) | 21 (20%) | 24 (35%) | 22 (26%) |
| Entrained at Exports | -5000 | 43% | 28 (-34%) | 23 (-47%) | 22 (-48%) | 24 (-44%) | 24 (-43%) | 27 (-37%) | 27 (-37%) | 33 (-22%) |
| Entrained at Exports | -5500 | #N/A | 48 (NA) | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |
| Remaining in Delta | -2000 | 34% | 44 (30%) | 48 (39%) | 44 (30%) | 34 (0%) | 32 (-5%) | 39 (13%) | 47 (38%) | 38 (12%) |
| Remaining in Delta | -3500 | 12% | 20 (60%) | 17 (34%) | 16 (28%) | 18 (47%) | 17 (40%) | 31 (153%) | 19 (51%) | 20 (65%) |
| Remaining in Delta | -5000 | 21% | 13 (-36%) | 10 (-54%) | 9 (-55%) | 10 (-51%) | 11 (-49%) | 9 (-56%) | 11 (-47%) | 14 (-29%) |
| Remaining in Delta | -5500 | #N/A | 11 (NA) | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |
| Crossed SJR to South Delta | -2000 | 28% | 34 (23%) | 36 (29%) | 34 (22%) | 27 (-4%) | 26 (-5%) | 27 (-2%) | 35 (27%) | 29 (6%) |

| Exit Point | OMR Bin | NAA | ALT1 | Alt2wTUCPwoVA | Alt2woTUCPwoVA | Alt2woTUCPDeltaVA | Alt2woTUCPAllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Crossed SJR to South Delta | -3500 | 23% | 32 (37%) | 29 (26%) | 29 (23%) | 29 (24%) | 29 (24%) | 34 (46%) | 32 (38%) | 30 (34%) |
| Crossed SJR to South Delta | -5000 | 51% | 34 (-33%) | 27 (-48%) | 26 (-49%) | 28 (-45%) | 29 (-44%) | 31 (-39%) | 31 (-39%) | 39 (-23%) |
| Crossed SJR to South Delta | -5500 | #N/A | 53 (NA) | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |

Table I.8-60. Mean March through June neutrally buoyant particle fate by OMR bin for NAA, Alternative 1, four phases of Alternative 2, Alternative 3, and Alternative 4 – particle insertion location at Sacramento River for all particle system exit points. The parenthetical value represents the percent difference from the NAA. Values displayed as 0% may represent small nonzero decimals rounded to 0%. Percent-difference values are calculated from the unrounded values. Note that NA values result from no data falling into that OMR bin.

| Exit Point | OMR Bin | NAA | ALT1 | Alt2wTUCPwoVA | Alt2woTUCPwoVA | Alt2woTUCPDeltaVA | Alt2woTUCPAllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| West of Chipps | -2000 | 77% | 65 (-16%) | 64 (-17%) | 67 (-12%) | 77 (0%) | 78 (2%) | 67 (-13%) | 64 (-17%) | 72 (-5%) |
| West of Chipps | -3500 | 90% | 84 (-7%) | 87 (-3%) | 88 (-2%) | 85 (-5%) | 86 (-5%) | 67 (-25%) | 86 (-5%) | 82 (-8%) |
| West of Chipps | -5000 | 64% | 82 (28%) | 86 (34%) | 87 (34%) | 85 (32%) | 84 (31%) | 92 (43%) | 85 (33%) | 78 (21%) |
| West of Chipps | -5500 | #N/A | 79 (NA) | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |
| Entrained at Exports | -2000 | 2% | 3 (42%) | 3 (27%) | 3 (25%) | 2 (-2%) | 2 (-7%) | 2 (11%) | 3 (25%) | 2 (-3%) |

| Exit Point | OMR Bin | NAA | ALT1 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Entrained at Exports | -3500 | 2% | 4 (64%) | 3 (29%) | 3 (24%) | 3 (38%) | 3 (40%) | 5 (97%) | 4 (49%) | 3 (59%) |
| Entrained at Exports | -5000 | 13% | 6 (-51%) | 5 (-61%) | 5 (-62%) | 5 (-58%) | 6 (-56%) | 3 (-75%) | 5 (-58%) | 7 (-38%) |
| Entrained at Exports | -5500 | #N/A | 10 (NA) | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |
| Remaining in Delta | -2000 | 21% | 32 (52%) | 33 (58%) | 30 (41%) | 21 (1%) | 20 (-6%) | 31 (45%) | 34 (59%) | 25 (20%) |
| Remaining in Delta | -3500 | 8% | 12 (56%) | 10 (22%) | 9 (14%) | 12 (48%) | 11 (40%) | 28 (260%) | 11 (39%) | 13 (74%) |
| Remaining in Delta | -5000 | 23% | 12 (-49%) | 9 (-62%) | 9 (-63%) | 10 (-58%) | 10 (-56%) | 5 (-80%) | 9 (-59%) | 14 (-39%) |
| Remaining in Delta | -5500 | #N/A | 10 (NA) | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |
| Crossed SJR to South Delta | -2000 | 7% | 11 (56%) | 11 (53%) | 10 (42%) | 7 (3%) | 7 (-3%) | 9 (29%) | 11 (51%) | 7 (14%) |
| Crossed SJR to South Delta | -3500 | 4% | 7 (64%) | 5 (28%) | 5 (21%) | 6 (43%) | 6 (42%) | 11 (161%) | 6 (48%) | 6 (68%) |
| Crossed SJR to South Delta | -5000 | 18% | 9 (-50%) | 7 (-62%) | 7 (-63%) | 7 (-58%) | 8 (-57%) | 4 (-76%) | 7 (-59%) | 11 (-38%) |
| Crossed SJR to South Delta | -5500 | #N/A | 13 (NA) | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |

Table I.8-61. Mean March through June neutrally buoyant particle fate by OMR bin for NAA, Alternative 1, four phases of Alternative 2, Alternative 3, and Alternative 4 – particle insertion location at Mokelumne River for all particle system exit points. The parenthetical value represents the percent difference from the NAA. Values displayed as 0% may represent small nonzero decimals rounded to 0%. Percent-difference values are calculated from the unrounded values. Note that NA values result from no data falling into that OMR bin.

| Exit Point | OMR Bin | NAA | ALT1 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| West of Chipps | -2000 | 30% | 20 (-33%) | 16 (-47%) | 19 (-36%) | 33 (8%) | 35 (16%) | 30 (-2%) | 17 (-43%) | 27 (-10%) |
| West of Chipps | -3500 | 55% | 37 (-34%) | 42 (-23%) | 43 (-21%) | 43 (-23%) | 43 (-22%) | 27 (-50%) | 38 (-32%) | 38 (-29%) |
| West of Chipps | -5000 | 18% | 42 (141%) | 53 (202%) | 54 (208%) | 51 (190%) | 49 (182%) | 47 (166%) | 45 (157%) | 34 (96%) |
| West of Chipps | -5500 | #N/A | 22 (NA) | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |
| Entrained at Exports | -2000 | 14% | 14 (-2%) | 14 (-4%) | 13 (-7%) | 13 (-13%) | 13 (-13%) | 14 (-5%) | 14 (-5%) | 13 (-6%) |
| Entrained at Exports | -3500 | 22% | 29 (30%) | 28 (25%) | 28 (25%) | 26 (16%) | 27 (21%) | 28 (25%) | 30 (33%) | 27 (23%) |
| Entrained at Exports | -5000 | 59% | 39 (-34%) | 33 (-44%) | 32 (-45%) | 34 (-41%) | 35 (-40%) | 36 (-39%) | 38 (-35%) | 46 (-21%) |
| Entrained at Exports | -5500 | #N/A | 64 (NA) | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |
| Remaining in Delta | -2000 | 55% | 66 (19%) | 70 (27%) | 67 (22%) | 54 (-1%) | 52 (-6%) | 56 (3%) | 69 (25%) | 58 (7%) |
| Remaining in Delta | -3500 | 23% | 34 (53%) | 30 (33%) | 29 (28%) | 32 (40%) | 30 (32%) | 45 (99%) | 33 (46%) | 33 (49%) |
| Remaining in Delta | -5000 | 24% | 19 (-20%) | 14 (-41%) | 14 (-43%) | 15 (-39%) | 15 (-36%) | 17 (-27%) | 17 (-30%) | 19 (-18%) |
| Remaining in Delta | -5500 | #N/A | 14 (NA) | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |
| Crossed SJR to South Delta | -2000 | 38% | 41 (10%) | 44 (16%) | 42 (11%) | 36 (-5%) | 35 (-7%) | 38 (1%) | 43 (16%) | 38 (3%) |
| Crossed SJR to South Delta | -3500 | 33% | 44 (33%) | 41 (25%) | 41 (23%) | 40 (21%) | 40 (22%) | 48 (45%) | 44 (35%) | 42 (28%) |
| Crossed SJR to South Delta | -5000 | 69% | 47 (-32%) | 39 (-44%) | 38 (-45%) | 41 (-41%) | 41 (-40%) | 45 (-34%) | 45 (-34%) | 54 (-20%) |

| Exit Point | OMR Bin | NAA | ALT1 | Alt2wTUCPwoVA | Alt2woTUCPwoVA | Alt2woTUCPDeltaVA | Alt2woTUCPAllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Crossed SJR to South Delta | -5500 | #N/A | 70 (NA) | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |

Table I.8-62. Mean March through June neutrally buoyant particle fate by OMR bin for NAA, Alternative 1, four phases of Alternative 2, Alternative 3, and Alternative 4 – particle insertion location at Yolo Bypass for all particle system exit points. The parenthetical value represents the percent difference from the NAA. Values displayed as 0% may represent small nonzero decimals rounded to 0%. Percent-difference values are calculated from the unrounded values. Note that NA values result from no data falling into that OMR bin.

| Exit Point | OMR Bin | NAA | ALT1 | Alt2wTUCPwoVA | Alt2woTUCPwoVA | Alt2woTUCPDeltaVA | Alt2woTUCPAllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| West of Chipps | -2000 | 39% | 31 (-20%) | 31 (-21%) | 33 (-15%) | 40 (3%) | 42 (7%) | 33 (-17%) | 31 (-21%) | 37 (-4%) |
| West of Chipps | -3500 | 55% | 45 (-17%) | 50 (-8%) | 51 (-7%) | 48 (-13%) | 48 (-12%) | 30 (-45%) | 49 (-11%) | 43 (-20%) |
| West of Chipps | -5000 | 31% | 45 (45%) | 47 (52%) | 47 (54%) | 45 (47%) | 44 (44%) | 60 (94%) | 48 (57%) | 43 (41%) |
| West of Chipps | -5500 | #N/A | 47 (NA) | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |
| Entrained at Exports | -2000 | 1% | 1 (37%) | 1 (17%) | 1 (18%) | 1 (-6%) | 1 (-14%) | 1 (-5%) | 1 (19%) | 0 (-9%) |
| Entrained at Exports | -3500 | 1% | 1 (107%) | 1 (42%) | 1 (36%) | 1 (63%) | 1 (59%) | 1 (81%) | 1 (68%) | 1 (90%) |
| Entrained at Exports | -5000 | 4% | 2 (-54%) | 2 (-61%) | 2 (-62%) | 2 (-58%) | 2 (-56%) | 1 (-85%) | 2 (-60%) | 2 (-40%) |
| Entrained at Exports | -5500 | #N/A | 3 (NA) | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |

| Exit Point | OMR Bin | NAA | ALT1 | Alt2wTUCPwoVA | Alt2woTUCPwoVA | Alt2woTUCPDeltaVA | Alt2woTUCPAllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Remaining in Delta | -2000 | 60% | 68 (13%) | 68 (13%) | 66 (10%) | 59 (-2%) | 57 (-4%) | 67 (11%) | 68 (13%) | 61 (3%) |
| Remaining in Delta | -3500 | 45% | 53 (20%) | 49 (9%) | 48 (8%) | 51 (15%) | 51 (14%) | 69 (54%) | 50 (12%) | 55 (23%) |
| Remaining in Delta | -5000 | 65% | 53 (-18%) | 51 (-21%) | 51 (-21%) | 53 (-19%) | 54 (-17%) | 39 (-39%) | 50 (-23%) | 53 (-17%) |
| Remaining in Delta | -5500 | #N/A | 49 (NA) | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |
| Crossed SJR to South Delta | -2000 | 4% | 6 (50%) | 6 (51%) | 5 (39%) | 4 (2%) | 3 (-5%) | 4 (15%) | 6 (49%) | 4 (11%) |
| Crossed SJR to South Delta | -3500 | 2% | 3 (81%) | 2 (34%) | 2 (26%) | 3 (53%) | 3 (46%) | 5 (161%) | 3 (56%) | 3 (82%) |
| Crossed SJR to South Delta | -5000 | 8% | 4 (-50%) | 3 (-61%) | 3 (-62%) | 3 (-58%) | 4 (-56%) | 1 (-82%) | 3 (-59%) | 4 (-38%) |
| Crossed SJR to South Delta | -5500 | #N/A | 5 (NA) | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |

Table I.8-63. Mean March through June neutrally buoyant particle fate by OMR bin for NAA, Alternative 1, four phases of Alternative 2, Alternative 3, and Alternative 4 – particle insertion location at Western Delta for all particle system exit points. The parenthetical value represents the percent difference from the NAA. Values displayed as 0% may represent small nonzero decimals rounded to 0%. Percent-difference values are calculated from the unrounded values. Note that NA values result from no data falling into that OMR bin.

| Exit Point | OMR Bin | NAA | ALT1 | Alt2wTUCPwoVA | Alt2woTUCPwoVA | Alt2woTUCPDeltaVA | Alt2woTUCPAllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| West of Chipps | -2000 | 94% | 91 (-3%) | 90 (-4%) | 92 (-2%) | 95 (0%) | 95 (1%) | 93 (-1%) | 90 (-5%) | 92 (-2%) |
| West of Chipps | -3500 | 98% | 97 (-1%) | 98 (0%) | 98 (0%) | 97 (-1%) | 97 (-1%) | 94 (-4%) | 97 (-1%) | 96 (-1%) |
| West of Chipps | -5000 | 92% | 96 (5%) | 98 (6%) | 98 (6%) | 97 (6%) | 97 (6%) | 99 (8%) | 98 (6%) | 95 (4%) |
| West of Chipps | -5500 | #N/A | 96 (NA) | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |
| Entrained at Exports | -2000 | 0% | 0 (78%) | 0 (58%) | 0 (46%) | 0 (7%) | 0 (-8%) | 0 (-15%) | 0 (53%) | 0 (3%) |
| Entrained at Exports | -3500 | 0% | 0 (123%) | 0 (40%) | 0 (30%) | 0 (64%) | 0 (62%) | 0 (38%) | 0 (75%) | 0 (109%) |
| Entrained at Exports | -5000 | 1% | 1 (-56%) | 0 (-75%) | 0 (-75%) | 0 (-71%) | 0 (-70%) | 0 (-88%) | 0 (-72%) | 0 (-47%) |
| Entrained at Exports | -5500 | #N/A | 1 (NA) | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |
| Remaining in Delta | -2000 | 5% | 8 (54%) | 9 (76%) | 8 (41%) | 5 (-4%) | 5 (-10%) | 6 (19%) | 10 (79%) | 6 (29%) |
| Remaining in Delta | -3500 | 2% | 3 (35%) | 2 (9%) | 2 (-1%) | 3 (41%) | 3 (31%) | 5 (183%) | 2 (23%) | 3 (65%) |
| Remaining in Delta | -5000 | 7% | 3 (-55%) | 2 (-72%) | 2 (-73%) | 2 (-68%) | 2 (-68%) | 1 (-87%) | 2 (-69%) | 3 (-44%) |
| Remaining in Delta | -5500 | #N/A | 3 (NA) | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |
| Crossed SJR to South Delta | -2000 | 1% | 2 (84%) | 2 (81%) | 1 (57%) | 1 (6%) | 1 (-3%) | 1 (-2%) | 2 (79%) | 1 (24%) |
| Crossed SJR to South Delta | -3500 | 0% | 1 (87%) | 0 (27%) | 0 (14%) | 1 (53%) | 1 (51%) | 1 (107%) | 1 (56%) | 0 (106%) |
| Crossed SJR to South Delta | -5000 | 2% | 1 (-55%) | 1 (-75%) | 1 (-75%) | 1 (-71%) | 1 (-71%) | 0 (-88%) | 1 (-72%) | 1 (-46%) |

| Exit Point | OMR Bin | NAA | ALT1 | Alt2wTUCPwoVA | Alt2woTUCPwoVA | Alt2woTUCPDeltaVA | Alt2woTUCPAllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Crossed SJR to South Delta | -5500 | #N/A | 2 (NA) | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |

Table I.8-64. Mean March through June neutrally buoyant particle fate by OMR bin for NAA, Alternative 1, four phases of Alternative 2, Alternative 3, and Alternative 4 – particle insertion location at Suisun Bay for all particle system exit points. The parenthetical value represents the percent difference from the NAA. Values displayed as 0% may represent small nonzero decimals rounded to 0%. Percent-difference values are calculated from the unrounded values. Note that NA values result from no data falling into that OMR bin.

| Exit Point | OMR Bin | NAA | ALT1 | Alt2wTUCPwoVA | Alt2woTUCPwoVA | Alt2woTUCPDeltaVA | Alt2woTUCPAllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| West of Chipps | -2000 | 68% | 59 (-12%) | 64 (-5%) | 62 (-8%) | 68 (1%) | 70 (3%) | 67 (-1%) | 66 (-3%) | 68 (2%) |
| West of Chipps | -3500 | 85% | 69 (-18%) | 77 (-10%) | 77 (-9%) | 76 (-11%) | 76 (-11%) | 61 (-28%) | 74 (-13%) | 70 (-17%) |
| West of Chipps | -5000 | 71% | 73 (3%) | 76 (7%) | 77 (8%) | 74 (5%) | 73 (3%) | 88 (24%) | 77 (9%) | 76 (8%) |
| West of Chipps | -5500 | #N/A | 74 (NA) | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |
| Entrained at Exports | -2000 | 0% | 0 (-21%) | 0 (-6%) | 0 (-4%) | 0 (30%) | 0 (-69%) | 0 (5%) | 0 (94%) | 0 (-24%) |
| Entrained at Exports | -3500 | 0% | 0 (-5%) | 0 (-26%) | 0 (-57%) | 0 (-36%) | 0 (-14%) | 0 (-18%) | 0 (-43%) | 0 (74%) |
| Entrained at Exports | -5000 | 0% | 0 (-73%) | 0 (-70%) | 0 (-75%) | 0 (-76%) | 0 (-66%) | 0 (-100%) | 0 (-71%) | 0 (-46%) |
| Entrained at Exports | -5500 | #N/A | 0 (NA) | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |
| Remaining in Delta | -2000 | 32% | 41 (25%) | 36 (11%) | 38 (17%) | 32 (-3%) | 30 (-7%) | 33 (2%) | 34 (6%) | 31 (-4%) |
| Remaining in Delta | -3500 | 15% | 31 (104%) | 23 (56%) | 23 (51%) | 24 (62%) | 24 (63%) | 39 (160%) | 26 (75%) | 29 (97%) |
| Remaining in Delta | -5000 | 29% | 27 (-8%) | 24 (-18%) | 23 (-20%) | 26 (-13%) | 27 (-7%) | 12 (-58%) | 23 (-22%) | 23 (-20%) |
| Remaining in Delta | -5500 | #N/A | 26 (NA) | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |

| Exit Point | OMR Bin | NAA | ALT1 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Crossed SJR to South Delta | -2000 | 0% | 0 (32%) | 0 (108%) | 0 (20%) | 0 (-11%) | 0 (-36%) | 0 (-8%) | 0 (72%) | 0 (33%) |
| Crossed SJR to South Delta | -3500 | 0% | 0 (48%) | 0 (-11%) | 0 (3%) | 0 (66%) | 0 (54%) | 0 (298%) | 0 (-12%) | 0 (159%) |
| Crossed SJR to South Delta | -5000 | 0% | 0 (-67%) | 0 (-75%) | 0 (-81%) | 0 (-75%) | 0 (-72%) | 0 (-98%) | 0 (-75%) | 0 (-50%) |
| Crossed SJR to South Delta | -5500 | #N/A | 0 (NA) | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |

### *I.8.4.3.8 Surface Oriented, OMR Bins, December through March [EIS, Table I.8-65 through Table I.8-73]*

Table I.8-65. Mean December through March surface-oriented particle fate by OMR bin for NAA, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4, and Action 5 – particle insertion location at San Joaquin River for all particle system exit points. The parenthetical value represents the percent difference from the NAA. Values displayed as 0% may represent small nonzero decimals rounded to 0%. Percent-difference values are calculated from the unrounded values. Note that NA values result from no data falling into that OMR bin.

| Exit Point | OMR Bin | NAA | ALT1 | Alt2wTUCPwoVA | Alt2woTUCPwoVA | Alt2woTUCPDeltaVA | Alt2woTUCPAllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| West of Chipps | -2000 | 9% | 13 (53%) | 5 (-45%) | 4 (-52%) | 13 (50%) | 14 (68%) | 8 (-10%) | 3 (-62%) | 5 (-34%) |
| West of Chipps | -3500 | 12% | 8 (-29%) | 8 (-34%) | 8 (-33%) | 7 (-41%) | 7 (-39%) | 5 (-57%) | 7 (-45%) | 5 (-50%) |
| West of Chipps | -5000 | 6% | 7 (11%) | 11 (77%) | 11 (85%) | 10 (72%) | 10 (71%) | 11 (77%) | 7 (24%) | 8 (49%) |
| West of Chipps | -5500 | 0% | 3 (13553%) | 0 (267%) | 0 (242%) | 0 (32%) | 0 (248%) | 0 (-50%) | 3 (16817%) | 0 (158%) |
| Entrained at Exports | -2000 | 66% | 66 (-1%) | 69 (4%) | 69 (5%) | 61 (-7%) | 62 (-6%) | 66 (-1%) | 68 (3%) | 67 (1%) |
| Entrained at Exports | -3500 | 78% | 81 (4%) | 82 (6%) | 82 (6%) | 82 (6%) | 82 (6%) | 82 (5%) | 82 (6%) | 83 (8%) |
| Entrained at Exports | -5000 | 88% | 88 (-1%) | 84 (-5%) | 84 (-5%) | 84 (-4%) | 85 (-4%) | 85 (-4%) | 87 (-1%) | 86 (-3%) |
| Entrained at Exports | -5500 | 89% | 93 (5%) | 87 (-2%) | 88 (-1%) | 88 (0%) | 88 (-1%) | 90 (2%) | 88 (-1%) | 89 (1%) |
| Remaining in Delta | -2000 | 25% | 21 (-15%) | 26 (4%) | 27 (6%) | 26 (3%) | 23 (-7%) | 27 (6%) | 28 (13%) | 27 (9%) |
| Remaining in Delta | -3500 | 10% | 11 (6%) | 10 (-4%) | 10 (-7%) | 11 (4%) | 11 (4%) | 13 (27%) | 11 (6%) | 10 (-1%) |
| Remaining in Delta | -5000 | 6% | 5 (-3%) | 5 (-9%) | 5 (-12%) | 5 (-8%) | 5 (-11%) | 5 (-14%) | 5 (-5%) | 5 (-10%) |
| Remaining in Delta | -5500 | 11% | 4 (-64%) | 13 (12%) | 12 (9%) | 12 (2%) | 12 (4%) | 10 (-13%) | 9 (-23%) | 10 (-4%) |
| Crossed SJR to South Delta | -2000 | 44% | 43 (-2%) | 47 (6%) | 47 (7%) | 42 (-4%) | 42 (-4%) | 46 (4%) | 47 (7%) | 46 (4%) |
| Crossed SJR to South Delta | -3500 | 51% | 51 (1%) | 54 (7%) | 54 (7%) | 54 (6%) | 53 (5%) | 53 (5%) | 54 (7%) | 54 (7%) |

| Exit Point | OMR Bin | NAA | ALT1 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Crossed SJR to South Delta | -5000 | 55% | 55 (0%) | 52 (-6%) | 52 (-7%) | 52 (-6%) | 52 (-6%) | 54 (-3%) | 55 (0%) | 54 (-1%) |
| Crossed SJR to South Delta | -5500 | 51% | 57 (12%) | 51 (0%) | 51 (0%) | 51 (0%) | 52 (2%) | 52 (2%) | 53 (4%) | 52 (3%) |

Table I.8-66. Mean December through March surface-oriented particle fate by OMR bin for NAA, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4, and Action 5 – particle insertion location at Old and Middle River for all particle system exit points. The parenthetical value represents the percent difference from the NAA. Values displayed as 0% may represent small nonzero decimals rounded to 0%. Percent-difference values are calculated from the unrounded values. Note that NA values result from no data falling into that OMR bin.

| Exit Point | OMR Bin | NAA | ALT1 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| West of Chipps | -2000 | 10% | 13 (34%) | 10 (-3%) | 10 (-1%) | 14 (41%) | 14 (40%) | 13 (31%) | 8 (-19%) | 11 (13%) |
| West of Chipps | -3500 | 11% | 8 (-24%) | 10 (-9%) | 10 (-8%) | 9 (-13%) | 9 (-12%) | 9 (-19%) | 9 (-16%) | 8 (-21%) |
| West of Chipps | -5000 | 7% | 6 (-12%) | 8 (16%) | 8 (20%) | 8 (15%) | 8 (14%) | 10 (39%) | 8 (13%) | 8 (22%) |
| West of Chipps | -5500 | 1% | 4 (255%) | 1 (8%) | 1 (3%) | 1 (-5%) | 1 (4%) | 2 (96%) | 3 (171%) | 1 (19%) |
| Entrained at Exports | -2000 | 81% | 79 (-2%) | 81 (1%) | 81 (0%) | 78 (-3%) | 79 (-2%) | 80 (-1%) | 81 (1%) | 80 (0%) |
| Entrained at Exports | -3500 | 86% | 88 (2%) | 87 (1%) | 87 (1%) | 87 (1%) | 87 (1%) | 88 (1%) | 88 (2%) | 88 (2%) |
| Entrained at Exports | -5000 | 91% | 92 (1%) | 90 (-1%) | 90 (-1%) | 90 (-1%) | 90 (-1%) | 88 (-3%) | 90 (-1%) | 89 (-1%) |
| Entrained at Exports | -5500 | 97% | 95 (-2%) | 97 (0%) | 97 (0%) | 97 (0%) | 97 (0%) | 96 (-1%) | 95 (-2%) | 96 (0%) |
| Remaining in Delta | -2000 | 9% | 7 (-22%) | 9 (-3%) | 9 (-2%) | 8 (-19%) | 7 (-28%) | 7 (-27%) | 11 (14%) | 7 (-15%) |
| Remaining in Delta | -3500 | 3% | 4 (30%) | 3 (2%) | 3 (1%) | 3 (16%) | 3 (15%) | 4 (34%) | 3 (8%) | 3 (25%) |
| Remaining in Delta | -5000 | 2% | 2 (0%) | 2 (-18%) | 2 (-20%) | 2 (-18%) | 2 (-18%) | 2 (-16%) | 2 (-11%) | 2 (-8%) |
| Remaining in Delta | -5500 | 2% | 1 (-40%) | 2 (-5%) | 2 (-5%) | 2 (-1%) | 2 (1%) | 2 (4%) | 2 (7%) | 2 (7%) |

| Exit Point | OMR Bin | NAA | ALT1 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Crossed SJR to South Delta | -2000 | -15% | -16 (10%) | -14 (-3%) | -14 (-3%) | -17 (19%) | -17 (16%) | -15 (6%) | -14 (-7%) | -15 (0%) |
| Crossed SJR to South Delta | -3500 | -12% | -10 (-19%) | -11 (-9%) | -11 (-8%) | -10 (-12%) | -10 (-11%) | -10 (-15%) | -10 (-13%) | -10 (-16%) |
| Crossed SJR to South Delta | -5000 | -7% | -7 (-8%) | -8 (13%) | -9 (17%) | -8 (13%) | -8 (12%) | -10 (32%) | -8 (12%) | -9 (20%) |
| Crossed SJR to South Delta | -5500 | -2% | -4 (150%) | -2 (7%) | -2 (1%) | -2 (0%) | -2 (6%) | -3 (69%) | -4 (126%) | -2 (21%) |

Table I.8-67. Mean December through March surface-oriented particle fate by OMR bin for NAA, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4, and Action 5 – particle insertion location at Southern Delta for all particle system exit points. The parenthetical value represents the percent difference from the NAA. Values displayed as 0% may represent small nonzero decimals rounded to 0%. Percent-difference values are calculated from the unrounded values. Note that NA values result from no data falling into that OMR bin.

| Exit Point | OMR Bin | NAA | ALT1 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| West of Chipps | -2000 | 0% | 0 (-1844495%) | 0 (-148%) | 0 (-201%) | 0 (-86%) | 0 (-134%) | 0 (-145%) | 0 (-7%) | 0 (-213%) |
| West of Chipps | -3500 | 0% | 0 (-1%) | 0 (38%) | 0 (-256%) | 0 (-58%) | 0 (-508%) | 0 (-292%) | 0 (-286%) | 0 (49%) |
| West of Chipps | -5000 | 0% | 0 (-356%) | 0 (221%) | 0 (298%) | 0 (99%) | 0 (117%) | 0 (-257%) | 0 (-37%) | 0 (-51%) |
| West of Chipps | -5500 | 0% | 0 (969%) | 0 (-1117%) | 0 (-1603%) | 0 (-59%) | 0 (1978%) | 0 (12382%) | 0 (2313%) | 0 (-525%) |
| Entrained at Exports | -2000 | 100% | 100 (0%) | 100 (0%) | 100 (0%) | 100 (0%) | 100 (0%) | 100 (0%) | 100 (0%) | 99 (0%) |
| Entrained at Exports | -3500 | 100% | 100 (0%) | 100 (0%) | 100 (0%) | 100 (0%) | 100 (0%) | 100 (0%) | 100 (0%) | 99 (0%) |

| Exit Point | OMR Bin | NAA | ALT1 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Entrained at Exports | -5000 | 100% | 100 (0%) | 100 (0%) | 100 (0%) | 100 (0%) | 100 (0%) | 100 (0%) | 100 (0%) | 99 (0%) |
| Entrained at Exports | -5500 | 100% | 100 (0%) | 100 (0%) | 100 (0%) | 100 (0%) | 100 (0%) | 100 (0%) | 100 (0%) | 99 (0%) |
| Remaining in Delta | -2000 | 0% | 0 (163%) | 0 (-33%) | 0 (1%) | 0 (-53%) | 0 (-24%) | 0 (-33%) | 0 (89%) | 0 (-16%) |
| Remaining in Delta | -3500 | 0% | 0 (-71%) | 0 (-52%) | 0 (-69%) | 0 (-33%) | 0 (-42%) | 0 (-96%) | 0 (-76%) | 0 (-74%) |
| Remaining in Delta | -5000 | 0% | 0 (-29%) | 0 (-11%) | 0 (-38%) | 0 (-64%) | 0 (-62%) | 0 (42%) | 0 (-18%) | 0 (-37%) |
| Remaining in Delta | -5500 | 0% | 0 (-15%) | 0 (-68%) | 0 (0%) | 0 (-27%) | 0 (3%) | 0 (214%) | 0 (33%) | -1 (-30%) |
| Crossed SJR to South Delta | -2000 | 0% | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 0 (#N/A) |
| Crossed SJR to South Delta | -3500 | 0% | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 0 (#N/A) |
| Crossed SJR to South Delta | -5000 | 0% | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 0 (#N/A) |
| Crossed SJR to South Delta | -5500 | 0% | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 0 (#N/A) |

Table I.8-68. Mean December through March surface-oriented particle fate by OMR bin for NAA, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4, and Action 5 – particle insertion location at Central Delta for all particle system exit points. The parenthetical value represents the percent difference from the NAA. Values displayed as 0% may represent small nonzero decimals rounded to 0%. Percent-difference values are calculated from the unrounded values. Note that NA values result from no data falling into that OMR bin.

| Exit Point | OMR Bin | NAA | ALT1 | Alt2wTUCPwoVA | Alt2woTUCPwoVA | Alt2woTUCPDeltaVA | Alt2woTUCPAllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| West of Chipps | -2000 | 44% | 55 (24%) | 41 (-7%) | 42 (-5%) | 60 (36%) | 61 (38%) | 60 (37%) | 37 (-17%) | 47 (7%) |
| West of Chipps | -3500 | 61% | 47 (-23%) | 59 (-4%) | 59 (-3%) | 56 (-8%) | 56 (-8%) | 51 (-17%) | 54 (-11%) | 51 (-15%) |
| West of Chipps | -5000 | 50% | 43 (-14%) | 56 (11%) | 56 (12%) | 56 (11%) | 56 (11%) | 66 (31%) | 54 (7%) | 57 (14%) |
| West of Chipps | -5500 | 11% | 37 (252%) | 11 (7%) | 11 (3%) | 11 (0%) | 11 (6%) | 18 (74%) | 24 (130%) | 12 (15%) |
| Entrained at Exports | -2000 | 24% | 22 (-8%) | 27 (13%) | 26 (11%) | 16 (-31%) | 17 (-29%) | 18 (-23%) | 26 (8%) | 22 (-3%) |
| Entrained at Exports | -3500 | 28% | 37 (34%) | 30 (9%) | 30 (8%) | 32 (16%) | 32 (15%) | 35 (26%) | 32 (17%) | 35 (27%) |
| Entrained at Exports | -5000 | 42% | 46 (9%) | 38 (-10%) | 38 (-11%) | 38 (-9%) | 38 (-9%) | 29 (-31%) | 39 (-8%) | 36 (-14%) |
| Entrained at Exports | -5500 | 81% | 58 (-28%) | 80 (-1%) | 81 (0%) | 81 (0%) | 80 (-1%) | 72 (-11%) | 66 (-18%) | 78 (-3%) |
| Remaining in Delta | -2000 | 32% | 24 (-27%) | 32 (0%) | 32 (-1%) | 24 (-27%) | 22 (-31%) | 21 (-34%) | 38 (17%) | 29 (-7%) |
| Remaining in Delta | -3500 | 11% | 16 (37%) | 11 (-1%) | 11 (-3%) | 12 (6%) | 12 (5%) | 14 (26%) | 13 (17%) | 13 (17%) |
| Remaining in Delta | -5000 | 8% | 11 (40%) | 6 (-18%) | 6 (-22%) | 6 (-20%) | 6 (-21%) | 5 (-37%) | 7 (-3%) | 6 (-18%) |
| Remaining in Delta | -5500 | 9% | 4 (-51%) | 8 (-2%) | 8 (-2%) | 9 (2%) | 9 (2%) | 10 (13%) | 10 (12%) | 9 (13%) |
| Crossed SJR to South Delta | -2000 | 36% | 32 (-11%) | 40 (9%) | 39 (8%) | 26 (-28%) | 26 (-28%) | 29 (-21%) | 40 (9%) | 35 (-3%) |
| Crossed SJR to South Delta | -3500 | 33% | 44 (35%) | 35 (8%) | 35 (6%) | 38 (15%) | 37 (14%) | 42 (28%) | 38 (17%) | 40 (24%) |
| Crossed SJR to South Delta | -5000 | 46% | 51 (11%) | 41 (-10%) | 41 (-12%) | 41 (-10%) | 41 (-10%) | 32 (-30%) | 42 (-8%) | 39 (-14%) |

| Exit Point | OMR Bin | NAA | ALT1 | Alt2wTUCPwoVA | Alt2woTUCPwoVA | Alt2woTUCPDeltaVA | Alt2woTUCPAllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Crossed SJR to South Delta | -5500 | 85% | 61 (-28%) | 84 (-1%) | 85 (0%) | 85 (0%) | 84 (-1%) | 77 (-9%) | 70 (-17%) | 82 (-3%) |

Table I.8-69. Mean December through March surface-oriented particle fate by OMR bin for NAA, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4, and Action 5 – particle insertion location at Sacramento River for all particle system exit points. The parenthetical value represents the percent difference from the NAA. Values displayed as 0% may represent small nonzero decimals rounded to 0%. Percent-difference values are calculated from the unrounded values. Note that NA values result from no data falling into that OMR bin.

| Exit Point | OMR Bin | NAA | ALT1 | Alt2wTUCPwoVA | Alt2woTUCPwoVA | Alt2woTUCPDeltaVA | Alt2woTUCPAllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| West of Chipps | -2000 | 67% | 74 (10%) | 67 (-1%) | 68 (1%) | 80 (19%) | 82 (21%) | 86 (28%) | 61 (-9%) | 72 (8%) |
| West of Chipps | -3500 | 87% | 75 (-14%) | 88 (1%) | 89 (1%) | 86 (-1%) | 86 (-2%) | 83 (-5%) | 86 (-2%) | 82 (-5%) |
| West of Chipps | -5000 | 85% | 77 (-9%) | 86 (2%) | 87 (2%) | 87 (2%) | 87 (2%) | 94 (11%) | 86 (2%) | 88 (5%) |
| West of Chipps | -5500 | 48% | 80 (66%) | 50 (4%) | 49 (3%) | 48 (1%) | 49 (2%) | 62 (28%) | 63 (32%) | 51 (7%) |
| Entrained at Exports | -2000 | 6% | 7 (11%) | 7 (16%) | 7 (9%) | 4 (-41%) | 3 (-43%) | 3 (-47%) | 7 (13%) | 5 (-9%) |
| Entrained at Exports | -3500 | 5% | 11 (137%) | 5 (0%) | 5 (-2%) | 6 (17%) | 6 (17%) | 7 (45%) | 6 (18%) | 6 (43%) |
| Entrained at Exports | -5000 | 9% | 13 (52%) | 8 (-10%) | 8 (-11%) | 8 (-9%) | 8 (-11%) | 4 (-56%) | 8 (-11%) | 6 (-25%) |
| Entrained at Exports | -5500 | 35% | 16 (-54%) | 34 (-3%) | 34 (-2%) | 35 (0%) | 34 (-3%) | 25 (-27%) | 22 (-36%) | 31 (-10%) |
| Remaining in Delta | -2000 | 27% | 19 (-28%) | 26 (-1%) | 25 (-5%) | 16 (-39%) | 15 (-44%) | 11 (-59%) | 32 (19%) | 21 (-18%) |
| Remaining in Delta | -3500 | 8% | 14 (77%) | 7 (-13%) | 7 (-14%) | 8 (4%) | 8 (7%) | 10 (32%) | 9 (12%) | 10 (31%) |
| Remaining in Delta | -5000 | 7% | 10 (53%) | 6 (-9%) | 6 (-15%) | 6 (-16%) | 5 (-18%) | 2 (-63%) | 6 (-6%) | 4 (-29%) |
| Remaining in Delta | -5500 | 17% | 5 (-73%) | 16 (-5%) | 17 (-4%) | 17 (-1%) | 17 (-1%) | 13 (-24%) | 15 (-16%) | 17 (1%) |
| Crossed SJR to South Delta | -2000 | 12% | 12 (3%) | 13 (10%) | 13 (3%) | 7 (-40%) | 7 (-44%) | 6 (-48%) | 14 (12%) | 10 (-11%) |

| Exit Point | OMR Bin | NAA | ALT1 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Crossed SJR to South Delta | -3500 | 7% | 16 (133%) | 7 (-3%) | 6 (-5%) | 8 (14%) | 8 (15%) | 10 (48%) | 8 (18%) | 9 (40%) |
| Crossed SJR to South Delta | -5000 | 11% | 17 (57%) | 10 (-10%) | 9 (-12%) | 10 (-10%) | 9 (-12%) | 5 (-57%) | 9 (-11%) | 7 (-26%) |
| Crossed SJR to South Delta | -5500 | 40% | 18 (-57%) | 39 (-3%) | 40 (-2%) | 40 (0%) | 39 (-3%) | 30 (-25%) | 27 (-34%) | 36 (-9%) |

Table I.8-70. Mean December through March surface-oriented particle fate by OMR bin for NAA, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4, and Action 5 – particle insertion location at Mokelumne River for all particle system exit points. The parenthetical value represents the percent difference from the NAA. Values displayed as 0% may represent small nonzero decimals rounded to 0%. Percent-difference values are calculated from the unrounded values. Note that NA values result from no data falling into that OMR bin.

| Exit Point | OMR Bin | NAA | ALT1 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| West of Chipps | -2000 | 26% | 37 (42%) | 21 (-20%) | 21 (-19%) | 42 (61%) | 44 (67%) | 40 (52%) | 18 (-33%) | 26 (1%) |
| West of Chipps | -3500 | 45% | 30 (-32%) | 40 (-10%) | 41 (-9%) | 38 (-16%) | 38 (-14%) | 32 (-28%) | 35 (-21%) | 33 (-24%) |
| West of Chipps | -5000 | 33% | 27 (-19%) | 41 (23%) | 42 (26%) | 41 (22%) | 41 (22%) | 50 (49%) | 37 (12%) | 41 (23%) |
| West of Chipps | -5500 | 2% | 21 (910%) | 2 (14%) | 2 (9%) | 2 (-1%) | 2 (9%) | 5 (142%) | 13 (524%) | 2 (28%) |
| Entrained at Exports | -2000 | 23% | 26 (13%) | 26 (10%) | 26 (13%) | 17 (-26%) | 18 (-23%) | 20 (-15%) | 25 (8%) | 23 (-1%) |
| Entrained at Exports | -3500 | 34% | 46 (34%) | 39 (13%) | 38 (12%) | 40 (16%) | 39 (15%) | 41 (20%) | 40 (17%) | 42 (25%) |
| Entrained at Exports | -5000 | 53% | 56 (7%) | 47 (-10%) | 47 (-11%) | 48 (-10%) | 48 (-9%) | 40 (-23%) | 49 (-7%) | 46 (-11%) |
| Entrained at Exports | -5500 | 78% | 73 (-6%) | 78 (0%) | 79 (0%) | 79 (0%) | 78 (0%) | 73 (-6%) | 69 (-12%) | 77 (-1%) |
| Remaining in Delta | -2000 | 50% | 36 (-28%) | 53 (6%) | 52 (4%) | 40 (-20%) | 38 (-25%) | 40 (-20%) | 57 (14%) | 50 (0%) |

| Exit Point | OMR Bin | NAA | ALT1 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Remaining in Delta | -3500 | 21% | 24 (14%) | 21 (0%) | 21 (-1%) | 23 (8%) | 23 (6%) | 27 (28%) | 25 (17%) | 23 (12%) |
| Remaining in Delta | -5000 | 14% | 17 (20%) | 11 (-17%) | 11 (-21%) | 12 (-17%) | 11 (-18%) | 10 (-30%) | 14 (-2%) | 11 (-14%) |
| Remaining in Delta | -5500 | 20% | 6 (-70%) | 19 (-2%) | 19 (-2%) | 19 (-1%) | 20 (0%) | 22 (10%) | 18 (-6%) | 20 (2%) |
| Crossed SJR to South Delta | -2000 | 43% | 42 (-2%) | 47 (8%) | 48 (11%) | 34 (-20%) | 35 (-20%) | 38 (-11%) | 48 (10%) | 43 (1%) |
| Crossed SJR to South Delta | -3500 | 45% | 57 (29%) | 49 (10%) | 49 (9%) | 51 (14%) | 50 (12%) | 54 (21%) | 52 (16%) | 53 (21%) |
| Crossed SJR to South Delta | -5000 | 59% | 64 (8%) | 53 (-11%) | 52 (-12%) | 53 (-11%) | 53 (-10%) | 46 (-23%) | 55 (-7%) | 52 (-11%) |
| Crossed SJR to South Delta | -5500 | 85% | 76 (-11%) | 86 (0%) | 86 (0%) | 86 (0%) | 86 (0%) | 82 (-3%) | 76 (-11%) | 85 (0%) |

Table I.8-71. Mean December through March surface-oriented particle fate by OMR bin for NAA, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4, and Action 5 – particle insertion location at Yolo Bypass for all particle system exit points. The parenthetical value represents the percent difference from the NAA. Values displayed as 0% may represent small nonzero decimals rounded to 0%. Percent-difference values are calculated from the unrounded values. Note that NA values result from no data falling into that OMR bin.

| Exit Point | OMR Bin | NAA | ALT1 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| West of Chipps | -2000 | 42% | 49 (16%) | 42 (0%) | 44 (4%) | 53 (25%) | 55 (29%) | 60 (40%) | 36 (-14%) | 46 (10%) |
| West of Chipps | -3500 | 61% | 51 (-17%) | 63 (3%) | 63 (3%) | 62 (2%) | 62 (2%) | 60 (-1%) | 59 (-3%) | 59 (-2%) |
| West of Chipps | -5000 | 65% | 54 (-16%) | 67 (3%) | 67 (4%) | 67 (4%) | 68 (5%) | 73 (13%) | 65 (0%) | 67 (4%) |
| West of Chipps | -5500 | 34% | 62 (80%) | 36 (5%) | 35 (4%) | 34 (1%) | 35 (2%) | 46 (35%) | 46 (35%) | 35 (4%) |
| Entrained at Exports | -2000 | 3% | 3 (6%) | 3 (17%) | 3 (7%) | 1 (-45%) | 1 (-50%) | 1 (-56%) | 3 (10%) | 2 (-12%) |

| Exit Point | OMR Bin | NAA | ALT1 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Entrained at Exports | -3500 | 2% | 5 (200%) | 2 (-4%) | 2 (-6%) | 2 (17%) | 2 (18%) | 3 (54%) | 2 (19%) | 2 (59%) |
| Entrained at Exports | -5000 | 3% | 6 (66%) | 3 (-12%) | 3 (-13%) | 3 (-11%) | 3 (-14%) | 1 (-66%) | 3 (-13%) | 2 (-30%) |
| Entrained at Exports | -5500 | 16% | 7 (-57%) | 16 (-3%) | 16 (-1%) | 16 (-1%) | 16 (-4%) | 11 (-33%) | 10 (-38%) | 14 (-12%) |
| Remaining in Delta | -2000 | 55% | 48 (-12%) | 55 (-1%) | 53 (-3%) | 46 (-17%) | 44 (-20%) | 39 (-29%) | 61 (10%) | 50 (-7%) |
| Remaining in Delta | -3500 | 37% | 44 (18%) | 36 (-4%) | 35 (-5%) | 36 (-4%) | 36 (-4%) | 37 (0%) | 39 (4%) | 37 (0%) |
| Remaining in Delta | -5000 | 32% | 40 (26%) | 30 (-5%) | 30 (-6%) | 30 (-6%) | 29 (-8%) | 26 (-20%) | 32 (1%) | 30 (-6%) |
| Remaining in Delta | -5500 | 49% | 31 (-37%) | 48 (-3%) | 48 (-2%) | 49 (0%) | 49 (0%) | 43 (-13%) | 44 (-11%) | 49 (1%) |
| Crossed SJR to South Delta | -2000 | 7% | 7 (-3%) | 8 (11%) | 7 (2%) | 4 (-40%) | 4 (-45%) | 3 (-52%) | 8 (13%) | 6 (-14%) |
| Crossed SJR to South Delta | -3500 | 3% | 9 (166%) | 3 (-5%) | 3 (-7%) | 4 (12%) | 4 (12%) | 5 (49%) | 4 (21%) | 4 (46%) |
| Crossed SJR to South Delta | -5000 | 5% | 9 (71%) | 5 (-12%) | 4 (-14%) | 5 (-13%) | 4 (-14%) | 2 (-64%) | 5 (-11%) | 3 (-29%) |
| Crossed SJR to South Delta | -5500 | 22% | 9 (-59%) | 21 (-4%) | 22 (-2%) | 22 (-1%) | 21 (-4%) | 15 (-31%) | 14 (-35%) | 19 (-10%) |

Table I.8-72. Mean December through March surface-oriented particle fate by OMR bin for NAA, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4, and Action 5 – particle insertion location at Western Delta for all particle system exit points. The parenthetical value represents the percent difference from the NAA. Values displayed as 0% may represent small nonzero decimals rounded to 0%. Percent-difference values are calculated from the unrounded values. Note that NA values result from no data falling into that OMR bin.

| Exit Point | OMR Bin | NAA | ALT1 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| West of Chipps | -2000 | 90% | 94 (5%) | 90 (0%) | 91 (1%) | 95 (5%) | 95 (5%) | 97 (8%) | 89 (-2%) | 92 (2%) |
| West of Chipps | -3500 | 97% | 95 (-3%) | 98 (1%) | 98 (1%) | 97 (0%) | 97 (-1%) | 96 (-1%) | 97 (0%) | 95 (-1%) |

| Exit Point | OMR Bin | NAA | ALT1 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| West of Chipps | -5000 | 96% | 94 (-2%) | 96 (0%) | 96 (0%) | 96 (0%) | 96 (0%) | 99 (3%) | 96 (0%) | 97 (1%) |
| West of Chipps | -5500 | 77% | 94 (23%) | 78 (2%) | 78 (1%) | 77 (0%) | 78 (1%) | 86 (11%) | 86 (12%) | 78 (3%) |
| Entrained at Exports | -2000 | 1% | 1 (-8%) | 1 (18%) | 1 (6%) | 0 (-52%) | 0 (-54%) | 0 (-65%) | 1 (9%) | 0 (-12%) |
| Entrained at Exports | -3500 | 1% | 2 (177%) | 1 (-14%) | 1 (-21%) | 1 (18%) | 1 (25%) | 1 (66%) | 1 (15%) | 1 (60%) |
| Entrained at Exports | -5000 | 2% | 3 (48%) | 2 (-2%) | 2 (-3%) | 2 (-2%) | 2 (-5%) | 0 (-74%) | 2 (-13%) | 1 (-33%) |
| Entrained at Exports | -5500 | 14% | 4 (-74%) | 14 (-5%) | 14 (-2%) | 14 (0%) | 14 (-4%) | 9 (-41%) | 7 (-50%) | 12 (-14%) |
| Remaining in Delta | -2000 | 9% | 5 (-46%) | 9 (0%) | 8 (-6%) | 5 (-43%) | 4 (-49%) | 3 (-71%) | 10 (18%) | 7 (-19%) |
| Remaining in Delta | -3500 | 2% | 4 (69%) | 2 (-20%) | 2 (-21%) | 2 (5%) | 3 (16%) | 3 (35%) | 2 (8%) | 3 (38%) |
| Remaining in Delta | -5000 | 2% | 3 (33%) | 2 (-1%) | 2 (-7%) | 2 (-13%) | 2 (-14%) | 1 (-70%) | 2 (-8%) | 1 (-33%) |
| Remaining in Delta | -5500 | 9% | 2 (-79%) | 8 (-7%) | 8 (-5%) | 9 (-1%) | 9 (-2%) | 6 (-33%) | 6 (-26%) | 8 (-1%) |
| Crossed SJR to South Delta | -2000 | 2% | 2 (-10%) | 3 (13%) | 2 (4%) | 1 (-49%) | 1 (-53%) | 1 (-64%) | 2 (7%) | 1 (-16%) |
| Crossed SJR to South Delta | -3500 | 1% | 3 (174%) | 1 (-16%) | 1 (-22%) | 1 (14%) | 1 (25%) | 2 (70%) | 1 (15%) | 1 (55%) |
| Crossed SJR to South Delta | -5000 | 2% | 4 (54%) | 2 (-2%) | 2 (-3%) | 2 (-3%) | 2 (-6%) | 1 (-74%) | 2 (-12%) | 1 (-33%) |
| Crossed SJR to South Delta | -5500 | 17% | 4 (-74%) | 16 (-4%) | 17 (-3%) | 17 (0%) | 16 (-4%) | 11 (-38%) | 9 (-48%) | 14 (-13%) |

Table I.8-73. Mean December through March surface-oriented particle fate by OMR bin for NAA, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4, and Action 5 – particle insertion location at Suisun Bay for all particle system exit points. The parenthetical value represents the percent difference from the NAA. Values displayed as 0% may represent small nonzero decimals rounded to 0%. Percent-difference values are calculated from the unrounded values. Note that NA values result from no data falling into that OMR bin.

| Exit Point | OMR Bin | NAA | ALT1 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| West of Chipps | -2000 | 91% | 69 (-24%) | 86 (-5%) | 89 (-1%) | 87 (-4%) | 90 (-1%) | 83 (-9%) | 92 (2%) | 86 (-5%) |
| West of Chipps | -3500 | 89% | 70 (-22%) | 88 (-2%) | 88 (-1%) | 90 (1%) | 91 (2%) | 86 (-4%) | 84 (-6%) | 91 (2%) |
| West of Chipps | -5000 | 92% | 72 (-21%) | 94 (2%) | 94 (2%) | 94 (2%) | 94 (2%) | 94 (2%) | 92 (1%) | 92 (1%) |
| West of Chipps | -5500 | 86% | 84 (-3%) | 87 (2%) | 87 (2%) | 87 (1%) | 87 (1%) | 91 (6%) | 91 (5%) | 89 (4%) |
| Entrained at Exports | -2000 | 0% | 0 (-5%) | 0 (23%) | 0 (0%) | 0 (-35%) | 0 (-55%) | 0 (-87%) | 0 (46%) | 0 (-30%) |
| Entrained at Exports | -3500 | 0% | 0 (278%) | 0 (-59%) | 0 (-48%) | 0 (-1%) | 0 (27%) | 0 (12%) | 0 (-10%) | 0 (65%) |
| Entrained at Exports | -5000 | 0% | 0 (138%) | 0 (16%) | 0 (-6%) | 0 (1%) | 0 (-2%) | 0 (-86%) | 0 (-12%) | 0 (-44%) |
| Entrained at Exports | -5500 | 0% | 0 (-79%) | 0 (-3%) | 0 (-11%) | 0 (-2%) | 0 (-4%) | 0 (-50%) | 0 (-61%) | 0 (-17%) |
| Remaining in Delta | -2000 | 9% | 31 (229%) | 14 (48%) | 11 (13%) | 13 (37%) | 10 (5%) | 17 (82%) | 8 (-16%) | 13 (46%) |
| Remaining in Delta | -3500 | 11% | 30 (185%) | 12 (15%) | 12 (10%) | 10 (-9%) | 9 (-17%) | 14 (30%) | 16 (52%) | 8 (-18%) |
| Remaining in Delta | -5000 | 8% | 28 (234%) | 6 (-25%) | 6 (-24%) | 6 (-24%) | 6 (-22%) | 6 (-25%) | 8 (-7%) | 7 (-14%) |
| Remaining in Delta | -5500 | 14% | 16 (20%) | 12 (-10%) | 12 (-10%) | 13 (-5%) | 13 (-8%) | 9 (-37%) | 9 (-32%) | 10 (-24%) |
| Crossed SJR to South Delta | -2000 | 0% | 0 (-26%) | 0 (-11%) | 0 (-28%) | 0 (-54%) | 0 (-57%) | 0 (-86%) | 0 (2%) | 0 (-26%) |
| Crossed SJR to South Delta | -3500 | 0% | 0 (285%) | 0 (-43%) | 0 (-28%) | 0 (15%) | 0 (64%) | 0 (62%) | 0 (4%) | 0 (73%) |
| Crossed SJR to South Delta | -5000 | 0% | 0 (136%) | 0 (25%) | 0 (19%) | 0 (7%) | 0 (5%) | 0 (-82%) | 0 (-2%) | 0 (-38%) |

| Exit Point | OMR Bin | NAA | ALT1 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Crossed SJR to South Delta | -5500 | 0% | 0 (-81%) | 0 (-6%) | 0 (-13%) | 0 (-1%) | 0 (-3%) | 0 (-56%) | 0 (-57%) | 0 (-17%) |

### *I.8.4.3.9 Neutrally Buoyant, Inflow Bins, December through March [EIS, Table I.8-74 through Table I.8-82]*

Table I.8-74. Mean December through March neutrally buoyant particle fate by Inflow bin for NAA, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4, and Action 5 – particle insertion location at San Joaquin River for all particle system exit points. The parenthetical value represents the percent difference from the NAA. Values displayed as 0% may represent small nonzero decimals rounded to 0%. Percent-difference values are calculated from the unrounded values. Note that NA values result from no data falling into that Inflow bin.

| Exit Point | Flow Bin | NAA | ALT1 | Alt2wTUCPwoVA | Alt2woTUCPwoVA | Alt2woTUCPDeltaVA | Alt2woTUCPAllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| West of Chipps | lolo | 0% | 0 (-35%) | 0 (8%) | 0 (26%) | 0 (5%) | 0 (5%) | 1 (327%) | 0 (6%) | 0 (-8%) |
| West of Chipps | lomed | 0% | 1 (116%) | 1 (73%) | 1 (144%) | 1 (237%) | 2 (373%) | 3 (952%) | 0 (12%) | 1 (214%) |
| West of Chipps | lohi | 1% | 2 (71%) | 1 (27%) | 1 (24%) | 1 (7%) | 1 (24%) | 10 (766%) | 1 (-21%) | 17 (1430%) |
| West of Chipps | medlo | 0% | 0 (-84%) | 0 (15%) | 0 (19%) | 0 (15%) | 0 (8%) | 4 (902%) | 0 (3%) | 0 (-18%) |
| West of Chipps | medmed | 1% | 0 (-86%) | 1 (-4%) | 1 (9%) | 3 (162%) | 4 (176%) | 14 (935%) | 1 (-7%) | 1 (32%) |
| West of Chipps | medhi | 12% | 4 (-65%) | 12 (-6%) | 11 (-7%) | 18 (42%) | 18 (45%) | 56 (354%) | 9 (-26%) | 10 (-13%) |
| West of Chipps | hilo | 2% | 1 (-15%) | 2 (14%) | 2 (14%) | 2 (21%) | 1 (-21%) | 7 (297%) | 2 (16%) | 1 (-8%) |
| West of Chipps | himed | 5% | 0 (-92%) | 5 (1%) | 5 (0%) | 7 (32%) | 7 (34%) | 16 (191%) | 6 (2%) | 4 (-8%) |
| West of Chipps | hihi | 38% | 30 (-22%) | 37 (-4%) | 37 (-4%) | 39 (1%) | 39 (1%) | 51 (34%) | 36 (-6%) | 36 (-6%) |
| Entrained at Exports | lolo | 75% | 81 (8%) | 75 (0%) | 74 (-1%) | 75 (0%) | 75 (-1%) | 60 (-20%) | 76 (1%) | 77 (3%) |
| Entrained at Exports | lomed | 82% | 79 (-3%) | 76 (-7%) | 75 (-8%) | 70 (-14%) | 69 (-16%) | 61 (-26%) | 79 (-3%) | 70 (-14%) |
| Entrained at Exports | lohi | 84% | 89 (6%) | 83 (-2%) | 81 (-3%) | 83 (-1%) | 81 (-3%) | 49 (-42%) | 87 (3%) | 60 (-28%) |
| Entrained at Exports | medlo | 87% | 87 (-1%) | 86 (-2%) | 86 (-2%) | 86 (-2%) | 85 (-3%) | 62 (-29%) | 88 (0%) | 86 (-1%) |

| Exit Point | Flow Bin | NAA | ALT1 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Entrained at Exports | medmed | 86% | 94 (9%) | 87 (0%) | 85 (-1%) | 76 (-12%) | 76 (-12%) | 56 (-36%) | 88 (2%) | 83 (-4%) |
| Entrained at Exports | medhi | 78% | 91 (16%) | 80 (2%) | 80 (2%) | 70 (-11%) | 70 (-11%) | 26 (-67%) | 83 (6%) | 80 (3%) |
| Entrained at Exports | hilo | 89% | 89 (0%) | 89 (-1%) | 89 (-1%) | 89 (-1%) | 89 (0%) | 77 (-14%) | 89 (0%) | 90 (1%) |
| Entrained at Exports | himed | 88% | 98 (11%) | 88 (0%) | 88 (-1%) | 84 (-5%) | 84 (-5%) | 70 (-21%) | 89 (0%) | 88 (0%) |
| Entrained at Exports | hihi | 59% | 69 (16%) | 61 (3%) | 61 (3%) | 58 (-1%) | 58 (-1%) | 45 (-23%) | 61 (4%) | 61 (4%) |
| Remaining in Delta | lolo | 24% | 18 (-24%) | 24 (0%) | 25 (3%) | 25 (1%) | 25 (2%) | 38 (58%) | 24 (-3%) | 22 (-9%) |
| Remaining in Delta | lomed | 18% | 20 (9%) | 24 (30%) | 24 (32%) | 29 (61%) | 30 (65%) | 36 (98%) | 21 (14%) | 28 (58%) |
| Remaining in Delta | lohi | 15% | 9 (-39%) | 16 (10%) | 17 (17%) | 16 (7%) | 17 (17%) | 41 (182%) | 13 (-14%) | 21 (49%) |
| Remaining in Delta | medlo | 12% | 13 (8%) | 14 (13%) | 14 (14%) | 14 (12%) | 15 (21%) | 34 (177%) | 12 (-2%) | 13 (10%) |
| Remaining in Delta | medmed | 12% | 5 (-56%) | 12 (-2%) | 13 (7%) | 20 (64%) | 20 (63%) | 31 (149%) | 11 (-11%) | 14 (21%) |
| Remaining in Delta | medhi | 10% | 5 (-51%) | 9 (-8%) | 9 (-8%) | 13 (33%) | 12 (29%) | 18 (89%) | 8 (-17%) | 8 (-7%) |
| Remaining in Delta | hilo | 9% | 9 (1%) | 9 (6%) | 9 (3%) | 9 (4%) | 10 (8%) | 16 (84%) | 9 (-5%) | 7 (-12%) |
| Remaining in Delta | himed | 6% | 1 (-78%) | 7 (6%) | 7 (8%) | 9 (41%) | 9 (39%) | 15 (136%) | 6 (-4%) | 6 (5%) |

| Exit Point | Flow Bin | NAA | ALT1 | Alt2wTUCPwoVA | Alt2woTUCPwoVA | Alt2woTUCPDeltaVA | Alt2woTUCPAllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Remaining in Delta | hihi | 3% | 1 (-45%) | 2 (-10%) | 2 (-10%) | 3 (15%) | 3 (13%) | 3 (23%) | 2 (-12%) | 2 (-8%) |
| Crossed SJR to South Delta | lolo | 49% | 51 (5%) | 49 (0%) | 49 (0%) | 49 (0%) | 49 (-1%) | 45 (-9%) | 50 (1%) | 50 (2%) |
| Crossed SJR to South Delta | lomed | 56% | 55 (-1%) | 53 (-4%) | 53 (-5%) | 51 (-9%) | 50 (-10%) | 46 (-18%) | 55 (-1%) | 51 (-7%) |
| Crossed SJR to South Delta | lohi | 60% | 62 (3%) | 59 (-1%) | 59 (-1%) | 60 (0%) | 59 (-1%) | 37 (-38%) | 61 (2%) | 41 (-31%) |
| Crossed SJR to South Delta | medlo | 53% | 46 (-13%) | 52 (-1%) | 52 (-1%) | 52 (-1%) | 52 (-1%) | 45 (-15%) | 54 (2%) | 52 (-1%) |
| Crossed SJR to South Delta | medmed | 59% | 61 (4%) | 59 (0%) | 58 (-1%) | 54 (-8%) | 54 (-8%) | 40 (-32%) | 59 (1%) | 57 (-2%) |
| Crossed SJR to South Delta | medhi | 55% | 64 (17%) | 56 (2%) | 56 (2%) | 48 (-12%) | 48 (-12%) | 7 (-86%) | 58 (7%) | 56 (4%) |
| Crossed SJR to South Delta | hilo | 55% | 46 (-17%) | 54 (-2%) | 54 (-1%) | 54 (-2%) | 55 (0%) | 50 (-10%) | 56 (1%) | 55 (0%) |
| Crossed SJR to South Delta | himed | 57% | 61 (6%) | 57 (0%) | 57 (0%) | 55 (-4%) | 55 (-4%) | 45 (-21%) | 57 (0%) | 57 (1%) |
| Crossed SJR to South Delta | hihi | 32% | 40 (26%) | 34 (5%) | 34 (5%) | 32 (-1%) | 32 (-1%) | 19 (-41%) | 34 (7%) | 34 (7%) |

Table I.8-75. Mean December through March neutrally buoyant particle fate by Inflow bin for NAA, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4, and Action 5 – particle insertion location at Old and Middle River for all particle system exit points. The parenthetical value represents the percent difference from the NAA. Values displayed as 0% may represent small nonzero decimals rounded to 0%. Percent-difference values are calculated from the unrounded values. Note that NA values result from no data falling into that Inflow bin.

| Exit Point | Flow Bin | NAA | ALT1 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| West of Chipps | lolo | 5% | 6 (10%) | 6 (4%) | 6 (14%) | 6 (4%) | 6 (4%) | 12 (123%) | 6 (7%) | 5 (-5%) |
| West of Chipps | lomed | 5% | 7 (28%) | 6 (24%) | 8 (46%) | 9 (72%) | 10 (91%) | 14 (164%) | 6 (7%) | 8 (61%) |
| West of Chipps | lohi | 4% | 4 (9%) | 4 (0%) | 4 (4%) | 4 (-1%) | 4 (1%) | 12 (238%) | 3 (-11%) | 18 (405%) |
| West of Chipps | medlo | 5% | 2 (-54%) | 5 (9%) | 5 (9%) | 5 (5%) | 5 (7%) | 17 (259%) | 5 (4%) | 4 (-8%) |
| West of Chipps | medmed | 7% | 3 (-53%) | 7 (2%) | 8 (7%) | 10 (44%) | 10 (45%) | 23 (223%) | 7 (-1%) | 7 (10%) |
| West of Chipps | medhi | 11% | 6 (-42%) | 11 (-1%) | 11 (-1%) | 13 (24%) | 13 (24%) | 48 (346%) | 10 (-10%) | 9 (-9%) |
| West of Chipps | hilo | 8% | 2 (-76%) | 8 (-1%) | 8 (-2%) | 8 (-3%) | 8 (-1%) | 16 (98%) | 8 (3%) | 7 (-10%) |
| West of Chipps | himed | 10% | 3 (-67%) | 10 (3%) | 10 (3%) | 11 (12%) | 11 (11%) | 20 (98%) | 10 (0%) | 9 (-3%) |
| West of Chipps | hihi | 27% | 24 (-10%) | 26 (-4%) | 26 (-4%) | 27 (0%) | 27 (1%) | 46 (71%) | 25 (-6%) | 25 (-5%) |
| Entrained at Exports | lolo | 86% | 88 (3%) | 86 (0%) | 85 (-1%) | 86 (0%) | 86 (0%) | 74 (-13%) | 86 (0%) | 87 (2%) |
| Entrained at Exports | lomed | 89% | 87 (-2%) | 86 (-3%) | 84 (-6%) | 82 (-8%) | 81 (-9%) | 73 (-18%) | 88 (-1%) | 83 (-6%) |
| Entrained at Exports | lohi | 91% | 92 (1%) | 91 (0%) | 91 (-1%) | 91 (-1%) | 91 (-1%) | 72 (-21%) | 91 (0%) | 72 (-21%) |
| Entrained at Exports | medlo | 92% | 96 (4%) | 92 (-1%) | 91 (-1%) | 92 (0%) | 91 (-1%) | 70 (-24%) | 92 (-1%) | 91 (0%) |
| Entrained at Exports | medmed | 90% | 95 (5%) | 90 (0%) | 89 (-1%) | 85 (-5%) | 85 (-5%) | 61 (-32%) | 90 (0%) | 88 (-1%) |
| Entrained at Exports | medhi | 87% | 92 (6%) | 87 (0%) | 87 (0%) | 84 (-4%) | 84 (-4%) | 36 (-58%) | 89 (2%) | 88 (1%) |
| Entrained at Exports | hilo | 90% | 97 (8%) | 89 (0%) | 90 (0%) | 89 (0%) | 89 (0%) | 78 (-13%) | 89 (0%) | 90 (1%) |
| Entrained at Exports | himed | 88% | 96 (9%) | 88 (0%) | 88 (0%) | 86 (-2%) | 86 (-2%) | 73 (-16%) | 88 (0%) | 88 (1%) |
| Entrained at Exports | hihi | 72% | 74 (4%) | 73 (1%) | 73 (1%) | 71 (0%) | 71 (0%) | 51 (-29%) | 73 (2%) | 73 (2%) |

| Exit Point | Flow Bin | NAA | ALT1 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Remaining in Delta | lolo | 9% | 6 (-35%) | 9 (-5%) | 9 (-3%) | 9 (-5%) | 8 (-6%) | 14 (55%) | 9 (-3%) | 7 (-13%) |
| Remaining in Delta | lomed | 6% | 6 (13%) | 7 (32%) | 8 (47%) | 9 (64%) | 9 (61%) | 13 (135%) | 6 (15%) | 7 (39%) |
| Remaining in Delta | lohi | 5% | 4 (-16%) | 5 (7%) | 5 (11%) | 6 (14%) | 5 (11%) | 15 (218%) | 5 (9%) | 9 (96%) |
| Remaining in Delta | medlo | 3% | 2 (-32%) | 3 (7%) | 3 (8%) | 3 (5%) | 4 (22%) | 13 (323%) | 3 (9%) | 3 (18%) |
| Remaining in Delta | medmed | 3% | 2 (-35%) | 3 (0%) | 3 (10%) | 5 (47%) | 5 (45%) | 16 (422%) | 3 (-5%) | 3 (13%) |
| Remaining in Delta | medhi | 2% | 1 (-36%) | 2 (-9%) | 2 (-7%) | 3 (34%) | 3 (32%) | 16 (635%) | 2 (-17%) | 2 (-6%) |
| Remaining in Delta | hilo | 2% | 1 (-54%) | 3 (12%) | 3 (6%) | 3 (19%) | 3 (17%) | 6 (144%) | 3 (8%) | 2 (2%) |
| Remaining in Delta | himed | 2% | 1 (-51%) | 2 (-2%) | 2 (1%) | 2 (16%) | 2 (15%) | 6 (221%) | 2 (-4%) | 1 (-6%) |
| Remaining in Delta | hihi | 2% | 2 (-13%) | 2 (-2%) | 2 (-3%) | 2 (12%) | 2 (10%) | 4 (122%) | 2 (7%) | 1 (3%) |
| Crossed SJR to South Delta | lolo | -10% | -8 (-13%) | -10 (1%) | -10 (6%) | -9 (0%) | -9 (0%) | -17 (81%) | -10 (4%) | -9 (-8%) |
| Crossed SJR to South Delta | lomed | -8% | -9 (17%) | -10 (27%) | -12 (42%) | -13 (64%) | -14 (73%) | -18 (127%) | -9 (9%) | -13 (49%) |
| Crossed SJR to South Delta | lohi | -6% | -6 (1%) | -6 (7%) | -6 (7%) | -6 (6%) | -6 (5%) | -21 (250%) | -6 (-1%) | -22 (256%) |
| Crossed SJR to South Delta | medlo | -6% | -3 (-53%) | -6 (9%) | -6 (9%) | -6 (5%) | -6 (10%) | -21 (257%) | -6 (5%) | -6 (-2%) |
| Crossed SJR to South Delta | medmed | -8% | -4 (-52%) | -8 (1%) | -9 (6%) | -12 (42%) | -12 (42%) | -27 (225%) | -8 (-2%) | -10 (10%) |
| Crossed SJR to South Delta | medhi | -11% | -7 (-41%) | -11 (-1%) | -11 (-1%) | -14 (24%) | -14 (24%) | -53 (370%) | -10 (-10%) | -11 (-9%) |
| Crossed SJR to South Delta | hilo | -8% | -2 (-75%) | -8 (-1%) | -8 (-2%) | -8 (-2%) | -8 (-1%) | -17 (99%) | -9 (3%) | -8 (-10%) |
| Crossed SJR to South Delta | himed | -10% | -3 (-67%) | -11 (3%) | -11 (3%) | -12 (12%) | -12 (11%) | -21 (104%) | -10 (0%) | -11 (-3%) |

| Exit Point | Flow Bin | NAA | ALT1 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Crossed SJR to South Delta | hihi | -27% | -24 (-9%) | -26 (-4%) | -26 (-4%) | -27 (0%) | -27 (1%) | -47 (74%) | -25 (-6%) | -26 (-5%) |

Table I.8-76. Mean December through March neutrally buoyant particle fate by Inflow bin for NAA, Alternative 1, four phases of Alternative 2, Alternative 3, and Alternative 4 – particle insertion location at Southern Delta for all particle system exit points. The parenthetical value represents the percent difference from the NAA. Values displayed as 0% may represent small nonzero decimals rounded to 0%. Percent-difference values are calculated from the unrounded values. Note that NA values result from no data falling into that Inflow bin.

| Exit Point | Flow Bin | NAA | ALT1 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ALT3 | ALT4 |
|---|---|---|---|---|---|---|---|---|---|
| West of Chipps | lolo | 0% | 0 (-100%) | 0 (32%) | 0 (-42%) | 0 (-51%) | 0 (-17%) | 0 (-22%) | 0 (0%) |
| West of Chipps | lomed | 0% | 0 (-227060%) | 0 (-29%) | 0 (-881215%) | 0 (-181%) | 0 (-238012%) | 0 (-54017767%) | 0 (-237%) |
| West of Chipps | lohi | 0% | 0 (-223%) | 0 (-100%) | 0 (-100%) | 0 (-198%) | 0 (-2%) | 0 (-2%) | 0 (-100%) |
| West of Chipps | medlo | 0% | 0 (-166%) | 0 (-129%) | 0 (-82%) | 0 (124%) | 0 (1%) | 0 (67326071%) | 0 (-449%) |
| West of Chipps | medmed | 0% | 0 (-141%) | 0 (-48%) | 0 (-178%) | 0 (99%) | 0 (-348%) | 1 (-318372158%) | 0 (-205%) |
| West of Chipps | medhi | 0% | 0 (6506%) | 0 (2183%) | 0 (2040%) | 0 (3910%) | 0 (5233%) | 17 (82535543633%) | 0 (2358%) |
| West of Chipps | hilo | 0% | 0 (-6%) | 0 (-277%) | 0 (-211%) | 0 (112%) | 0 (33%) | 0 (89220930%) | 0 (-79%) |
| West of Chipps | himed | 0% | 0 (-6617%) | 0 (8348%) | 0 (-4131%) | 0 (9157%) | 0 (-13350%) | 2 (64423814327%) | 0 (4255%) |

| Exit Point | Flow Bin | NAA | ALT1 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ALT3 | ALT4 |
|---|---|---|---|---|---|---|---|---|---|
| West of Chipps | hihi | 5% | 5 (15%) | 4 (-11%) | 4 (-9%) | 4 (-11%) | 4 (-9%) | 20 (341%) | 4 (-21%) |
| Entrained at Exports | lolo | 100% | 100 (0%) | 100 (0%) | 100 (0%) | 100 (0%) | 100 (0%) | 100 (0%) | 100 (0%) |
| Entrained at Exports | lomed | 100% | 100 (0%) | 100 (0%) | 100 (0%) | 100 (0%) | 100 (0%) | 95 (-5%) | 100 (0%) |
| Entrained at Exports | lohi | 100% | 100 (0%) | 100 (0%) | 100 (0%) | 100 (0%) | 100 (0%) | 100 (0%) | 100 (0%) |
| Entrained at Exports | medlo | 100% | 100 (0%) | 100 (0%) | 100 (0%) | 100 (0%) | 100 (0%) | 98 (-2%) | 100 (0%) |
| Entrained at Exports | medmed | 100% | 100 (0%) | 100 (0%) | 100 (0%) | 100 (0%) | 100 (0%) | 97 (-3%) | 100 (0%) |
| Entrained at Exports | medhi | 100% | 100 (0%) | 100 (0%) | 100 (0%) | 100 (0%) | 100 (0%) | 73 (-27%) | 100 (0%) |
| Entrained at Exports | hilo | 100% | 100 (0%) | 100 (0%) | 100 (0%) | 100 (0%) | 100 (0%) | 99 (-1%) | 100 (0%) |
| Entrained at Exports | himed | 100% | 100 (0%) | 100 (0%) | 100 (0%) | 100 (0%) | 100 (0%) | 97 (-3%) | 100 (0%) |
| Entrained at Exports | hihi | 95% | 94 (-1%) | 96 (1%) | 96 (0%) | 96 (0%) | 96 (0%) | 77 (-19%) | 96 (1%) |
| Remaining in Delta | lolo | 0% | 0 (-96%) | 0 (-37%) | 0 (-34%) | 0 (-33%) | 0 (-40%) | 0 (-20%) | 0 (-44%) |
| Remaining in Delta | lomed | 0% | 0 (10775%) | 0 (108%) | 0 (14282%) | 0 (11900%) | 0 (11757%) | 4 (132446%) | 0 (163%) |
| Remaining in Delta | lohi | 0% | 0 (-100%) | 0 (-100%) | 0 (-100%) | 0 (-100%) | 0 (69%) | 0 (-4886718418514%) | 0 (-100%) |

| Exit Point | Flow Bin | NAA | ALT1 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ALT3 | ALT4 |
|---|---|---|---|---|---|---|---|---|---|
| Remaining in Delta | medlo | 0% | 0 (-1328588%) | 0 (-448318396412%) | 0 (-448318396428%) | 0 (33%) | 0 (-3452051248413%) | 2 (-1531316529445930%) | 0 (-2370914561216%) |
| Remaining in Delta | medmed | 0% | 0 (1553278%) | 0 (-19%) | 0 (-1486486182089%) | 0 (-4660134134453%) | 0 (-4739120090103%) | 2 (-815826082623677%) | 0 (-47%) |
| Remaining in Delta | medhi | 0% | 0 (-82%) | 0 (-60%) | 0 (-80%) | 0 (-40%) | 0 (0%) | 9 (79870%) | 0 (-100%) |
| Remaining in Delta | hilo | 0% | 0 (567385%) | 0 (65%) | 0 (284%) | 0 (-41%) | 0 (-44%) | 1 (-1579187368168190%) | 0 (95%) |
| Remaining in Delta | himed | 0% | 0 (2075828%) | 0 (10%) | 0 (23%) | 0 (-650604379690%) | 0 (-1049916807719%) | 2 (-829338596375550%) | 0 (5%) |
| Remaining in Delta | Hihi | 0% | 0 (76%) | 0 (-3%) | 0 (-4%) | 0 (11%) | 0 (16%) | 2 (1099%) | 0 (11%) |
| Crossed SJR to South Delta | Lolo | 0% | 0 (-100%) | 0 (2%) | 0 (-48%) | 0 (-55%) | 0 (0%) | 0 (-68%) | 0 (-30%) |
| Crossed SJR to South Delta | lomed | 0% | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | -1 (NA) | 0 (NA) |
| Crossed SJR to South Delta | lohi | 0% | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) |
| Crossed SJR to South Delta | medlo | 0% | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) |

| Exit Point | Flow Bin | NAA | ALT1 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ALT3 | ALT4 |
|---|---|---|---|---|---|---|---|---|---|
| Crossed SJR to South Delta | medmed | 0% | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | -1 (NA) | 0 (NA) |
| Crossed SJR to South Delta | medhi | 0% | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | -20 (NA) | 0 (NA) |
| Crossed SJR to South Delta | hilo | 0% | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) |
| Crossed SJR to South Delta | himed | 0% | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | -2 (NA) | 0 (NA) |
| Crossed SJR to South Delta | hihi | -5% | -5 (15%) | -4 (-11%) | -4 (-9%) | -4 (-11%) | -4 (-8%) | -21 (351%) | -4 (-21%) |

Table I.8-76a. Mean December through March neutrally buoyant particle fate by Inflow bin for NAA and Action 5 – particle insertion location at Southern Delta for all particle system exit points. The parenthetical value represents the percent difference from the NAA. Values displayed as 0% may represent small nonzero decimals rounded to 0%. Percent-difference values are calculated from the unrounded values. Note that NA values result from no data falling into that Inflow bin.

| Exit Point | Flow Bin | NAA | ACT5 |
|---|---|---|---|
| West of Chipps | lolo | 0% | -1 (-100%) |
| West of Chipps | lomed | 0% | -1 (-93%) |
| West of Chipps | lohi | 0% | -1 (-63%) |
| West of Chipps | medlo | 0% | -1 (-145%) |
| West of Chipps | medmed | 0% | 0 (-202%) |
| West of Chipps | medhi | 0% | 0 (3775%) |
| West of Chipps | hilo | 0% | 0 (152%) |
| West of Chipps | himed | 0% | 0 (9775%) |
| West of Chipps | hihi | 5% | 4 (-11%) |
| Entrained at Exports | lolo | 100% | 99 (0%) |
| Entrained at Exports | lomed | 100% | 99 (0%) |
| Entrained at Exports | lohi | 100% | 99 (0%) |
| Entrained at Exports | medlo | 100% | 99 (0%) |
| Entrained at Exports | medmed | 100% | 99 (0%) |
| Entrained at Exports | medhi | 100% | 99 (0%) |
| Entrained at Exports | hilo | 100% | 99 (0%) |
| Entrained at Exports | himed | 100% | 99 (0%) |
| Entrained at Exports | hihi | 95% | 95 (1%) |
| Remaining in Delta | lolo | 0% | 0 (-84%) |
| Remaining in Delta | lomed | 0% | 0 (650%) |

| Exit Point | Flow Bin | NAA | ACT5 |
|---|---|---|---|
| Remaining in Delta | lohi | 0% | 0 (-56197253984760%) |
| Remaining in Delta | medlo | 0% | 0 (-513698277357%) |
| Remaining in Delta | medmed | 0% | 0 (-564864683993%) |
| Remaining in Delta | medhi | 0% | 0 (-78%) |
| Remaining in Delta | hilo | 0% | -1 (44%) |
| Remaining in Delta | himed | 0% | -1 (-9%) |
| Remaining in Delta | Hihi | 0% | 0 (-5%) |
| Crossed SJR to South Delta | Lolo | 0% | 0 (-100%) |
| Crossed SJR to South Delta | lomed | 0% | 0 (#N/A) |
| Crossed SJR to South Delta | lohi | 0% | -1 (#N/A) |
| Crossed SJR to South Delta | medlo | 0% | 0 (#N/A) |
| Crossed SJR to South Delta | medmed | 0% | 0 (#N/A) |
| Crossed SJR to South Delta | medhi | 0% | 0 (#N/A) |
| Crossed SJR to South Delta | hilo | 0% | 0 (#N/A) |
| Crossed SJR to South Delta | himed | 0% | 0 (#N/A) |
| Crossed SJR to South Delta | hihi | -5% | -5 (-11%) |

Table I.8-77. Mean December through March neutrally buoyant particle fate by Inflow bin for NAA, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4, and Action 5 – particle insertion location at Central Delta for all particle system exit points. The parenthetical value represents the percent difference from the NAA. Values displayed as 0% may represent small nonzero decimals rounded to 0%. Percent-difference values are calculated from the unrounded values. Note that NA values result from no data falling into that Inflow bin.

| Exit Point | Flow Bin | NAA | ALT1 | Alt2wTUCPwoVA | Alt2woTUCPwoVA | Alt2woTUCPDeltaVA | Alt2woTUCPAllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| West of Chipps | lolo | 30 (19%) | 26 (3%) | 27 (9%) | 26 (3%) | 26 (3%) | 43 (71%) | 26 (4%) | 28 (4%) | 24 (-2%) |
| West of Chipps | lomed | 34 (15%) | 33 (9%) | 36 (19%) | 40 (32%) | 43 (43%) | 52 (75%) | 31 (3%) | 35 (-6%) | 38 (29%) |
| West of Chipps | lohi | 29 (19%) | 25 (2%) | 25 (2%) | 25 (3%) | 26 (5%) | 47 (92%) | 22 (-12%) | 57 (-9%) | 57 (133%) |
| West of Chipps | medlo | 20 (-36%) | 33 (4%) | 33 (4%) | 33 (3%) | 32 (0%) | 59 (88%) | 33 (3%) | 32 (7%) | 28 (-9%) |
| West of Chipps | medmed | 29 (-36%) | 45 (2%) | 46 (3%) | 53 (19%) | 53 (19%) | 69 (56%) | 45 (2%) | 48 (-4%) | 46 (4%) |
| West of Chipps | medhi | 51 (-25%) | 67 (-1%) | 67 (-1%) | 72 (8%) | 72 (8%) | 94 (40%) | 63 (-6%) | 71 (-11%) | 64 (-4%) |
| West of Chipps | hilo | 23 (-58%) | 55 (-1%) | 55 (-1%) | 54 (-3%) | 55 (-2%) | 68 (22%) | 57 (2%) | 65 (4%) | 51 (-7%) |
| West of Chipps | himed | 38 (-44%) | 69 (1%) | 69 (1%) | 71 (3%) | 70 (3%) | 76 (11%) | 69 (0%) | 69 (-5%) | 66 (-2%) |
| West of Chipps | hihi | 79 (-11%) | 88 (0%) | 88 (0%) | 89 (0%) | 89 (0%) | 92 (3%) | 88 (-1%) | 90 (-3%) | 87 (-2%) |
| Entrained at Exports | lolo | 48 (8%) | 43 (-2%) | 42 (-5%) | 44 (0%) | 43 (-1%) | 21 (-51%) | 42 (-3%) | 24 (18%) | 45 (4%) |
| Entrained at Exports | lomed | 40 (-3%) | 34 (-18%) | 33 (-18%) | 28 (-32%) | 26 (-36%) | 23 (-43%) | 38 (-6%) | 26 (10%) | 28 (-29%) |

| Exit Point | Flow Bin | NAA | ALT1 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Entrained at Exports | lohi | 47 (1%) | 44 (-6%) | 44 (-4%) | 44 (-5%) | 43 (-7%) | 8 (-82%) | 50 (8%) | 22 (40%) | 23 (-50%) |
| Entrained at Exports | medlo | 70 (28%) | 52 (-4%) | 52 (-4%) | 53 (-2%) | 52 (-4%) | 21 (-62%) | 52 (-4%) | 43 (-7%) | 55 (3%) |
| Entrained at Exports | medmed | 61 (51%) | 40 (-1%) | 39 (-3%) | 31 (-22%) | 31 (-22%) | 15 (-62%) | 40 (0%) | 29 (14%) | 37 (-6%) |
| Entrained at Exports | medhi | 42 (68%) | 25 (3%) | 25 (3%) | 20 (-19%) | 20 (-19%) | 1 (-94%) | 29 (16%) | 17 (71%) | 27 (11%) |
| Entrained at Exports | hilo | 74 (95%) | 38 (2%) | 38 (2%) | 39 (3%) | 38 (2%) | 25 (-33%) | 37 (-3%) | 30 (3%) | 41 (11%) |
| Entrained at Exports | himed | 59 (117%) | 26 (-2%) | 26 (-3%) | 24 (-10%) | 25 (-8%) | 18 (-32%) | 27 (-1%) | 23 (17%) | 28 (5%) |
| Entrained at Exports | hihi | 20 (102%) | 10 (5%) | 10 (5%) | 10 (-3%) | 10 (-3%) | 7 (-25%) | 11 (10%) | 7 (55%) | 11 (15%) |
| Remaining in Delta | lolo | 23 (-27%) | 31 (-1%) | 31 (0%) | 30 (-2%) | 31 (-1%) | 36 (15%) | 31 (1%) | 48 (-9%) | 29 (-4%) |
| Remaining in Delta | lomed | 26 (-11%) | 34 (15%) | 31 (6%) | 33 (12%) | 31 (6%) | 24 (-17%) | 31 (6%) | 39 (0%) | 32 (12%) |
| Remaining in Delta | lohi | 24 (-17%) | 31 (8%) | 30 (5%) | 31 (6%) | 31 (8%) | 44 (52%) | 28 (-3%) | 21 (-2%) | 19 (-32%) |
| Remaining in Delta | medlo | 10 (-29%) | 15 (7%) | 15 (7%) | 15 (3%) | 16 (13%) | 20 (41%) | 15 (9%) | 25 (3%) | 15 (9%) |
| Remaining in Delta | medmed | 11 (-30%) | 15 (-1%) | 15 (0%) | 16 (4%) | 16 (3%) | 15 (0%) | 15 (-5%) | 22 (-5%) | 15 (3%) |
| Remaining in Delta | medhi | 8 (-2%) | 8 (0%) | 8 (1%) | 7 (-5%) | 7 (-6%) | 4 (-42%) | 8 (2%) | 12 (20%) | 7 (-3%) |
| Remaining in Delta | hilo | 3 (-51%) | 7 (0%) | 7 (1%) | 7 (6%) | 7 (7%) | 7 (4%) | 6 (0%) | 5 (-43%) | 6 (0%) |

| Exit Point | Flow Bin | NAA | ALT1 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Remaining in Delta | himed | 3 (-28%) | 5 (4%) | 5 (4%) | 5 (6%) | 5 (6%) | 5 (16%) | 5 (2%) | 9 (3%) | 4 (4%) |
| Remaining in Delta | hihi | 1 (4%) | 1 (-4%) | 1 (-6%) | 1 (3%) | 1 (4%) | 1 (-21%) | 1 (-1%) | 2 (4%) | 1 (3%) |
| Crossed SJR to South Delta | lolo | 57 (2%) | 55 (-1%) | 54 (-4%) | 56 (0%) | 55 (-1%) | 36 (-35%) | 54 (-3%) | 44 (5%) | 56 (2%) |
| Crossed SJR to South Delta | lomed | 51 (-4%) | 47 (-11%) | 45 (-14%) | 40 (-24%) | 38 (-27%) | 33 (-36%) | 50 (-4%) | 42 (6%) | 41 (-20%) |
| Crossed SJR to South Delta | lohi | 56 (-3%) | 57 (-2%) | 57 (-2%) | 56 (-3%) | 56 (-4%) | 20 (-66%) | 61 (5%) | 30 (28%) | 31 (-46%) |
| Crossed SJR to South Delta | medlo | 74 (23%) | 59 (-3%) | 59 (-3%) | 60 (-2%) | 60 (-2%) | 30 (-51%) | 59 (-3%) | 53 (-5%) | 62 (3%) |
| Crossed SJR to South Delta | medmed | 66 (40%) | 47 (-1%) | 46 (-3%) | 39 (-18%) | 39 (-18%) | 23 (-52%) | 47 (0%) | 40 (9%) | 45 (-4%) |
| Crossed SJR to South Delta | medhi | 45 (58%) | 29 (2%) | 29 (2%) | 24 (-17%) | 24 (-17%) | 3 (-88%) | 32 (13%) | 22 (59%) | 31 (9%) |
| Crossed SJR to South Delta | hilo | 76 (82%) | 42 (2%) | 42 (2%) | 43 (4%) | 42 (2%) | 29 (-30%) | 40 (-3%) | 32 (-3%) | 45 (10%) |
| Crossed SJR to South Delta | himed | 60 (105%) | 29 (-2%) | 29 (-2%) | 27 (-8%) | 27 (-7%) | 22 (-27%) | 29 (-1%) | 27 (13%) | 30 (5%) |
| Crossed SJR to South Delta | hihi | 21 (94%) | 11 (4%) | 11 (4%) | 10 (-3%) | 10 (-3%) | 8 (-25%) | 12 (9%) | 9 (45%) | 12 (13%) |

Table I.8-78. Mean December through March neutrally buoyant particle fate by Inflow bin for NAA, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4, and Action 5 – particle insertion location at Sacramento River for all particle system exit points. The parenthetical value represents the percent difference from the NAA. Values displayed as 0% may represent small nonzero decimals rounded to 0%. Percent-difference values are calculated from the unrounded values. Note that NA values result from no data falling into that Inflow bin.

| Exit Point | Flow Bin | NAA | ALT1 | Alt2wTUCPwoVA | Alt2woTUCPwoVA | Alt2woTUCPDeltaVA | Alt2woTUCPAllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| West of Chipps | lolo | 57% | 60 (4%) | 58 (1%) | 59 (3%) | 58 (1%) | 58 (1%) | 72 (26%) | 58 (1%) | 57 (0%) |
| West of Chipps | lomed | 67% | 69 (4%) | 68 (1%) | 70 (4%) | 72 (8%) | 75 (12%) | 81 (21%) | 67 (-1%) | 72 (8%) |
| West of Chipps | lohi | 51% | 53 (4%) | 51 (0%) | 51 (1%) | 50 (-1%) | 52 (3%) | 60 (18%) | 46 (-10%) | 73 (44%) |
| West of Chipps | medlo | 76% | 64 (-17%) | 76 (0%) | 76 (0%) | 76 (0%) | 76 (-1%) | 89 (16%) | 78 (2%) | 73 (-3%) |
| West of Chipps | medmed | 84% | 76 (-10%) | 85 (0%) | 85 (1%) | 87 (3%) | 87 (3%) | 92 (10%) | 86 (2%) | 84 (0%) |
| West of Chipps | medhi | 94% | 90 (-4%) | 94 (0%) | 94 (0%) | 95 (1%) | 95 (1%) | 98 (4%) | 93 (-1%) | 93 (0%) |
| West of Chipps | hilo | 93% | 79 (-15%) | 93 (0%) | 93 (0%) | 93 (-1%) | 93 (-1%) | 95 (2%) | 93 (0%) | 91 (-1%) |
| West of Chipps | himed | 96% | 88 (-8%) | 96 (0%) | 96 (0%) | 96 (0%) | 96 (0%) | 97 (1%) | 96 (0%) | 95 (0%) |
| West of Chipps | hihi | 99% | 98 (-1%) | 99 (0%) | 99 (0%) | 99 (0%) | 99 (0%) | 99 (0%) | 99 (0%) | 98 (0%) |
| Entrained at Exports | lolo | 13% | 18 (38%) | 12 (-5%) | 12 (-9%) | 13 (-1%) | 13 (-3%) | 5 (-64%) | 12 (-8%) | 12 (-1%) |
| Entrained at Exports | lomed | 9% | 12 (29%) | 7 (-20%) | 8 (-20%) | 6 (-34%) | 6 (-38%) | 6 (-38%) | 10 (2%) | 6 (-28%) |
| Entrained at Exports | lohi | 13% | 16 (21%) | 12 (-6%) | 12 (-8%) | 13 (-4%) | 12 (-12%) | 2 (-87%) | 16 (22%) | 6 (-50%) |
| Entrained at Exports | medlo | 13% | 25 (99%) | 12 (-3%) | 12 (-3%) | 13 (-1%) | 13 (-2%) | 3 (-73%) | 11 (-16%) | 13 (5%) |
| Entrained at Exports | medmed | 7% | 16 (114%) | 7 (-1%) | 7 (-3%) | 6 (-21%) | 6 (-20%) | 2 (-71%) | 6 (-11%) | 6 (-5%) |
| Entrained at Exports | medhi | 3% | 6 (117%) | 3 (2%) | 3 (4%) | 2 (-21%) | 2 (-21%) | 0 (-96%) | 3 (17%) | 3 (12%) |
| Entrained at Exports | hilo | 5% | 18 (294%) | 5 (4%) | 5 (6%) | 5 (8%) | 5 (7%) | 3 (-39%) | 4 (-5%) | 5 (20%) |
| Entrained at Exports | himed | 2% | 9 (290%) | 2 (-2%) | 2 (-3%) | 2 (-10%) | 2 (-8%) | 2 (-35%) | 2 (-4%) | 2 (8%) |
| Entrained at Exports | hihi | 1% | 2 (186%) | 1 (3%) | 1 (2%) | 1 (-3%) | 1 (-3%) | 0 (-27%) | 1 (13%) | 0 (20%) |

| Exit Point | Flow Bin | NAA | ALT1 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Remaining in Delta | lolo | 30% | 22 (-25%) | 30 (0%) | 29 (-2%) | 29 (-1%) | 30 (0%) | 23 (-23%) | 30 (1%) | 29 (0%) |
| Remaining in Delta | lomed | 24% | 19 (-22%) | 25 (5%) | 23 (-4%) | 22 (-8%) | 19 (-18%) | 13 (-45%) | 24 (1%) | 21 (-11%) |
| Remaining in Delta | lohi | 36% | 31 (-13%) | 37 (2%) | 36 (1%) | 37 (3%) | 36 (1%) | 38 (7%) | 38 (6%) | 20 (-44%) |
| Remaining in Delta | medlo | 11% | 11 (-1%) | 11 (4%) | 11 (4%) | 11 (0%) | 12 (7%) | 8 (-29%) | 12 (5%) | 12 (15%) |
| Remaining in Delta | medmed | 9% | 9 (3%) | 8 (-3%) | 8 (-3%) | 8 (-11%) | 8 (-11%) | 6 (-34%) | 8 (-7%) | 8 (3%) |
| Remaining in Delta | medhi | 3% | 4 (18%) | 3 (1%) | 3 (1%) | 3 (-6%) | 3 (-6%) | 2 (-32%) | 3 (4%) | 3 (2%) |
| Remaining in Delta | hilo | 2% | 3 (18%) | 2 (2%) | 2 (1%) | 3 (7%) | 3 (10%) | 2 (-14%) | 2 (-4%) | 2 (10%) |
| Remaining in Delta | himed | 1% | 2 (57%) | 1 (7%) | 1 (7%) | 1 (2%) | 1 (3%) | 1 (8%) | 1 (3%) | 1 (7%) |
| Remaining in Delta | hihi | 0% | 1 (27%) | 0 (-2%) | 0 (-1%) | 0 (4%) | 0 (3%) | 0 (-20%) | 0 (4%) | 0 (4%) |
| Crossed SJR to South Delta | lolo | 19% | 24 (26%) | 19 (-3%) | 18 (-6%) | 19 (0%) | 19 (-1%) | 10 (-49%) | 18 (-6%) | 19 (-1%) |
| Crossed SJR to South Delta | lomed | 14% | 17 (20%) | 12 (-13%) | 12 (-16%) | 10 (-28%) | 10 (-32%) | 9 (-39%) | 15 (4%) | 11 (-22%) |
| Crossed SJR to South Delta | lohi | 22% | 24 (9%) | 21 (-4%) | 21 (-4%) | 22 (-1%) | 21 (-6%) | 6 (-72%) | 25 (13%) | 11 (-48%) |
| Crossed SJR to South Delta | medlo | 16% | 29 (87%) | 15 (-2%) | 15 (-2%) | 16 (-1%) | 16 (0%) | 5 (-66%) | 14 (-13%) | 16 (6%) |
| Crossed SJR to South Delta | medmed | 9% | 18 (96%) | 9 (-1%) | 9 (-3%) | 8 (-18%) | 8 (-17%) | 3 (-63%) | 8 (-10%) | 9 (-3%) |
| Crossed SJR to South Delta | medhi | 4% | 7 (101%) | 4 (2%) | 4 (3%) | 3 (-20%) | 3 (-20%) | 0 (-91%) | 4 (14%) | 3 (8%) |
| Crossed SJR to South Delta | hilo | 5% | 19 (257%) | 6 (5%) | 6 (6%) | 6 (9%) | 6 (8%) | 3 (-36%) | 5 (-4%) | 6 (19%) |

| Exit Point | Flow Bin | NAA | ALT1 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Crossed SJR to South Delta | himed | 3% | 10 (266%) | 3 (-2%) | 3 (-2%) | 3 (-9%) | 3 (-7%) | 2 (-29%) | 3 (-4%) | 3 (8%) |
| Crossed SJR to South Delta | hihi | 1% | 2 (174%) | 1 (2%) | 1 (1%) | 1 (-2%) | 1 (-2%) | 0 (-27%) | 1 (12%) | 0 (20%) |

Table I.8-79. Mean December through March neutrally buoyant particle fate by Inflow bin for NAA, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4, and Action 5 – particle insertion location at Mokelumne River for all particle system exit points. The parenthetical value represents the percent difference from the NAA. Values displayed as 0% may represent small nonzero decimals rounded to 0%. Percent-difference values are calculated from the unrounded values. Note that NA values result from no data falling into that Inflow bin.

| Exit Point | Flow Bin | NAA | ALT1 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| West of Chipps | lolo | 9% | 12 (37%) | 9 (6%) | 10 (15%) | 9 (5%) | 9 (5%) | 19 (123%) | 9 (5%) | 8 (-3%) |
| West of Chipps | lomed | 11% | 13 (20%) | 13 (13%) | 15 (29%) | 17 (53%) | 20 (76%) | 29 (161%) | 12 (3%) | 16 (47%) |
| West of Chipps | lohi | 12% | 16 (27%) | 13 (7%) | 13 (8%) | 13 (3%) | 14 (11%) | 31 (154%) | 10 (-22%) | 43 (250%) |
| West of Chipps | medlo | 13% | 6 (-55%) | 14 (6%) | 14 (8%) | 14 (5%) | 13 (-2%) | 35 (172%) | 13 (1%) | 10 (-19%) |
| West of Chipps | medmed | 23% | 10 (-55%) | 23 (2%) | 24 (5%) | 32 (38%) | 32 (39%) | 49 (113%) | 23 (1%) | 24 (9%) |
| West of Chipps | medhi | 49% | 29 (-41%) | 48 (-2%) | 48 (-3%) | 56 (15%) | 57 (15%) | 87 (78%) | 44 (-11%) | 46 (-5%) |
| West of Chipps | hilo | 33% | 7 (-79%) | 33 (0%) | 33 (0%) | 31 (-4%) | 31 (-5%) | 48 (46%) | 34 (5%) | 28 (-13%) |
| West of Chipps | himed | 50% | 18 (-64%) | 50 (1%) | 50 (1%) | 53 (7%) | 53 (6%) | 60 (21%) | 50 (0%) | 47 (-4%) |
| West of Chipps | hihi | 82% | 68 (-17%) | 81 (-1%) | 81 (-1%) | 83 (0%) | 82 (0%) | 86 (5%) | 81 (-2%) | 79 (-3%) |
| Entrained at Exports | lolo | 42% | 58 (37%) | 41 (-2%) | 39 (-6%) | 41 (-2%) | 41 (-2%) | 20 (-52%) | 42 (-1%) | 44 (4%) |
| Entrained at Exports | lomed | 43% | 45 (4%) | 35 (-18%) | 36 (-18%) | 29 (-33%) | 28 (-36%) | 24 (-44%) | 40 (-7%) | 29 (-31%) |
| Entrained at Exports | lohi | 48% | 57 (17%) | 44 (-10%) | 44 (-9%) | 45 (-7%) | 43 (-12%) | 9 (-81%) | 55 (13%) | 24 (-48%) |

| Exit Point | Flow Bin | NAA | ALT1 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Entrained at Exports | medlo | 61% | 80 (31%) | 58 (-5%) | 58 (-6%) | 59 (-4%) | 58 (-6%) | 24 (-61%) | 59 (-4%) | 62 (1%) |
| Entrained at Exports | medmed | 49% | 73 (49%) | 48 (-1%) | 47 (-4%) | 36 (-26%) | 36 (-25%) | 19 (-62%) | 50 (3%) | 44 (-8%) |
| Entrained at Exports | medhi | 33% | 57 (72%) | 35 (5%) | 35 (5%) | 26 (-22%) | 26 (-21%) | 2 (-95%) | 39 (17%) | 36 (10%) |
| Entrained at Exports | hilo | 52% | 87 (66%) | 53 (1%) | 53 (1%) | 53 (2%) | 53 (1%) | 36 (-32%) | 51 (-3%) | 57 (10%) |
| Entrained at Exports | himed | 40% | 77 (93%) | 39 (-2%) | 39 (-2%) | 35 (-11%) | 36 (-10%) | 27 (-33%) | 40 (0%) | 41 (4%) |
| Entrained at Exports | hihi | 15% | 30 (99%) | 16 (5%) | 16 (6%) | 14 (-4%) | 14 (-3%) | 11 (-25%) | 16 (11%) | 17 (16%) |
| Remaining in Delta | lolo | 49% | 30 (-38%) | 50 (1%) | 51 (3%) | 49 (1%) | 50 (1%) | 60 (22%) | 49 (0%) | 47 (-3%) |
| Remaining in Delta | lomed | 46% | 42 (-9%) | 52 (14%) | 50 (10%) | 54 (18%) | 53 (16%) | 46 (2%) | 48 (6%) | 53 (18%) |
| Remaining in Delta | lohi | 39% | 28 (-29%) | 43 (10%) | 43 (9%) | 42 (8%) | 44 (11%) | 60 (52%) | 35 (-10%) | 31 (-18%) |
| Remaining in Delta | medlo | 26% | 14 (-46%) | 28 (10%) | 28 (11%) | 27 (7%) | 30 (16%) | 41 (59%) | 28 (8%) | 27 (7%) |
| Remaining in Delta | medmed | 28% | 17 (-40%) | 28 (0%) | 29 (2%) | 32 (13%) | 32 (12%) | 33 (15%) | 27 (-6%) | 30 (7%) |
| Remaining in Delta | medhi | 18% | 14 (-22%) | 17 (-2%) | 17 (-2%) | 18 (0%) | 17 (-2%) | 11 (-37%) | 17 (-2%) | 16 (-6%) |
| Remaining in Delta | hilo | 15% | 6 (-60%) | 15 (-2%) | 15 (-2%) | 15 (2%) | 16 (8%) | 16 (10%) | 15 (-1%) | 14 (-5%) |
| Remaining in Delta | himed | 10% | 5 (-49%) | 11 (5%) | 11 (5%) | 11 (9%) | 11 (9%) | 13 (27%) | 10 (0%) | 10 (4%) |
| Remaining in Delta | hihi | 3% | 3 (-14%) | 3 (-4%) | 3 (-5%) | 3 (5%) | 3 (5%) | 3 (-17%) | 3 (-1%) | 3 (0%) |
| Crossed SJR to South Delta | lolo | 61% | 70 (15%) | 61 (-1%) | 59 (-3%) | 61 (-1%) | 61 (-1%) | 44 (-28%) | 61 (-1%) | 62 (3%) |
| Crossed SJR to South Delta | lomed | 64% | 63 (-1%) | 58 (-9%) | 57 (-10%) | 52 (-19%) | 50 (-21%) | 43 (-33%) | 62 (-3%) | 53 (-17%) |
| Crossed SJR to South Delta | lohi | 67% | 68 (2%) | 64 (-4%) | 64 (-4%) | 64 (-3%) | 63 (-5%) | 28 (-58%) | 70 (5%) | 39 (-41%) |
| Crossed SJR to South Delta | medlo | 73% | 87 (18%) | 71 (-3%) | 71 (-3%) | 72 (-2%) | 71 (-3%) | 41 (-43%) | 72 (-2%) | 73 (1%) |
| Crossed SJR to South Delta | medmed | 62% | 81 (30%) | 62 (-1%) | 61 (-3%) | 52 (-17%) | 52 (-17%) | 33 (-47%) | 63 (1%) | 59 (-5%) |

| Exit Point | Flow Bin | NAA | ALT1 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Crossed SJR to South Delta | medhi | 41% | 63 (53%) | 42 (2%) | 42 (3%) | 34 (-18%) | 34 (-18%) | 6 (-86%) | 46 (13%) | 44 (7%) |
| Crossed SJR to South Delta | hilo | 60% | 89 (49%) | 60 (1%) | 60 (0%) | 61 (2%) | 61 (1%) | 44 (-27%) | 59 (-2%) | 64 (7%) |
| Crossed SJR to South Delta | himed | 45% | 79 (76%) | 44 (-2%) | 44 (-2%) | 41 (-8%) | 42 (-8%) | 33 (-26%) | 45 (-1%) | 47 (4%) |
| Crossed SJR to South Delta | hihi | 16% | 31 (88%) | 17 (4%) | 17 (4%) | 16 (-3%) | 16 (-2%) | 12 (-25%) | 18 (9%) | 18 (14%) |

Table I.8-80. Mean December through March neutrally buoyant particle fate by Inflow bin for NAA, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4, and Action 5 – particle insertion location at Yolo Bypass for all particle system exit points. The parenthetical value represents the percent difference from the NAA. Values displayed as 0% may represent small nonzero decimals rounded to 0%. Percent-difference values are calculated from the unrounded values. Note that NA values result from no data falling into that Inflow bin.

| Exit Point | Flow Bin | NAA | ALT1 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| West of Chipps | lolo | 34% | 37 (9%) | 35 (2%) | 36 (4%) | 35 (3%) | 35 (3%) | 43 (27%) | 35 (2%) | 34 (1%) |
| West of Chipps | lomed | 38% | 40 (5%) | 37 (-1%) | 40 (5%) | 41 (7%) | 43 (13%) | 51 (35%) | 37 (-2%) | 40 (6%) |
| West of Chipps | lohi | 32% | 33 (2%) | 32 (0%) | 32 (1%) | 32 (-1%) | 33 (1%) | 35 (8%) | 27 (-15%) | 45 (43%) |
| West of Chipps | medlo | 51% | 43 (-15%) | 51 (-1%) | 51 (0%) | 51 (1%) | 50 (-1%) | 58 (13%) | 51 (1%) | 49 (-4%) |
| West of Chipps | medmed | 54% | 50 (-7%) | 55 (0%) | 55 (1%) | 56 (3%) | 56 (2%) | 59 (9%) | 56 (3%) | 54 (0%) |
| West of Chipps | medhi | 62% | 60 (-3%) | 62 (0%) | 62 (0%) | 63 (1%) | 63 (1%) | 65 (4%) | 62 (0%) | 62 (0%) |
| West of Chipps | hilo | 67% | 60 (-10%) | 67 (0%) | 67 (0%) | 67 (0%) | 67 (0%) | 68 (2%) | 67 (0%) | 66 (-1%) |
| West of Chipps | himed | 70% | 67 (-5%) | 70 (-1%) | 70 (-1%) | 70 (0%) | 70 (0%) | 70 (0%) | 70 (0%) | 69 (-1%) |
| West of Chipps | hihi | 70% | 70 (-1%) | 70 (0%) | 70 (0%) | 70 (0%) | 70 (0%) | 71 (0%) | 70 (0%) | 70 (0%) |

| Exit Point | Flow Bin | NAA | ALT1 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Entrained at Exports | lolo | 5% | 8 (47%) | 5 (-7%) | 5 (-11%) | 5 (-3%) | 5 (-5%) | 2 (-66%) | 5 (-7%) | 5 (-2%) |
| Entrained at Exports | lomed | 3% | 5 (42%) | 3 (-22%) | 3 (-21%) | 2 (-35%) | 2 (-38%) | 2 (-35%) | 4 (7%) | 2 (-28%) |
| Entrained at Exports | lohi | 5% | 6 (26%) | 4 (-7%) | 4 (-13%) | 4 (-9%) | 4 (-19%) | 1 (-83%) | 7 (37%) | 2 (-49%) |
| Entrained at Exports | medlo | 5% | 11 (131%) | 5 (-4%) | 5 (-3%) | 5 (-1%) | 5 (-1%) | 1 (-77%) | 4 (-20%) | 5 (7%) |
| Entrained at Exports | medmed | 2% | 6 (149%) | 2 (0%) | 2 (-2%) | 2 (-19%) | 2 (-19%) | 1 (-78%) | 2 (-16%) | 2 (-3%) |
| Entrained at Exports | medhi | 1% | 2 (153%) | 1 (4%) | 1 (4%) | 1 (-22%) | 1 (-22%) | 0 (-97%) | 1 (20%) | 0 (4%) |
| Entrained at Exports | hilo | 1% | 6 (620%) | 1 (14%) | 1 (12%) | 1 (13%) | 1 (16%) | 1 (-39%) | 1 (-7%) | 1 (32%) |
| Entrained at Exports | himed | 0% | 3 (659%) | 0 (-1%) | 0 (-2%) | 0 (-11%) | 0 (-8%) | 0 (-37%) | 0 (-4%) | 0 (12%) |
| Entrained at Exports | hihi | 0% | 0 (506%) | 0 (6%) | 0 (3%) | 0 (-1%) | 0 (-1%) | 0 (-21%) | 0 (32%) | 0 (44%) |
| Remaining in Delta | lolo | 61% | 55 (-9%) | 61 (-1%) | 60 (-2%) | 60 (-2%) | 60 (-1%) | 55 (-10%) | 61 (0%) | 60 (-1%) |
| Remaining in Delta | lomed | 59% | 55 (-5%) | 60 (2%) | 58 (-2%) | 57 (-2%) | 55 (-6%) | 46 (-21%) | 59 (1%) | 57 (-2%) |
| Remaining in Delta | lohi | 63% | 61 (-3%) | 64 (1%) | 64 (1%) | 64 (1%) | 64 (1%) | 65 (2%) | 66 (5%) | 51 (-18%) |
| Remaining in Delta | medlo | 44% | 45 (3%) | 44 (1%) | 44 (1%) | 44 (-1%) | 45 (2%) | 41 (-6%) | 45 (1%) | 45 (4%) |
| Remaining in Delta | medmed | 43% | 44 (1%) | 43 (-1%) | 43 (-1%) | 42 (-2%) | 42 (-2%) | 40 (-7%) | 42 (-2%) | 43 (0%) |
| Remaining in Delta | medhi | 37% | 38 (2%) | 37 (1%) | 37 (0%) | 36 (-1%) | 36 (-2%) | 35 (-4%) | 37 (0%) | 36 (0%) |
| Remaining in Delta | hilo | 32% | 33 (4%) | 32 (0%) | 32 (0%) | 32 (0%) | 32 (-1%) | 31 (-3%) | 32 (-1%) | 32 (0%) |
| Remaining in Delta | himed | 29% | 31 (4%) | 30 (2%) | 30 (2%) | 30 (1%) | 30 (1%) | 30 (1%) | 30 (1%) | 29 (2%) |
| Remaining in Delta | hihi | 30% | 30 (1%) | 30 (0%) | 30 (0%) | 30 (0%) | 29 (0%) | 29 (0%) | 30 (0%) | 29 (0%) |
| Crossed SJR to South Delta | lolo | 10% | 13 (28%) | 9 (-4%) | 9 (-8%) | 10 (-2%) | 10 (-3%) | 5 (-48%) | 9 (-5%) | 9 (-1%) |
| Crossed SJR to South Delta | lomed | 7% | 9 (24%) | 6 (-11%) | 6 (-14%) | 5 (-26%) | 5 (-31%) | 4 (-39%) | 7 (7%) | 5 (-19%) |
| Crossed SJR to South Delta | lohi | 11% | 12 (12%) | 10 (-2%) | 10 (-4%) | 10 (-3%) | 10 (-10%) | 4 (-64%) | 13 (23%) | 5 (-48%) |

| Exit Point | Flow Bin | NAA | ALT1 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Crossed SJR to South Delta | medlo | 7% | 15 (102%) | 7 (-3%) | 7 (-2%) | 7 (-2%) | 7 (0%) | 2 (-66%) | 6 (-14%) | 7 (7%) |
| Crossed SJR to South Delta | medmed | 4% | 9 (109%) | 4 (0%) | 4 (-2%) | 3 (-17%) | 3 (-17%) | 1 (-65%) | 4 (-14%) | 3 (-3%) |
| Crossed SJR to South Delta | medhi | 1% | 3 (112%) | 1 (2%) | 1 (3%) | 1 (-20%) | 1 (-21%) | 0 (-86%) | 2 (15%) | 1 (0%) |
| Crossed SJR to South Delta | hilo | 1% | 8 (468%) | 1 (13%) | 1 (13%) | 2 (18%) | 2 (16%) | 1 (-33%) | 1 (-4%) | 1 (29%) |
| Crossed SJR to South Delta | himed | 1% | 3 (488%) | 1 (2%) | 1 (3%) | 1 (-8%) | 1 (-7%) | 0 (-25%) | 1 (2%) | 0 (12%) |
| Crossed SJR to South Delta | hihi | 0% | 0 (281%) | 0 (5%) | 0 (6%) | 0 (-3%) | 0 (-5%) | 0 (-30%) | 0 (26%) | 0 (27%) |

Table I.8-81. Mean December through March neutrally buoyant particle fate by Inflow bin for NAA, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4, and Action 5 – particle insertion location at Western Delta for all particle system exit points. The parenthetical value represents the percent difference from the NAA. Values displayed as 0% may represent small nonzero decimals rounded to 0%. Percent-difference values are calculated from the unrounded values. Note that NA values result from no data falling into that Inflow bin.

| Exit Point | Flow Bin | NAA | ALT1 | Alt2wTUCPwoVA | Alt2woTUCPwoVA | Alt2woTUCPDeltaVA | Alt2woTUCPAllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| West of Chipps | lolo | 85% | 90 (6%) | 86 (0%) | 86 (1%) | 85 (0%) | 85 (0%) | 93 (9%) | 86 (1%) | 85 (0%) |
| West of Chipps | lomed | 91% | 93 (2%) | 92 (1%) | 92 (1%) | 93 (2%) | 94 (3%) | 96 (5%) | 91 (0%) | 93 (2%) |
| West of Chipps | lohi | 84% | 88 (4%) | 85 (1%) | 85 (1%) | 84 (0%) | 85 (1%) | 89 (6%) | 82 (-3%) | 91 (9%) |
| West of Chipps | medlo | 93% | 89 (-4%) | 93 (0%) | 93 (0%) | 93 (0%) | 93 (0%) | 98 (6%) | 94 (1%) | 91 (-1%) |
| West of Chipps | medmed | 96% | 94 (-3%) | 96 (0%) | 96 (0%) | 97 (1%) | 97 (0%) | 99 (2%) | 97 (1%) | 96 (0%) |
| West of Chipps | medhi | 99% | 99 (0%) | 99 (0%) | 99 (0%) | 99 (0%) | 99 (0%) | 99 (0%) | 99 (0%) | 99 (0%) |
| West of Chipps | hilo | 99% | 94 (-5%) | 99 (0%) | 99 (0%) | 99 (0%) | 99 (0%) | 100 (0%) | 99 (0%) | 99 (0%) |
| West of Chipps | himed | 100% | 98 (-2%) | 100 (0%) | 100 (0%) | 100 (0%) | 100 (0%) | 100 (0%) | 100 (0%) | 99 (0%) |
| West of Chipps | hihi | 100% | 100 (0%) | 100 (0%) | 100 (0%) | 100 (0%) | 100 (0%) | 100 (0%) | 100 (0%) | 99 (0%) |
| Entrained at Exports | lolo | 3% | 3 (1%) | 3 (-11%) | 3 (-15%) | 3 (-2%) | 3 (-5%) | 1 (-79%) | 3 (-20%) | 2 (-12%) |

| Exit Point | Flow Bin | NAA | ALT1 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Entrained at Exports | lomed | 2% | 2 (36%) | 1 (-25%) | 1 (-19%) | 1 (-36%) | 1 (-41%) | 1 (-23%) | 2 (19%) | 1 (-26%) |
| Entrained at Exports | lohi | 3% | 3 (1%) | 3 (-4%) | 3 (-3%) | 2 (-14%) | 2 (-12%) | 0 (-96%) | 4 (31%) | 1 (-54%) |
| Entrained at Exports | medlo | 3% | 6 (97%) | 3 (-2%) | 3 (-1%) | 3 (-1%) | 3 (-3%) | 0 (-86%) | 2 (-38%) | 3 (3%) |
| Entrained at Exports | medmed | 1% | 3 (147%) | 1 (2%) | 1 (0%) | 1 (-11%) | 1 (-9%) | 0 (-88%) | 1 (-44%) | 1 (-2%) |
| Entrained at Exports | medhi | 0% | 0 (277%) | 0 (11%) | 0 (-6%) | 0 (-30%) | 0 (-22%) | 0 (-99%) | 0 (23%) | 0 (13%) |
| Entrained at Exports | hilo | 0% | 4 (1994%) | 0 (48%) | 0 (47%) | 0 (55%) | 0 (45%) | 0 (-56%) | 0 (0%) | 0 (56%) |
| Entrained at Exports | himed | 0% | 1 (2676%) | 0 (-1%) | 0 (3%) | 0 (-2%) | 0 (-4%) | 0 (-44%) | 0 (-15%) | 0 (19%) |
| Entrained at Exports | hihi | 0% | 0 (6244%) | 0 (-14%) | 0 (0%) | 0 (98%) | 0 (98%) | 0 (-1%) | 0 (155%) | 0 (233%) |
| Remaining in Delta | lolo | 12% | 7 (-42%) | 12 (0%) | 11 (-4%) | 12 (1%) | 12 (2%) | 7 (-42%) | 11 (0%) | 11 (1%) |
| Remaining in Delta | lomed | 7% | 5 (-36%) | 7 (-2%) | 7 (-11%) | 6 (-14%) | 5 (-29%) | 3 (-57%) | 7 (-4%) | 5 (-23%) |
| Remaining in Delta | lohi | 13% | 9 (-29%) | 13 (-3%) | 12 (-5%) | 13 (3%) | 12 (-5%) | 11 (-16%) | 15 (13%) | 6 (-47%) |
| Remaining in Delta | medlo | 4% | 4 (11%) | 4 (2%) | 4 (3%) | 4 (-3%) | 4 (3%) | 2 (-58%) | 4 (-2%) | 4 (15%) |
| Remaining in Delta | medmed | 2% | 3 (31%) | 2 (-3%) | 2 (-5%) | 2 (-15%) | 2 (-15%) | 1 (-52%) | 2 (-10%) | 2 (7%) |

| Exit Point | Flow Bin | NAA | ALT1 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Remaining in Delta | medhi | 1% | 1 (25%) | 1 (0%) | 1 (-1%) | 1 (-6%) | 1 (-6%) | 1 (-29%) | 1 (3%) | 0 (2%) |
| Remaining in Delta | hilo | 0% | 1 (200%) | 0 (19%) | 0 (16%) | 1 (30%) | 1 (30%) | 0 (-18%) | 0 (5%) | 0 (23%) |
| Remaining in Delta | himed | 0% | 1 (290%) | 0 (4%) | 0 (5%) | 0 (-3%) | 0 (-6%) | 0 (7%) | 0 (1%) | 0 (2%) |
| Remaining in Delta | hihi | 0% | 0 (53%) | 0 (-6%) | 0 (-4%) | 0 (-2%) | 0 (-7%) | 0 (-23%) | 0 (3%) | 0 (-1%) |
| Crossed SJR to South Delta | lolo | 5% | 5 (-1%) | 5 (-7%) | 5 (-11%) | 5 (0%) | 5 (-2%) | 2 (-69%) | 4 (-16%) | 4 (-8%) |
| Crossed SJR to South Delta | lomed | 3% | 3 (26%) | 2 (-21%) | 2 (-20%) | 2 (-36%) | 1 (-41%) | 2 (-30%) | 3 (15%) | 1 (-25%) |
| Crossed SJR to South Delta | lohi | 5% | 5 (-11%) | 5 (-7%) | 5 (-6%) | 5 (-4%) | 5 (-11%) | 1 (-90%) | 6 (19%) | 2 (-50%) |
| Crossed SJR to South Delta | medlo | 4% | 8 (90%) | 4 (-2%) | 4 (0%) | 4 (-1%) | 4 (-1%) | 1 (-83%) | 3 (-33%) | 4 (5%) |
| Crossed SJR to South Delta | medmed | 2% | 4 (138%) | 2 (0%) | 2 (-1%) | 2 (-12%) | 2 (-11%) | 0 (-84%) | 1 (-39%) | 1 (-1%) |
| Crossed SJR to South Delta | medhi | 0% | 0 (238%) | 0 (3%) | 0 (-7%) | 0 (-36%) | 0 (-24%) | 0 (-98%) | 0 (14%) | 0 (5%) |

| Exit Point | Flow Bin | NAA | ALT1 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Crossed SJR to South Delta | hilo | 0% | 5 (1685%) | 0 (48%) | 0 (45%) | 0 (58%) | 0 (46%) | 0 (-55%) | 0 (0%) | 0 (57%) |
| Crossed SJR to South Delta | himed | 0% | 2 (2459%) | 0 (-7%) | 0 (-4%) | 0 (-6%) | 0 (-8%) | 0 (-43%) | 0 (-16%) | 0 (15%) |
| Crossed SJR to South Delta | hihi | 0% | 0 (7123%) | 0 (0%) | 0 (21%) | 0 (141%) | 0 (141%) | 0 (-1%) | 0 (197%) | 0 (311%) |

Table I.8-82. Mean December through March neutrally buoyant particle fate by Inflow bin for NAA, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4, and Action 5 – particle insertion location at Suisun Bay for all particle system exit points. The parenthetical value represents the percent difference from the NAA. Values displayed as 0% may represent small nonzero decimals rounded to 0%. Percent-difference values are calculated from the unrounded values. Note that NA values result from no data falling into that Inflow bin.

| Exit Point | Flow Bin | NAA | ALT1 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| West of Chipps | lolo | 87% | 57 (-34%) | 87 (0%) | 88 (1%) | 88 (2%) | 90 (3%) | 79 (-9%) | 88 (2%) | 90 (4%) |
| West of Chipps | lomed | 76% | 59 (-22%) | 76 (0%) | 77 (1%) | 79 (4%) | 77 (1%) | 78 (2%) | 74 (-3%) | 74 (-3%) |
| West of Chipps | lohi | 79% | 55 (-31%) | 79 (-1%) | 79 (0%) | 79 (0%) | 79 (0%) | 97 (23%) | 77 (-3%) | 73 (-7%) |
| West of Chipps | medlo | 86% | 65 (-25%) | 87 (1%) | 86 (1%) | 87 (2%) | 86 (1%) | 83 (-3%) | 85 (-1%) | 86 (1%) |
| West of Chipps | medmed | 83% | 71 (-14%) | 82 (-1%) | 82 (-1%) | 82 (-1%) | 83 (0%) | 82 (-1%) | 83 (0%) | 83 (0%) |
| West of Chipps | medhi | 82% | 78 (-5%) | 82 (0%) | 81 (-1%) | 83 (1%) | 83 (1%) | 87 (6%) | 81 (-1%) | 85 (4%) |
| West of Chipps | hilo | 95% | 90 (-5%) | 94 (-1%) | 94 (-1%) | 94 (0%) | 94 (0%) | 94 (-1%) | 95 (0%) | 94 (0%) |
| West of Chipps | himed | 97% | 94 (-3%) | 97 (0%) | 97 (0%) | 97 (0%) | 97 (0%) | 96 (-1%) | 97 (0%) | 96 (0%) |

| Exit Point | Flow Bin | NAA | ALT1 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| West of Chipps | hihi | 98% | 98 (0%) | 98 (0%) | 98 (0%) | 98 (0%) | 98 (0%) | 98 (0%) | 98 (0%) | 98 (0%) |
| Entrained at Exports | lolo | 0% | 0 (41%) | 0 (-3%) | 0 (-11%) | 0 (-18%) | 0 (-12%) | 0 (-82%) | 0 (-23%) | 0 (-12%) |
| Entrained at Exports | lomed | 0% | 0 (118%) | 0 (33%) | 0 (-24%) | 0 (-20%) | 0 (-19%) | 0 (-73%) | 0 (40%) | 0 (11%) |
| Entrained at Exports | lohi | 0% | 0 (50%) | 0 (50%) | 0 (0%) | 0 (0%) | 0 (-50%) | 0 (-50%) | 0 (50%) | 0 (50%) |
| Entrained at Exports | medlo | 0% | 0 (135%) | 0 (-8%) | 0 (-11%) | 0 (6%) | 0 (-11%) | 0 (-98%) | 0 (-73%) | 0 (-24%) |
| Entrained at Exports | medmed | 0% | 0 (124%) | 0 (-3%) | 0 (6%) | 0 (12%) | 0 (53%) | 0 (-100%) | 0 (-74%) | 0 (17%) |
| Entrained at Exports | medhi | 0% | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (#N/A) |
| Entrained at Exports | hilo | 0% | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (#N/A) |
| Entrained at Exports | himed | 0% | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (#N/A) |
| Entrained at Exports | hihi | 0% | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (#N/A) |
| Remaining in Delta | lolo | 13% | 43 (232%) | 13 (1%) | 12 (-7%) | 12 (-10%) | 10 (-19%) | 20 (59%) | 12 (-11%) | 9 (-24%) |
| Remaining in Delta | lomed | 24% | 41 (72%) | 24 (1%) | 23 (-4%) | 21 (-13%) | 23 (-4%) | 22 (-7%) | 26 (10%) | 25 (9%) |
| Remaining in Delta | lohi | 21% | 45 (119%) | 21 (3%) | 21 (-1%) | 21 (2%) | 21 (1%) | 3 (-86%) | 23 (10%) | 26 (26%) |
| Remaining in Delta | medlo | 14% | 35 (145%) | 13 (-7%) | 14 (-5%) | 13 (-9%) | 14 (-3%) | 17 (20%) | 15 (4%) | 13 (-7%) |
| Remaining in Delta | medmed | 17% | 29 (69%) | 18 (6%) | 18 (7%) | 18 (5%) | 17 (2%) | 18 (6%) | 17 (2%) | 16 (-1%) |
| Remaining in Delta | medhi | 18% | 22 (21%) | 18 (2%) | 19 (3%) | 17 (-6%) | 17 (-5%) | 13 (-26%) | 19 (4%) | 14 (-20%) |
| Remaining in Delta | hilo | 5% | 10 (100%) | 6 (12%) | 6 (12%) | 6 (9%) | 6 (8%) | 6 (9%) | 5 (3%) | 5 (4%) |
| Remaining in Delta | himed | 3% | 6 (99%) | 3 (7%) | 3 (11%) | 3 (-4%) | 3 (-7%) | 4 (23%) | 3 (-5%) | 3 (-2%) |
| Remaining in Delta | hihi | 2% | 2 (25%) | 2 (0%) | 2 (2%) | 2 (4%) | 2 (1%) | 2 (-12%) | 2 (6%) | 1 (2%) |
| Crossed SJR to South Delta | lolo | 0% | 0 (14%) | 0 (-1%) | 0 (-8%) | 0 (-5%) | 0 (0%) | 0 (-74%) | 0 (-17%) | 0 (-6%) |
| Crossed SJR to South Delta | lomed | 0% | 0 (70%) | 0 (-3%) | 0 (-7%) | 0 (-25%) | 0 (-17%) | 0 (-63%) | 0 (24%) | 0 (-8%) |

| Exit Point | Flow Bin | NAA | ALT1 | Alt2wTUCPwoVA | Alt2woTUCPwoVA | Alt2woTUCPDeltaVA | Alt2woTUCPAllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Crossed SJR to South Delta | lohi | 0% | 0 (0%) | 0 (33%) | 0 (0%) | 0 (11%) | 0 (-22%) | 0 (-78%) | 0 (22%) | 0 (-28%) |
| Crossed SJR to South Delta | medlo | 0% | 0 (128%) | 0 (2%) | 0 (6%) | 0 (-2%) | 0 (2%) | 0 (-98%) | 0 (-62%) | 0 (-19%) |
| Crossed SJR to South Delta | medmed | 0% | 0 (112%) | 0 (-15%) | 0 (0%) | 0 (23%) | 0 (40%) | 0 (-97%) | 0 (-72%) | 0 (8%) |
| Crossed SJR to South Delta | medhi | 0% | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (#N/A) |
| Crossed SJR to South Delta | hilo | 0% | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (#N/A) |
| Crossed SJR to South Delta | himed | 0% | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (#N/A) |
| Crossed SJR to South Delta | hihi | 0% | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (#N/A) |

### *I.8.4.3.10 Neutrally Buoyant, OMR Bins, December through March [EIS, Table I.8-83 through Table I.8-91]*

Table I.8-83. Mean December through March neutrally buoyant particle fate by OMR bin for NAA, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4, and Action 5 – particle insertion location at San Joaquin River for all particle system exit points. The parenthetical value represents the percent difference from the NAA. Values displayed as 0% may represent small nonzero decimals rounded to 0%. Percent-difference values are calculated from the unrounded values. Note that NA values result from no data falling into that OMR bin.

| Exit Point | OMR Bin | NAA | ALT1 | Alt2wTUCPwoVA | Alt2woTUCPwoVA | Alt2woTUCPDeltaVA | Alt2woTUCPAllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| West of Chipps | -2000 | 8% | 13 (53%) | 4 (-49%) | 4 (-56%) | 12 (39%) | 13 (61%) | 7 (-20%) | 3 (-64%) | 4 (-49%) |
| West of Chipps | -3500 | 12% | 8 (-29%) | 7 (-36%) | 8 (-35%) | 7 (-43%) | 7 (-40%) | 5 (-58%) | 6 (-46%) | 5 (-52%) |
| West of Chipps | -5000 | 6% | 7 (9%) | 11 (77%) | 11 (85%) | 10 (72%) | 10 (72%) | 11 (77%) | 7 (21%) | 8 (45%) |
| West of Chipps | -5500 | 0% | 3 (20089%) | 0 (208%) | 0 (206%) | 0 (34%) | 0 (250%) | 0 (-100%) | 3 (24863%) | 0 (137%) |
| Entrained at Exports | -2000 | 64% | 63 (-1%) | 67 (4%) | 67 (5%) | 59 (-7%) | 60 (-5%) | 63 (-1%) | 66 (3%) | 64 (1%) |
| Entrained at Exports | -3500 | 76% | 79 (4%) | 81 (6%) | 81 (6%) | 80 (6%) | 80 (5%) | 80 (5%) | 81 (6%) | 82 (8%) |
| Entrained at Exports | -5000 | 87% | 86 (-1%) | 83 (-4%) | 83 (-5%) | 83 (-4%) | 83 (-4%) | 83 (-4%) | 86 (-1%) | 85 (-2%) |
| Entrained at Exports | -5500 | 87% | 93 (7%) | 86 (-1%) | 86 (-1%) | 87 (0%) | 86 (0%) | 88 (1%) | 86 (-1%) | 87 (0%) |
| Remaining in Delta | -2000 | 28% | 24 (-14%) | 29 (5%) | 29 (6%) | 29 (4%) | 26 (-6%) | 30 (8%) | 31 (12%) | 31 (13%) |
| Remaining in Delta | -3500 | 12% | 13 (3%) | 12 (-3%) | 12 (-5%) | 13 (6%) | 13 (4%) | 16 (25%) | 13 (6%) | 12 (-1%) |
| Remaining in Delta | -5000 | 7% | 7 (-2%) | 6 (-10%) | 6 (-12%) | 7 (-9%) | 6 (-11%) | 6 (-13%) | 7 (-4%) | 6 (-13%) |
| Remaining in Delta | -5500 | 13% | 5 (-63%) | 14 (7%) | 14 (5%) | 13 (1%) | 13 (2%) | 12 (-8%) | 11 (-20%) | 12 (-2%) |
| Crossed SJR to South Delta | -2000 | 43% | 42 (-3%) | 46 (7%) | 46 (7%) | 42 (-2%) | 42 (-2%) | 45 (6%) | 46 (7%) | 45 (7%) |
| Crossed SJR to South Delta | -3500 | 50% | 50 (1%) | 53 (7%) | 53 (7%) | 53 (5%) | 52 (5%) | 52 (4%) | 54 (7%) | 53 (7%) |
| Crossed SJR to South Delta | -5000 | 54% | 54 (0%) | 51 (-6%) | 51 (-6%) | 51 (-6%) | 51 (-6%) | 53 (-2%) | 55 (0%) | 54 (0%) |

| Exit Point | OMR Bin | NAA | ALT1 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Crossed SJR to South Delta | -5500 | 50% | 57 (14%) | 49 (-1%) | 49 (0%) | 50 (0%) | 50 (1%) | 50 (2%) | 52 (4%) | 50 (3%) |

Table I.8-84. Mean December through March neutrally buoyant particle fate by OMR bin for NAA, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4, and Action 5 – particle insertion location at Old and Middle River for all particle system exit points. The parenthetical value represents the percent difference from the NAA. Values displayed as 0% may represent small nonzero decimals rounded to 0%. Percent-difference values are calculated from the unrounded values. Note that NA values result from no data falling into that OMR bin.

| Exit Point | OMR Bin | NAA | ALT1 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| West of Chipps | -2000 | 10% | 13 (33%) | 10 (-3%) | 10 (-2%) | 14 (42%) | 14 (41%) | 13 (33%) | 8 (-19%) | 10 (9%) |
| West of Chipps | -3500 | 11% | 8 (-24%) | 10 (-9%) | 10 (-9%) | 9 (-13%) | 9 (-13%) | 9 (-20%) | 9 (-16%) | 8 (-24%) |
| West of Chipps | -5000 | 7% | 6 (-12%) | 8 (17%) | 8 (21%) | 8 (16%) | 8 (15%) | 10 (40%) | 8 (13%) | 8 (18%) |
| West of Chipps | -5500 | 1% | 4 (283%) | 1 (13%) | 1 (5%) | 1 (-2%) | 1 (8%) | 2 (115%) | 3 (187%) | 1 (20%) |
| Entrained at Exports | -2000 | 80% | 79 (-2%) | 81 (1%) | 80 (0%) | 78 (-3%) | 79 (-2%) | 80 (-1%) | 81 (1%) | 80 (0%) |
| Entrained at Exports | -3500 | 86% | 88 (2%) | 87 (1%) | 87 (1%) | 87 (1%) | 87 (1%) | 87 (1%) | 88 (2%) | 88 (2%) |
| Entrained at Exports | -5000 | 91% | 91 (1%) | 90 (-1%) | 90 (-1%) | 90 (-1%) | 90 (-1%) | 88 (-3%) | 90 (-1%) | 89 (-1%) |
| Entrained at Exports | -5500 | 97% | 95 (-2%) | 97 (0%) | 97 (0%) | 97 (0%) | 97 (0%) | 96 (-1%) | 95 (-2%) | 96 (0%) |

| Exit Point | OMR Bin | NAA | ALT1 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Remaining in Delta | -2000 | 10% | 8 (-20%) | 10 (-2%) | 10 (0%) | 8 (-18%) | 7 (-26%) | 7 (-26%) | 11 (15%) | 9 (-8%) |
| Remaining in Delta | -3500 | 3% | 4 (31%) | 3 (3%) | 3 (2%) | 3 (14%) | 3 (13%) | 4 (29%) | 3 (9%) | 3 (21%) |
| Remaining in Delta | -5000 | 3% | 3 (4%) | 2 (-18%) | 2 (-20%) | 2 (-17%) | 2 (-18%) | 2 (-18%) | 2 (-9%) | 2 (-13%) |
| Remaining in Delta | -5500 | 2% | 1 (-39%) | 2 (-3%) | 2 (-5%) | 2 (2%) | 2 (0%) | 2 (10%) | 2 (10%) | 2 (9%) |
| Crossed SJR to South Delta | -2000 | -15% | -16 (9%) | -14 (-3%) | -14 (-3%) | -18 (19%) | -17 (16%) | -16 (5%) | -14 (-6%) | -15 (1%) |
| Crossed SJR to South Delta | -3500 | -12% | -10 (-18%) | -11 (-9%) | -11 (-8%) | -11 (-12%) | -11 (-12%) | -10 (-16%) | -10 (-13%) | -10 (-19%) |
| Crossed SJR to South Delta | -5000 | -8% | -7 (-7%) | -9 (14%) | -9 (17%) | -8 (12%) | -8 (12%) | -10 (32%) | -8 (12%) | -9 (15%) |
| Crossed SJR to South Delta | -5500 | -2% | -4 (144%) | -2 (7%) | -2 (2%) | -2 (2%) | -2 (4%) | -3 (77%) | -4 (122%) | -2 (19%) |

Table I.8-85. Mean December through March neutrally buoyant particle fate by OMR bin for NAA, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4, and Action 5 – particle insertion location at Southern Delta for all particle system exit points. The parenthetical value represents the percent difference from the NAA. Values displayed as 0% may represent small nonzero decimals rounded to 0%. Percent-difference values are calculated from the unrounded values. Note that NA values result from no data falling into that OMR bin.

| Exit Point | OMR Bin | NAA | ALT1 | Alt2wTUCPwoVA | Alt2woTUCPwoVA | Alt2woTUCPDeltaVA | Alt2woTUCPAllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| West of Chipps | -2000 | 0% | 0 (-1949945%) | 0 (-44%) | 0 (-168561%) | 0 (-119%) | 0 (-111%) | 0 (-78%) | 0 (-63%) | 0 (-146%) |
| West of Chipps | -3500 | 0% | 0 (-2%) | 0 (-64%) | 0 (-107%) | 0 (-71%) | 0 (-71706%) | 0 (34%) | 0 (-70%) | 0 (-142%) |
| West of Chipps | -5000 | 0% | 0 (13%) | 0 (-272%) | 0 (-26%) | 0 (31%) | 0 (44%) | 0 (-315%) | 0 (163%) | 0 (123%) |
| West of Chipps | -5500 | 0% | 0 (-90%) | 0 (-161%) | 0 (-16%) | 0 (-229%) | 0 (-64%) | 0 (-125%) | 0 (-139%) | -1 (-336%) |
| Entrained at Exports | -2000 | 100% | 100 (0%) | 100 (0%) | 100 (0%) | 100 (0%) | 100 (0%) | 100 (0%) | 100 (0%) | 99 (0%) |
| Entrained at Exports | -3500 | 100% | 100 (0%) | 100 (0%) | 100 (0%) | 100 (0%) | 100 (0%) | 100 (0%) | 100 (0%) | 99 (0%) |
| Entrained at Exports | -5000 | 100% | 100 (0%) | 100 (0%) | 100 (0%) | 100 (0%) | 100 (0%) | 100 (0%) | 100 (0%) | 99 (0%) |
| Entrained at Exports | -5500 | 100% | 100 (0%) | 100 (0%) | 100 (0%) | 100 (0%) | 100 (0%) | 100 (0%) | 100 (0%) | 100 (0%) |
| Remaining in Delta | -2000 | 0% | 0 (329%) | 0 (-28%) | 0 (-15%) | 0 (-31%) | 0 (-35%) | 0 (-21%) | 0 (9%) | 0 (-3%) |
| Remaining in Delta | -3500 | 0% | 0 (-43%) | 0 (-72%) | 0 (-66%) | 0 (-1%) | 0 (-14%) | 0 (-100%) | 0 (-69%) | 0 (-60%) |

| Exit Point | OMR Bin | NAA | ALT1 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Remaining in Delta | -5000 | 0% | 0 (232%) | 0 (-100%) | 0 (25%) | 0 (-100%) | 0 (-100%) | 0 (121%) | 0 (130%) | 0 (57%) |
| Remaining in Delta | -5500 | 0% | 0 (825642%) | 0 (6%) | 0 (-51%) | 0 (1%) | 0 (-5%) | 0 (8%) | 0 (-18%) | -1 (74%) |
| Crossed SJR to South Delta | -2000 | 0% | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (#N/A) |
| Crossed SJR to South Delta | -3500 | 0% | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (#N/A) |
| Crossed SJR to South Delta | -5000 | 0% | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (#N/A) |
| Crossed SJR to South Delta | -5500 | 0% | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (NA) | 0 (#N/A) |

Table I.8-86. Mean December through March neutrally buoyant particle fate by OMR bin for NAA, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4, and Action 5 – particle insertion location at Central Delta for all particle system exit points. The parenthetical value represents the percent difference from the NAA. Values displayed as 0% may represent small nonzero decimals rounded to 0%. Percent-difference values are calculated from the unrounded values. Note that NA values result from no data falling into that OMR bin.

| Exit Point | OMR Bin | NAA | ALT1 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| West of Chipps | -2000 | 42% | 53 (25%) | 39 (-8%) | 40 (-6%) | 58 (38%) | 60 (41%) | 59 (40%) | 34 (-19%) | 45 (7%) |

| Exit Point | OMR Bin | NAA | ALT1 | Alt2wTUCPwoVA | Alt2woTUCPwoVA | Alt2woTUCPDeltaVA | Alt2woTUCPAllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| West of Chipps | -3500 | 60% | 46 (-24%) | 58 (-4%) | 58 (-3%) | 55 (-9%) | 55 (-8%) | 50 (-17%) | 53 (-11%) | 50 (-16%) |
| West of Chipps | -5000 | 50% | 43 (-15%) | 55 (11%) | 56 (13%) | 55 (11%) | 55 (11%) | 66 (32%) | 54 (7%) | 57 (15%) |
| West of Chipps | -5500 | 10% | 37 (263%) | 11 (7%) | 11 (4%) | 10 (-1%) | 11 (5%) | 18 (75%) | 24 (134%) | 11 (15%) |
| Entrained at Exports | -2000 | 22% | 20 (-6%) | 25 (13%) | 24 (11%) | 15 (-31%) | 15 (-30%) | 17 (-24%) | 23 (8%) | 20 (-4%) |
| Entrained at Exports | -3500 | 26% | 35 (36%) | 28 (9%) | 28 (8%) | 30 (16%) | 30 (16%) | 33 (27%) | 31 (17%) | 33 (28%) |
| Entrained at Exports | -5000 | 41% | 44 (8%) | 37 (-10%) | 37 (-11%) | 37 (-9%) | 37 (-9%) | 28 (-31%) | 37 (-9%) | 35 (-14%) |
| Entrained at Exports | -5500 | 79% | 58 (-27%) | 79 (-1%) | 79 (0%) | 79 (0%) | 79 (-1%) | 71 (-11%) | 64 (-19%) | 76 (-4%) |
| Remaining in Delta | -2000 | 36% | 27 (-26%) | 36 (1%) | 36 (0%) | 27 (-26%) | 25 (-30%) | 24 (-33%) | 42 (18%) | 33 (-6%) |
| Remaining in Delta | -3500 | 14% | 19 (37%) | 14 (0%) | 13 (-2%) | 14 (7%) | 14 (5%) | 17 (25%) | 16 (18%) | 15 (18%) |
| Remaining in Delta | -5000 | 9% | 13 (43%) | 7 (-18%) | 7 (-22%) | 7 (-19%) | 7 (-20%) | 6 (-36%) | 9 (-1%) | 7 (-17%) |
| Remaining in Delta | -5500 | 10% | 5 (-49%) | 10 (-2%) | 10 (-3%) | 10 (1%) | 11 (2%) | 12 (12%) | 12 (12%) | 11 (14%) |
| Crossed SJR to South Delta | -2000 | 35% | 32 (-11%) | 39 (9%) | 38 (8%) | 26 (-28%) | 25 (-28%) | 28 (-21%) | 39 (10%) | 34 (-2%) |

| Exit Point | OMR Bin | NAA | ALT1 | Alt2wTUCPwoVA | Alt2woTUCPwoVA | Alt2woTUCPDeltaVA | Alt2woTUCPAllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Crossed SJR to South Delta | -3500 | 32% | 44 (36%) | 34 (8%) | 34 (6%) | 37 (15%) | 37 (14%) | 41 (28%) | 38 (17%) | 40 (25%) |
| Crossed SJR to South Delta | -5000 | 45% | 50 (11%) | 41 (-10%) | 40 (-12%) | 41 (-10%) | 41 (-10%) | 32 (-30%) | 41 (-9%) | 38 (-14%) |
| Crossed SJR to South Delta | -5500 | 84% | 60 (-28%) | 84 (-1%) | 84 (0%) | 84 (0%) | 84 (-1%) | 76 (-9%) | 70 (-17%) | 81 (-3%) |

Table I.8-87. Mean December through March neutrally buoyant particle fate by OMR bin for NAA, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4, and Action 5 – particle insertion location at Sacramento River for all particle system exit points. The parenthetical value represents the percent difference from the NAA. Values displayed as 0% may represent small nonzero decimals rounded to 0%. Percent-difference values are calculated from the unrounded values. Note that NA values result from no data falling into that OMR bin.

| Exit Point | OMR Bin | NAA | ALT1 | Alt2wTUCPwoVA | Alt2woTUCPwoVA | Alt2woTUCPDeltaVA | Alt2woTUCPAllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| West of Chipps | -2000 | 66% | 74 (12%) | 66 (-1%) | 67 (1%) | 79 (20%) | 81 (22%) | 86 (30%) | 60 (-10%) | 71 (9%) |
| West of Chipps | -3500 | 87% | 75 (-14%) | 88 (1%) | 88 (1%) | 86 (-1%) | 86 (-2%) | 83 (-5%) | 86 (-2%) | 82 (-5%) |
| West of Chipps | -5000 | 85% | 77 (-9%) | 86 (2%) | 87 (2%) | 87 (2%) | 87 (3%) | 94 (11%) | 86 (2%) | 88 (5%) |
| West of Chipps | -5500 | 48% | 80 (65%) | 50 (4%) | 49 (2%) | 48 (0%) | 49 (2%) | 62 (29%) | 63 (30%) | 50 (5%) |
| Entrained at Exports | -2000 | 5% | 5 (14%) | 6 (16%) | 5 (9%) | 3 (-42%) | 3 (-43%) | 2 (-49%) | 5 (11%) | 4 (-8%) |

| Exit Point | OMR Bin | NAA | ALT1 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Entrained at Exports | -3500 | 4% | 10 (142%) | 4 (1%) | 4 (-1%) | 5 (18%) | 5 (18%) | 6 (46%) | 5 (18%) | 5 (46%) |
| Entrained at Exports | -5000 | 8% | 12 (51%) | 7 (-9%) | 7 (-11%) | 7 (-9%) | 7 (-11%) | 3 (-56%) | 7 (-12%) | 5 (-25%) |
| Entrained at Exports | -5500 | 31% | 15 (-54%) | 30 (-3%) | 31 (-1%) | 31 (0%) | 30 (-3%) | 22 (-29%) | 20 (-37%) | 28 (-10%) |
| Remaining in Delta | -2000 | 29% | 20 (-30%) | 29 (-1%) | 28 (-4%) | 18 (-39%) | 16 (-43%) | 12 (-59%) | 35 (20%) | 23 (-18%) |
| Remaining in Delta | -3500 | 9% | 15 (74%) | 8 (-12%) | 8 (-13%) | 9 (5%) | 9 (8%) | 12 (31%) | 10 (11%) | 11 (32%) |
| Remaining in Delta | -5000 | 8% | 11 (49%) | 7 (-9%) | 7 (-15%) | 6 (-15%) | 6 (-18%) | 3 (-63%) | 7 (-6%) | 5 (-29%) |
| Remaining in Delta | -5500 | 20% | 6 (-73%) | 19 (-5%) | 20 (-3%) | 20 (0%) | 20 (0%) | 15 (-24%) | 17 (-15%) | 20 (3%) |
| Crossed SJR to South Delta | -2000 | 11% | 11 (5%) | 12 (10%) | 11 (4%) | 6 (-41%) | 6 (-44%) | 5 (-49%) | 12 (11%) | 9 (-11%) |
| Crossed SJR to South Delta | -3500 | 6% | 14 (137%) | 6 (-2%) | 6 (-5%) | 7 (15%) | 7 (16%) | 9 (49%) | 7 (19%) | 8 (42%) |
| Crossed SJR to South Delta | -5000 | 10% | 15 (56%) | 9 (-9%) | 8 (-11%) | 9 (-10%) | 8 (-11%) | 4 (-56%) | 8 (-11%) | 7 (-26%) |
| Crossed SJR to South Delta | -5500 | 37% | 16 (-56%) | 36 (-3%) | 37 (-1%) | 37 (0%) | 36 (-3%) | 27 (-26%) | 24 (-35%) | 33 (-9%) |

Table I.8-88. Mean December through March neutrally buoyant particle fate by OMR bin for NAA, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4, and Action 5 – particle insertion location at Mokelumne River for all particle system exit points. The parenthetical value represents the percent difference from the NAA. Values displayed as 0% may represent small nonzero decimals rounded to 0%. Percent-difference values are calculated from the unrounded values. Note that NA values result from no data falling into that OMR bin.

| Exit Point | OMR Bin | NAA | ALT1 | Alt2wTUCPwoVA | Alt2woTUCPwoVA | Alt2woTUCPDeltaVA | Alt2woTUCPAllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| West of Chipps | -2000 | 25% | 35 (42%) | 19 (-23%) | 19 (-22%) | 40 (62%) | 42 (69%) | 38 (52%) | 16 (-36%) | 24 (-2%) |
| West of Chipps | -3500 | 44% | 29 (-34%) | 39 (-11%) | 39 (-10%) | 37 (-16%) | 37 (-15%) | 31 (-29%) | 34 (-22%) | 32 (-25%) |
| West of Chipps | -5000 | 33% | 26 (-20%) | 41 (24%) | 42 (27%) | 41 (23%) | 41 (23%) | 50 (50%) | 37 (12%) | 40 (24%) |
| West of Chipps | -5500 | 2% | 20 (982%) | 2 (17%) | 2 (10%) | 2 (1%) | 2 (12%) | 5 (157%) | 13 (572%) | 2 (28%) |
| Entrained at Exports | -2000 | 21% | 24 (19%) | 23 (11%) | 23 (14%) | 15 (-27%) | 16 (-24%) | 17 (-16%) | 22 (8%) | 20 (-1%) |
| Entrained at Exports | -3500 | 32% | 43 (36%) | 36 (14%) | 36 (13%) | 37 (16%) | 36 (15%) | 38 (20%) | 37 (17%) | 39 (26%) |
| Entrained at Exports | -5000 | 50% | 54 (7%) | 45 (-10%) | 45 (-11%) | 46 (-10%) | 46 (-9%) | 39 (-24%) | 47 (-7%) | 44 (-11%) |
| Entrained at Exports | -5500 | 75% | 72 (-4%) | 75 (0%) | 75 (0%) | 76 (0%) | 75 (-1%) | 70 (-7%) | 66 (-13%) | 74 (-2%) |
| Remaining in Delta | -2000 | 54% | 40 (-26%) | 58 (6%) | 57 (5%) | 45 (-18%) | 42 (-22%) | 45 (-18%) | 62 (13%) | 55 (1%) |
| Remaining in Delta | -3500 | 25% | 28 (13%) | 25 (2%) | 25 (0%) | 27 (8%) | 26 (7%) | 31 (26%) | 29 (17%) | 27 (11%) |
| Remaining in Delta | -5000 | 17% | 20 (20%) | 14 (-18%) | 13 (-20%) | 14 (-17%) | 14 (-18%) | 12 (-29%) | 16 (-1%) | 14 (-14%) |
| Remaining in Delta | -5500 | 23% | 7 (-68%) | 23 (-1%) | 23 (-2%) | 23 (-1%) | 23 (1%) | 25 (11%) | 22 (-5%) | 23 (3%) |
| Crossed SJR to South Delta | -2000 | 42% | 41 (-1%) | 45 (8%) | 47 (12%) | 34 (-20%) | 34 (-19%) | 37 (-11%) | 46 (10%) | 42 (2%) |
| Crossed SJR to South Delta | -3500 | 43% | 56 (29%) | 48 (10%) | 47 (9%) | 49 (14%) | 49 (13%) | 52 (21%) | 51 (17%) | 52 (21%) |
| Crossed SJR to South Delta | -5000 | 58% | 63 (8%) | 52 (-11%) | 51 (-12%) | 52 (-11%) | 52 (-10%) | 45 (-23%) | 54 (-7%) | 51 (-11%) |

| Exit Point | OMR Bin | NAA | ALT1 | Alt2wTUCPwoVA | Alt2woTUCPwoVA | Alt2woTUCPDeltaVA | Alt2woTUCPAllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Crossed SJR to South Delta | -5500 | 84% | 76 (-9%) | 84 (0%) | 84 (0%) | 84 (1%) | 84 (0%) | 80 (-4%) | 75 (-11%) | 83 (0%) |

Table I.8-89. Mean December through March neutrally buoyant particle fate by OMR bin for NAA, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4, and Action 5 – particle insertion location at Yolo Bypass for all particle system exit points. The parenthetical value represents the percent difference from the NAA. Values displayed as 0% may represent small nonzero decimals rounded to 0%. Percent-difference values are calculated from the unrounded values. Note that NA values result from no data falling into that OMR bin.

| Exit Point | OMR Bin | NAA | ALT1 | Alt2wTUCPwoVA | Alt2woTUCPwoVA | Alt2woTUCPDeltaVA | Alt2woTUCPAllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| West of Chipps | -2000 | 39% | 45 (16%) | 39 (1%) | 41 (5%) | 49 (26%) | 51 (30%) | 55 (42%) | 34 (-13%) | 43 (12%) |
| West of Chipps | -3500 | 56% | 47 (-16%) | 58 (3%) | 59 (4%) | 58 (3%) | 58 (3%) | 57 (0%) | 55 (-2%) | 55 (-1%) |
| West of Chipps | -5000 | 60% | 51 (-16%) | 61 (2%) | 62 (3%) | 62 (3%) | 62 (4%) | 67 (12%) | 60 (0%) | 62 (4%) |
| West of Chipps | -5500 | 32% | 58 (78%) | 34 (5%) | 34 (4%) | 33 (1%) | 33 (3%) | 43 (33%) | 43 (33%) | 33 (5%) |
| Entrained at Exports | -2000 | 2% | 2 (14%) | 2 (20%) | 2 (9%) | 1 (-44%) | 1 (-51%) | 1 (-59%) | 2 (15%) | 1 (-8%) |
| Entrained at Exports | -3500 | 1% | 4 (228%) | 1 (-4%) | 1 (-6%) | 1 (21%) | 1 (20%) | 2 (55%) | 1 (22%) | 1 (64%) |
| Entrained at Exports | -5000 | 3% | 5 (75%) | 2 (-11%) | 2 (-12%) | 2 (-11%) | 2 (-13%) | 1 (-67%) | 2 (-12%) | 1 (-30%) |
| Entrained at Exports | -5500 | 13% | 6 (-58%) | 13 (-4%) | 13 (-2%) | 13 (-1%) | 13 (-5%) | 9 (-35%) | 8 (-39%) | 11 (-13%) |

| Exit Point | OMR Bin | NAA | ALT1 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Remaining in Delta | -2000 | 59% | 53 (-11%) | 58 (-1%) | 57 (-4%) | 50 (-16%) | 48 (-18%) | 44 (-26%) | 64 (8%) | 54 (-8%) |
| Remaining in Delta | -3500 | 42% | 49 (16%) | 41 (-4%) | 40 (-5%) | 41 (-4%) | 41 (-4%) | 42 (-2%) | 43 (2%) | 42 (0%) |
| Remaining in Delta | -5000 | 37% | 45 (21%) | 36 (-3%) | 36 (-4%) | 36 (-4%) | 35 (-5%) | 32 (-15%) | 38 (1%) | 35 (-4%) |
| Remaining in Delta | -5500 | 54% | 37 (-32%) | 53 (-2%) | 53 (-2%) | 54 (-1%) | 54 (0%) | 48 (-11%) | 49 (-10%) | 54 (1%) |
| Crossed SJR to South Delta | -2000 | 6% | 6 (-2%) | 6 (12%) | 6 (1%) | 3 (-40%) | 3 (-47%) | 3 (-54%) | 7 (13%) | 4 (-15%) |
| Crossed SJR to South Delta | -3500 | 3% | 7 (181%) | 2 (-6%) | 2 (-8%) | 3 (13%) | 3 (12%) | 4 (49%) | 3 (22%) | 3 (49%) |
| Crossed SJR to South Delta | -5000 | 4% | 7 (78%) | 4 (-11%) | 4 (-13%) | 4 (-13%) | 4 (-14%) | 1 (-65%) | 4 (-11%) | 2 (-30%) |
| Crossed SJR to South Delta | -5500 | 19% | 7 (-60%) | 18 (-4%) | 18 (-3%) | 18 (-1%) | 18 (-4%) | 13 (-32%) | 12 (-36%) | 16 (-11%) |

Table I.8-90. Mean December through March neutrally buoyant particle fate by OMR bin for NAA, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4, and Action 5 – particle insertion location at Western Delta for all particle system exit points. The parenthetical value represents the percent difference from the NAA. Values displayed as 0% may represent small nonzero decimals rounded to 0%. Percent-difference values are calculated from the unrounded values. Note that NA values result from no data falling into that OMR bin.

| Exit Point | OMR Bin | NAA | ALT1 | Alt2wTUCPwoVA | Alt2woTUCPwoVA | Alt2woTUCPDeltaVA | Alt2woTUCPAllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| West of Chipps | -2000 | 89% | 95 (6%) | 89 (0%) | 90 (1%) | 94 (5%) | 94 (6%) | 97 (9%) | 87 (-3%) | 91 (2%) |
| West of Chipps | -3500 | 97% | 95 (-2%) | 98 (1%) | 98 (1%) | 97 (0%) | 96 (-1%) | 96 (-1%) | 97 (0%) | 95 (-1%) |
| West of Chipps | -5000 | 96% | 95 (-1%) | 96 (0%) | 96 (0%) | 96 (0%) | 96 (1%) | 99 (3%) | 96 (0%) | 97 (1%) |
| West of Chipps | -5500 | 77% | 95 (23%) | 78 (2%) | 78 (1%) | 77 (0%) | 78 (1%) | 87 (13%) | 86 (12%) | 78 (2%) |
| Entrained at Exports | -2000 | 1% | 1 (-6%) | 1 (14%) | 1 (5%) | 0 (-53%) | 0 (-56%) | 0 (-66%) | 1 (10%) | 0 (-12%) |
| Entrained at Exports | -3500 | 0% | 1 (197%) | 0 (-14%) | 0 (-22%) | 1 (20%) | 1 (29%) | 1 (70%) | 0 (12%) | 0 (68%) |
| Entrained at Exports | -5000 | 1% | 2 (41%) | 1 (-1%) | 1 (-2%) | 1 (-1%) | 1 (-5%) | 0 (-76%) | 1 (-13%) | 0 (-34%) |
| Entrained at Exports | -5500 | 12% | 3 (-75%) | 12 (-4%) | 12 (-3%) | 12 (0%) | 12 (-5%) | 6 (-48%) | 6 (-53%) | 10 (-15%) |
| Remaining in Delta | -2000 | 10% | 5 (-53%) | 10 (-2%) | 10 (-5%) | 6 (-42%) | 5 (-48%) | 3 (-72%) | 13 (23%) | 8 (-20%) |
| Remaining in Delta | -3500 | 3% | 4 (54%) | 2 (-23%) | 2 (-23%) | 3 (5%) | 3 (16%) | 4 (32%) | 3 (5%) | 3 (36%) |
| Remaining in Delta | -5000 | 3% | 3 (26%) | 3 (-1%) | 3 (-8%) | 2 (-14%) | 2 (-16%) | 1 (-71%) | 3 (-9%) | 1 (-34%) |
| Remaining in Delta | -5500 | 11% | 2 (-79%) | 10 (-6%) | 10 (-4%) | 11 (0%) | 11 (0%) | 7 (-37%) | 8 (-24%) | 10 (1%) |
| Crossed SJR to South Delta | -2000 | 2% | 2 (-13%) | 2 (9%) | 2 (-2%) | 1 (-52%) | 1 (-56%) | 1 (-67%) | 2 (3%) | 1 (-17%) |
| Crossed SJR to South Delta | -3500 | 1% | 2 (183%) | 1 (-17%) | 1 (-25%) | 1 (16%) | 1 (27%) | 1 (71%) | 1 (14%) | 1 (61%) |
| Crossed SJR to South Delta | -5000 | 2% | 3 (50%) | 2 (0%) | 2 (-2%) | 2 (-2%) | 2 (-6%) | 0 (-75%) | 2 (-13%) | 1 (-34%) |

| Exit Point | OMR Bin | NAA | ALT1 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Crossed SJR to South Delta | -5500 | 15% | 4 (-75%) | 15 (-4%) | 15 (-3%) | 15 (0%) | 15 (-4%) | 8 (-44%) | 8 (-50%) | 13 (-13%) |

Table I.8-91. Mean December through March neutrally buoyant particle fate by OMR bin for NAA, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4, and Action 5 – particle insertion location at Suisun Bay for all particle system exit points. The parenthetical value represents the percent difference from the NAA. Values displayed as 0% may represent small nonzero decimals rounded to 0%. Percent-difference values are calculated from the unrounded values. Note that NA values result from no data falling into that OMR bin.

| Exit Point | OMR Bin | NAA | ALT1 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| West of Chipps | -2000 | 89% | 66 (-26%) | 85 (-5%) | 88 (-1%) | 86 (-3%) | 90 (0%) | 82 (-8%) | 91 (2%) | 85 (-4%) |
| West of Chipps | -3500 | 89% | 68 (-24%) | 87 (-2%) | 88 (-1%) | 90 (1%) | 91 (2%) | 86 (-4%) | 83 (-6%) | 90 (2%) |
| West of Chipps | -5000 | 91% | 71 (-22%) | 94 (2%) | 93 (2%) | 94 (2%) | 93 (2%) | 94 (3%) | 92 (1%) | 92 (1%) |
| West of Chipps | -5500 | 84% | 83 (-1%) | 86 (2%) | 86 (2%) | 85 (1%) | 85 (2%) | 91 (8%) | 89 (7%) | 88 (5%) |
| Entrained at Exports | -2000 | 0% | 0 (-31%) | 0 (-8%) | 0 (-4%) | 0 (-73%) | 0 (-89%) | 0 (-91%) | 0 (-17%) | 0 (-49%) |
| Entrained at Exports | -3500 | 0% | 0 (235%) | 0 (-43%) | 0 (-47%) | 0 (-15%) | 0 (15%) | 0 (8%) | 0 (-38%) | 0 (76%) |
| Entrained at Exports | -5000 | 0% | 0 (81%) | 0 (17%) | 0 (6%) | 0 (-6%) | 0 (2%) | 0 (-85%) | 0 (-16%) | 0 (-38%) |
| Entrained at Exports | -5500 | 0% | 0 (-79%) | 0 (-5%) | 0 (-16%) | 0 (6%) | 0 (1%) | 0 (-79%) | 0 (-63%) | 0 (-20%) |
| Remaining in Delta | -2000 | 11% | 34 (216%) | 15 (45%) | 12 (9%) | 13 (27%) | 10 (-3%) | 18 (67%) | 9 (-18%) | 14 (35%) |
| Remaining in Delta | -3500 | 11% | 32 (191%) | 13 (14%) | 12 (9%) | 10 (-9%) | 9 (-17%) | 14 (32%) | 17 (50%) | 9 (-16%) |
| Remaining in Delta | -5000 | 9% | 29 (238%) | 6 (-25%) | 6 (-24%) | 6 (-25%) | 7 (-23%) | 6 (-28%) | 8 (-6%) | 7 (-15%) |
| Remaining in Delta | -5500 | 16% | 17 (7%) | 14 (-12%) | 14 (-12%) | 15 (-7%) | 14 (-10%) | 9 (-43%) | 11 (-34%) | 11 (-26%) |
| Crossed SJR to South Delta | -2000 | 0% | 0 (-31%) | 0 (-2%) | 0 (-11%) | 0 (-46%) | 0 (-65%) | 0 (-89%) | 0 (-9%) | 0 (-28%) |

| Exit Point | OMR Bin | NAA | ALT1 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | ALT3 | ALT4 | ACT5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Crossed SJR to South Delta | -3500 | 0% | 0 (291%) | 0 (-35%) | 0 (-36%) | 0 (21%) | 0 (91%) | 0 (71%) | 0 (-16%) | 0 (93%) |
| Crossed SJR to South Delta | -5000 | 0% | 0 (53%) | 0 (21%) | 0 (9%) | 0 (-28%) | 0 (-11%) | 0 (-84%) | 0 (-21%) | 0 (-51%) |
| Crossed SJR to South Delta | -5500 | 0% | 0 (-81%) | 0 (-9%) | 0 (-15%) | 0 (3%) | 0 (3%) | 0 (-69%) | 0 (-56%) | 0 (-20%) |

## I.8.4.4 Figures

### *I.8.4.4.1 Neutrally Buoyant, Inflow and OMR Bins, March through June [BA, Figure I.8-2 through Figure I.8-19]*

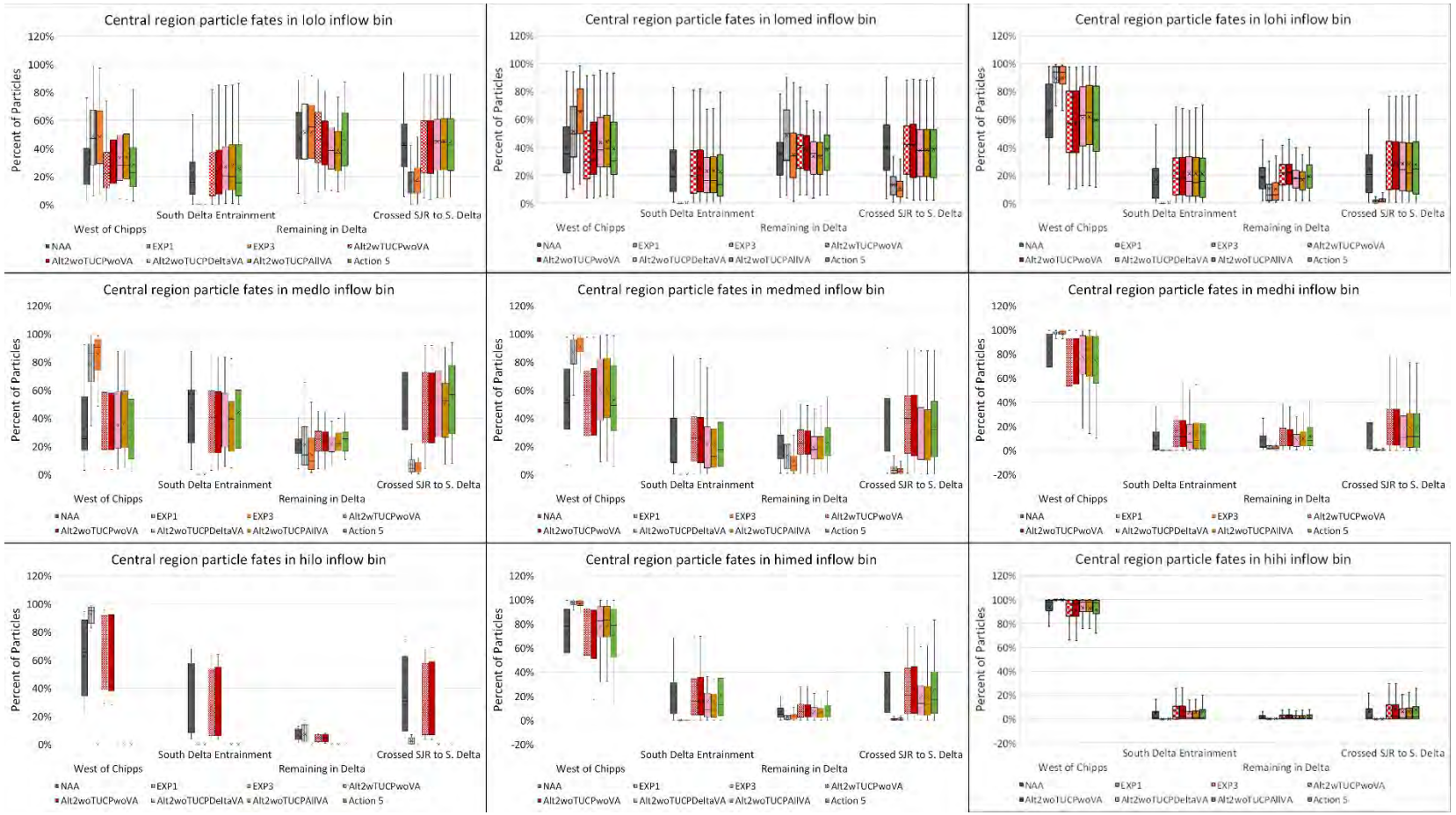



Figure I.8-2. Box and whisker plot of mean March through June particle fate after 45 days by exit location (within each facet from left to right: West of Chipps, South Delta Entrainment, Remaining in Delta, Crossed SJR to S. Delta) for neutrally buoyant particles injected at Central Delta region by Inflow Bin (from top left to bottom right: "lolo" to "hihi") for the No Action Alternative, EXP 1, EXP 3, four phases of Alternative 2, and Action 5.

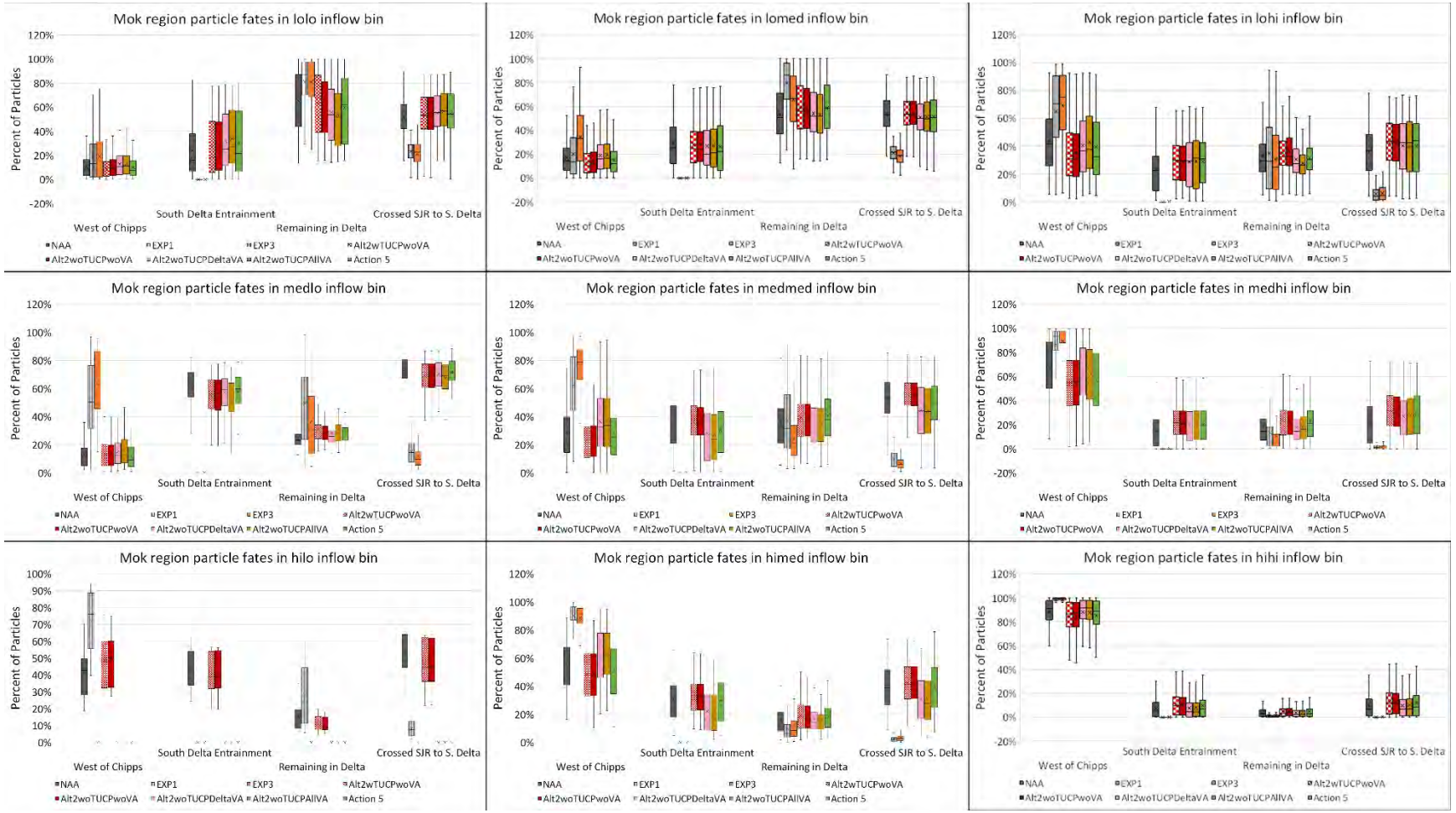



Figure I.8-3. Box and whisker plot of mean March through June particle fate after 45 days by exit location (within each facet from left to right: West of Chipps, South Delta Entrainment, Remaining in Delta, Crossed SJR to S. Delta) for neutrally buoyant particles injected at Mokelumne River region by Inflow Bin (from top left to bottom right: “lolo” to “hihi”) for the No Action Alternative, EXP 1, EXP 3, four phases of Alternative 2, and Action 5.

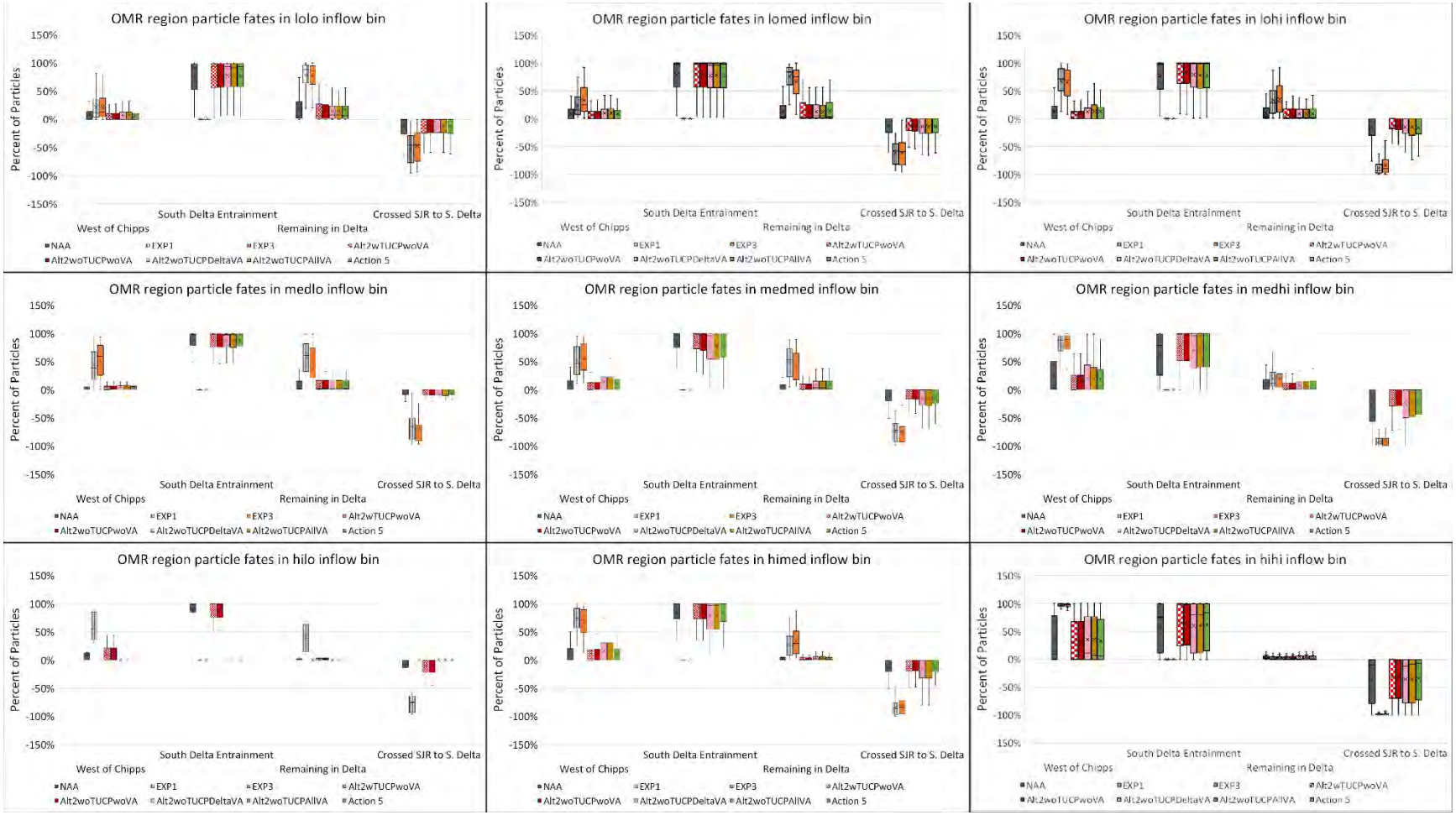



Figure I.8-4. Box and whisker plot of mean March through June particle fate after 45 days by exit location (within each facet from left to right: West of Chipps, South Delta Entrainment, Remaining in Delta, Crossed SJR to S. Delta) for neutrally buoyant particles injected at Old and Middle River region by Inflow Bin (from top left to bottom right: “lolo” to “hihi”) for the No Action Alternative, EXP 1, EXP 3, four phases of Alternative 2, and Action 5.

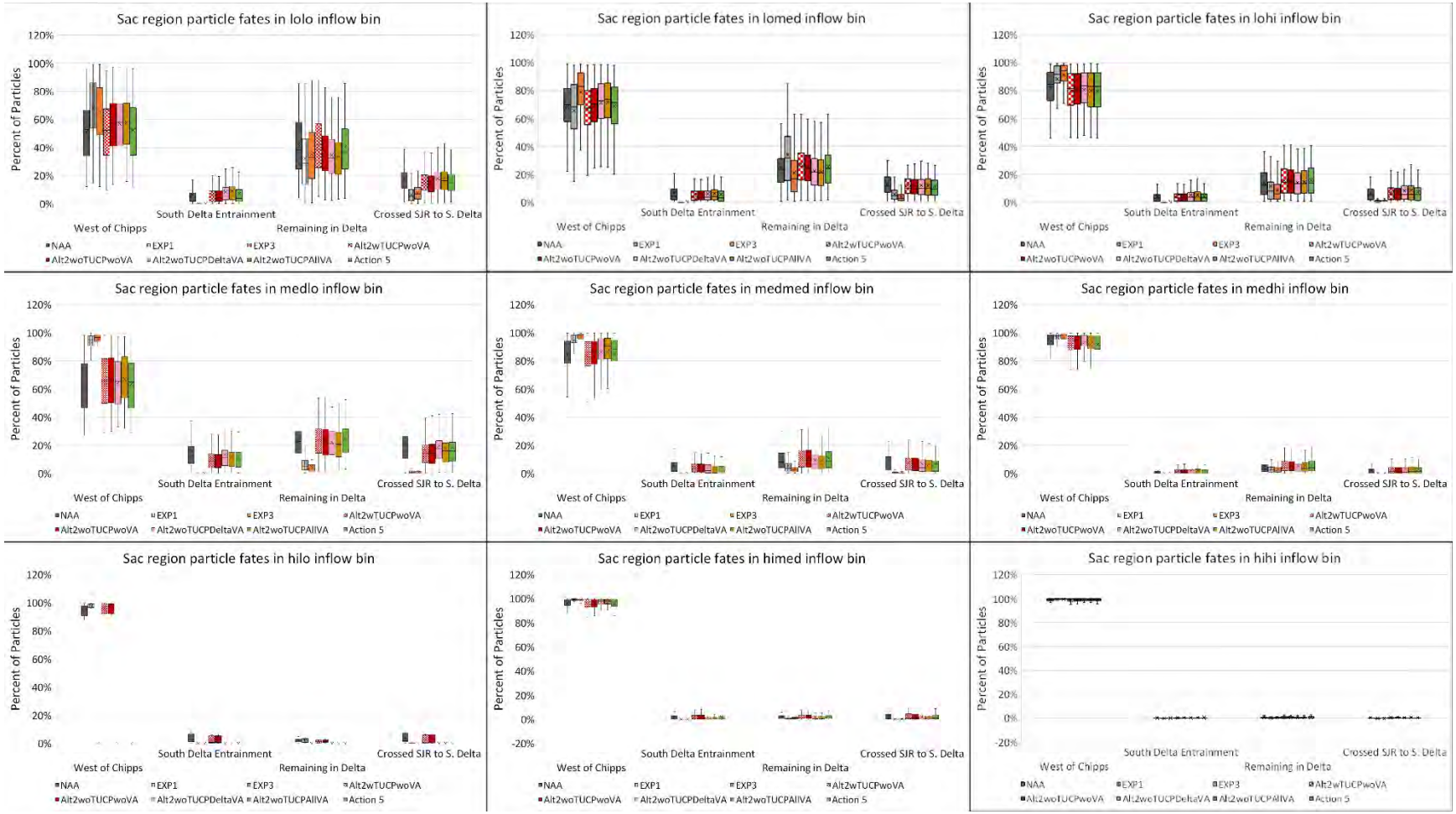



Figure I.8-5. Box and whisker plot of mean March through June particle fate after 45 days by exit location (within each facet from left to right: West of Chipps, South Delta Entrainment, Remaining in Delta, Crossed SJR to S. Delta) for neutrally buoyant particles injected at Sacramento River region by Inflow Bin (from top left to bottom right: “lolo” to “hihi”) for the No Action Alternative, EXP 1, EXP 3, four phases of Alternative 2, and Action 5.

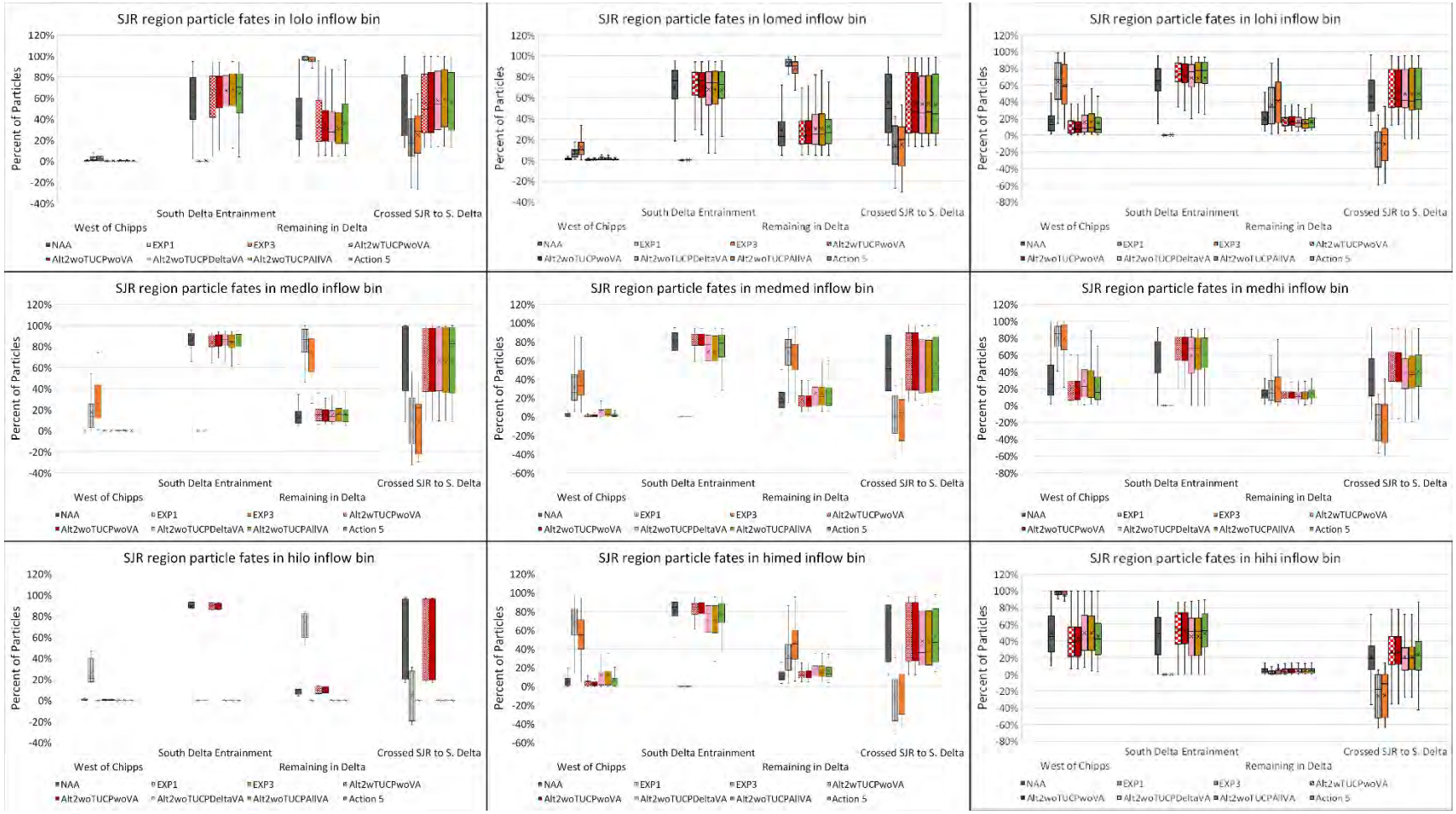



Figure I.8-6. Box and whisker plot of mean March through June particle fate after 45 days by exit location (within each facet from left to right: West of Chipps, South Delta Entrainment, Remaining in Delta, Crossed SJR to S. Delta) for neutrally buoyant particles injected at San Joaquin River region by Inflow Bin (from top left to bottom right: "lolo" to "hihi") for the No Action Alternative, EXP 1, EXP 3, four phases of Alternative 2, and Action 5.

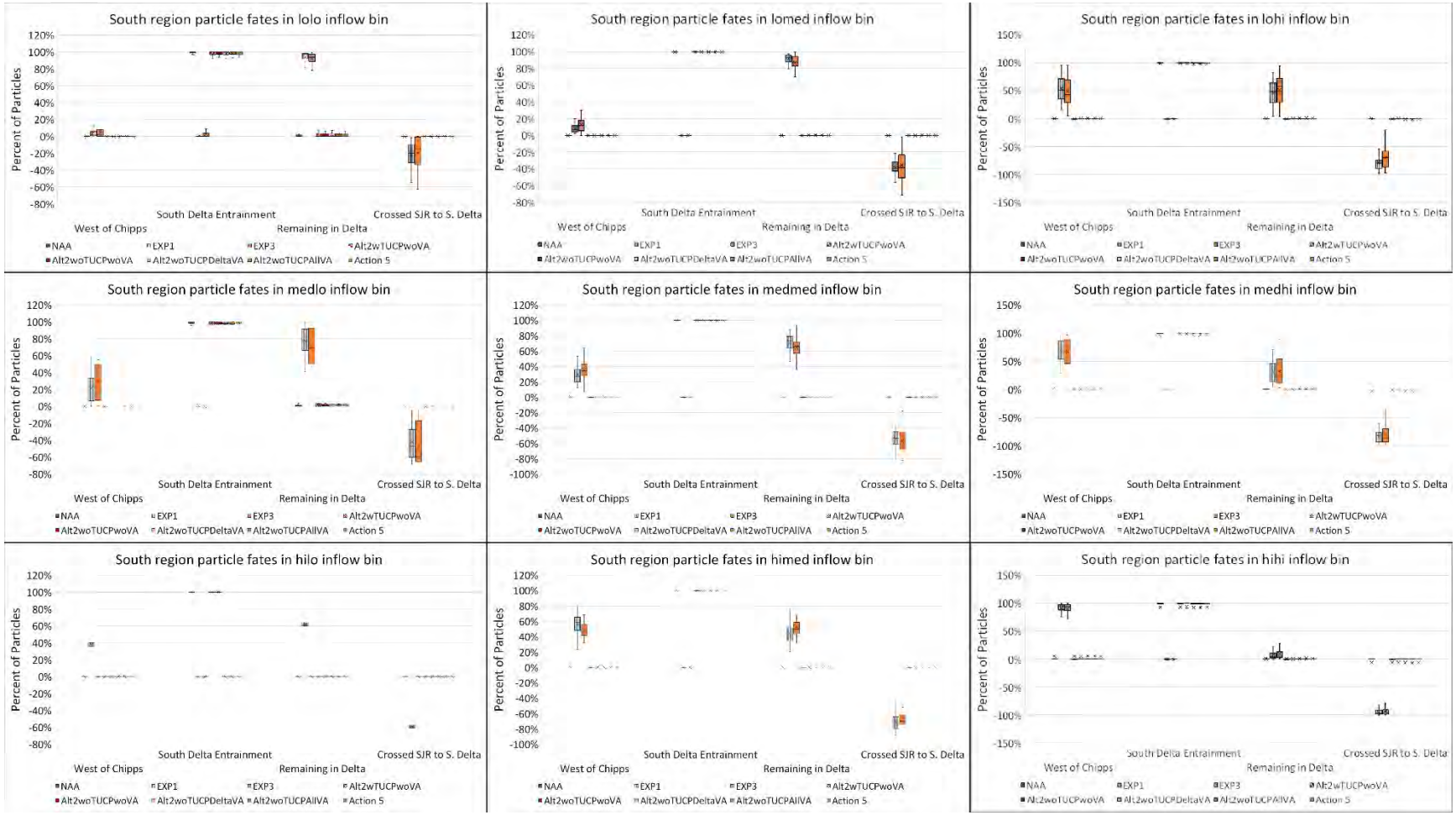



Figure I.8-7. Box and whisker plot of mean March through June particle fate after 45 days by exit location (within each facet from left to right: West of Chipps, South Delta Entrainment, Remaining in Delta, Crossed SJR to S. Delta) for neutrally buoyant particles injected at South Delta region by Inflow Bin (from top left to bottom right: “lolo” to “hihi”) for the No Action Alternative, EXP 1, EXP 3, four phases of Alternative 2, and Action 5.

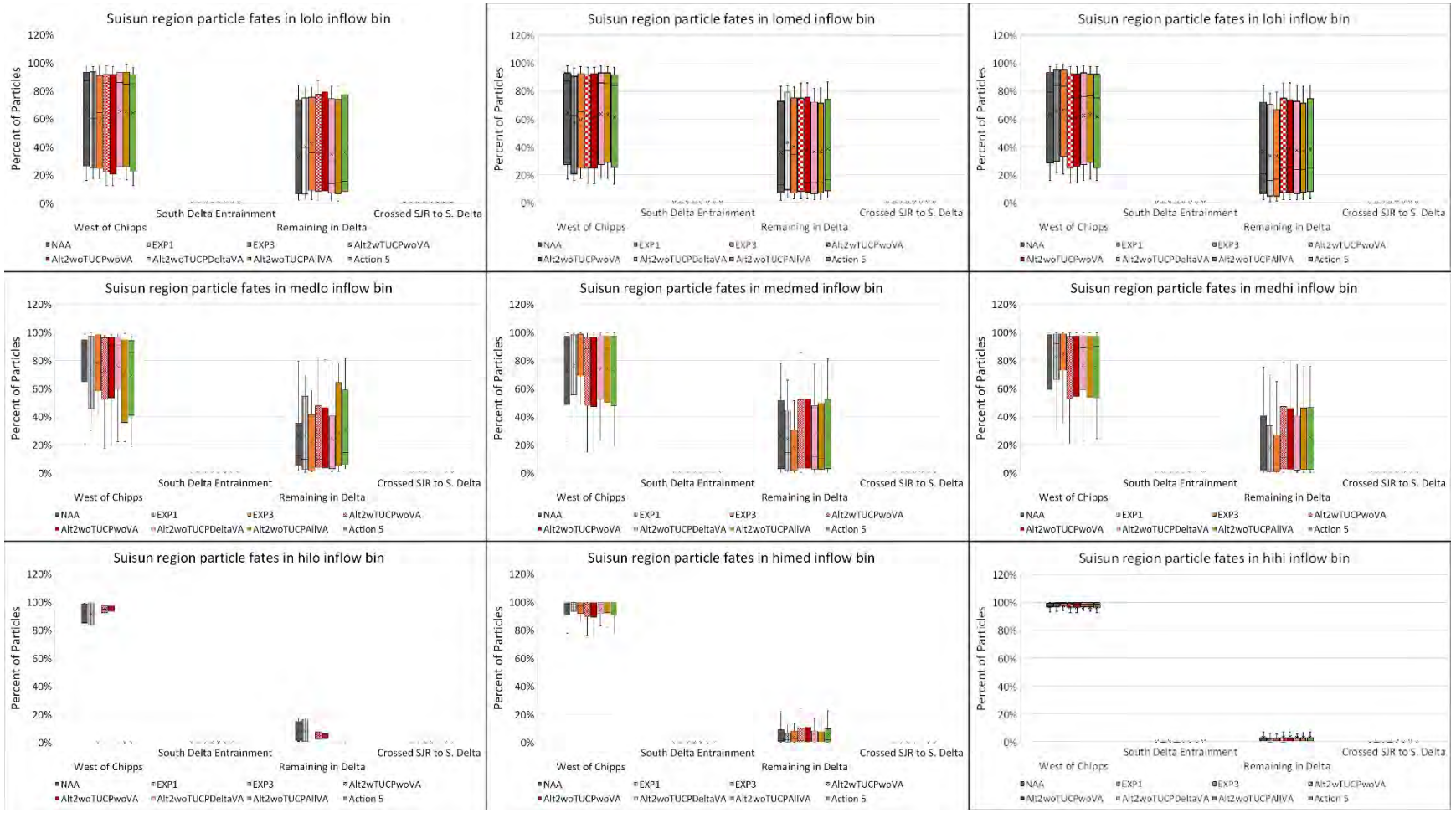



Figure I.8-8. Box and whisker plot of mean March through June particle fate after 45 days by exit location (within each facet from left to right: West of Chipps, South Delta Entrainment, Remaining in Delta, Crossed SJR to S. Delta) for neutrally buoyant particles injected at Suisun region by Inflow Bin (from top left to bottom right: “lolo” to “hihi”) for the No Action Alternative, EXP 1, EXP 3, four phases of Alternative 2, and Action 5.

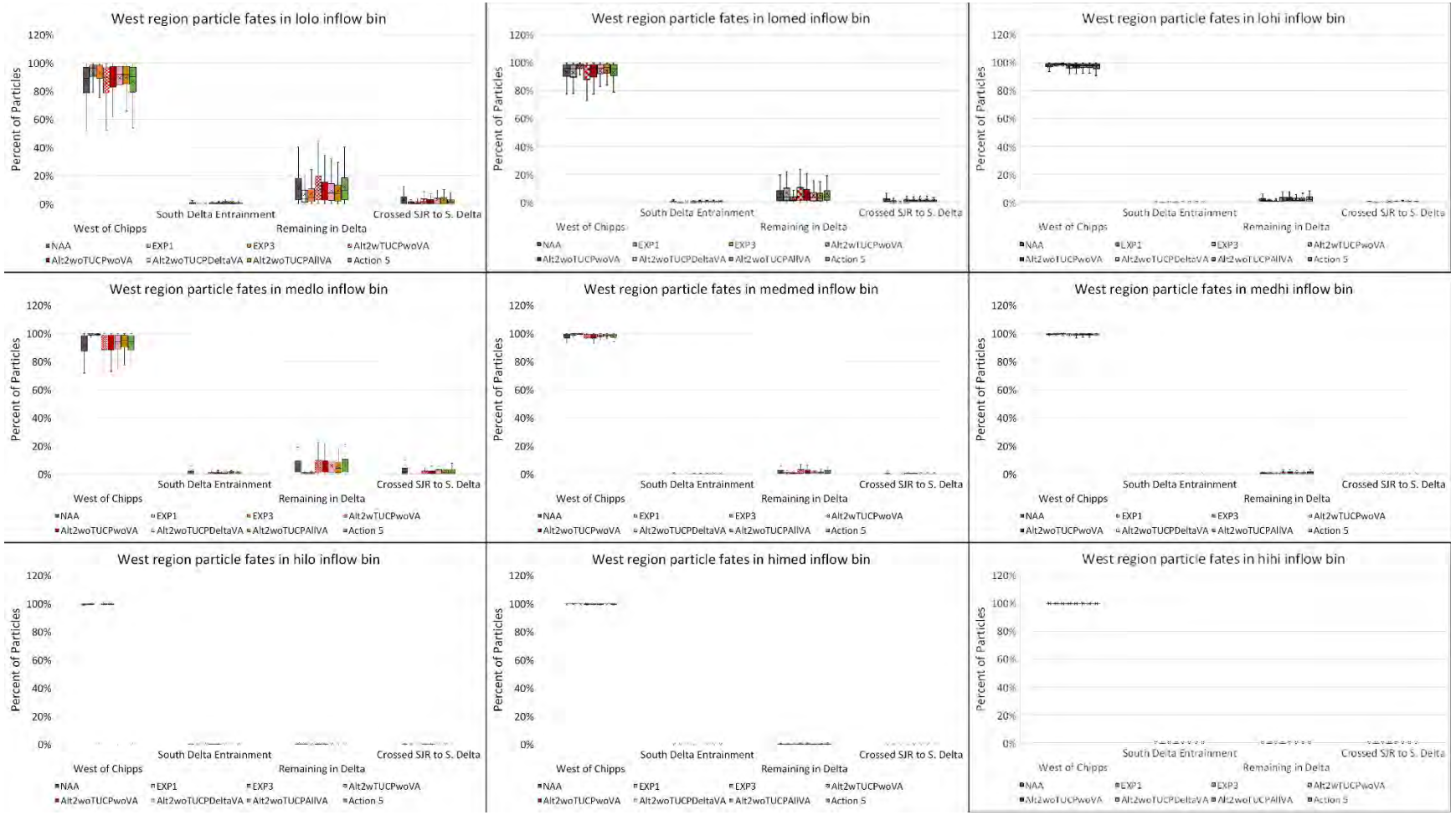



Figure I.8-9. Box and whisker plot of mean March through June particle fate after 45 days by exit location (within each facet from left to right: West of Chipps, South Delta Entrainment, Remaining in Delta, Crossed SJR to S. Delta) for neutrally buoyant particles injected at West Delta region by Inflow Bin (from top left to bottom right: “lolo” to “hihi”) for the No Action Alternative, EXP 1, EXP 3, four phases of Alternative 2, and Action 5.

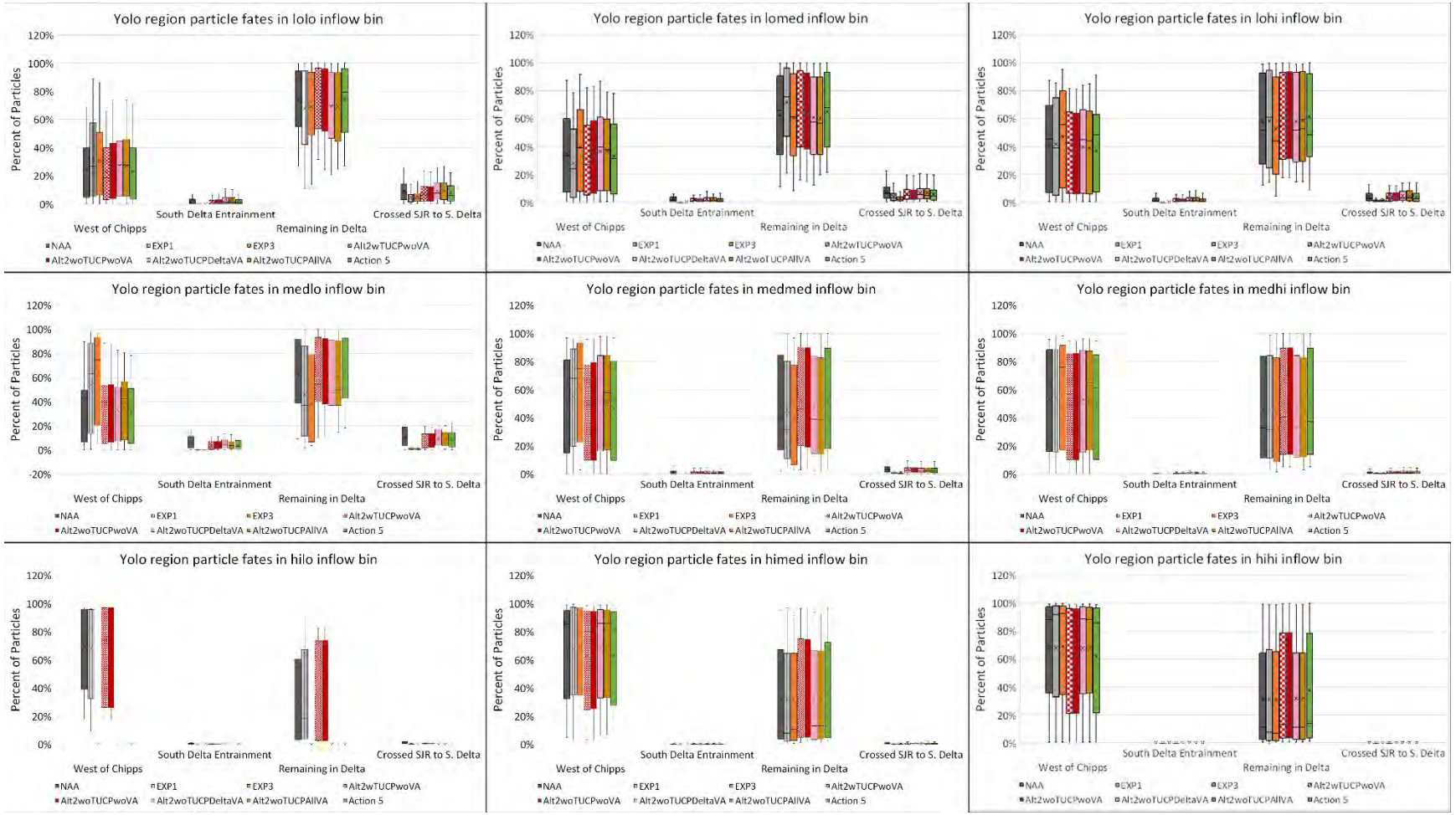



Figure I.8-10. Box and whisker plot of mean March through June particle fate after 45 days by exit location (within each facet from left to right: West of Chipps, South Delta Entrainment, Remaining in Delta, Crossed SJR to S. Delta) for neutrally buoyant particles injected at Yolo region by Inflow Bin (from top left to bottom right: “lolo” to “hihi”) for the No Action Alternative, EXP 1, EXP 3, four phases of Alternative 2, and Action 5.

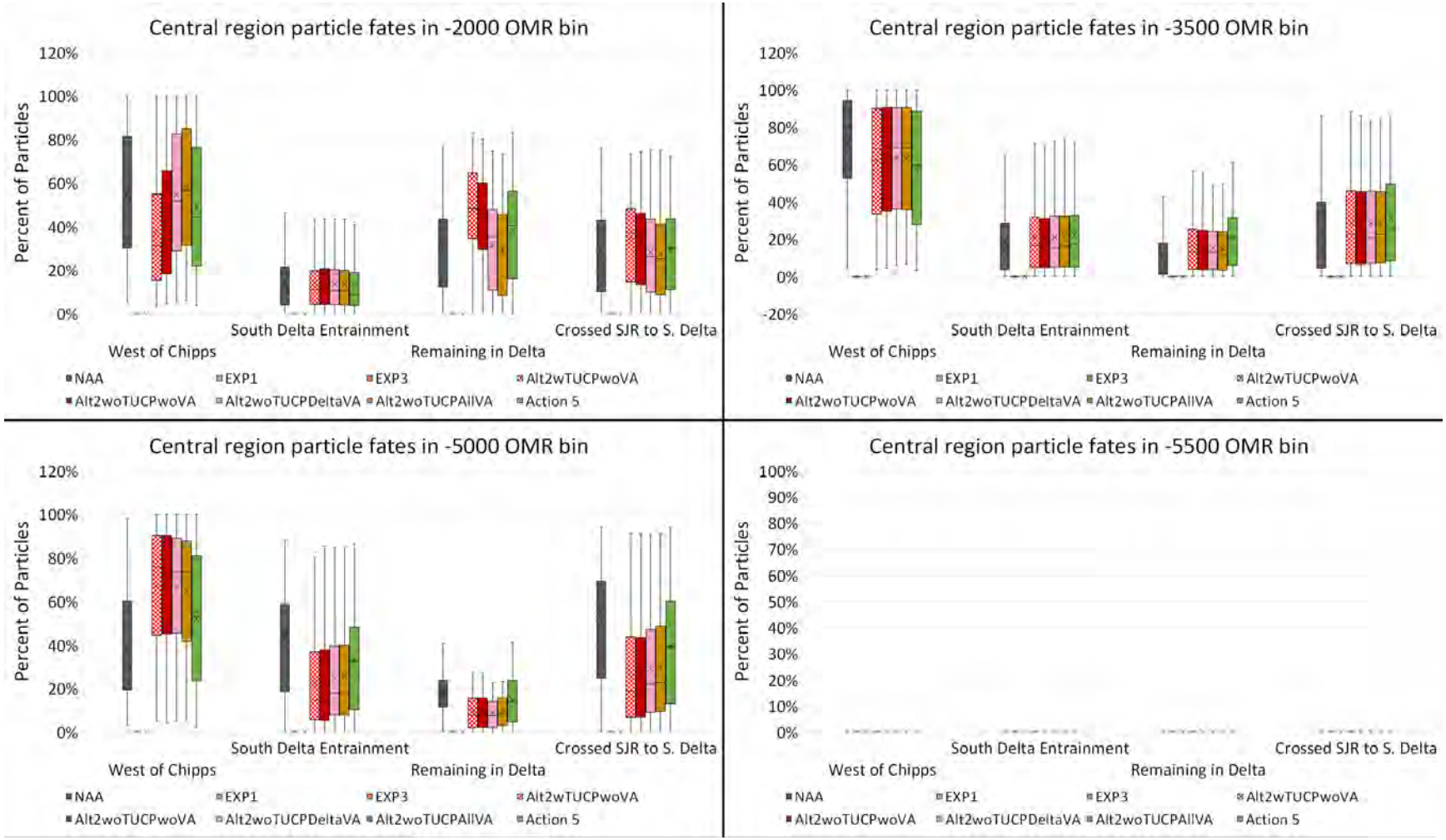



Figure I.8-11. Box and whisker plot of mean March through June particle fate after 45 days by exit location (within each facet from left to right: West of Chipps, South Delta Entrainment, Remaining in Delta, Crossed SJR to S. Delta) for neutrally buoyant particles injected at Central Delta region by OMR Bin (from top left to bottom right: -2,000 cfs, -3,500 cfs, -5,000 cfs, -5,500 cfs) for the No Action Alternative, EXP 1, EXP 3, four phases of Alternative 2, and Action 5.

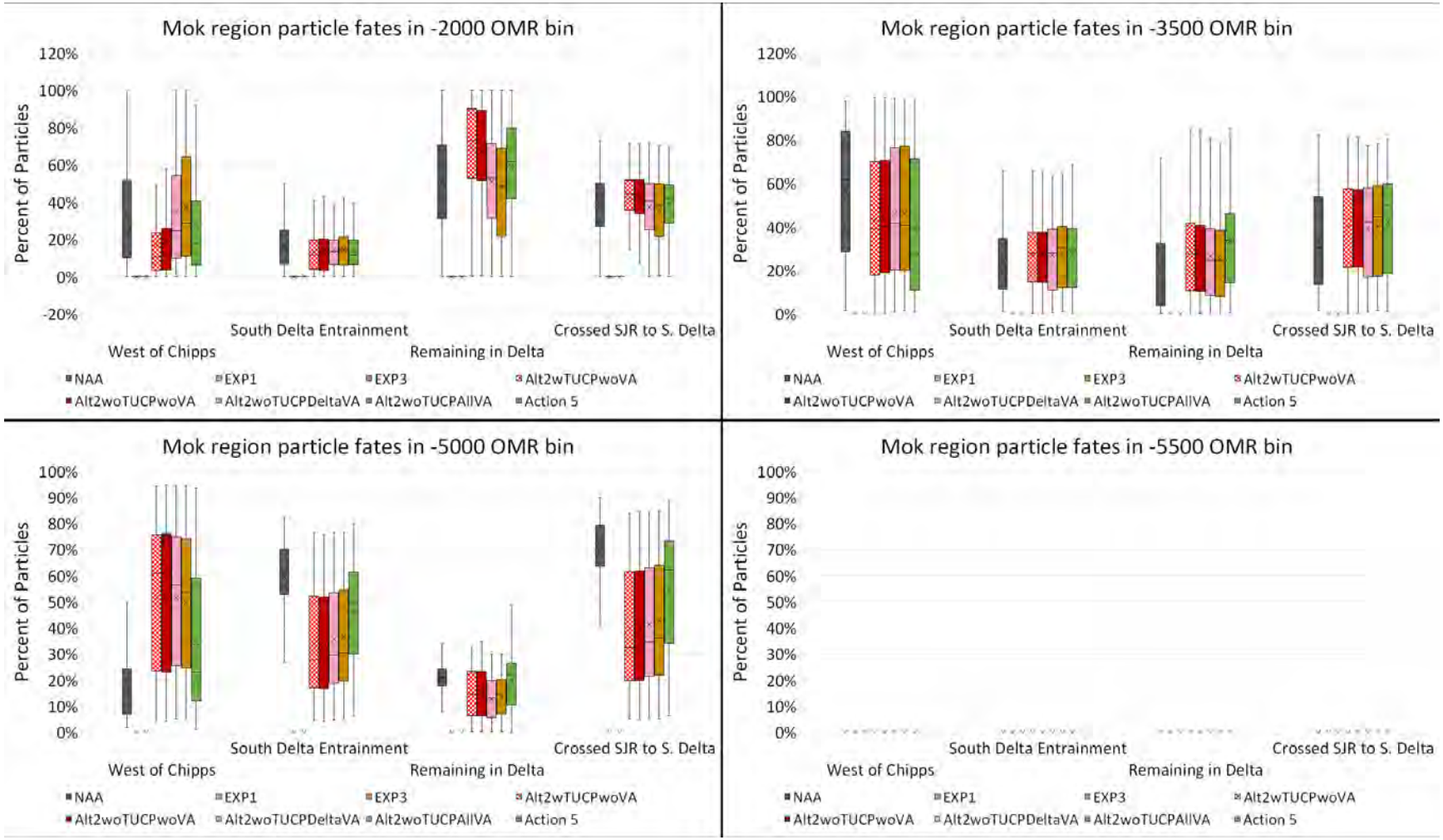



Figure I.8-12. Box and whisker plot of mean March through June particle fate after 45 days by exit location (within each facet from left to right: West of Chipps, South Delta Entrainment, Remaining in Delta, Crossed SJR to S. Delta) for neutrally buoyant particles injected at Mokelumne River region by OMR Bin (from top left to bottom right: -2,000 cfs, -3,500 cfs, -5,000 cfs, -5,500 cfs) for the No Action Alternative, EXP 1, EXP 3, four phases of Alternative 2, and Action 5.

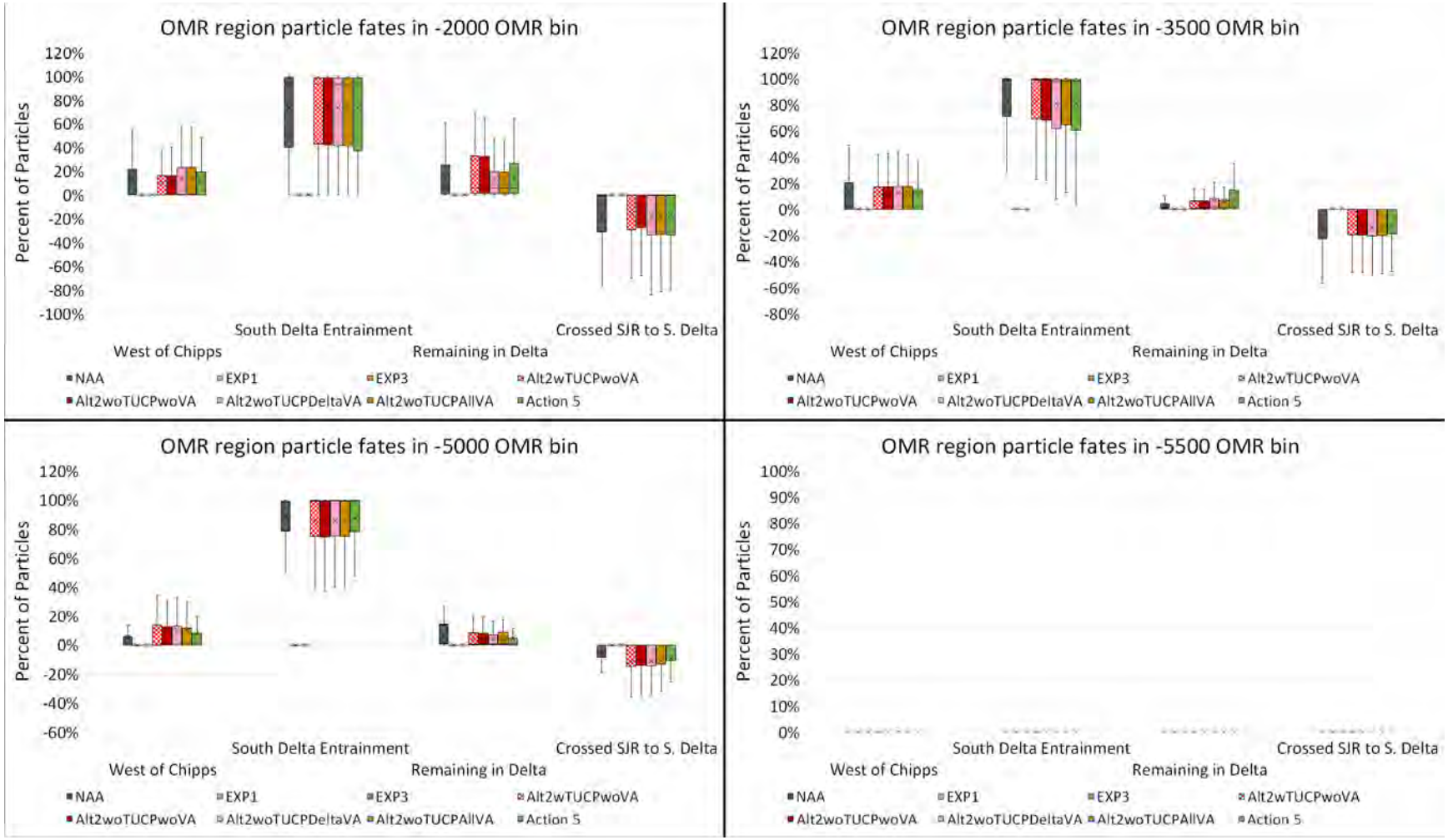



Figure I.8-13. Box and whisker plot of mean March through June particle fate after 45 days by exit location (within each facet from left to right: West of Chipps, South Delta Entrainment, Remaining in Delta, Crossed SJR to S. Delta) for neutrally buoyant particles injected at Old and Middle River region by OMR Bin (from top left to bottom right: -2,000 cfs, -3,500 cfs, -5,000 cfs, -5,500 cfs) for the No Action Alternative, EXP 1, EXP 3, four phases of Alternative 2, and Action 5.

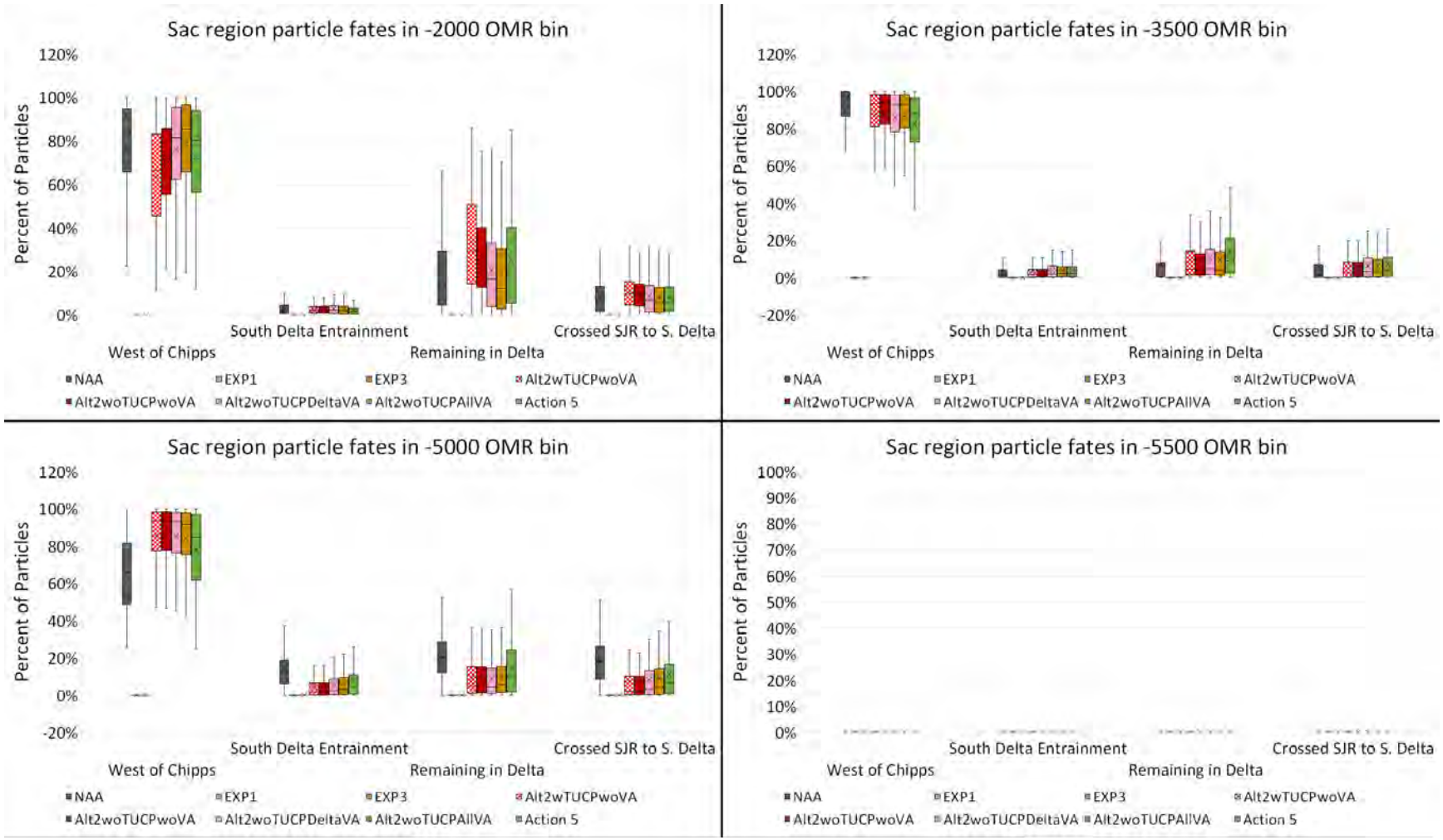



Figure I.8-14. Box and whisker plot of mean March through June particle fate after 45 days by exit location (within each facet from left to right: West of Chipps, South Delta Entrainment, Remaining in Delta, Crossed SJR to S. Delta) for neutrally buoyant particles injected at Sacramento River region by OMR Bin (from top left to bottom right: -2,000 cfs, -3,500 cfs, -5,000 cfs, -5,500 cfs) for the No Action Alternative, EXP 1, EXP 3, four phases of Alternative 2, and Action 5.

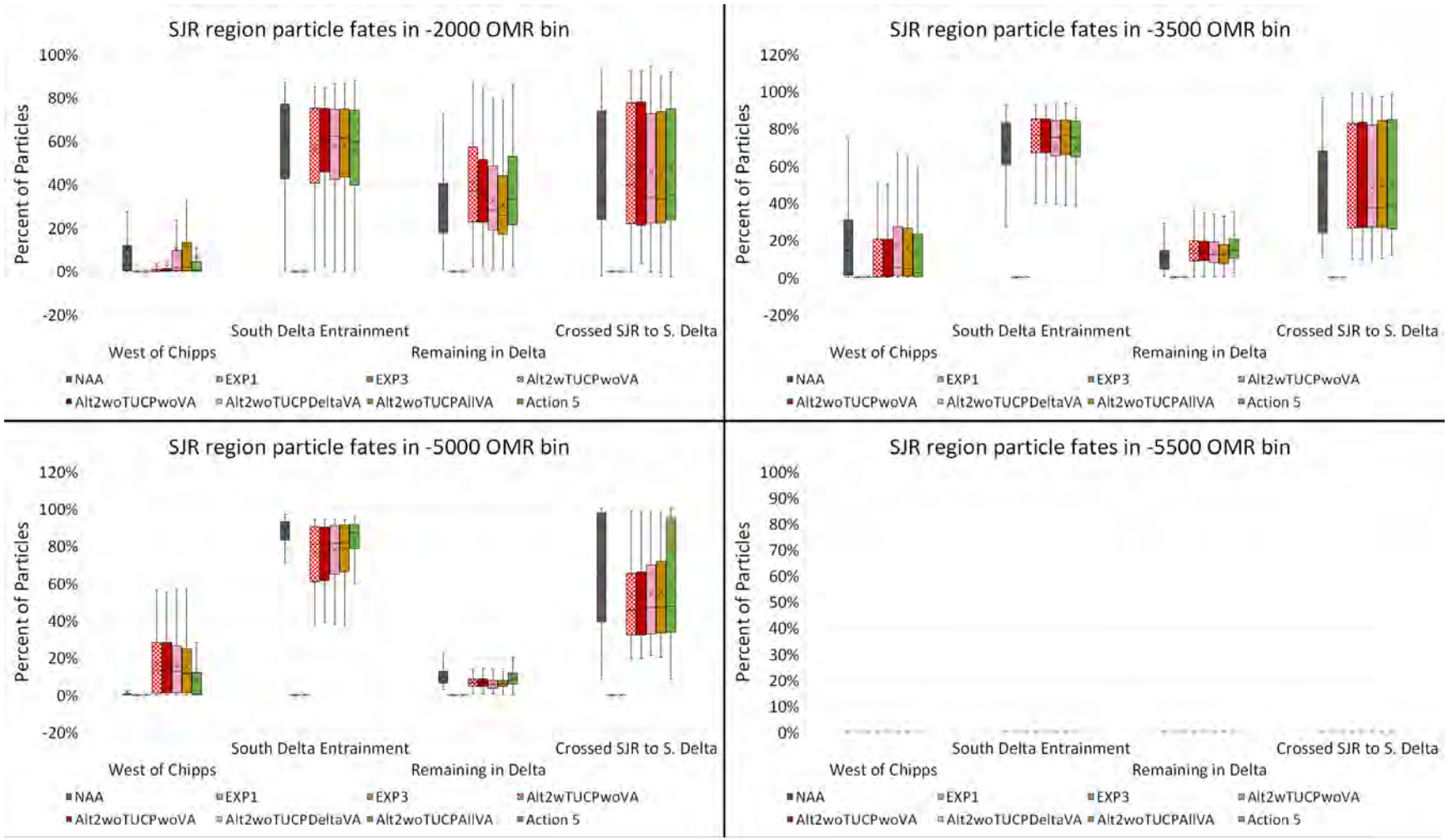



Figure I.8-15. Box and whisker plot of mean March through June particle fate after 45 days by exit location (within each facet from left to right: West of Chipps, South Delta Entrainment, Remaining in Delta, Crossed SJR to S. Delta) for neutrally buoyant particles injected at San Joaquin River region by OMR Bin (from top left to bottom right: -2,000 cfs, -3,500 cfs, -5,000 cfs, -5,500 cfs) for the No Action Alternative, EXP 1, EXP 3, four phases of Alternative 2, and Action 5.

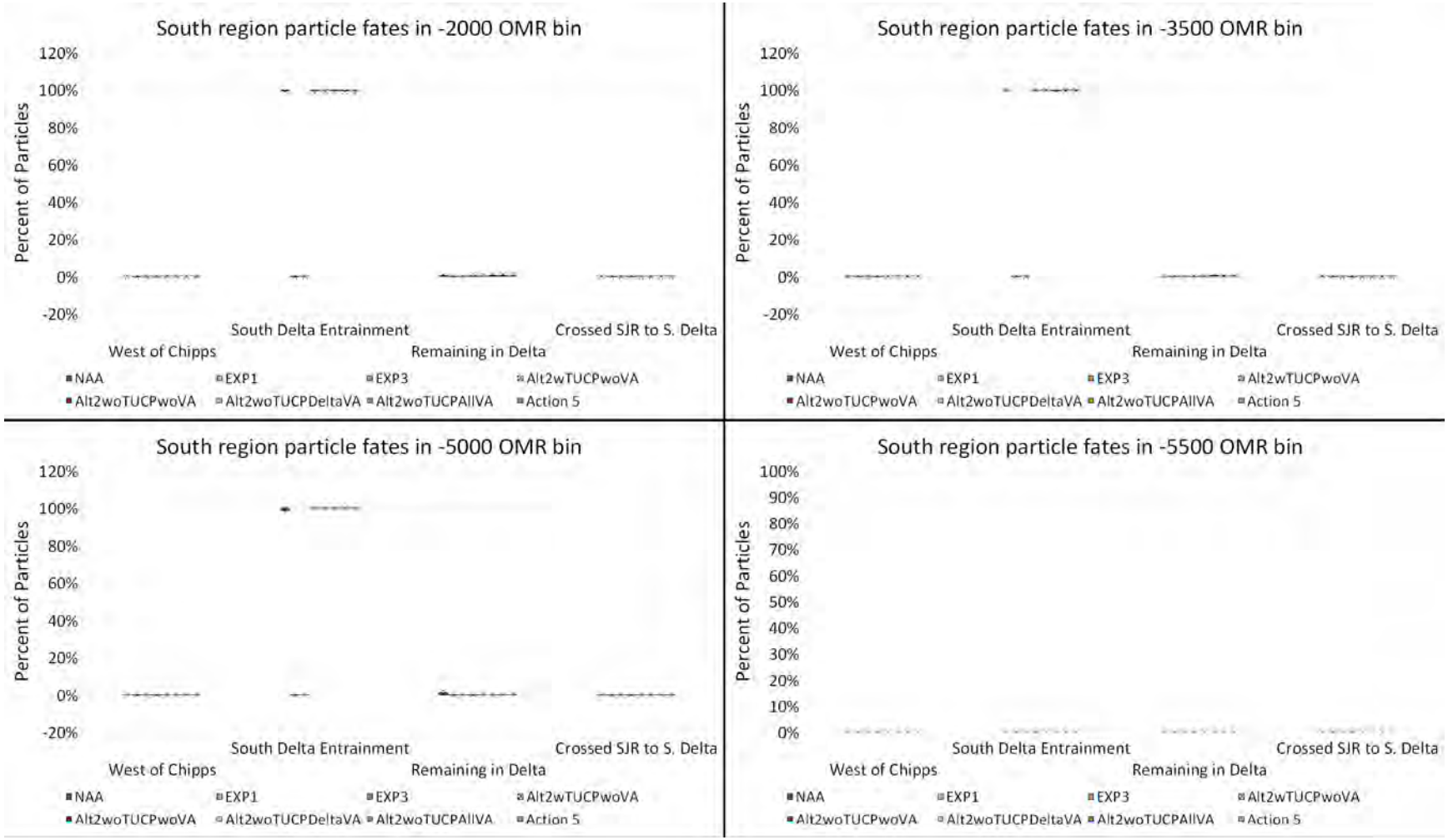



Figure I.8-16. Box and whisker plot of mean March through June particle fate after 45 days by exit location (within each facet from left to right: West of Chipps, South Delta Entrainment, Remaining in Delta, Crossed SJR to S. Delta) for neutrally buoyant particles injected at South Delta region by OMR Bin (from top left to bottom right: -2,000 cfs, -3,500 cfs, -5,000 cfs, -5,500 cfs) for the No Action Alternative, EXP 1, EXP 3, four phases of Alternative 2, and Action 5.

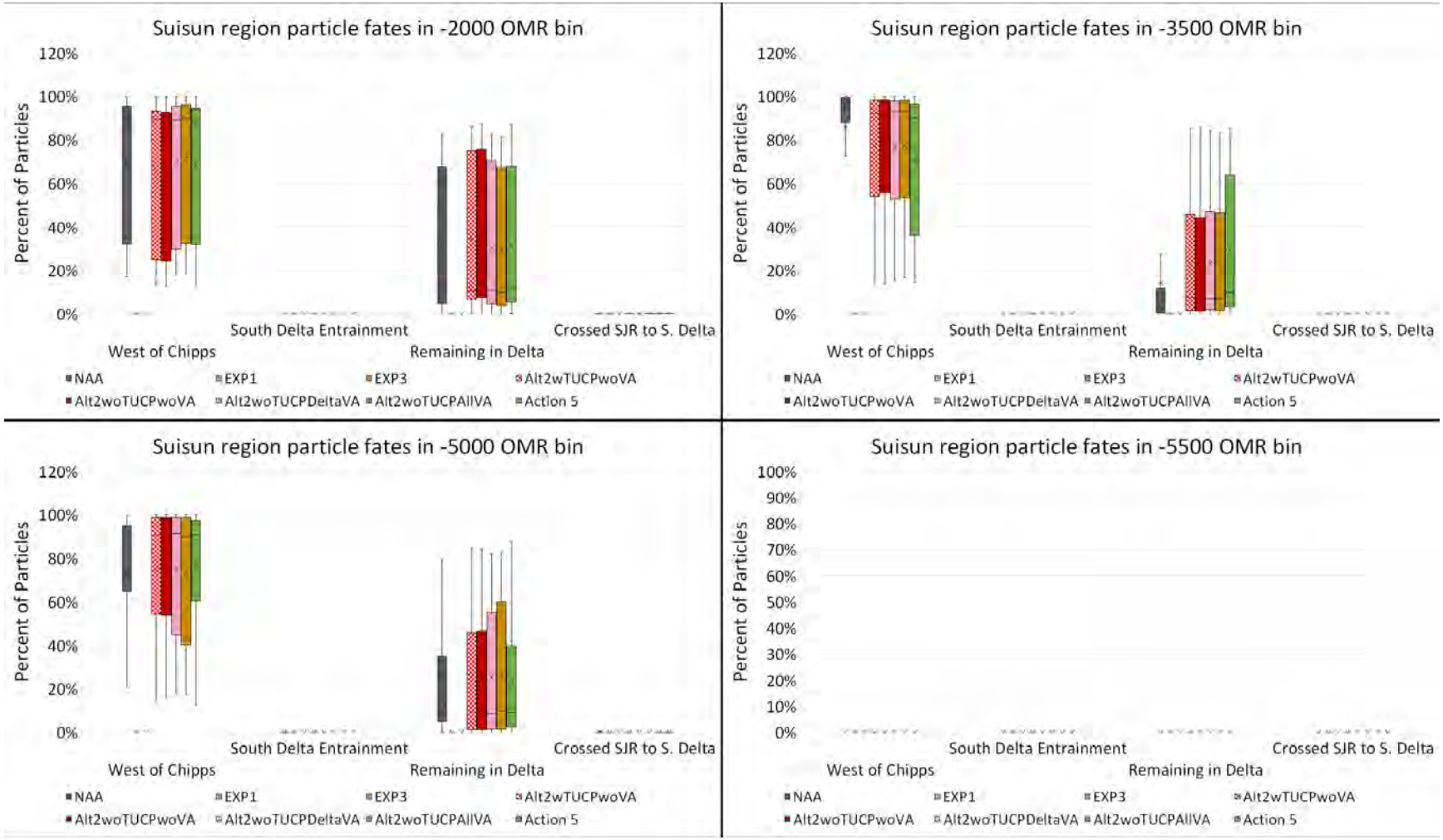



Figure I.8-17. Box and whisker plot of mean March through June particle fate after 45 days by exit location (within each facet from left to right: West of Chipps, South Delta Entrainment, Remaining in Delta, Crossed SJR to S. Delta) for neutrally buoyant particles injected at Suisun region by OMR Bin (from top left to bottom right: -2,000 cfs, -3,500 cfs, -5,000 cfs, -5,500 cfs) for the No Action Alternative, EXP 1, EXP 3, four phases of Alternative 2, and Action 5.

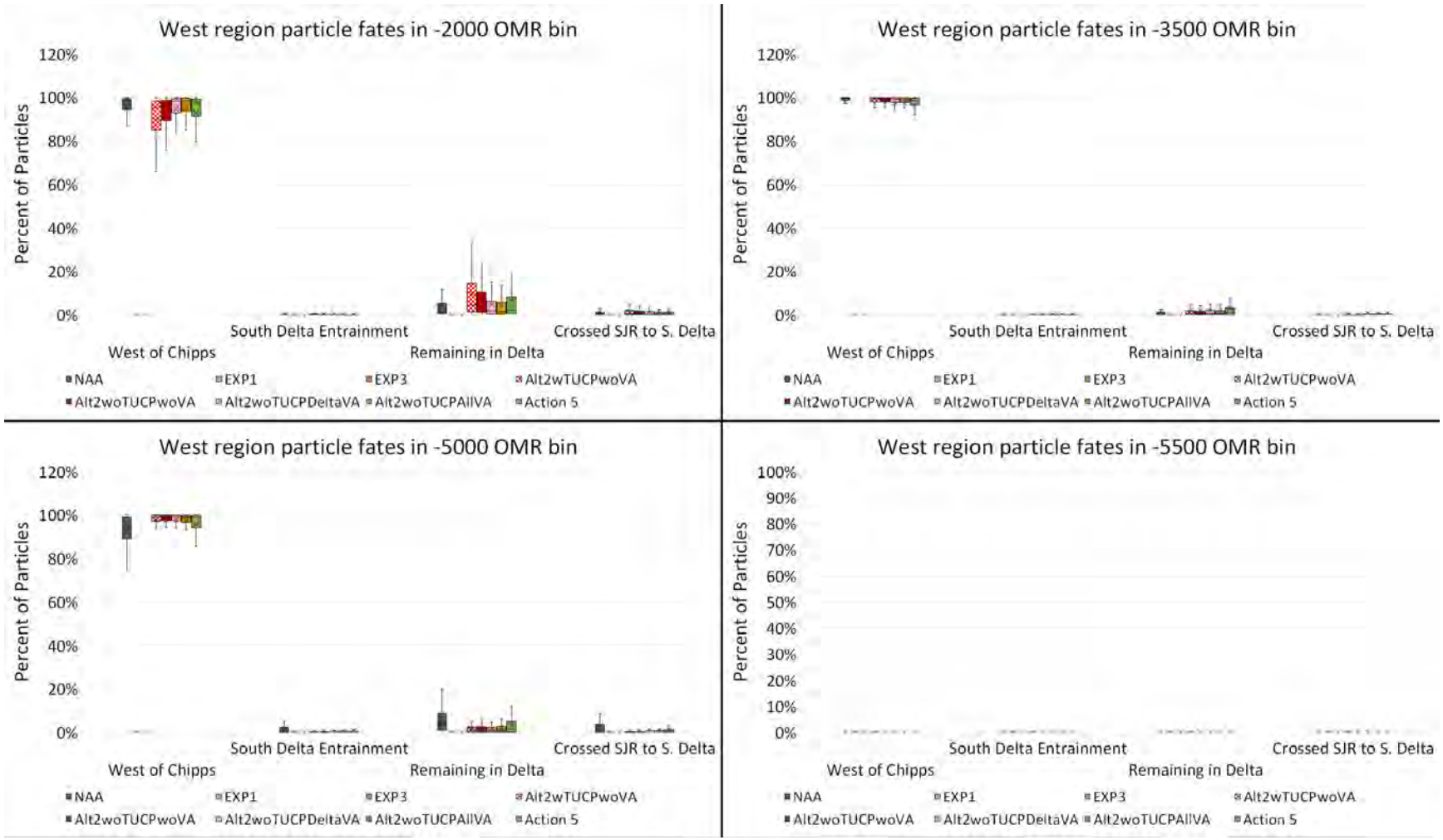



Figure I.8-18. Box and whisker plot of mean March through June particle fate after 45 days by exit location (within each facet from left to right: West of Chipps, South Delta Entrainment, Remaining in Delta, Crossed SJR to S. Delta) for neutrally buoyant particles injected at West Delta region by OMR Bin (from top left to bottom right: -2,000 cfs, -3,500 cfs, -5,000 cfs, -5,500 cfs) for the No Action Alternative, EXP 1, EXP 3, four phases of Alternative 2, and Action 5.

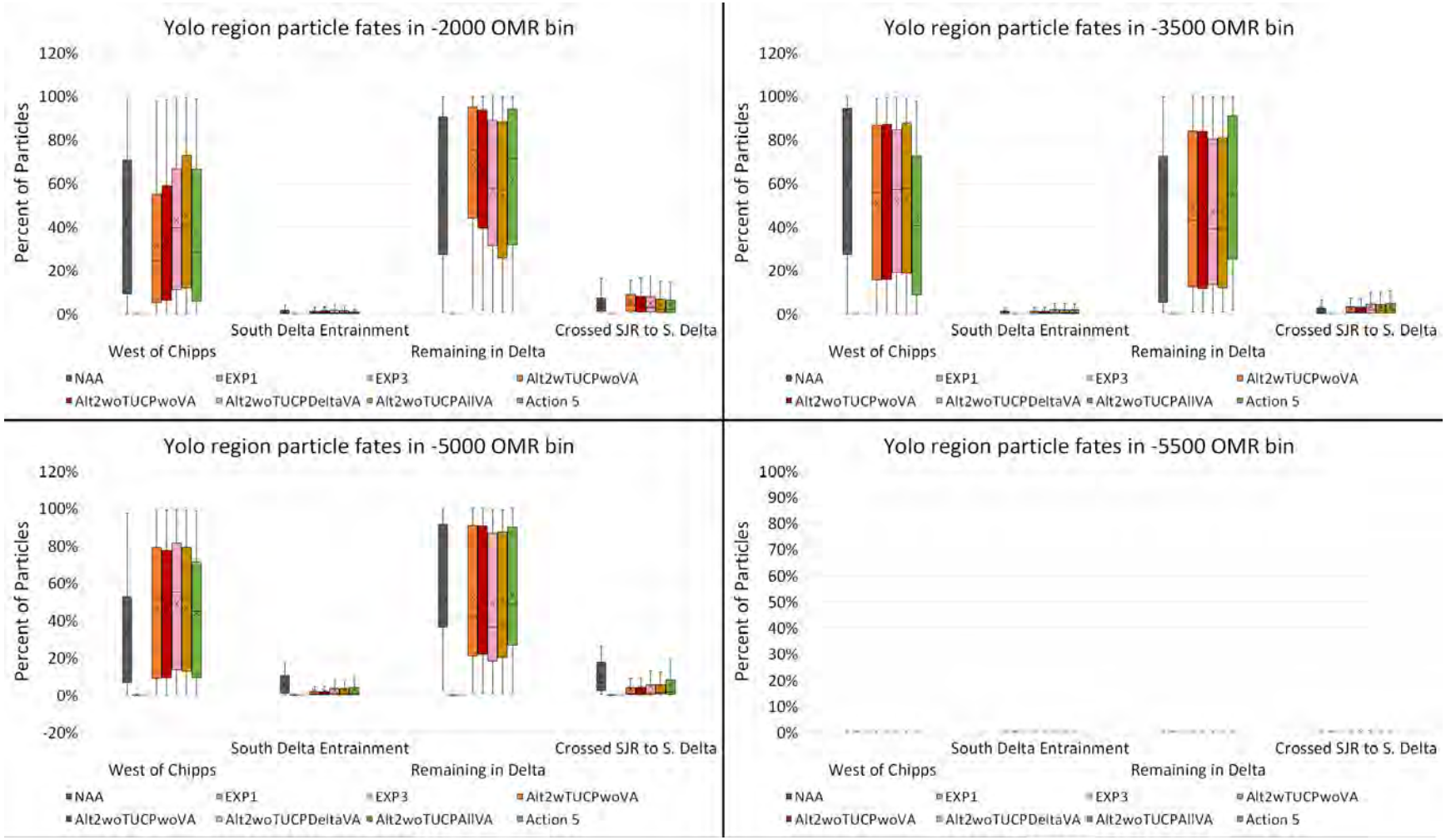



Figure I.8-19. Box and whisker plot of mean March through June particle fate after 45 days by exit location (within each facet from left to right: West of Chipps, South Delta Entrainment, Remaining in Delta, Crossed SJR to S. Delta) for neutrally buoyant particles injected at Yolo region by OMR Bin (from top left to bottom right: -2,000 cfs, -3,500 cfs, -5,000 cfs, -5,500 cfs) for the No Action Alternative, EXP 1, EXP 3, four phases of Alternative 2, and Action 5.

### *I.8.4.4.2 Surface Oriented, Inflow and OMR Bins, December through March[BA, Figure I.8-20 through Figure I.8-37]*

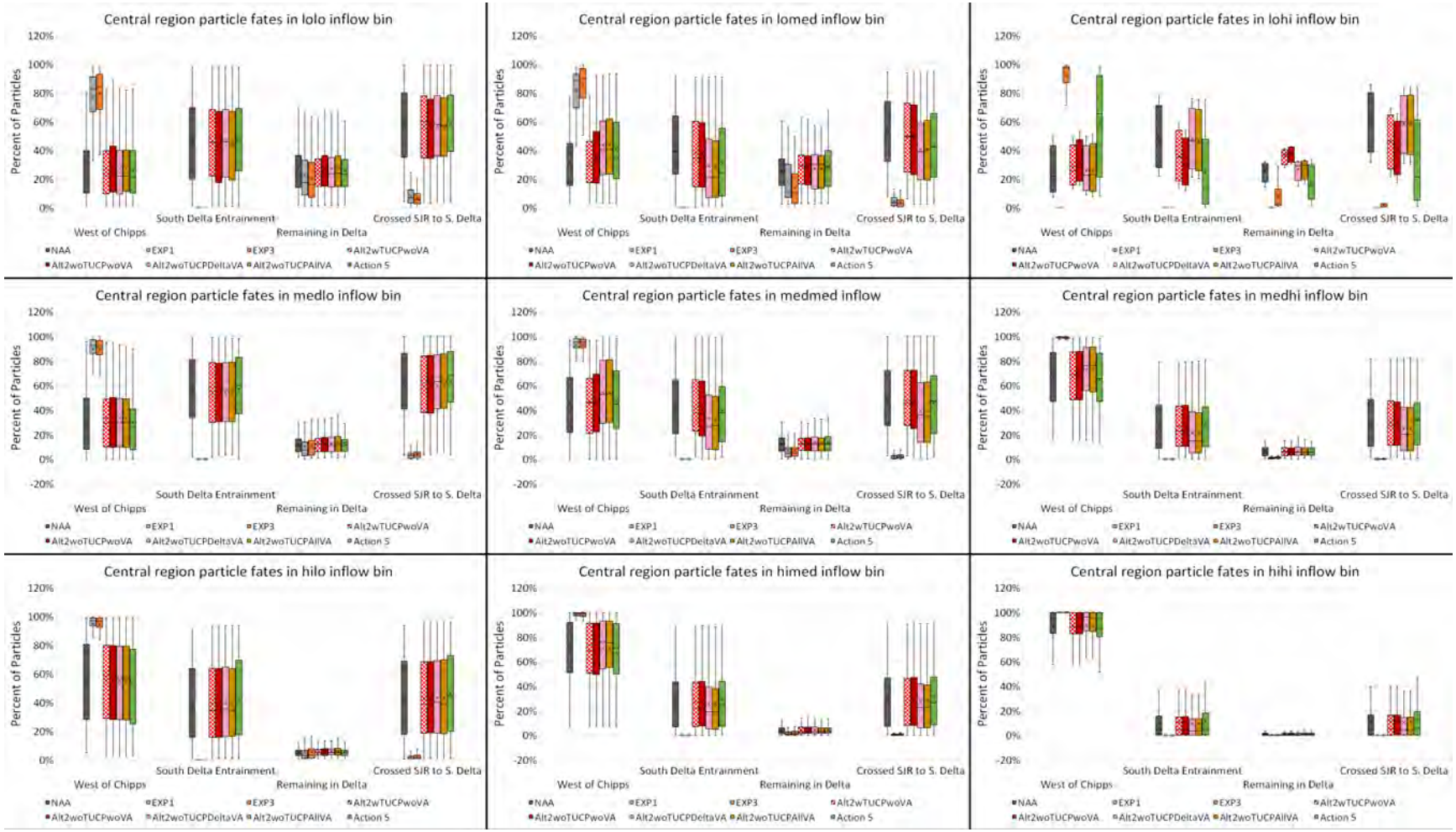



Figure I.8-20. Box and whisker plot of mean December through March particle fate after 45 days by exit location (within each facet from left to right: West of Chipps, South Delta Entrainment, Remaining in Delta, Crossed SJR to S. Delta) for surface oriented particles injected at Central Delta region by Inflow Bin (from top left to bottom right: "lolo" to "hihi") for the No Action Alternative, EXP 1, EXP 3, four phases of Alternative 2, and Action 5.

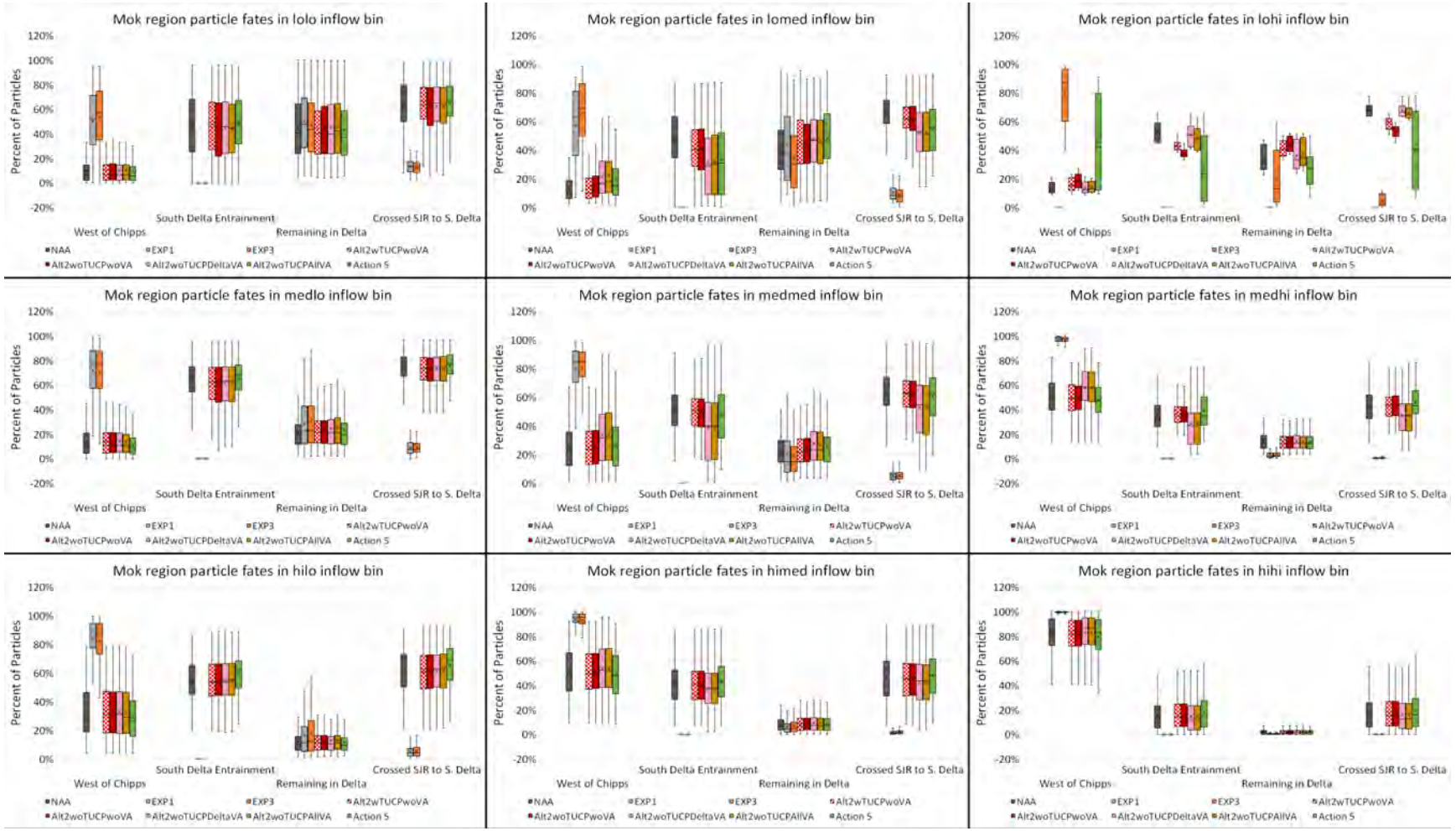



Figure I.8-21. Box and whisker plot of mean December through March particle fate after 45 days by exit location (within each facet from left to right: West of Chipps, South Delta Entrainment, Remaining in Delta, Crossed SJR to S. Delta) for surface oriented particles injected at Mokelumne River region by Inflow Bin (from top left to bottom right: “lolo” to “hihi”) for the No Action Alternative, EXP 1, EXP 3, four phases of Alternative 2, and Action 5.

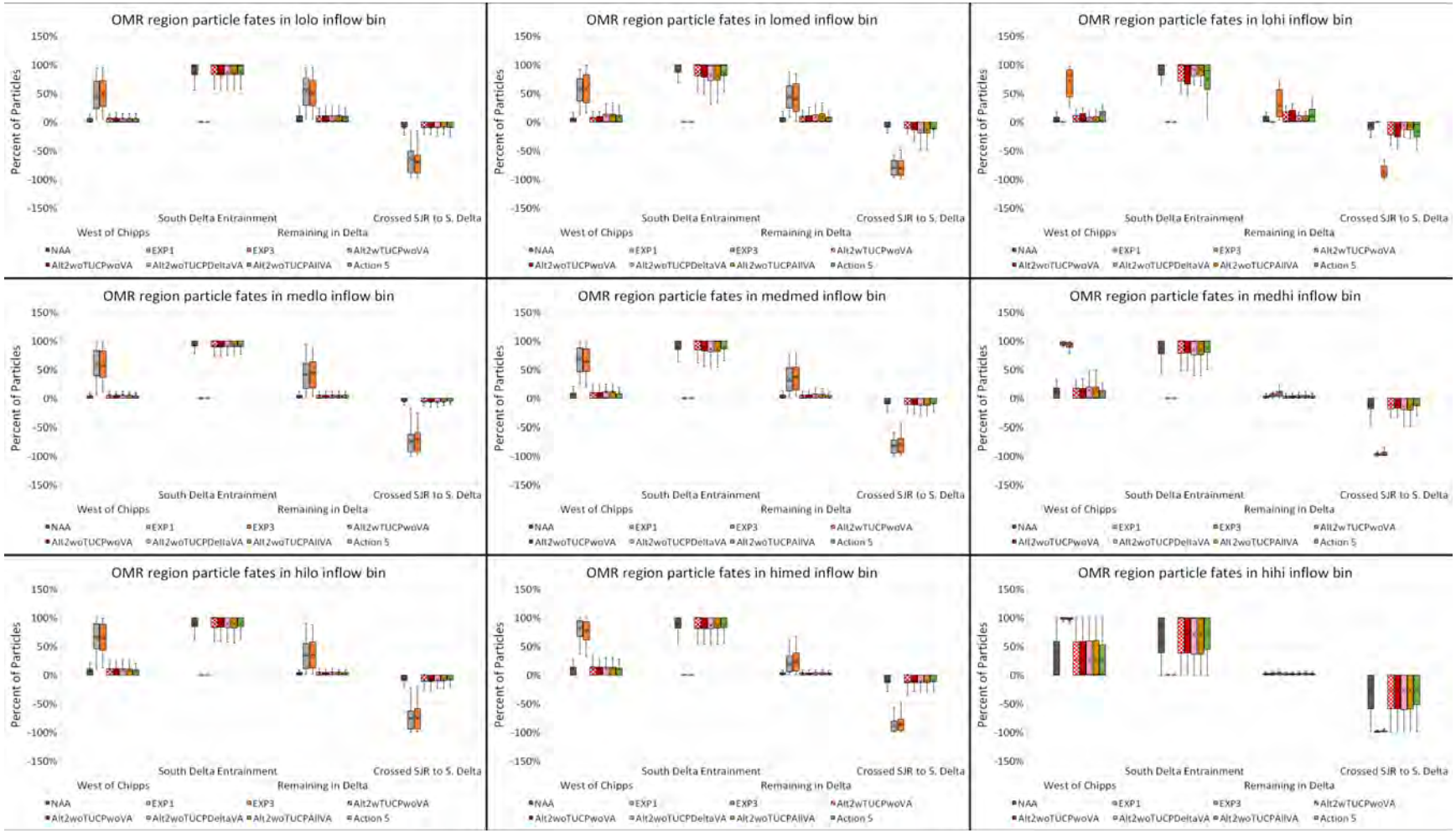



Figure I.8-22. Box and whisker plot of mean December through March particle fate after 45 days by exit location (within each facet from left to right: West of Chipps, South Delta Entrainment, Remaining in Delta, Crossed SJR to S. Delta) for surface oriented particles injected at Old and Middle River region by Inflow Bin (from top left to bottom right: "lolo" to "hihi") for the No Action Alternative, EXP 1, EXP 3, four phases of Alternative 2, and Action 5.

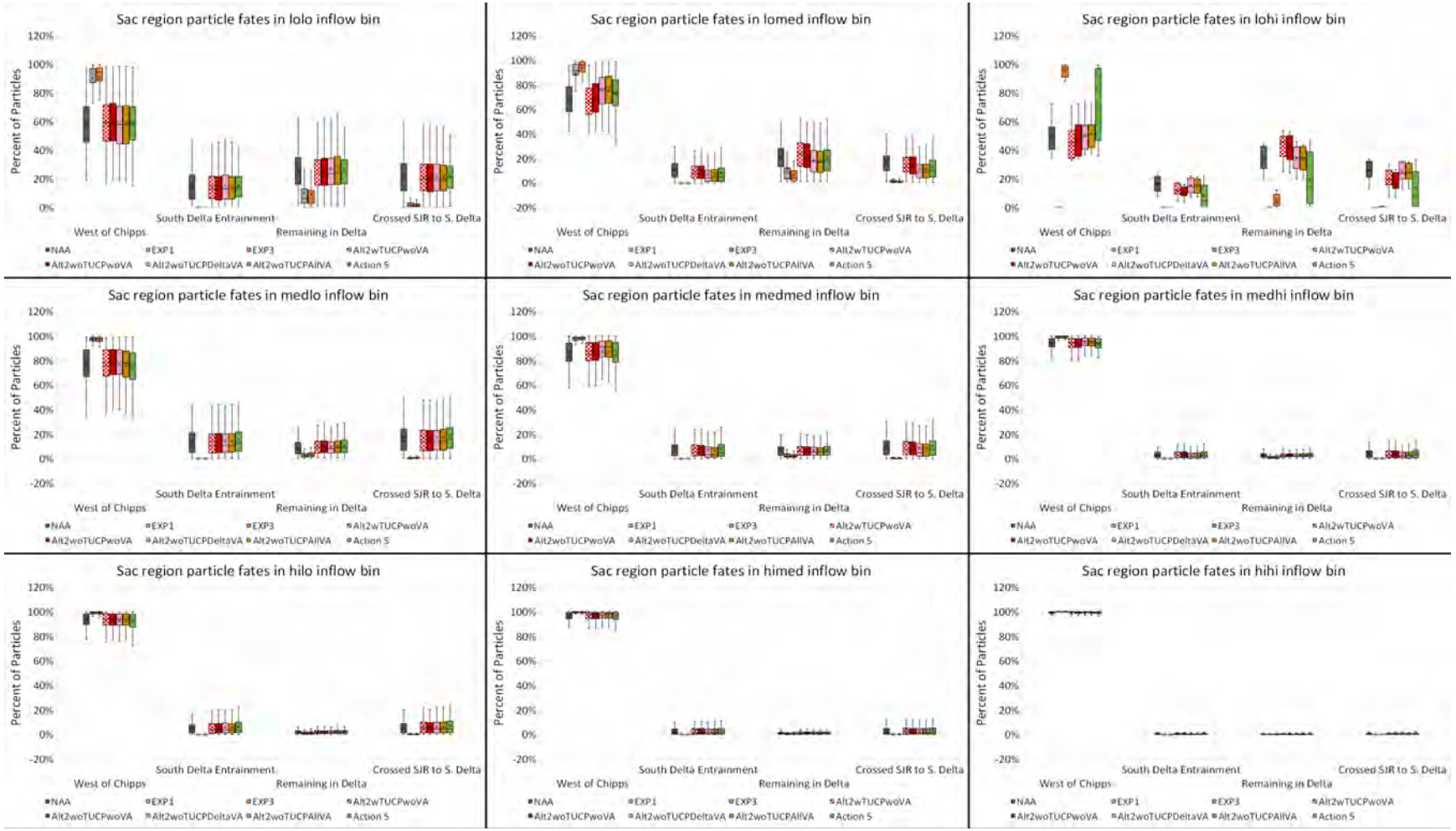



Figure I.8-23. Box and whisker plot of mean December through March particle fate after 45 days by exit location (within each facet from left to right: West of Chipps, South Delta Entrainment, Remaining in Delta, Crossed SJR to S. Delta) for surface oriented particles injected at Sacramento River region by Inflow Bin (from top left to bottom right: "lolo" to "hihi") for the No Action Alternative, EXP 1, EXP 3, four phases of Alternative 2, and Action 5.

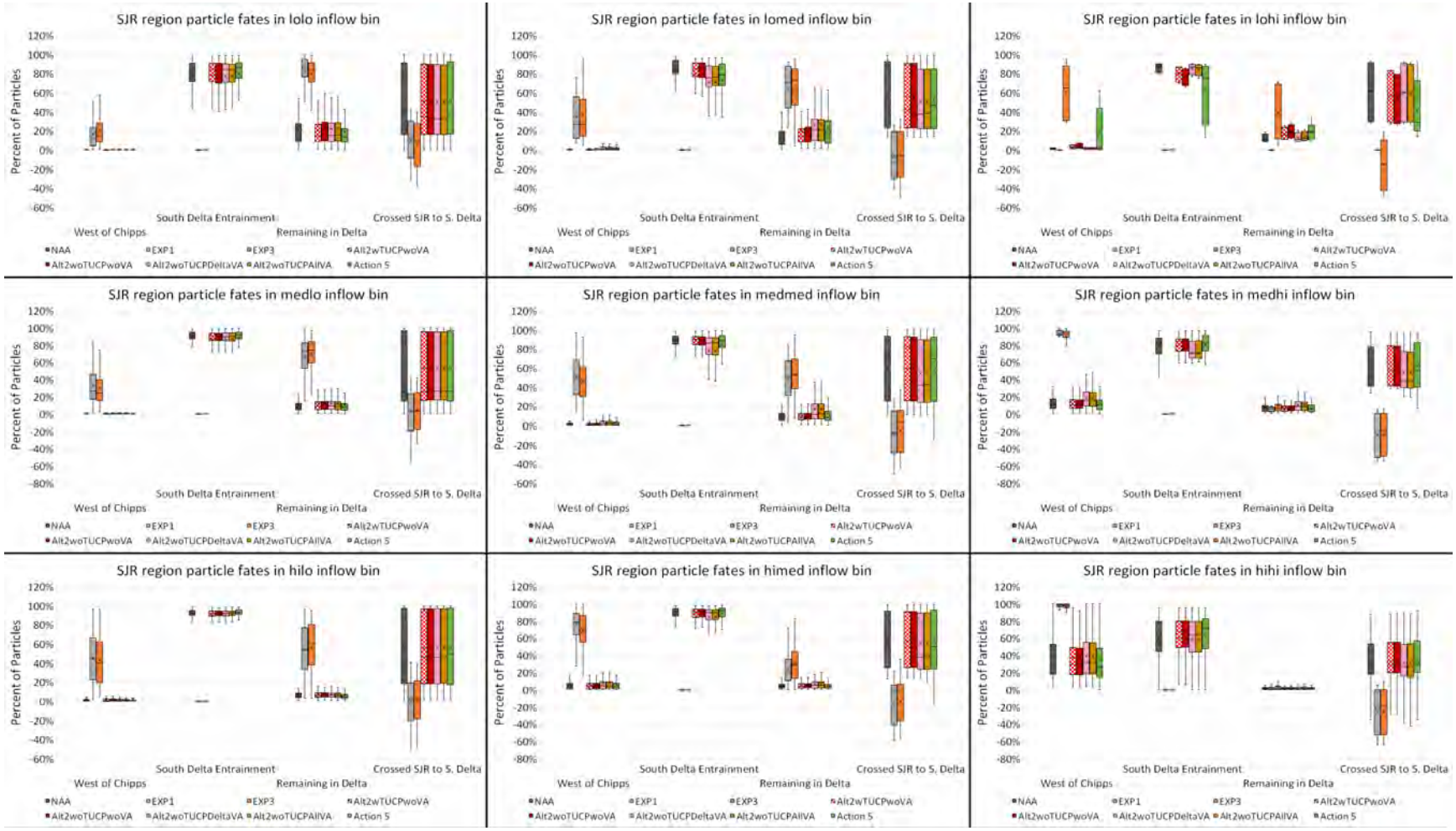



Figure I.8-24. Box and whisker plot of mean December through March particle fate after 45 days by exit location (within each facet from left to right: West of Chipps, South Delta Entrainment, Remaining in Delta, Crossed SJR to S. Delta) for surface oriented particles injected at San Joaquin River region by Inflow Bin (from top left to bottom right: “lolo” to “hihi”) for the No Action Alternative, EXP 1, EXP 3, four phases of Alternative 2, and Action 5.

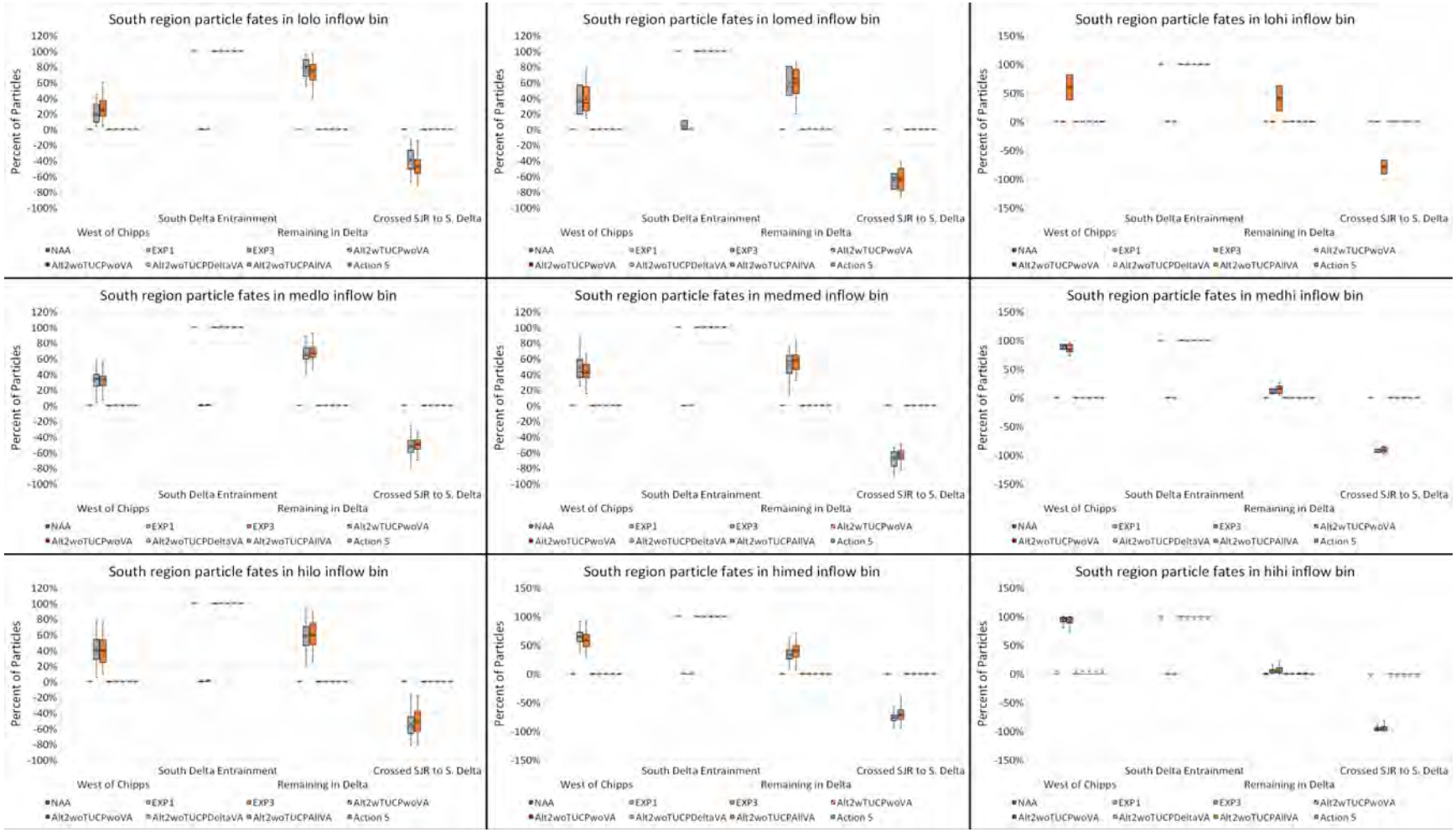



Figure I.8-25. Box and whisker plot of mean December through March particle fate after 45 days by exit location (within each facet from left to right: West of Chipps, South Delta Entrainment, Remaining in Delta, Crossed SJR to S. Delta) for surface oriented particles injected at South Delta region by Inflow Bin (from top left to bottom right: "lolo" to "hihi") for the No Action Alternative, EXP 1, EXP 3, four phases of Alternative 2, and Action 5.

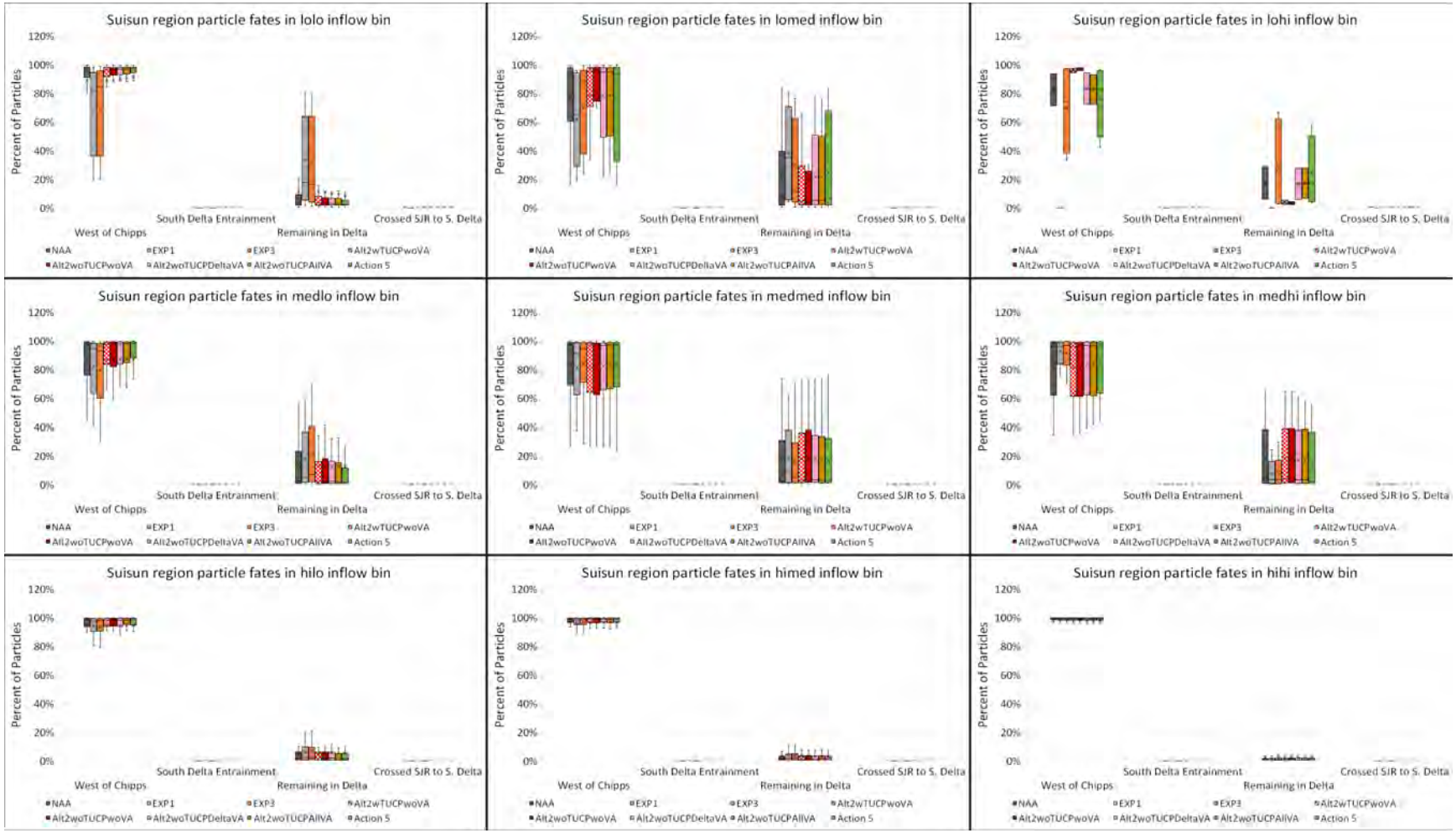



Figure I.8-26. Box and whisker plot of mean December through March particle fate after 45 days by exit location (within each facet from left to right: West of Chipps, South Delta Entrainment, Remaining in Delta, Crossed SJR to S. Delta) for surface oriented particles injected at Suisun region by Inflow Bin (from top left to bottom right: "lolo" to "hihi") for the No Action Alternative, EXP 1, EXP 3, four phases of Alternative 2, and Action 5.

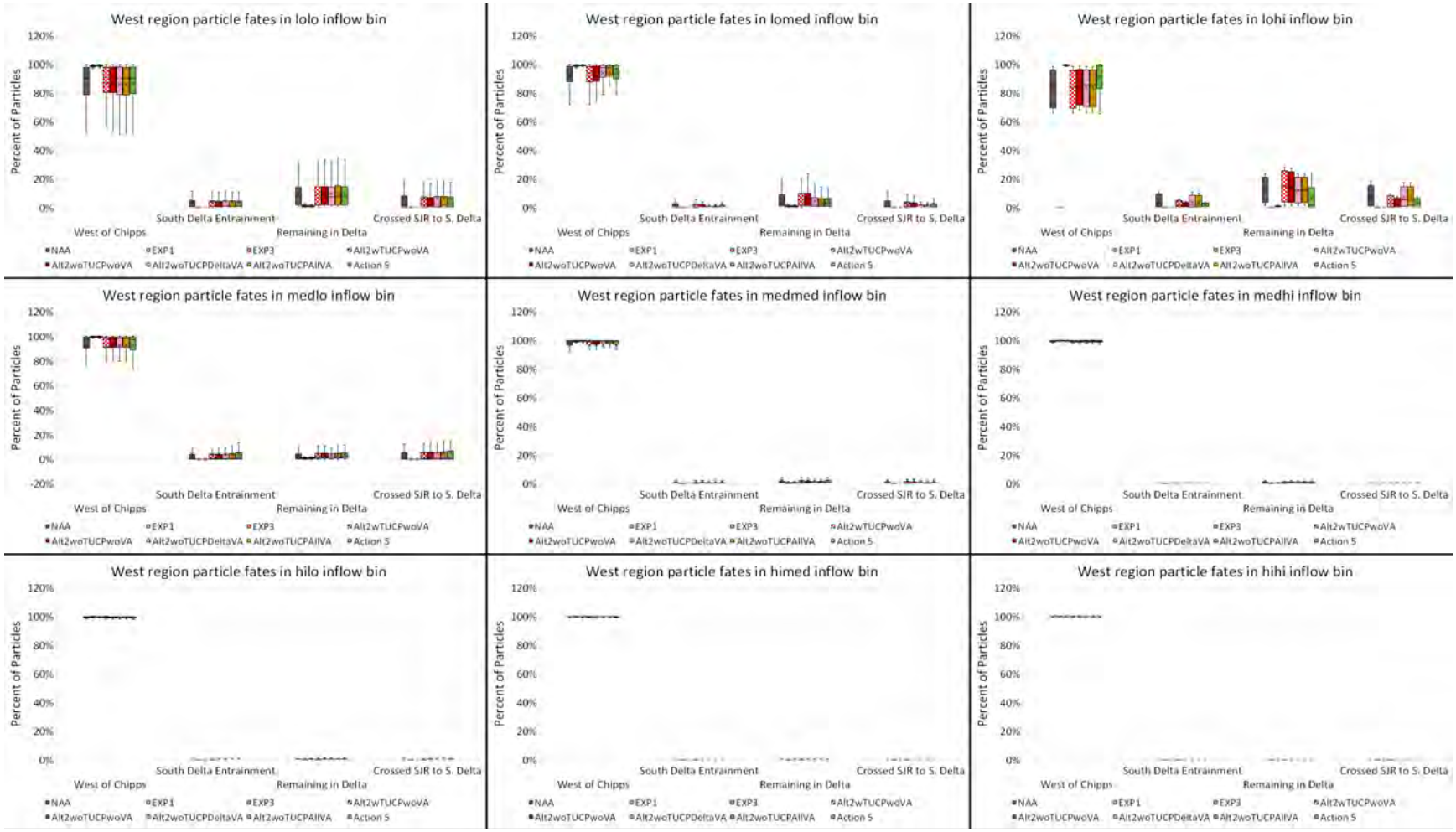



Figure I.8-27. Box and whisker plot of mean December through March particle fate after 45 days by exit location (within each facet from left to right: West of Chipps, South Delta Entrainment, Remaining in Delta, Crossed SJR to S. Delta) for surface oriented particles injected at West Delta region by Inflow Bin (from top left to bottom right: "lolo" to "hihi") for the No Action Alternative, EXP 1, EXP 3, four phases of Alternative 2, and Action 5.

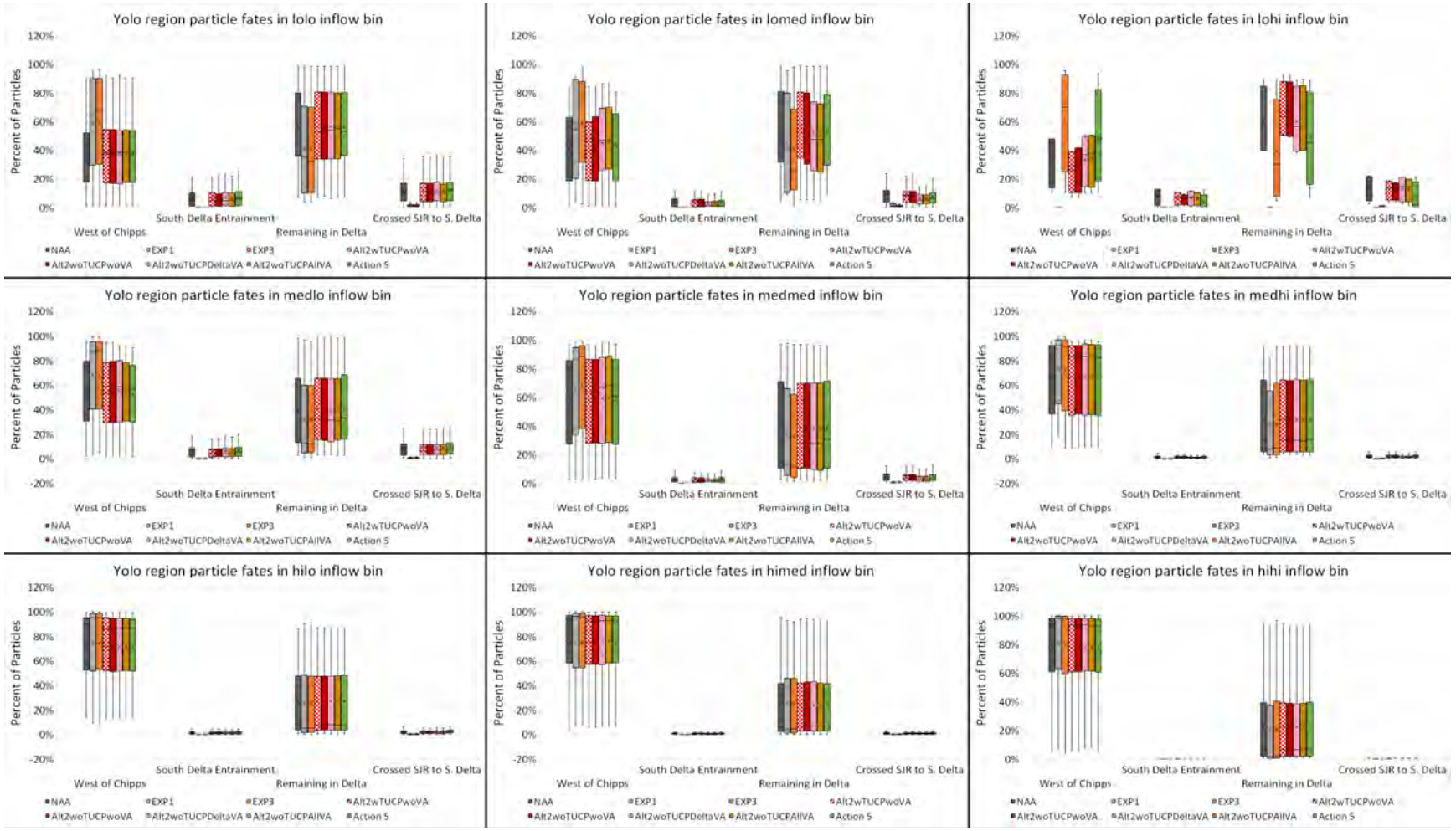



Figure I.8-28. Box and whisker plot of mean December through March particle fate after 45 days by exit location (within each facet from left to right: West of Chipps, South Delta Entrainment, Remaining in Delta, Crossed SJR to S. Delta) for surface oriented particles injected at Yolo region by Inflow Bin (from top left to bottom right: "lolo" to "hihi") for the No Action Alternative, EXP 1, EXP 3, four phases of Alternative 2, and Action 5.

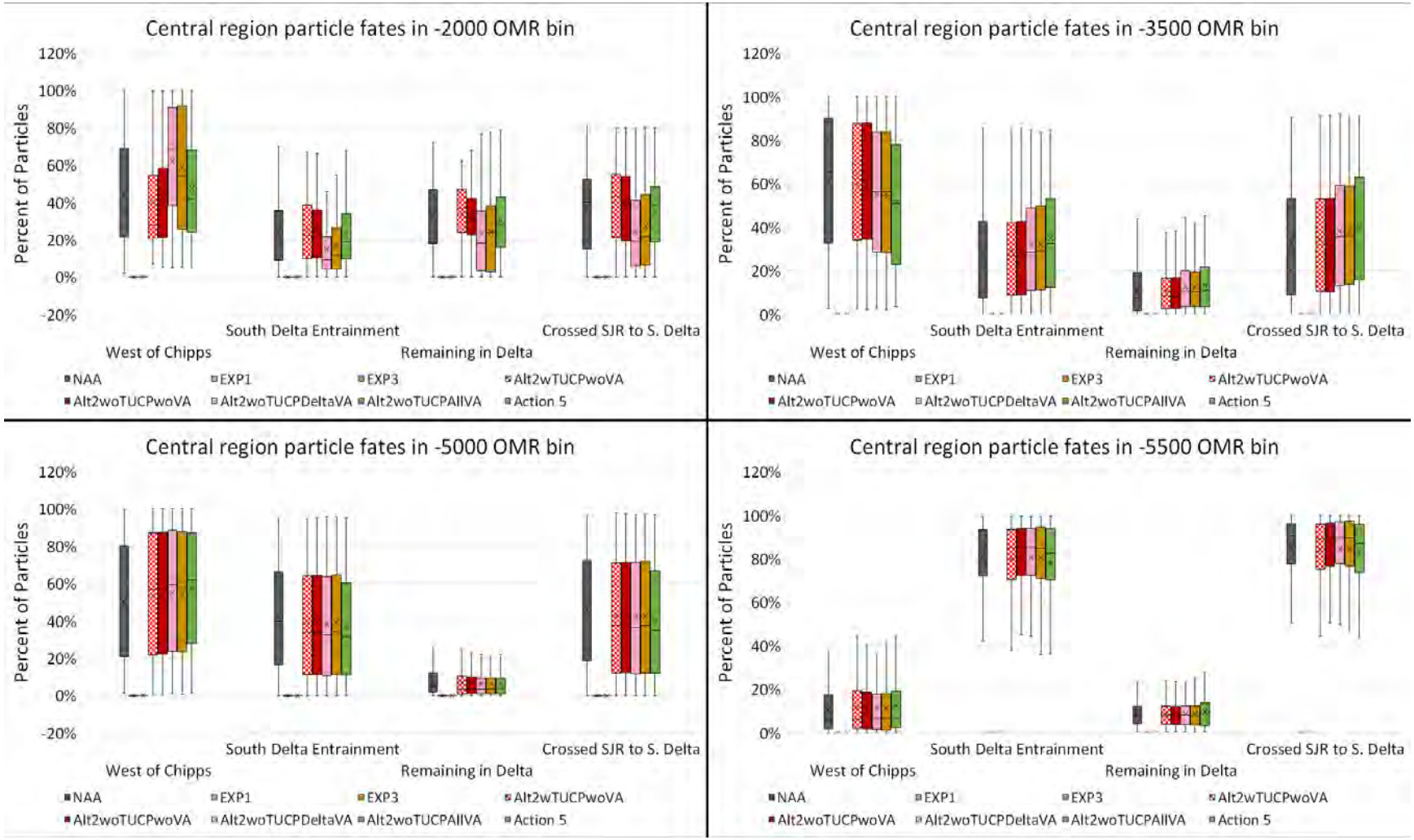



Figure I.8-29. Box and whisker plot of mean December through March particle fate after 45 days by exit location (within each facet from left to right: West of Chipps, South Delta Entrainment, Remaining in Delta, Crossed SJR to S. Delta) for surface oriented particles injected at Central Delta region by OMR Bin (from top left to bottom right: -2,000 cfs, -3,500 cfs, -5,000 cfs, -5,500 cfs) for the No Action Alternative, EXP 1, EXP 3, four phases of Alternative 2, and Action 5.

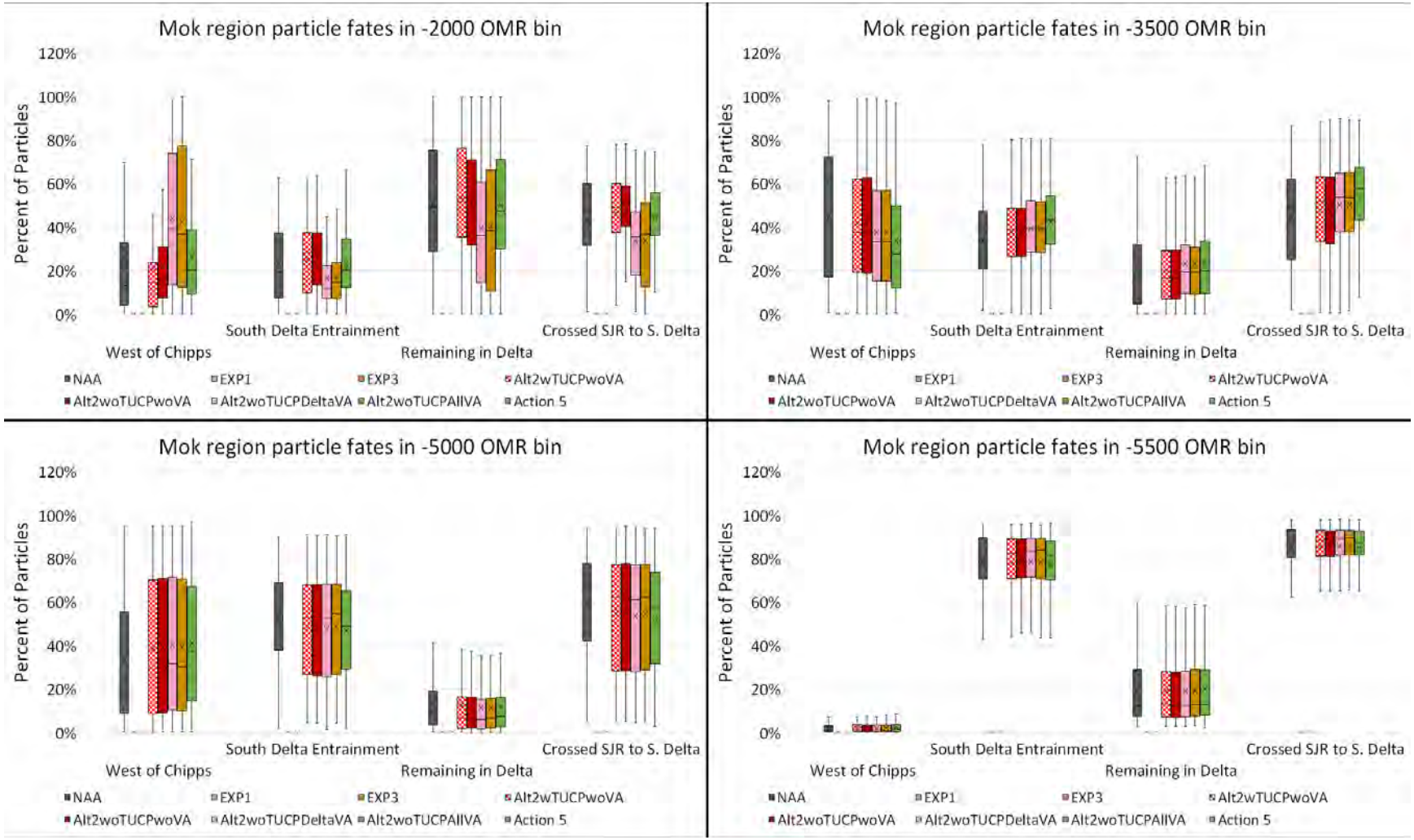



Figure I.8-30. Box and whisker plot of mean December through March particle fate after 45 days by exit location (within each facet from left to right: West of Chipps, South Delta Entrainment, Remaining in Delta, Crossed SJR to S. Delta) for surface oriented particles injected at Mokelumne River region by OMR Bin (from top left to bottom right: -2,000 cfs, -3,500 cfs, -5,000 cfs, -5,500 cfs) for the No Action Alternative, EXP 1, EXP 3, four phases of Alternative 2, and Action 5.

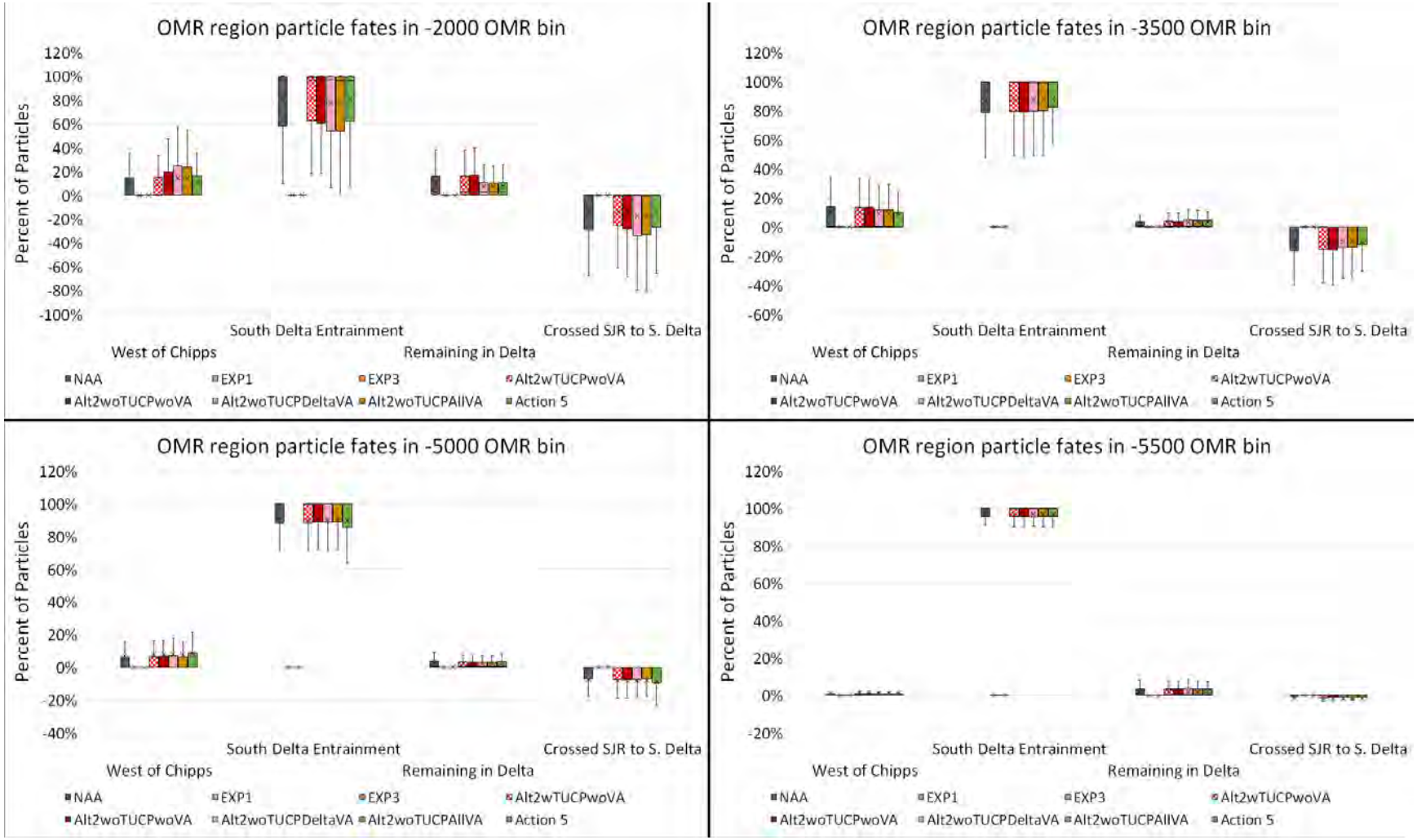



Figure I.8-31. Box and whisker plot of mean December through March particle fate after 45 days by exit location (within each facet from left to right: West of Chipps, South Delta Entrainment, Remaining in Delta, Crossed SJR to S. Delta) for surface oriented particles injected at Old and Middle River region by OMR Bin (from top left to bottom right: -2,000 cfs, -3,500 cfs, -5,000 cfs, -5,500 cfs) for the No Action Alternative, EXP 1, EXP 3, four phases of Alternative 2, and Action 5.

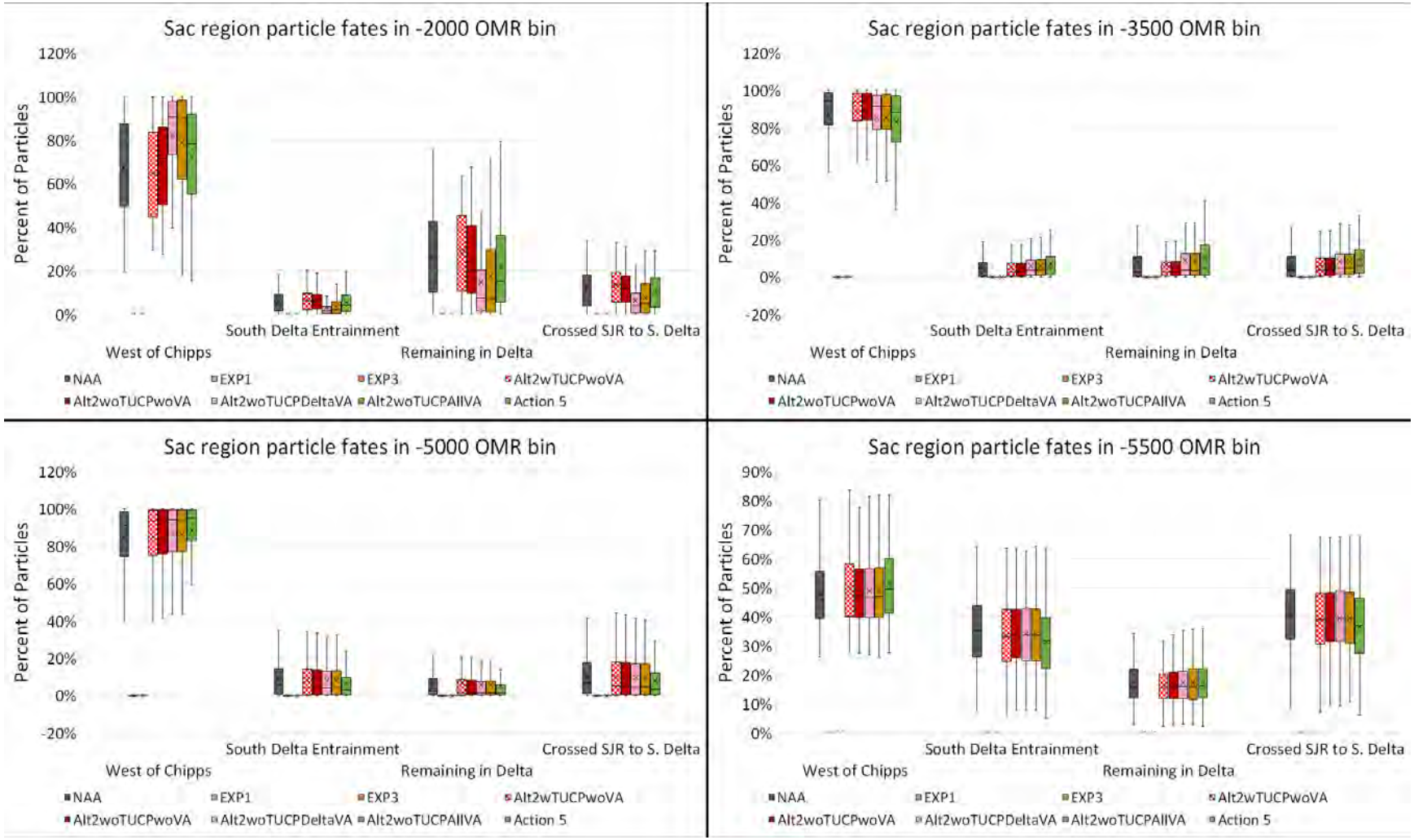



Figure I.8-32. Box and whisker plot of mean December through March particle fate after 45 days by exit location (within each facet from left to right: West of Chipps, South Delta Entrainment, Remaining in Delta, Crossed SJR to S. Delta) for surface oriented particles injected at Sacramento River region by OMR Bin (from top left to bottom right: -2,000 cfs, -3,500 cfs, -5,000 cfs, -5,500 cfs) for the No Action Alternative, EXP 1, EXP 3, four phases of Alternative 2, and Action 5.

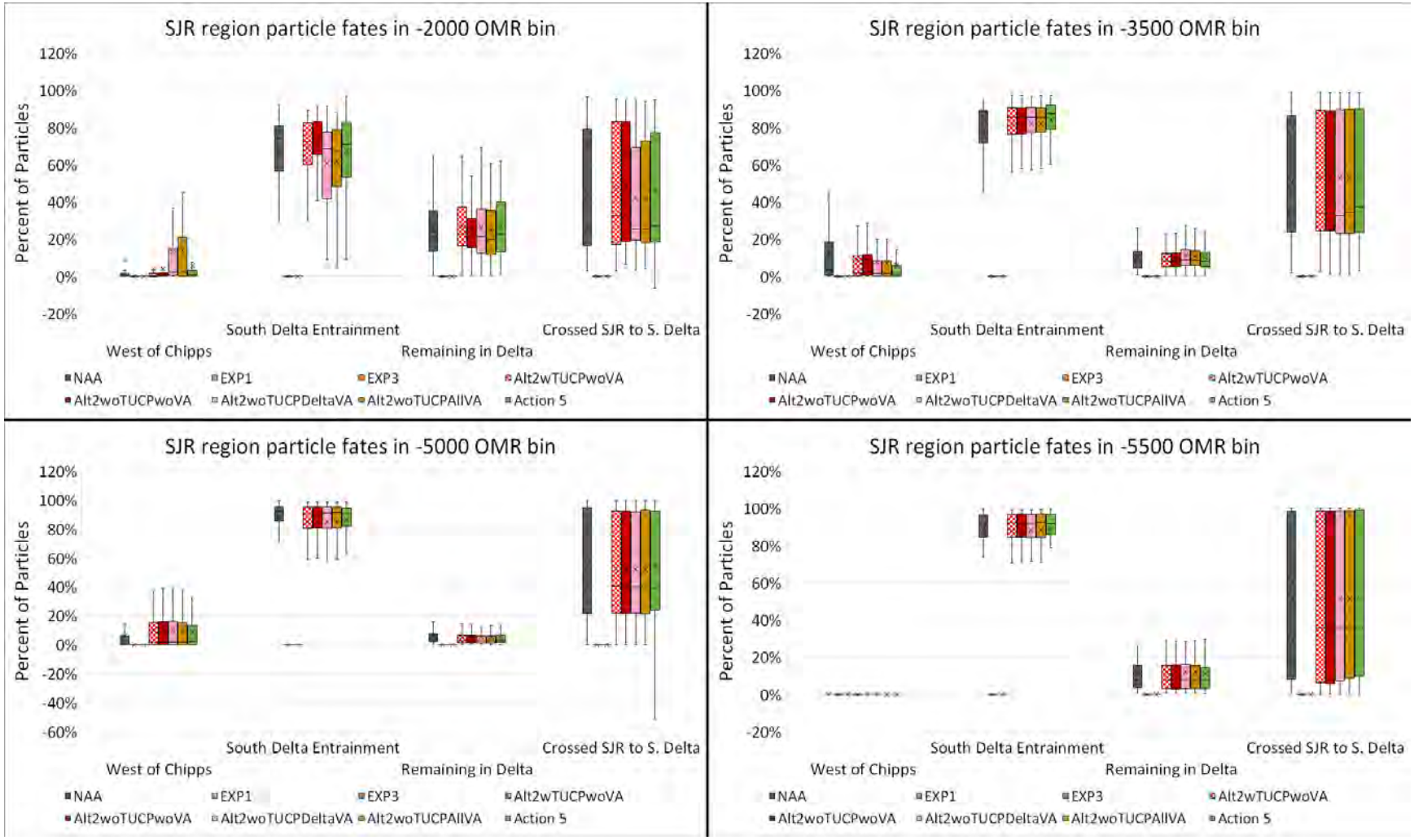



Figure I.8-33. Box and whisker plot of mean December through March particle fate after 45 days by exit location (within each facet from left to right: West of Chipps, South Delta Entrainment, Remaining in Delta, Crossed SJR to S. Delta) for surface oriented particles injected at San Joaquin River region by OMR Bin (from top left to bottom right: -2,000 cfs, -3,500 cfs, -5,000 cfs, -5,500 cfs) for the No Action Alternative, EXP 1, EXP 3, four phases of Alternative 2, and Action 5.

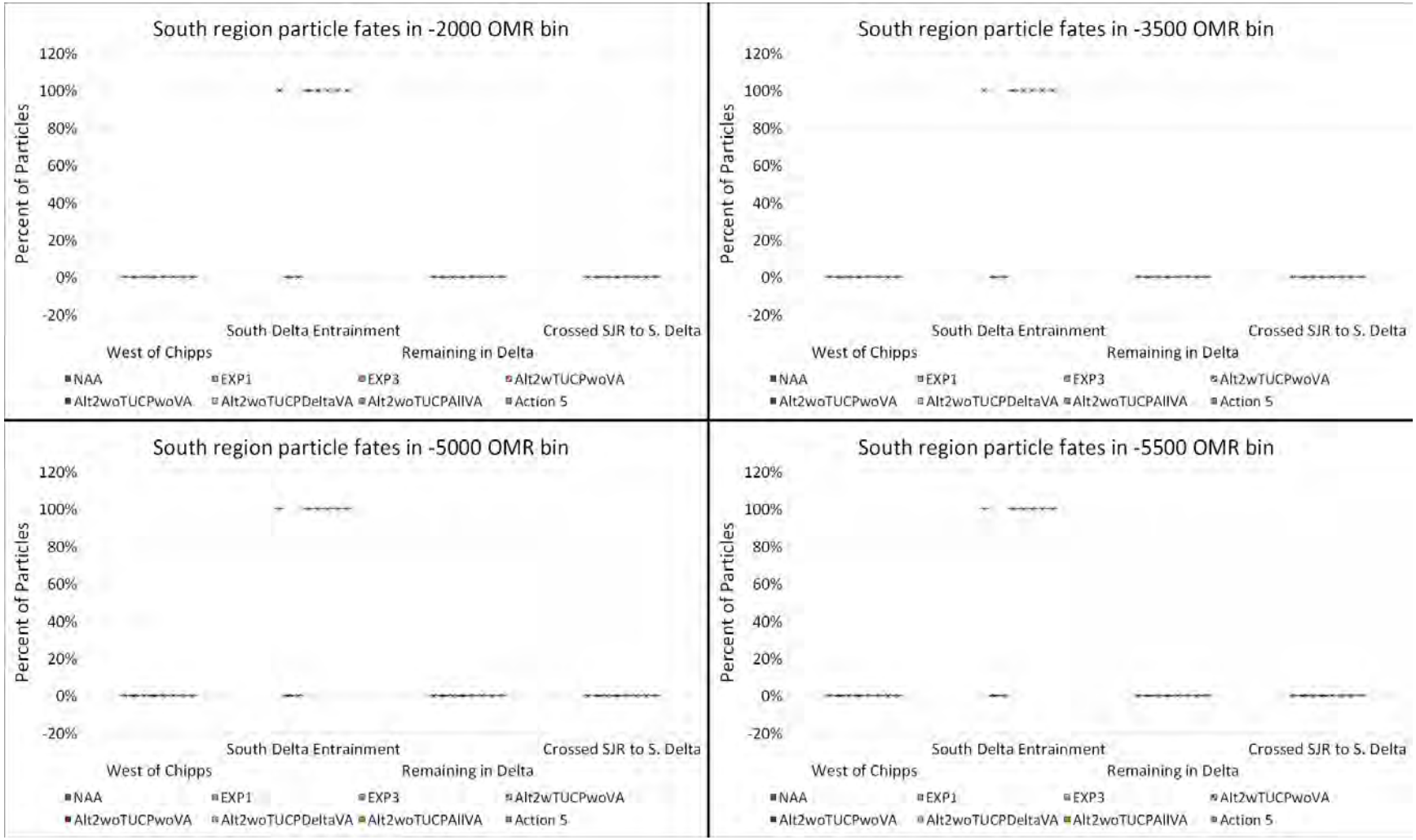



Figure I.8-34. Box and whisker plot of mean December through March particle fate after 45 days by exit location (within each facet from left to right: West of Chipps, South Delta Entrainment, Remaining in Delta, Crossed SJR to S. Delta) for surface oriented particles injected at South Delta region by OMR Bin (from top left to bottom right: -2,000 cfs, -3,500 cfs, -5,000 cfs, -5,500 cfs) for the No Action Alternative, EXP 1, EXP 3, four phases of Alternative 2, and Action 5.

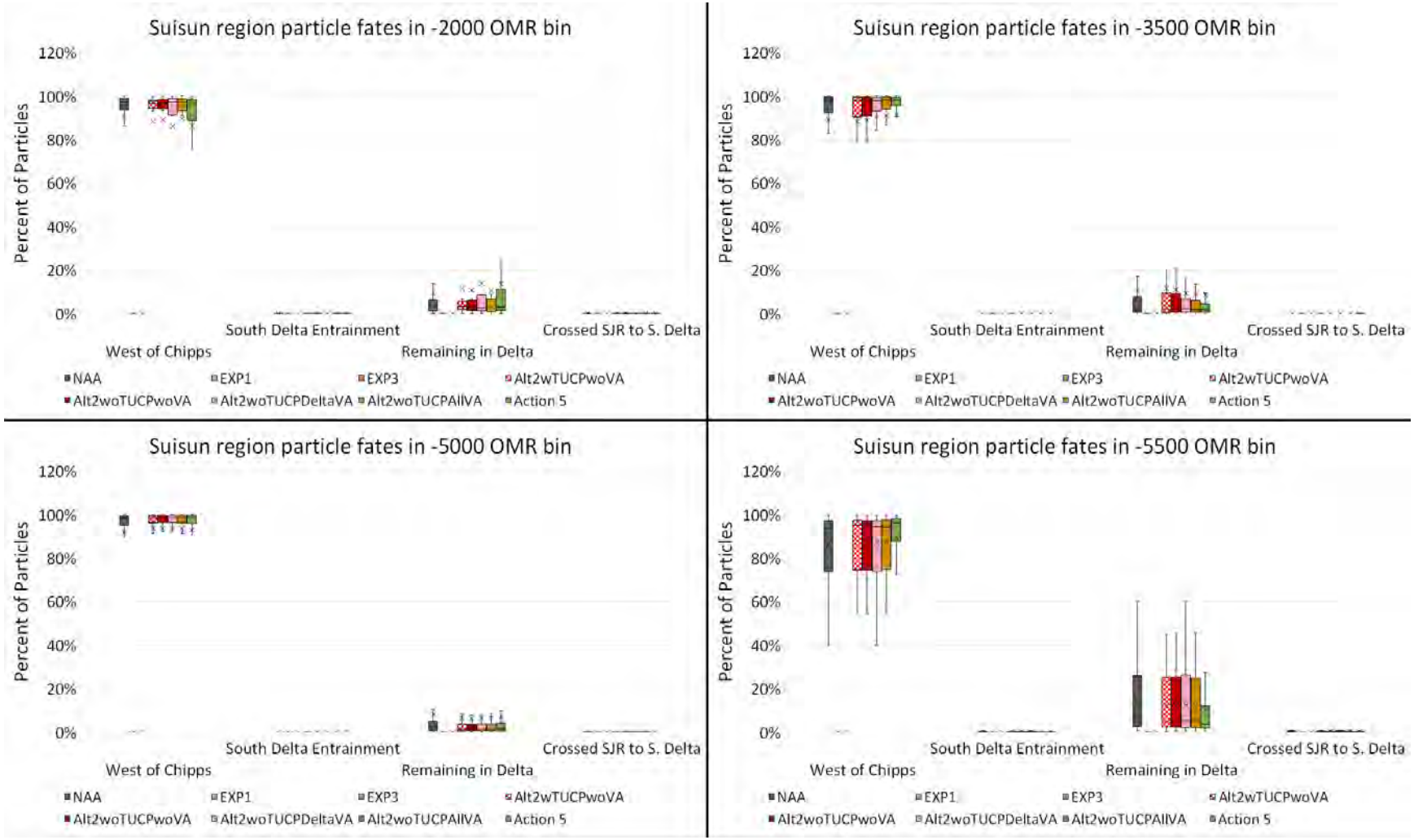



Figure I.8-35. Box and whisker plot of mean December through March particle fate after 45 days by exit location (within each facet from left to right: West of Chipps, South Delta Entrainment, Remaining in Delta, Crossed SJR to S. Delta) for surface oriented particles injected at Suisun region by OMR Bin (from top left to bottom right: -2,000 cfs, -3,500 cfs, -5,000 cfs, -5,500 cfs) for the No Action Alternative, EXP 1, EXP 3, four phases of Alternative 2, and Action 5.

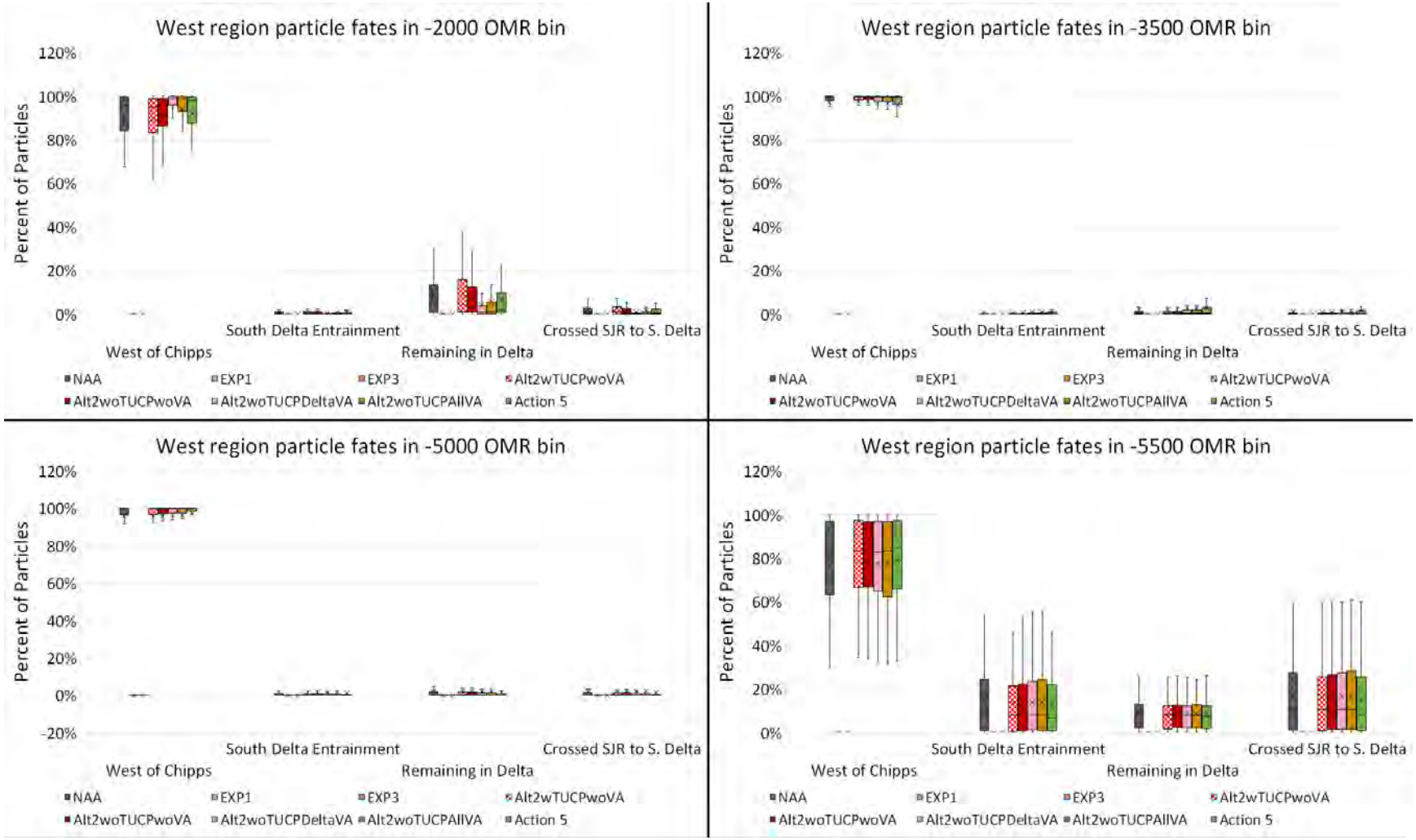



Figure I.8-36. Box and whisker plot of mean December through March particle fate after 45 days by exit location (within each facet from left to right: West of Chipps, South Delta Entrainment, Remaining in Delta, Crossed SJR to S. Delta) for surface oriented particles injected at West Delta region by OMR Bin (from top left to bottom right: -2,000 cfs, -3,500 cfs, -5,000 cfs, -5,500 cfs) for the No Action Alternative, EXP 1, EXP 3, four phases of Alternative 2, and Action 5.

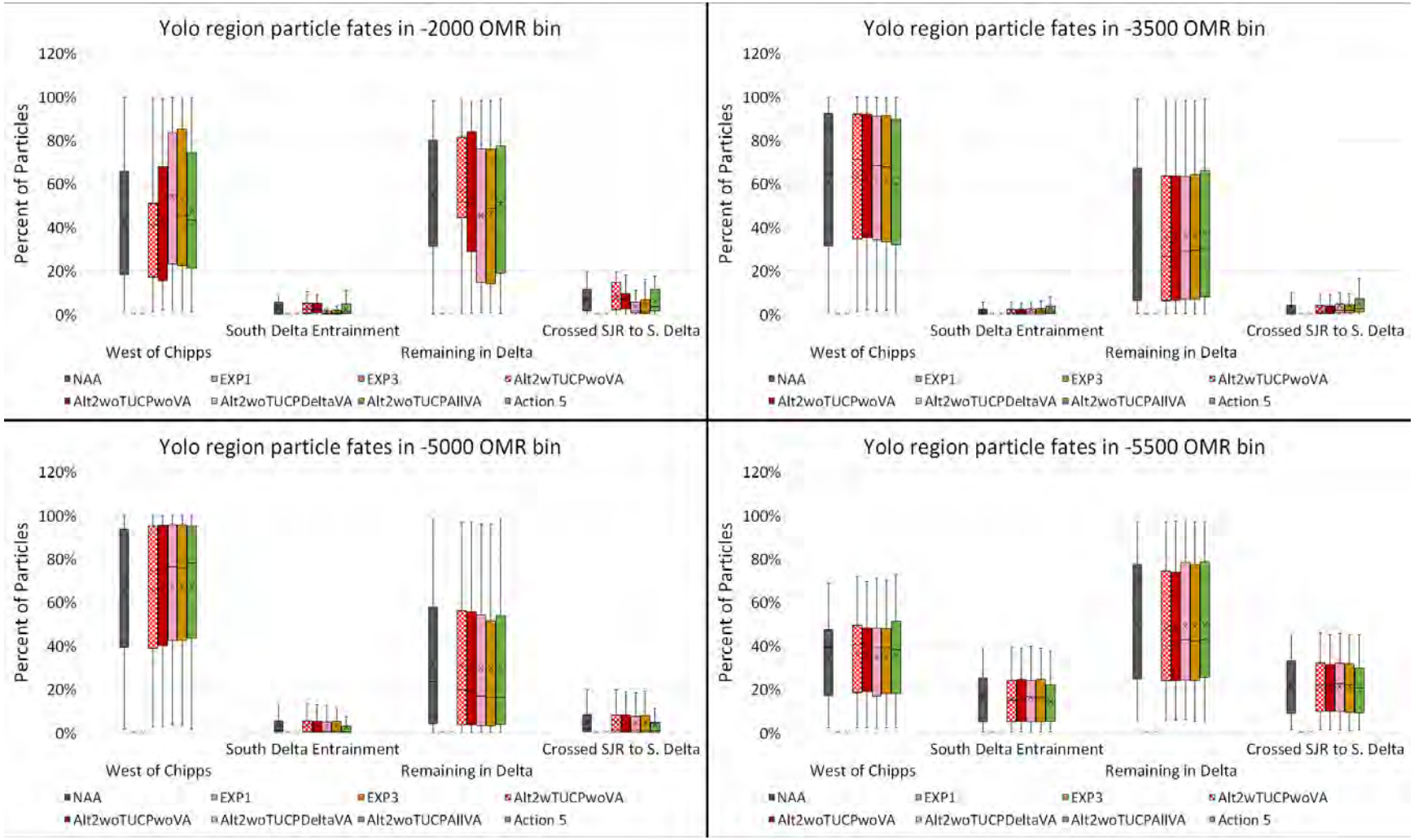



Figure I.8-37. Box and whisker plot of mean December through March particle fate after 45 days by exit location (within each facet from left to right: West of Chipps, South Delta Entrainment, Remaining in Delta, Crossed SJR to S. Delta) for surface oriented particles injected at Yolo region by OMR Bin (from top left to bottom right: -2,000 cfs, -3,500 cfs, -5,000 cfs, -5,500 cfs) for the No Action Alternative, EXP 1, EXP 3, four phases of Alternative 2, and Action 5.

### *I.8.4.4.3 Neutrally Buoyant, Inflow and OMR Bins, March through June [EIS, Figure I.8-38 through Figure I.8-55]*

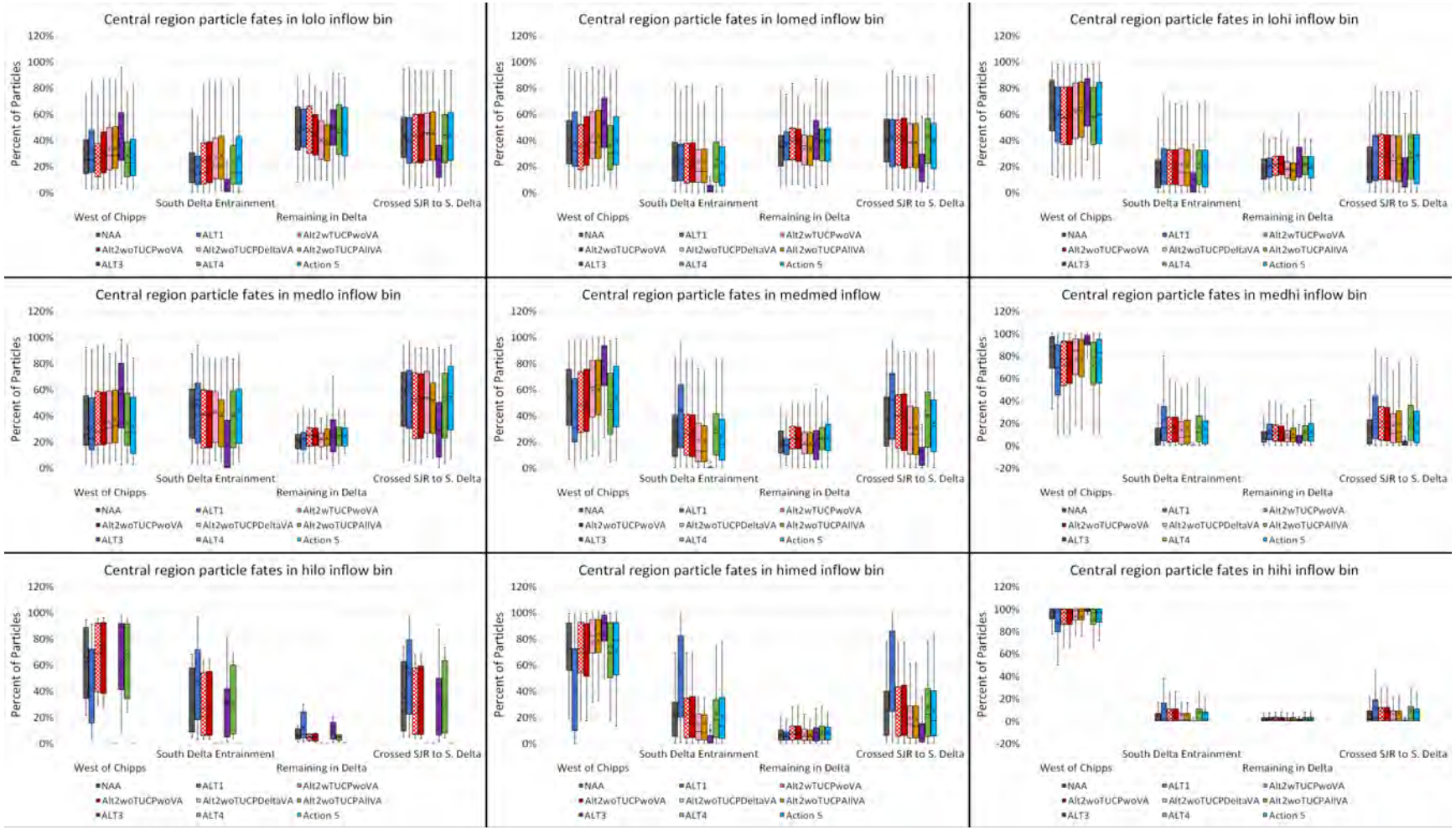



Figure I.8-38. Box and whisker plot of mean March through June particle fate after 45 days by exit location (within each facet from left to right: West of Chipps, South Delta Entrainment, Remaining in Delta, Crossed SJR to S. Delta) for neutrally buoyant particles injected at Central Delta region by Inflow Bin (from top left to bottom right: "lolo" to "hihi") for the No Action Alternative, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4, and Action 5.

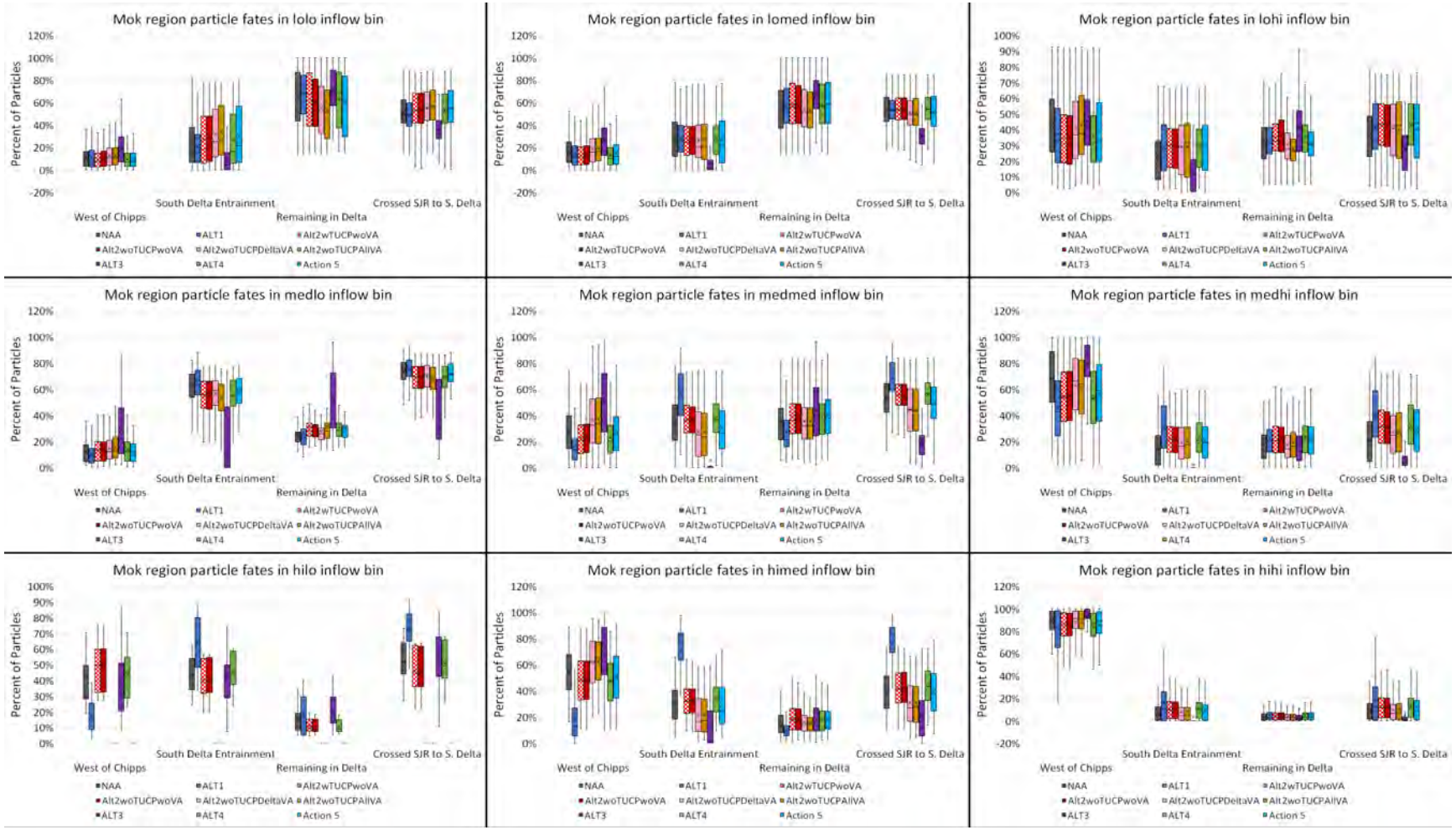



Figure I.8-39. Box and whisker plot of mean March through June particle fate after 45 days by exit location (within each facet from left to right: West of Chipps, South Delta Entrainment, Remaining in Delta, Crossed SJR to S. Delta) for neutrally buoyant particles injected at Mokelumne River region by Inflow Bin (from top left to bottom right: "lolo" to "hihi") for the No Action Alternative, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4, and Action 5.

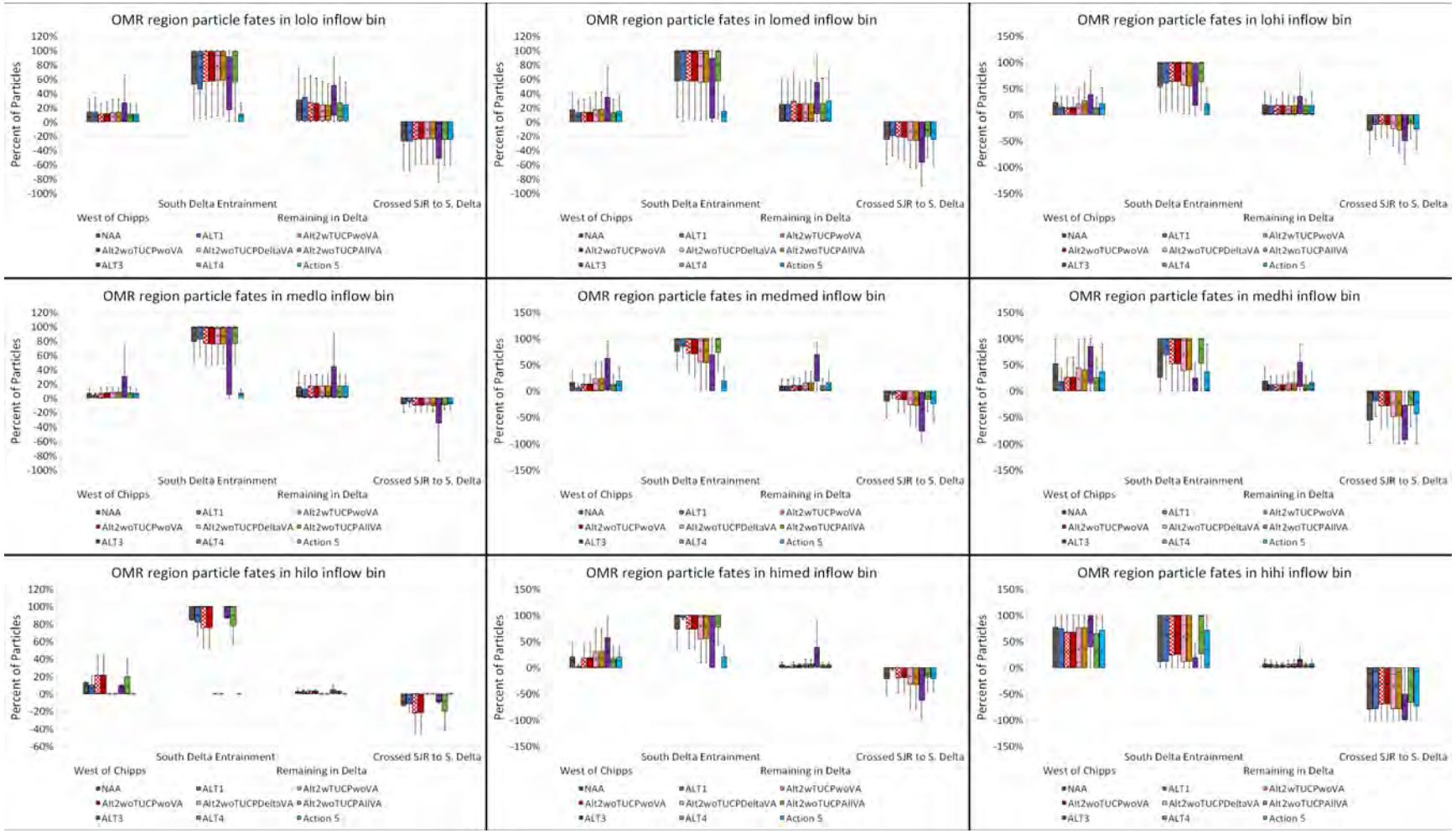



Figure I.8-40. Box and whisker plot of mean March through June particle fate after 45 days by exit location (within each facet from left to right: West of Chipps, South Delta Entrainment, Remaining in Delta, Crossed SJR to S. Delta) for neutrally buoyant particles injected at Old and Middle River region by Inflow Bin (from top left to bottom right: "lolo" to "hihi") for the No Action Alternative, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4, and Action 5.

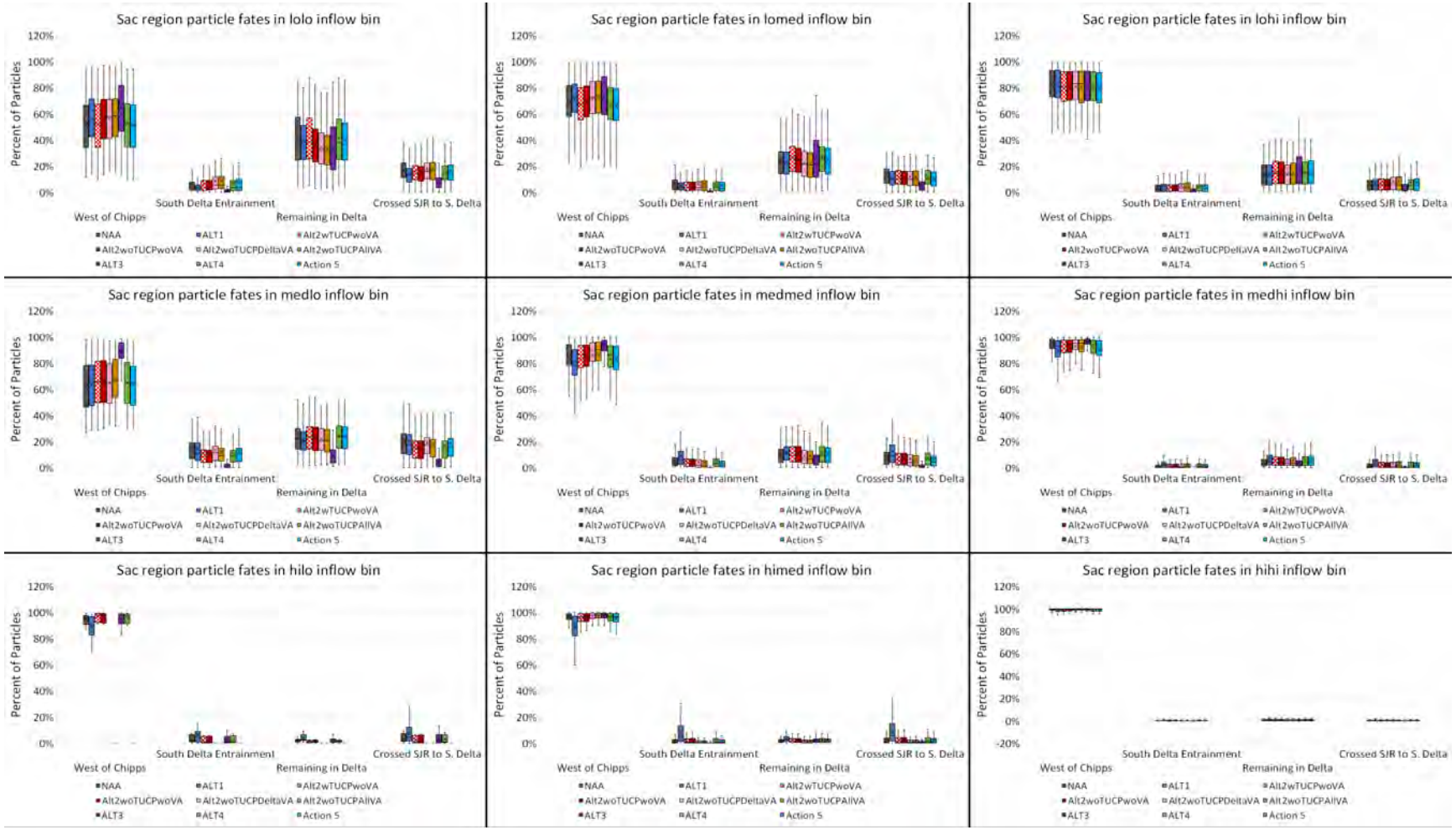



Figure I.8-41. Box and whisker plot of mean March through June particle fate after 45 days by exit location (within each facet from left to right: West of Chipps, South Delta Entrainment, Remaining in Delta, Crossed SJR to S. Delta) for neutrally buoyant particles injected at Sacramento River region by Inflow Bin (from top left to bottom right: "lolo" to "hihi") for the No Action Alternative, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4, and Action 5.

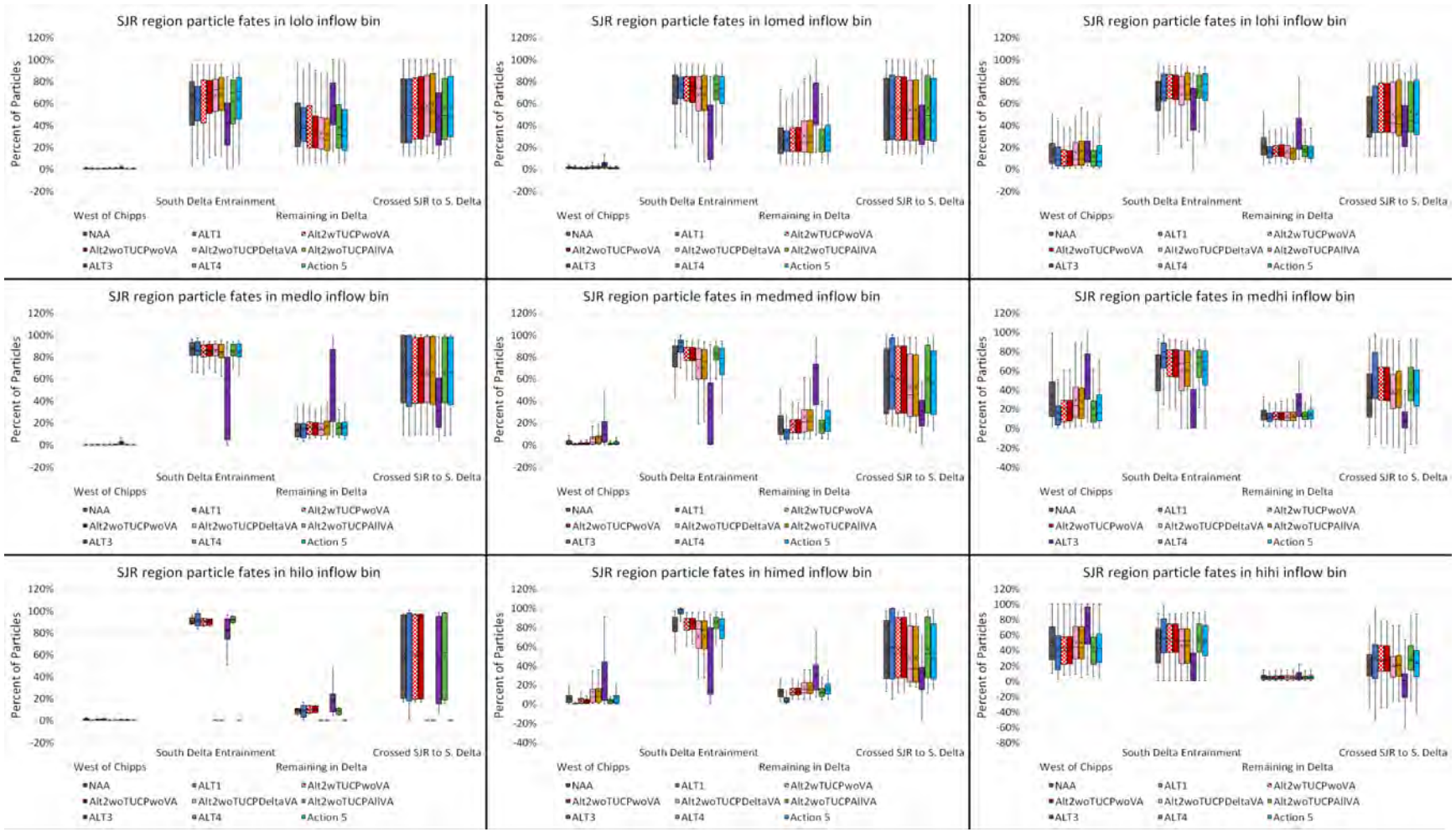



Figure I.8-42. Box and whisker plot of mean March through June particle fate after 45 days by exit location (within each facet from left to right: West of Chipps, South Delta Entrainment, Remaining in Delta, Crossed SJR to S. Delta) for neutrally buoyant particles injected at San Joaquin River region by Inflow Bin (from top left to bottom right: "lolo" to "hihi") for the No Action Alternative, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4, and Action 5.

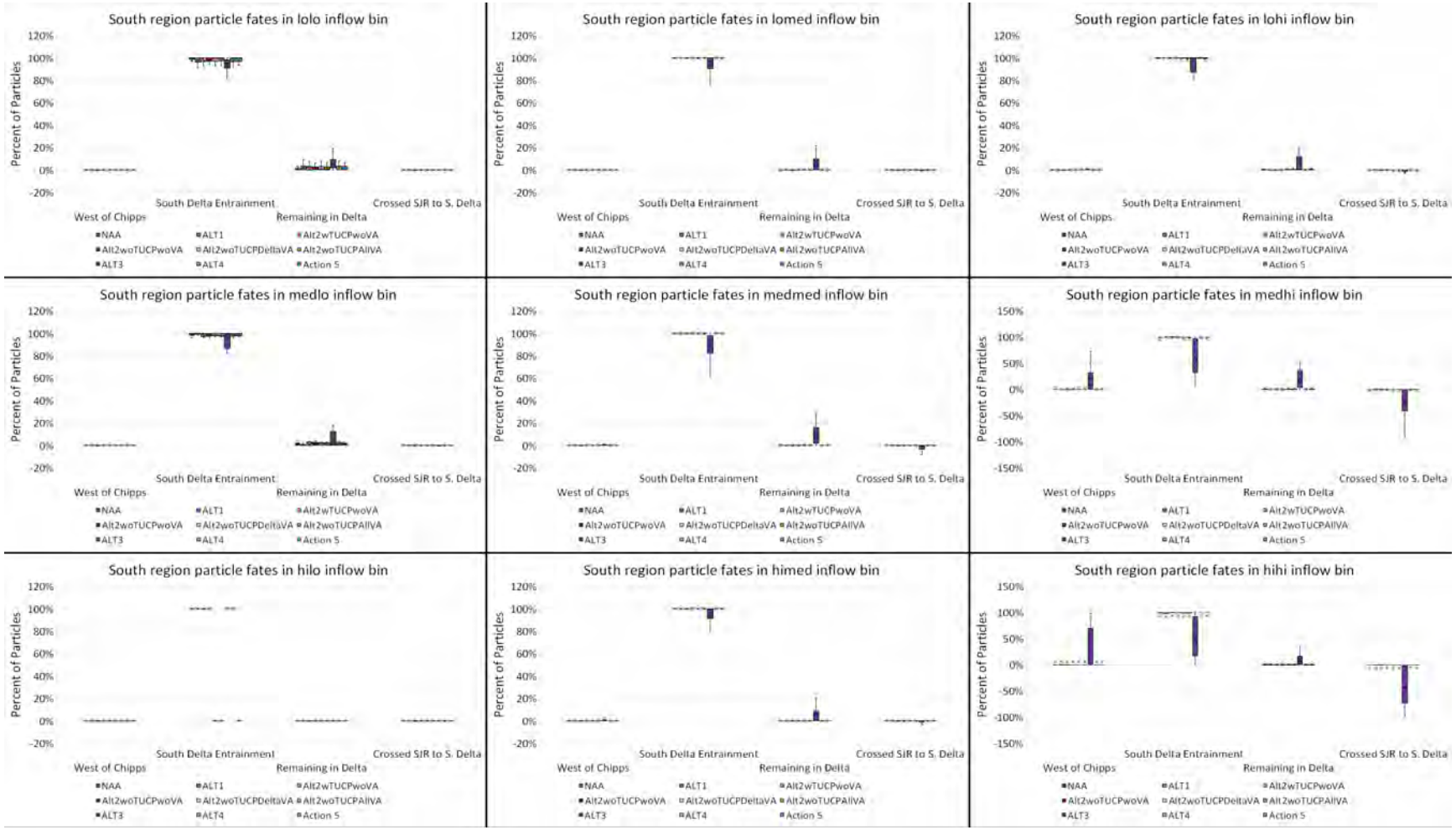



Figure I.8-43. Box and whisker plot of mean March through June particle fate after 45 days by exit location (within each facet from left to right: West of Chipps, South Delta Entrainment, Remaining in Delta, Crossed SJR to S. Delta) for neutrally buoyant particles injected at South Delta region by Inflow Bin (from top left to bottom right: "lolo" to "hihi") for the No Action Alternative, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4, and Action 5.

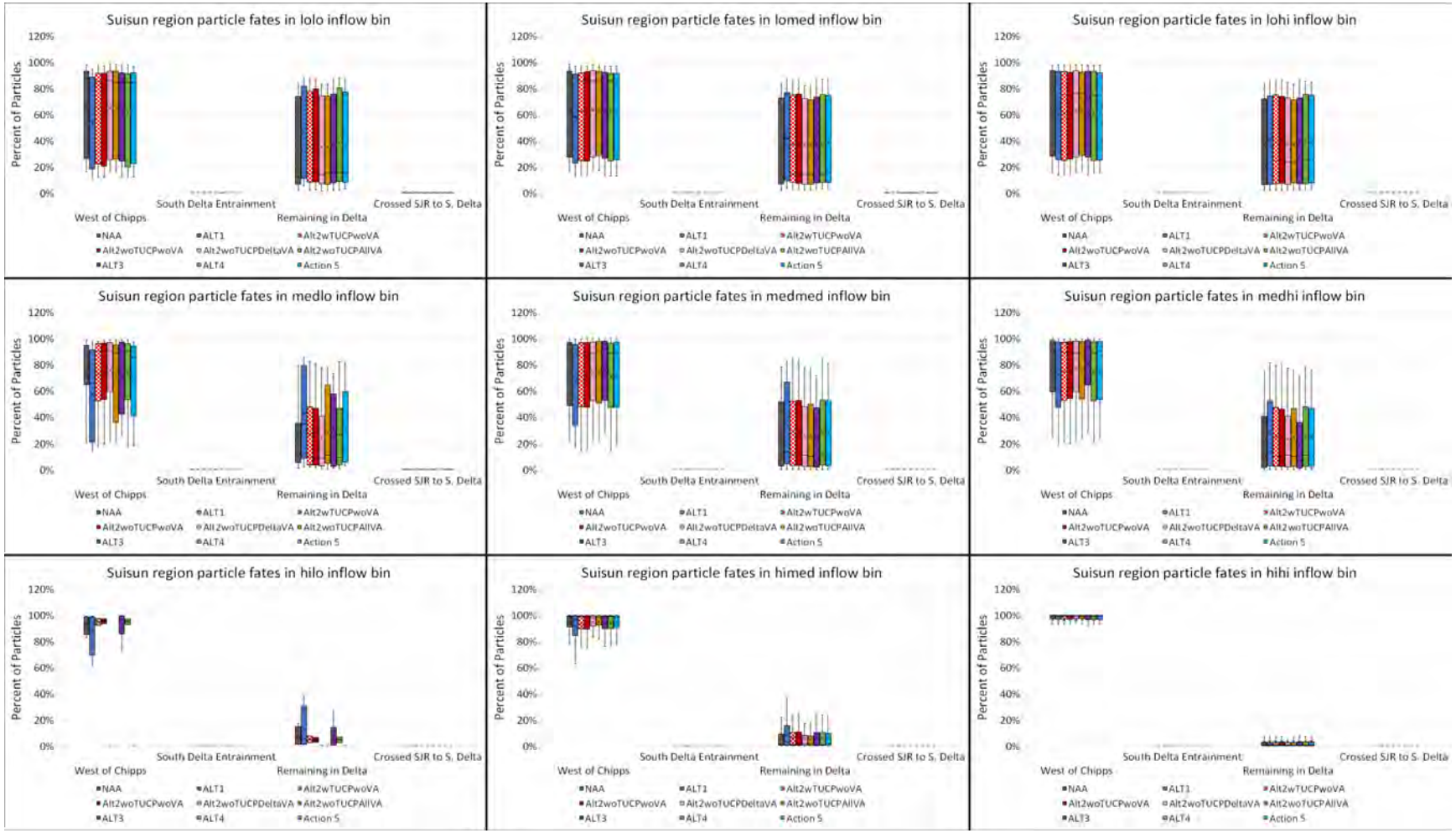



Figure I.8-44. Box and whisker plot of mean March through June particle fate after 45 days by exit location (within each facet from left to right: West of Chipps, South Delta Entrainment, Remaining in Delta, Crossed SJR to S. Delta) for neutrally buoyant particles injected at Suisun region by Inflow Bin (from top left to bottom right: "lolo" to "hihi") for the No Action Alternative, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4, and Action 5.

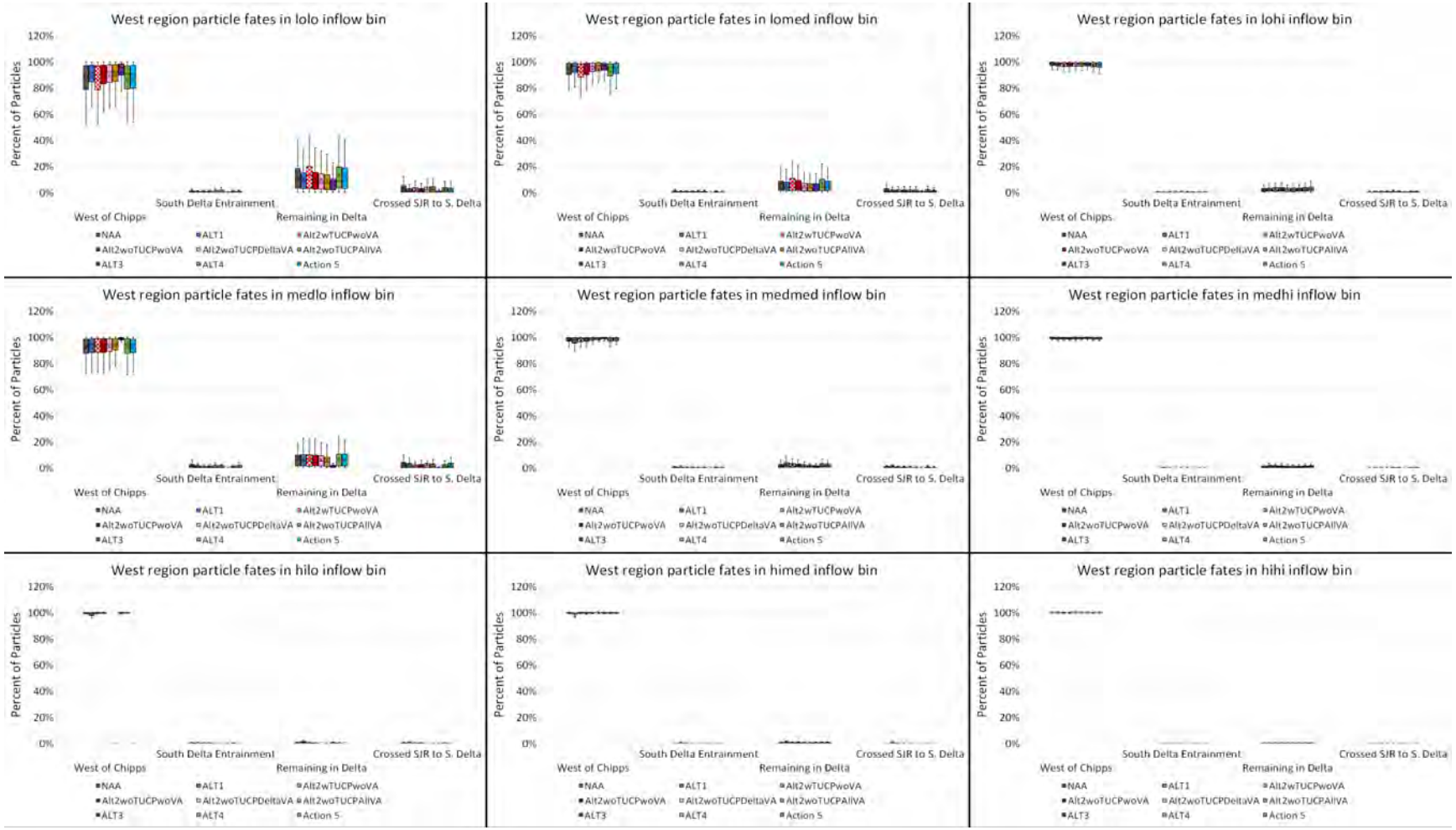



Figure I.8-45. Box and whisker plot of mean March through June particle fate after 45 days by exit location (within each facet from left to right: West of Chipps, South Delta Entrainment, Remaining in Delta, Crossed SJR to S. Delta) for neutrally buoyant particles injected at West Delta region by Inflow Bin (from top left to bottom right: "lolo" to "hihi") for the No Action Alternative, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4, and Action 5.

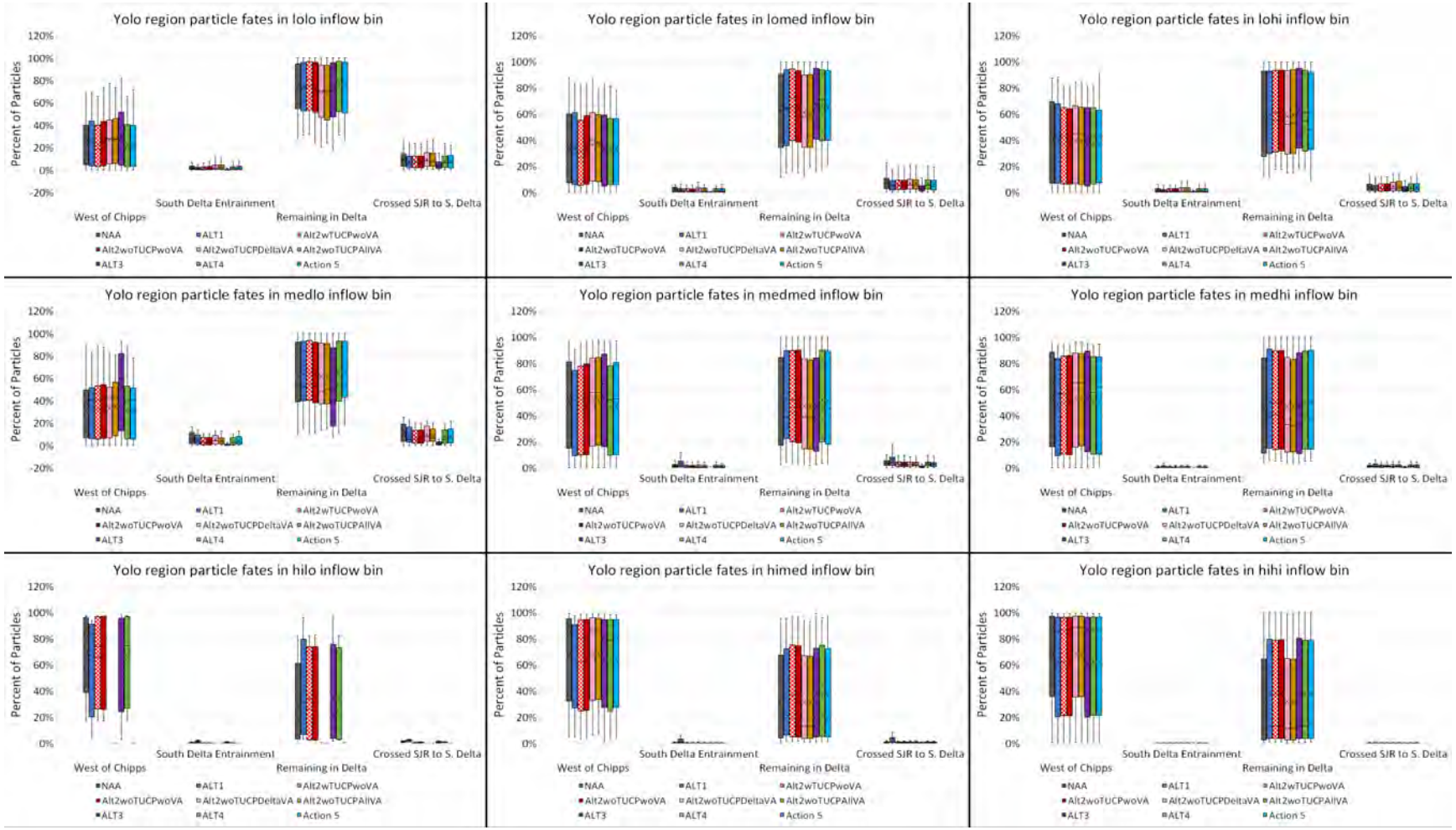



Figure I.8-46. Box and whisker plot of mean March through June particle fate after 45 days by exit location (within each facet from left to right: West of Chipps, South Delta Entrainment, Remaining in Delta, Crossed SJR to S. Delta) for neutrally buoyant particles injected at Yolo region by Inflow Bin (from top left to bottom right: "lolo" to "hihi") for the No Action Alternative, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4, and Action 5.

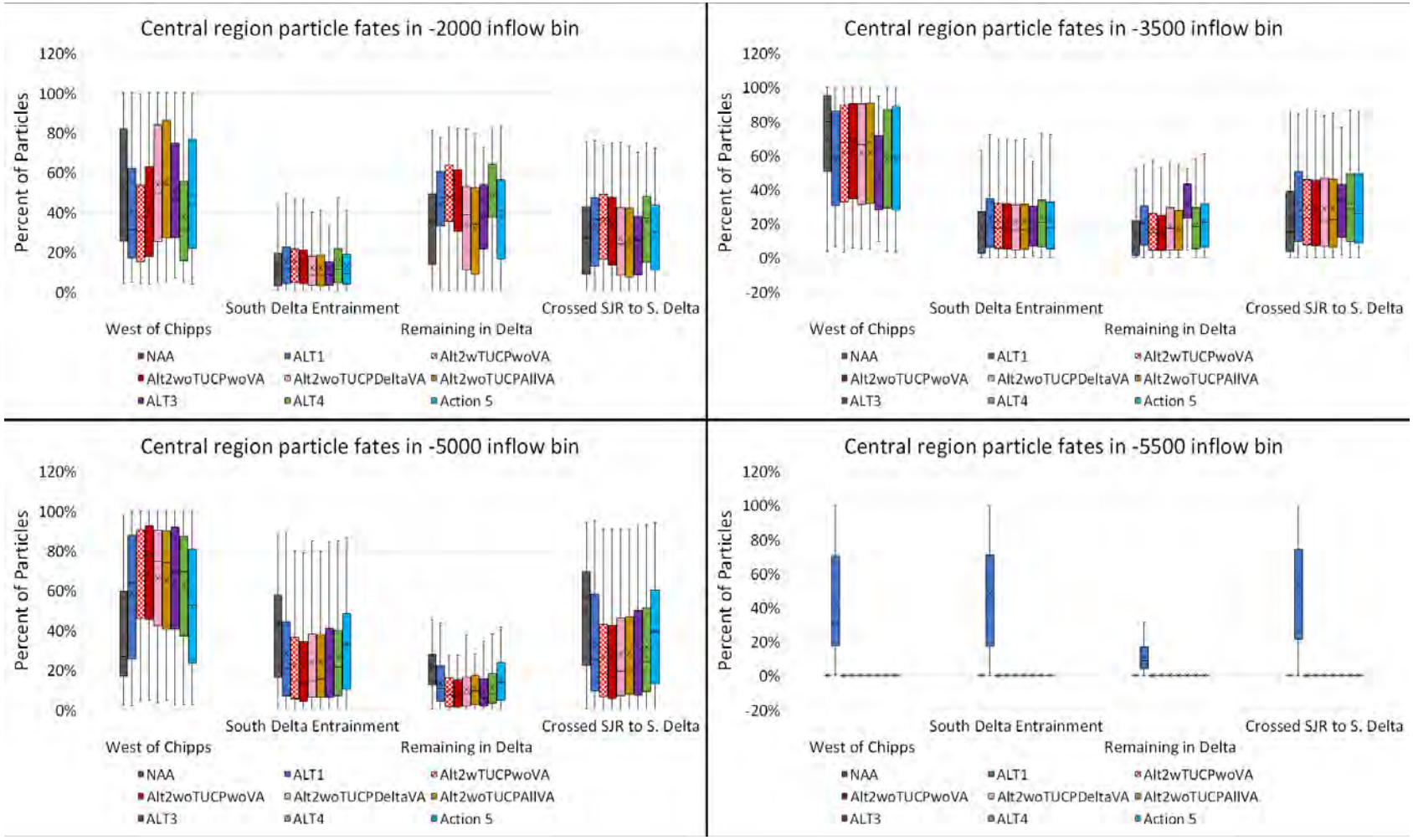



Figure I.8-47. Box and whisker plot of mean March through June particle fate after 45 days by exit location (within each facet from left to right: West of Chipps, South Delta Entrainment, Remaining in Delta, Crossed SJR to S. Delta) for neutrally buoyant particles injected at Central Delta region by OMR Bin (from top left to bottom right: -2,000 cfs, -3,500 cfs, -5,000 cfs, -5,500 cfs) for the No Action Alternative, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4, and Action 5.

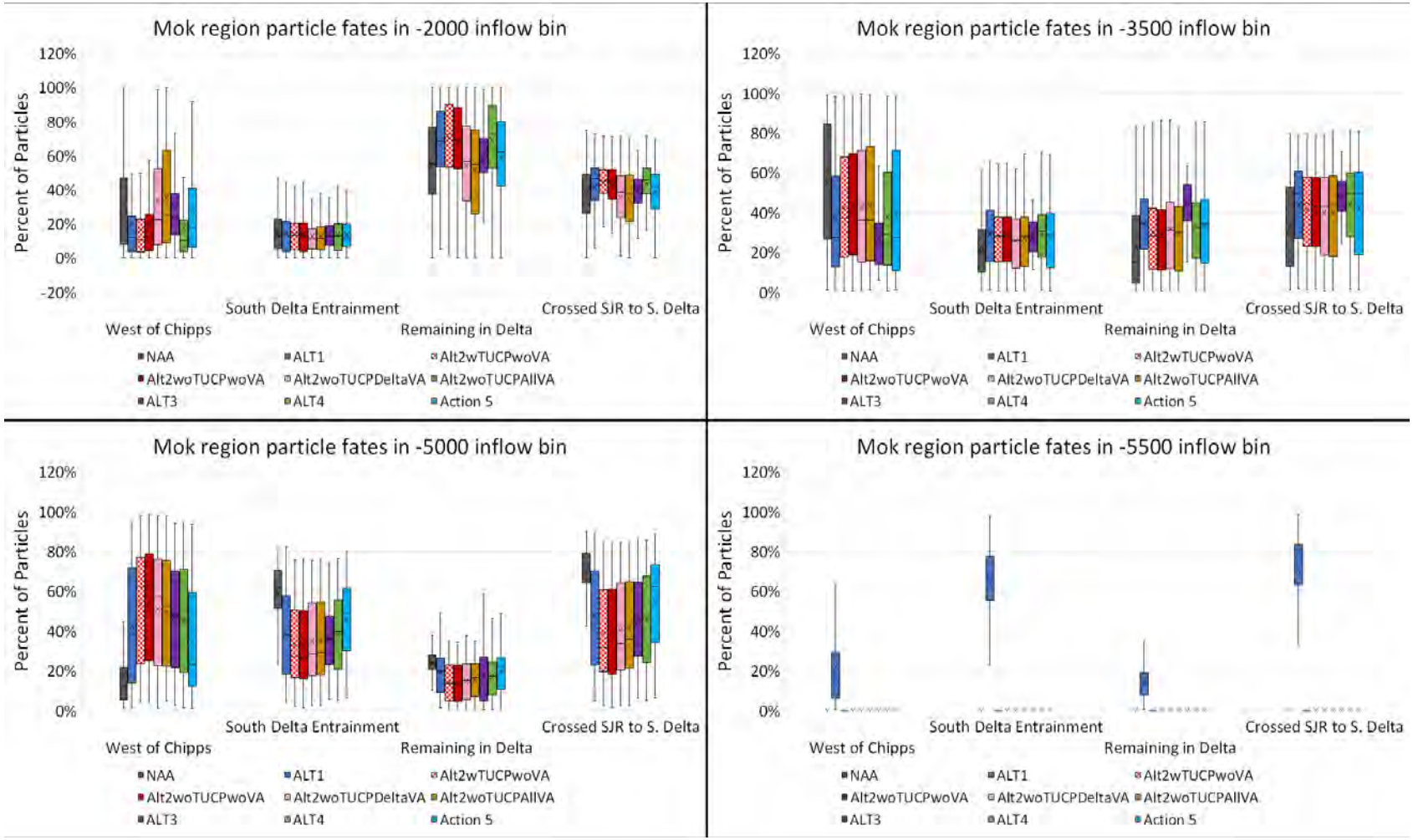



Figure I.8-48. Box and whisker plot of mean March through June particle fate after 45 days by exit location (within each facet from left to right: West of Chipps, South Delta Entrainment, Remaining in Delta, Crossed SJR to S. Delta) for neutrally buoyant particles injected at Mokelumne River region by OMR Bin (from top left to bottom right: -2,000 cfs, -3,500 cfs, -5,000 cfs, -5,500 cfs) for the No Action Alternative, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4, and Action 5.

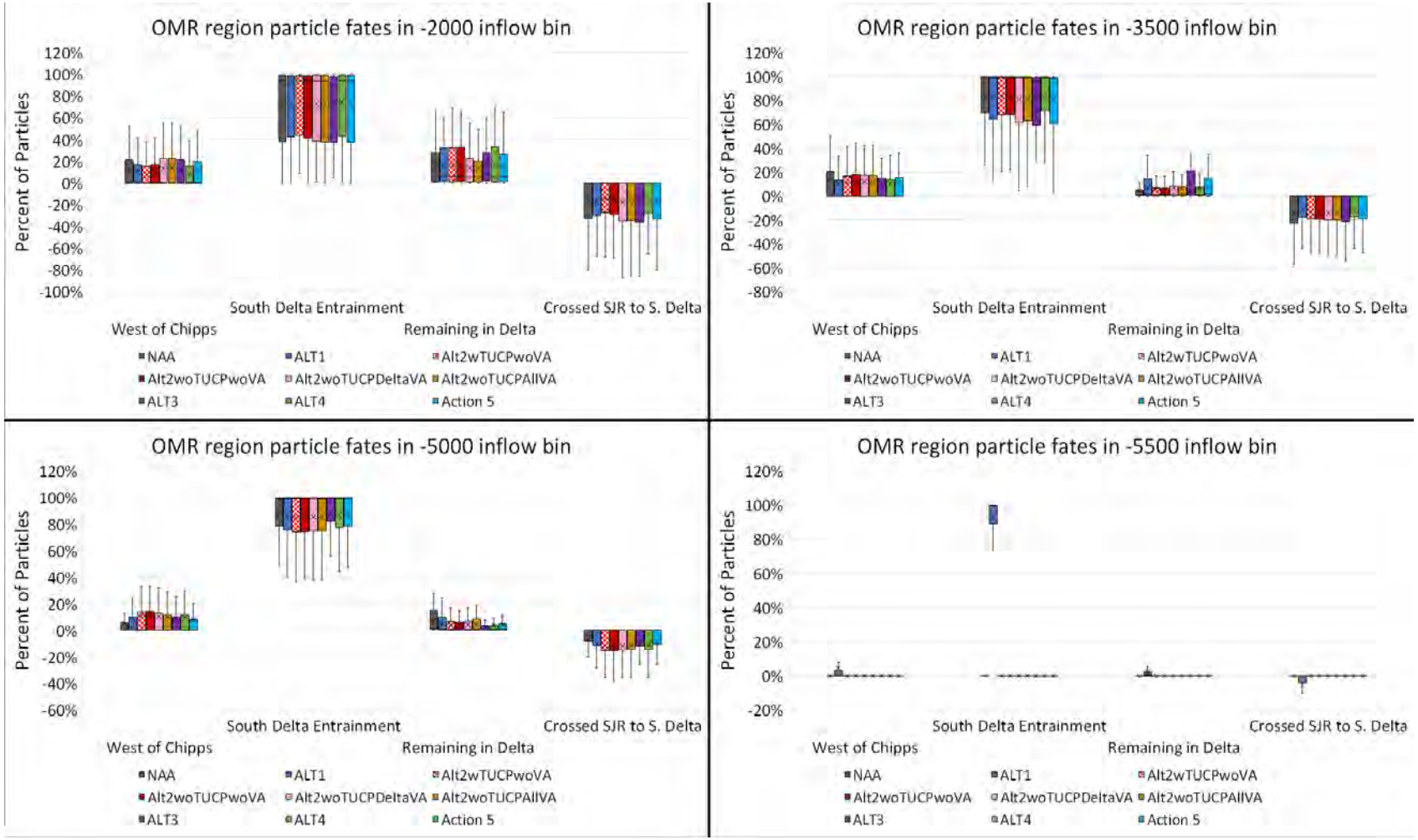



Figure I.8-49. Box and whisker plot of mean March through June particle fate after 45 days by exit location (within each facet from left to right: West of Chipps, South Delta Entrainment, Remaining in Delta, Crossed SJR to S. Delta) for neutrally buoyant particles injected at Old and Middle River region by OMR Bin (from top left to bottom right: -2,000 cfs, -3,500 cfs, -5,000 cfs, -5,500 cfs) for the No Action Alternative, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4, and Action 5.

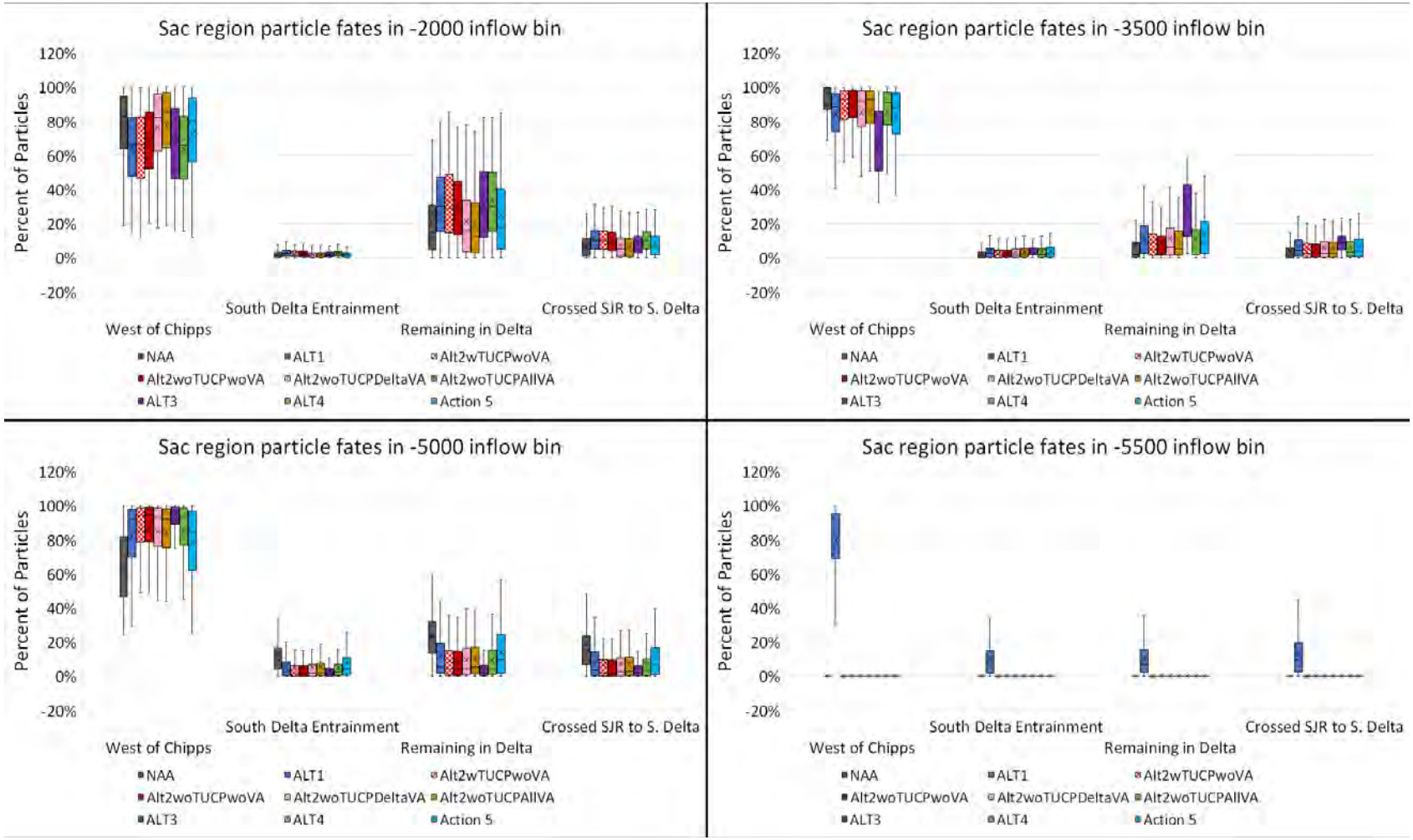



Figure I.8-50. Box and whisker plot of mean March through June particle fate after 45 days by exit location (within each facet from left to right: West of Chipps, South Delta Entrainment, Remaining in Delta, Crossed SJR to S. Delta) for neutrally buoyant particles injected at Sacramento River region by OMR Bin (from top left to bottom right: -2,000 cfs, -3,500 cfs, -5,000 cfs, -5,500 cfs) for the No Action Alternative, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4, and Action 5.

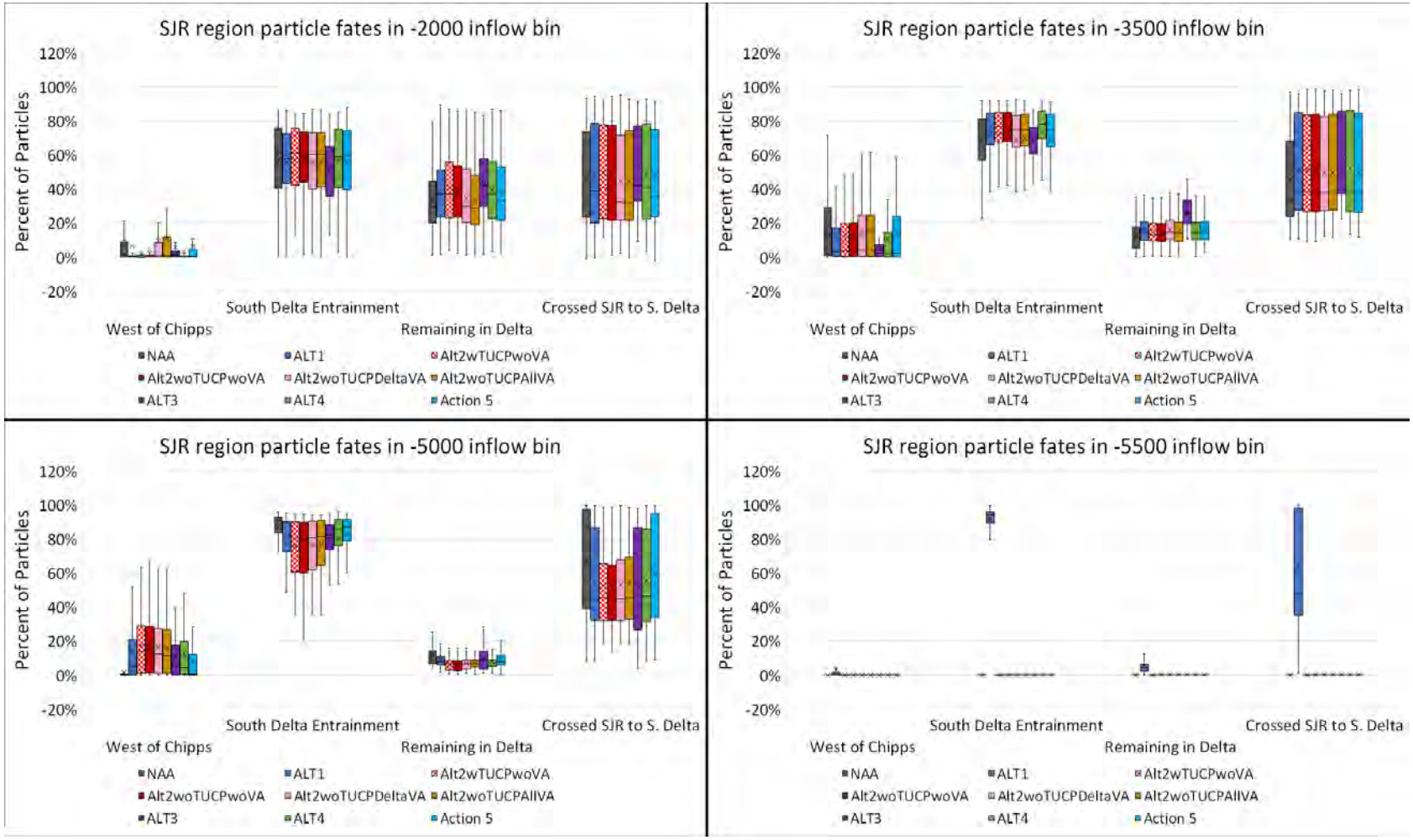



Figure I.8-51. Box and whisker plot of mean March through June particle fate after 45 days by exit location (within each facet from left to right: West of Chipps, South Delta Entrainment, Remaining in Delta, Crossed SJR to S. Delta) for neutrally buoyant particles injected at San Joaquin River region by OMR Bin (from top left to bottom right: -2,000 cfs, -3,500 cfs, -5,000 cfs, -5,500 cfs) for the No Action Alternative, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4, and Action 5.

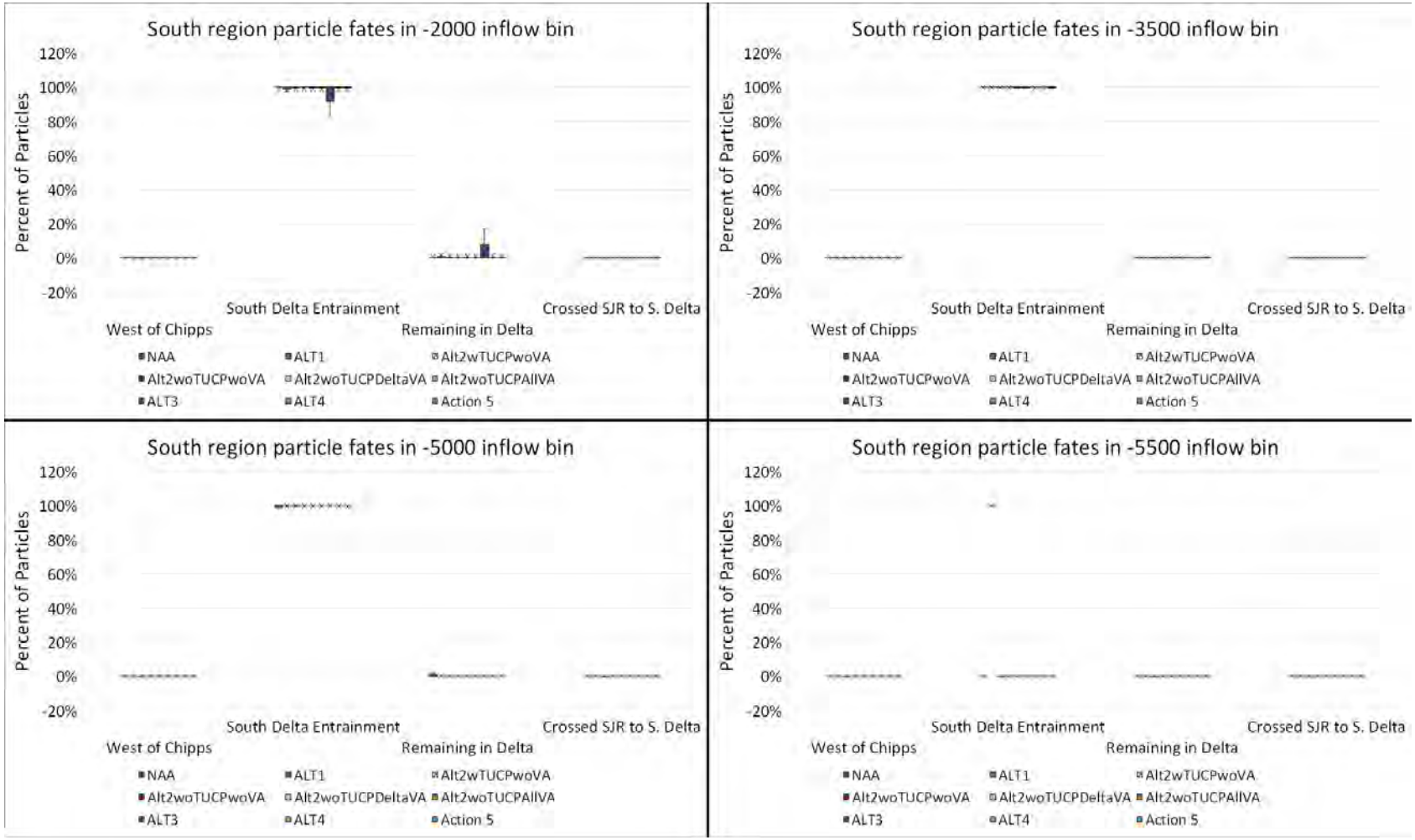



Figure I.8-52. Box and whisker plot of mean March through June particle fate after 45 days by exit location (within each facet from left to right: West of Chipps, South Delta Entrainment, Remaining in Delta, Crossed SJR to S. Delta) for neutrally buoyant particles injected at South Delta region by OMR Bin (from top left to bottom right: -2,000 cfs, -3,500 cfs, -5,000 cfs, -5,500 cfs) for the No Action Alternative, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4, and Action 5.

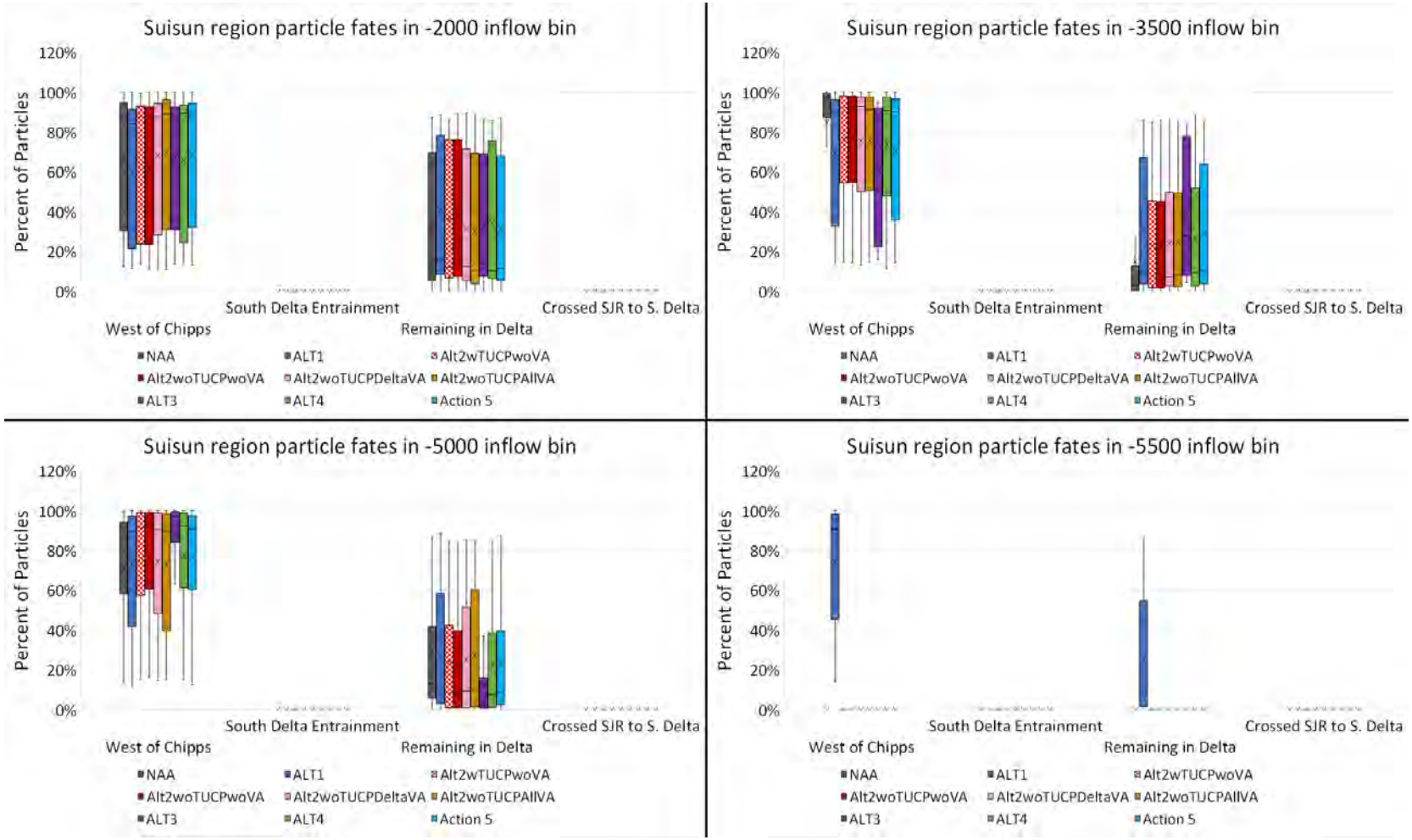



Figure I.8-53. Box and whisker plot of mean March through June particle fate after 45 days by exit location (within each facet from left to right: West of Chipps, South Delta Entrainment, Remaining in Delta, Crossed SJR to S. Delta) for neutrally buoyant particles injected at Suisun region by OMR Bin (from top left to bottom right: -2,000 cfs, -3,500 cfs, -5,000 cfs, -5,500 cfs) for the No Action Alternative, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4, and Action 5.

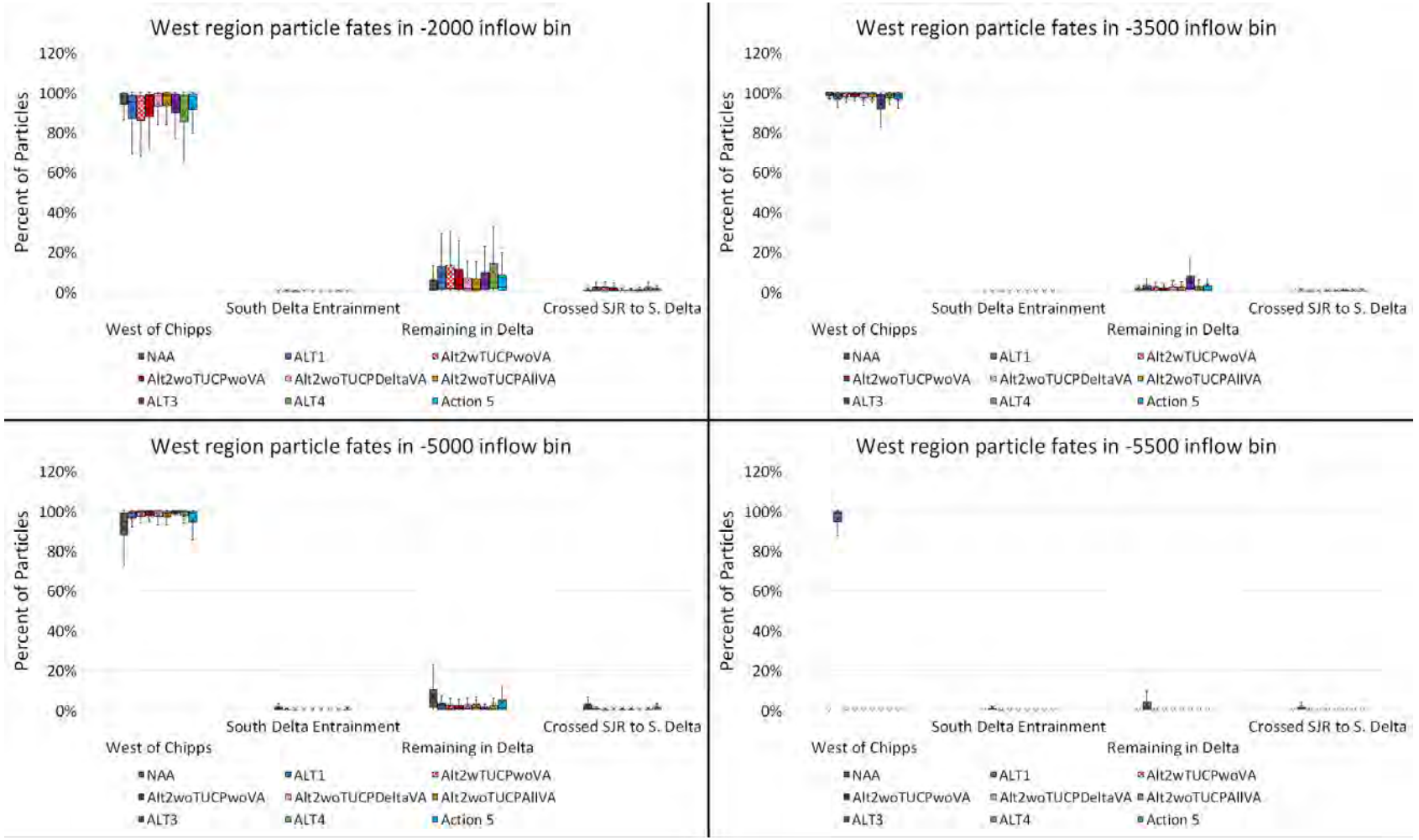



Figure I.8-54. Box and whisker plot of mean March through June particle fate after 45 days by exit location (within each facet from left to right: West of Chipps, South Delta Entrainment, Remaining in Delta, Crossed SJR to S. Delta) for neutrally buoyant particles injected at West Delta region by OMR Bin (from top left to bottom right: -2,000 cfs, -3,500 cfs, -5,000 cfs, -5,500 cfs) for the No Action Alternative, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4, and Action 5.

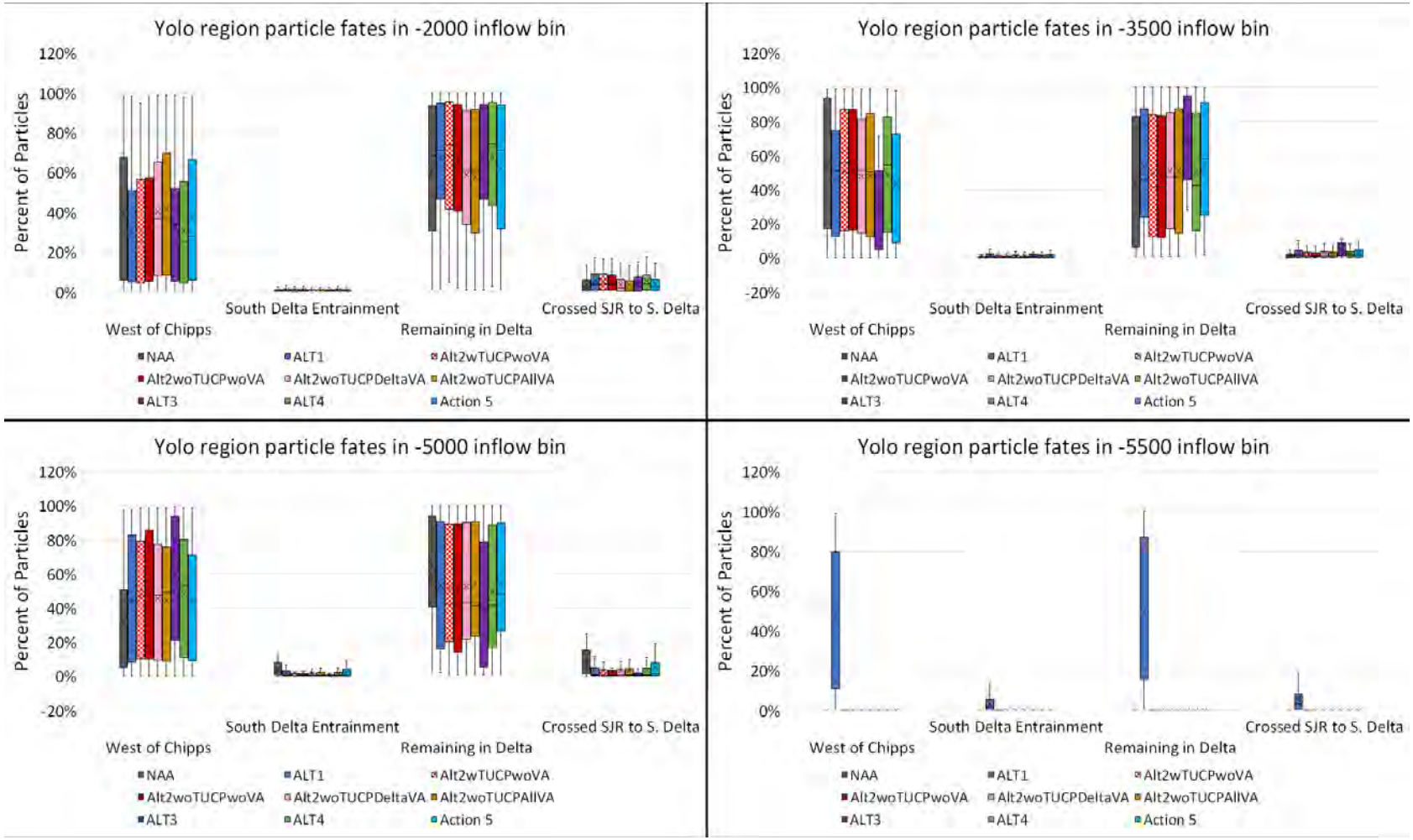



Figure I.8-55. Box and whisker plot of mean March through June particle fate after 45 days by exit location (within each facet from left to right: West of Chipps, South Delta Entrainment, Remaining in Delta, Crossed SJR to S. Delta) for neutrally buoyant particles injected at Yolo region by OMR Bin (from top left to bottom right: -2,000 cfs, -3,500 cfs, -5,000 cfs, -5,500 cfs) for the No Action Alternative, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4, and Action 5.

### *I.8.4.4.4 Surface Oriented, Inflow and OMR Bins, December through March [EIS, Figure I.8-56 through Figure I.8-73]*

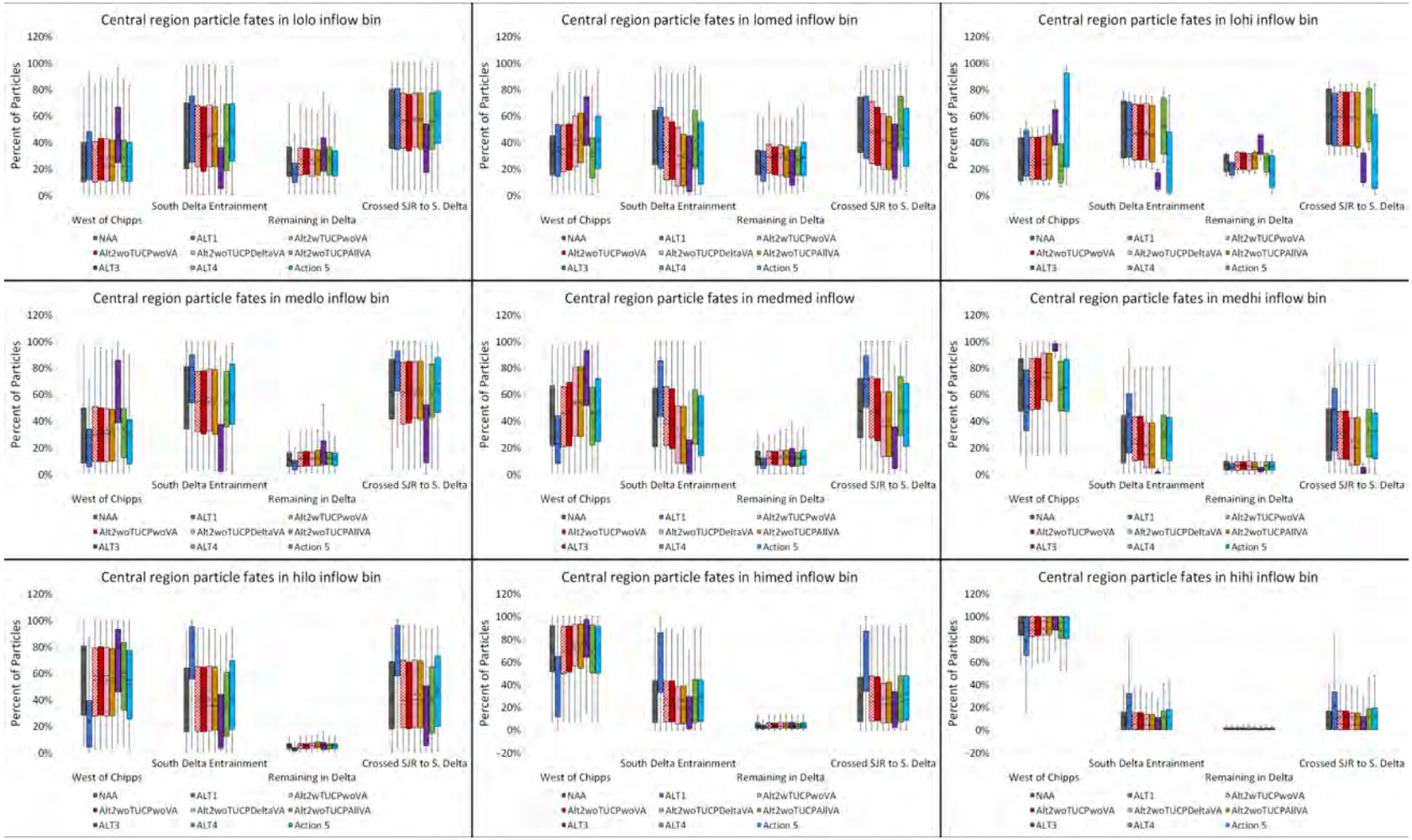



Figure I.8-56. Box and whisker plot of mean December through March particle fate after 45 days by exit location (within each facet from left to right: West of Chipps, South Delta Entrainment, Remaining in Delta, Crossed SJR to S. Delta) for surface oriented particles injected at Central Delta region by Inflow Bin (from top left to bottom right: "lolo" to "hihi") for the No Action Alternative, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4, and Action 5.

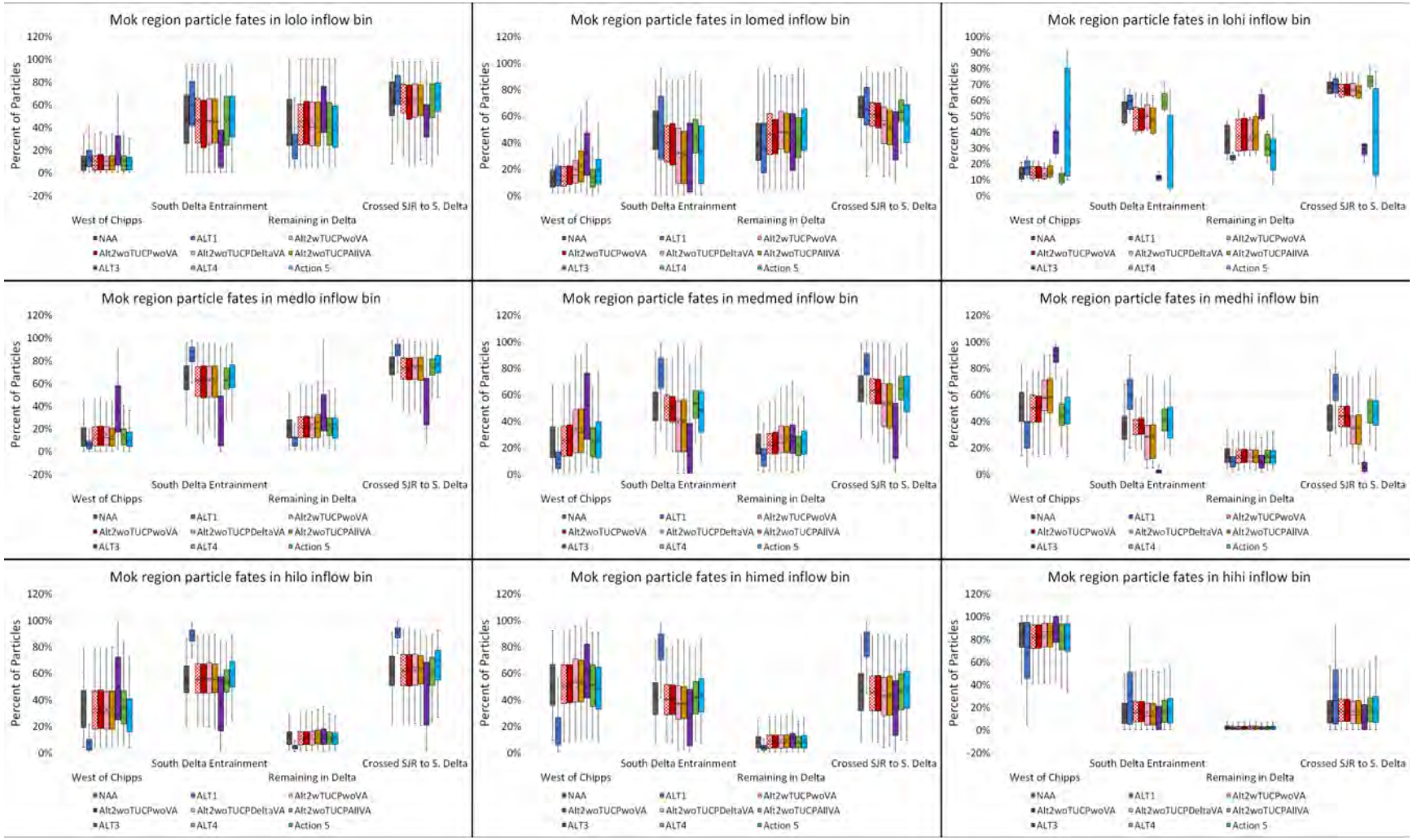



Figure I.8-57. Box and whisker plot of mean December through March particle fate after 45 days by exit location (within each facet from left to right: West of Chipps, South Delta Entrainment, Remaining in Delta, Crossed SJR to S. Delta) for surface oriented particles injected at Mokelumne River region by Inflow Bin (from top left to bottom right: “lolo” to “hihi”) for the No Action Alternative, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4, and Action 5.

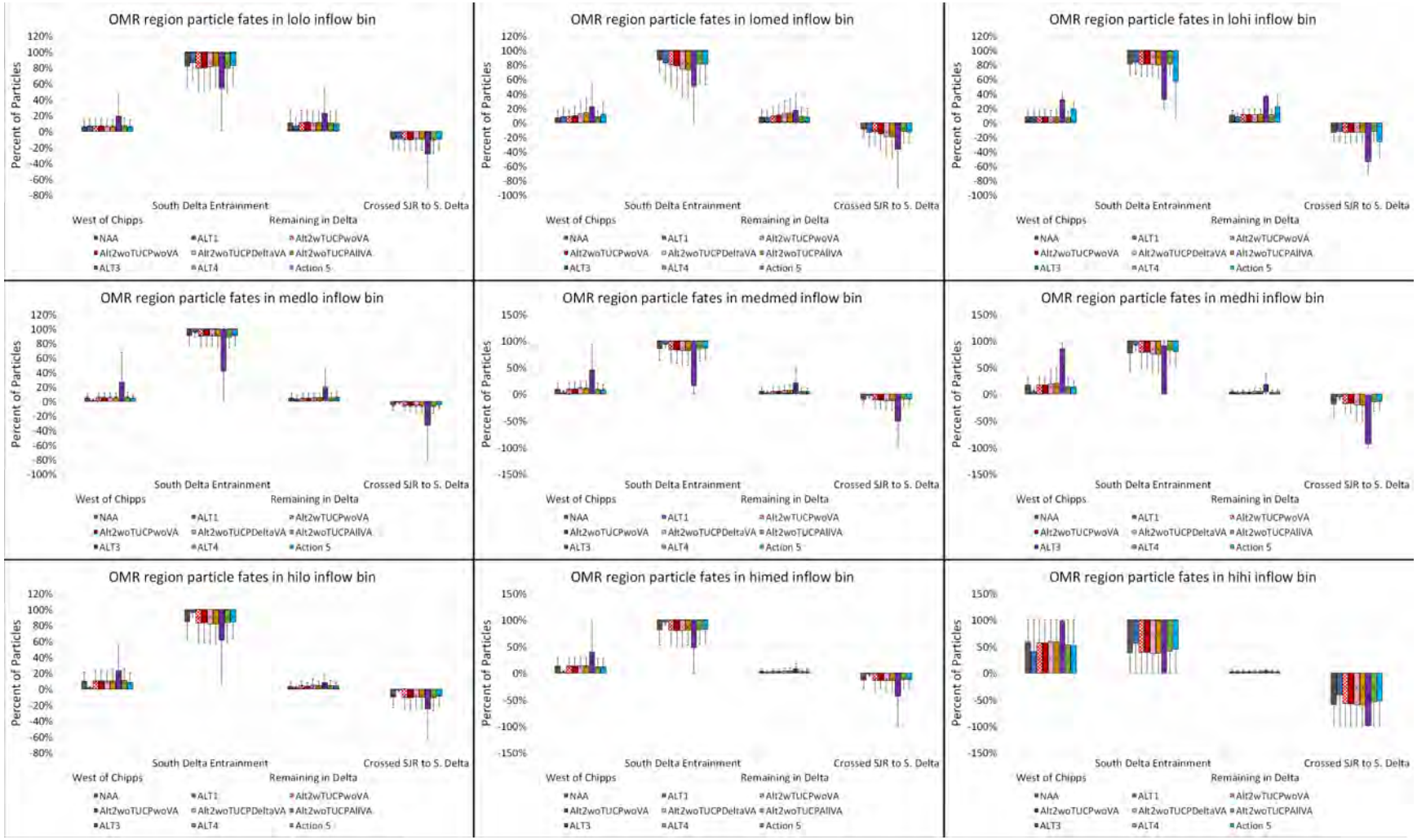



Figure I.8-58. Box and whisker plot of mean December through March particle fate after 45 days by exit location (within each facet from left to right: West of Chipps, South Delta Entrainment, Remaining in Delta, Crossed SJR to S. Delta) for surface oriented particles injected at Old and Middle River region by Inflow Bin (from top left to bottom right: "lolo" to "hihi") for the No Action Alternative, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4, and Action 5.

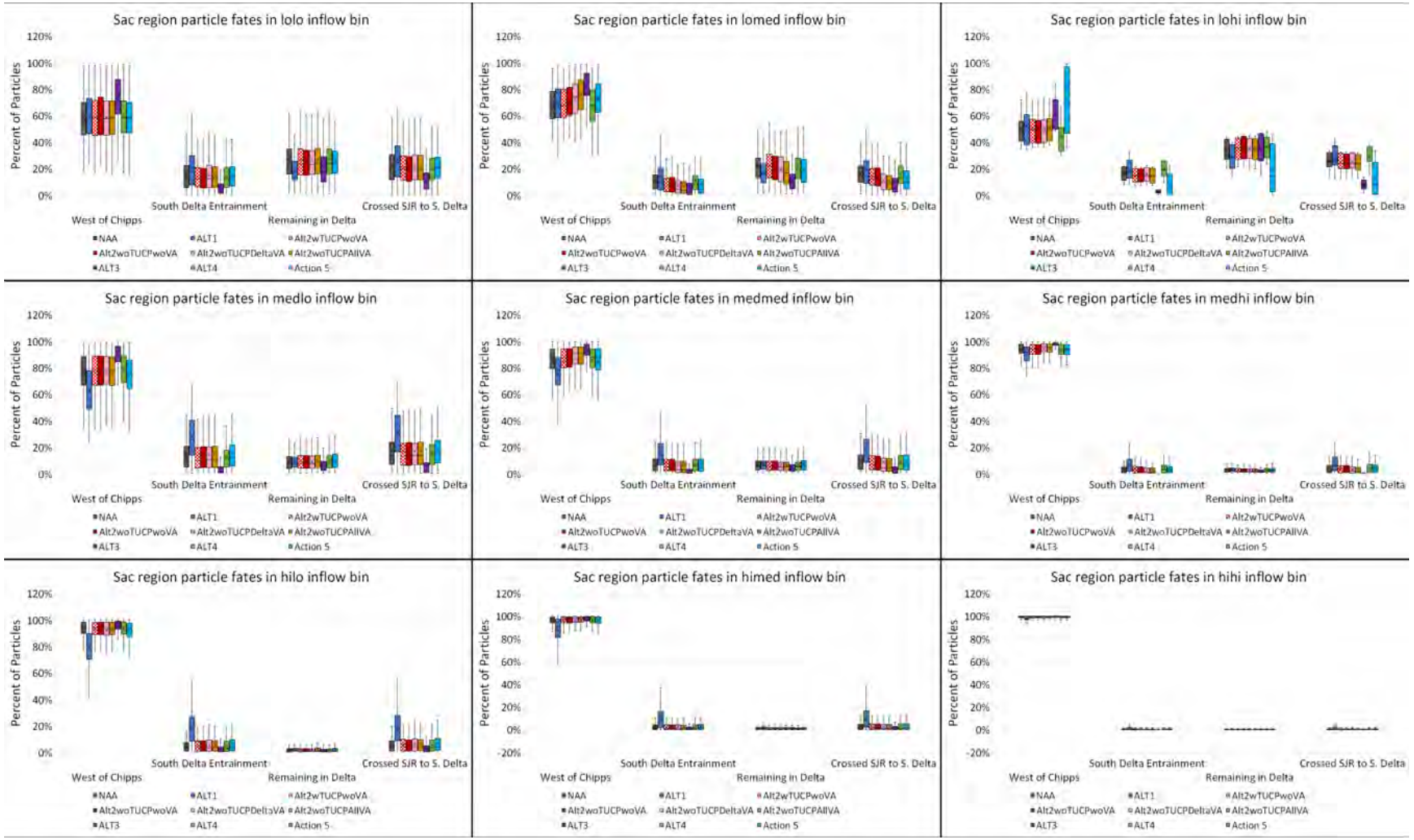



Figure I.8-59. Box and whisker plot of mean December through March particle fate after 45 days by exit location (within each facet from left to right: West of Chipps, South Delta Entrainment, Remaining in Delta, Crossed SJR to S. Delta) for surface oriented particles injected at Sacramento River region by Inflow Bin (from top left to bottom right: “lolo” to “hihi”) for the No Action Alternative, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4, and Action 5.

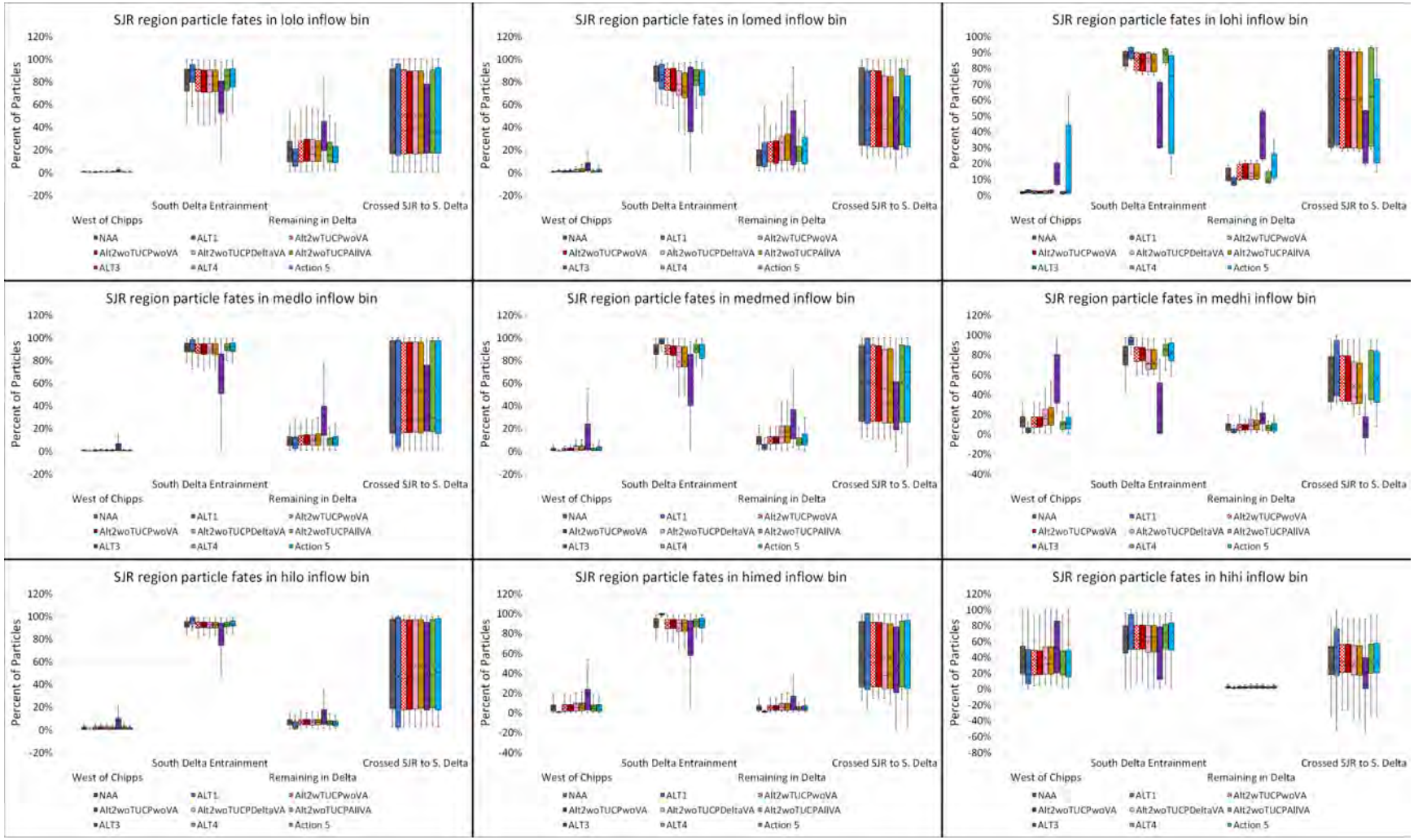



Figure I.8-60. Box and whisker plot of mean December through March particle fate after 45 days by exit location (within each facet from left to right: West of Chipps, South Delta Entrainment, Remaining in Delta, Crossed SJR to S. Delta) for surface oriented particles injected at San Joaquin River region by Inflow Bin (from top left to bottom right: “lolo” to “hihi”) for the No Action Alternative, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4, and Action 5.

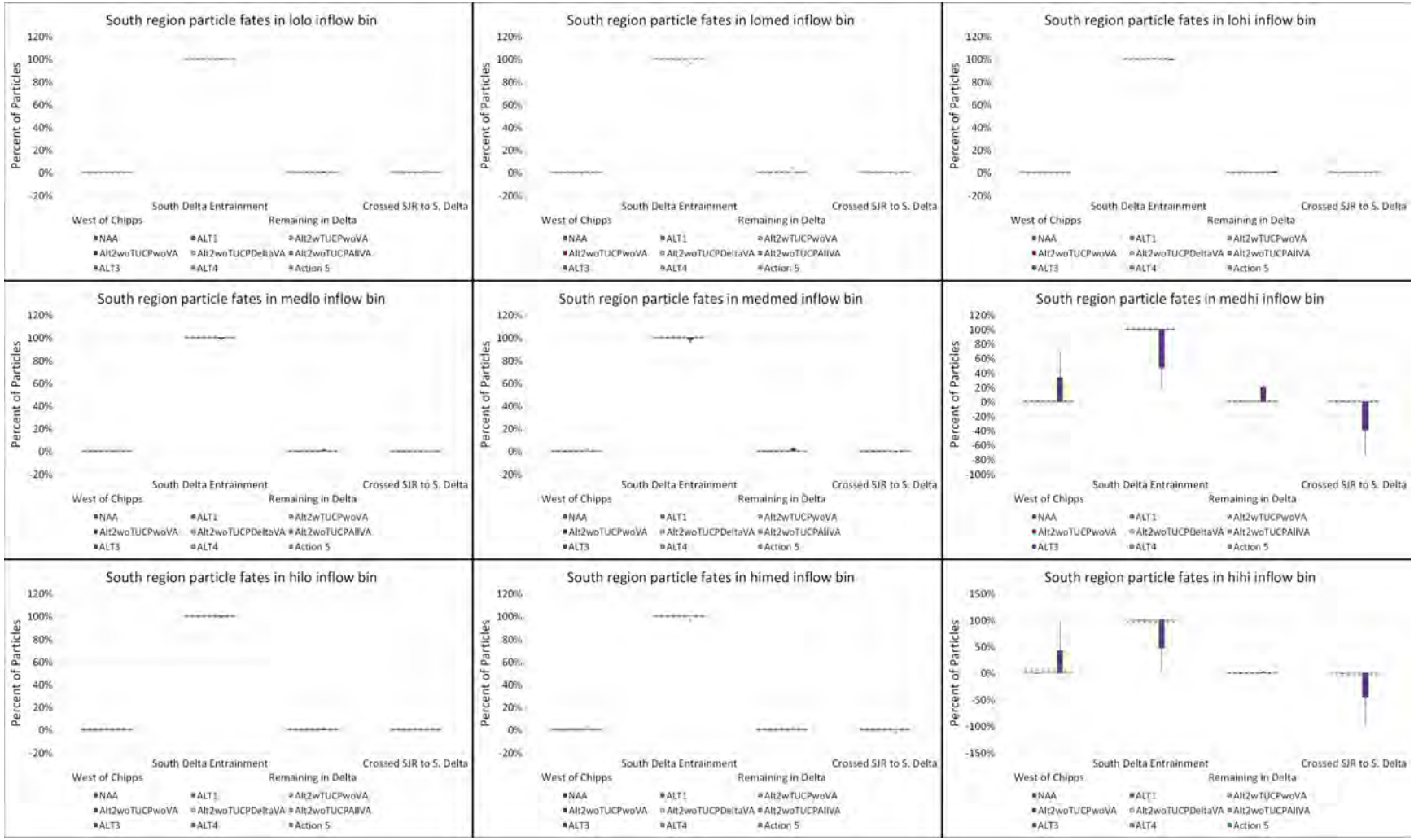



Figure I.8-61. Box and whisker plot of mean December through March particle fate after 45 days by exit location (within each facet from left to right: West of Chipps, South Delta Entrainment, Remaining in Delta, Crossed SJR to S. Delta) for surface oriented particles injected at South Delta region by Inflow Bin (from top left to bottom right: "lolo" to "hihi") for the No Action Alternative, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4, and Action 5.

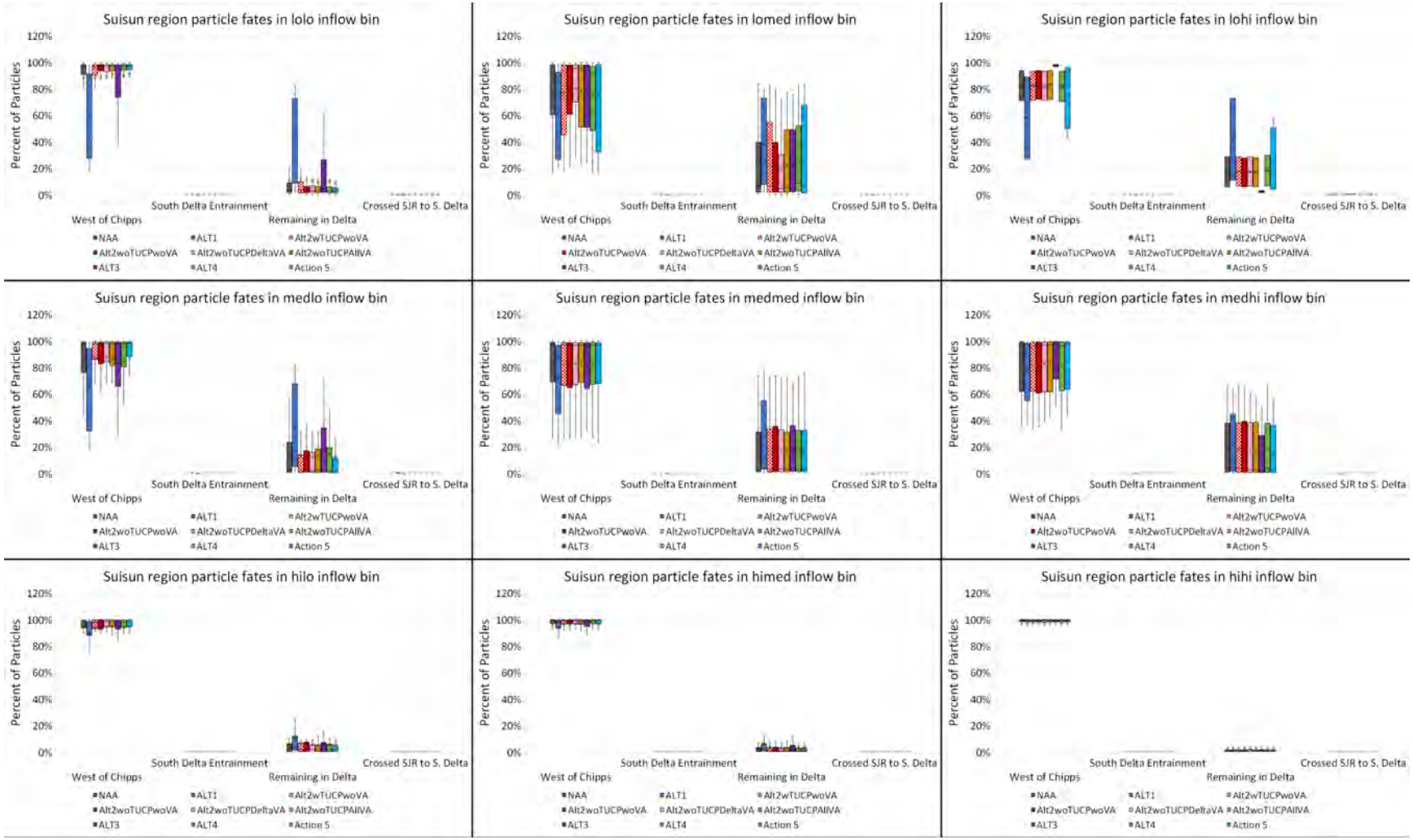



Figure I.8-62. Box and whisker plot of mean December through March particle fate after 45 days by exit location (within each facet from left to right: West of Chipps, South Delta Entrainment, Remaining in Delta, Crossed SJR to S. Delta) for surface oriented particles injected at Suisun region by Inflow Bin (from top left to bottom right: "lolo" to "hihi") for the No Action Alternative, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4, and Action 5.

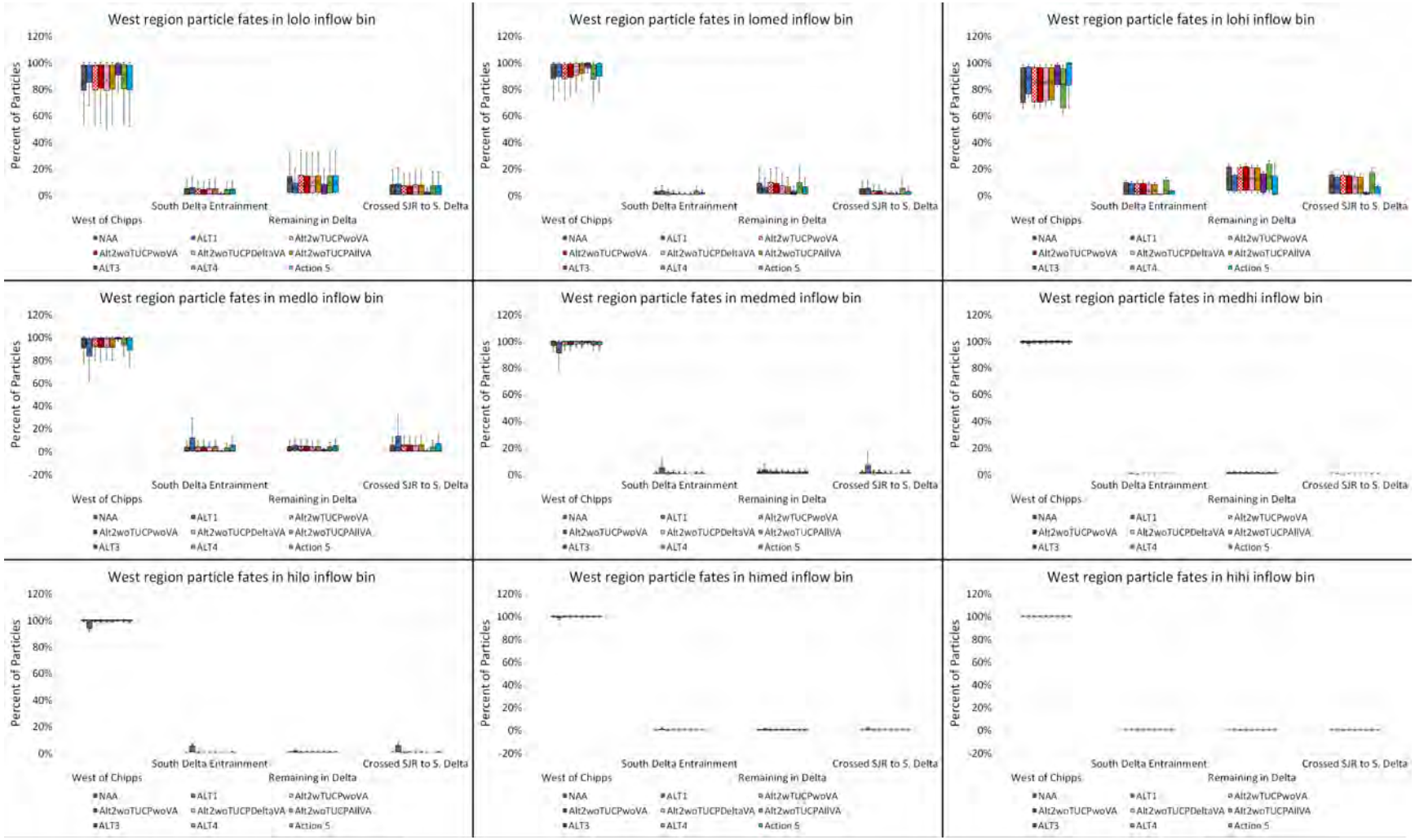



Figure I.8-63. Box and whisker plot of mean December through March particle fate after 45 days by exit location (within each facet from left to right: West of Chipps, South Delta Entrainment, Remaining in Delta, Crossed SJR to S. Delta) for surface oriented particles injected at West Delta region by Inflow Bin (from top left to bottom right: "lolo" to "hihi") for the No Action Alternative, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4, and Action 5.

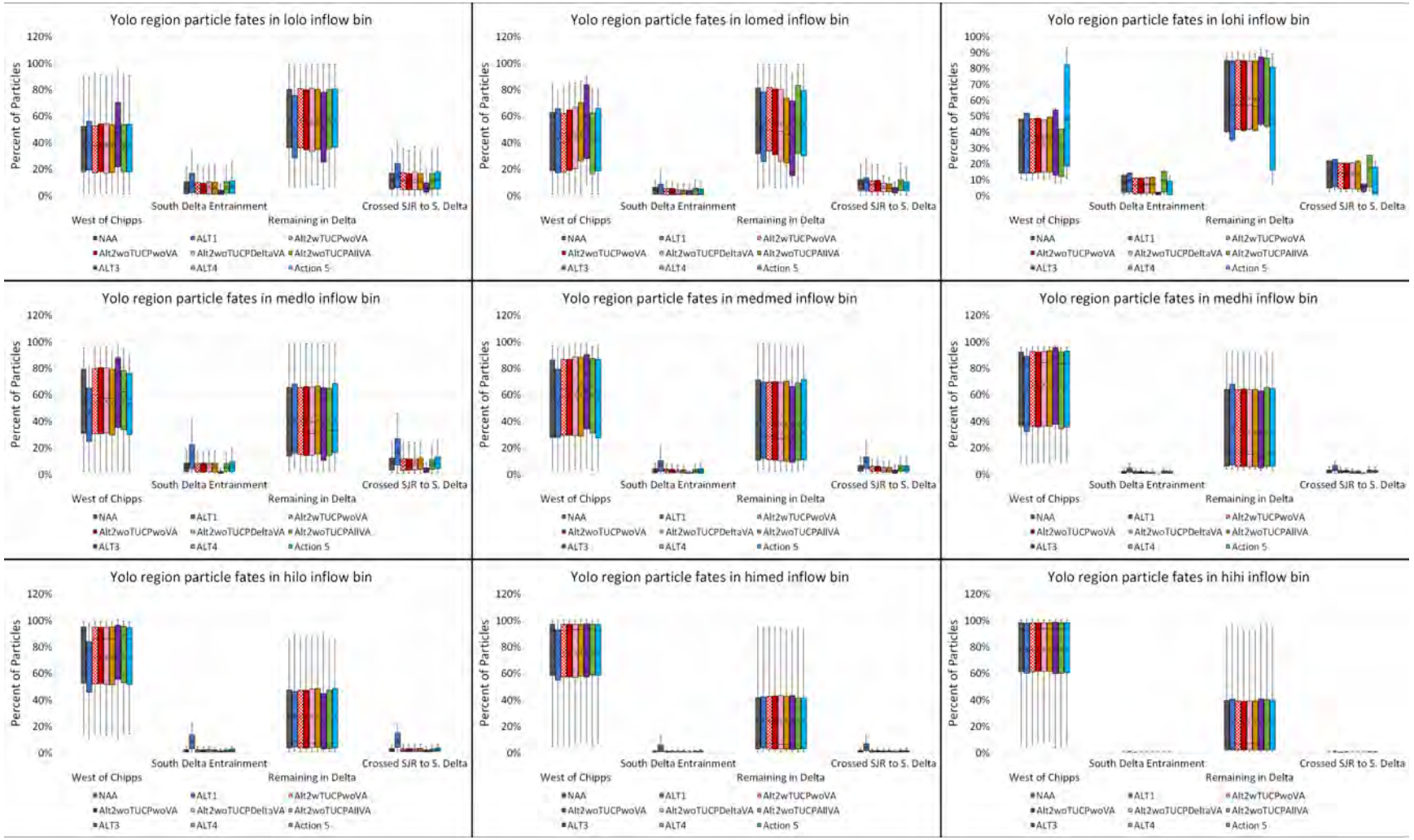



Figure I.8-64. Box and whisker plot of mean December through March particle fate after 45 days by exit location (within each facet from left to right: West of Chipps, South Delta Entrainment, Remaining in Delta, Crossed SJR to S. Delta) for surface oriented particles injected at Yolo region by Inflow Bin (from top left to bottom right: "lolo" to "hihi") for the No Action Alternative, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4, and Action 5.

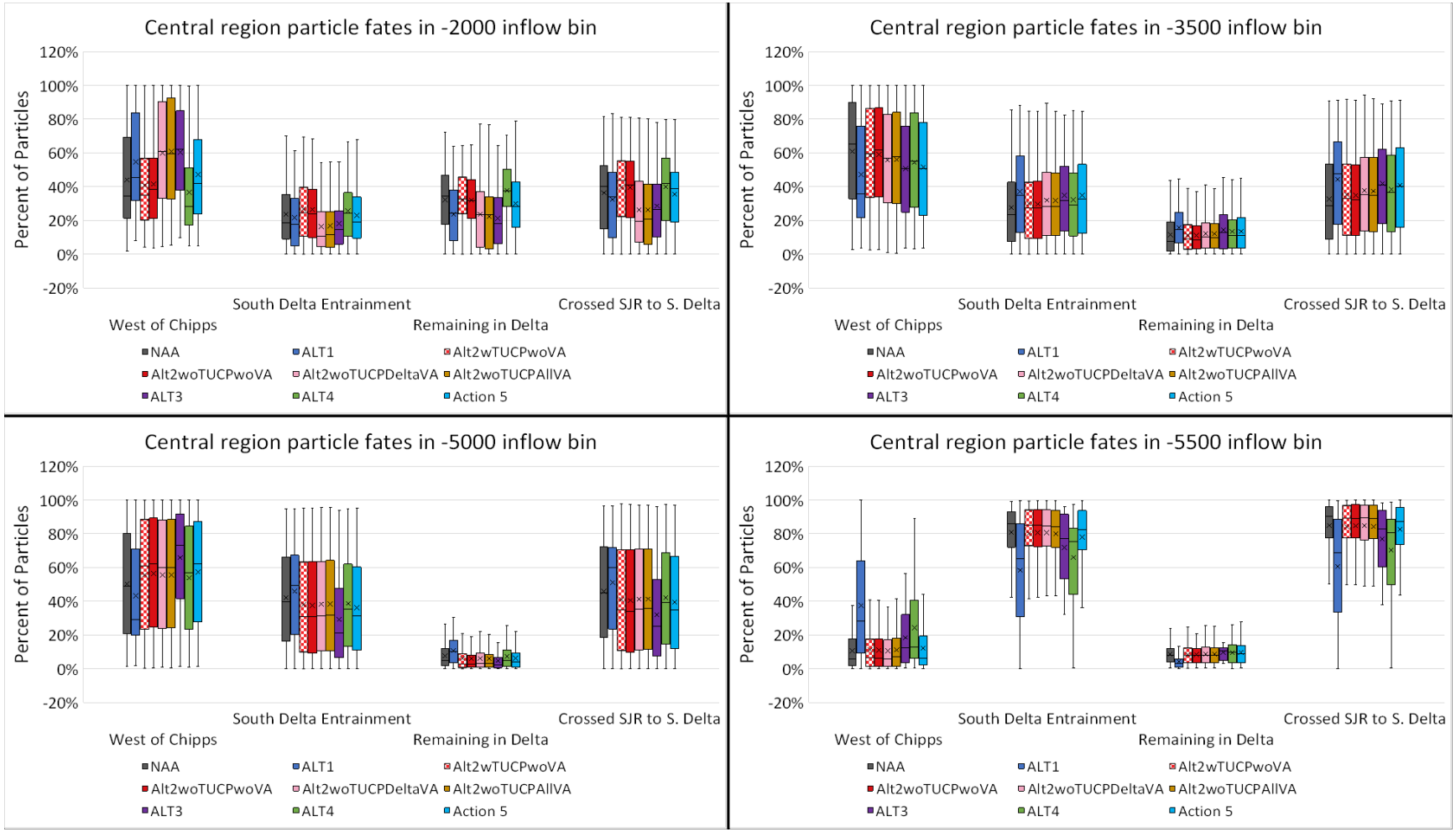



Figure I.8-65. Box and whisker plot of mean December through March particle fate after 45 days by exit location (within each facet from left to right: West of Chipps, South Delta Entrainment, Remaining in Delta, Crossed SJR to S. Delta) for surface oriented particles injected at Central Delta region by OMR Bin (from top left to bottom right: -2,000 cfs, -3,500 cfs, -5,000 cfs, -5,500 cfs) for the No Action Alternative, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4, and Action 5.

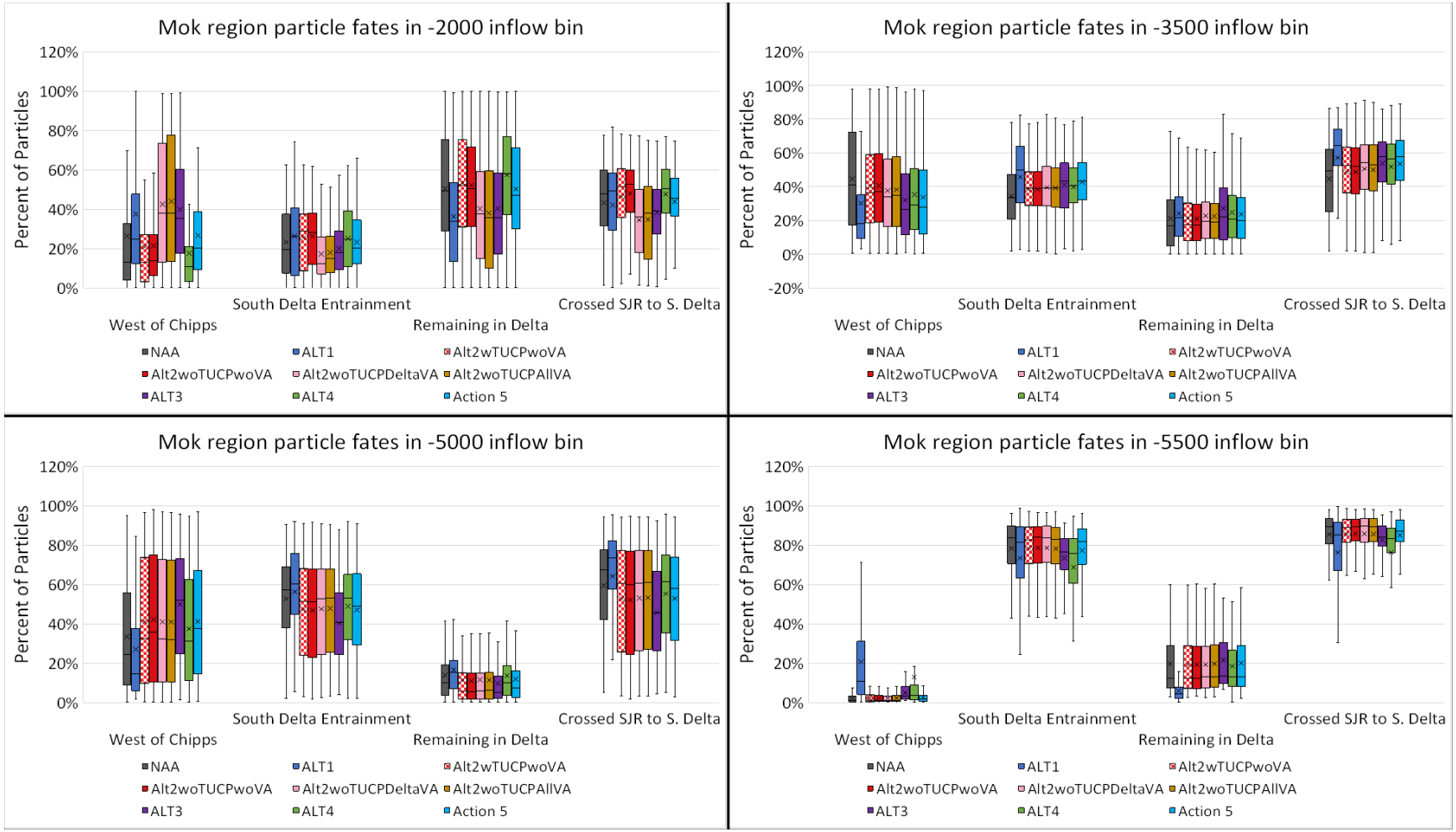



Figure I.8-66. Box and whisker plot of mean December through March particle fate after 45 days by exit location (within each facet from left to right: West of Chipps, South Delta Entrainment, Remaining in Delta, Crossed SJR to S. Delta) for surface oriented particles injected at Mokelumne River region by OMR Bin (from top left to bottom right: -2,000 cfs, -3,500 cfs, -5,000 cfs, -5,500 cfs) for the No Action Alternative, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4, and Action 5.




Figure I.8-67. Box and whisker plot of mean December through March particle fate after 45 days by exit location (within each facet from left to right: West of Chipps, South Delta Entrainment, Remaining in Delta, Crossed SJR to S. Delta) for surface oriented particles injected at Old and Middle River region by OMR Bin (from top left to bottom right: -2,000 cfs, -3,500 cfs, -5,000 cfs, -5,500 cfs) for the No Action Alternative, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4, and Action 5.

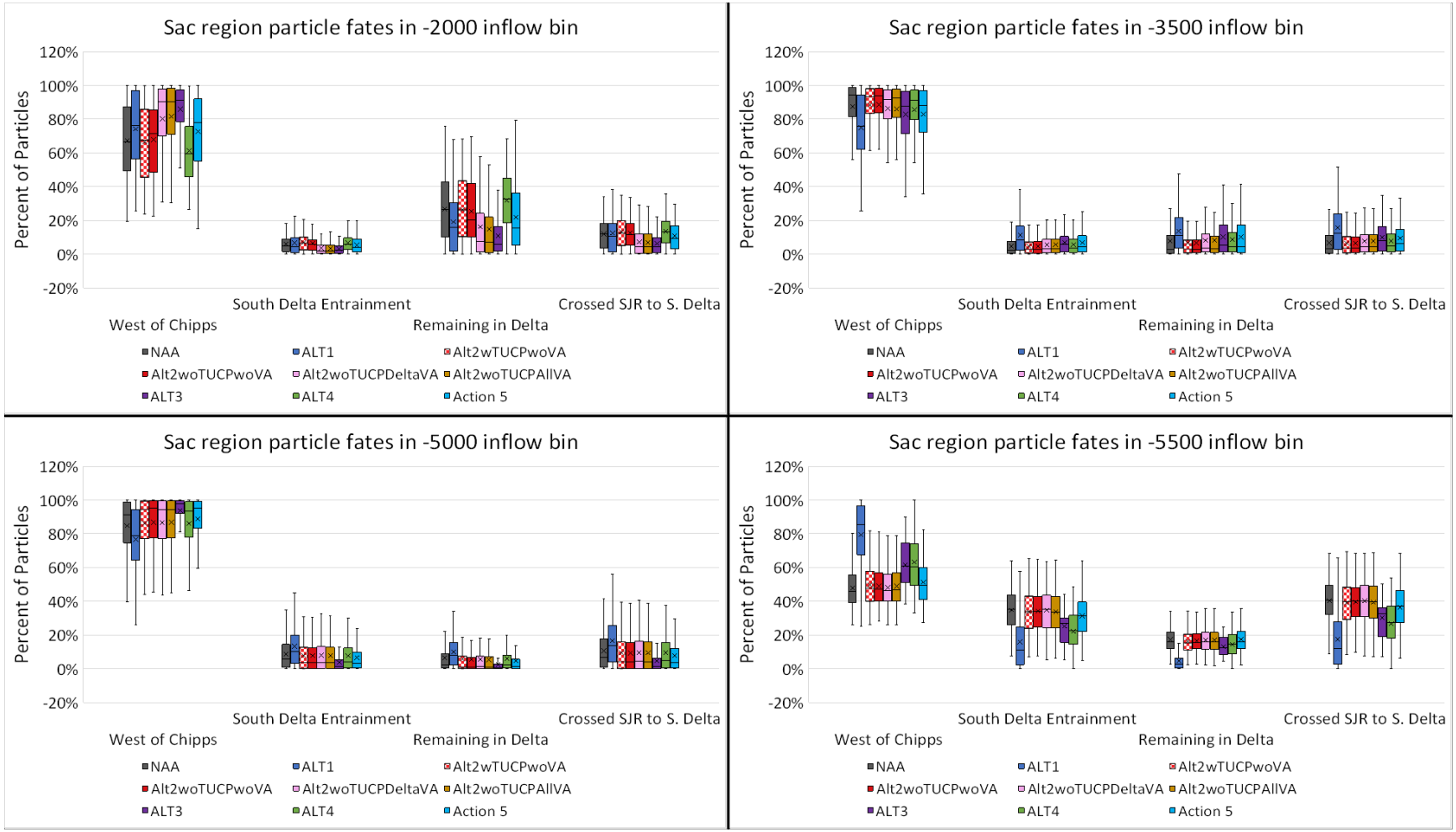



Figure I.8-68. Box and whisker plot of mean December through March particle fate after 45 days by exit location (within each facet from left to right: West of Chipps, South Delta Entrainment, Remaining in Delta, Crossed SJR to S. Delta) for surface oriented particles injected at Sacramento River region by OMR Bin (from top left to bottom right: -2,000 cfs, -3,500 cfs, -5,000 cfs, -5,500 cfs) for the No Action Alternative, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4, and Action 5.

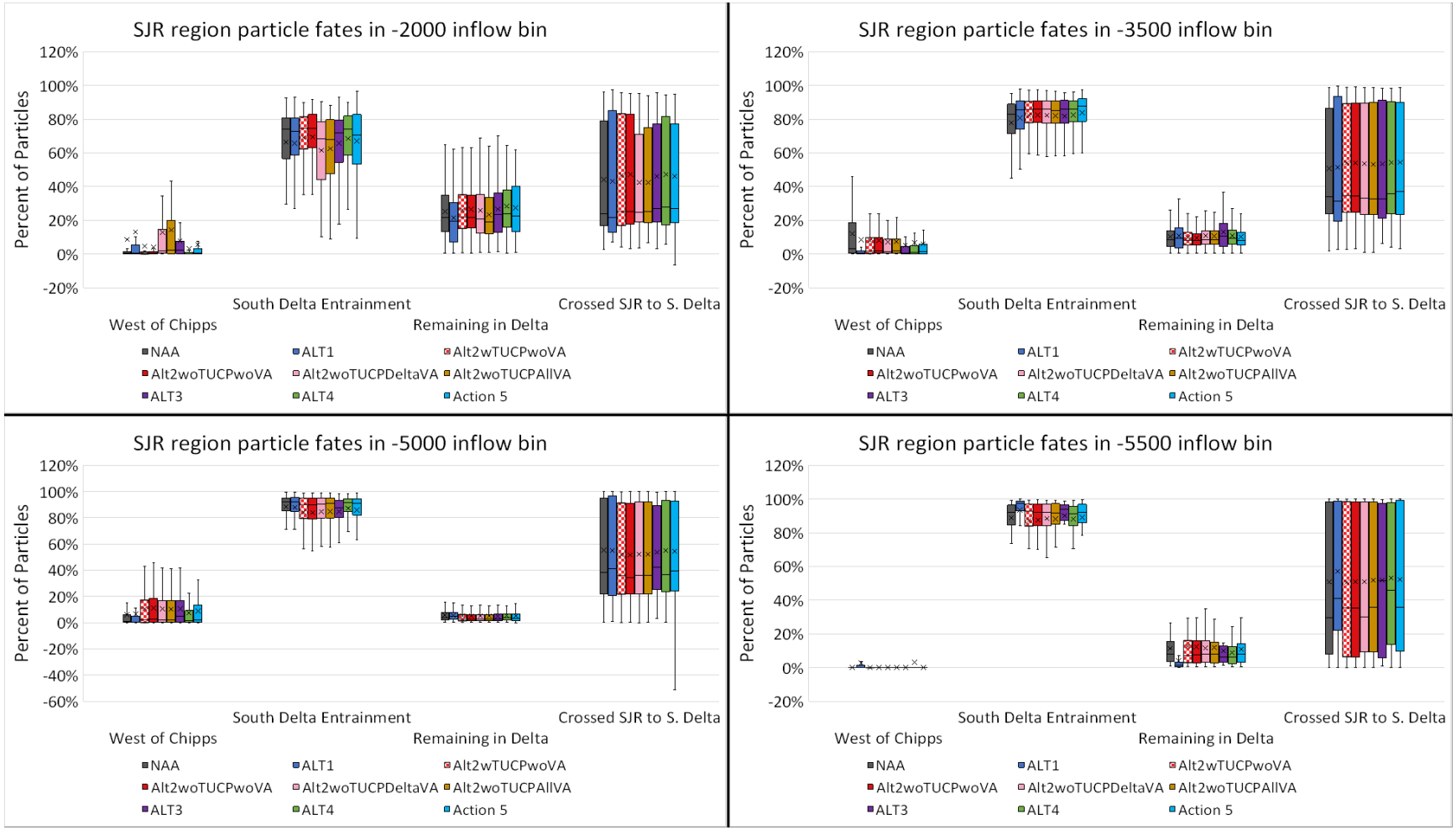



Figure I.8-69. Box and whisker plot of mean December through March particle fate after 45 days by exit location (within each facet from left to right: West of Chipps, South Delta Entrainment, Remaining in Delta, Crossed SJR to S. Delta) for surface oriented particles injected at San Joaquin River region by OMR Bin (from top left to bottom right: -2,000 cfs, -3,500 cfs, -5,000 cfs, -5,500 cfs) for the No Action Alternative, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4, and Action 5.




Figure I.8-70. Box and whisker plot of mean December through March particle fate after 45 days by exit location (within each facet from left to right: West of Chipps, South Delta Entrainment, Remaining in Delta, Crossed SJR to S. Delta) for surface oriented particles injected at South Delta region by OMR Bin (from top left to bottom right: -2,000 cfs, -3,500 cfs, -5,000 cfs, -5,500 cfs) for the No Action Alternative, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4, and Action 5.

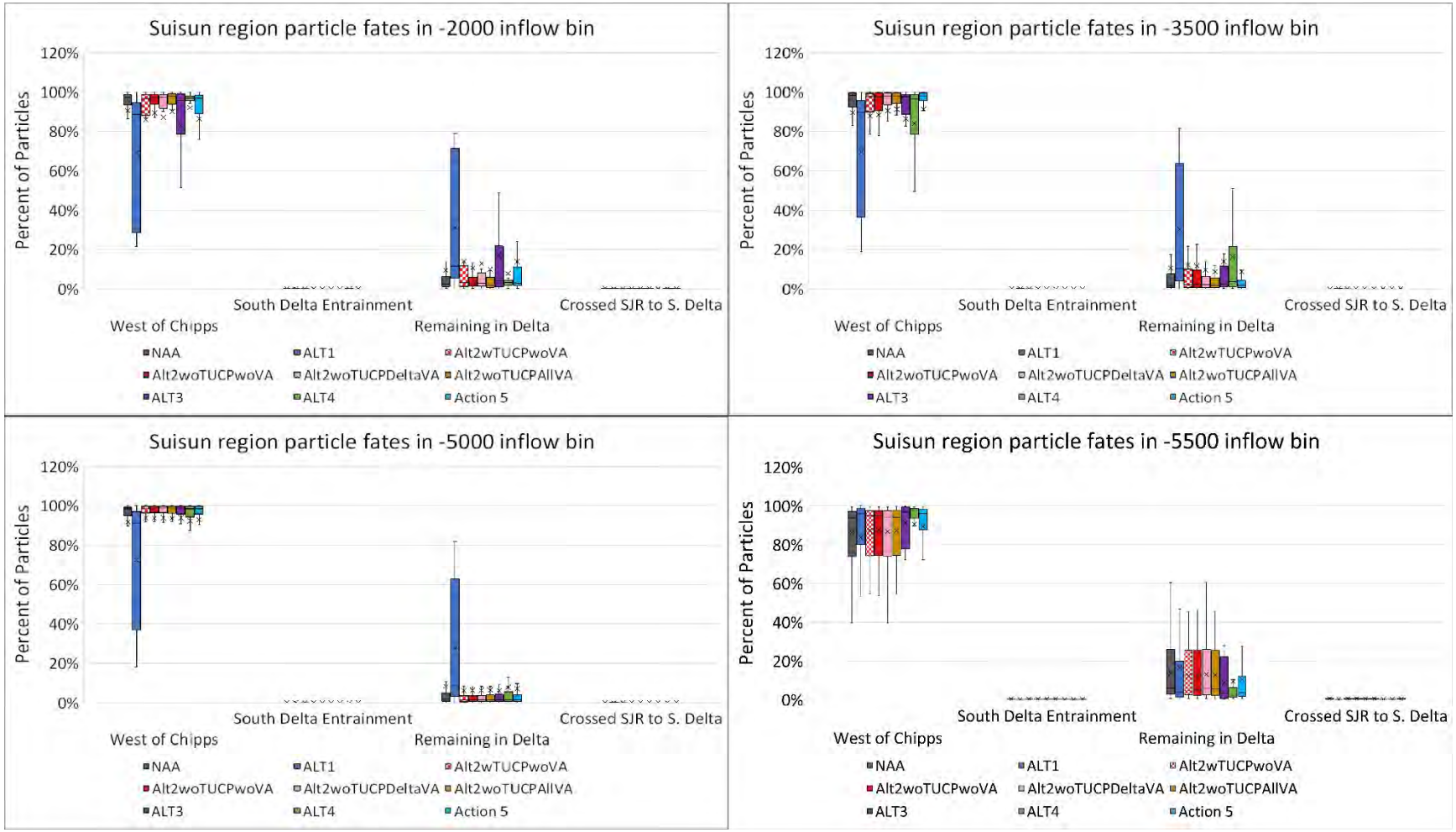



Figure I.8-71. Box and whisker plot of mean December through March particle fate after 45 days by exit location (within each facet from left to right: West of Chipps, South Delta Entrainment, Remaining in Delta, Crossed SJR to S. Delta) for surface oriented particles injected at Suisun region by OMR Bin (from top left to bottom right: -2,000 cfs, -3,500 cfs, -5,000 cfs, -5,500 cfs) for the No Action Alternative, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4, and Action 5.

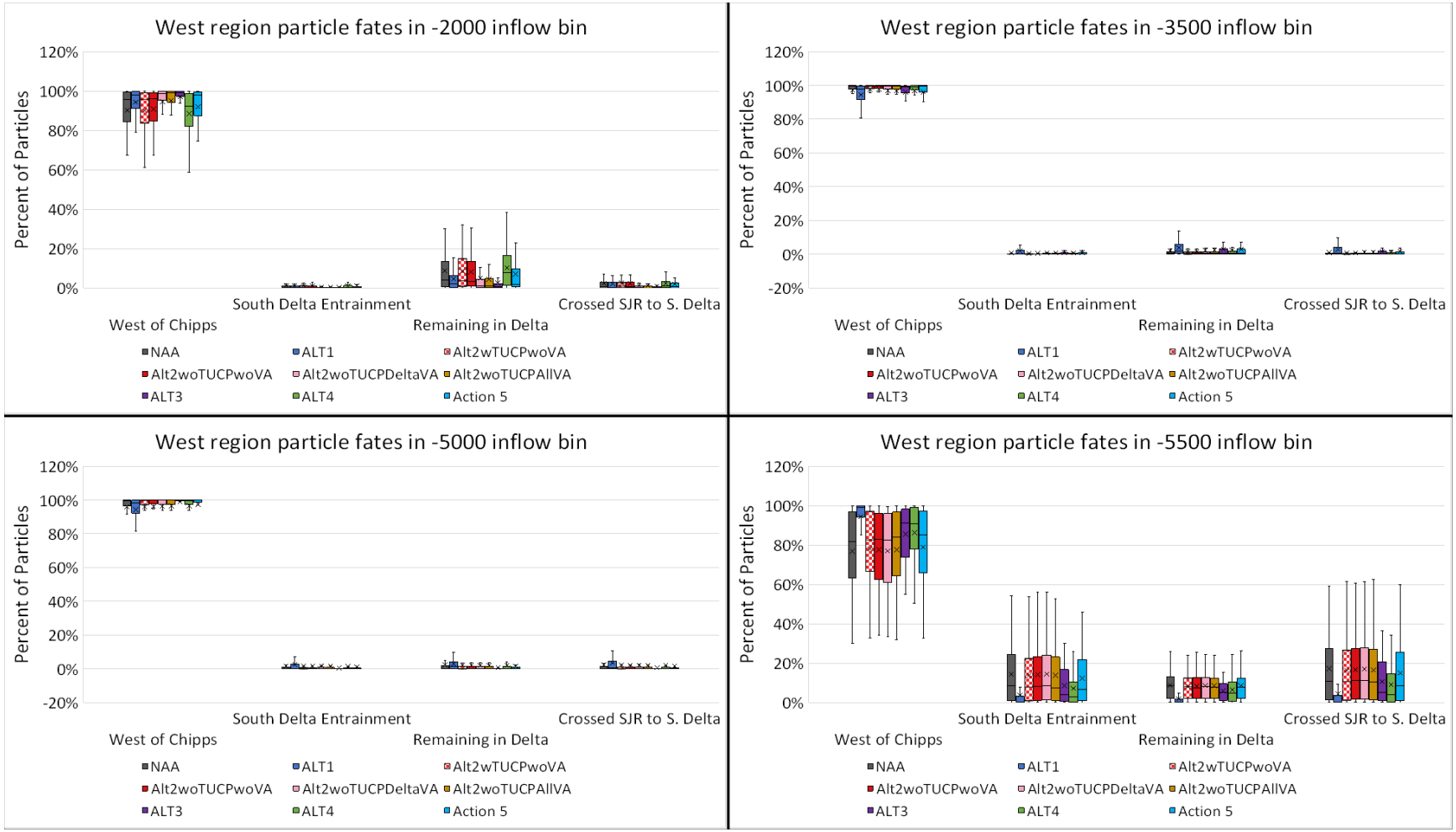



Figure I.8-72. Box and whisker plot of mean December through March particle fate after 45 days by exit location (within each facet from left to right: West of Chipps, South Delta Entrainment, Remaining in Delta, Crossed SJR to S. Delta) for surface oriented particles injected at West Delta region by OMR Bin (from top left to bottom right: -2,000 cfs, -3,500 cfs, -5,000 cfs, -5,500 cfs) for the No Action Alternative, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4, and Action 5.

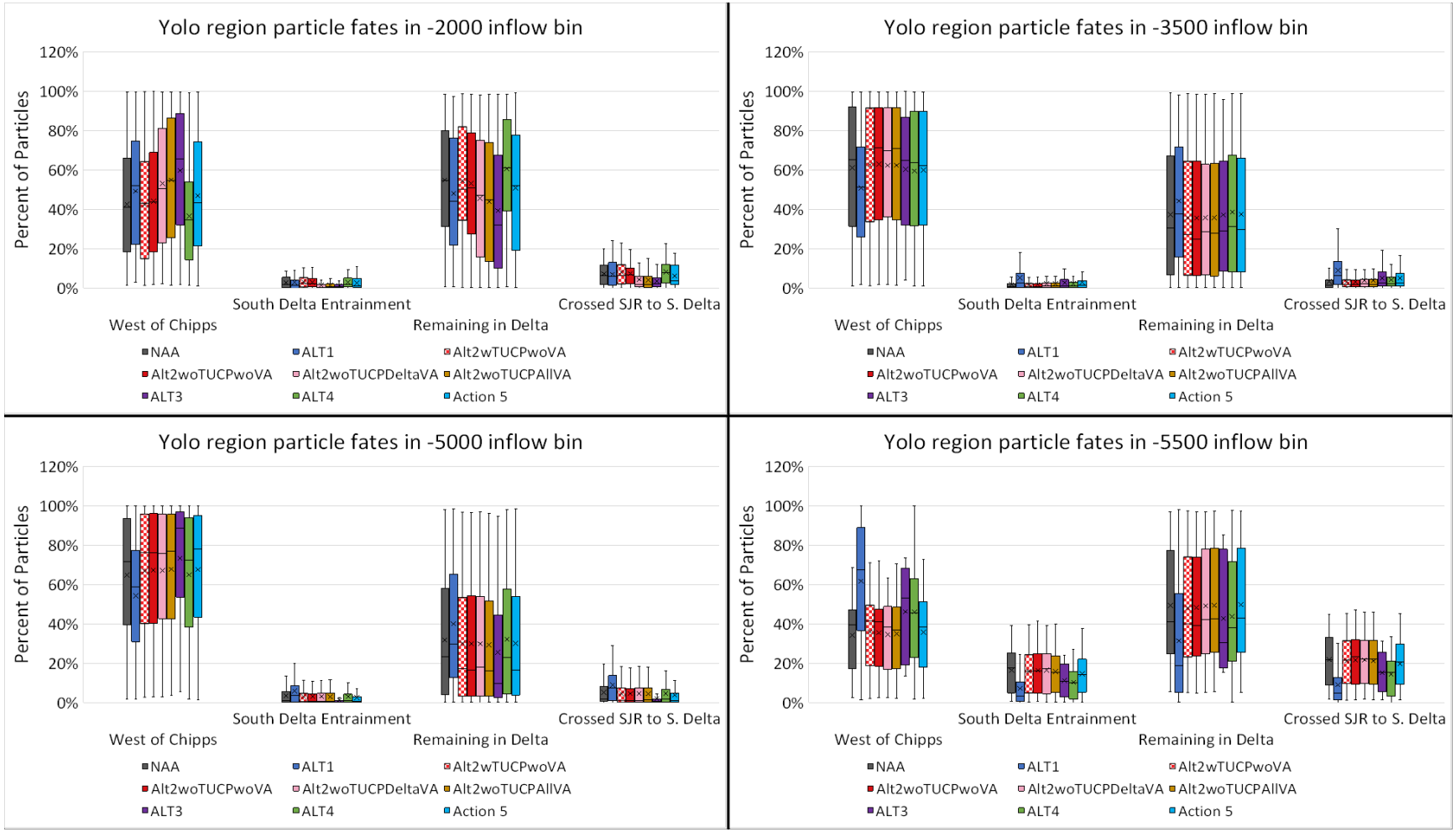



Figure I.8-73. Box and whisker plot of mean December through March particle fate after 45 days by exit location (within each facet from left to right: West of Chipps, South Delta Entrainment, Remaining in Delta, Crossed SJR to S. Delta) for surface oriented particles injected at Yolo region by OMR Bin (from top left to bottom right: -2,000 cfs, -3,500 cfs, -5,000 cfs, -5,500 cfs) for the No Action Alternative, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4, and Action 5.

### *I.8.4.4.5 Neutrally Buoyant, Inflow and OMR Bins, December through March [EIS, Figure I.8-74 through Figure I.8-92]*

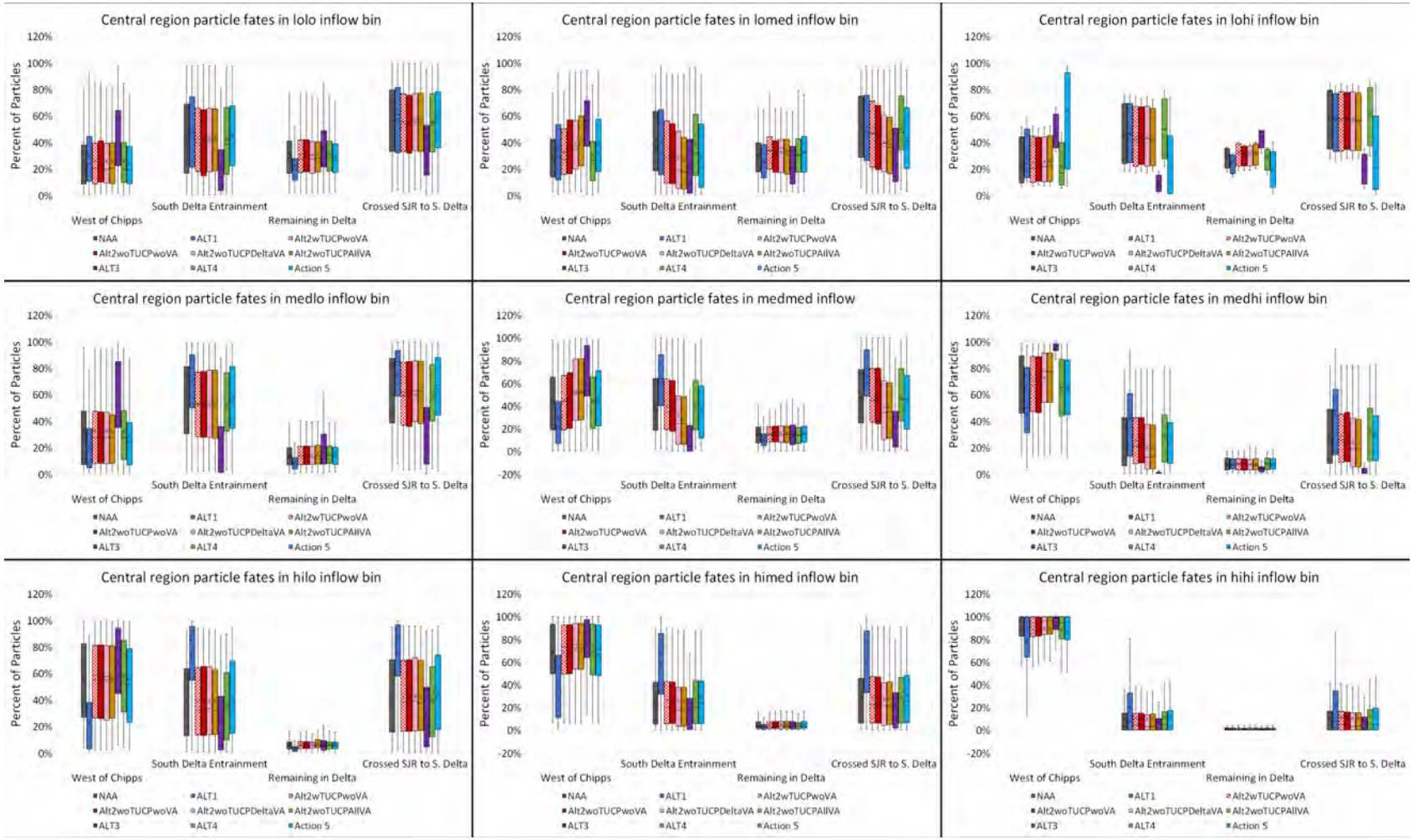



Figure I.8-74. Box and whisker plot of mean December through March particle fate after 45 days by exit location (within each facet from left to right: West of Chipps, South Delta Entrainment, Remaining in Delta, Crossed SJR to S. Delta) for neutrally buoyant particles injected at Central Delta region by Inflow Bin (from top left to bottom right: "lolo" to "hihi") for the No Action Alternative, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4, and Action 5.

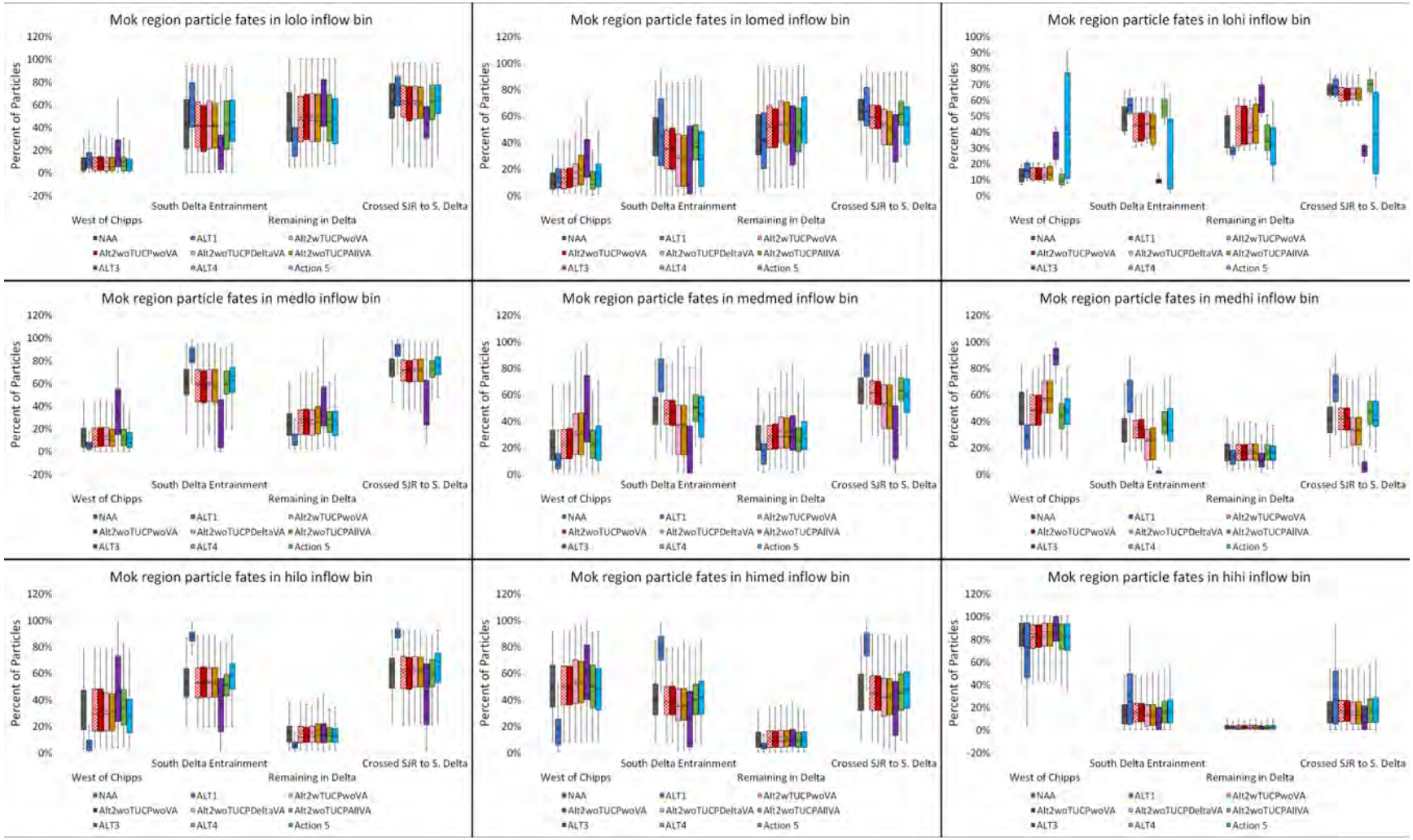



Figure I.8-75. Box and whisker plot of mean December through March particle fate after 45 days by exit location (within each facet from left to right: West of Chipps, South Delta Entrainment, Remaining in Delta, Crossed SJR to S. Delta) for neutrally buoyant particles injected at Mokelumne River region by Inflow Bin (from top left to bottom right: "lolo" to "hihi") for the No Action Alternative, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4, and Action 5.

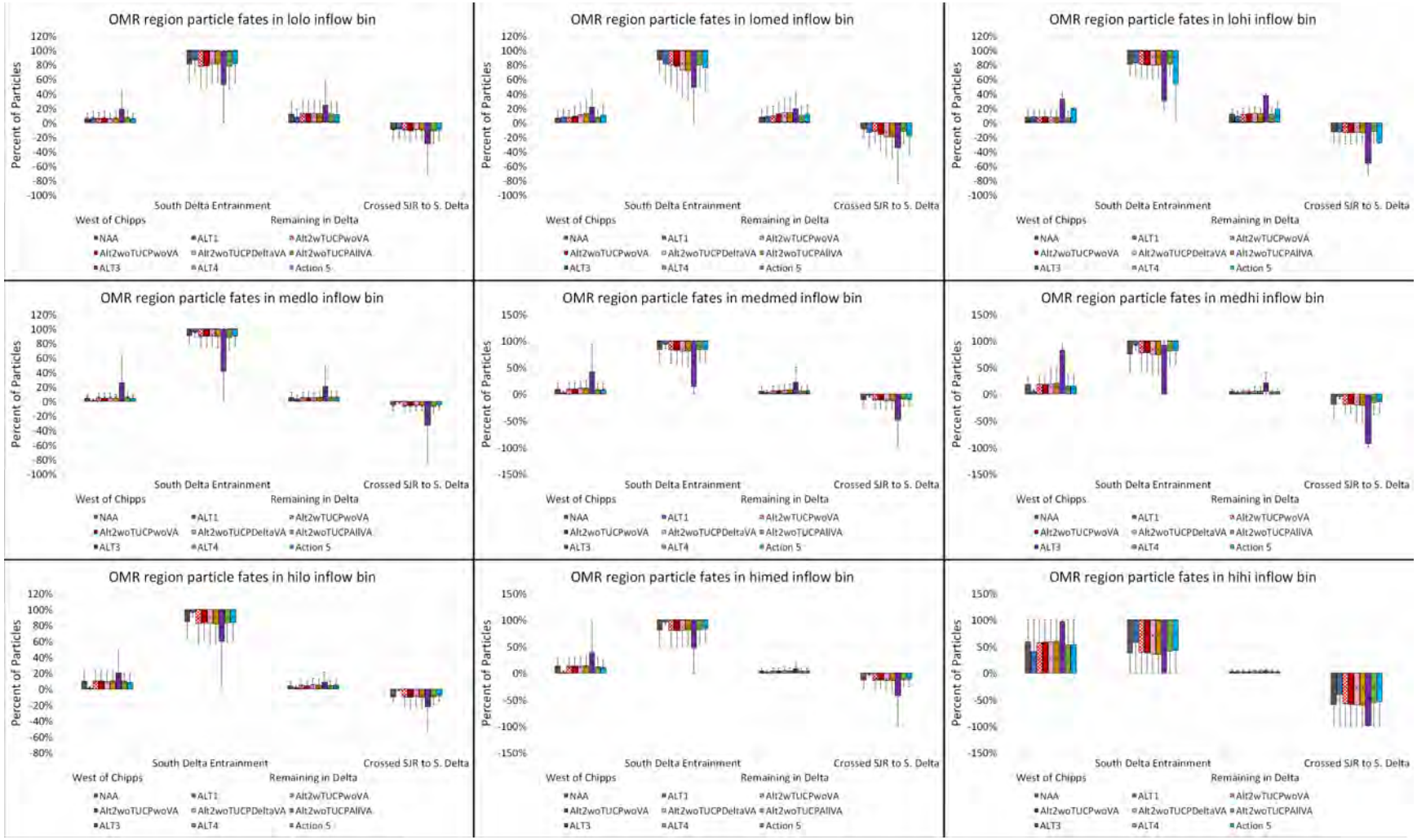



Figure I.8-76. Box and whisker plot of mean December through March particle fate after 45 days by exit location (within each facet from left to right: West of Chipps, South Delta Entrainment, Remaining in Delta, Crossed SJR to S. Delta) for neutrally buoyant particles injected at Old and Middle River region by Inflow Bin (from top left to bottom right: "lolo" to "hihi") for the No Action Alternative, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4, and Action 5.

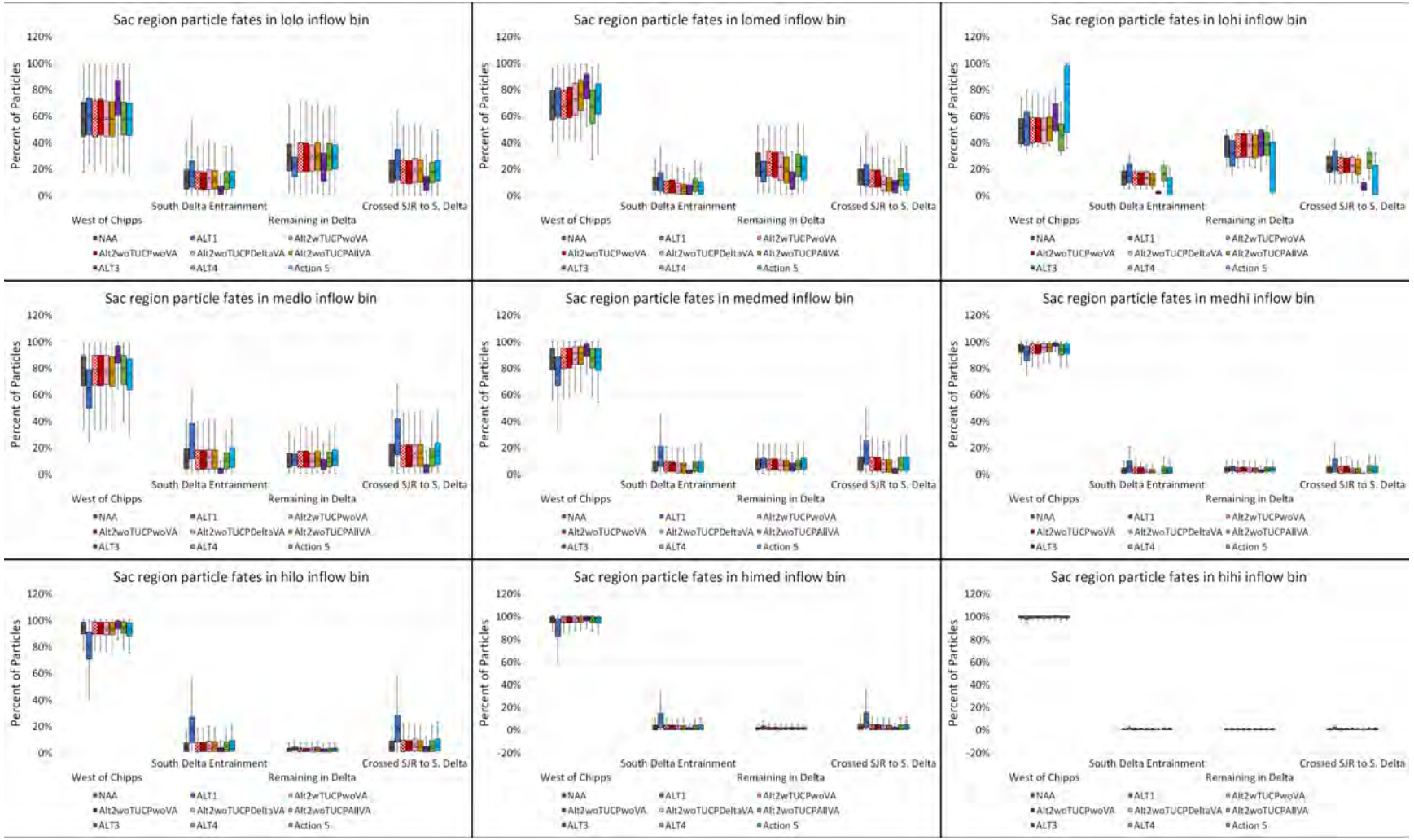



Figure I.8-77. Box and whisker plot of mean December through March particle fate after 45 days by exit location (within each facet from left to right: West of Chipps, South Delta Entrainment, Remaining in Delta, Crossed SJR to S. Delta) for neutrally buoyant particles injected at Sacramento River region by Inflow Bin (from top left to bottom right: "lolo" to "hihi") for the No Action Alternative, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4, and Action 5.

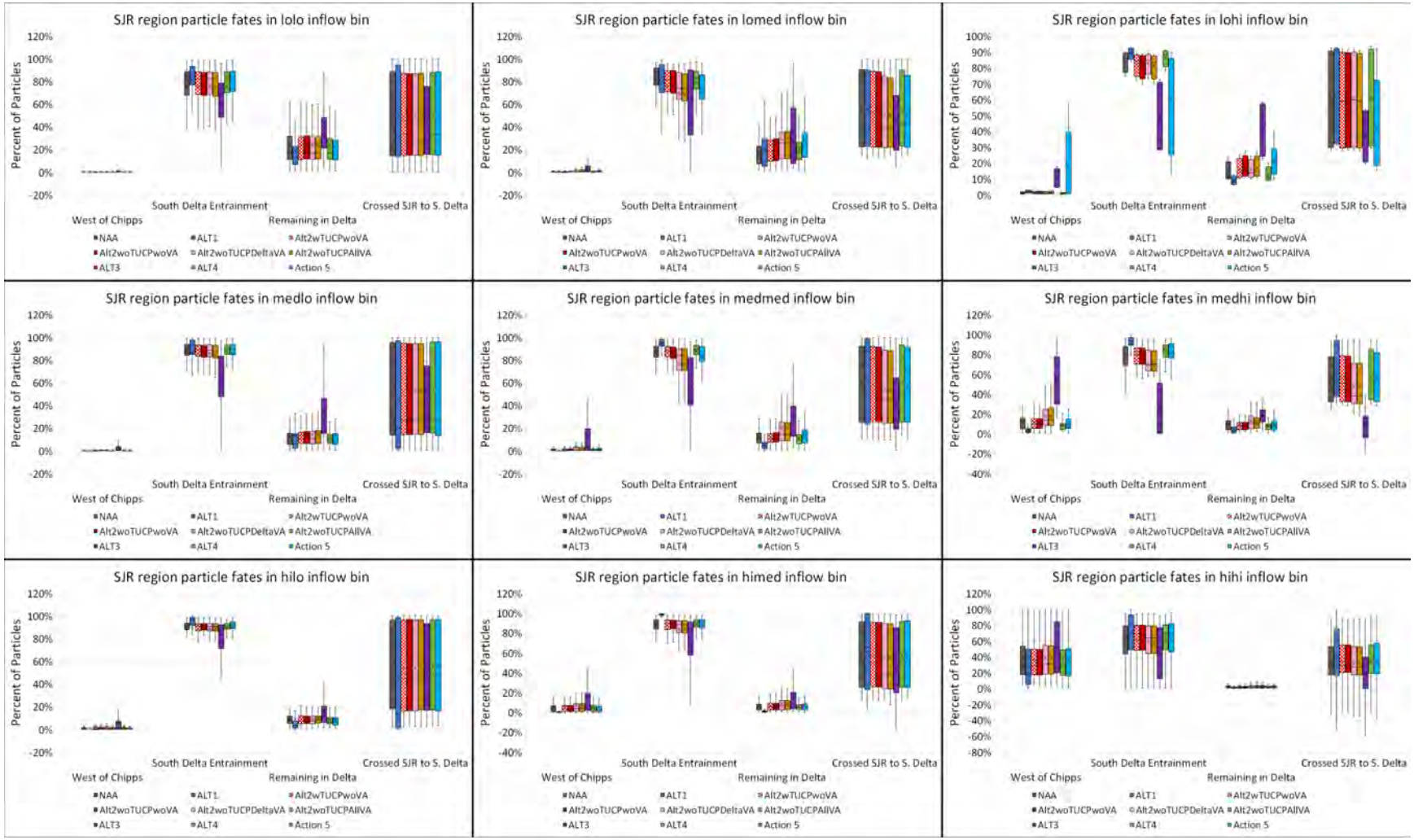



Figure I.8-78. Box and whisker plot of mean December through March particle fate after 45 days by exit location (within each facet from left to right: West of Chipps, South Delta Entrainment, Remaining in Delta, Crossed SJR to S. Delta) for neutrally buoyant particles injected at San Joaquin River region by Inflow Bin (from top left to bottom right: "lolo" to "hihi") for the No Action Alternative, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4, and Action 5.

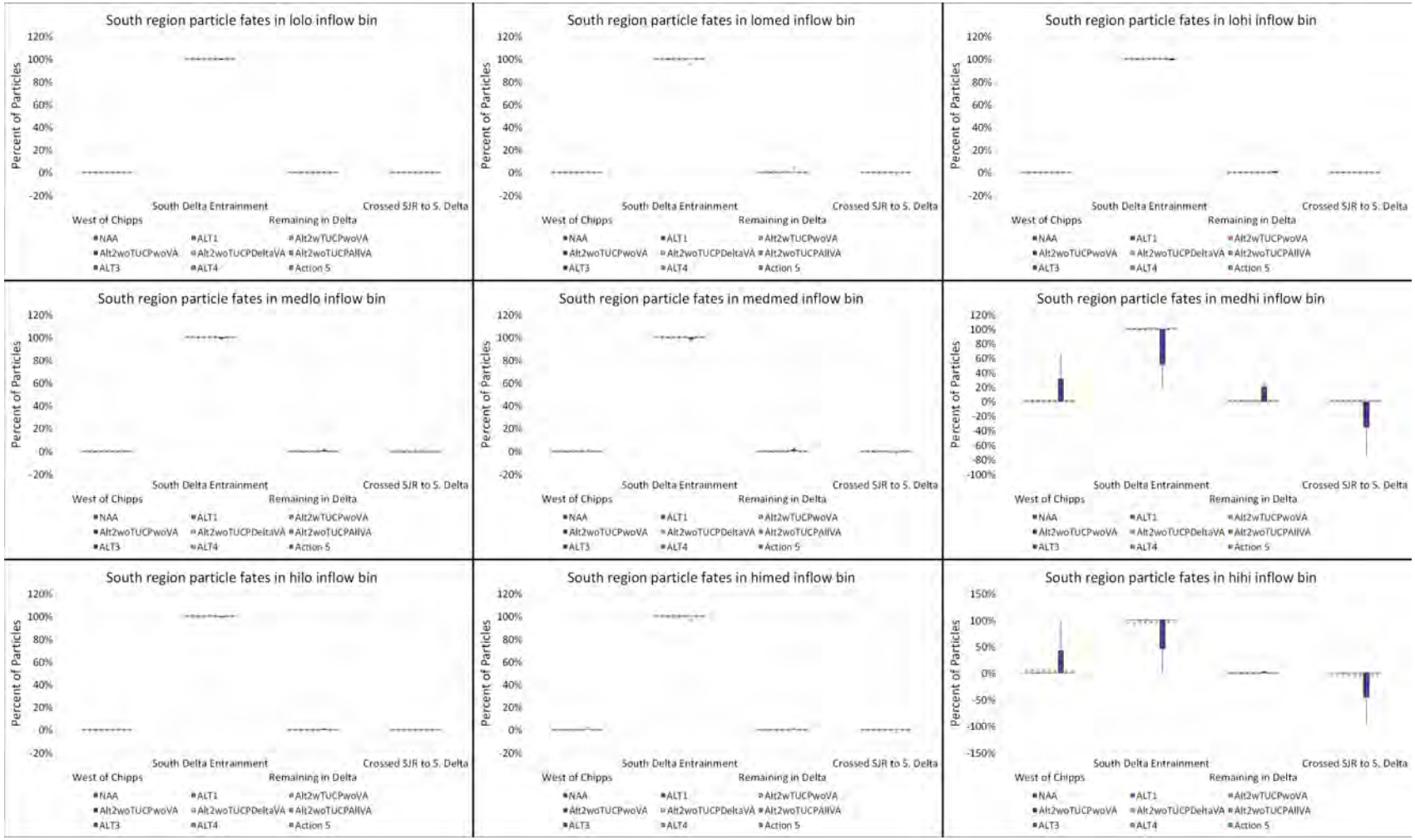



Figure I.8-79. Box and whisker plot of mean December through March particle fate after 45 days by exit location (within each facet from left to right: West of Chipps, South Delta Entrainment, Remaining in Delta, Crossed SJR to S. Delta) for neutrally buoyant particles injected at South Delta region by Inflow Bin (from top left to bottom right: “lolo” to “hihi”) for the No Action Alternative, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4, and Action 5.

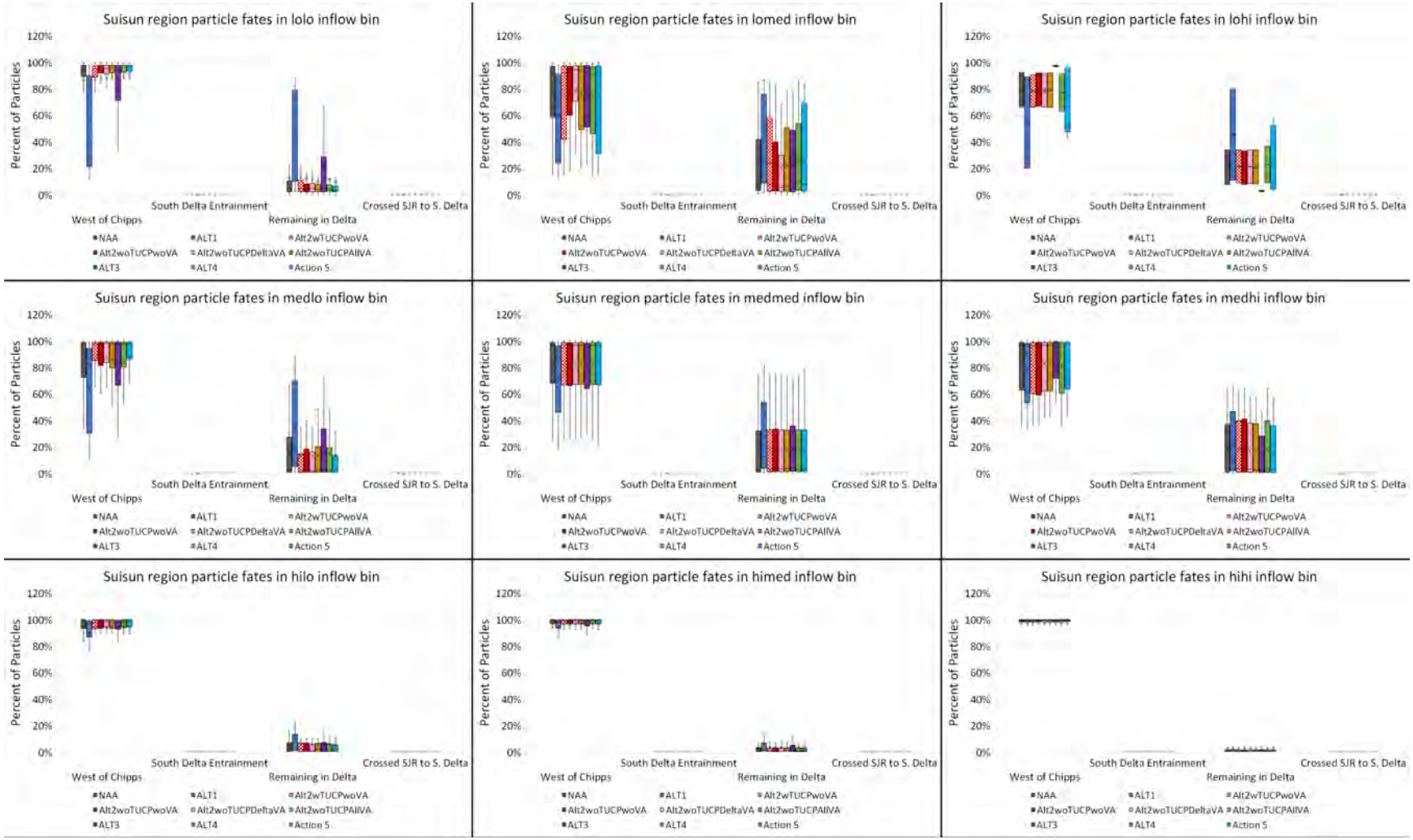



Figure I.8-80. Box and whisker plot of mean December through March particle fate after 45 days by exit location (within each facet from left to right: West of Chipps, South Delta Entrainment, Remaining in Delta, Crossed SJR to S. Delta) for neutrally buoyant particles injected at Suisun region by Inflow Bin (from top left to bottom right: "lolo" to "hihi") for the No Action Alternative, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4, and Action 5.

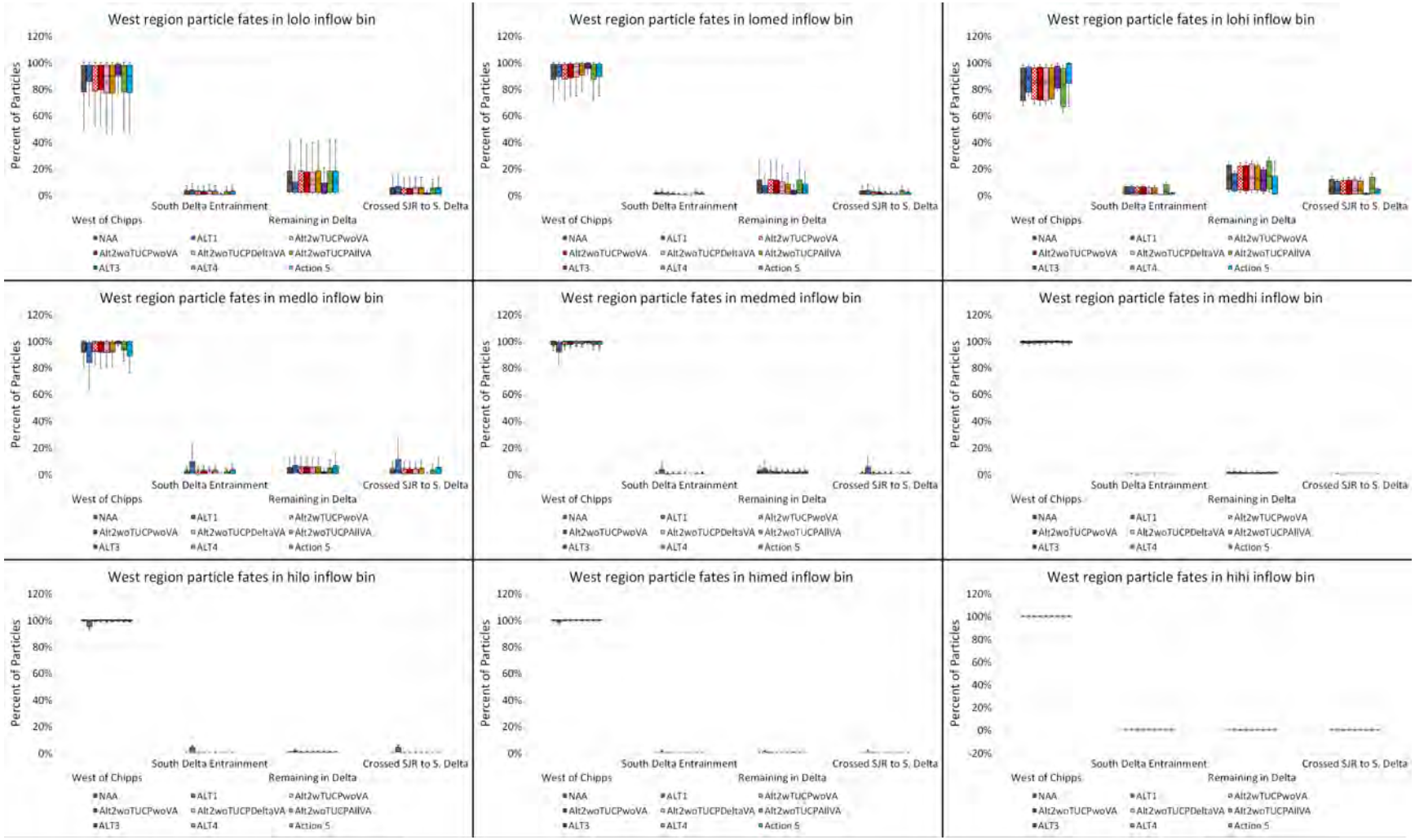



Figure I.8-81. Box and whisker plot of mean December through March particle fate after 45 days by exit location (within each facet from left to right: West of Chipps, South Delta Entrainment, Remaining in Delta, Crossed SJR to S. Delta) for neutrally buoyant particles injected at West Delta region by Inflow Bin (from top left to bottom right: "lolo" to "hihi") for the No Action Alternative, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4, and Action 5.

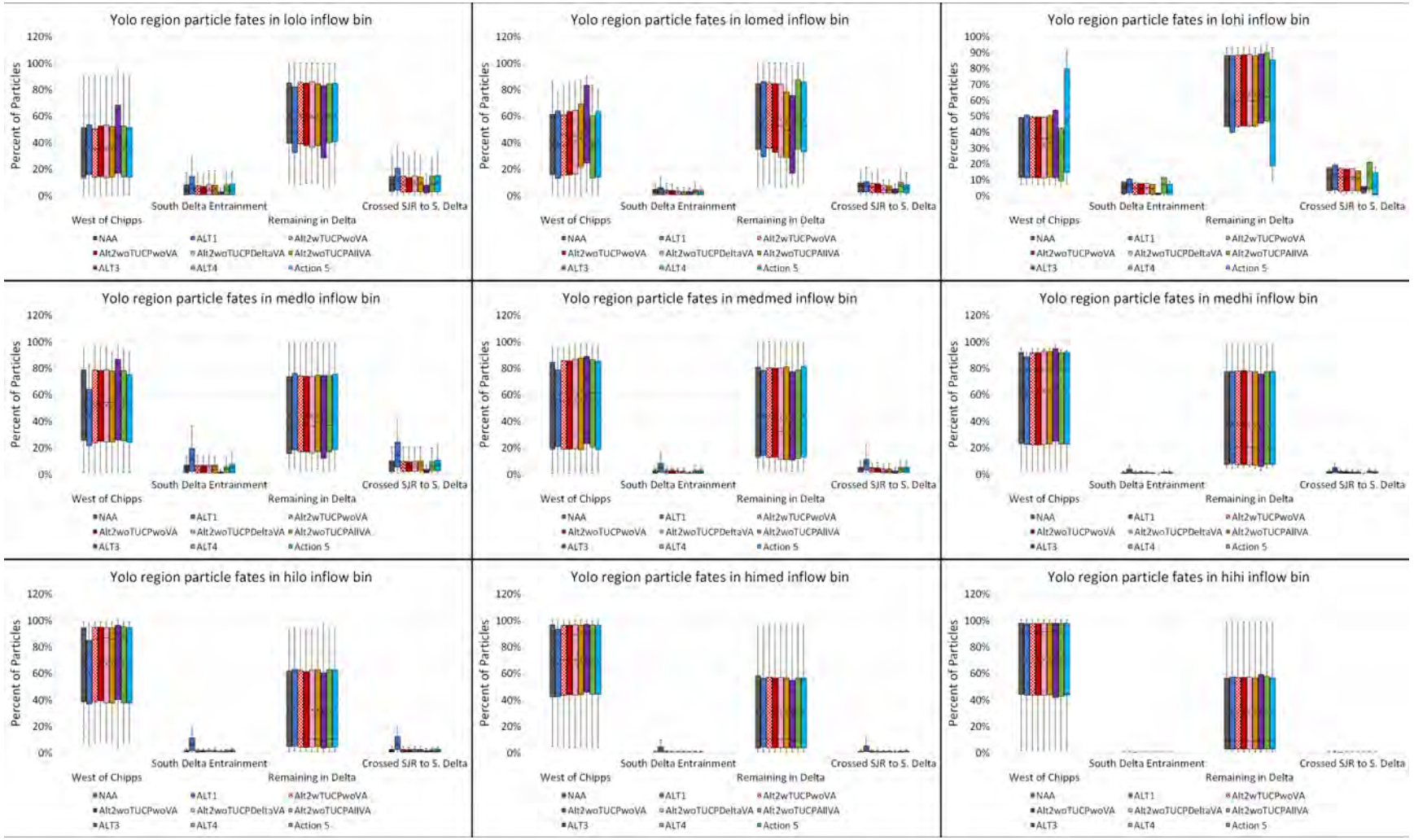



Figure I.8-82. Box and whisker plot of mean December through March particle fate after 45 days by exit location (within each facet from left to right: West of Chipps, South Delta Entrainment, Remaining in Delta, Crossed SJR to S. Delta) for neutrally buoyant particles injected at Yolo region by Inflow Bin (from top left to bottom right: “lolo” to “hihi”) for the No Action Alternative, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4, and Action 5.

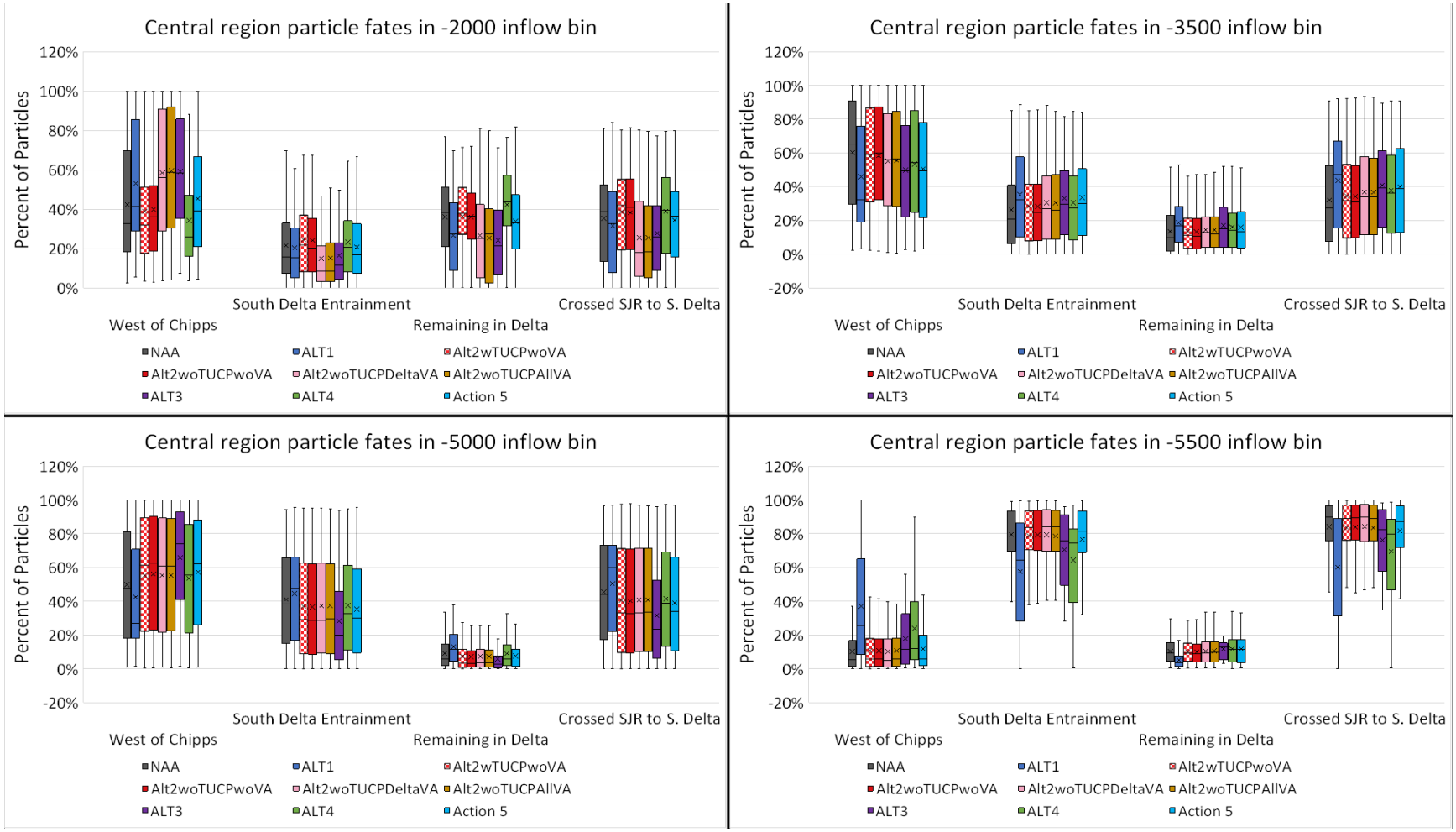



Figure I.8-83. Box and whisker plot of mean December through March particle fate after 45 days by exit location (within each facet from left to right: West of Chipps, South Delta Entrainment, Remaining in Delta, Crossed SJR to S. Delta) for neutrally buoyant particles injected at Central Delta region by OMR Bin (from top left to bottom right: -2,000 cfs, -3,500 cfs, -5,000 cfs, -5,500 cfs) for the No Action Alternative, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4, and Action 5.

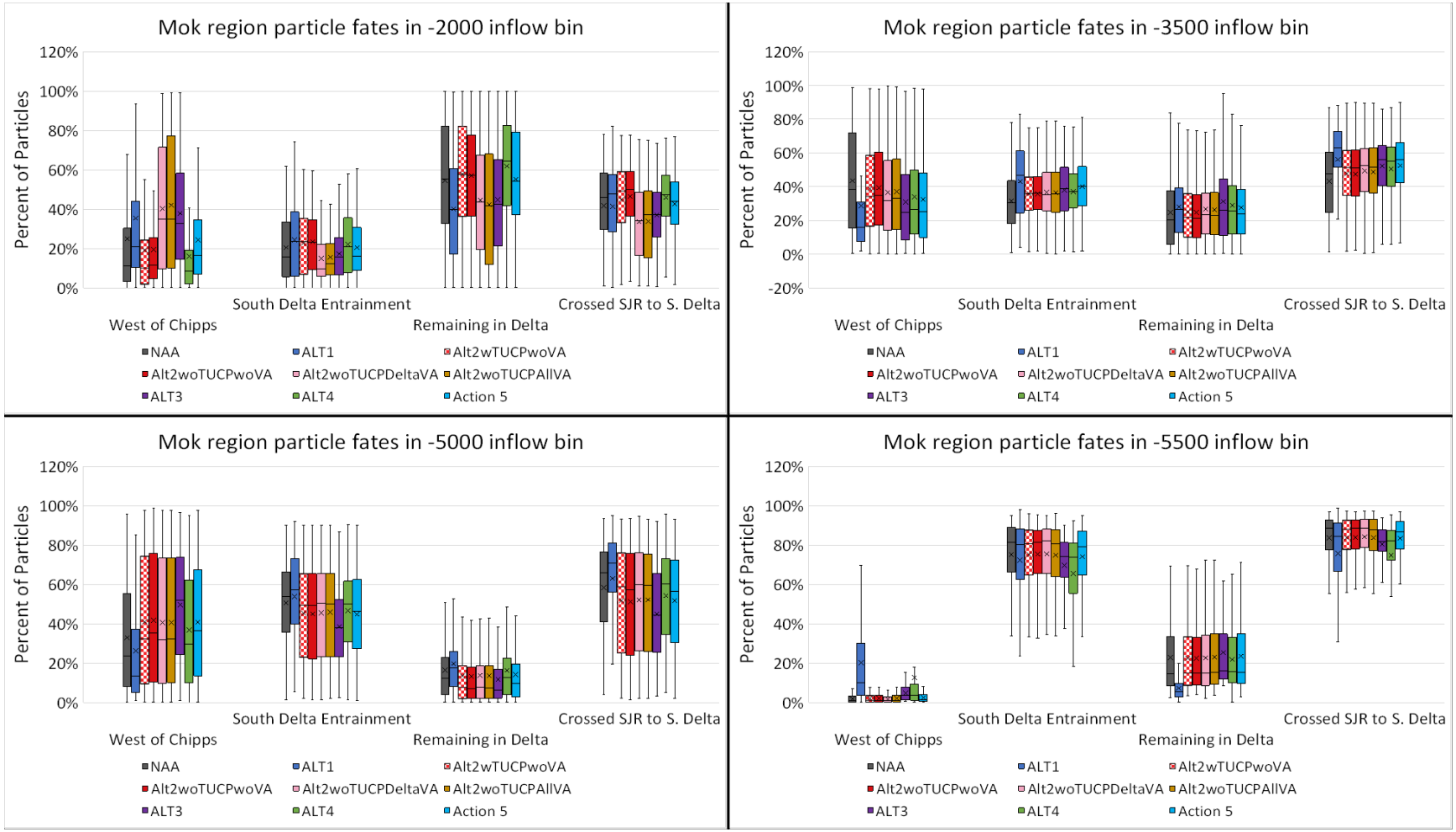



Figure I.8-84. Box and whisker plot of mean December through March particle fate after 45 days by exit location (within each facet from left to right: West of Chipps, South Delta Entrainment, Remaining in Delta, Crossed SJR to S. Delta) for neutrally buoyant particles injected at Mokelumne River by OMR Bin (from top left to bottom right: -2,000 cfs, -3,500 cfs, -5,000 cfs, -5,500 cfs) for the No Action Alternative, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4, and Action 5.

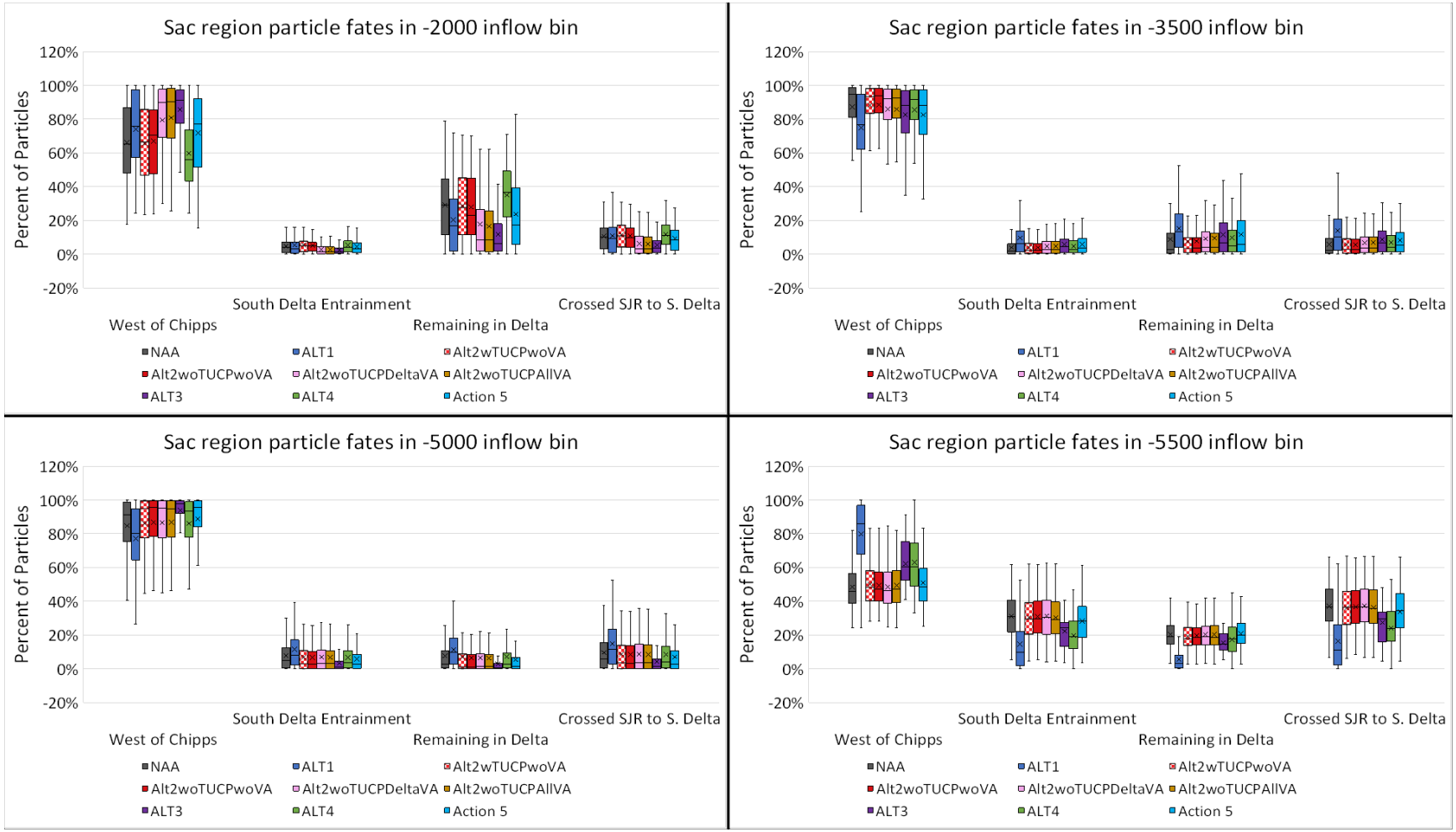



Figure I.8-85. Box and whisker plot of mean December through March particle fate after 45 days by exit location (within each facet from left to right: West of Chipps, South Delta Entrainment, Remaining in Delta, Crossed SJR to S. Delta) for neutrally buoyant particles injected at Mokelumne River region by OMR Bin (from top left to bottom right: -2,000 cfs, -3,500 cfs, -5,000 cfs, -5,500 cfs) for the No Action Alternative, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4, and Action 5.

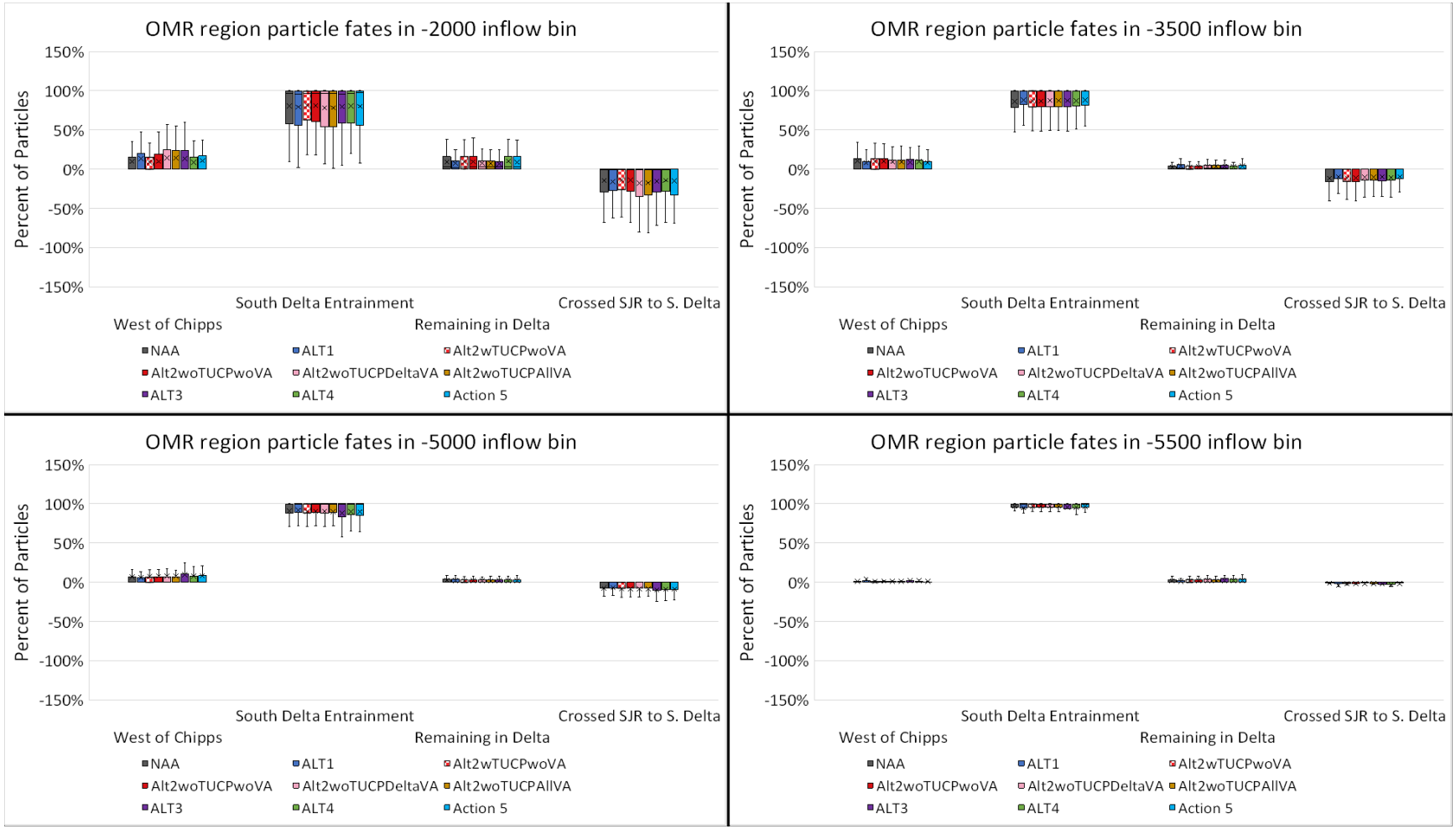



Figure I.8-86. Box and whisker plot of mean December through March particle fate after 45 days by exit location (within each facet from left to right: West of Chipps, South Delta Entrainment, Remaining in Delta, Crossed SJR to S. Delta) for neutrally buoyant particles injected at Old and Middle River region by OMR Bin (from top left to bottom right: -2,000 cfs, -3,500 cfs, -5,000 cfs, -5,500 cfs) for the No Action Alternative, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4, and Action 5.

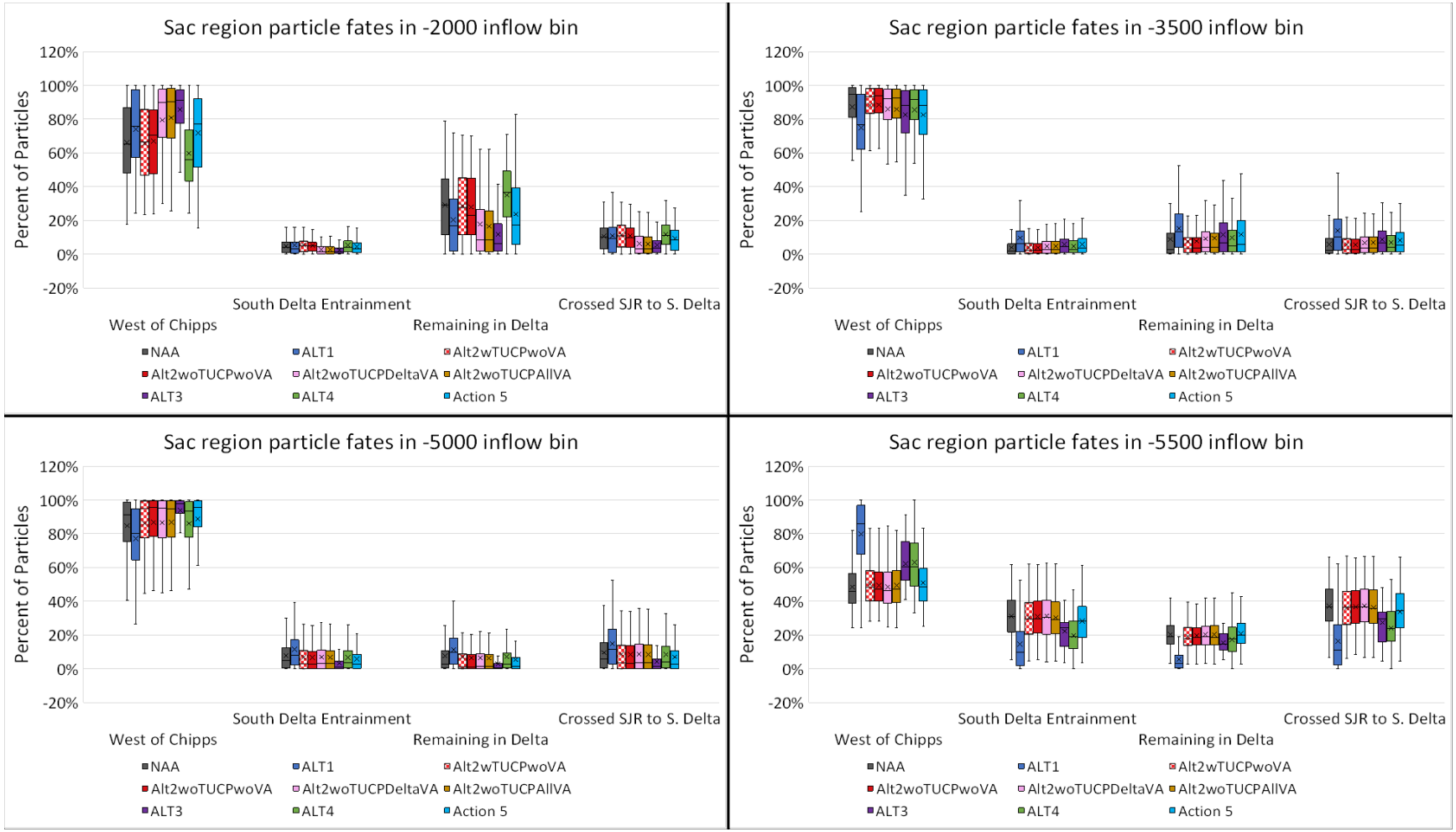



Figure I.8-87. Box and whisker plot of mean December through March particle fate after 45 days by exit location (within each facet from left to right: West of Chipps, South Delta Entrainment, Remaining in Delta, Crossed SJR to S. Delta) for neutrally buoyant particles injected at Sacramento River region by OMR Bin (from top left to bottom right: -2,000 cfs, -3,500 cfs, -5,000 cfs, -5,500 cfs) for the No Action Alternative, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4, and Action 5.

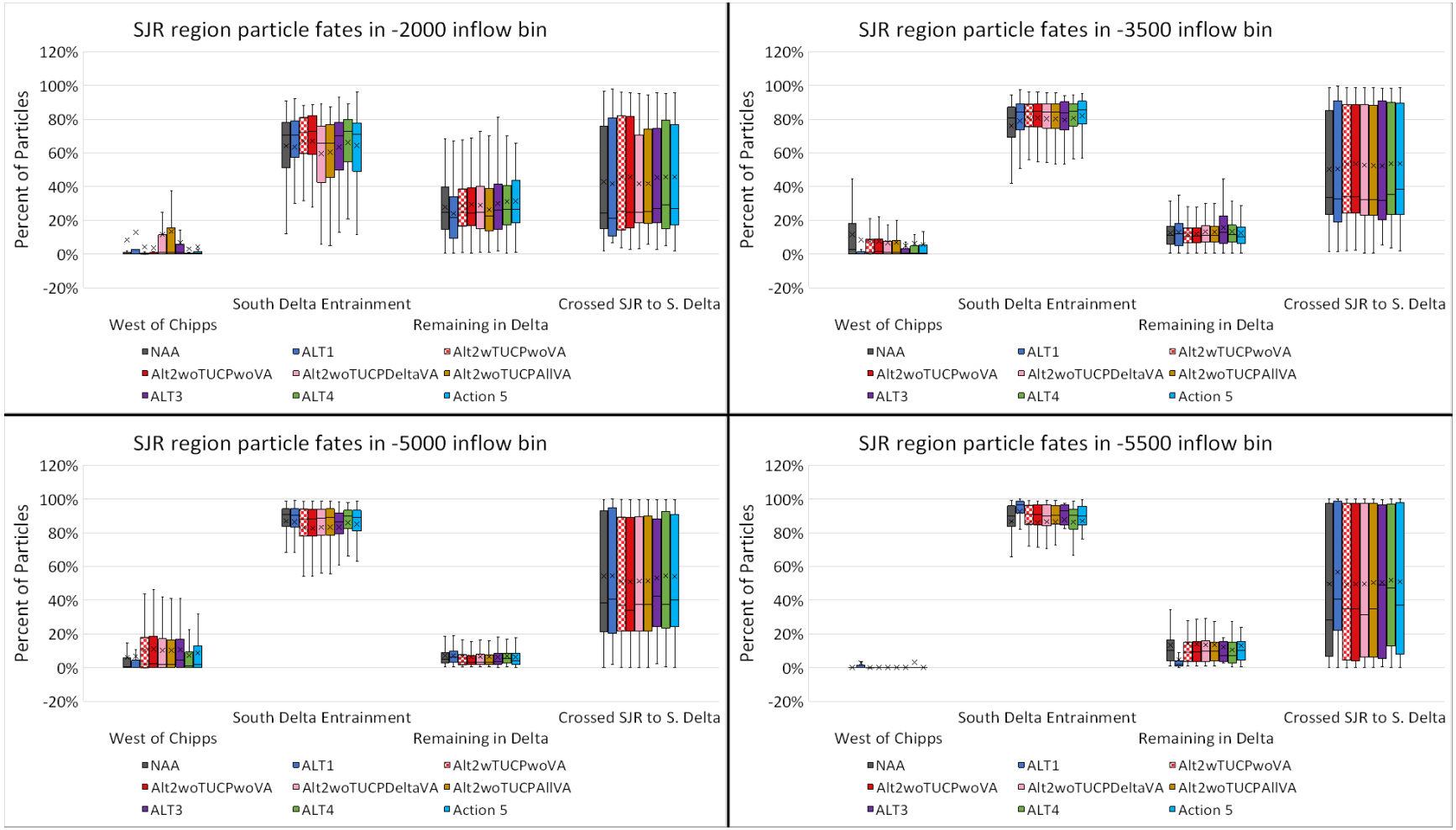



Figure I.8-88. Box and whisker plot of mean December through March particle fate after 45 days by exit location (within each facet from left to right: West of Chipps, South Delta Entrainment, Remaining in Delta, Crossed SJR to S. Delta) for neutrally buoyant particles injected at San Joaquin River region by OMR Bin (from top left to bottom right: -2,000 cfs, -3,500 cfs, -5,000 cfs, -5,500 cfs) for the No Action Alternative, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4, and Action 5.




Figure I.8-89. Box and whisker plot of mean December through March particle fate after 45 days by exit location (within each facet from left to right: West of Chipps, South Delta Entrainment, Remaining in Delta, Crossed SJR to S. Delta) for neutrally buoyant particles injected at South Delta region by OMR Bin (from top left to bottom right: -2,000 cfs, -3,500 cfs, -5,000 cfs, -5,500 cfs) for the No Action Alternative, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4, and Action 5.

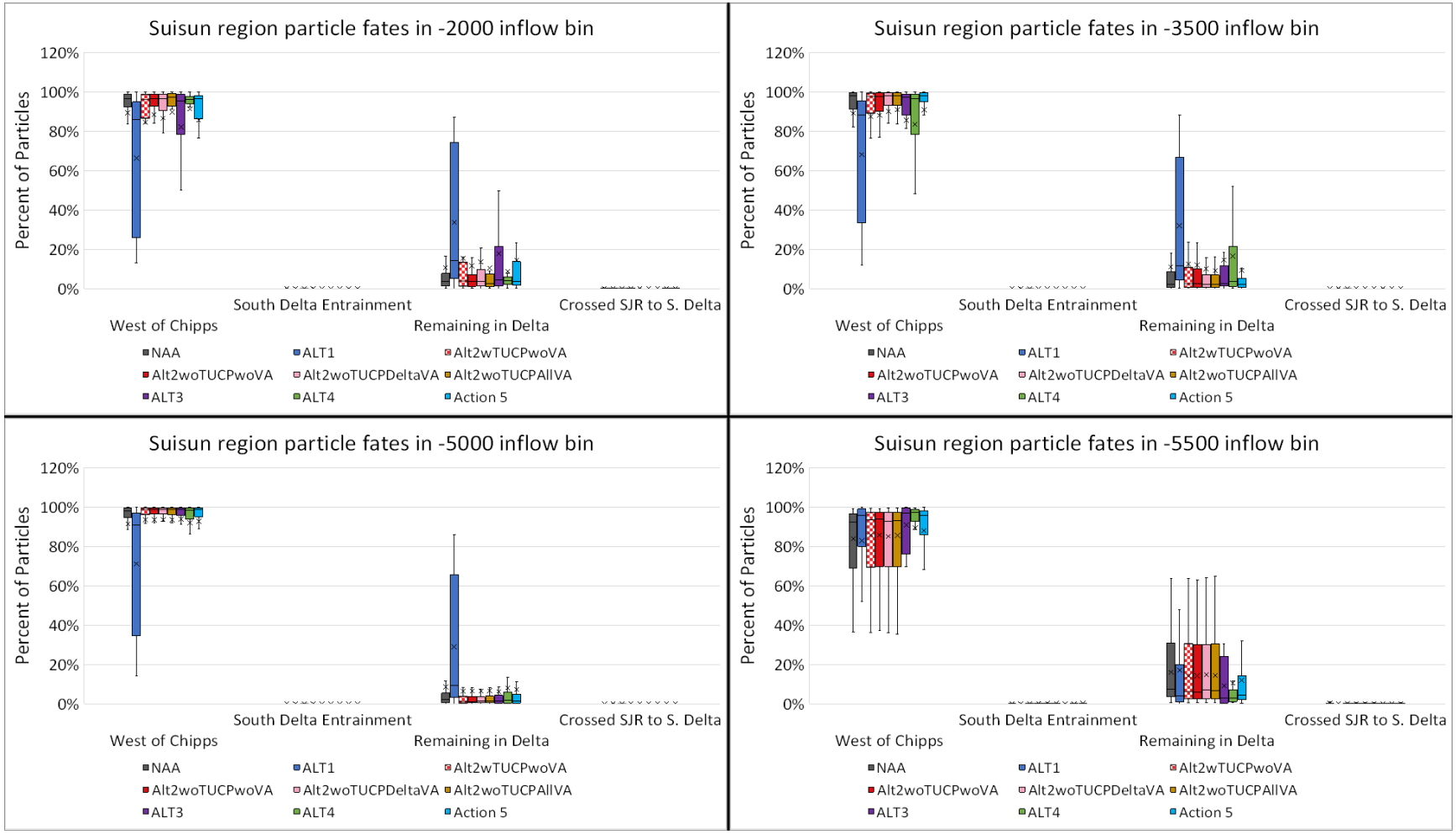



Figure I.8-90. Box and whisker plot of mean December through March particle fate after 45 days by exit location (within each facet from left to right: West of Chipps, South Delta Entrainment, Remaining in Delta, Crossed SJR to S. Delta) for neutrally buoyant particles injected at Suisun region by OMR Bin (from top left to bottom right: -2,000 cfs, -3,500 cfs, -5,000 cfs, -5,500 cfs) for the No Action Alternative, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4, and Action 5.

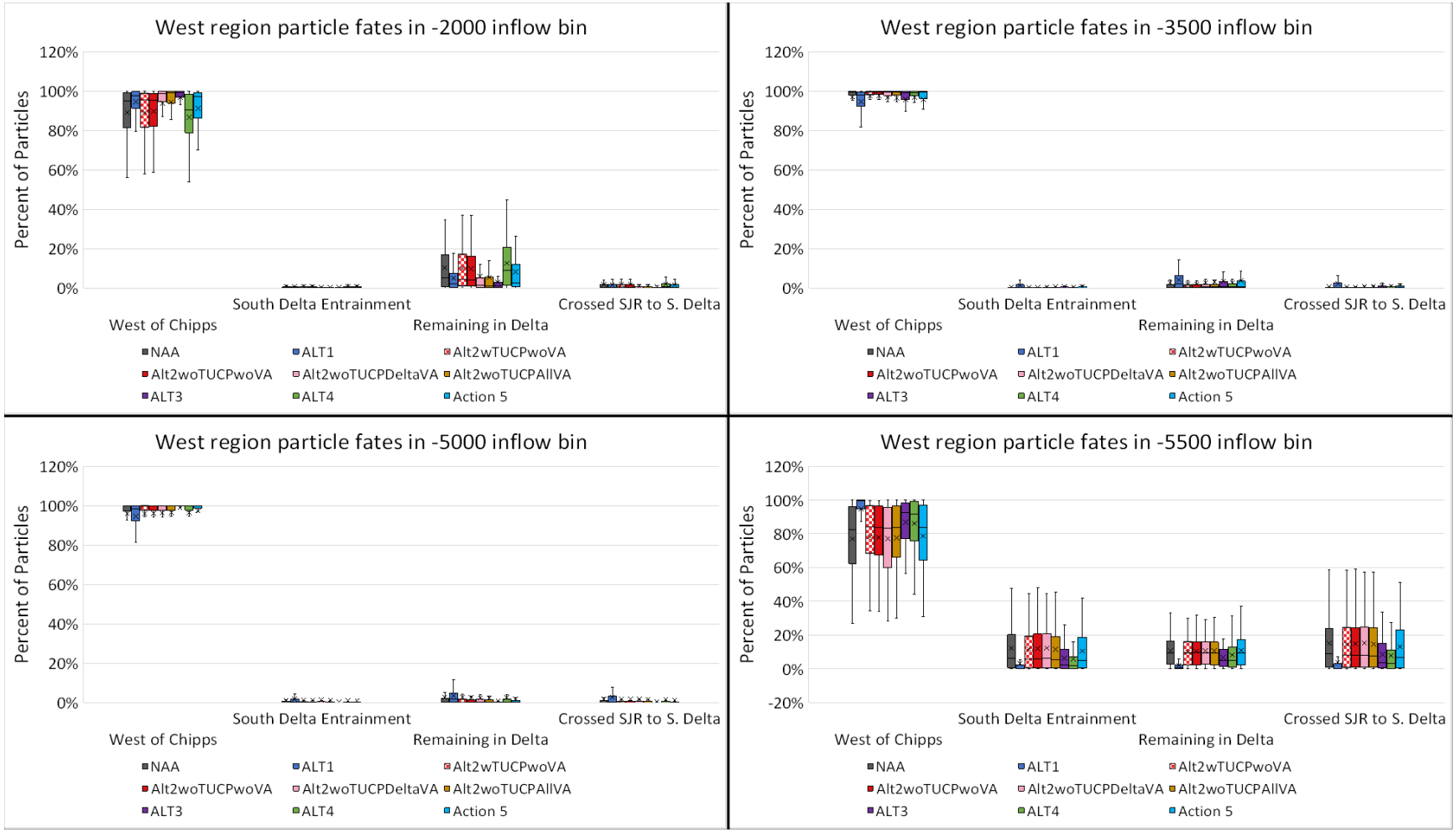



Figure I.8-91. Box and whisker plot of mean December through March particle fate after 45 days by exit location (within each facet from left to right: West of Chipps, South Delta Entrainment, Remaining in Delta, Crossed SJR to S. Delta) for neutrally buoyant particles injected at West Delta region by OMR Bin (from top left to bottom right: -2,000 cfs, -3,500 cfs, -5,000 cfs, -5,500 cfs) for the No Action Alternative, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4, and Action 5.

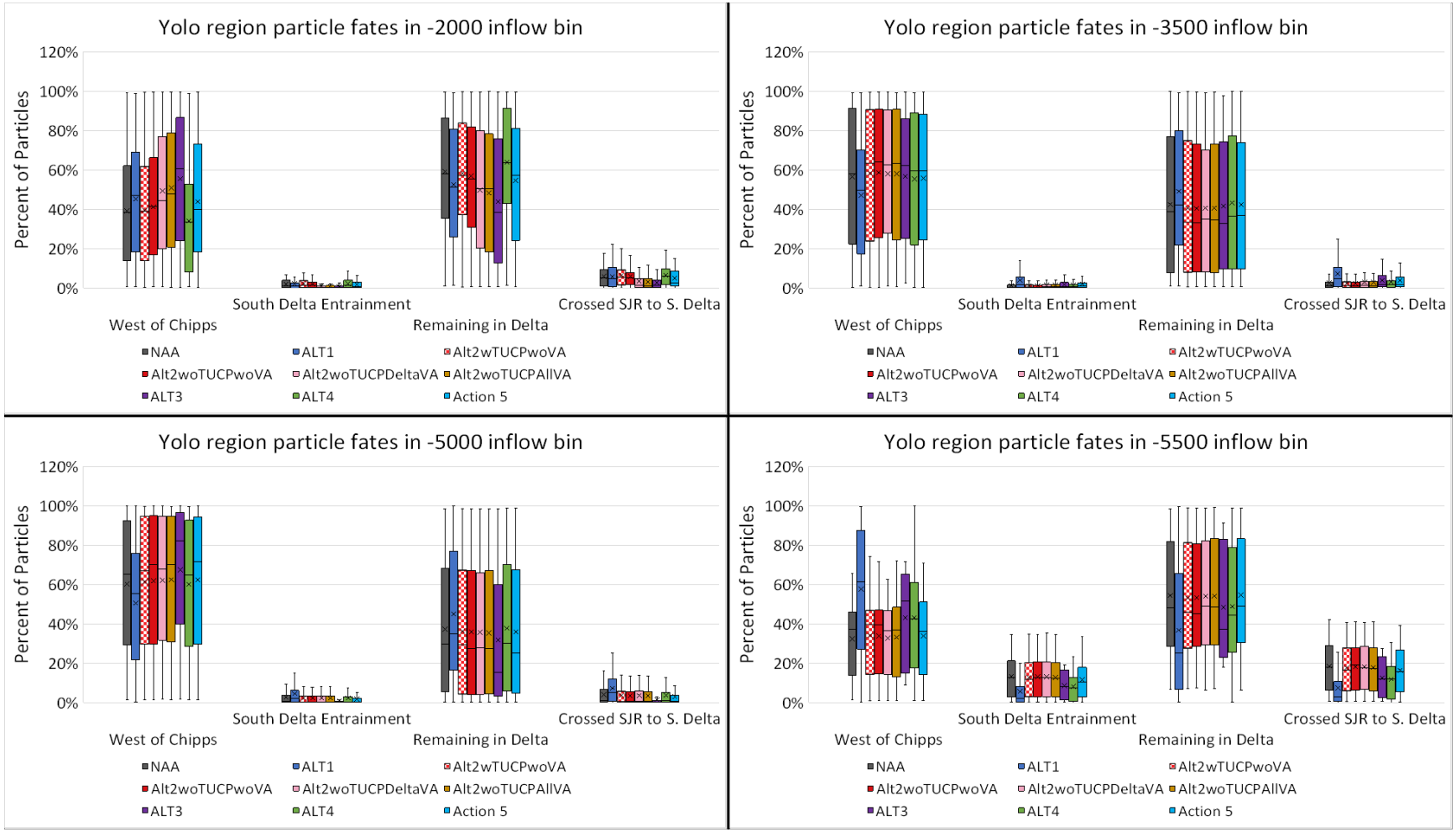



Figure I.8-92. Box and whisker plot of mean December through March particle fate after 45 days by exit location (within each facet from left to right: West of Chipps, South Delta Entrainment, Remaining in Delta, Crossed SJR to S. Delta) for neutrally buoyant particles injected at Yolo region by OMR Bin (from top left to bottom right: -2,000 cfs, -3,500 cfs, -5,000 cfs, -5,500 cfs) for the No Action Alternative, Alternative 1, four phases of Alternative 2, Alternative 3, Alternative 4, and Action 5.

## I.8.5 References

Miller, A. 2002. *Methodology for Flow and Salinity Estimates in the Sacramento–San Joaquin Delta and Suisun Marsh.* Twenty-Third Annual Progress Report to the State Water Resources Control Board. Chapter 2: Particle Tracking Model Verification and Calibration. Sacramento, CA.

Smith, T. 1998. *Methodology for Flow and Salinity Estimates in the Sacramento–San Joaquin Delta and Suisun Marsh.* Nineteenth Annual Progress Report to the State Water Resources Control Board. Chapter 4: DSM2-PTM. Sacramento, CA.

Wilbur, R. 2001. *Methodology for Flow and Salinity Estimates in the Sacramento–San Joaquin Delta and Suisun Marsh.* Twenty-Second Annual Progress Report to the State Water Resources Control Board. Chapter 4: Validation of Dispersion Using the Particle Tracking Model in the Sacramento–San Joaquin Delta. Sacramento, CA.

Appendix I, Old and Middle River Flow Management

# Attachment I.9 Winter-run Chinook Salmon Coded Wire Tag Salvage Model

## I.9.1 Model Overview

The Winter-Run Chinook Salmon Coded Wire Tag (CWT) Proportional Salvage Model was developed to estimate the fraction of juvenile winter-run Chinook salmon in the Delta predicted to be salvaged based on hydrologic conditions and fish size. The model is based on the models of Zeug and Cavallo (2014) who analyzed > 1,000 release groups representing more than 28 million coded wire tagged juvenile fish including winter-, late fall-run, and fall-run Chinook salmon. These data represent large release groups of tagged smolts where the number of fish representing each release group salvaged at the export facilities has been estimated. Analysis of "raw" salvage (observed salvage without scaling by starting population size) is problematic because the actual stock or basin of origin is often unknown (e.g., poor performance of length-at-date curves). Furthermore, with "raw" salvage, the number of smolts produced and potentially exposed to entrainment and salvage at the Delta fish collection facilities is unknown. The CWT salvage data analyzed by Zeug and Cavallo (2014) overcomes these deficiencies and provides the most appropriate basis for defining stock-specific categories of entrainment risk.

A model specific to winter-run Chinook salmon was constructed by Zeug and Cavallo (2015) to examine the level of evidence for additional hydrologic metrics. This model combined salvage at both the CVP and SWP rather than modeling them separately as was done in Zeug and Cavallo (2014). Model selection included five potential hydrologic predictor variables including Old-Middle River flow (OMR), inflow-export ratio (I-E), total exports (CVP and SWP combined), San Joaquin River flow, Sacramento River flow and one biological variable (mean fork length at release) (Table I.9-1). To select the best approximating model, Akaike's Information Criterion (AIC) was calculated for each model. The model with the lowest AIC value was identified as the best approximating model. A single best model of salvage was selected with no other model having a $\Delta$AIC <2.8. This model had three predictor variables including: mean fork length of fish at release, Sacramento River flow, and total exports.

# I.9.2 Model Development

## I.9.2.1 Methods

### *I.9.2.1.1 Model Development: Salmon Releases*

Hatchery winter-run Chinook salmon are raised at the Livingston Stone National Fish Hatchery located at the base of Shasta Dam. All of the juveniles raised at this hatchery have coded wire tags (CWTs) inserted for identification when recaptured. These tags are short lengths of steel wire with a numeric code that identifies a specific release group. Fish receiving a CWT also have their adipose fin clipped so tagged fish can be visually identified at capture.

Juvenile salmon with an adipose clip collected at the diversions are retained, the CWT is read, and the number of fish salvaged from that release group is estimated. Release data for juvenile salmon were obtained from the Regional Mark Processing Center coded wire tag database maintained by the Pacific States Marine Fisheries Commission (http://www.rmpc.org/). Data from release years 1993–2007 were queried from the database. These years were chosen to represent water management in the Delta which changed in the mid-1990's in response to the Bay-Delta Accord (California State Water Resources Control Board Ruling D-1641). Additionally, releases under 1000 individuals were excluded. The data queried included: release size, date of release, and mean fork length at release. Recovery information was obtained from the United States Fish and Wildlife Service Chipps Island Survival table (http://www.fws.gov/stockton/jfmp/datamanagement.asp). These data included: the expanded number of tagged salmon collected at the CVP and SWP salvage facilities, and the range of dates over which fish from each release group were captured in the trawl.

### *I.9.2.1.2 Model Development: Environmental data*

Juvenile winter-run Chinook salmon are released in the Sacramento River ~ 600 km from CVP and SWP Delta diversions; however, they are not vulnerable to entrainment until they enter the tidal Delta. A study of salmon migration with acoustic telemetry indicated juvenile salmon migrated through the Delta in 6.4 days on average. To capture the conditions experienced during Delta migration, hydrologic variables were averaged over 7 days after salmon entered the Delta. To estimate the date when each release group arrived at the Delta, we calculated the median date between the first and last capture in the Chipps Island trawl at the exit of the Delta. The 7 days prior to the median capture date was the time period over which hydrologic conditions were averaged. Mean daily flow (hereafter ''flow'') for the Sacramento River was obtained from the United States Geological Survey (USGS) gauge 11447650 at Freeport. San Joaquin River flow was obtained from USGS gauge 11303500 at Vernalis. Daily water diversion rates from the CVP and SWP, and OMR were obtained from the DAYFLOW online data archive maintained by the California Department of Water Resources.

#### *I.9.2.1.3 Model Development: Data Analysis*

The response variable in the model was the number of fish salvaged. The number of fish released was included as an offset variable to account for differences in release group size.

Independent variables in statistical models were selected based on hypothesized relationships with salvage. These variables could potentially affect the process of salvage or the exposure of fish to salvage. For example, zero salvage could occur because most fish were not exposed to entrainment or died prior to entering the Delta. To account for mortality prior to salvage, fork length at release was included as smaller fish should be more susceptible to gape limited predators and survival was expected to be positively associated with mean fork length. For fish in the Delta it was hypothesized that salvage would increase as flows decreased and as diversion increased. Previous analyses of fish entrainment have utilized a ratio of diversion to flow as a predictor of entrainment risk instead of using these variables as separate independent predictors.

Table I.9-1. Six candidate models of salvage evaluated to determine which hydrologic variables were the best predictors of winter-run Chinook salmon salvage.

| Model | Length | Sac Flow | SJ Flow | Exports | OMR | I:E Ratio |
|---|---|---|---|---|---|---|
| Model 1 | X | X | - | X | - | - |
| Model 2 | X | X | - | - | X | - |
| Model 3 | X | X | X | - | - | - |
| Model 4 | X | X | - | - | - | X |
| Model 5 | X | X | X | - | - | X |
| Model 6 | X | X | - | - | - | - |

The model selection exercise included five potential hydrologic predictor variables including Old-Middle River flow (OMR), inflow-export ratio (I:E), total exports (CVP and SWP combined), San Joaquin River flow, Sacramento River flow, and one biological variable (mean fork length at release). Most of these variables were strongly correlated so models were constructed only with variables that had correlation coefficients <0.70 to avoid multicollinearity. Table I.9-1 contains a list of candidate models examined in this exercise. Screening of the response variable indicated that many releases in both rivers resulted in zero salvage. Thus, a zero-inflated negative binomial model (ZINB) was fit based only on winter run releases (178 release groups, > 1 million individuals) for each candidate model with standardized predictors for both the count and zero-inflation portion of the models and the log number of fish released as an offset variable in the count portion of the model. Model selection proceeded using an information-theoretic approach. Akaike's Information Criterion corrected for sample size (AICc) was calculated for each model. The model with the lowest AICc value was identified as the "best fit" model and any other model within 2 points of the best fit model was considered a competing explanation of the observed data. All modeling was performed with the R statistical program and the packages "pscl" and "MASS".

A single best model was selected that included fish length, Sacramento River flow and exports as predictors (Table I.9-2). All other models had ΔAICc values < 2.0.

Table I.9-2. Parameter estimates from the best approximating model of winter-run Chinook salmon salvage.

| | Count Model | | Zero-Inflated Model | |
|---|---|---|---|---|
| **Model Parameter** | **Coefficient** | **P-Value** | **Coefficient** | **P-Value** |
| Fork Length | 0.709 | < 0.001 | -0.776 | <0.001 |
| Sacramento River Flow | 0.155 | 0.707 | 0.610 | 0.140 |
| Total Exports | 0.350 | 0.006 | -0.957 | <0.001 |

To apply this model to hydrologic scenarios outside of those used to construct the model, we had to use a fixed number of winter-run Chinook salmon entering the Delta each month. The raw output of the model is the number of fish salvaged. However, we used the offset variable to convert this number to a proportion. In this way the model predicts the magnitude of salvage independent of the number of fish that may actually be in the Delta during a given month. The measures of error associated with model parameters are used to quantify uncertainty in model predictions.

### I.9.2.2 Assumptions / Uncertainty

Relationships developed with hatchery-origin winter-run Chinook salmon are applicable to natural-origin winter-run Chinook salmon.

Relationships developed within the time period of the winter-run Chinook salmon CWT releases applies to time periods outside of the CWT releases that winter-run Chinook salmon are still in the Delta.

### I.9.2.3 Code and Data Repository

Analysis files for the WR CWT Proportional Loss input data and WR CWT Proportional Loss analysis are available upon request.

## I.9.3 Results

### I.9.3.1 EIS: Narrative, Figures, and Table Results

Under Alt1 in wet water years, mean predicted salvage proportion of winter-run Chinook salmon is higher than NAA, ranging from 117.2% higher in the month of December to 16.9% higher in the month of November compared to the NAA (Figure I.9-1 and Table I.9-3).

Under Alt2 With TUCP Without VA in wet water years, mean predicted salvage proportion of winter-run Chinook salmon is higher than NAA, ranging from 68.3% higher in the month of May to 3.6% lower in the month of December compared to the NAA.

Under Alt2 Without TUCP Without VA in wet water years, mean predicted salvage proportion of winter-run Chinook salmon is higher than NAA, ranging from 67.8% higher in the month of May to 3.4% lower in the month of December compared to the NAA.

Under Alt2 Without TUCP Delta VA in wet water years, mean predicted salvage proportion of winter-run Chinook salmon is higher than NAA, ranging from 67.5% higher in the month of May to 3.3% lower in the month of December compared to the NAA.

Under Alt2 Without TUCP Systemwide VA in wet water years, mean predicted salvage proportion of winter-run Chinook salmon is higher than NAA, ranging from 67.9% higher in the month of May to 2.4% lower in the month of December compared to the NAA.

Under Alt3 in wet water years, mean predicted salvage proportion of winter-run Chinook salmon is lower than NAA, ranging from 37.5% lower in the month of January to 92% lower in the month of April compared to the NAA.

Under Alt4 in wet water years, mean predicted salvage proportion of winter-run Chinook salmon is higher than NAA, ranging from 64% higher in the month of May to 13.5% lower in the month of December compared to the NAA.

Under Act5 in wet water years, mean predicted salvage proportion of winter-run Chinook salmon is higher than NAA, ranging from 63.1% higher in the month of May to 1.3% lower in the month of November compared to the NAA.

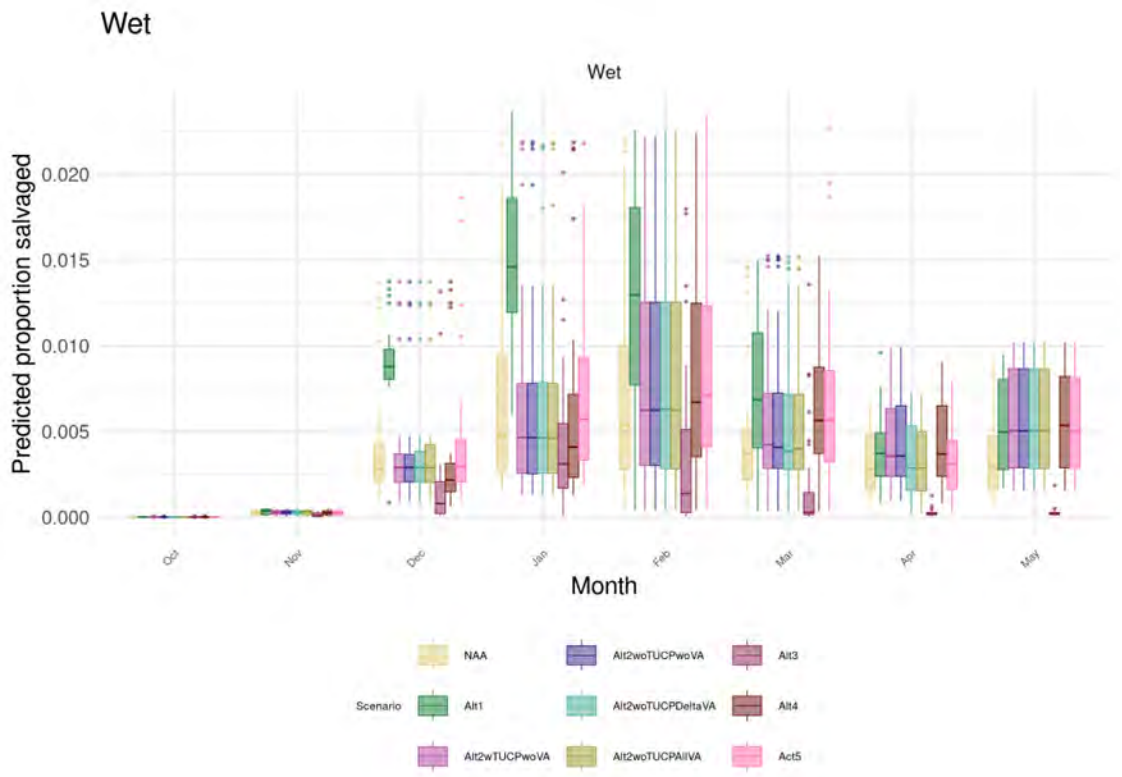



Figure I.9-1. Boxplot of predicted monthly proportion of winter-run Chinook salmon salvaged at CVP and SWP for alternatives during Wet water year types.

Table I.9-3. Mean predicted monthly proportion of winter-run Chinook salmon salvaged at CVP and SWP for alternatives during Wet water year types. Percent difference from NAA indicated in parenthesis.

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Act5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Wet | Oct | 0.0000 | 0.0000 (48.4%) | 0.0000 (-2.8%) | 0.0000 (-3.4%) | 0.0000 (1.0%) | 0.0000 (3.8%) | 0.0000 (-39.9%) | 0.0000 (-1.8%) | 0.0000 (43.7%) |
| Wet | Nov | 0.0003 | 0.0003 (16.9%) | 0.0003 (-0.0%) | 0.0003 (0.0%) | 0.0003 (0.9%) | 0.0003 (0.3%) | 0.0001 (-45.9%) | 0.0003 (-4.2%) | 0.0003 (-1.3%) |
| Wet | Dec | 0.0042 | 0.0091 (117.2%) | 0.0040 (-3.6%) | 0.0040 (-3.4%) | 0.0040 (-3.3%) | 0.0041 (-2.4%) | 0.0019 (-55.5%) | 0.0036 (-13.5%) | 0.0046 (9.3%) |
| Wet | Jan | 0.0070 | 0.0151 (116.8%) | 0.0071 (2.4%) | 0.0071 (2.2%) | 0.0071 (1.6%) | 0.0071 (1.7%) | 0.0044 (-37.5%) | 0.0066 (-5.3%) | 0.0073 (4.8%) |
| Wet | Feb | 0.0082 | 0.0129 (57.1%) | 0.0090 (10.0%) | 0.0090 (9.4%) | 0.0090 (10.0%) | 0.0090 (9.8%) | 0.0039 (-52.9%) | 0.0094 (15.0%) | 0.0096 (16.7%) |

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Act5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Wet | Mar | 0.0050 | 0.0077 (54.6%) | 0.0062 (25.5%) | 0.0062 (25.3%) | 0.0058 (16.4%) | 0.0056 (13.4%) | 0.0019 (-61.5%) | 0.0069 (40.0%) | 0.0070 (42.0%) |
| Wet | Apr | 0.0032 | 0.0039 (21.5%) | 0.0043 (35.6%) | 0.0044 (37.6%) | 0.0032 (1.2%) | 0.0032 (-0.7%) | 0.0003 (-92.0%) | 0.0044 (36.8%) | 0.0032 (-0.4%) |
| Wet | May | 0.0033 | 0.0054 (63.6%) | 0.0056 (68.3%) | 0.0056 (67.8%) | 0.0056 (67.5%) | 0.0056 (67.9%) | 0.0003 (-91.7%) | 0.0054 (64.0%) | 0.0054 (63.1%) |

Under Alt1 in above normal water years, mean predicted salvage proportion of winter-run Chinook salmon is higher than NAA, ranging from 255.8% higher in the month of January to 6.6% higher in the month of November compared to the NAA (Figure I.9-2 and Table I.9-4).

Under Alt2 With TUCP Without VA in above normal water years, mean predicted salvage proportion of winter-run Chinook salmon is higher than NAA, ranging from 99.7% higher in the month of April to 4.5% lower in the month of January compared to the NAA.

Under Alt2 Without TUCP Without VA in above normal water years, mean predicted salvage proportion of winter-run Chinook salmon is higher than NAA, ranging from 99.1% higher in the month of April to 5.3% lower in the month of January compared to the NAA.

Under Alt2 Without TUCP Delta VA in above normal water years, mean predicted salvage proportion of winter-run Chinook salmon is higher than NAA, ranging from 47.8% higher in the month of May to 38.7% lower in the month of March compared to the NAA.

Under Alt2 Without TUCP Systemwide VA in above normal water years, mean predicted salvage proportion of winter-run Chinook salmon is lower than NAA, ranging from 43.7% higher in the month of May to 37.8% lower in the month of March compared to the NAA.

Under Alt3 in above normal water years, mean predicted salvage proportion of winter-run Chinook salmon is lower than NAA, ranging from 8.4% higher in the month of March to 81% lower in the month of May compared to the NAA.

Under Alt4 in above normal water years, mean predicted salvage proportion of winter-run Chinook salmon is higher than NAA, ranging from 100.5% higher in the month of April to 14.5% lower in the month of December compared to the NAA.

Under Act5 in above normal water years, mean predicted salvage proportion of winter-run Chinook salmon is higher than NAA, ranging from 114.1% higher in the month of October to 35% lower in the month of November compared to the NAA.

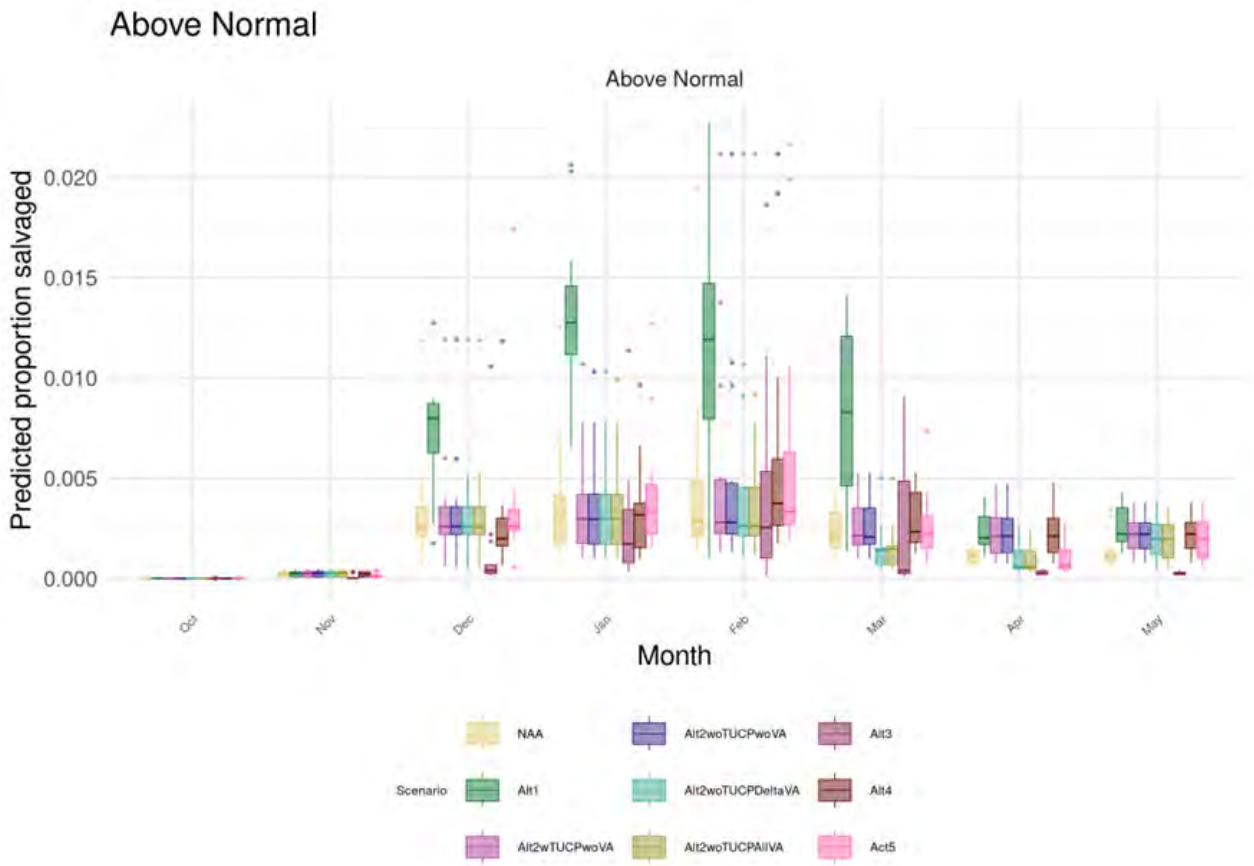



Figure I.9-2. Boxplot of predicted monthly proportion of winter-run Chinook salmon salvaged at CVP and SWP for alternatives during above normal water year types.

Table I.9-4. Mean predicted monthly proportion of winter-run Chinook salmon salvaged at CVP and SWP for alternatives during Above Normal water year types. Percent difference from NAA indicated in parenthesis.

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Act5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Above Normal | Oct | 0.000 | 0.0000 (245.8%) | 0.0000 (-0.3%) | 0.0000 (0.5%) | 0.0000 (-0.2%) | 0.0000 (4.7%) | 0.0000 (-28.9%) | 0.0000 (0.4%) | 0.0000 (114.1%) |
| Above Normal | Nov | 0.002 | 0.0002 (6.6%) | 0.0002 (3.8%) | 0.0002 (4.9%) | 0.0002 (3.6%) | 0.0002 (4.5%) | 0.0001 (-69.7%) | 0.0002 (-1.5%) | 0.0001 (-35.0%) |
| Above Normal | Dec | 0.003 | 0.0073 (121.6%) | 0.0034 (3.4%) | 0.0034 (3.2%) | 0.0033 (1.2%) | 0.0033 (1.4%) | 0.0013 (-59.4%) | 0.0028 (-14.5%) | 0.0037 (13.8%) |
| Above Normal | Jan | 0.004 | 0.0133 (255.8%) | 0.0036 (-4.5%) | 0.0035 (-5.3%) | 0.0035 (-5.4%) | 0.0035 (-6.4%) | 0.0026 (-29.7%) | 0.0033 (-10.9%) | 0.0042 (12.5%) |
| Above Normal | Feb | 0.005 | 0.0117 (159.0%) | 0.0053 (17.9%) | 0.0051 (12.6%) | 0.0049 (8.7%) | 0.0047 (4.2%) | 0.0045 (-1.0%) | 0.0063 (40.1%) | 0.0065 (43.1%) |
| Above Normal | Mar | 0.002 | 0.0082 (241.5%) | 0.0027 (10.8%) | 0.0027 (10.9%) | 0.0015 (-38.7%) | 0.0015 (-37.8%) | 0.0026 (8.4%) | 0.0029 (20.5%) | 0.0026 (8.4%) |
| Above Normal | Apr | 0.001 | 0.0023 (106.9%) | 0.0022 (99.7%) | 0.0022 (99.1%) | 0.0010 (-13.1%) | 0.0009 (-16.1%) | 0.0003 (-74.1%) | 0.0022 (100.5%) | 0.0010 (-12.1%) |
| Above Normal | May | 0.001 | 0.0026 (87.3%) | 0.0022 (63.0%) | 0.0022 (62.9%) | 0.0020 (47.8%) | 0.0020 (43.7%) | 0.0003 (-81.0%) | 0.0023 (64.1%) | 0.0020 (48.5%) |

Under Alt1 in below normal water years, mean predicted salvage proportion of winter-run Chinook salmon is higher than NAA, ranging from 271% higher in the month of January to 2% higher in the month of November compared to the NAA (Figure I.9-3 and Table I.9-5).

Under Alt2 With TUCP Without VA in below normal water years, mean predicted salvage proportion of winter-run Chinook salmon is higher than NAA, ranging from 54.8% higher in the month of April to 6.9% lower in the month of January compared to the NAA.

Under Alt2 Without TUCP Without VA in below normal water years, mean predicted salvage proportion of winter-run Chinook salmon is higher than NAA, ranging from 54.6% higher in the month of April to 6.9% lower in the month of January compared to the NAA.

Under Alt2 Without TUCP Delta VA in below normal water years, mean predicted salvage proportion of winter-run Chinook salmon is lower than NAA, ranging from 40.1% higher in the month of May to 45.3% lower in the month of March compared to the NAA.

Under Alt2 Without TUCP Systemwide VA in below normal water years, mean predicted salvage proportion of winter-run Chinook salmon is lower than NAA, ranging from 36.1% higher in the month of May to 45.2% lower in the month of March compared to the NAA.

Under Alt3 in below normal water years, mean predicted salvage proportion of winter-run Chinook salmon is lower than NAA, ranging from 6.8% lower in the month of March to 68.3% lower in the month of November compared to the NAA.

Under Alt4 in below normal water years, mean predicted salvage proportion of winter-run Chinook salmon is higher than NAA, ranging from 56.6% higher in the month of April to 30.9% lower in the month of December compared to the NAA.

Under Act5 in below normal water years, mean predicted salvage proportion of winter-run Chinook salmon is higher than NAA, ranging from 117.4% higher in the month of October to 18.6% lower in the month of March compared to the NAA.

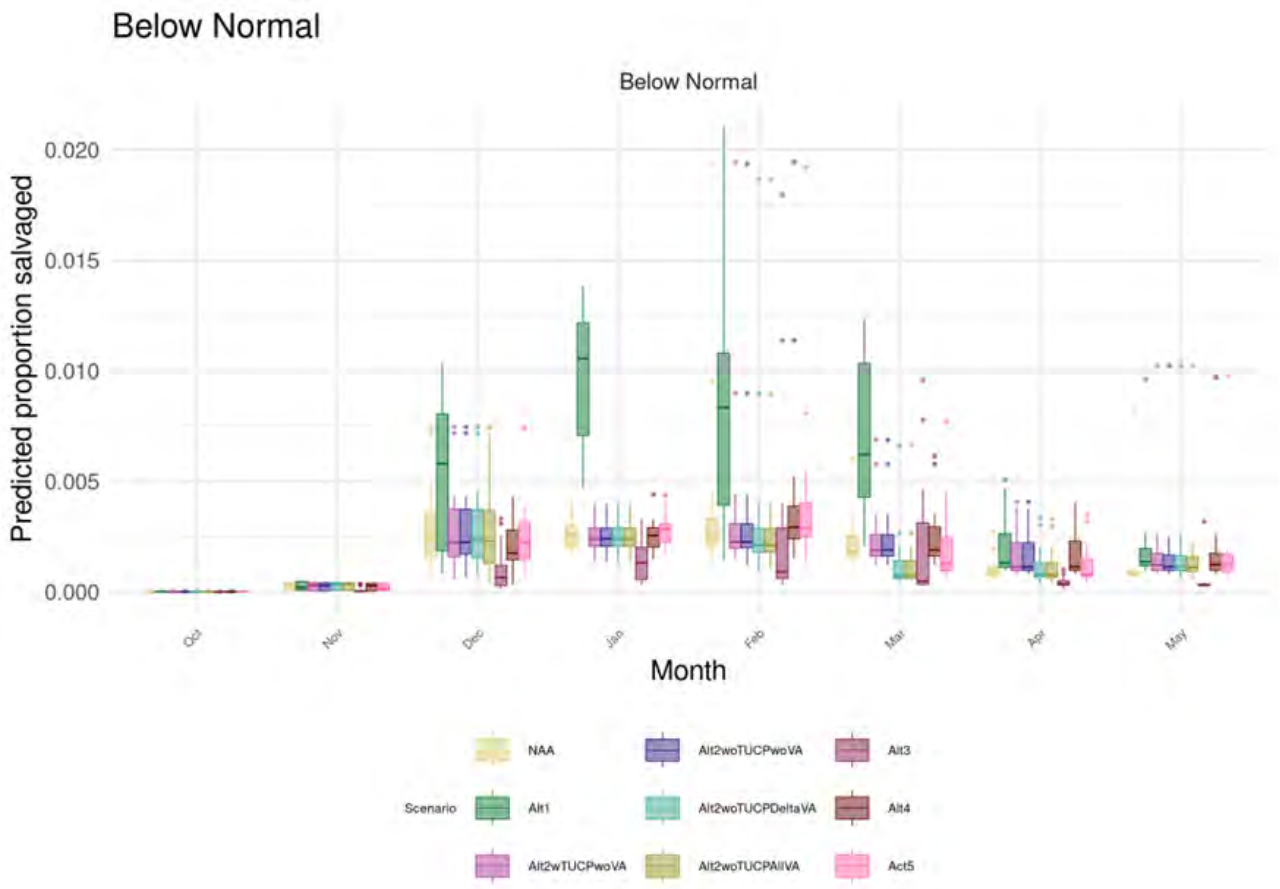



Figure I.9-3. Boxplot of predicted monthly proportion of winter-run Chinook salmon salvaged at CVP and SWP for alternatives during below normal water year types.

Table I.9-5. Mean predicted monthly proportion of winter-run Chinook salmon salvaged at CVP and SWP for alternatives during Below Normal water year types. Percent difference from NAA indicated in parenthesis.

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Act5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Below Normal | Oct | 0.0000 | 0.0000 (148.3%) | 0.0000 (-3.7%) | 0.0000 (-5.4%) | 0.0000 (-1.0%) | 0.0000 (4.1%) | 0.0000 (-63.0%) | 0.0000 (2.4%) | 0.0000 (117.4%) |
| Below Normal | Nov | 0.0002 | 0.0003 (2.0%) | 0.0002 (-2.6%) | 0.0002 (-2.6%) | 0.0003 (2.2%) | 0.0003 (4.0%) | 0.0001 (-68.3%) | 0.0002 (-8.2%) | 0.0002 (-13.6%) |
| Below Normal | Dec | 0.0030 | 0.0052 (73.2%) | 0.0028 (-6.7%) | 0.0028 (-5.1%) | 0.0029 (-3.7%) | 0.0028 (-8.0%) | 0.0010 (-65.2%) | 0.0021 (-30.9%) | 0.0027 (-9.0%) |
| Below Normal | Jan | 0.0026 | 0.0098 (271.0%) | 0.0025 (-6.9%) | 0.0025 (-6.9%) | 0.0025 (-6.1%) | 0.0025 (-6.2%) | 0.0015 (-44.4%) | 0.0025 (-4.1%) | 0.0029 (8.1%) |
| Below Normal | Feb | 0.0039 | 0.0084 (115.9%) | 0.0037 (-4.6%) | 0.0037 (-5.1%) | 0.0035 (-10.6%) | 0.0035 (-10.7%) | 0.0029 (-26.1%) | 0.0043 (11.6%) | 0.0042 (7.1%) |
| Below Normal | Mar | 0.0025 | 0.0069 (182.1%) | 0.0025 (1.4%) | 0.0025 (1.3%) | 0.0013 (-45.3%) | 0.0013 (-45.2%) | 0.0023 (-6.8%) | 0.0025 (1.3%) | 0.0020 (-18.6%) |
| Below Normal | Apr | 0.0011 | 0.0020 (88.6%) | 0.0017 (54.8%) | 0.0017 (54.6%) | 0.0012 (8.2%) | 0.0012 (7.4%) | 0.0004 (-59.5%) | 0.0017 (56.6%) | 0.0012 (13.6%) |
| Below Normal | May | 0.0013 | 0.0020 (58.2%) | 0.0019 (48.2%) | 0.0018 (42.5%) | 0.0018 (40.1%) | 0.0017 (36.1%) | 0.0005 (-62.4%) | 0.0018 (47.5%) | 0.0017 (37.1%) |

Under Alt1 in dry water years, mean predicted salvage proportion of winter-run Chinook salmon is higher than NAA, ranging from 182.8% higher in the month of February to 17.9% lower in the month of November compared to the NAA (Figure I.9-4 and Table I.9-6).

Under Alt2 With TUCP Without VA in dry water years, mean predicted salvage proportion of winter-run Chinook salmon is higher than NAA, ranging from 33.7% higher in the month of May to 13.8% lower in the month of January compared to the NAA.

Under Alt2 Without TUCP Without VA in dry water years, mean predicted salvage proportion of winter-run Chinook salmon is higher than NAA, ranging from 33.7% higher in the month of May to 13.8% lower in the month of January compared to the NAA.

Under Alt2 Without TUCP Delta VA in dry water years, mean predicted salvage proportion of winter-run Chinook salmon is lower than NAA, ranging from 22.2% higher in the month of May to 33.8% lower in the month of March compared to the NAA.

Under Alt2 Without TUCP Systemwide VA in dry water years, mean predicted salvage proportion of winter-run Chinook salmon is lower than NAA, ranging from 18.2% higher in the month of May to 34.1% lower in the month of March compared to the NAA.

Under Alt3 in dry water years, mean predicted salvage proportion of winter-run Chinook salmon is lower than NAA, ranging from 12.2% lower in the month of March to 75.2% lower in the month of November compared to the NAA.

Under Alt4 in dry water years, mean predicted salvage proportion of winter-run Chinook salmon is higher than NAA, ranging from 34.2% higher in the month of May to 18.2% lower in the month of December compared to the NAA.

Under Act5 in dry water years, mean predicted salvage proportion of winter-run Chinook salmon is higher than NAA, ranging from 136.9% higher in the month of October to 27.1% lower in the month of November compared to the NAA.

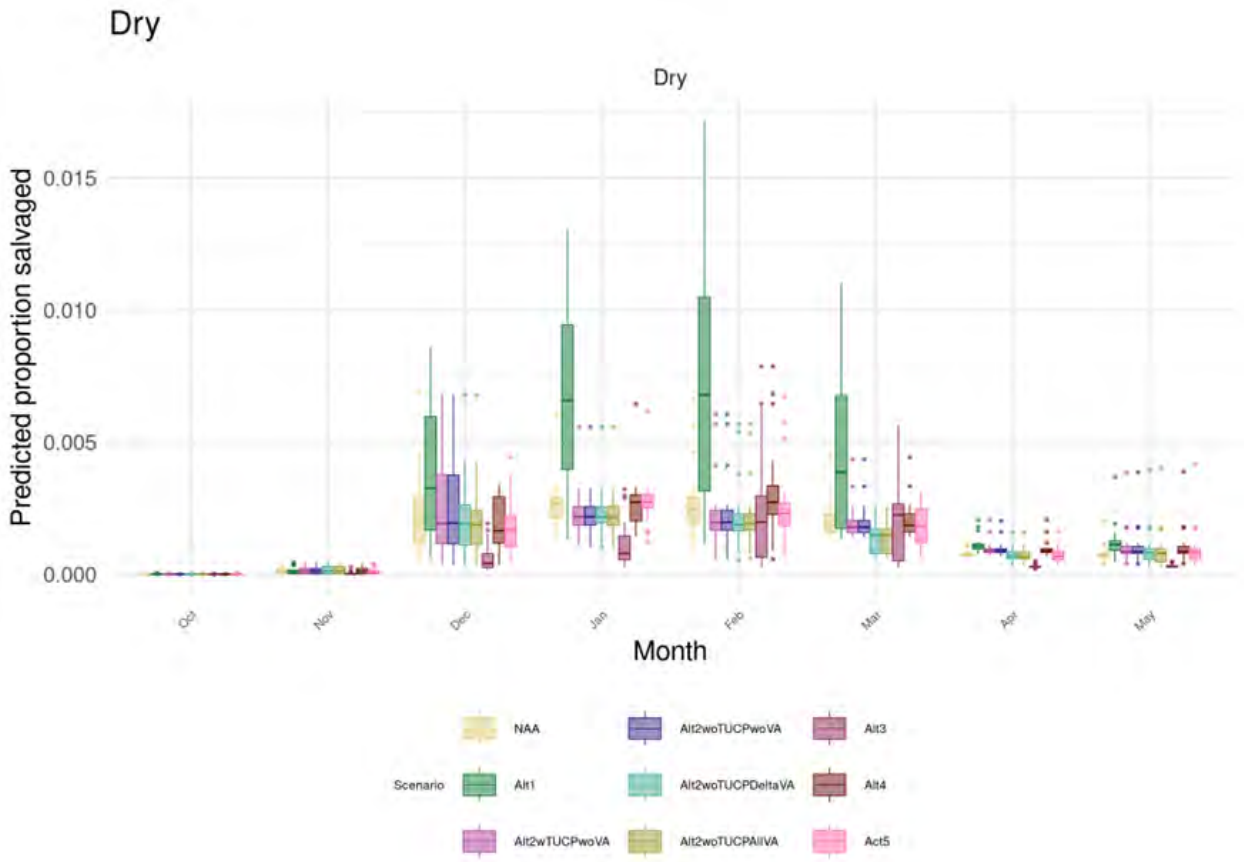



Figure I.9-4. Boxplot of predicted monthly proportion of winter-run Chinook salmon salvaged at CVP and SWP for alternatives during dry water year types.

Table I.9-6. Mean predicted monthly proportion of winter-run Chinook salmon salvaged at CVP and SWP for alternatives during Dry water year types. Percent difference from NAA indicated in parenthesis.

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Act5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Dry | Oct | 0.0000 | 0.0000 (130.2%) | 0.0000 (-1.7%) | 0.0000 (-2.1%) | 0.0000 (6.6%) | 0.0000 (11.9%) | 0.0000 (-63.4%) | 0.0000 (-1.3%) | 0.0000 (136.9%) |
| Dry | Nov | 0.0004 | 0.0001 (-17.9%) | 0.0001 (1.9%) | 0.0001 (1.5%) | 0.0002 (13.1%) | 0.0002 (12.3%) | 0.0000 (-75.2%) | 0.0001 (-3.2%) | 0.0001 (-27.1%) |
| Dry | Dec | 0.0022 | 0.0039 (78.3%) | 0.0023 (3.3%) | 0.0022 (1.6%) | 0.0021 (-3.3%) | 0.0021 (-6.2%) | 0.0006 (-71.4%) | 0.0018 (-18.2%) | 0.0018 (-18.6%) |
| Dry | Jan | 0.0026 | 0.0068 (156.3%) | 0.0023 (-13.8%) | 0.0023 (-13.8%) | 0.0023 (-13.0%) | 0.0023 (-12.8%) | 0.0011 (-57.0%) | 0.0027 (0.4%) | 0.0028 (3.9%) |
| Dry | Feb | 0.0026 | 0.0074 (182.8%) | 0.0023 (-13.0%) | 0.0023 (-13.0%) | 0.0022 (-17.2%) | 0.0022 (-15.3%) | 0.0023 (-12.8%) | 0.0031 (18.4%) | 0.0026 (-2.4%) |
| Dry | Mar | 0.0020 | 0.0047 (129.0%) | 0.0020 (-4.0%) | 0.0020 (-4.0%) | 0.0014 (-33.8%) | 0.0013 (-34.1%) | 0.0018 (-12.2%) | 0.0020 (-0.5%) | 0.0018 (-11.7%) |
| Dry | Apr | 0.0008 | 0.0011 (45.3%) | 0.0010 (24.1%) | 0.0010 (23.8%) | 0.0007 (-5.7%) | 0.0007 (-7.9%) | 0.0003 (-61.4%) | 0.0010 (25.3%) | 0.0007 (-6.1%) |
| Dry | May | 0.0008 | 0.0012 (56.3%) | 0.0010 (33.7%) | 0.0010 (33.7%) | 0.0009 (22.2%) | 0.0009 (18.2%) | 0.0003 (-59.2%) | 0.0010 (34.2%) | 0.0009 (22.6%) |

Under Alt1 in critical water years, mean predicted salvage proportion of winter-run Chinook salmon is higher than NAA, ranging from 124% higher in the month of January to 5.1% lower in the month of November compared to the NAA (Figure I.9-5 and Table I.9-7).

Under Alt2 With TUCP Without VA in critical water years, mean predicted salvage proportion of winter-run Chinook salmon is higher than NAA, ranging from 21.8% higher in the month of May to 15% lower in the month of January compared to the NAA.

Under Alt2 Without TUCP Without VA in critical water years, mean predicted salvage proportion of winter-run Chinook salmon is lower than NAA, ranging from 17.6% higher in the month of May to 22.7% lower in the month of March compared to the NAA.

Under Alt2 Without TUCP Delta VA in critical water years, mean predicted salvage proportion of winter-run Chinook salmon is lower than NAA, ranging from 18.1% higher in the month of May to 25.6% lower in the month of March compared to the NAA.

Under Alt2 Without TUCP Systemwide VA in critical water years, mean predicted salvage proportion of winter-run Chinook salmon is lower than NAA, ranging from 17.7% higher in the month of May to 25.2% lower in the month of March compared to the NAA.

Under Alt3 in critical water years, mean predicted salvage proportion of winter-run Chinook salmon is lower than NAA, ranging from 32.6% lower in the month of February to 86.6% lower in the month of November compared to the NAA.

Under Alt4 in critical water years, mean predicted salvage proportion of winter-run Chinook salmon is higher than NAA, ranging from 23.2% higher in the month of February to 10.6% lower in the month of December compared to the NAA.

Under Act5 in critical water years, mean predicted salvage proportion of winter-run Chinook salmon is higher than NAA, ranging from 56.5% higher in the month of October to 2.5% lower in the month of November and February compared to the NAA.

Figure I.9-6 and 8 summarize predicted annual proportion of winter-run Chinook salmon salvaged at CVP and SWP for alternatives during different water year types.

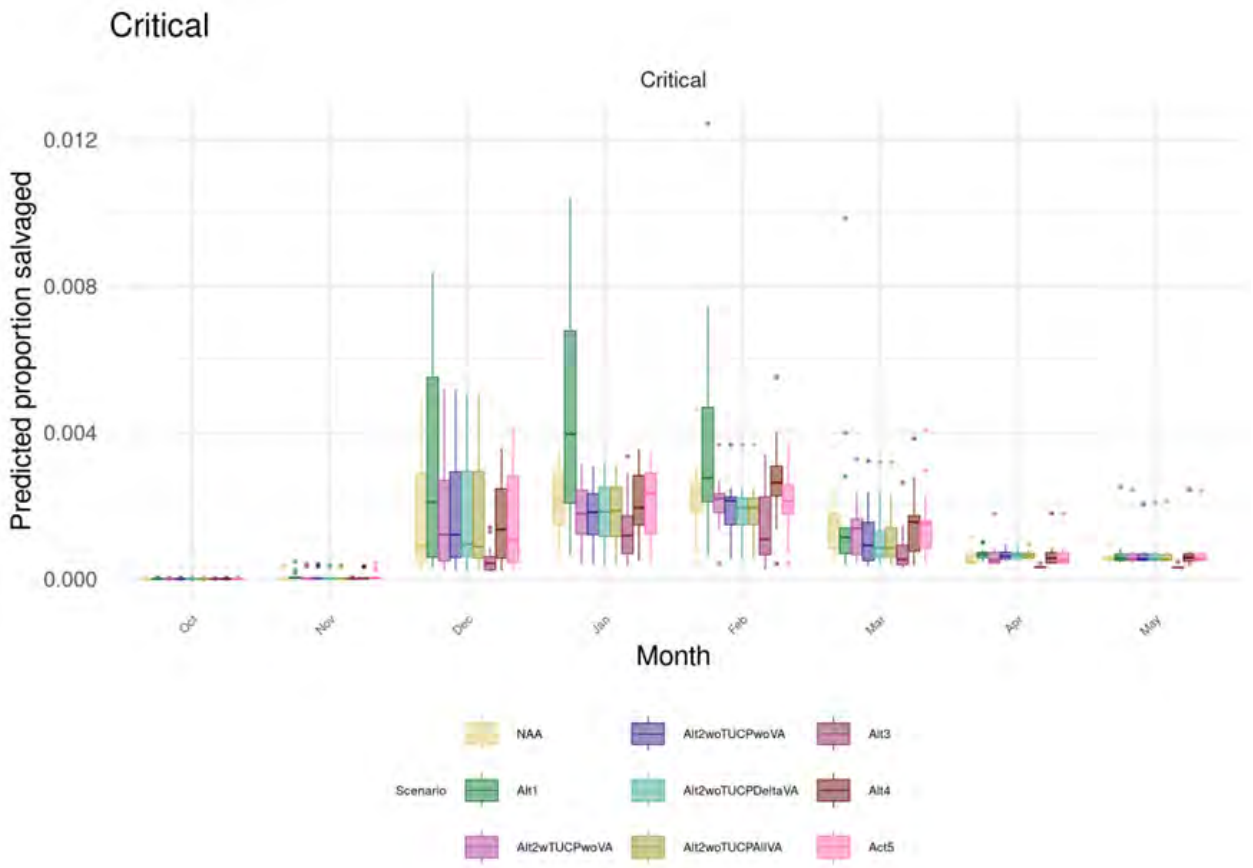



Figure I.9-5. Boxplot of predicted monthly proportion of winter-run Chinook salmon salvaged at CVP and SWP for alternatives during critically dry water year types.

Table I.9-7. Mean predicted monthly proportion of winter-run Chinook salmon salvaged at CVP and SWP for alternatives during Critical water year types. Percent difference from NAA indicated in parenthesis.

| Water Year Type | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Act5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Critical | Oct | 0.0000 | 0.0000 (46.5%) | 0.0000 (0.6%) | 0.0000 (-1.9%) | 0.0000 (-0.6%) | 0.0000 (-0.1%) | 0.0000 (-47.8%) | 0.0000 (1.2%) | 0.0000 (56.5%) |
| Critical | Nov | 0.0004 | 0.0001 (-5.1%) | 0.0001 (4.0%) | 0.0001 (2.3%) | 0.0001 (-0.9%) | 0.0001 (-0.1%) | 0.0000 (-86.6%) | 0.0001 (-3.1%) | 0.0001 (-2.5%) |
| Critical | Dec | 0.0018 | 0.0032 (78.4%) | 0.0018 (1.3%) | 0.0019 (6.9%) | 0.0019 (5.0%) | 0.0019 (5.2%) | 0.0005 (-69.9%) | 0.0016 (-10.6%) | 0.0017 (-1.5%) |
| Critical | Jan | 0.0021 | 0.0046 (124.0%) | 0.0017 (-15.0%) | 0.0017 (-16.3%) | 0.0018 (-12.7%) | 0.0018 (-12.5%) | 0.0014 (-33.2%) | 0.0020 (-3.3%) | 0.0021 (0.2%) |
| Critical | Feb | 0.0022 | 0.0039 (75.4%) | 0.0021 (-4.5%) | 0.0019 (-12.8%) | 0.0019 (-15.4%) | 0.0019 (-15.6%) | 0.0015 (-32.6%) | 0.0027 (23.2%) | 0.0021 (-2.5%) |
| Critical | Mar | 0.0015 | 0.0018 (17.9%) | 0.0014 (-9.4%) | 0.0012 (-22.7%) | 0.0011 (-25.6%) | 0.0011 (-25.2%) | 0.0008 (-49.7%) | 0.0015 (0.5%) | 0.0015 (-0.2%) |
| Critical | Apr | 0.0006 | 0.0007 (18.3%) | 0.0006 (13.9%) | 0.0007 (14.8%) | 0.0006 (13.7%) | 0.0006 (13.8%) | 0.0003 (-43.9%) | 0.0007 (15.0%) | 0.0006 (12.8%) |
| Critical | May | 0.0006 | 0.0007 (24.7%) | 0.0007 (21.8%) | 0.0007 (17.6%) | 0.0007 (18.1%) | 0.0007 (17.7%) | 0.0003 (-44.2%) | 0.0007 (20.4%) | 0.0007 (21.1%) |

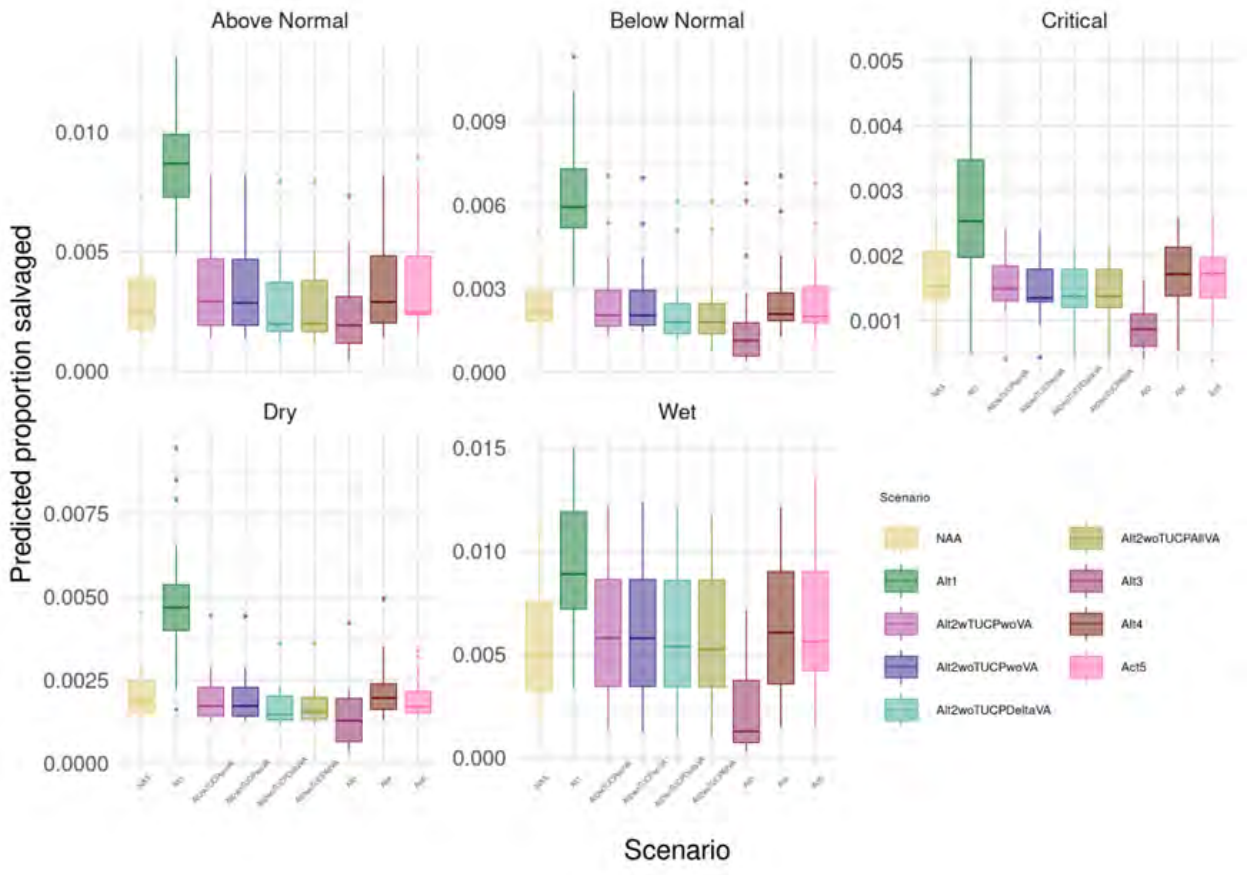



Figure I.9-6. Boxplot of predicted annual proportion of winter-run Chinook salmon salvaged at CVP and SWP for alternatives during different water year types.

Table I.9-8. Mean predicted annual proportion of winter-run Chinook salmon salvaged at CVP and SWP for alternatives during different water year types. Percent difference from NAA indicated in parenthesis.

| Water Year Type | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Act5 |
|---|---|---|---|---|---|---|---|---|---|
| Above Normal | 0.003 | 0.0086 (182.4%) | 0.0034 (12.7%) | 0.0034 (10.5%) | 0.0028 (-6.6%) | 0.0028 (-8.3%) | 0.0025 (-17.0%) | 0.0036 (19.2%) | 0.0037 (22.9%) |
| Below Normal | 0.003 | 0.0065 (141.3%) | 0.0027 (-1.6%) | 0.0027 (-1.5%) | 0.0022 (-17.4%) | 0.0022 (-18.3%) | 0.0018 (-32.1%) | 0.0027 (-0.1%) | 0.0026 (-2.9%) |
| Critical | 0.002 | 0.0027 (65.6%) | 0.0015 (-5.8%) | 0.0015 (-11.4%) | 0.0014 (-12.9%) | 0.0014 (-12.8%) | 0.0009 (-45.2%) | 0.0017 (6.0%) | 0.0016 (-0.8%) |
| Dry | 0.002 | 0.0049 (137.7%) | 0.0020 (-6.1%) | 0.0019 (-6.4%) | 0.0017 (-18.3%) | 0.0017 (-18.4%) | 0.0014 (-32.4%) | 0.0021 (3.2%) | 0.0019 (-7.5%) |

| Water Year Type | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Act5 |
|---|---|---|---|---|---|---|---|---|---|
| Wet | 0.006 | 0.0094 (71.9%) | 0.0062 (12.6%) | 0.0062 (12.4%) | 0.0059 (8.3%) | 0.0059 (7.5%) | 0.0024 (-55.3%) | 0.0064 (16.0%) | 0.0066 (20.0%) |

### I.9.3.2 BA: Narrative, Figures, and Table Results

Highest predicted salvage proportion of winter-run Chinook salmon occurred under Act5 in February of wet water years (0.0096), followed by February of wet water years under all Alternative 2 scenarios (0.009). The lowest predicted salvage proportion of winter-run Chinook salmon (0) occurred in October in all water year types. (Figure I.9-7 through Figure I.9-12, Table I.9-9 through Table I.9-14).

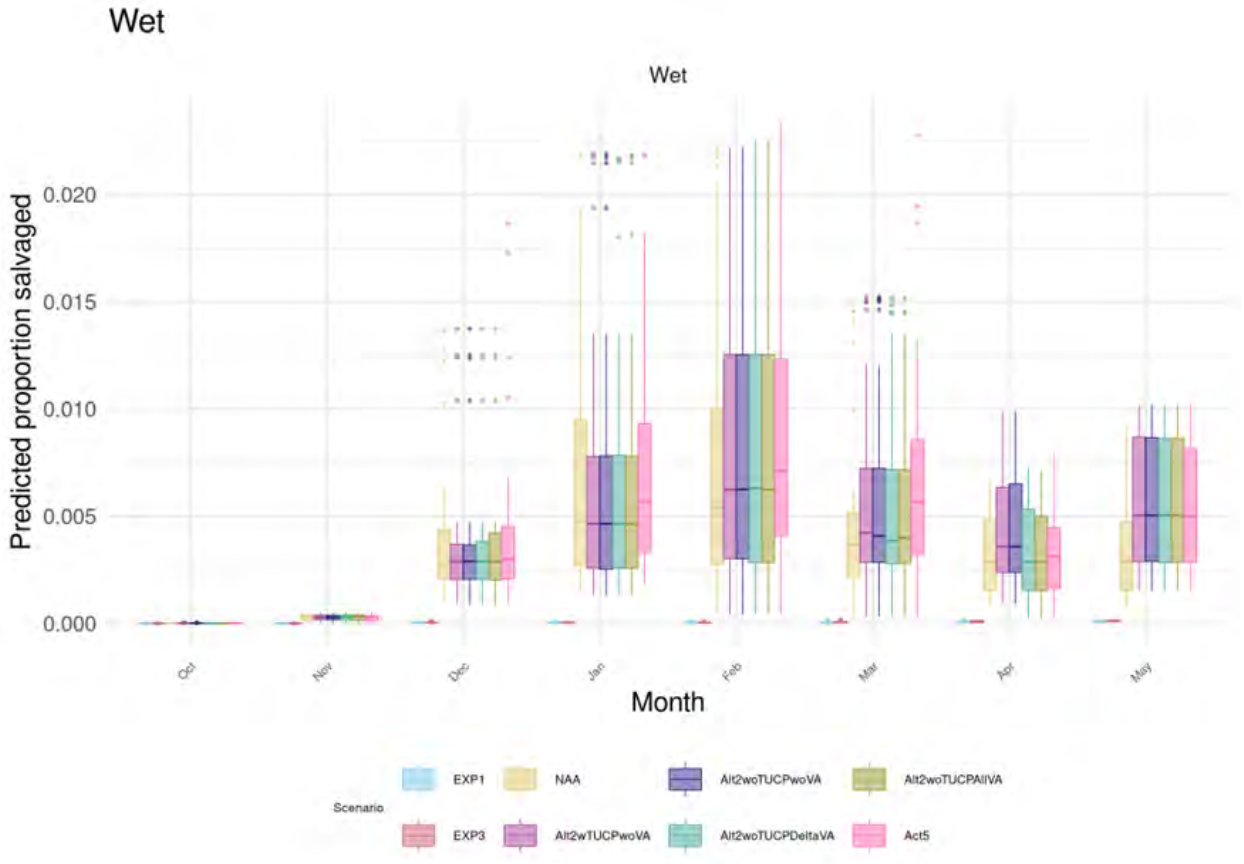



Figure I.9-7. Boxplot of predicted monthly proportion of winter-run Chinook salmon salvaged at CVP and SWP for EXP1, EXP3, NAA, Alt2 phases, and Act5 during wet water year types.

Table I.9-9. Predicted mean of monthly proportion of winter-run Chinook salmon salvaged at CVP and SWP for EXP1, EXP3, NAA, Alt2 phases, and Act5 during wet water year types.

| Water Year Type | Month | EXP1 | EXP3 | NAA | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Act5 |
|---|---|---|---|---|---|---|---|---|---|
| Wet | Oct | 0.0000 | 0.0000 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wet | Nov | 0.0000 | 0.0000 | 0.0003 | 0.0003 | 0.0003 | 0.0003 | 0.0003 | 0.0003 |
| Wet | Dec | 0.0000 | 0.0000 | 0.0042 | 0.004 | 0.004 | 0.004 | 0.0041 | 0.0046 |
| Wet | Jan | 0.0000 | 0.0000 | 0.007 | 0.0071 | 0.0071 | 0.0071 | 0.0071 | 0.0073 |
| Wet | Feb | 0.0000 | 0.0000 | 0.0082 | 0.009 | 0.009 | 0.009 | 0.009 | 0.0096 |
| Wet | Mar | 0.0000 | 0.0001 | 0.005 | 0.0062 | 0.0062 | 0.0058 | 0.0056 | 0.007 |
| Wet | Apr | 0.0001 | 0.0001 | 0.0032 | 0.0043 | 0.0044 | 0.0032 | 0.0032 | 0.0032 |
| Wet | May | 0.0001 | 0.0001 | 0.0033 | 0.0056 | 0.0056 | 0.0056 | 0.0056 | 0.0054 |

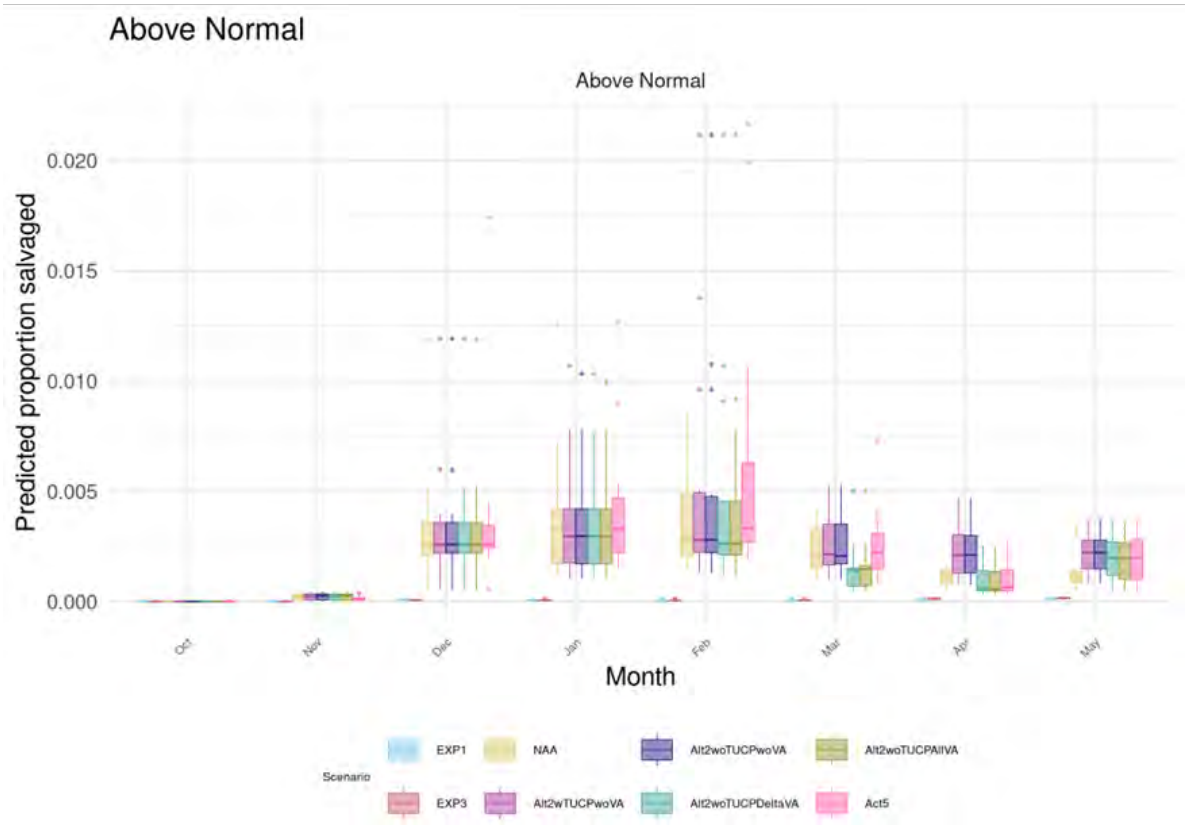



Figure I.9-8. Boxplot of predicted monthly proportion of winter-run Chinook salmon salvaged at CVP and SWP for EXP1, EXP3, NAA, Alt2 phases, and Act5 during above normal water year types.

Table I.9-10. Predicted mean of monthly proportion of winter-run Chinook salmon salvaged at CVP and SWP for EXP1, EXP3, NAA, Alt2 phases, and Act5 during above normal water year types.

| Water Year Type | Month | EXP1 | EXP3 | NAA | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Act5 |
|---|---|---|---|---|---|---|---|---|---|
| Above Normal | Oct | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0 |
| Above Normal | Nov | 0.0000 | 0.0000 | 0.0002 | 0.0002 | 0.0002 | 0.0002 | 0.0002 | 0.0001 |
| Above Normal | Dec | 0.0001 | 0.0001 | 0.0030 | 0.0034 | 0.0034 | 0.0033 | 0.0033 | 0.0037 |
| Above Normal | Jan | 0.0001 | 0.0001 | 0.0040 | 0.0036 | 0.0035 | 0.0035 | 0.0035 | 0.0042 |
| Above Normal | Feb | 0.0000 | 0.0001 | 0.0050 | 0.0053 | 0.0051 | 0.0049 | 0.0047 | 0.0065 |
| Above Normal | Mar | 0.0001 | 0.0001 | 0.0020 | 0.0027 | 0.0027 | 0.0015 | 0.0015 | 0.0026 |
| Above Normal | Apr | 0.0001 | 0.0001 | 0.0010 | 0.0022 | 0.0022 | 0.0010 | 0.0009 | 0.001 |
| Above Normal | May | 0.0001 | 0.0002 | 0.0010 | 0.0022 | 0.0022 | 0.0020 | 0.0020 | 0.002 |

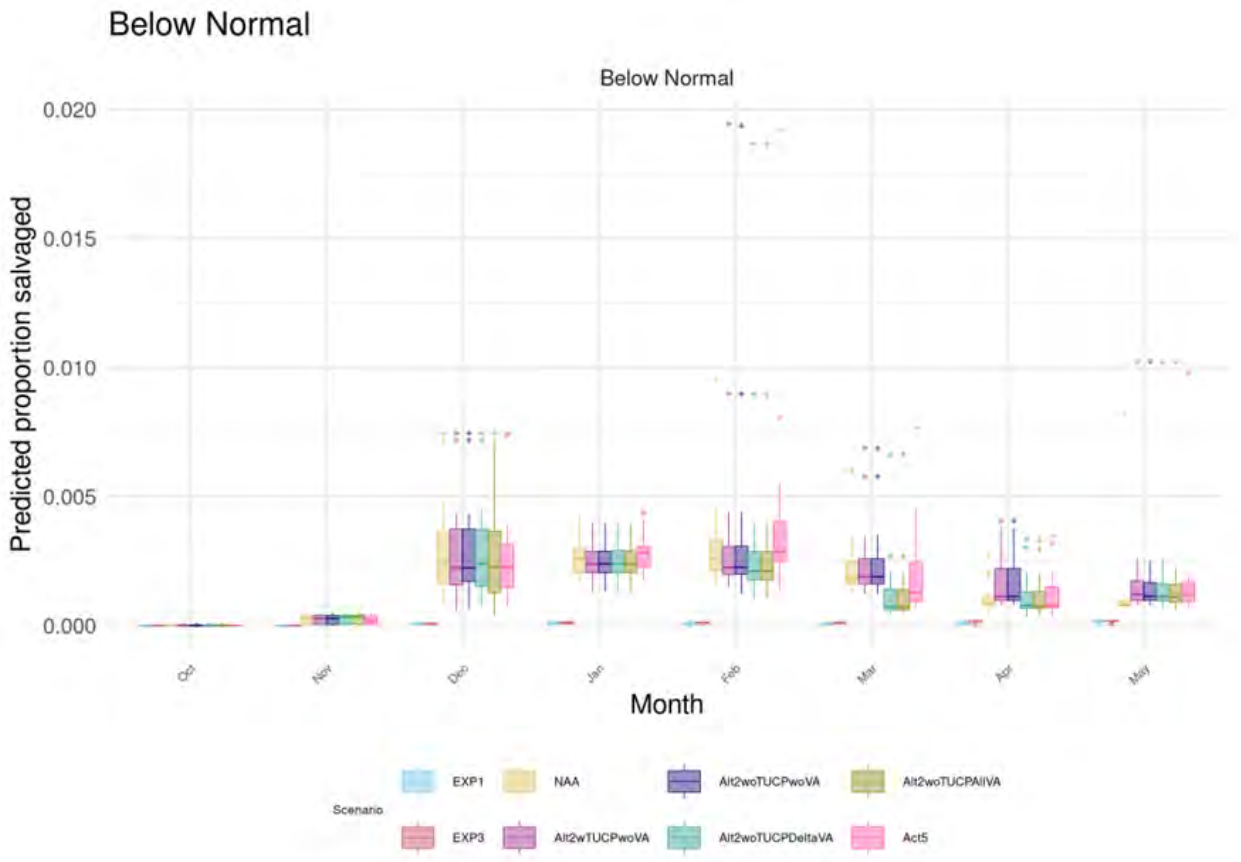



Figure I.9-9. Boxplot of predicted monthly proportion of winter-run Chinook salmon salvaged at CVP and SWP for EXP1, EXP3, NAA, Alt2 phases, and Act5 during below normal water year types.

Table I.9-11. Predicted mean of monthly proportion of winter-run Chinook salmon salvaged at CVP and SWP for EXP1, EXP3, NAA, and Alt2 phases during below normal water year types.

| Water Year Type | Month | EXP1 | EXP3 | NAA | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Act5 |
|---|---|---|---|---|---|---|---|---|---|
| Below Normal | Oct | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0 |
| Below Normal | Nov | 0.0000 | 0.0000 | 0.0002 | 0.0002 | 0.0002 | 0.0003 | 0.0003 | 0.0002 |
| Below Normal | Dec | 0.0001 | 0.0001 | 0.0030 | 0.0028 | 0.0028 | 0.0029 | 0.0028 | 0.0027 |
| Below Normal | Jan | 0.0001 | 0.0001 | 0.0026 | 0.0025 | 0.0025 | 0.0025 | 0.0025 | 0.0029 |

| Water Year Type | Month | EXP1 | EXP3 | NAA | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Act5 |
|---|---|---|---|---|---|---|---|---|---|
| Below Normal | Feb | 0.0001 | 0.0001 | 0.0039 | 0.0037 | 0.0037 | 0.0035 | 0.0035 | 0.0042 |
| Below Normal | Mar | 0.0001 | 0.0001 | 0.0025 | 0.0025 | 0.0025 | 0.0013 | 0.0013 | 0.002 |
| Below Normal | Apr | 0.0001 | 0.0002 | 0.0011 | 0.0017 | 0.0017 | 0.0012 | 0.0012 | 0.0012 |
| Below Normal | May | 0.0002 | 0.0002 | 0.0013 | 0.0019 | 0.0018 | 0.0018 | 0.0017 | 0.0017 |

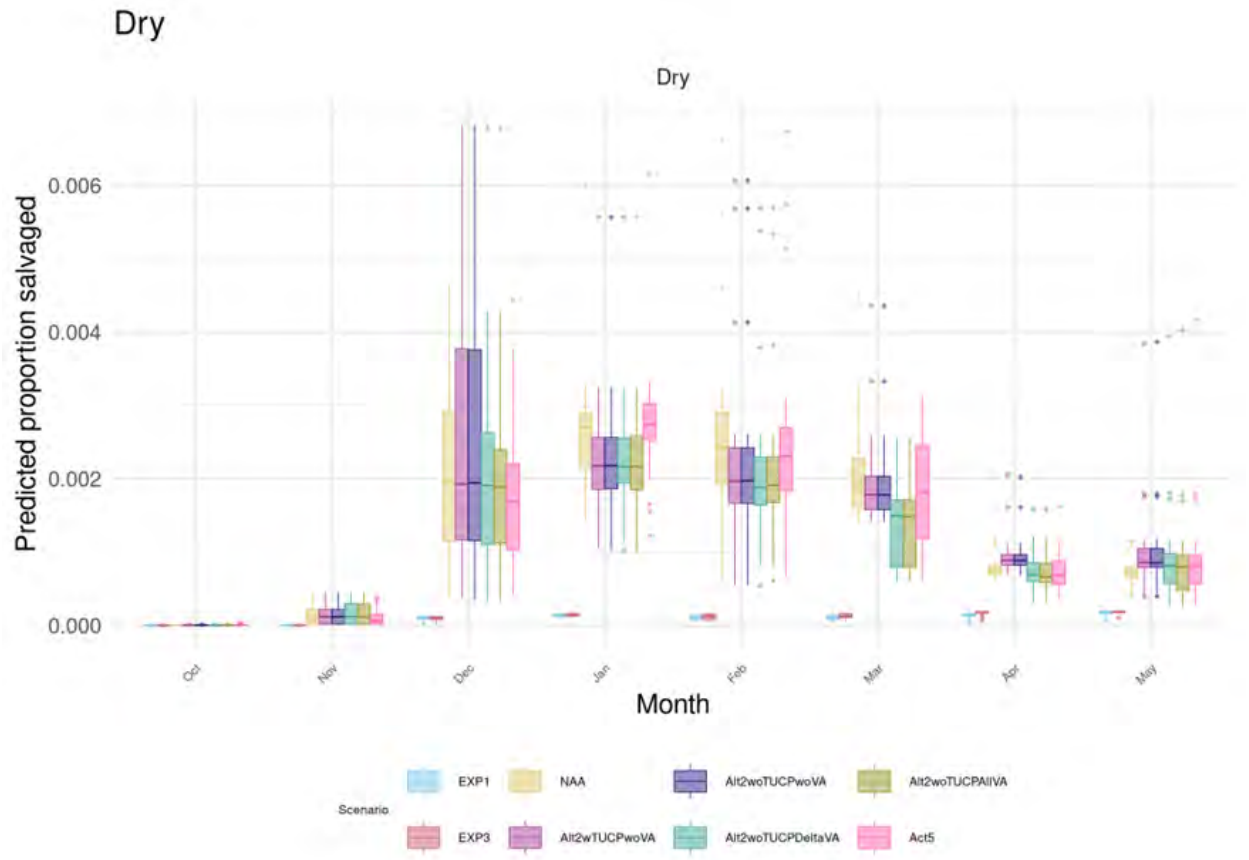



Figure I.9-10. Boxplot of predicted monthly proportion of winter-run Chinook salmon salvaged at CVP and SWP for EXP1, EXP3, NAA, Alt2 phases, and Act5 during dry water year types.

Table I.9-12. Predicted mean monthly proportion of winter-run Chinook salmon salvaged at CVP and SWP for EXP1, EXP3, NAA, Alt2 phases, and Act5 during dry water year types.

| Water Year Type | Month | EXP1 | EXP3 | NAA | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Act5 |
|---|---|---|---|---|---|---|---|---|---|
| Dry | Oct | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0 |
| Dry | Nov | 0.0000 | 0.0000 | 0.0001 | 0.0001 | 0.0001 | 0.0002 | 0.0002 | 0.0001 |
| Dry | Dec | 0.0001 | 0.0001 | 0.0022 | 0.0023 | 0.0022 | 0.0021 | 0.0021 | 0.0018 |
| Dry | Jan | 0.0001 | 0.0001 | 0.0026 | 0.0023 | 0.0023 | 0.0023 | 0.0023 | 0.0028 |
| Dry | Feb | 0.0001 | 0.0001 | 0.0026 | 0.0023 | 0.0023 | 0.0022 | 0.0022 | 0.0026 |
| Dry | Mar | 0.0001 | 0.0001 | 0.0020 | 0.0020 | 0.0020 | 0.0014 | 0.0013 | 0.0018 |
| Dry | Apr | 0.0001 | 0.0002 | 0.0008 | 0.0010 | 0.0010 | 0.0007 | 0.0007 | 0.0007 |
| Dry | May | 0.0002 | 0.0002 | 0.0008 | 0.0010 | 0.0010 | 0.0009 | 0.0009 | 0.0009 |

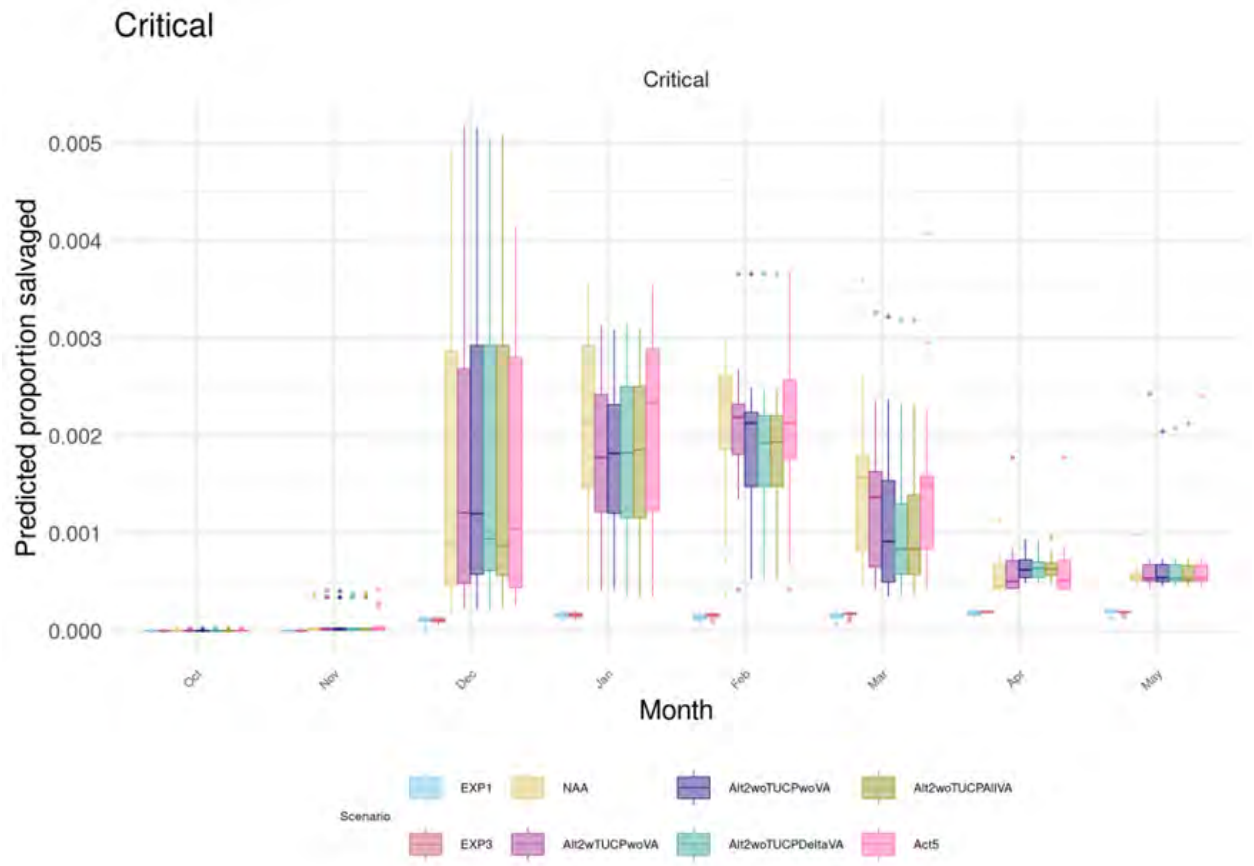



Figure I.9-11. Boxplot of predicted monthly proportion of winter-run Chinook salmon salvaged at CVP and SWP for EXP1, EXP3, NAA, and Alt2 phases during critically dry water year types.

Table I.9-13. Predicted mean of monthly proportion of winter-run Chinook salmon salvaged at CVP and SWP for EXP1, EXP3, NAA, Alt2 phases, and Act5 during critical water year types.

| Water Year Type | Month | EXP1 | EXP3 | NAA | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Act5 |
|---|---|---|---|---|---|---|---|---|---|
| Critical | Oct | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0 |
| Critical | Nov | 0.0000 | 0.0000 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 |
| Critical | Dec | 0.0001 | 0.0001 | 0.0018 | 0.0018 | 0.0019 | 0.0019 | 0.0019 | 0.0017 |
| Critical | Jan | 0.0002 | 0.0002 | 0.0021 | 0.0017 | 0.0017 | 0.0018 | 0.0018 | 0.0021 |
| Critical | Feb | 0.0001 | 0.0002 | 0.0022 | 0.0021 | 0.0019 | 0.0019 | 0.0019 | 0.0021 |
| Critical | Mar | 0.0001 | 0.0002 | 0.0015 | 0.0014 | 0.0012 | 0.0011 | 0.0011 | 0.0015 |

| Water Year Type | Month | EXP1 | EXP3 | NAA | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Act5 |
|---|---|---|---|---|---|---|---|---|---|
| Critical | Apr | 0.0002 | 0.0002 | 0.0006 | 0.0006 | 0.0007 | 0.0006 | 0.0006 | 0.0006 |
| Critical | May | 0.0002 | 0.0002 | 0.0006 | 0.0007 | 0.0007 | 0.0007 | 0.0007 | 0.0007 |

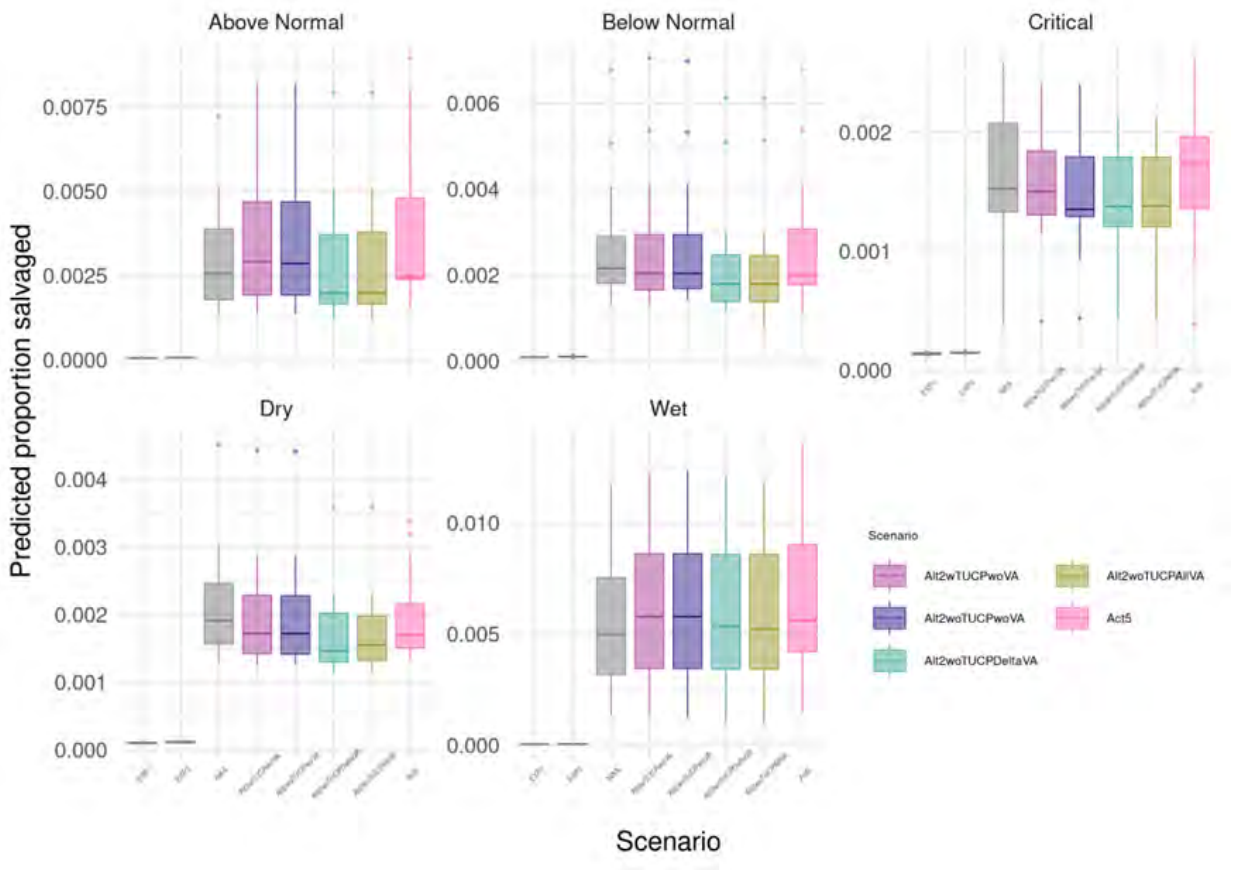



Figure I.9-12. Boxplot of predicted annual proportion of winter-run Chinook salmon salvaged at CVP and SWP for EXP1, EXP3, NAA, Alt2 phases, and Act5 during different water year types.

Table I.9-14. Predicted mean of annual proportion of winter-run Chinook salmon salvaged at CVP and SWP for EXP1, EXP3, NAA, Alt2 phases, and Act5 during different water year types.

| Water Year Type | EXP1 | EXP3 | NAA | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Act5 |
|---|---|---|---|---|---|---|---|---|
| Above Normal | 0.0001 | 0.0001 | 0.003 | 0.0034 | 0.0034 | 0.0028 | 0.0028 | 0.0037 |
| Below Normal | 0.0001 | 0.0001 | 0.0027 | 0.0027 | 0.0027 | 0.0022 | 0.0022 | 0.0026 |
| Critical | 0.0001 | 0.0001 | 0.0016 | 0.0015 | 0.0015 | 0.0014 | 0.0014 | 0.0016 |
| Dry | 0.0001 | 0.0001 | 0.0021 | 0.002 | 0.0019 | 0.0017 | 0.0017 | 0.0019 |
| Wet | 0.0000 | 0.0000 | 0.0055 | 0.0062 | 0.0062 | 0.0059 | 0.0059 | 0.0066 |

## I.9.4 References


Zeug S., and B. Cavallo (2014) Controls on the Entrainment of Juvenile Chinook Salmon (*Oncorhynchus tshawytscha*) into Large Water Diversions and Estimates of Population-Level Loss. *PLoS ONE* 9(7): e101479. doi:10.1371/journal.pone.0101479.

Zeug, S., and B. Cavallo. 2015. *Sacramento River Winter-run entrainment risk evaluation.* Research Gate. Prepared for Delta Operations for Salmonids and Sturgeon (DOSS).

Appendix J, Winter and Spring Pulses and Delta Outflow

# Attachment J.1 Longfin Smelt Outflow

## J.1.1 Model Overview

The potential effect of operations on Longfin Smelt abundance was investigated through development of a statistical modeling approach relating the Longfin Smelt Fall Midwater Trawl (FMWT) abundance index to: (1) Delta outflow[1]; (2) the FMWT abundance index two years earlier (as a representation of parental stock size), and; (3) ecological regime (i.e., 1967–1987, pre-*Potamocorbula amurensis* invasion; 1988–2002, post-*P. amurensis* invasion; and 2003–2022, Pelagic Organism Decline [POD]). The inclusion of the regime factor represents major ecological changepoints in the Bay-Delta (e.g., Nobriga and Rosenfield 2016; Sommer et al. 2007). Total Delta outflow (thousand acre-feet) was summed and examined as an explanatory covariate for two overlapping time periods: December through May, and March through May. Similar time periods have also been investigated in previous studies by Mount et al. (2013:66–69) and Nobriga and Rosenfield (2016). Bayesian methods were used to account for model uncertainty (e.g., uncertainty in the time period over which Delta Outflow is considered to affect Longfin Smelt abundance), therefore integrating an important component of scientific uncertainty into the resulting model predictions for decision making.

## J.1.2 Model Development

### J.1.2.1 Methods

Twelve log-linear regression models were considered in the analysis. The models were fit to the FMWT index of Longfin Smelt abundance[2] (1967–2022) using a Bayesian approach implemented in the R statistical computing language (R Core Team 2023) via the *brms* package (Bürkner 2017). Three Markov Chain Monte Carlo chains were run for each model and flat priors were assumed for covariates. There was a 2,000-sample warm-up for each chain before 10,000 samples were retained as draws from the posterior (30,000 samples total drawn from the posterior). Bayesian values for the $\hat{R}$ statistic were less than 1.01 across estimated parameters, which indicated sampling converged on the posterior probability distributions for all models considered.

Preliminary model comparison was performed using leave-one-out cross validation (LOO; Vehtari et al. 2017). Measures of model predictive accuracy using LOO are asymptotically equal to the widely applicable information criteria (WAIC; Watanabe 2010), but in the case of finite

[1] Downloaded from: https://data.ca.gov/dataset/dayflow
[2] Downloaded from: https://apps.wildlife.ca.gov/FMWT

data LOO has been shown to be more robust to influential observations like outliers (Vehtari et al. 2017). The extent of model overlap in predictive accuracy was measured by the differences (and the standard errors of the differences) in expected log pointwise predictive densities, i.e., the differences in out-of-sample predictive accuracy between models. The preliminary model comparisons indicated there was a relatively high degree of similarity in terms of predictive ability between the top scoring individual models.

Therefore, rather than selecting a single model for inference, the posterior predictive probability distributions were combined as a weighted average across models. This process involved taking draws from the posterior of each single model in proportion to its model weight, with model weights for averaging posterior predictive distributions calculated using the *loo* package (Vehtari et al. 2020). For example, if a single model's weight was 25 percent of the total model set, then 2,500 draws from its posterior were added to the averaged posterior predictive distribution, which included 10,000 total draws taken across the posterior predictive distributions for all models. The statistical approach used to calculate the model weights for averaging the posterior predictive distributions across models is known as "stacking" (Yao et al. 2018).

Compared to more traditional model averaging approaches, stacking differs in terms of how model weights are assigned. Instead of calculating model weights based on the relative predictive ability for each individual model—where the best model for prediction would be given the highest weight—the model weights estimated through stacking minimize the LOO mean squared error of the resulting averaged posterior predictive distribution across models. In other words, stacking was used to estimate the optimal linear combination of model weights for averaging predictive distributions across the model set (Yao et al. 2018).

Hence, the model with the largest stacking weight does not necessarily have the highest predictive score compared to other models in the set. For example, the models in this case can be divided into two subsets: one subset includes a covariate for Delta outflow during December-May and the other model subset includes a covariate for March-May Delta outflow (Table J.1-1). Comparing the predictive ability of each individual model using LOO resulted in a model with December-May outflow (the model with the third highest stacking weight in Table J.1-1) having the highest individual predictive accuracy of any single model considered. In contrast, when the optimal linear combination of weighted model predictions was calculated, stacking resulted in a model with March–May Delta outflow having the highest single model weight (37 percent of the total stacking weight across the model set). Nevertheless, because stacking optimizes the linear combination of model weights for predictive accuracy, the next four models (~63 percent of the stacking weight) all include December–May Delta outflow instead of March–May Delta outflow. Therefore, in this case, even though the model with highest stacking weight included March–May Delta outflow, the averaged posterior predictive distribution was ultimately weighted more heavily with models that include December–May Delta outflow compared to models with March–May Delta outflow. Of the twelve models considered, the top five models by stacking weight accounted for >99.9 percent of the averaged posterior predictive distribution (Table J.1-1).

Predictions of the fall midwater trawl abundance index under the modeled CalSim 3 outflow scenarios (1922–2022) were generated using the model stacking approach described above to generate a weighted average Bayesian posterior predictive distribution across the set of models

considered. Dropping subscripts denoting individual models for simplicity, the general form of the models can be written as:

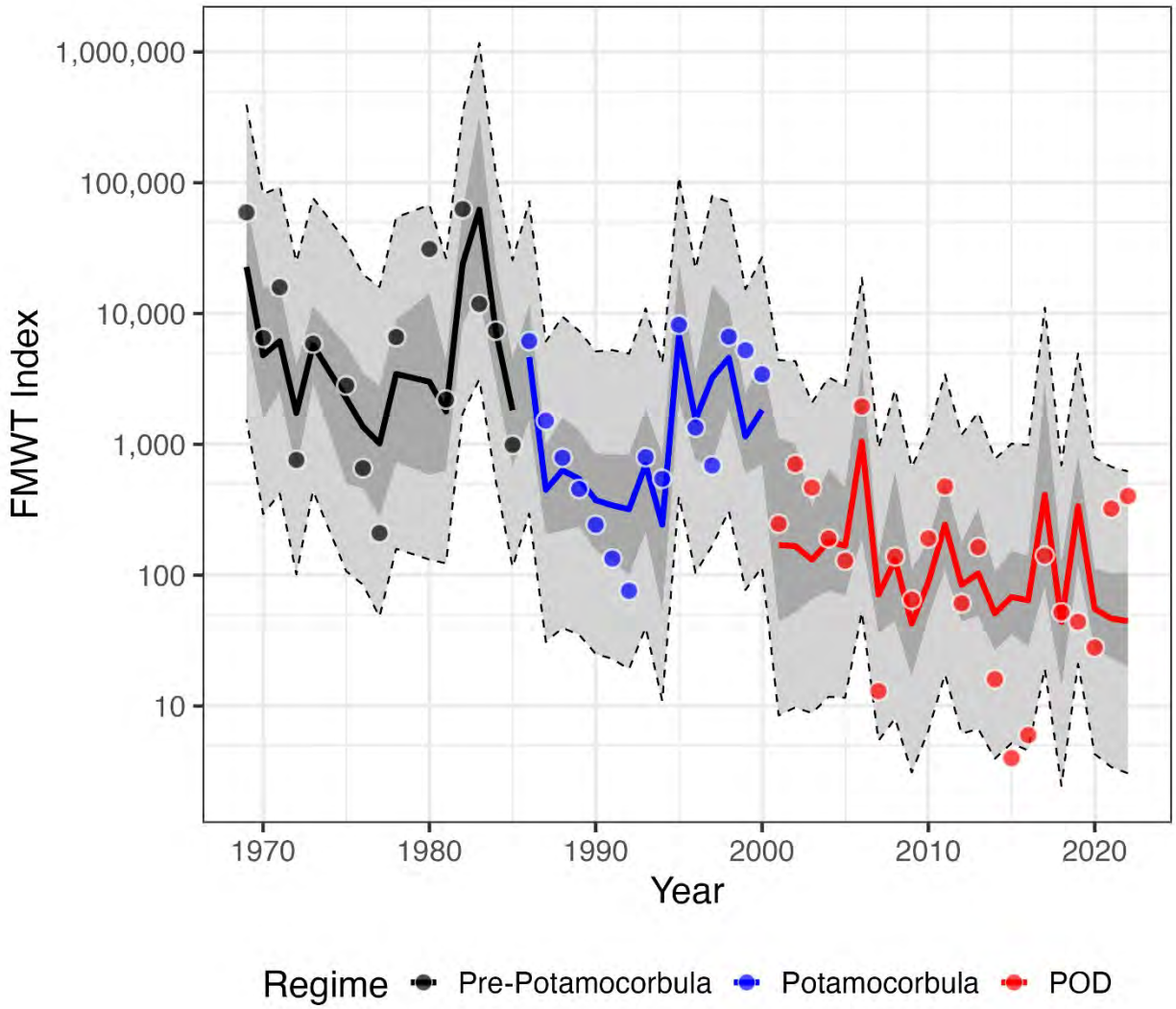
$$Log_{10}[\text{FMWT}_{yr}] \sim N(\mu_{yr}, \sigma^2) \quad (1)$$

$$\mu_{yr} = \beta_{0,i} + \beta_1 Outflow_{yr,j} + \beta_2 Log_{10}[\text{FMWT}_{yr-2}] + \beta_3 \text{Regime}_i \, Outflow_{yr,j} \quad (2)$$

where:

- $Log_{10}[\text{FMWT}_{yr}]$ is the model predicted $Log_{10}$ value of the fall midwater trawl index in water year *yr*;
- $\mu_{yr}$ is the expected fall midwater trawl index in water year yr (the stacked posterior predictive distribution for $\mu_{yr}$ is shown as the dark grey ribbon in Figure J.1-1);
- $\sigma^2$ is the residual variance parameter (the stacked posterior predictive distribution including the residual variance is shown as the light grey ribbon in Figure J.1-1);
- $\beta_{0,i}$ represents the intercept parameter estimated for each regime: Pre-Potamocorbula (i = 1); Potamocorbula (i = 2); and POD ($i\beta_0^{OBJ}$ $\beta_{0,i}^{OBJ}$;
- $\beta_1$ represents the slope parameter estimated for the relationship between the fall midwater trawl index and Delta outflow;
- $Outflow_{yr,j}$ is the normalized[3] outflow level during water year *yr*, and *j* denotes the outflow level during either the December through May, or the March through May period;
- $\beta_2$ represents the slope parameter estimated for the relationship between the expected fall midwater trawl index and the value of that index 2 years prior. For models without the parental stock covariate, $\beta_2 = 0$, and;
- $\beta_3$ represents the interaction covariate (the difference in slopes) with respect to the estimated effect of outflow on the FMWT index of abundance during different regimes (The asterisk "*" sign represents an interaction term between Regime and Delta Outflow). For models without this interaction term, $\beta_3 = 0$.

[3] Normalized outflow values for each CalSim 3 scenario were calculated by subtracting the mean and dividing by the standard deviation of observed Delta outflow values (1967–2020).




Note: The circles represent the annual historical values of the fall midwater trawl abundance index. Colors correspond to the three modeled regimes. The solid lines connect the annual expected values from the stacked Bayesian posterior distribution. The darker gray ribbon represents the 95% posterior probability interval for the annual expected values for the fall midwater trawl index value. The lighter gray ribbon with a dashed black outline represents the averaged 95% overall posterior predictive probability interval for the fall midwater trawl index value. The posterior uncertainty interval (dark gray ribbon) has a smaller range than the posterior predictive interval (light gray ribbon) because in addition to uncertainty in the estimated model covariate values, the posterior predictive distribution also incorporates uncertainty in the residual error of the model fits (Equations 1 and 2 below).

Figure J.1-1. Stacked Posterior Predictive Distributions for the Log-Linear Regressions of Longfin Smelt Fall Midwater Trawl Abundance Index as a Function of Delta Outflow (December–May), Ecological Regime (1967–1987, pre-*Potamocorbula amurensis* invasion; 1988–2002, post-*Potamocorbula* invasion [shown as *Potamocorbula*]; and 2003–2022, Pelagic Organism Decline [POD]), and Abundance Index 2 Years Earlier [$Log_{10}$ FMWT(yr – 2)]).

For those models that included the $Log_{10}$ FMWT(yr – 2) parental stock size covariate (Table J.1-1) the starting parental stock size in 1922 and 1923 was set at a FMWT index value of 118.2, corresponding to the mean index value from 2013 through 2022. Given the starting values for the FMWT index (in the relevant models), the recursive nature of the regression formula was used to generate the expected FMWT index value in successive years from the posterior predictive distribution two years prior. For all models, predictions were conditional on the estimated relationship between the FMWT index and Delta outflow (in December–May, or March–May, depending on the model), and for those models that included a regime covariate, draws from the posterior predictive distributions were conditioned on estimates during the Pelagic Organism Decline regime.

Table J.1-1. The Optimal Linear Combination of Model Weights based on Stacking, which Minimizes the Mean Squared Error of the Leave-One-Out Cross Validation for the Resulting Model Averaged Posterior Predictive Distribution across the Twelve Log-Linear Regressions of Longfin Smelt Fall Midwater Trawl Abundance Index. Models are a Function of Delta Outflow (December–May or March–May), Ecological Regime (1967–1987, pre-*Potamocorbula amurensis* invasion; 1988–2002, post-*P. amurensis* invasion; and 2003–2022, Pelagic Organism Decline), and Abundance Index 2 Years Earlier ($Log_{10}$ FMWT(yr – 2)).

| **$Log_{10}$FMWT Linear Regression Model** [a] | **Stacking Weight** |
|---|---|
| Mar–May + Regime + $Log_{10}$ FMWT(yr – 2) | 0.3661 |
| Dec–May + Regime + $Log_{10}$ FMWT(yr – 2) | 0.2134 |
| Dec–May + Regime + Dec–May*Regime | 0.1636 |
| Dec–May + Regime | 0.1469 |
| Dec–May + $Log_{10}$ FMWT(yr – 2) | 0.1099 |
| Mar–May + Regime + Mar–May*Regime + $Log_{10}$ FMWT(yr – 2) | <0.0001 |
| Dec–May | <0.0001 |
| Mar–May + $Log_{10}$ FMWT(yr – 2) | <0.0001 |
| Dec–May + Regime + Dec–May*Regime + $Log_{10}$ FMWT(yr – 2) | <0.0001 |
| Mar–May + Regime + Mar–May*Regime | <0.0001 |
| Mar–May + Regime | <0.0001 |
| Mar–May | <0.0001 |

[a] An asterisk "*" sign represents an interaction term between Regime and Delta Outflow.

As an example, starting in 1924, draws from the posterior predictive distribution for models including the parental stock size covariate were generated by first substituting the normalized 1924 December through May (or March through May) CalSim 3 outflow value for each alternative and Action 5. CalSim 3 outflow values prior to normalization (i.e., in units of million acre-feet) are shown in Figure J.1-2. Draws from the posterior distributions for the regression

parameters and the starting value for $Log_{10}[FMWT_{1992}]$ were then used to generate the posterior predictive distribution for the fall midwater trawl index in 1924 ($\mu_{1924}$). This value was then substituted into Equation 1, and the posterior distribution for the residual variance parameter was used to generate draws from the pointwise posterior predictive distributions for the fall midwater trawl index.[4] This process was iterated over each successive year, substituting the derived $\mu_{yr-2}$ values for $Log_{10}[FMWT_{yr-2}]$ to calculate $\mu_y$, and to generate the annual posterior predictive distributions for the fall midwater trawl index under each alternative and Action 5. For models that did not include the parental stock size covariate, the posterior predictive distributions were generated based on the corresponding CalSim 3 outflow values for the monthly period corresponding to the individual model estimates, and likewise conditioned on covariate estimates during the POD regime for models that included a regime covariate (or the constant intercept parameter $\beta_0$, for models without the regime covariate). As noted above in the description of the model stacking approach, draws from the posterior predictive distribution for each model were sampled in proportion to the stacking model weights, to generate a weighted average posterior predictive distribution across the models considered. Summaries were then calculated by grouping the stacked annual posterior predictive distributions by water year type and calculating the means and Bayesian credible intervals for each aggregated water year type posterior predictive distribution.

### J.1.2.2 Assumptions / Uncertainty

Several additional models were also examined, in addition to those in Table J.1-1, but they were ultimately not included in this analysis due to poor model fits and what would have been additional computational cost without an expected difference in results (i.e., the poor model fits are indicative of poor model predictive accuracy, and hence tiny model weights). The additional models included a squared term on Delta outflow and their examination was motivated by the modeling results of Nobriga and Rosenfield (2016). Those authors assessed the relationship between Delta outflow and the ratio of age-0 to age-2 Longfin Smelt abundance in the two-life-stage versions of the models included in their analyses. They found support for non-linearity in this relationship (i.e., there was a peak in productivity at more intermediate outflow values), which led to the inclusion of a second-order polynomial regression (i.e., a squared term) on Delta outflow (Nobriga and Rosenfield 2016:50). Given the approach taken here, which differs from the Nobriga and Rosenfield analysis in terms of: (1) the survey data used for Longfin Smelt abundance; (2) how Delta outflow values were included as covariates, and; (3) the overall time periods for available data included in the regression models, there was little to no support found for a second-order polynomial regression on Delta outflow. The aforementioned factors that differed between the two analyses are briefly described in the next paragraph for completeness; but, given the poor predictive ability of the second-order polynomial regressions under the current approach, that subset of models was ultimately not included because the preliminary results indicated the stacked model weights would be near zero. Hence the averaged posterior predictive distributions would not be expected to be sensitive to the exclusion of those models in this case, but their inclusion would have increased the computational time necessary to run and perform the averaging over a larger set of models.

[4] "$\sim N$" in Eqn. 1 denotes a normal (Gaussian) distribution.

As outlined above, there are several differences between these analyses and those of Nobriga and Rosenfield (2016) that might explain the discrepancy in terms of support (or lack thereof) found for dome shaped Longfin Smelt productivity as a function of Delta outflow. Firstly, Nobriga and Rosenfield (2016) found support for this relationship fitting models to catch data from the San Francisco Bay Study. In these analyses, on the other hand, the regression models have been fit to the FMWT index of abundance instead. Second, Nobriga and Rosenfield (2016) incorporated covariate values for Delta Outflow based on a principal component analysis (the first principal component values) of the *z*-scored monthly means from December to May. Here, the monthly total outflows (either from December to May, or March to May) were summed, resulting in a total outflow value during each time period each year, and the regression covariate values were calculated as the *z*-scores of the period-total outflow values taken across years. Third, in addition to examining indices of abundance from different surveys, the annual time periods that have been examined also differ. Nobriga and Rosenfield (2016) examined the relationship between annual indices of Longfin Smelt abundance-at-age and Delta outflow that were available from the Bay Study during 1980–2013. In these analyses, this relationship was examined over a longer period (1967–2022), which includes >20 additional years in the comparison between Longfin Smelt abundance and Delta outflow.

This evaluation of management scenarios assumes that the correlation between outflow and the FMWT index of Longfin Smelt abundance during the POD regime (2003-2022) will remain constant in the future. While a positive correlation between outflow and the FMWT index has been evident for over 50 years of FMWT surveys, the strength of this relationship does not appear constant through time. For example, the results of Bayesian stacking indicates that averaging over models with ecological regime (at least as defined here) maximizes the out-of-sample predictive ability of models. In other words, these results indicate the FMWT data are consistent with shifts in stock productivity between regimes as a function of outflow. Only one model, with no regime covariate (equivalent to assuming the FMWT correlation with outflow has been constant since 1967) was assigned any substantial (~10%) weighting in the final averaged model set (Table J.1-1). In the absence of empirical data on whether or how this correlation may change in the future, it is reasonable to evaluate the management scenarios based on the correlation during the most recent ecological regime.

### J.1.2.3 Code and Data Repository

Analysis files and code for the Longfin Smelt Outflow analysis are available upon request.

## J.1.3 Results

### J.1.3.1 BA Analysis

The means of annual posterior predictive means for the fall midwater trawl (FMWT) index under each BA scenario are shown in Table J.1-2 and Figure J.1-3. For all water year types, EXP1 and EXP 3 means of annual posterior predictive means were the highest, ranging from 130.7 (Critical) to 2186.2 (Wet). This is likely due to these scenarios having the highest Delta outflow values (Figure J.1-2). Alt2 scenarios all had very similar mean annual posterior predictive means for the FMWT index, within each water year type. For Wet, Above Normal, Below Normal, and Dry years, Alt2 without TUCP without VA had the lowest mean annual posterior predictive

means for the FMWT index, ranging from 94.7 (Dry) to 701.5 (Wet). For Critical years, the No Action Alternative had the lowest mean annual posterior predictive mean for the FMWT index (76.4). Bayesian credible intervals for the annual posterior predictive means are shown in Figure J.1-5. Across a majority of modeled years for the BA scenarios, annual posterior predictive means were highest for EXP1 and lowest for Alt2 without TUCP without VA (Wet, Above Normal, Below Normal, and Dry water year types) and Alt 2 with TUCP without VA (Critical water year types) compared to the No Action Alternative (Table J.1-5).

### J.1.3.2 EIS Analysis

The means of annual posterior predictive means for the FMWT index of Longfin smelt abundance for each EIS scenario are shown in Table J.1-3 and Figure J.1-4. For Wet years, the mean annual posterior predictive means for the FMWT index of Longfin smelt abundance ranged from 40% greater (Alt3) to 8% lower (Alt1) than the No Action Alternative. For Above Normal years, the mean annual posterior predictive means for the FMWT index of Longfin smelt abundance ranged from 32% greater (Alt3) to 10% lower (Alt1) than the No Action Alternative. For Below Normal years, the mean annual posterior predictive means for the FMWT index of Longfin smelt abundance ranged from 23% greater (Alt3) to 8% lower (Alt1) than the No Action Alternative. For Dry years, the mean annual posterior predictive means for the FMWT index of Longfin smelt abundance ranged from 22% greater (Alt3) to 8% lower (Alt1) than the No Action Alternative. For Critical years, the mean annual posterior predictive means for the FMWT index of Longfin smelt abundance ranged from 19% greater (Alt3) to 5% lower (Alt1) than the No Action Alternative. Bayesian credible intervals for the annual posterior predictive means are shown in Figure J.1-6. Across a majority of modeled years for the EIS scenarios, annual posterior predictive means were highest for Alt3 and lowest for Alt1 compared to the No Action Alternative (Table J.1-4).

For all modeled years, the occurrence of specific water year types was higher for the CalSim 3 scenarios compared to the POD Regime (2003-2022) for Wet (28%, 25%, respectively) and Dry (24%, 10%, respectively) water year types (Table J.1-6). The occurrence of water year types was greater for the POD Regime than CalSim 3 scenarios for Above Normal (20%, 14%, respectively), Below Normal (25%, 18%, respectively), and Critical (20%, 16%, respectively) water year types. This analysis demonstrates that FMWT Longfin smelt index estimates and variability increase with both December-March and March-May Delta outflow (Figure J.1-7).

Table J.1-2. Means of annual posterior predictive means for the FMWT index of Longfin Smelt abundance by water year type (WYT) for BA scenarios.

| Water Year Type | EXP1 | EXP3 | NAA | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | Act5 |
|---|---|---|---|---|---|---|---|---|
| Wet | 2186.2 | 1626.5 | 725.6 | 704.6 | 701.5 | 713.9 | 716.3 | 797.1 |
| Above Normal | 592.7 | 423.6 | 215.8 | 210.9 | 208.8 | 215.0 | 221.8 | 238.0 |
| Below Normal | 216.0 | 170.2 | 104.8 | 103.8 | 103.0 | 105.6 | 109.1 | 112.3 |

| Water Year Type | EXP1 | EXP3 | NAA | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | Act5 |
|---|---|---|---|---|---|---|---|---|
| Dry | 196.3 | 151.2 | 95.9 | 95.5 | 94.7 | 96.4 | 99.2 | 101.2 |
| Critical | 130.7 | 107.3 | 76.4 | 76.8 | 77.8 | 77.8 | 79.1 | 78.5 |

Table J.1-3. Means of annual posterior predictive means for the FMWT index of Longfin Smelt abundance by water year type (WYT) for EIS Scenarios. The percentage difference between scenarios and NAA is shown in the parentheses.

| Water Year Type | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Act5 |
|---|---|---|---|---|---|---|---|---|---|
| Wet | 725.6 | 664.2 (-8%) | 711.7 (-2%) | 709.3 (-2%) | 717.2 (-1%) | 727.1 (0%) | 1015.7 (40%) | 728.6 (0%) | 797.1 (10%) |
| Above Normal | 215.8 | 194.0 (-10%) | 210.8 (-2%) | 209.4 (-3%) | 214.9 (0%) | 222.4 (3%) | 285.4 (32%) | 214.4 (-1%) | 238.0 (10%) |
| Below Normal | 104.8 | 96.1 (-8%) | 102.9 (-2%) | 102.4 (-2%) | 105.0 (0%) | 108.7 (4%) | 129.0 (23%) | 104.4 (0%) | 112.3 (7%) |
| Dry | 95.9 | 88.2 (-8%) | 95.2 (-1%) | 95.2 (-1%) | 97.0 (1%) | 99.9 (4%) | 116.8 (22%) | 95.3 (-1%) | 101.2 (5%) |
| Critical | 76.4 | 72.3 (-5%) | 75.9 (-1%) | 77.5 (1%) | 77.7 (2%) | 79.6 (4%) | 91.0 (19%) | 75.6 (-1%) | 78.5 (3%) |

Table J.1-4. Means of annual posterior predictive distributions for the FMWT index of Longfin Smelt abundance. Water year types (WYT) are shown by first initial (see Table Table J.1-2 to reference full names for each type). The percentage difference between scenarios and NAA is shown in the parentheses.

| Water Year | WYT | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Act5 |
|---|---|---|---|---|---|---|---|---|---|---|
| 1922 | AN | 121.2 | 113.9 (-6%) | 117.2 (-3%) | 116.9 (-4%) | 120.7 (0%) | 123.5 (2%) | 142.4 (17%) | 119.8 (-1%) | 126.6 (4%) |
| 1923 | BN | 84.7 | 80.2 (-5%) | 83.5 (-1%) | 83.2 (-2%) | 85.1 (1%) | 87.1 (3%) | 97.0 (15%) | 83.1 (-2%) | 88.1 (4%) |
| 1924 | C | 59.4 | 59.2 (0%) | 59.2 (0%) | 61.0 (3%) | 61.8 (4%) | 62.8 (6%) | 64.6 (9%) | 58.7 (-1%) | 60.8 (2%) |
| 1925 | D | 84.4 | 80.2 (-5%) | 85.4 (1%) | 84.8 (0%) | 86.8 (3%) | 88.9 (5%) | 99.8 (18%) | 84.5 (0%) | 91.5 (8%) |

| Water Year | WYT | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Act5 |
|---|---|---|---|---|---|---|---|---|---|---|
| 1926 | D | 69.3 | 65.9 (-5%) | 68.8 (-1%) | 69.6 (0%) | 70.0 (1%) | 70.9 (2%) | 74.4 (7%) | 68.9 (-1%) | 72.7 (5%) |
| 1927 | W | 193.1 | 167.5 (-13%) | 197.5 (2%) | 195.7 (1%) | 199.2 (3%) | 207.1 (7%) | 250.0 (29%) | 197.2 (2%) | 212.7 (10%) |
| 1928 | AN | 111.2 | 101.4 (-9%) | 109.1 (-2%) | 109.0 (-2%) | 112.6 (1%) | 116.6 (5%) | 130.7 (18%) | 113.9 (2%) | 120.3 (8%) |
| 1929 | C | 70 | 67.0 (-4%) | 70.2 (0%) | 71.7 (2%) | 72.0 (3%) | 73.9 (6%) | 85.3 (22%) | 69.4 (-1%) | 73.6 (5%) |
| 1930 | D | 77.9 | 69.6 (-11%) | 78.2 (0%) | 77.4 (-1%) | 79.3 (2%) | 81.1 (4%) | 90.8 (16%) | 79.2 (2%) | 81.7 (5%) |
| 1931 | C | 54 | 53.5 (-1%) | 53.8 (0%) | 55.4 (3%) | 56.1 (4%) | 57.4 (6%) | 59.6 (10%) | 53.7 (-1%) | 55.1 (2%) |
| 1932 | C | 67.9 | 62.2 (-8%) | 67.2 (-1%) | 69.3 (2%) | 70.1 (3%) | 71.2 (5%) | 79.9 (18%) | 67.9 (0%) | 69.5 (2%) |
| 1933 | C | 51.1 | 50.4 (-2%) | 50.8 (-1%) | 52.7 (3%) | 53.2 (4%) | 54.0 (6%) | 53.9 (5%) | 50.6 (-1%) | 51.5 (1%) |
| 1934 | C | 55.4 | 54.2 (-2%) | 55.0 (-1%) | 57.5 (4%) | 57.5 (4%) | 58.3 (5%) | 60.7 (9%) | 55.2 (0%) | 55.8 (1%) |
| 1935 | BN | 80.4 | 74.4 (-7%) | 81.2 (1%) | 80.2 (0%) | 80.4 (0%) | 82.8 (3%) | 89.1 (11%) | 81.2 (1%) | 83.4 (4%) |
| 1936 | BN | 106 | 94.7 (-11%) | 102.9 (-3%) | 102.7 (-3%) | 102.7 (-3%) | 107.1 (1%) | 110.4 (4%) | 104.0 (-2%) | 109.3 (3%) |
| 1937 | BN | 91.4 | 83.6 (-8%) | 88.8 (-3%) | 88.7 (-3%) | 90.4 (-1%) | 92.5 (1%) | 102.3 (12%) | 88.7 (-3%) | 93.4 (2%) |
| 1938 | W | 794.6 | 749.8 (-6%) | 770.9 (-3%) | 770.8 (-3%) | 770.6 (-3%) | 777.3 (-2%) | 1123.6 (41%) | 778.3 (-2%) | 838.3 (5%) |
| 1939 | D | 59.5 | 56.3 (-5%) | 59.2 (0%) | 59.1 (-1%) | 59.8 (1%) | 60.7 (2%) | 66.0 (11%) | 58.7 (-1%) | 59.3 (0%) |
| 1940 | AN | 404.1 | 369.0 (-9%) | 391.5 (-3%) | 394.4 (-2%) | 391.6 (-3%) | 413.1 (2%) | 528.9 (31%) | 400.7 (-1%) | 458.9 (14%) |
| 1941 | W | 364.9 | 336.3 (-8%) | 352.9 (-3%) | 351.9 (-4%) | 353.9 (-3%) | 353.3 (-3%) | 424.8 (16%) | 365.8 (0%) | 418.9 (15%) |
| 1942 | W | 570.1 | 511.7 (-10%) | 556.4 (-2%) | 569.1 (0%) | 564.0 (-1%) | 581.6 (2%) | 791.6 (39%) | 580.6 (2%) | 632.2 (11%) |
| 1943 | W | 283.5 | 258.6 (-9%) | 273.1 (-4%) | 269.8 (-5%) | 279.8 (-1%) | 283.9 (0%) | 385.1 (36%) | 283.3 (0%) | 314.3 (11%) |
| 1944 | D | 138.1 | 126.2 (-9%) | 134.4 (-3%) | 137.2 (-1%) | 137.5 (0%) | 143.0 (4%) | 171.3 (24%) | 136.1 (-1%) | 147.8 (7%) |

| Water Year | WYT | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Act5 |
|---|---|---|---|---|---|---|---|---|---|---|
| 1945 | D | 126.3 | 112.3 (-11%) | 124.7 (-1%) | 123.4 (-2%) | 127.4 (1%) | 131.7 (4%) | 162.3 (29%) | 125.9 (0%) | 138.0 (9%) |
| 1946 | BN | 144.1 | 126.1 (-12%) | 141.2 (-2%) | 142.1 (-1%) | 146.2 (1%) | 152.8 (6%) | 182.1 (26%) | 141.5 (-2%) | 154.2 (7%) |
| 1947 | D | 73.4 | 69.7 (-5%) | 73.5 (0%) | 73.2 (0%) | 74.3 (1%) | 75.6 (3%) | 87.6 (19%) | 73.4 (0%) | 76.9 (5%) |
| 1948 | D | 89.4 | 85.7 (-4%) | 89.4 (0%) | 89.5 (0%) | 91.6 (2%) | 94.9 (6%) | 107.8 (21%) | 88.1 (-1%) | 93.8 (5%) |
| 1949 | D | 74.4 | 69.8 (-6%) | 74.6 (0%) | 74.4 (0%) | 75.2 (1%) | 77.8 (5%) | 80.2 (8%) | 74.1 (0%) | 76.8 (3%) |
| 1950 | D | 80.7 | 74.6 (-7%) | 80.3 (0%) | 80.5 (0%) | 82.8 (3%) | 86.5 (7%) | 91.1 (13%) | 79.8 (-1%) | 84.8 (5%) |
| 1951 | AN | 172 | 156.4 (-9%) | 167.9 (-2%) | 168.3 (-2%) | 174.0 (1%) | 176.6 (3%) | 200.0 (16%) | 169.6 (-1%) | 176.5 (3%) |
| 1952 | W | 331.7 | 296.4 (-11%) | 319.1 (-4%) | 318.7 (-4%) | 324.1 (-2%) | 330.5 (0%) | 421.0 (27%) | 329.4 (-1%) | 355.0 (7%) |
| 1953 | AN | 142.9 | 128.5 (-10%) | 140.3 (-2%) | 141.2 (-1%) | 146.1 (2%) | 150.7 (5%) | 177.8 (24%) | 143.5 (0%) | 158.5 (11%) |
| 1954 | AN | 149.9 | 128.3 (-14%) | 143.7 (-4%) | 143.4 (-4%) | 147.2 (-2%) | 154.1 (3%) | 203.0 (35%) | 148.3 (-1%) | 158.2 (6%) |
| 1955 | D | 76.5 | 70.9 (-7%) | 75.6 (-1%) | 75.8 (-1%) | 78.0 (2%) | 79.6 (4%) | 96.6 (26%) | 76.5 (0%) | 79.8 (4%) |
| 1956 | W | 522.6 | 464.0 (-11%) | 504.2 (-4%) | 506.8 (-3%) | 515.6 (-1%) | 530.0 (1%) | 727.4 (39%) | 526.5 (1%) | 587.1 (12%) |
| 1957 | BN | 80.1 | 73.5 (-8%) | 78.6 (-2%) | 78.6 (-2%) | 81.0 (1%) | 84.3 (5%) | 100.1 (25%) | 79.0 (-1%) | 82.9 (4%) |
| 1958 | W | 1085 | 911.6 (-16%) | 1045.5 (-4%) | 1048.2 (-3%) | 1061.7 (-2%) | 1084.5 (0%) | 1613.1 (49%) | 1074.1 (-1%) | 1153.3 (6%) |
| 1959 | BN | 74.8 | 70.0 (-6%) | 74.0 (-1%) | 73.8 (-1%) | 75.8 (1%) | 78.3 (5%) | 90.7 (21%) | 74.6 (0%) | 79.8 (7%) |
| 1960 | D | 188.6 | 172.5 (-9%) | 186.7 (-1%) | 190.5 (1%) | 191.2 (1%) | 199.6 (6%) | 262.0 (39%) | 185.8 (-1%) | 199.5 (6%) |
| 1961 | D | 63.2 | 57.8 (-9%) | 63.0 (0%) | 62.8 (-1%) | 64.0 (1%) | 65.1 (3%) | 70.8 (12%) | 62.3 (-1%) | 64.7 (2%) |
| 1962 | D | 118.9 | 109.2 (-8%) | 117.4 (-1%) | 118.1 (-1%) | 121.9 (3%) | 127.1 (7%) | 156.8 (32%) | 117.9 (-1%) | 130.0 (9%) |
| 1963 | W | 147.3 | 128.5 (-13%) | 145.6 (-1%) | 145.3 (-1%) | 149.0 (1%) | 152.4 (3%) | 173.8 (18%) | 146.0 (-1%) | 149.9 (2%) |

| Water Year | WYT | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Act5 |
|---|---|---|---|---|---|---|---|---|---|---|
| 1964 | D | 71 | 67.6 (-5%) | 70.5 (-1%) | 70.8 (0%) | 72.8 (3%) | 74.2 (4%) | 88.0 (24%) | 71.2 (0%) | 75.4 (6%) |
| 1965 | W | 238.2 | 205.1 (-14%) | 235.2 (-1%) | 234.0 (-2%) | 241.2 (1%) | 243.9 (2%) | 321.3 (35%) | 237.9 (0%) | 252.4 (6%) |
| 1966 | BN | 72.5 | 66.1 (-9%) | 71.3 (-2%) | 71.6 (-1%) | 73.5 (1%) | 75.8 (5%) | 89.7 (24%) | 72.7 (0%) | 74.7 (3%) |
| 1967 | W | 279.5 | 234.8 (-16%) | 271.7 (-3%) | 272.3 (-3%) | 280.2 (0%) | 289.9 (4%) | 392.5 (40%) | 277.7 (-1%) | 305.1 (9%) |
| 1968 | BN | 79.2 | 73.6 (-7%) | 79.1 (0%) | 79.2 (0%) | 81.5 (3%) | 83.7 (6%) | 93.5 (18%) | 82.0 (4%) | 85.3 (8%) |
| 1969 | W | 719.9 | 640.2 (-11%) | 717.0 (0%) | 714.5 (-1%) | 719.6 (0%) | 737.7 (2%) | 1091.5 (52%) | 724.7 (1%) | 783.4 (9%) |
| 1970 | W | 288.5 | 280.2 (-3%) | 280.8 (-3%) | 281.2 (-3%) | 288.4 (0%) | 289.9 (0%) | 381.6 (32%) | 296.1 (3%) | 320.0 (11%) |
| 1971 | W | 301.7 | 263.9 (-13%) | 301.8 (0%) | 296.9 (-2%) | 300.2 (0%) | 310.5 (3%) | 460.4 (53%) | 305.2 (1%) | 329.3 (9%) |
| 1972 | BN | 97.4 | 87.1 (-11%) | 93.7 (-4%) | 93.7 (-4%) | 98.2 (1%) | 101.1 (4%) | 128.9 (32%) | 98.3 (1%) | 104.8 (8%) |
| 1973 | AN | 303.5 | 259.6 (-14%) | 297.2 (-2%) | 296.9 (-2%) | 307.8 (1%) | 322.4 (6%) | 436.0 (44%) | 306.0 (1%) | 343.3 (13%) |
| 1974 | W | 476.1 | 412.3 (-13%) | 464.1 (-3%) | 467.5 (-2%) | 472.0 (-1%) | 477.4 (0%) | 623.7 (31%) | 477.6 (0%) | 485.8 (2%) |
| 1975 | AN | 223 | 189.3 (-15%) | 215.6 (-3%) | 212.2 (-5%) | 224.6 (1%) | 230.5 (3%) | 313.0 (40%) | 222.1 (0%) | 250.0 (12%) |
| 1976 | C | 97.3 | 90.9 (-7%) | 95.1 (-2%) | 96.3 (-1%) | 96.0 (-1%) | 98.1 (1%) | 119.6 (23%) | 96.8 (-1%) | 98.6 (1%) |
| 1977 | C | 76.1 | 73.4 (-4%) | 75.5 (-1%) | 76.5 (1%) | 78.7 (3%) | 80.3 (6%) | 89.5 (18%) | 76.3 (0%) | 81.9 (8%) |
| 1978 | AN | 182 | 167.2 (-8%) | 182.4 (0%) | 179.4 (-1%) | 182.7 (0%) | 188.2 (3%) | 259.7 (43%) | 180.8 (-1%) | 193.8 (7%) |
| 1979 | D | 81.1 | 74.2 (-9%) | 79.0 (-3%) | 78.9 (-3%) | 81.8 (1%) | 84.4 (4%) | 95.4 (18%) | 79.9 (-1%) | 85.5 (5%) |
| 1980 | AN | 316.5 | 295.4 (-7%) | 308.7 (-2%) | 310.0 (-2%) | 319.2 (1%) | 334.1 (6%) | 415.2 (31%) | 303.7 (-4%) | 350.9 (11%) |
| 1981 | D | 66.8 | 62.4 (-7%) | 65.9 (-1%) | 65.7 (-2%) | 67.9 (2%) | 70.0 (5%) | 77.2 (16%) | 67.3 (1%) | 69.3 (4%) |
| 1982 | W | 1151 | 1015.8 (-12%) | 1120.3 (-3%) | 1121.0 (-3%) | 1126.7 (-2%) | 1162.5 (1%) | 1599.6 (39%) | 1124.3 (-2%) | 1221.4 (6%) |

| Water Year | WYT | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Act5 |
|---|---|---|---|---|---|---|---|---|---|---|
| 1983 | W | 3476.1 | 3336.9 (-4%) | 3475.2 (0%) | 3430.3 (-1%) | 3527.1 (1%) | 3516.7 (1%) | 4489.4 (29%) | 3577.9 (3%) | 3980.4 (15%) |
| 1984 | W | 676.6 | 593.1 (-12%) | 654.9 (-3%) | 656.8 (-3%) | 661.3 (-2%) | 684.2 (1%) | 962.2 (42%) | 643.5 (-5%) | 720.4 (6%) |
| 1985 | BN | 229.3 | 212.9 (-7%) | 222.6 (-3%) | 221.2 (-4%) | 225.0 (-2%) | 234.5 (2%) | 288.1 (26%) | 223.4 (-3%) | 250.8 (9%) |
| 1986 | W | 939.5 | 822.2 (-12%) | 902.4 (-4%) | 902.9 (-4%) | 915.9 (-3%) | 940.3 (0%) | 1494.5 (59%) | 900.7 (-4%) | 985.2 (5%) |
| 1987 | D | 100.3 | 93.5 (-7%) | 103.2 (3%) | 102.4 (2%) | 103.3 (3%) | 106.2 (6%) | 113.0 (13%) | 101.5 (1%) | 103.9 (4%) |
| 1988 | C | 168.9 | 143.8 (-15%) | 162.8 (-4%) | 164.3 (-3%) | 159.1 (-6%) | 171.1 (1%) | 229.0 (36%) | 161.3 (-4%) | 168.4 (0%) |
| 1989 | D | 86.9 | 82.1 (-6%) | 87.8 (1%) | 87.2 (0%) | 89.3 (3%) | 91.1 (5%) | 97.9 (13%) | 87.7 (1%) | 87.9 (1%) |
| 1990 | C | 79.1 | 74.3 (-6%) | 80.7 (2%) | 81.1 (2%) | 80.4 (2%) | 83.1 (5%) | 95.0 (20%) | 79.5 (0%) | 83.4 (5%) |
| 1991 | C | 66.6 | 65.4 (-2%) | 66.6 (0%) | 67.7 (2%) | 67.2 (1%) | 70.7 (6%) | 72.5 (9%) | 66.6 (0%) | 67.3 (1%) |
| 1992 | C | 66.9 | 64.4 (-4%) | 69.1 (3%) | 70.4 (5%) | 70.6 (5%) | 70.3 (5%) | 74.5 (11%) | 68.5 (2%) | 69.3 (4%) |
| 1993 | AN | 148 | 124.0 (-16%) | 145.0 (-2%) | 135.5 (-8%) | 137.6 (-7%) | 138.4 (-7%) | 183.4 (24%) | 142.9 (-3%) | 146.3 (-1%) |
| 1994 | C | 57.1 | 55.2 (-3%) | 57.6 (1%) | 57.6 (1%) | 58.2 (2%) | 59.1 (3%) | 62.3 (9%) | 57.3 (0%) | 57.8 (1%) |
| 1995 | W | 908.8 | 822.6 (-9%) | 910.6 (0%) | 896.9 (-1%) | 877.5 (-3%) | 898.1 (-1%) | 1220.0 (34%) | 925.9 (2%) | 965.4 (6%) |
| 1996 | W | 220.8 | 215.8 (-2%) | 212.0 (-4%) | 210.4 (-5%) | 213.3 (-3%) | 213.1 (-3%) | 275.8 (25%) | 218.7 (-1%) | 223.1 (1%) |
| 1997 | W | 1238.4 | 1133.0 (-9%) | 1192.7 (-4%) | 1194.4 (-4%) | 1167.6 (-6%) | 1203.2 (-3%) | 1701.7 (37%) | 1262.9 (2%) | 1410.1 (14%) |
| 1998 | W | 1026 | 1089.7 (6%) | 1013.2 (-1%) | 1009.8 (-2%) | 1021.8 (0%) | 1013.9 (-1%) | 1339.3 (31%) | 1065.3 (4%) | 1255.7 (22%) |
| 1999 | W | 586 | 519.6 (-11%) | 553.3 (-6%) | 559.3 (-5%) | 546.2 (-7%) | 562.1 (-4%) | 856.0 (46%) | 569.4 (-3%) | 607.8 (4%) |
| 2000 | AN | 428.9 | 403.6 (-6%) | 417.7 (-3%) | 413.6 (-4%) | 424.1 (-1%) | 435.3 (1%) | 590.0 (38%) | 428.1 (0%) | 496.1 (16%) |
| 2001 | D | 145.3 | 129.0 (-11%) | 140.6 (-3%) | 141.9 (-2%) | 143.1 (-2%) | 145.4 (0%) | 178.9 (23%) | 142.3 (-2%) | 152.7 (5%) |

| Water Year | WYT | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Act5 |
|---|---|---|---|---|---|---|---|---|---|---|
| 2002 | BN | 161.2 | 151.1 (-6%) | 158.5 (-2%) | 155.7 (-3%) | 160.3 (-1%) | 169.1 (5%) | 219.2 (36%) | 160.8 (0%) | 181.5 (13%) |
| 2003 | AN | 154.5 | 132.9 (-14%) | 152.1 (-2%) | 152.4 (-1%) | 155.3 (1%) | 158.1 (2%) | 198.6 (29%) | 153.6 (-1%) | 166.2 (8%) |
| 2004 | AN | 164.1 | 146.0 (-11%) | 162.7 (-1%) | 158.9 (-3%) | 165.8 (1%) | 173.6 (6%) | 217.0 (32%) | 169.8 (3%) | 185.8 (13%) |
| 2005 | BN | 147.2 | 129.2 (-12%) | 142.4 (-3%) | 141.4 (-4%) | 146.1 (-1%) | 150.4 (2%) | 194.6 (32%) | 146.0 (-1%) | 157.6 (7%) |
| 2006 | W | 1352.3 | 1250.2 (-8%) | 1347.4 (0%) | 1321.8 (-2%) | 1355.4 (0%) | 1384.8 (2%) | 2041.8 (51%) | 1385.7 (2%) | 1506.7 (11%) |
| 2007 | BN | 79.3 | 72.4 (-9%) | 77.4 (-2%) | 76.9 (-3%) | 79.2 (0%) | 81.3 (2%) | 98.0 (23%) | 78.9 (-1%) | 83.4 (5%) |
| 2008 | D | 190.4 | 168.1 (-12%) | 189.0 (-1%) | 186.5 (-2%) | 188.3 (-1%) | 194.4 (2%) | 253.6 (33%) | 187.1 (-2%) | 204.3 (7%) |
| 2009 | D | 70.3 | 64.7 (-8%) | 69.5 (-1%) | 69.2 (-2%) | 71.5 (2%) | 74.8 (6%) | 79.5 (13%) | 70.4 (0%) | 72.2 (3%) |
| 2010 | BN | 118.5 | 105.5 (-11%) | 117.3 (-1%) | 117.4 (-1%) | 120.8 (2%) | 125.3 (6%) | 155.6 (31%) | 118.3 (0%) | 131.8 (11%) |
| 2011 | W | 289.7 | 263.6 (-9%) | 279.7 (-3%) | 278.3 (-4%) | 284.3 (-2%) | 287.1 (-1%) | 394.8 (36%) | 281.8 (-3%) | 299.1 (3%) |
| 2012 | BN | 79.6 | 76.4 (-4%) | 78.6 (-1%) | 78.8 (-1%) | 80.6 (1%) | 83.1 (4%) | 98.8 (24%) | 82.3 (3%) | 86.8 (9%) |
| 2013 | D | 108.8 | 97.5 (-10%) | 106.9 (-2%) | 106.6 (-2%) | 108.8 (0%) | 112.2 (3%) | 132.7 (22%) | 107.7 (-1%) | 117.0 (7%) |
| 2014 | C | 58.5 | 57.0 (-3%) | 57.9 (-1%) | 58.5 (0%) | 59.3 (1%) | 59.6 (2%) | 64.0 (9%) | 58.1 (-1%) | 60.1 (3%) |
| 2015 | C | 69.8 | 68.6 (-2%) | 69.3 (-1%) | 72.4 (4%) | 73.1 (5%) | 74.1 (6%) | 81.7 (17%) | 69.5 (0%) | 74.3 (7%) |
| 2016 | BN | 83.9 | 78.3 (-7%) | 83.5 (0%) | 81.6 (-3%) | 83.7 (0%) | 87.0 (4%) | 95.6 (14%) | 84.6 (1%) | 89.7 (7%) |
| 2017 | W | 1169.2 | 1077.1 (-8%) | 1150.7 (-2%) | 1155.7 (-1%) | 1155.7 (-1%) | 1144.7 (-2%) | 1762.8 (51%) | 1170.0 (0%) | 1288.7 (10%) |
| 2018 | BN | 77.1 | 74.6 (-3%) | 77.5 (0%) | 76.2 (-1%) | 78.6 (2%) | 81.2 (5%) | 87.7 (14%) | 79.4 (3%) | 83.7 (9%) |
| 2019 | W | 684.8 | 596.1 (-13%) | 667.4 (-3%) | 673.9 (-2%) | 694.2 (1%) | 695.9 (2%) | 1120.3 (64%) | 657.9 (-4%) | 716.3 (5%) |
| 2020 | D | 60.5 | 57.8 (-5%) | 60.5 (0%) | 59.9 (-1%) | 61.2 (1%) | 62.7 (4%) | 69.4 (15%) | 61.1 (1%) | 62.3 (3%) |

| Water Year | WYT | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 | Act5 |
|---|---|---|---|---|---|---|---|---|---|---|
| 2021 | C | 124.6 | 117.2 (-6%) | 123.9 (-1%) | 126.2 (1%) | 129.3 (4%) | 130.1 (4%) | 164.2 (32%) | 120.5 (-3%) | 129.3 (4%) |

Table J.1-5 Means of annual posterior predictive distributions for the FMWT index of Longfin Smelt abundance. Scenarios considered in the BA are shown for comparison across years.

| Water Year | WYT | EXP1 | EXP3 | NAA | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | Act5 |
|---|---|---|---|---|---|---|---|---|---|
| 1922 | Above Normal | 221.4 | 158.2 | 121.2 | 117 | 116.5 | 119.8 | 122.4 | 126.6 |
| 1923 | Below Normal | 126.9 | 110.5 | 84.7 | 83.3 | 82.9 | 84.4 | 86.2 | 88.1 |
| 1924 | Critical | 74.7 | 70 | 59.4 | 59.4 | 61.2 | 61.5 | 62.6 | 60.8 |
| 1925 | Dry | 166 | 108.7 | 84.4 | 85.4 | 84.9 | 86.1 | 88.8 | 91.5 |
| 1926 | Dry | 101.1 | 86.2 | 69.3 | 69.7 | 70.3 | 70.4 | 72.4 | 72.7 |
| 1927 | Wet | 425.5 | 291.7 | 193.1 | 198.5 | 196.5 | 198.4 | 205.4 | 212.7 |
| 1928 | Above Normal | 199 | 168 | 111.2 | 110 | 109.6 | 112.4 | 117.2 | 120.3 |
| 1929 | Critical | 119.3 | 93.4 | 70 | 72.1 | 72.9 | 72.3 | 74.3 | 73.6 |
| 1930 | Dry | 150.6 | 108.2 | 77.9 | 77.4 | 77.3 | 78.6 | 81.4 | 81.7 |
| 1931 | Critical | 70 | 63.8 | 54 | 54.2 | 56.3 | 55.7 | 56.9 | 55.1 |
| 1932 | Critical | 137.4 | 89.8 | 67.9 | 66.8 | 69 | 69.2 | 70.5 | 69.5 |
| 1933 | Critical | 69.8 | 61.4 | 51.1 | 50.6 | 53.1 | 52.6 | 53.5 | 51.5 |
| 1934 | Critical | 89 | 68.7 | 55.4 | 55.3 | 57.3 | 57.3 | 58.1 | 55.8 |
| 1935 | Below Normal | 158.5 | 104.8 | 80.4 | 80.6 | 79.6 | 80.1 | 81.9 | 83.4 |
| 1936 | Below Normal | 228.1 | 158.1 | 106 | 103 | 102.8 | 103.1 | 106.9 | 109.3 |
| 1937 | Below Normal | 204.2 | 136.2 | 91.4 | 88.5 | 88.5 | 90.2 | 91.6 | 93.4 |
| 1938 | Wet | 2479.4 | 1760.3 | 794.6 | 762 | 763 | 773.2 | 765.2 | 838.3 |
| 1939 | Dry | 87.8 | 76.8 | 59.5 | 58.5 | 58.6 | 58.9 | 59.5 | 59.3 |
| 1940 | Above Normal | 1478.4 | 848.9 | 404.1 | 391.8 | 390 | 397.6 | 406.7 | 458.9 |

| Water Year | WYT | EXP1 | EXP3 | NAA | Alt2wTUCPwoVA | Alt2woTUCPwoVA | Alt2woTUCPDeltaVA | Alt2woTUCPAllVA | Act5 |
|---|---|---|---|---|---|---|---|---|---|
| 1941 | Wet | 967.2 | 722.3 | 364.9 | 346.2 | 346.1 | 346.9 | 343.4 | 418.9 |
| 1942 | Wet | 2033.6 | 1388.5 | 570.1 | 559.9 | 550.9 | 560.9 | 559.8 | 632.2 |
| 1943 | Wet | 790.9 | 616.5 | 283.5 | 270.5 | 268.6 | 274.7 | 282.4 | 314.3 |
| 1944 | Dry | 333.6 | 247.8 | 138.1 | 135.8 | 136.3 | 139 | 142.4 | 147.8 |
| 1945 | Dry | 336.4 | 247.7 | 126.3 | 122.8 | 122.4 | 125.9 | 129.7 | 138.0 |
| 1946 | Below Normal | 334.6 | 262 | 144.1 | 142.6 | 141.5 | 147.9 | 152 | 154.2 |
| 1947 | Dry | 138.2 | 110.1 | 73.4 | 73.5 | 72.3 | 72.8 | 75.2 | 76.9 |
| 1948 | Dry | 199.5 | 143.8 | 89.4 | 91.5 | 90.6 | 93.2 | 95.2 | 93.8 |
| 1949 | Dry | 124.1 | 102.9 | 74.4 | 74.8 | 73.2 | 74 | 77 | 76.8 |
| 1950 | Dry | 163.5 | 114.3 | 80.7 | 80.6 | 80.8 | 82.6 | 84.9 | 84.8 |
| 1951 | Above Normal | 349.3 | 297.8 | 172 | 169.6 | 168.3 | 174 | 175.8 | 176.5 |
| 1952 | Wet | 966.9 | 653.5 | 331.7 | 319.6 | 319.7 | 321.9 | 322.3 | 355.0 |
| 1953 | Above Normal | 302.5 | 245.1 | 142.9 | 139.5 | 139 | 144.8 | 148.6 | 158.5 |
| 1954 | Above Normal | 366.9 | 270.3 | 149.9 | 145.6 | 145 | 148.7 | 154.1 | 158.2 |
| 1955 | Dry | 135.2 | 114.8 | 76.5 | 75.5 | 75.2 | 77.1 | 78.8 | 79.8 |
| 1956 | Wet | 1895.4 | 1254.1 | 522.6 | 509.1 | 509.4 | 522.1 | 529.7 | 587.1 |
| 1957 | Below Normal | 146.6 | 122.7 | 80.1 | 78.9 | 78.6 | 80.8 | 83.7 | 82.9 |
| 1958 | Wet | 3824.4 | 2821.6 | 1085 | 1040.7 | 1036.3 | 1054.9 | 1065.5 | 1153.3 |
| 1959 | Below Normal | 118.2 | 109.5 | 74.8 | 73.1 | 72.6 | 75.1 | 76.4 | 79.8 |
| 1960 | Dry | 531.4 | 371.9 | 188.6 | 192 | 184 | 188.8 | 194.9 | 199.5 |
| 1961 | Dry | 99 | 83.4 | 63.2 | 62.7 | 62.4 | 63.3 | 64.1 | 64.7 |
| 1962 | Dry | 287 | 205.1 | 118.9 | 118.7 | 116.9 | 118.4 | 124.2 | 130.0 |
| 1963 | Wet | 268.8 | 219.8 | 147.3 | 145.3 | 144.6 | 146.9 | 150.1 | 149.9 |
| 1964 | Dry | 118.8 | 105.5 | 71 | 70.9 | 70.1 | 70.6 | 72.3 | 75.4 |
| 1965 | Wet | 611.4 | 420.1 | 238.2 | 236 | 232.3 | 236.5 | 243.6 | 252.4 |
| 1966 | Below Normal | 119.6 | 108.2 | 72.5 | 71.7 | 71.2 | 72.3 | 74.6 | 74.7 |
| 1967 | Wet | 858.8 | 599.7 | 279.5 | 273.5 | 270.1 | 277.8 | 288.2 | 305.1 |
| 1968 | Below Normal | 124.4 | 116 | 79.2 | 79.5 | 78.5 | 80 | 82.5 | 85.3 |

| Water Year | WYT | EXP1 | EXP3 | NAA | Alt2wTUCPwoVA | Alt2woTUCPwoVA | Alt2woTUCPDeltaVA | Alt2woTUCPAllVA | Act5 |
|---|---|---|---|---|---|---|---|---|---|
| 1969 | Wet | 2848.3 | 1885.7 | 719.9 | 735.9 | 725.1 | 721.8 | 731.1 | 783.4 |
| 1970 | Wet | 539.6 | 527.2 | 288.5 | 282.5 | 281.6 | 286.9 | 288.3 | 320.0 |
| 1971 | Wet | 1018.5 | 694.5 | 301.7 | 304.5 | 301.6 | 298.6 | 301.5 | 329.3 |
| 1972 | Below Normal | 180.6 | 162.4 | 97.4 | 96.3 | 96.2 | 97.9 | 100.7 | 104.8 |
| 1973 | Above Normal | 856.3 | 639.1 | 303.5 | 300.8 | 295 | 305.3 | 318.9 | 343.3 |
| 1974 | Wet | 988.9 | 892 | 476.1 | 466.7 | 464.6 | 469.8 | 469.4 | 485.8 |
| 1975 | Above Normal | 600.9 | 466.9 | 223 | 216.4 | 213.9 | 224.3 | 233 | 250.0 |
| 1976 | Critical | 154.4 | 155.3 | 97.3 | 96.5 | 96.4 | 96.3 | 98.6 | 98.6 |
| 1977 | Critical | 110.3 | 104.4 | 76.1 | 77.6 | 77.8 | 78.2 | 79.6 | 81.9 |
| 1978 | Above Normal | 569.3 | 329.6 | 182 | 182.8 | 178.3 | 184.9 | 189.4 | 193.8 |
| 1979 | Dry | 156 | 128.6 | 81.1 | 79.8 | 79.8 | 81.4 | 83.7 | 85.5 |
| 1980 | Above Normal | 946.4 | 666.4 | 316.5 | 308.3 | 303.8 | 316.7 | 331.2 | 350.9 |
| 1981 | Dry | 113.8 | 95.9 | 66.8 | 66.5 | 65.9 | 68.2 | 68.7 | 69.3 |
| 1982 | Wet | 3937.1 | 3016.6 | 1151 | 1099.6 | 1096.4 | 1110.1 | 1145.7 | 1221.4 |
| 1983 | Wet | 7315.3 | 6540 | 3476.1 | 3375 | 3399.6 | 3507.9 | 3456.5 | 3980.4 |
| 1984 | Wet | 1969.9 | 1640.3 | 676.6 | 661 | 637.3 | 652.6 | 665.9 | 720.4 |
| 1985 | Below Normal | 432.7 | 407.5 | 229.3 | 226.7 | 226.4 | 231.3 | 238.6 | 250.8 |
| 1986 | Wet | 3519.7 | 2654.4 | 939.5 | 914.3 | 900.7 | 905.9 | 920.5 | 985.2 |
| 1987 | Dry | 159.4 | 143.1 | 100.3 | 102.2 | 102.2 | 101.6 | 104.9 | 103.9 |
| 1988 | Critical | 396.9 | 296.5 | 168.9 | 169.7 | 167.6 | 166.5 | 170.3 | 168.4 |
| 1989 | Dry | 163 | 126.4 | 86.9 | 87.5 | 87.2 | 88.2 | 90.2 | 87.9 |
| 1990 | Critical | 131.2 | 107.3 | 79.1 | 80.4 | 80.2 | 79.6 | 81.6 | 83.4 |
| 1991 | Critical | 99.4 | 80.6 | 66.6 | 66.6 | 68.5 | 66.7 | 67.5 | 67.3 |
| 1992 | Critical | 102 | 83.3 | 66.9 | 68.7 | 69.2 | 69.5 | 70.2 | 69.3 |
| 1993 | Above Normal | 366.8 | 224.9 | 148 | 140.7 | 130.3 | 135.1 | 137.1 | 146.3 |
| 1994 | Critical | 76.2 | 72.5 | 57.1 | 57.4 | 57.2 | 58 | 58.8 | 57.8 |
| 1995 | Wet | 3207.1 | 1785.3 | 908.8 | 887.8 | 865.6 | 877.7 | 885.7 | 965.4 |
| 1996 | Wet | 444.3 | 370.1 | 220.8 | 209.8 | 209.6 | 212 | 212.3 | 223.1 |
| 1997 | Wet | 4213.5 | 3145.6 | 1238.4 | 1162.7 | 1161.2 | 1170 | 1170.4 | 1410.1 |

| Water Year | WYT | EXP1 | EXP3 | NAA | Alt2wTUCPwoVA | Alt2woTUCPwoVA | Alt2woTUCPDeltaVA | Alt2woTUCPAllVA | Act5 |
|---|---|---|---|---|---|---|---|---|---|
| 1998 | Wet | 3211.5 | 2402.7 | 1026 | 981.7 | 1002.8 | 1022.2 | 1013.9 | 1255.7 |
| 1999 | Wet | 1729 | 1363 | 586 | 544.4 | 543.6 | 547.2 | 556.5 | 607.8 |
| 2000 | Above Normal | 1316.6 | 1041.4 | 428.9 | 415.3 | 422.1 | 427.5 | 438.1 | 496.1 |
| 2001 | Dry | 299.1 | 249.4 | 145.3 | 141.2 | 140.3 | 143 | 146.8 | 152.7 |
| 2002 | Below Normal | 407.4 | 310.8 | 161.2 | 159.8 | 159.9 | 163.6 | 173.1 | 181.5 |
| 2003 | Above Normal | 360.7 | 268.8 | 154.5 | 152.3 | 149.8 | 153.3 | 158.3 | 166.2 |
| 2004 | Above Normal | 363.7 | 305.4 | 164.1 | 162 | 161.1 | 165.1 | 174.3 | 185.8 |
| 2005 | Below Normal | 433.7 | 298.5 | 147.2 | 145.2 | 143.4 | 148.4 | 153.2 | 157.6 |
| 2006 | Wet | 3912.4 | 3117.8 | 1352.3 | 1316.3 | 1319.7 | 1371.1 | 1388 | 1506.7 |
| 2007 | Below Normal | 150.3 | 125.3 | 79.3 | 78.5 | 77.3 | 80.1 | 81.7 | 83.4 |
| 2008 | Dry | 417.5 | 308.4 | 190.4 | 188 | 185.7 | 190.5 | 197.3 | 204.3 |
| 2009 | Dry | 134.1 | 97.3 | 70.3 | 69.7 | 68.8 | 71.3 | 74.2 | 72.2 |
| 2010 | Below Normal | 271.4 | 196.2 | 118.5 | 119.6 | 118 | 122.6 | 128.3 | 131.8 |
| 2011 | Wet | 687.3 | 536.4 | 289.7 | 278 | 277 | 280 | 283 | 299.1 |
| 2012 | Below Normal | 142.5 | 117.8 | 79.6 | 80.4 | 79 | 81.1 | 83.9 | 86.8 |
| 2013 | Dry | 204.2 | 170.9 | 108.8 | 107.1 | 107.3 | 108.3 | 111.5 | 117.0 |
| 2014 | Critical | 80.8 | 71.1 | 58.5 | 58.6 | 58.8 | 59.6 | 59.5 | 60.1 |
| 2015 | Critical | 116.9 | 95.1 | 69.8 | 69.8 | 72.7 | 73.3 | 73.5 | 74.3 |
| 2016 | Below Normal | 171.2 | 105.7 | 83.9 | 83.5 | 81.6 | 83.1 | 87.6 | 89.7 |
| 2017 | Wet | 3890.3 | 2596 | 1169.2 | 1155.3 | 1139.6 | 1141 | 1123.8 | 1288.7 |
| 2018 | Below Normal | 137.5 | 111.1 | 77.1 | 76.3 | 76.4 | 77.8 | 80.8 | 83.7 |
| 2019 | Wet | 2657.9 | 1626.7 | 684.8 | 693.1 | 680 | 699.5 | 689.7 | 716.3 |
| 2020 | Dry | 91.7 | 81.5 | 60.5 | 59.6 | 59.6 | 60.6 | 61.8 | 62.3 |
| 2021 | Critical | 262 | 203.7 | 124.6 | 124.8 | 125.9 | 128.2 | 130.6 | 129.3 |

Table J.1-6. The percentages of each water year type are shown for: (1) the CalSim 3 scenarios, and; (2) the historical water year types during 2003-2022 (POD regime).

| Scenario | Wet | Above Normal | Below Normal | Dry | Critical |
|---|---|---|---|---|---|
| CalSim 3 | 28% | 14% | 18% | 24% | 16% |
| 2003-2022 (POD regime) | 25% | 20% | 25% | 10% | 20% |

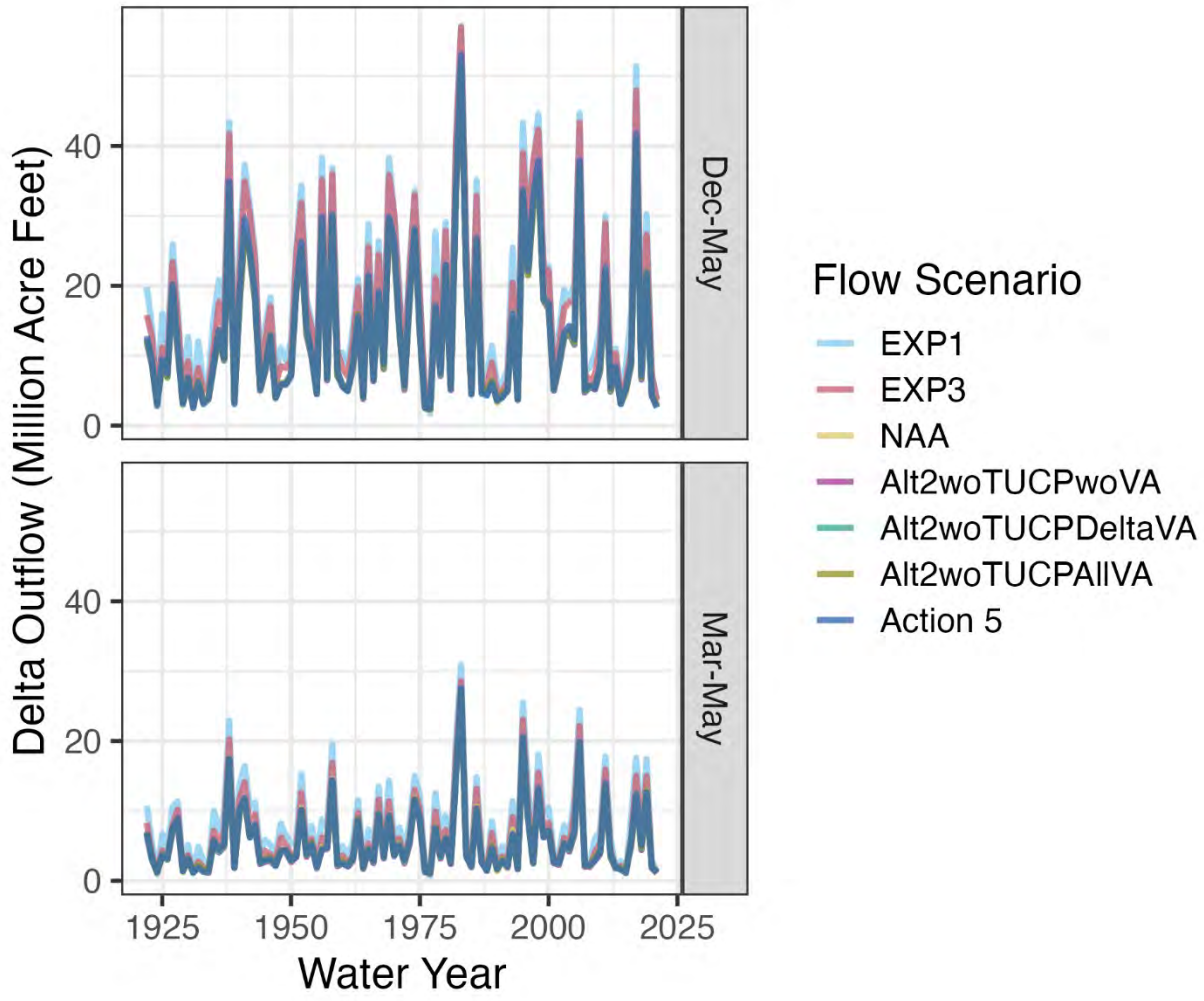



Figure J.1-212. CalSim 3 outflow values are shown for comparison across BA scenarios.

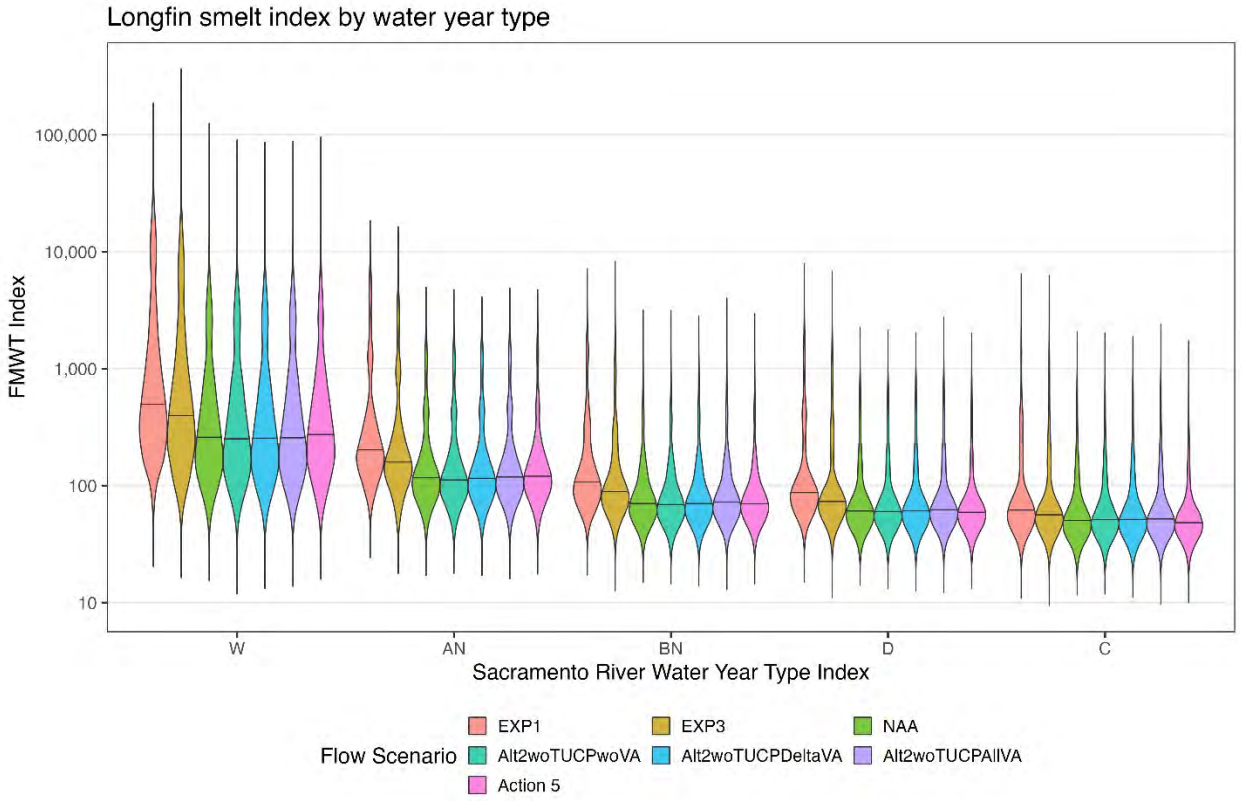



Figure J.1-3. Posterior predictive distributions for the FMWT index of Longfin Smelt abundance are shown aggregated by water year type[5] for each BA scenario. The horizontal line in the distribution for each scenario represents the median predicted value.

[5] https://cdec.water.ca.gov/reportapp/javareports?name=WSIHIST

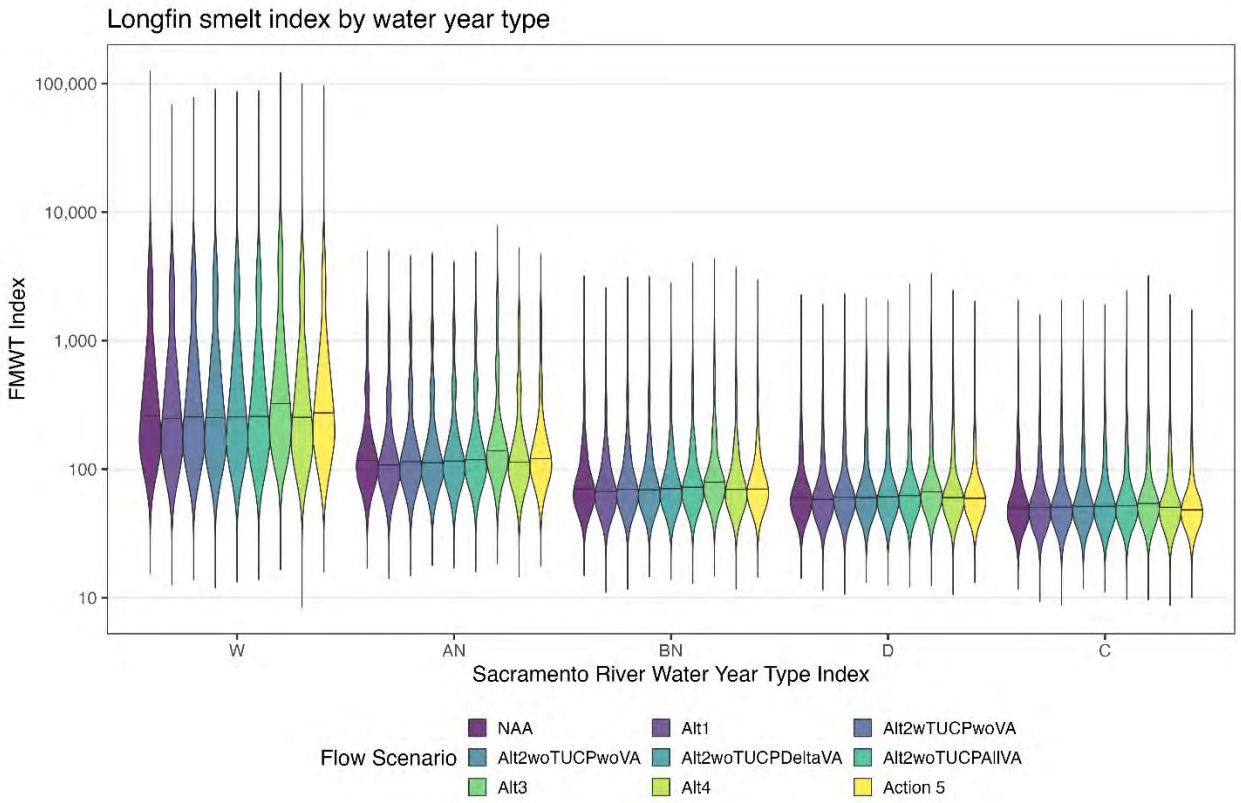



Figure J.1-4. Posterior predictive distributions for the FMWT index of Longfin Smelt abundance are shown aggregated by water year type for each EIS scenario. The horizontal line in the distribution for each scenario represents the median predicted value.

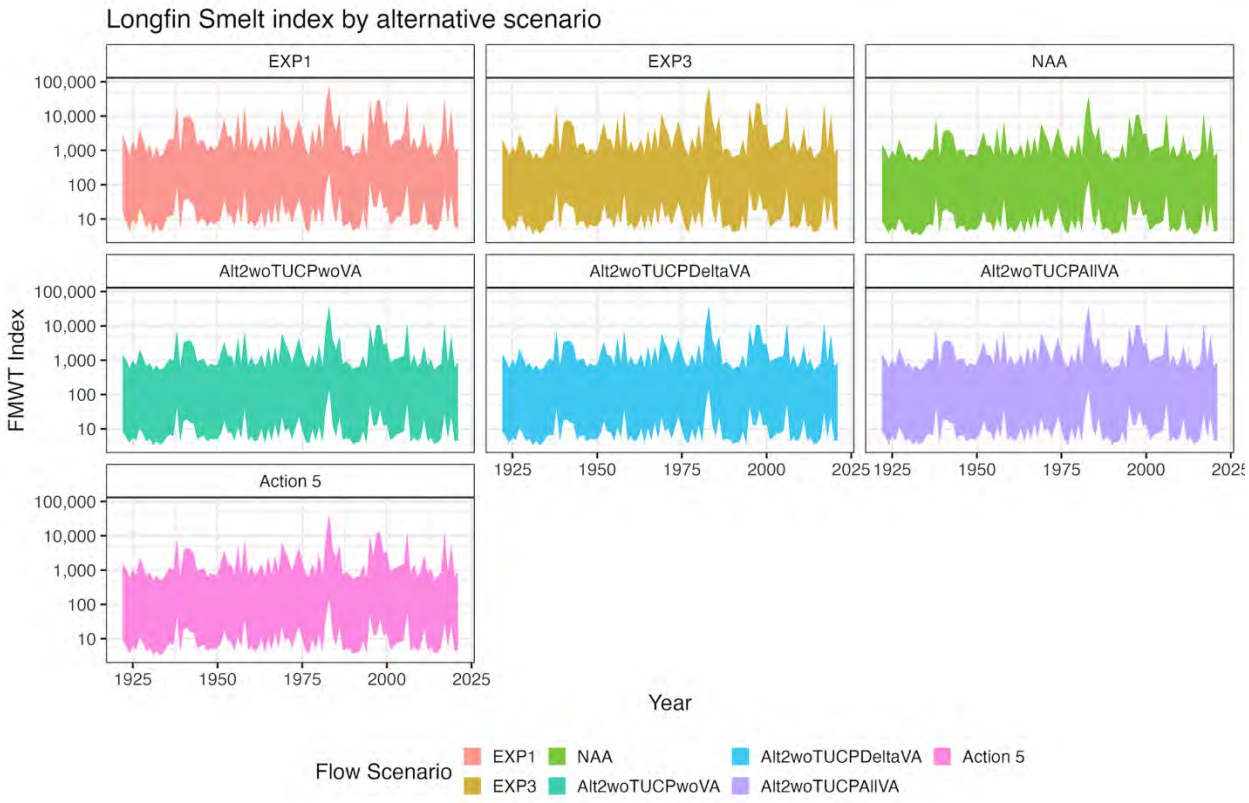



Figure J.1-5. The 95th Bayesian credible intervals for the posterior predictive distributions are shown, based on the parental stock model and the 100-year time series of CalSim 3 Delta Outflow values for each BA scenario.

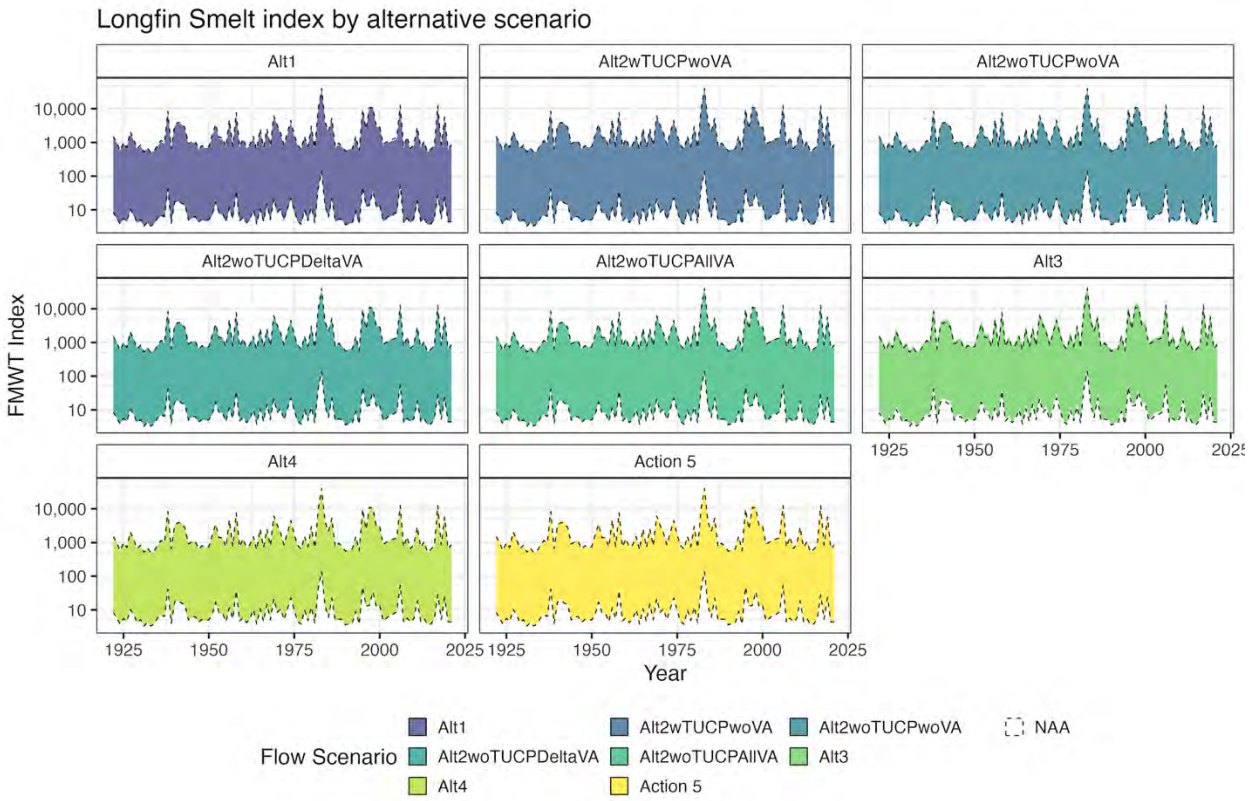



Figure J.1-6. The 95th Bayesian credible intervals for the posterior predictive distributions are shown, based on the parental stock model and the 100-year time series of CalSim 3 Delta Outflow values for each EIS scenario. The credible intervals for the NAA scenario are overlaid as the dashed black lines for comparison with the alternatives.

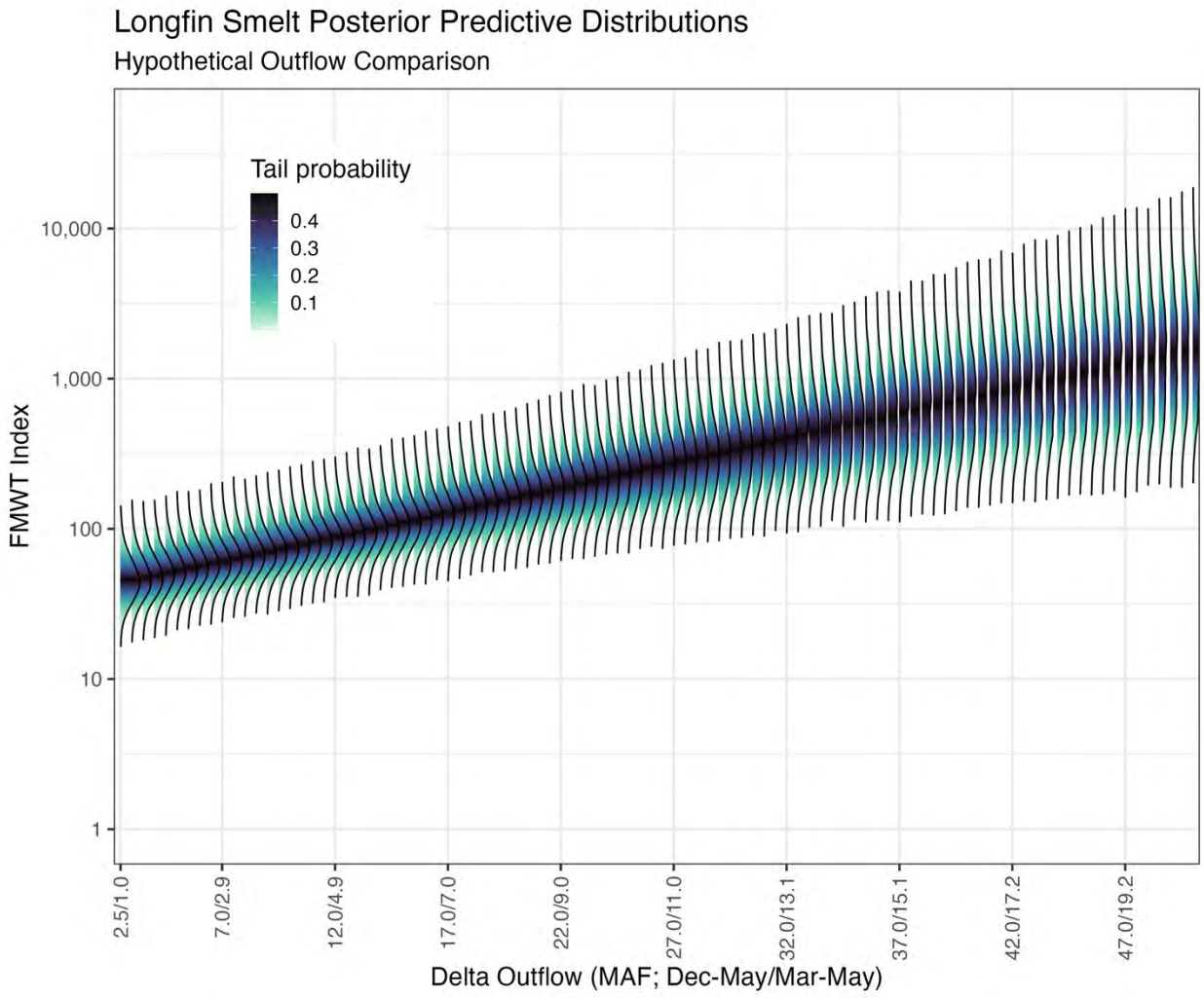



Figure J.1-7. Posterior predictive distributions for the FMWT index are shown as a function of hypothetical outflow levels. The hypothetical outflow levels are paired between the two monthly time periods considered. The paired (Dec-May / Mar-May) values are based on the linear correlation of cumulative outflow values generated from the CalSim 3 runs. "MAF" denotes cumulative outflow across the monthly time periods in million acre-feet.

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Appendix L, Shasta Coldwater Pool Management

# Attachment L.4 Sacramento River Redd Dewatering Analysis

## L.4.1 Model Overview

Redd dewatering for salmon and steelhead occurs when the water level drops below the depth of an existing redd or drops low enough to cause lethal conditions for incubating eggs or alevins within the redd. Redd dewatering can occur at any time between the start of spawning to the final emergence of alevins from the redd. Fluctuations in flow during this period increase the probability of redd dewatering because higher flows could lead to redd placement in areas that subsequently may be dewatered when flows drop.

The redd dewatering analyses for the Sacramento River are based on the maximum reduction in flow from the initial flow, or *spawning flow*, that occurs over the duration of an egg cohort. The duration of a cohort in a redd includes egg incubation and alevin development to emergence from the gravel. Based on technical assistance from the National Marine Fisheries Service (NMFS), cohort duration was estimated as three months for the four Sacramento River Chinook salmon races (fall-run, spring-run, winter-run, and late fall–run) and steelhead. The minimum flow during the egg cohort period is referred to herein as the *dewatering flow*. If flows during the three months after spawning are all greater than the spawning flow, no dewatering is assumed to occur. This analysis uses the flow results from Upper Sacramento River Daily Operations Model (USRDOM). The model has a daily time-step and the redd dewatering analysis assumes a new egg cohort begins each day of the spawning period. The redd dewatering period is assumed to end 90 days (three months) after the end of the spawning period. The results of the analysis are expressed as the percentage of redds dewatered. Therefore, the dewatering results provide relative rather than absolute estimates of numbers of redds dewatered, which can provide some comparison between alternatives.

## L.4.2 Model Development

### L.4.2.1 Methods

The percentage of redds in the Sacramento River lost to dewatering was estimated using U.S. Fish and Wildlife Service (USFWS) (2006) tables that relate spawning and dewatering flows to percent reductions in species- or race-specific spawning habitat weighted usable area (WUA). These tables are reproduced in Table L.4-1 through Table L.4-8. USFWS (2006) developed the dewatering tables for winter-run, fall-run, and late fall–run Chinook salmon and steelhead but not for spring-run Chinook salmon because data on spring-run redds were insufficient to develop spring-run spawning WUA curves. Therefore, as was done for the WUA curves (see Attachment O.3, *Sacramento River Weighted Usable Area*), the fall-run salmon results were used to estimate spring-run redd dewatering, but flows for the spring-run spawning distribution (Table L.4-9) and spawning period (Table L.4-10) were used to look up the percent of spring-run redds dewatered. The validity of substituting the fall-run tables for spring-run is discussed below in Assumptions/Uncertainty. Separate tables were developed for periods when the Anderson-Cottonwood Irrigation District (ACID) Dam boards are installed (April through October) and for when the boards are out because installation of the boards affects water levels for some of the sampling transects used to produce the tables.

Table L.4-9 gives the spawning distributions of Chinook salmon in the Sacramento River as estimated from aerial redd surveys conducted by the California Department of Fish and Wildlife (CDFW) from 2006 through 2021 (CDFW unpublished data). The field studies used for the U.S. Fish and Wildlife Service (2006) study were conducted in the Sacramento River between Keswick Dam and Battle Creek at the same locations as the spawning WUA studies discussed in Attachment O.3, *Sacramento River Weighted Usable Area*. USRDOM flow data are available for three locations in the river section from Keswick Dam to Battle Creek: Keswick Dam (River Mile [RM] 302), the Sacramento River at Clear Creek (RM 289), and the Sacramento River at Battle Creek (RM 271). A single relationship between flows and redd dewatering was developed for the entire river section, but the flows used to estimate redd dewatering in the current analysis were those that best matched the longitudinal distribution of the redds of the different salmon runs in the river (Table L.4-9). The redd distributions of steelhead in the Sacramento River are poorly known but are expected to be similar to those of spring-run (U.S. Fish and Wildlife Service 2003). Therefore, Keswick Dam flows were used for the winter-run and late fall–run analyses, Sacramento River at Clear Creek flows were used for spring-run and steelhead, and Sacramento River at Battle Creek flows were used for fall-run.

Table L.4-1. Percent Redd Dewatered Look-up Table for Winter-Run Chinook Salmon with ACID Dam Boards Out (the percent of redds dewatered are looked up at the intersection of the "Spawning Flow" columns and "Dewatering Flow" rows)

| Spawning Flow/ Dewatering Flow | 3,500 | 3,750 | 4,000 | 4,250 | 4,500 | 4,750 | 5,000 | 5,250 | 5,500 | 6,000 | 6,500 | 7,000 | 7,500 | 8,000 | 9,000 | 10,000 | 11,000 | 12,000 | 13,000 | 14,000 | 15,000 | 17,000 | 19,000 | 21,000 | 23,000 | 25,000 | 27,000 | 29,000 | 31,000 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **3,250** | 0.8 | 1.5 | 2.2 | 3 | 3.9 | 4.9 | 5.8 | 7 | 8.2 | 11 | 13.8 | 16.7 | 19.7 | 22.6 | 28.8 | 34.8 | 39.4 | 43.2 | 46.2 | 49.1 | 51.4 | 55 | 57.6 | 59.9 | 62.6 | 64.7 | 68.9 | 73.3 | 77.3 |
| **3,500** | - | 0.6 | 1 | 1.4 | 2 | 2.7 | 3.4 | 4.2 | 5.1 | 7.2 | 9.5 | 12.1 | 14.7 | 17.4 | 23.4 | 29.5 | 34.3 | 38.3 | 41.5 | 44.6 | 47.1 | 51 | 53.6 | 56.1 | 58.8 | 61.1 | 65.4 | 70.2 | 74.5 |
| **3,750** | - | - | 0.2 | 0.5 | 0.8 | 1.2 | 1.6 | 2.1 | 2.8 | 4.3 | 6.1 | 8.3 | 10.6 | 13.1 | 18.9 | 25.1 | 30 | 34.1 | 37.5 | 40.6 | 43.2 | 47.2 | 50 | 52.5 | 55.4 | 57.7 | 62.3 | 67.4 | 72 |
| **4,000** | - | - | - | 0.2 | 0.4 | 0.7 | 1 | 1.4 | 2 | 3.2 | 4.7 | 7.6 | 8.9 | 11.3 | 16.9 | 23.1 | 27.9 | 32.1 | 35.5 | 38.6 | 41.2 | 45.4 | 48.2 | 50.7 | 53.6 | 56.1 | 60.8 | 66.1 | 70.8 |
| **4,250** | - | - | - | - | 0.1 | 0.3 | 0.5 | 0.8 | 1.2 | 2.2 | 3.4 | 5.9 | 7 | 9.1 | 14.3 | 20.3 | 25 | 29.1 | 32.5 | 35.5 | 38.2 | 42.4 | 45.3 | 47.8 | 50.8 | 53.4 | 58.3 | 63.8 | 68.8 |
| **4,500** | - | - | - | - | - | 0.2 | 0.3 | 0.6 | 0.8 | 1.7 | 2.6 | 3.9 | 5.5 | 7.6 | 12.2 | 17.8 | 22.3 | 26.3 | 29.6 | 32.6 | 35.3 | 39.6 | 42.5 | 45.1 | 48.2 | 51 | 56 | 61.7 | 66.9 |
| **4,750** | - | - | - | - | - | - | 0.1 | 0.3 | 0.5 | 1.2 | 1.9 | 2.9 | 4.3 | 5.8 | 10.2 | 15.5 | 19.8 | 23.7 | 26.9 | 29.9 | 32.7 | 37 | 40 | 42.7 | 45.9 | 48.8 | 54 | 59.9 | 65.4 |
| **5,000** | - | - | - | - | - | - | - | 0.2 | 0.4 | 0.9 | 1.5 | 2.4 | 3.5 | 4.8 | 8.7 | 13.8 | 17.9 | 21.6 | 24.7 | 27.7 | 30.4 | 34.8 | 37.9 | 40.6 | 43.8 | 44.1 | 52.3 | 58.4 | 64.1 |
| **5,250** | - | - | - | - | - | - | - | - | 0.2 | 0.6 | 1.1 | 1.8 | 2.7 | 3.8 | 7 | 11.8 | 15.7 | 19.4 | 22.4 | 25.4 | 28.2 | 32.7 | 35.8 | 38.6 | 41.9 | 45.2 | 50.7 | 57 | 62.8 |
| **5,500** | - | - | - | - | - | - | - | - | - | 0.3 | 0.8 | 1.4 | 2.1 | 3 | 5.8 | 10.3 | 14.1 | 17.6 | 20.6 | 23.5 | 26.2 | 30.7 | 33.9 | 36.8 | 40.1 | 43.5 | 49 | 55.5 | 61.5 |
| **6,000** | - | - | - | - | - | - | - | - | - | - | 0.2 | 0.6 | 1.1 | 1.7 | 3.7 | 7.7 | 10.9 | 14 | 16.7 | 19.4 | 22 | 26.4 | 29.6 | 32.6 | 35.9 | 39.6 | 45.4 | 52.2 | 58.5 |
| **6,500** | - | - | - | - | - | - | - | - | - | - | - | 0.1 | 0.4 | 0.8 | 2.2 | 5.5 | 8.4 | 11.2 | 13.6 | 16.2 | 18.8 | 23.1 | 26.2 | 29.3 | 32.7 | 36.5 | 42.6 | 49.7 | 56.4 |
| **7,000** | - | - | - | - | - | - | - | - | - | - | - | - | 0.2 | 0.4 | 1.2 | 3.5 | 5.6 | 7.9 | 10.1 | 12.4 | 14.8 | 19 | 22.3 | 25.6 | 29.2 | 33.3 | 39.7 | 47.2 | 54.1 |
| **7,500** | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.2 | 0.7 | 2.6 | 4.3 | 6.3 | 8.1 | 10.2 | 12.4 | 16.3 | 19.7 | 23 | 26.7 | 31 | 37.6 | 45.3 | 52.5 |
| **8,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.3 | 1.9 | 3.2 | 4.9 | 6.6 | 8.6 | 10.5 | 14.3 | 17.7 | 21.1 | 25 | 29.3 | 36.1 | 44.1 | 51.4 |
| **9,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1.2 | 1.8 | 3 | 4.4 | 6 | 7.8 | 11.4 | 14.7 | 18.3 | 22.1 | 26.6 | 33.6 | 41.9 | 49.5 |
| **10,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.4 | 1.3 | 2.3 | 3.7 | 5.3 | 8.6 | 11.8 | 15.4 | 19.3 | 23.8 | 30.6 | 39.7 | 47.5 |
| **11,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.6 | 1.2 | 2.2 | 3.5 | 6.4 | 9.5 | 13.2 | 17.1 | 21.7 | 28.5 | 37.6 | 45.6 |
| **12,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.2 | 0.9 | 1.8 | 4.1 | 7 | 10.5 | 14.7 | 19.3 | 26.3 | 35.7 | 43.8 |
| **13,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.4 | 1 | 2.8 | 5.3 | 8.7 | 13 | 17.5 | 24.5 | 34 | 42.3 |
| **14,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.4 | 1.6 | 4.2 | 7.5 | 11.8 | 16.2 | 23 | 32.6 | 41 |
| **15,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.9 | 2.8 | 5.9 | 10.6 | 14.9 | 21.8 | 31.5 | 40.1 |
| **17,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1.3 | 3.9 | 7.8 | 11.8 | 18.3 | 28.1 | 36.9 |
| **19,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1.4 | 4 | 7.1 | 13 | 22.5 | 31.7 |
| **21,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1.3 | 3.6 | 9.2 | 18.7 | 28 |
| **23,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1.4 | 6.2 | 15.4 | 24.6 |
| **25,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | 8.3 | 15.2 |
| **27,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1.6 | 3.6 |
| **29,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.6 |

Table L.4-2. Percent Redd Dewatered Look-up Table for Winter-Run Chinook Salmon with ACID Dam Boards In (the percent of redds dewatered are looked up at the intersection of the "Spawning Flow" columns and "Dewatering Flow" rows)

| Spawning Flow/ Dewatering Flow | 3,500 | 3,750 | 4,000 | 4,250 | 4,500 | 4,750 | 5,000 | 5,250 | 5,500 | 6,000 | 6,500 | 7,000 | 7,500 | 8,000 | 9,000 | 10,000 | 11,000 | 12,000 | 13,000 | 14,000 | 15,000 | 17,000 | 19,000 | 21,000 | 23,000 | 25,000 | 27,000 | 29,000 | 31,000 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **3,250** | 1.2 | 2.2 | 3.1 | 4.1 | 5.2 | 6.4 | 7.5 | 8.8 | 10.2 | 13 | 16 | 18.9 | 21.9 | 24.7 | 30.5 | 35.9 | 40.1 | 43.4 | 46 | 48.4 | 50.3 | 53.5 | 56 | 58.9 | 62.4 | 65.4 | 69.5 | 73.7 | 77.2 |
| **3,500** | - | 0.9 | 1.4 | 2 | 2.7 | 3.6 | 4.4 | 5.3 | 6.3 | 8.5 | 11 | 13.6 | 16.2 | 18.9 | 24.7 | 30.4 | 34.8 | 38.5 | 41.1 | 43.9 | 46.1 | 49.6 | 52.3 | 55.3 | 58.8 | 61.9 | 65.9 | 69.9 | 73.5 |
| **3,750** | - | - | 0.4 | 0.8 | 0.2 | 1.7 | 2.2 | 2.8 | 3.5 | 5.1 | 7 | 9.3 | 11.7 | 14.2 | 19.9 | 25.9 | 30.5 | 34.4 | 37.3 | 40 | 42.4 | 46.1 | 49 | 52.1 | 55.7 | 58.8 | 62.8 | 66.7 | 70.2 |
| **4,000** | - | - | - | 0.4 | 0.7 | 1.1 | 1.4 | 1.9 | 2.5 | 3.8 | 5.4 | 7.5 | 9.8 | 12.2 | 17.7 | 23.7 | 28.3 | 32.2 | 35.3 | 38 | 40.4 | 44.2 | 47.2 | 50.3 | 53.9 | 57 | 61.1 | 65 | 68.5 |
| **4,250** | - | - | - | - | 0.3 | 0.5 | 0.8 | 1.1 | 1.5 | 2.6 | 3.9 | 5.6 | 7.6 | 9.7 | 15 | 20.7 | 25.2 | 29.2 | 32.2 | 34.9 | 37.4 | 41.4 | 44.4 | 47.5 | 51.2 | 54.4 | 58.5 | 62.3 | 65.7 |
| **4,500** | - | - | - | - | - | 0.3 | 0.5 | 0.8 | 1.1 | 1.9 | 2.9 | 4.3 | 5.9 | 7.9 | 12.6 | 18.1 | 22.4 | 26.3 | 29.3 | 32 | 34.6 | 38.6 | 41.7 | 45 | 48.7 | 52 | 56 | 59.8 | 63.2 |
| **4,750** | - | - | - | - | - | - | 0.2 | 0.4 | 0.7 | 1.3 | 2.1 | 3.1 | 4.5 | 6.1 | 10.5 | 15.7 | 20 | 23.7 | 26.7 | 29.5 | 32.1 | 36.3 | 39.5 | 42.8 | 46.6 | 49.9 | 53.9 | 57.6 | 61.1 |
| **5,000** | - | - | - | - | - | - | - | 0.3 | 0.5 | 1 | 1.6 | 2.5 | 3.7 | 5 | 9 | 14 | 18.1 | 21.7 | 24.6 | 27.4 | 29.9 | 34.2 | 37.4 | 40.8 | 44.6 | 48 | 51.9 | 55.7 | 59.1 |
| **5,250** | - | - | - | - | - | - | - | - | 0.3 | 0.7 | 1.2 | 1.9 | 2.9 | 3.9 | 7.3 | 11.9 | 15.9 | 19.5 | 22.5 | 25.2 | 27.9 | 32.2 | 35.6 | 39 | 42.8 | 46.4 | 50.3 | 54.1 | 57.5 |
| **5,500** | - | - | - | - | - | - | - | - | - | 0.4 | 0.9 | 1.5 | 2.3 | 3.2 | 6.1 | 10.5 | 14.3 | 17.9 | 20.7 | 23.5 | 26.1 | 30.5 | 33.9 | 37.4 | 41.2 | 44.8 | 48.7 | 52.4 | 55.8 |
| **6,000** | - | - | - | - | - | - | - | - | - | - | 0.3 | 0.7 | 1.3 | 1.9 | 4 | 8 | 11.3 | 14.5 | 17.1 | 19.8 | 22.3 | 26.8 | 30.2 | 33.7 | 37.5 | 41.3 | 45.1 | 48.8 | 52.2 |
| **6,500** | - | - | - | - | - | - | - | - | - | - | - | 0.2 | 0.5 | 1 | 2.4 | 5.8 | 8.8 | 11.8 | 14.3 | 16.8 | 19.3 | 23.7 | 27.2 | 30.7 | 34.7 | 38.4 | 42.3 | 45.9 | 49.3 |
| **7,000** | - | - | - | - | - | - | - | - | - | - | - | - | 0.3 | 0.5 | 1.4 | 3.8 | 6.1 | 8.7 | 10.9 | 13.3 | 15.7 | 20.1 | 23.7 | 27.5 | 31.5 | 35.4 | 39.4 | 42.9 | 46.2 |
| **7,500** | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.3 | 0.9 | 2.9 | 4.8 | 7 | 9 | 11.2 | 13.5 | 17.7 | 21.4 | 25.2 | 29.3 | 33.2 | 37.2 | 40.7 | 44 |
| **8,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.4 | 2.1 | 3.7 | 5.7 | 7.6 | 9.7 | 11.8 | 15.9 | 19.6 | 23.5 | 27.7 | 31.6 | 35.7 | 39.1 | 42.4 |
| **9,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1.3 | 2.4 | 4 | 5.6 | 7.4 | 9.4 | 13.3 | 16.9 | 20.8 | 24.9 | 28.7 | 32.8 | 36.3 | 39.6 |
| **10,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.9 | 2.2 | 3.6 | 5.2 | 7 | 10.5 | 14 | 17.7 | 18.6 | 25.4 | 28.9 | 32.6 | 35.8 |
| **11,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1.1 | 2 | 3.1 | 4.6 | 7.6 | 10.5 | 13.8 | 17.4 | 20.6 | 23.5 | 26.7 | 29.4 |
| **12,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.5 | 1.2 | 2.2 | 4.2 | 6.4 | 9.1 | 12.1 | 14.6 | 16.8 | 19.1 | 21.1 |
| **13,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.5 | 1.1 | 2.6 | 4.4 | 6.7 | 9.2 | 11.7 | 13.5 | 15.3 | 17 |
| **14,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.5 | 1.7 | 3.5 | 5.5 | 8.2 | 10.1 | 11.7 | 13.4 | 14.9 |
| **15,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.7 | 2.1 | 3.9 | 6.8 | 8.6 | 10.1 | 11.6 | 13 |
| **17,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.9 | 2.5 | 4.9 | 6.5 | 7.7 | 9.1 | 10.4 |
| **19,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1 | 2.5 | 3.6 | 4.4 | 5.5 | 6.6 |
| **21,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.9 | 1.6 | 2.1 | 3 | 4 |
| **23,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.4 | 0.6 | 1.1 | 1.9 |
| **25,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.3 | 0.9 | 1.6 |
| **27,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.3 | 0.7 |
| **29,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.3 |

Table L.4-3. Percent Redd Dewatered Look-up Table for Fall-Run Chinook Salmon (Also Used for the Spring-Run Chinook Salmon Analysis) with ACID Dam Boards Out (the percent of redds dewatered are looked up at the intersection of the "Spawning Flow" columns and "Dewatering Flow" rows)

| Spawning Flow/ Dewatering Flow | 3,500 | 3,750 | 4,000 | 4,250 | 4,500 | 4,750 | 5,000 | 5,250 | 5,500 | 6,000 | 6,500 | 7,000 | 7,500 | 8,000 | 9,000 | 10,000 | 11,000 | 12,000 | 13,000 | 14,000 | 15,000 | 17,000 | 19,000 | 21,000 | 23,000 | 25,000 | 27,000 | 29,000 | 31,000 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **3,250** | 1 | 2 | 3.4 | 4.8 | 6.6 | 8.4 | 10.6 | 12.9 | 15.3 | 20.6 | 26.2 | 31.7 | 37 | 41.5 | 50.2 | 56.3 | 60.4 | 62.9 | 63.7 | 65.3 | 66.4 | 66.8 | 65.7 | 67.8 | 71.3 | 74.5 | 80.4 | 87.3 | 92 |
| **3,500** | - | 1 | 2.1 | 3.2 | 4.6 | 6.2 | 8.1 | 10.1 | 12.2 | 17 | 22.2 | 27.4 | 29.2 | 37 | 45.9 | 52.8 | 57.3 | 60.1 | 61.1 | 63 | 64.2 | 64.9 | 63.8 | 66 | 69.5 | 73 | 79.1 | 86.2 | 91 |
| **3,750** | - | - | 0.9 | 1.6 | 2.6 | 3.9 | 5.5 | 7.3 | 9.2 | 13.6 | 18.4 | 23.1 | 28 | 32.4 | 41.5 | 48.7 | 53.6 | 56.9 | 58.3 | 60.3 | 61.8 | 62.7 | 61.7 | 64 | 67.7 | 71.4 | 77.7 | 84.9 | 89.6 |
| **4,000** | - | - | - | 0.9 | 1.7 | 2.8 | 4.1 | 5.7 | 7.3 | 11.4 | 15.8 | 20.3 | 24.8 | 29 | 38 | 45.7 | 50.7 | 54.3 | 55.9 | 58.2 | 59.9 | 61.2 | 60.2 | 62.7 | 66.5 | 70.4 | 77.1 | 84.1 | 88.8 |
| **4,250** | - | - | - | - | 0.8 | 1.6 | 2.7 | 4 | 5.4 | 8.9 | 13 | 17.2 | 21.6 | 25.8 | 34.9 | 42.8 | 48 | 51.8 | 53.6 | 56 | 58.1 | 59.6 | 58.8 | 61.3 | 65 | 68.5 | 75.7 | 83.1 | 87.8 |
| **4,500** | - | - | - | - | - | 0.8 | 1.7 | 2.8 | 4 | 6.9 | 10.4 | 14.2 | 18.2 | 22.1 | 30.9 | 38.8 | 44.2 | 48.3 | 50.2 | 52.8 | 55.1 | 57.1 | 56.4 | 59 | 62.7 | 66.2 | 73.3 | 81.8 | 86.5 |
| **4,750** | - | - | - | - | - | - | 0.8 | 1.6 | 2.5 | 4.8 | 7.6 | 10.8 | 14.2 | 17.6 | 25.8 | 33.2 | 38.8 | 43.3 | 45.6 | 48.6 | 51.4 | 54 | 53.7 | 56.6 | 60.4 | 64.5 | 71.7 | 80.3 | 85 |
| **5,000** | - | - | - | - | - | - | - | 0.7 | 1.3 | 3.2 | 5.6 | 8.6 | 11.6 | 14.7 | 22.6 | 30.2 | 36 | 40.6 | 43 | 46.1 | 49.1 | 52.2 | 52.2 | 55.2 | 59.1 | 63.3 | 70.6 | 79.4 | 84.1 |
| **5,250** | - | - | - | - | - | - | - | - | 0.7 | 2.1 | 4.2 | 6.8 | 9.4 | 12.3 | 19.8 | 27.2 | 33.1 | 37.7 | 40.2 | 43.5 | 46.5 | 50 | 50.2 | 53.5 | 57.4 | 60.7 | 68 | 78.2 | 83 |
| **5,500** | - | - | - | - | - | - | - | - | - | 1.4 | 3.2 | 5.4 | 7.7 | 10.3 | 17.6 | 24.9 | 31 | 35.8 | 38.4 | 41.7 | 44.8 | 48.3 | 48.8 | 52.3 | 56.1 | 60.1 | 67.5 | 77.3 | 82 |
| **6,000** | - | - | - | - | - | - | - | - | - | - | 1.2 | 2.8 | 4.6 | 6.4 | 12.9 | 19.7 | 25.8 | 30.9 | 33.8 | 37.3 | 40.6 | 45 | 45.8 | 49.5 | 53.2 | 57.2 | 65 | 75.4 | 80 |
| **6,500** | - | - | - | - | - | - | - | - | - | - | - | 1.3 | 2.6 | 4.2 | 9.8 | 15.6 | 21.1 | 26.5 | 29.2 | 32.7 | 36.1 | 41 | 42.4 | 46.5 | 50.4 | 54.8 | 63 | 73.3 | 77.7 |
| **7,000** | - | - | - | - | - | - | - | - | - | - | - | - | 0.9 | 2 | 6.6 | 11.8 | 17.3 | 22.8 | 25.8 | 29.3 | 32.9 | 38.3 | 40 | 44.4 | 48.3 | 52.9 | 61.3 | 71.8 | 76.1 |
| **7,500** | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.8 | 4.4 | 9.1 | 14.1 | 20 | 23.2 | 26.9 | 30.7 | 36.4 | 38.2 | 42.8 | 46.8 | 51.9 | 60.5 | 70.9 | 75.3 |
| **8,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 2.6 | 6.6 | 11.5 | 17.2 | 20.9 | 24.9 | 28.9 | 34.9 | 36.6 | 41.3 | 45.4 | 50.5 | 59.3 | 70.2 | 74.7 |
| **9,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 2.2 | 5.5 | 10.6 | 14.4 | 18.4 | 22.5 | 29.2 | 31.9 | 37.4 | 41.8 | 47.7 | 57 | 68.2 | 72.6 |
| **10,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.9 | 4.5 | 7.7 | 12 | 16.4 | 23.5 | 26.9 | 33 | 38.5 | 44.5 | 54.1 | 65.9 | 70.5 |
| **11,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 2.7 | 5.3 | 9 | 13.6 | 21.4 | 24.8 | 30.2 | 35.3 | 41.8 | 51.6 | 63.7 | 68.4 |
| **12,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1.6 | 4.7 | 9 | 16.8 | 20.6 | 27 | 32.9 | 39.8 | 50 | 62.3 | 67.2 |
| **13,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1.6 | 4.8 | 12.2 | 16.9 | 24.4 | 31.3 | 38.1 | 48.4 | 60.8 | 65.9 |
| **14,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 2.6 | 9.5 | 14.8 | 22.1 | 28.9 | 36.2 | 46.8 | 59.5 | 64.7 |
| **15,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 5.3 | 11.1 | 18.5 | 26.2 | 33.5 | 44.6 | 57.6 | 63.1 |
| **17,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 4.1 | 11.3 | 18.5 | 26.1 | 37.8 | 51.5 | 57.9 |
| **19,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 4.6 | 10.8 | 18.8 | 30.4 | 44.2 | 51.1 |
| **21,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 4.2 | 11.7 | 23.9 | 38.4 | 46.3 |
| **23,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 6.7 | 17.8 | 31.2 | 38.9 |
| **25,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 2.3 | 6.4 | 10.7 |
| **27,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1.8 | 5.3 |
| **29,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 2.2 |

Table L.4-4. Percent Redd Dewatered Look-up Table for Fall-Run Chinook Salmon (Also Used for the Spring-Run Chinook Salmon Analysis) with ACID Dam Boards In (the percent of redds dewatered are looked up at the intersection of the "Spawning Flow" columns and "Dewatering Flow" rows)

| Spawning Flow/ Dewatering Flow | 3,500 | 3,750 | 4,000 | 4,250 | 4,500 | 4,750 | 5,000 | 5,250 | 5,500 | 6,000 | 6,500 | 7,000 | 7,500 | 8,000 | 9,000 | 10,000 | 11,000 | 12,000 | 13,000 | 14,000 | 15,000 | 17,000 | 19,000 | 21,000 | 23,000 | 25,000 | 27,000 | 29,000 | 31,000 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **3,250** | 1.0 | 2.0 | 3.3 | 4.7 | 6.2 | 7.8 | 9.7 | 11.7 | 13.6 | 17.8 | 22.2 | 26.3 | 30.2 | 33.4 | 39.5 | 43.5 | 46.0 | 47.6 | 48.0 | 49.3 | 50.5 | 52.0 | 52.5 | 55.1 | 57.6 | 57.4 | 59.0 | 61.1 | 63.3 |
| **3,500** | - | 1.0 | 2.0 | 3.1 | 4.4 | 5.7 | 7.4 | 9.2 | 10.9 | 14.8 | 18.8 | 22.8 | 23.9 | 29.8 | 36.2 | 40.8 | 43.6 | 45.5 | 46.0 | 47.4 | 48.8 | 50.4 | 50.8 | 53.4 | 55.9 | 55.7 | 57.2 | 59.3 | 61.6 |
| **3,750** | - | - | 0.9 | 1.6 | 2.5 | 3.6 | 5.1 | 6.7 | 8.3 | 11.9 | 15.6 | 19.3 | 23.0 | 26.2 | 32.8 | 37.7 | 40.9 | 43.1 | 43.9 | 45.5 | 47.0 | 48.7 | 49.1 | 51.8 | 54.3 | 54.1 | 55.6 | 57.6 | 59.8 |
| **4,000** | - | - | - | 0.9 | 1.7 | 2.6 | 3.8 | 5.3 | 6.6 | 10.0 | 13.5 | 16.9 | 20.4 | 23.5 | 30.1 | 35.4 | 38.7 | 41.2 | 42.2 | 43.8 | 45.5 | 47.5 | 47.9 | 50.5 | 53.1 | 52.9 | 54.5 | 56.3 | 58.5 |
| **4,250** | - | - | - | - | 0.8 | 1.5 | 2.5 | 3.7 | 5.0 | 7.8 | 11.1 | 14.4 | 17.8 | 20.9 | 27.5 | 33.1 | 36.6 | 39.2 | 4.0 | 42.1 | 43.9 | 46.0 | 46.4 | 49.0 | 51.3 | 50.8 | 52.5 | 54.4 | 56.5 |
| **4,500** | - | - | - | - | - | 0.8 | 1.6 | 2.6 | 3.7 | 6.0 | 8.9 | 11.9 | 15.0 | 17.8 | 24.4 | 29.9 | 33.6 | 36.4 | 37.6 | 39.4 | 41.4 | 43.6 | 43.9 | 46.4 | 48.7 | 47.8 | 49.1 | 51.6 | 53.7 |
| **4,750** | - | - | - | - | - | - | 0.8 | 1.6 | 2.4 | 4.3 | 6.6 | 9.1 | 11.8 | 14.3 | 20.3 | 25.7 | 29.5 | 32.6 | 34.0 | 36.1 | 38.3 | 40.8 | 41.1 | 43.6 | 45.7 | 44.9 | 46.0 | 48.3 | 50.3 |
| **5,000** | - | - | - | - | - | - | - | 0.7 | 1.3 | 2.9 | 4.9 | 7.2 | 9.6 | 11.9 | 17.7 | 23.1 | 26.9 | 30.0 | 31.2 | 33.2 | 35.3 | 37.6 | 37.6 | 39.8 | 41.7 | 40.5 | 41.3 | 43.2 | 45.1 |
| **5,250** | - | - | - | - | - | - | - | - | 0.6 | 1.9 | 3.5 | 5.6 | 7.7 | 9.7 | 15.3 | 20.4 | 24.1 | 27.1 | 28.2 | 29.9 | 31.8 | 33.9 | 33.5 | 35.4 | 36.8 | 34.6 | 35.0 | 37.4 | 39.0 |
| **5,500** | - | - | - | - | - | - | - | - | - | 1.2 | 2.7 | 4.4 | 6.2 | 8.1 | 13.5 | 18.5 | 22.3 | 25.3 | 26.4 | 28.0 | 29.7 | 31.5 | 31.0 | 32.7 | 33.8 | 31.7 | 31.9 | 33.6 | 35.1 |
| **6,000** | - | - | - | - | - | - | - | - | - |  | 1.0 | 2.3 | 3.7 | 5.1 | 9.8 | 14.5 | 18.3 | 21.5 | 22.7 | 24.4 | 26.2 | 28.2 | 27.5 | 29.0 | 29.8 | 27.1 | 27.1 | 28.7 | 29.8 |
| **6,500** | - | - | - | - | - | - | - | - | - | - | - | 1.1 | 2.1 | 3.3 | 7.4 | 11.5 | 15.0 | 18.3 | 19.5 | 21.1 | 23.0 | 25.2 | 24.7 | 26.4 | 27.1 | 24.4 | 24.2 | 25.3 | 26.3 |
| **7,000** | - | - | - | - | - | - | - | - | - | - | - | - | 0.7 | 1.6 | 5.0 | 8.6 | 12.1 | 15.6 | 17.0 | 18.7 | 20.7 | 23.2 | 22.8 | 24.5 | 25.1 | 22.4 | 22.1 | 23.2 | 24.0 |
| **7,500** | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.6 | 3.4 | 6.7 | 9.9 | 13.7 | 15.3 | 17.1 | 19.3 | 21.9 | 21.5 | 23.3 | 23.9 | 21.3 | 21.0 | 21.9 | 22.7 |
| **8,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 2.0 | 4.9 | 8.1 | 11.8 | 13.7 | 15.7 | 17.9 | 20.7 | 20.2 | 21.9 | 22.4 | 19.8 | 19.4 | 20.5 | 21.4 |
| **9,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1.6 | 3.8 | 7.2 | 9.2 | 11.3 | 13.6 | 16.8 | 16.8 | 18.9 | 19.6 | 17.2 | 16.8 | 17.9 | 18.5 |
| **10,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1.2 | 3.0 | 4.9 | 7.2 | 9.8 | 13.3 | 13.8 | 16.2 | 17.4 | 14.9 | 14.5 | 15.9 | 16.7 |
| **11,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1.9 | 3.4 | 5.4 | 8.2 | 12.1 | 12.2 | 14.5 | 15.6 | 13.3 | 12.8 | 14.1 | 15.0 |
| **12,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1.0 | 2.8 | 5.4 | 9.4 | 10.0 | 12.5 | 14.0 | 11.9 | 11.5 | 12.9 | 13.9 |
| **13,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1.0 | 3.0 | 6.9 | 8.1 | 11.1 | 13.1 | 11.0 | 10.7 | 12.1 | 13.1 |
| **14,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1.8 | 5.4 | 7.0 | 9.8 | 11.8 | 10.0 | 9.9 | 11.4 | 12.4 |
| **15,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 2.8 | 4.8 | 7.7 | 10.2 | 8.6 | 8.7 | 10.4 | 11.5 |
| **17,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1.8 | 5.0 | 7.5 | 6.5 | 6.8 | 8.5 | 10.0 |
| **19,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 2.3 | 4.8 | 4.6 | 5.0 | 6.9 | 8.4 |
| **21,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1.9 | 2.0 | 2.6 | 4.7 | 6.6 |
| **23,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.7 | 1.6 | 3.6 | 5.7 |
| **25,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1.2 | 3.0 | 5.0 |
| **27,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1.2 | 3.3 |
| **29,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1.5 |

Table L.4-5. Percent Redd Dewatered Look-up Table for Late Fall–Run Chinook Salmon with ACID Dam Boards Out (the percent of redds dewatered are looked up at the intersection of the "Spawning Flow" columns and "Dewatering Flow" rows)

| Spawning Flow/ Dewatering Flow | 3,500 | 3,750 | 4,000 | 4,250 | 4,500 | 4,750 | 5,000 | 5,250 | 5,500 | 6,000 | 6,500 | 7,000 | 7,500 | 8,000 | 9,000 | 10,000 | 11,000 | 12,000 | 13,000 | 14,000 | 15,000 | 17,000 | 19,000 | 21,000 | 23,000 | 25,000 | 27,000 | 29,000 | 31,000 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **3,250** | 0.9 | 1.5 | 2.6 | 3.6 | 4.9 | 6.3 | 8 | 9.8 | 11.7 | 15.9 | 20.1 | 24.1 | 28 | 31.5 | 37.8 | 42.7 | 45.6 | 47.8 | 48.9 | 50.6 | 52.6 | 55.5 | 57.5 | 61.6 | 67.3 | 73.5 | 79.8 | 86.6 | 91.1 |
| **3,500** | - | 0.9 | 1.6 | 2.4 | 3.4 | 4.5 | 6 | 7.6 | 9.3 | 13.1 | 17.1 | 21 | 24.9 | 28.2 | 35 | 40.2 | 43.3 | 45.6 | 46.8 | 48.6 | 50.7 | 53.6 | 55.5 | 59.6 | 65.4 | 71.5 | 78.3 | 85.4 | 90.1 |
| **3,750** | - | - | 0.8 | 1.1 | 2 | 2.9 | 4.1 | 5.5 | 7 | 10.5 | 14.2 | 17.8 | 21.6 | 25 | 32 | 37.5 | 40.7 | 43.3 | 44.6 | 46.5 | 48.6 | 51.5 | 53.3 | 57.4 | 63.3 | 69.6 | 76.6 | 83.9 | 88.5 |
| **4,000** | - | - | - | 0.7 | 1.2 | 2 | 3 | 4.2 | 5.5 | 8.8 | 12.1 | 15.6 | 19.2 | 22.5 | 29.5 | 35.3 | 38.7 | 41.5 | 42.8 | 44.8 | 46.9 | 49.9 | 51.8 | 55.9 | 61.8 | 68.3 | 75.6 | 82.9 | 87.6 |
| **4,250** | - | - | - | - | 0.6 | 1.1 | 1.9 | 3 | 4.1 | 6.9 | 10 | 13.4 | 16.9 | 20.1 | 27.3 | 33.3 | 36.8 | 39.7 | 41.1 | 43.1 | 45.3 | 48.4 | 50.2 | 54.3 | 60.2 | 66.6 | 74.2 | 81.7 | 86.5 |
| **4,500** | - | - | - | - | - | 0.6 | 1.2 | 2.1 | 3.1 | 5.5 | 8.3 | 11.3 | 14.6 | 17.7 | 24.8 | 30.8 | 34.5 | 37.5 | 38.9 | 41 | 43.3 | 46.5 | 48.3 | 52.4 | 58.1 | 64.5 | 72.2 | 80.2 | 85 |
| **4,750** | - | - | - | - | - | - | 0.6 | 1.3 | 2 | 4 | 6.3 | 9 | 11.8 | 14.7 | 21.5 | 27.6 | 31.5 | 34.6 | 36.6 | 38.5 | 40.9 | 44.2 | 46 | 50.1 | 55.3 | 62.4 | 70.2 | 78.4 | 83.3 |
| **5,000** | - | - | - | - | - | - | - | 0.5 | 1 | 2.6 | 4.6 | 7 | 9.6 | 12.2 | 18.9 | 25.2 | 29.3 | 32.6 | 34.3 | 36.7 | 39.1 | 42.6 | 44.5 | 48.6 | 54.2 | 60.8 | 68.9 | 77.3 | 82.3 |
| **5,250** | - | - | - | - | - | - | - | - | 0.5 | 1.8 | 3.5 | 5.6 | 7.9 | 10.4 | 16.9 | 23.1 | 27.4 | 30.8 | 32.5 | 34.9 | 37.5 | 41.1 | 42.9 | 47 | 52.6 | 58.9 | 67 | 76 | 81.1 |
| **5,500** | - | - | - | - | - | - | - | - | - | 1.3 | 2.7 | 4.6 | 6.7 | 8.9 | 15.3 | 21.5 | 25.8 | 29.4 | 31.2 | 33.2 | 36.1 | 39.7 | 41.6 | 45.7 | 51.2 | 57.7 | 65.9 | 74.9 | 80 |
| **6,000** | - | - | - | - | - | - | - | - | - | - | 0.9 | 2.3 | 3.8 | 5.5 | 11.2 | 17.1 | 21.7 | 25.5 | 27.5 | 29.9 | 32.6 | 36.4 | 38.3 | 42.3 | 47.7 | 54.1 | 62.7 | 72.1 | 77.3 |
| **6,500** | - | - | - | - | - | - | - | - | - | - | - | 1 | 2.1 | 3.5 | 8.3 | 13.4 | 17.6 | 21.7 | 23.8 | 26.4 | 29.1 | 33.1 | 35.1 | 39.2 | 44.5 | 50.9 | 59.7 | 69.1 | 74 |
| **7,000** | - | - | - | - | - | - | - | - | - | - | - | - | 0.8 | 1.8 | 5.9 | 10.4 | 14.4 | 18.6 | 20.7 | 23.2 | 26.1 | 30.3 | 32.4 | 36.4 | 41.6 | 48 | 57 | 66.6 | 71.6 |
| **7,500** | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.7 | 3.9 | 7.9 | 11.5 | 16 | 18.4 | 21.1 | 24 | 28.3 | 30.4 | 34.5 | 39.6 | 46.3 | 55.4 | 65.2 | 70.3 |
| **8,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 2.2 | 5.5 | 8.9 | 13.3 | 16 | 18.9 | 21.9 | 26.3 | 28.3 | 32.5 | 37.6 | 44.3 | 53.7 | 63.7 | 69 |
| **9,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1.7 | 3.9 | 7.8 | 10.5 | 13.6 | 16.7 | 21.5 | 23.7 | 28.1 | 33.2 | 40.2 | 50 | 60.5 | 65.9 |
| **10,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1.2 | 3.1 | 5.6 | 8.8 | 12.1 | 17 | 19.6 | 24 | 29.8 | 36.7 | 46.7 | 57.4 | 62.9 |
| **11,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 2.3 | 4.1 | 6.7 | 10 | 15.2 | 17.4 | 21.8 | 26.9 | 34 | 44.2 | 55.1 | 60.7 |
| **12,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1.2 | 3.4 | 6.5 | 11.7 | 14.2 | 18.7 | 24.5 | 31.8 | 42.2 | 53.3 | 58.9 |
| **13,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1.1 | 3.4 | 8.3 | 11.3 | 16.2 | 22.7 | 29.9 | 40.3 | 51.5 | 57.2 |
| **14,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1.9 | 6.4 | 9.8 | 14.6 | 21.1 | 28.3 | 38.8 | 50.1 | 55.9 |
| **15,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 3.3 | 6.7 | 11.7 | 18.8 | 26 | 36.7 | 48.2 | 54.1 |
| **17,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 3.5 | 7 | 13.1 | 20.3 | 31.1 | 42.9 | 49.1 |
| **19,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 2.5 | 7.1 | 14.4 | 25.2 | 36.9 | 43.2 |
| **21,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 3.1 | 9.3 | 20 | 32.1 | 39.1 |
| **23,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 5.1 | 14.5 | 25.7 | 32.6 |
| **25,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1.8 | 5.2 | 9.4 |
| **27,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1.4 | 4.4 |
| **29,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1.6 |

Table L.4-6. Percent Redd Dewatered Look-up Table for Late Fall–Run Chinook Salmon with ACID Dam Boards In (the percent of redds dewatered are looked up at the intersection of the "Spawning Flow" columns and "Dewatering Flow" rows)

| Spawning Flow/ Dewatering Flow | 3,500 | 3,750 | 4,000 | 4,250 | 4,500 | 4,750 | 5,000 | 5,250 | 5,500 | 6,000 | 6,500 | 7,000 | 7,500 | 8,000 | 9,000 | 10,000 | 11,000 | 12,000 | 13,000 | 14,000 | 15,000 | 17,000 | 19,000 | 21,000 | 23,000 | 25,000 | 27,000 | 29,000 | 31,000 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **3,250** | 0.9 | 1.7 | 2.6 | 3.7 | 4.9 | 6.2 | 7.8 | 9.5 | 11.3 | 15.1 | 18.9 | 22.5 | 26 | 29.1 | 34.9 | 39.4 | 42.3 | 44.6 | 46 | 47.9 | 50.1 | 53.4 | 55.4 | 59.2 | 63.7 | 66.8 | 69.7 | 74.4 | 79.1 |
| **3,500** | - | 0.9 | 1.6 | 2.4 | 3.4 | 4.5 | 5.9 | 7.4 | 9 | 12.5 | 16.1 | 19.6 | 23.1 | 26.1 | 32.3 | 37.1 | 40.1 | 42.6 | 44 | 46 | 48.2 | 51.5 | 53.5 | 57.2 | 61.8 | 64.6 | 67.8 | 72.6 | 77.3 |
| **3,750** | - | - | 0.8 | 1.1 | 2 | 2.9 | 4.1 | 5.5 | 6.9 | 10.1 | 13.4 | 16.7 | 20.1 | 23.1 | 29.5 | 34.6 | 37.8 | 40.5 | 42 | 44 | 46.3 | 49.6 | 51.5 | 55.1 | 59.7 | 62.6 | 65.6 | 70.4 | 75.1 |
| **4,000** | - | - | - | 0.7 | 1.3 | 2 | 3 | 4.2 | 5.4 | 8.4 | 11.5 | 14.7 | 17.9 | 20.9 | 27.3 | 32.7 | 36 | 38.8 | 40.4 | 42.4 | 44.8 | 48.1 | 50 | 53.6 | 58.3 | 61.1 | 64.3 | 68.9 | 73.5 |
| **4,250** | - | - | - | - | 0.7 | 1.2 | 2 | 3 | 4.1 | 6.7 | 9.6 | 12.6 | 15.8 | 18.7 | 25.2 | 30.8 | 34.2 | 37.1 | 38.7 | 40.8 | 43.2 | 46.5 | 48.3 | 51.9 | 56.4 | 59 | 62.2 | 66.9 | 71.5 |
| **4,500** | - | - | - | - | - | 0.6 | 1.3 | 2.1 | 3.1 | 5.3 | 7.9 | 10.7 | 13.6 | 16.4 | 22.9 | 28.4 | 32 | 34.9 | 36.5 | 38.6 | 41.1 | 44.4 | 46.1 | 49.6 | 53.9 | 56.3 | 59.2 | 64.1 | 68.7 |
| **4,750** | - | - | - | - | - | - | 0.6 | 1.3 | 2.1 | 3.9 | 6 | 8.5 | 11.1 | 13.7 | 19.9 | 25.4 | 29.1 | 32.2 | 33.8 | 36 | 38.5 | 41.9 | 43.5 | 46.8 | 50.6 | 53.2 | 55.9 | 60.6 | 65.1 |
| **5,000** | - | - | - | - | - | - | - | 0.6 | 1.1 | 2.6 | 4.4 | 6.6 | 8.9 | 11.3 | 17.4 | 22.9 | 26.7 | 29.8 | 31.4 | 33.5 | 35.9 | 39.1 | 40.5 | 43.6 | 47.5 | 49.3 | 51.9 | 56.3 | 60.6 |
| **5,250** | - | - | - | - | - | - | - | - | 0.5 | 1.7 | 3.3 | 5.2 | 7.3 | 9.5 | 15.3 | 20.7 | 24.4 | 27.5 | 28.9 | 30.9 | 33.2 | 36.3 | 37.3 | 40.2 | 43.6 | 44.8 | 46.9 | 51.4 | 55.5 |
| **5,500** | - | - | - | - | - | - | - | - | - | 1.2 | 2.5 | 4.3 | 6.1 | 8.1 | 13.7 | 19.1 | 22.8 | 25.9 | 27.3 | 28.9 | 31.4 | 34.2 | 35.1 | 37.8 | 41 | 42.1 | 43.9 | 48 | 51.9 |
| **6,000** | - | - | - | - | - | - | - | - | - | - | 0.9 | 2.1 | 3.4 | 5 | 10 | 15.1 | 19 | 22.2 | 23.7 | 25.6 | 27.7 | 30.6 | 31.3 | 33.7 | 36.4 | 37 | 38.6 | 42.4 | 45.9 |
| **6,500** | - | - | - | - | - | - | - | - | - | - | - | 0.9 | 1.9 | 3.1 | 7.4 | 11.8 | 15.4 | 18.8 | 20.3 | 22.3 | 24.5 | 27.4 | 28.1 | 30.5 | 33 | 33.3 | 34.5 | 37.8 | 40.8 |
| **7,000** | - | - | - | - | - | - | - | - | - | - | - | - | 0.8 | 1.6 | 5.2 | 9.1 | 12.5 | 16 | 17.6 | 19.6 | 21.8 | 24.9 | 25.5 | 27.8 | 30.2 | 30.2 | 31.1 | 34.3 | 37.1 |
| **7,500** | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.7 | 3.5 | 6.9 | 9.9 | 13.7 | 15.5 | 17.6 | 20 | 23.1 | 23.8 | 26 | 28.3 | 28.4 | 29.2 | 32.2 | 35.2 |
| **8,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 2 | 4.9 | 7.7 | 11.4 | 13.5 | 15.7 | 18.1 | 21.3 | 21.8 | 24.1 | 26.3 | 26.2 | 27 | 30.1 | 33.1 |
| **9,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1.5 | 3.3 | 6.6 | 8.7 | 11.1 | 13.6 | 17 | 17.7 | 20.1 | 22.2 | 22.1 | 22.8 | 25.8 | 28.7 |
| **10,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |  | 1 | 2.7 | 4.6 | 7 | 9.8 | 13.3 | 14.3 | 16.7 | 19.3 | 19 | 19.4 | 22.3 | 25.1 |
| **11,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 2 | 3.4 | 5.4 | 8.1 | 12 | 12.6 | 16.6 | 17 | 16.7 | 17 | 19.9 | 22.6 |
| **12,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.9 | 2.7 | 5.3 | 9.1 | 10 | 12.3 | 15 | 14.7 | 14.9 | 17.7 | 20.5 |
| **13,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.9 | 2.8 | 6.5 | 7.8 | 10.4 | 13.7 | 13.3 | 13.6 | 16.3 | 19 |
| **14,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1.7 | 5.1 | 6.7 | 9.2 | 12.4 | 12.1 | 12.4 | 15 | 17.7 |
| **15,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 2.5 | 4.2 | 6.9 | 10.6 | 10.3 | 10.8 | 13.3 | 16 |
| **17,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 2.4 | 4.3 | 7.5 | 7.7 | 8.2 | 10.6 | 13.2 |
| **19,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1.7 | 4.2 | 5.1 | 5.8 | 8.1 | 10.5 |
| **21,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 2 | 2.7 | 3.5 | 5.8 | 8.4 |
| **23,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1.1 | 2.1 | 4.3 | 7.4 |
| **25,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1.3 | 3.4 | 6.4 |
| **27,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1.3 | 4 |
| **29,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1.5 |

Table L.4-7. Percent Redd Dewatered Look-up Table for CCV Steelhead with ACID Dam Boards Out (the percent of redds dewatered are looked up at the intersection of the "Spawning Flow" columns and "Dewatering Flow" rows)

| Spawning Flow/ Dewatering Flow | 3,500 | 3,750 | 4,000 | 4,250 | 4,500 | 4,750 | 5,000 | 5,250 | 5,500 | 6,000 | 6,500 | 7,000 | 7,500 | 8,000 | 9,000 | 10,000 | 11,000 | 12,000 | 13,000 | 14,000 | 15,000 | 17,000 | 19,000 | 21,000 | 23,000 | 25,000 | 27,000 | 29,000 | 31,000 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **3,250** | 1.2 | 2.6 | 3.7 | 4.9 | 6.8 | 8.9 | 10.9 | 13.3 | 15.7 | 19.9 | 23.4 | 26.2 | 28.5 | 31.1 | 37.2 | 43.5 | 49.8 | 56.6 | 63.7 | 70.7 | 76.8 | 84.2 | 86.5 | 88.5 | 89.1 | 91 | 91.3 | 93.1 | 94.7 |
| **3,500** | - | 1.6 | 2.4 | 3.2 | 4.7 | 6.4 | 8 | 10.2 | 12.4 | 16.5 | 19.9 | 22.8 | 25.1 | 27.7 | 33.8 | 40.1 | 46.2 | 52.9 | 60 | 67.1 | 73.6 | 81.4 | 84 | 86.4 | 87.4 | 89.9 | 90.5 | 92.3 | 94 |
| **3,750** | - | - | 0.5 | 1.2 | 2.5 | 3.8 | 5.3 | 7.3 | 9.1 | 12.7 | 15.9 | 18.9 | 21.1 | 23.9 | 30.3 | 36.5 | 42.4 | 49 | 55.9 | 63 | 69.7 | 77.8 | 80.9 | 84.3 | 85.9 | 88.9 | 89.7 | 91.7 | 93.8 |
| **4,000** | - | - | - | 0.8 | 1.9 | 2.9 | 4 | 5.7 | 7.3 | 10.5 | 13.4 | 16 | 18.2 | 20.8 | 27.1 | 33.5 | 39.5 | 46 | 52.9 | 60 | 66.8 | 74.9 | 78.2 | 82.1 | 84.1 | 88.1 | 89.4 | 91.6 | 93.7 |
| **4,250** | - | - | - | - | 1.1 | 2.2 | 3.2 | 4.8 | 6.2 | 9.3 | 12 | 14.6 | 16.7 | 19.1 | 25.3 | 31.5 | 37.3 | 43.6 | 50.3 | 57.3 | 64.1 | 72.3 | 75.6 | 79.8 | 82 | 86.8 | 88.3 | 91 | 93.3 |
| **4,500** | - | - | - | - | - | 1.1 | 1.9 | 3.3 | 4.5 | 7.1 | 9.6 | 12 | 14 | 16.3 | 22.4 | 28.5 | 34.2 | 40.3 | 46.9 | 53.7 | 60.5 | 69.4 | 73.1 | 77.4 | 79.4 | 84.3 | 86.3 | 89.7 | 92.2 |
| **4,750** | - | - | - | - | - | - | 0.8 | 2 | 2.8 | 5.1 | 7.4 | 9.7 | 11.6 | 13.8 | 19.8 | 25.8 | 31.4 | 37.3 | 43.7 | 50.2 | 57 | 66.1 | 70.1 | 74.6 | 77 | 83.1 | 85.5 | 89.2 | 91.9 |
| **5,000** | - | - | - | - | - | - | - | 1.1 | 1.8 | 3.7 | 5.8 | 8 | 9.7 | 11.8 | 17.7 | 23.8 | 26.6 | 35.4 | 41.7 | 48.2 | 55 | 64.1 | 68.2 | 72.8 | 75.2 | 82.1 | 85 | 88.8 | 91.6 |
| **5,250** | - | - | - | - | - | - | - | - | 0.8 | 2.4 | 4.2 | 6.2 | 7.7 | 9.4 | 14.9 | 21.1 | 26.8 | 32.6 | 38.7 | 45.2 | 51.9 | 61.3 | 66.1 | 70.8 | 73.2 | 79.3 | 82.9 | 88.1 | 90.8 |
| **5,500** | - | - | - | - | - | - | - | - | - | 1.5 | 3.2 | 5 | 6.1 | 7.8 | 13 | 19.1 | 24.6 | 30.1 | 36 | 42.2 | 48.8 | 58.2 | 63.6 | 69.2 | 71.9 | 78.2 | 82.1 | 87.2 | 89.9 |
| **6,000** | - | - | - | - | - | - | - | - | - | - | 1.3 | 2.7 | 3.8 | 5.3 | 10.2 | 15.9 | 21.2 | 26.6 | 32.3 | 38.4 | 44.7 | 53.8 | 58.8 | 64.6 | 67.7 | 74.9 | 79.2 | 84.3 | 86.8 |
| **6,500** | - | - | - | - | - | - | - | - | - | - | - | 2.8 | 1.3 | 2.6 | 6.9 | 12.1 | 17.2 | 22.9 | 28.7 | 34.5 | 40.4 | 48.6 | 52.6 | 58.2 | 61 | 69.2 | 74 | 79.2 | 81.4 |
| **7,000** | - | - | - | - | - | - | - | - | - | - | - | - | 0.5 | 1.3 | 4.8 | 9.4 | 14.3 | 19.9 | 25.7 | 31.6 | 37.5 | 46.2 | 50.2 | 56 | 59.1 | 67.5 | 72.2 | 77.3 | 79.4 |
| **7,500** | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.7 | 3.8 | 8.1 | 12.7 | 18.2 | 24.1 | 30 | 35.8 | 44.4 | 48.2 | 54.1 | 57.3 | 66.2 | 71.1 | 76 | 78.2 |
| **8,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 2.8 | 6.7 | 10.9 | 16.3 | 22 | 27.7 | 33.4 | 42.1 | 46.4 | 52.7 | 55.9 | 64.6 | 69.5 | 75 | 77.2 |
| **9,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 2.6 | 5.3 | 9.6 | 14.5 | 19.7 | 25.7 | 35.2 | 40.4 | 47.2 | 50.7 | 60.2 | 65.3 | 71.1 | 73.5 |
| **10,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1.9 | 4.6 | 8.9 | 13.4 | 18.9 | 27.7 | 33.7 | 41.4 | 45.6 | 55.7 | 61.7 | 68.3 | 70.8 |
| **11,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 2.8 | 6.8 | 10.9 | 15.7 | 24.3 | 29.5 | 37.4 | 42 | 52.8 | 58.7 | 65.1 | 67.7 |
| **12,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 3.1 | 6.3 | 10.4 | 18.9 | 25.1 | 33.9 | 38.9 | 50.3 | 56.5 | 63 | 65.7 |
| **13,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 5.4 | 5.4 | 12.7 | 19.7 | 29.1 | 36.4 | 48 | 54.6 | 61.2 | 64.1 |
| **14,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 3 | 9.5 | 15.6 | 25.1 | 32.3 | 44.5 | 51.7 | 58.3 | 61.5 |
| **15,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 5 | 10.9 | 20.7 | 29.5 | 42.1 | 49.3 | 55.8 | 58.8 |
| **17,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 4.8 | 13.4 | 20.8 | 34.1 | 42.5 | 49.7 | 53 |
| **19,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 7.3 | 13.3 | 26.4 | 35.7 | 43.1 | 46.6 |
| **21,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 6.8 | 20 | 29.2 | 36.3 | 39.9 |
| **23,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 13.5 | 20.5 | 26.9 | 31.2 |
| **25,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 4 | 9.3 | 14.6 |
| **27,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 3.9 | 9.2 |
| **29,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 5.1 |

Table L.4-8. Percent Redd Dewatered Look-up Table for CCV Steelhead with ACID Dam Boards In (the percent of redds dewatered are looked up at the intersection of the "Spawning Flow" columns and "Dewatering Flow" rows)

| Spawning Flow/ Dewatering Flow | 3,500 | 3,750 | 4,000 | 4,250 | 4,500 | 4,750 | 5,000 | 5,250 | 5,500 | 6,000 | 6,500 | 7,000 | 7,500 | 8,000 | 9,000 | 10,000 | 11,000 | 12,000 | 13,000 | 14,000 | 15,000 | 17,000 | 19,000 | 21,000 | 23,000 | 25,000 | 27,000 | 29,000 | 31,000 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **3,250** | 1.1 | 2.3 | 3.3 | 4.7 | 6.5 | 8.7 | 11 | 13.6 | 16 | 20.3 | 23.9 | 26.9 | 29.3 | 31.8 | 37.6 | 42.3 | 46.7 | 50.5 | 53.5 | 55.6 | 56.3 | 54.1 | 49.5 | 46.8 | 42.3 | 39.1 | 38.3 | 37.7 | 39.2 |
| **3,500** | - | 1.4 | 2.2 | 3.2 | 4.6 | 6.4 | 8.4 | 10.8 | 13 | 17.1 | 20.6 | 23.7 | 26.1 | 28.6 | 34.5 | 39.2 | 43.5 | 47.4 | 50.6 | 52.9 | 54.1 | 52.3 | 48.1 | 45.6 | 41.3 | 38.2 | 37.6 | 37 | 38.5 |
| **3,750** | - | - | 0.6 | 1.3 | 2.6 | 4.1 | 5.9 | 8.1 | 10 | 13.6 | 17 | 20 | 22.5 | 25.1 | 31.2 | 35.9 | 40.3 | 44.2 | 47.4 | 49.9 | 51.4 | 50.6 | 46.3 | 44.4 | 40.4 | 37.6 | 37 | 36.5 | 38.1 |
| **4,000** | - | - | - | 0.9 | 2.1 | 3.3 | 4.7 | 6.7 | 8.3 | 11.6 | 14.6 | 17.4 | 19.7 | 22.2 | 28.3 | 33.3 | 37.8 | 41.7 | 45.1 | 47.7 | 49.4 | 48.3 | 44.8 | 43.2 | 39.4 | 37 | 36.5 | 36.2 | 37.8 |
| **4,250** | - | - | - | - | 1.3 | 2.6 | 4 | 5.8 | 7.2 | 10.3 | 13.2 | 15.9 | 18.1 | 20.5 | 26.5 | 31.3 | 35.7 | 36.5 | 42.8 | 45.5 | 47.3 | 46.6 | 43.2 | 41.7 | 38.2 | 36 | 35.6 | 35.4 | 37.1 |
| **4,500** | - | - | - | - | - | 1.4 | 2.7 | 4.2 | 5.5 | 8.2 | 10.8 | 13.3 | 15.4 | 17.6 | 23.6 | 28.4 | 32.7 | 36.6 | 39.8 | 42.6 | 44.6 | 44.5 | 41.5 | 40.1 | 36.5 | 34.2 | 34 | 34 | 35.8 |
| **4,750** | - | - | - | - | - | - | 1.5 | 2.9 | 3.8 | 6.2 | 8.5 | 11 | 12.9 | 15.1 | 20.9 | 25.7 | 30 | 33.7 | 37 | 39.7 | 41.8 | 42.1 | 39.4 | 38.2 | 34.8 | 32.9 | 32.8 | 33 | 34.8 |
| **5,000** | - | - | - | - | - | - | - | 1.7 | 2.4 | 4.4 | 6.5 | 8.8 | 10.6 | 12.6 | 18.3 | 23.1 | 27.5 | 31.2 | 34.4 | 37.2 | 39.4 | 39.8 | 37.2 | 36.2 | 32.8 | 31.1 | 31.1 | 31.1 | 32.8 |
| **5,250** | - | - | - | - | - | - | - | - | 1.1 | 2.6 | 4.6 | 6.5 | 8 | 9.6 | 15 | 19.7 | 24 | 27.9 | 31.1 | 33.8 | 36.2 | 36.9 | 34.8 | 33.8 | 30.3 | 28.2 | 28.4 | 28.9 | 30.4 |
| **5,500** | - | - | - | - | - | - | - | - |  | 1.5 | 3.2 | 4.8 | 6.2 | 7.7 | 12.8 | 17.5 | 21.6 | 25.3 | 28.4 | 31.1 | 33.5 | 34.5 | 32.8 | 32.3 | 28.9 | 26.8 | 27 | 27.3 | 28.8 |
| **6,000** | - | - | - | - | - | - | - | - | - | - | 1.3 | 2.7 | 3.8 | 5.1 | 9.9 | 14.3 | 18.3 | 21.9 | 25.1 | 27.8 | 30.2 | 31.3 | 29.7 | 29.4 | 26.3 | 24.3 | 24.5 | 24.8 | 26 |
| **6,500** | - | - | - | - | - | - | - | - | - | - | - | 2.7 | 1.4 | 2.5 | 6.9 | 10.8 | 14.8 | 18.7 | 22.1 | 27.8 | 27.1 | 28.1 | 26.2 | 25.9 | 22.9 | 21.2 | 21.5 | 21.7 | 22.8 |
| **7,000** | - | - | - | - | - | - | - | - | - | - | - | - | 0.5 | 1.3 | 4.9 | 8.4 | 12.2 | 16.2 | 19.6 | 22.5 | 24.9 | 26.4 | 24.7 | 24.5 | 21.7 | 19.9 | 20.2 | 20.4 | 21.4 |
| **7,500** | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.7 | 4 | 7.3 | 10.8 | 14.8 | 18.3 | 21.2 | 23.7 | 25.2 | 23.5 | 23.5 | 20.7 | 19.1 | 19.3 | 19.4 | 20.4 |
| **8,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 3 | 5.9 | 9.2 | 13.1 | 16.6 | 19.5 | 21.9 | 23.7 | 22.2 | 22.5 | 19.7 | 18 | 18.1 | 18.5 | 19.5 |
| **9,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 2.2 | 4.4 | 7.6 | 10.8 | 13.6 | 16.6 | 19.4 | 18.7 | 19.3 | 16.8 | 15.2 | 15.4 | 15.9 | 17 |
| **10,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1.6 | 3.6 | 6.6 | 9.2 | 12.1 | 15.1 | 15.3 | 16.4 | 14.5 | 12.9 | 13.4 | 14.3 | 15.5 |
| **11,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 2.3 | 5 | 7.5 | 10.1 | 13.1 | 13.1 | 14.5 | 12.8 | 11.5 | 11.9 | 12.8 | 14.1 |
| **12,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 2.2 | 4.3 | 6.7 | 10.1 | 10.9 | 12.9 | 11.4 | 10.4 | 10.9 | 11.9 | 13.2 |
| **13,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 3.7 | 3.6 | 6.8 | 8.3 | 10.7 | 10.5 | 9.6 | 10.3 | 11.3 | 12.7 |
| **14,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 2.1 | 5.1 | 6.6 | 9.1 | 9 | 8.3 | 9.2 | 10.3 | 11.9 |
| **15,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 2.6 | 4.2 | 7.2 | 7.9 | 7.4 | 8.3 | 9.4 | 10.9 |
| **17,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1.9 | 5.1 | 5.8 | 5.6 | 6.8 | 8.3 | 10 |
| **19,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 3 | 3.7 | 3.8 | 5.1 | 6.7 | 8.4 |
| **21,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1.4 | 1.8 | 2.9 | 4.4 | 6.3 |
| **23,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.9 | 2.2 | 3.8 | 5.7 |
| **25,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1.7 | 3.4 | 5.4 |
| **27,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1.8 | 3.8 |
| **29,000** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 2.2 |

Table L.4-9. Distributions of Spawning Redds among WUA River Segments as Percent of Total in the Sacramento River for Chinook Salmon Runs.

| Segment No. | Description | River Miles | Winter-Run | Spring-Run | Fall-Run | Late Fall–Run |
|---|---|---|---|---|---|---|
| 6 | Keswick to ACID | 302-298.5 | 35.6% | 5.9% | 17.4% | 62.0% |
| 5 | ACID to Cow Creek | 298.5-280 | 63.0% | 72.1% | 32.9% | 19.8% |
| 4 | Cow Creek to Battle Creek | 280-271 | 0.4% | 6.7% | 14.2% | 8.7% |
| 3 | Battle Creek to RBDD | 271-243 | 0.2% | 3.6% | 18.1% | 3.7% |
| 2 | Downstream of RBDD | — | 0.8% | 11.7% | 17.4% | 5.8% |

ACID = Anderson-Cottonwood Irrigation District
RBDD = Red Bluff Diversion Dam[1]

Estimated daily redd dewatering potential was calculated for the NAA and alternative model scenarios from USRDOM flow data for each day of the 100-year period of record. The percentage of redds dewatered was computed independently for each day of the period of record, which would potentially lead to overcounting of dewatered redds when the results are summarized. Therefore, the results are treated as estimates of daily redd dewatering potential rather than as estimates of total redd dewatering. Dewatering potential of the NAA and the BA and EIS modeled alternatives were compared using the monthly mean dewatering potential under each water year type. Composite estimates of redd dewatering for each race or species under each water year type and all water year types combined were computed by weighting mean monthly results by monthly weighting factors (Table L.4-10). For winter-run and late fall-run, these weighting factors were estimated from the mean proportions of redds counted each months in the aerial redd surveys conducted by California Department of Fish and Wildlife during 2006 through 2021 (CDFW unpublished data). Information from Williams (2006) was also used in estimating the late fall-run spawning months. For spring-run and steelhead the weighting factors were derived from information on life-history timings of listed anadromous salmonids of the Central Valley in Appendix C, and the weighting factors for fall-run were estimated from information in Moyle et al. 2017.

[1] For simplicity, this location is referred to as the Red Bluff Diversion Dam (RBDD) in this document despite dam decommissioning in 2013.

Table L.4-10. Monthly Weighting Factors for Sacramento River Winter-run, Spring-run, Fall-run, Late fall-run, and Steelhead Spawning Used for Computing Composite Redd Dewatering Results by Water Year Type.

| Month | Winter-run | Spring-run | Fall-run | Late fall-run | Steelhead |
|---|---|---|---|---|---|
| January | 0 | 0 | 0 | 0.4 | 0.15 |
| February | 0 | 0 | 0 | 0.1 | 0.35 |
| March | 0 | 0 | 0 | 0.1 | 0.35 |
| April | 0 | 0 | 0 | 0 | 0.15 |
| May | 0.1 | 0 | 0 | 0 | 0 |
| June | 0.4 | 0 | 0 | 0 | 0 |
| July | 0.4 | 0 | 0 | 0 | 0 |
| August | 0.1 | 0.1 | 0 | 0 | 0 |
| September | 0 | 0.6 | 0.1 | 0 | 0 |
| October | 0 | 0.3 | 0.3 | 0 | 0 |
| November | 0 | 0 | 0.4 | 0 | 0 |
| December | 0 | 0 | 0.2 | 0.4 | 0 |

### L.4.2.2 Assumptions / Uncertainty

1. One assumption of the redd dewatering analysis is that dewatering of the redd results in 100% mortality of the eggs and alevins it contains. This assumption overestimates mortality. Several studies have demonstrated that the level of mortality is strongly related to the duration of dewatering, the temperature and humidity in the dewatered redd, and the life stages present when the redd is dewatered (Becker et al. 1982; Reiser and White 1983; McMichael et al. 2005). In general, eggs survive dewatering at a much higher rate than the alevins (Becker et al. 1982). Eggs may survive for weeks in a dewatered redd whereas alevins generally survive only a few hours (Becker et al. 1982; Reiser and White 1983). This observation suggests that dewatering of redds early in the spawning period of a population may have a less negative effect than later dewatering because the egg stage would be more prevalent early in the season than the alevin stage. Although the assumption of 100% mortality resulting from redd dewatering overestimates the effects of redd dewatering on the salmon and steelhead populations under the alternative scenarios, the level of overestimation is uncertain. Regardless, this assumption applies equally to all alternative scenarios.

2. The duration of egg and alevin incubation for steelhead and all runs of Chinook salmon is assumed to be the same regardless of the time of year. This ignores water temperature effects on egg and alevin development times and potential run and species differences, which increases uncertainty in the analysis. Water temperatures in the upper Sacramento River are not expected to differ greatly among the alternative scenarios, so any biases resulting from temperature effects are likely to be similar among scenarios.

3. As noted in Section L.4.2.1, *Methods*, the percentage of redds dewatered was computed independently for each day of the period of record, which would potentially lead to overcounting of dewatered redds when the results are summarized. Therefore, the results are treated as estimates of daily redd dewatering potential rather than as estimates of total redd dewatering.

4. As noted previously, Sacramento River fall-run Chinook salmon redd dewatering tables were used to model spring-run dewatering in the analysis because data on spring-run redds were insufficient to develop spring-run spawning WUA curves. Spawning WUA data are needed because spawning WUA results were used to develop redd dewatering tables (USFWS 2006). Substitution of fall-run WUA results for spring-run follows previous practice for WUA analyses. For instance, two models that currently produce spawning WUA outputs for spring-run Chinook salmon, SALMOD and Sacramento River Ecological Flows Tool (SacEFT), derive the spring-run WUA results using fall-run Chinook salmon spawning WUA curves as surrogates (Bartholow 2004; ESSA Technologies 2011). Mark Gard, who led the U.S. Fish and Wildlife Service studies that produced the Sacramento River WUA curves and dewatering tables, has endorsed this practice (Gard pers. comm.). However, this practice introduces additional uncertainty to spring-run Chinook salmon redd dewatering results.

5. USRDOM incorporates tributary inflow and flow variability not caused solely by reservoir releases. There is uncertainty in the source of potential redd dewatering since it is not solely caused by releases and instead incorporates variable hydrometeorology. This is likely more the case during wetter water years than drier water years.

6. Estimates of redd dewatering are an order of magnitude greater than observed in recent years for all species. This bias likely results from the multiple counting of redd dewatering events discussed in Assumption #3 listed above. Results are likely still useful for comparison between alternatives, but should not be considered as absolute values.

7. The redd dewatering analyses assume that channel characteristics of the river, such as proportions of mesohabitat types, during the years of field data collection, 1995–1999, by U.S. Fish and Wildlife Service have remained in dynamic equilibrium to the present time and will continue to do so through the life of the Project (USFWS 2010). If the channel characteristics substantially changed, the shape of the curves might no longer be applicable.

### L.4.2.3 Code and Data Repository

Data for this analysis are available upon request.

## L.4.3 Results

The following results provide the estimates of redd dewatering potential for winter-run, spring-run, fall-run, and late fall-run Chinook salmon, and steelhead. The results are provided separately for each race and species, with tables and figures for the BA and EIS modeled scenarios included in each section. As noted in Section L.4.2.1, *Methods*, the composite redd dewatering potential

results by water year type in the tables were computed from mean monthly results weighted by the factors in Table L.4-10.

### L.4.3.1 Winter-run Chinook

Table L.4-11 and Table L.4-12 provide the redd dewatering results for Sacramento River winter-run Chinook salmon under the BA modeled scenarios and EIS modeled scenarios, respectively. As noted above, these results are composite means computed by weighting mean monthly results by the monthly weighting factors (Table L.4-10). Months with weighting factors of zero are excluded from computation of the composite means. The results are the means for all years analyzed, weighted by the factors month (Table L.4-10). The table for the EIS modeled scenarios includes the percent differences between the results of the NAA and the alternatives including Action 5 (Table L.4-12).

The results for both the BA and EIS modeled scenarios show modest and inconsistent variation in percentage of winter-run redds dewatered with water year type for the EXP 1 and EXP 3, but under the NAA and all BA and EIS modeled scenarios for the alternatives, the variation among water year types is consistent, with the lowest percentages of redds dewatered under wet water years and highest in below normal and dry water years. During winter and spring, redd dewatering is generally higher during wet water years because periodic storms and high runoff, which increase flow fluctuations, tend to be more frequent in such water years. However, winter-run spawning and incubation occur during late spring through early fall, when flows tend to be less variable. The minimum rates of redd dewatering for winter-run during wet years (Table L.4-11 and Table L.4-12) may result from increased stability in project operations related to greater reservoir storage levels. For the EIS modeled scenarios, the largest difference between the NAA and the scenarios is a 33.3% increase in redd dewatering for Alt 4 in above normal years (Table L.4-12). The largest reduction is 26.2% for Alt 2 With TUCP Without VA in critical water years. Note that these large percentages may be misleading as they represent, respectively, 4.9% and 4.4% absolute differences in percentages of redds dewatered.

Table L.4-11. Expected Percentage of Redds Dewatered for Winter-run Chinook Egg Incubation in the Sacramento River from Keswick Dam to the Battle Creek Confluence for EXP1, EXP3, NAA, Four Phases of Alternative 2, and Action 5

| Water Year Type | EXP1 | EXP3 | NAA | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Act5 |
|---|---|---|---|---|---|---|---|---|
| Wet | 9.2 | 7.7 | 7.0 | 6.7 | 6.8 | 6.8 | 6.8 | 6.8 |
| AN | 6.6 | 9.1 | 11.9 | 10.9 | 10.8 | 10.8 | 10.5 | 10.4 |
| BN | 4.6 | 9.9 | 19.6 | 18.1 | 17.7 | 17.6 | 15.4 | 16.0 |
| Dry | 3.8 | 9.5 | 19.0 | 17.7 | 17.8 | 18.4 | 17.6 | 17.8 |
| Critical | 2.2 | 6.2 | 13.9 | 9.6 | 14.9 | 14.1 | 14.2 | 15.3 |
| All | 5.6 | 8.5 | 13.9 | 12.5 | 13.3 | 13.2 | 12.6 | 13.0 |

Table L.4-12. Estimated percent of redd dewatering potential for Winter-run Chinook Egg Incubation in the Sacramento River from Keswick Dam to the Battle Creek Confluence for the NAA, Alternatives 1-4, and Action 5. The lower panel gives the percent differences of the Alternatives and Action 5 from the NAA

| Water Year Type | NAA | Alt 1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt 3 | Alt 4 | Act5 |
|---|---|---|---|---|---|---|---|---|---|
| W | 7.0 | 8.0 | 6.8 | 6.8 | 6.7 | 6.7 | 8.0 | 8.1 | 6.8 |
| AN | 11.9 | 15.1 | 10.7 | 10.7 | 10.7 | 10.2 | 10.5 | 15.9 | 10.4 |
| BN | 19.6 | 17.2 | 17.4 | 17.1 | 17.4 | 15.8 | 17.9 | 19.0 | 16.0 |
| D | 19.0 | 18.4 | 18.1 | 18.2 | 18.4 | 17.6 | 20.1 | 18.2 | 17.8 |
| C | 13.9 | 18.4 | 10.3 | 15.6 | 14.9 | 15.2 | 13.0 | 10.5 | 15.3 |
| All | 13.9 | 14.8 | 12.5 | 13.3 | 13.3 | 12.8 | 13.8 | 14.0 | 13.0 |
| **Water Year Type** | **NAA** | **Alt 1** | **Alt2 wTUCP woVA** | **Alt2 woTUCP woVA** | **Alt2 woTUCP DeltaVA** | **Alt2 woTUCP AllVA** | **Alt 3** | **Alt 4** | **Act5** |
| W | - | 14.8 | -3.1 | -3.1 | -3.7 | -4.0 | 14.1 | 15.7 | -2.7 |
| AN | - | 26.8 | -10.2 | -10.1 | -10.0 | -14.2 | -11.9 | 33.3 | -12.8 |
| BN | - | -12.2 | -11.4 | -12.6 | -11.2 | -19.1 | -8.8 | -2.9 | -18.4 |
| D | - | -3.4 | -4.6 | -4.2 | -3.0 | -7.2 | 5.7 | -4.2 | -6.4 |
| C | - | 31.9 | -26.2 | 11.8 | 6.9 | 9.3 | -6.5 | -24.4 | 9.8 |
| All | - | 6.2 | -10.2 | -4.3 | -4.4 | -8.0 | -0.9 | 0.2 | -7.1 |

The results for winter-run redd dewatering grouped by incubation period indicate that the BA modeled scenarios generally have peak redd dewatering in the July – October period and August – November period, except for EXP1, which has peak dewatering expected in May (Figure L.4-1). For the EIS modeled scenarios, redd dewatering peaks in the July – October period and has the largest range of values in the May – August period (Figure L.4-2).

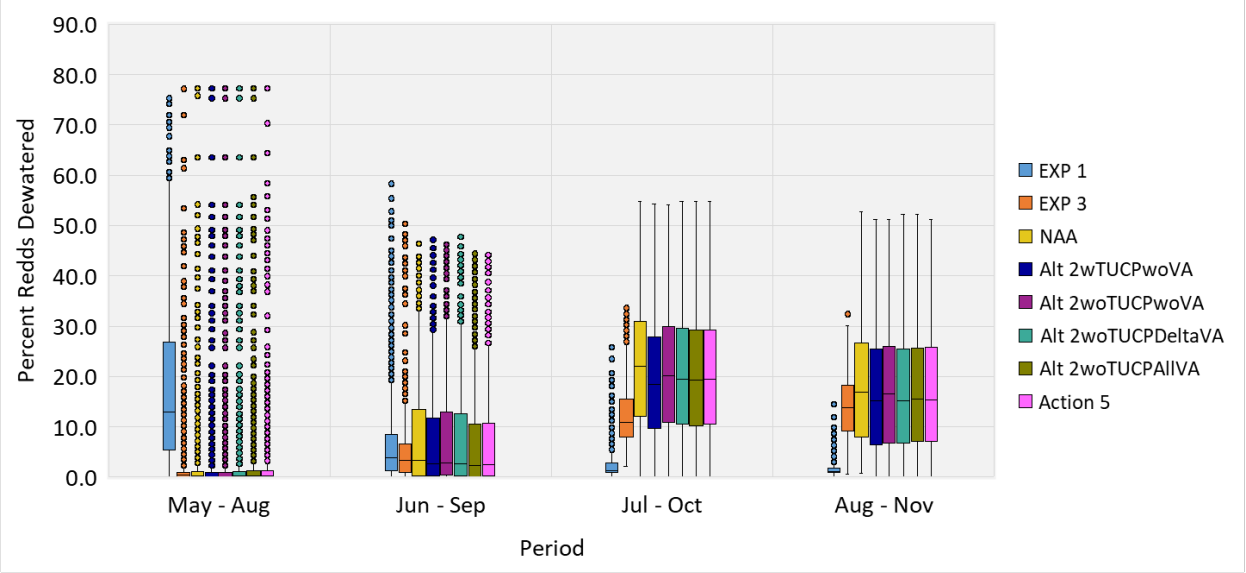



Figure L.4-1. Estimated percent of redd dewatering potential for Winter-run Chinook Salmon in the Sacramento River from Keswick Dam to the Battle Creek Confluence for EXP1, EXP3, NAA, four phases of Alternative 2, and Action 5 by Incubation Period

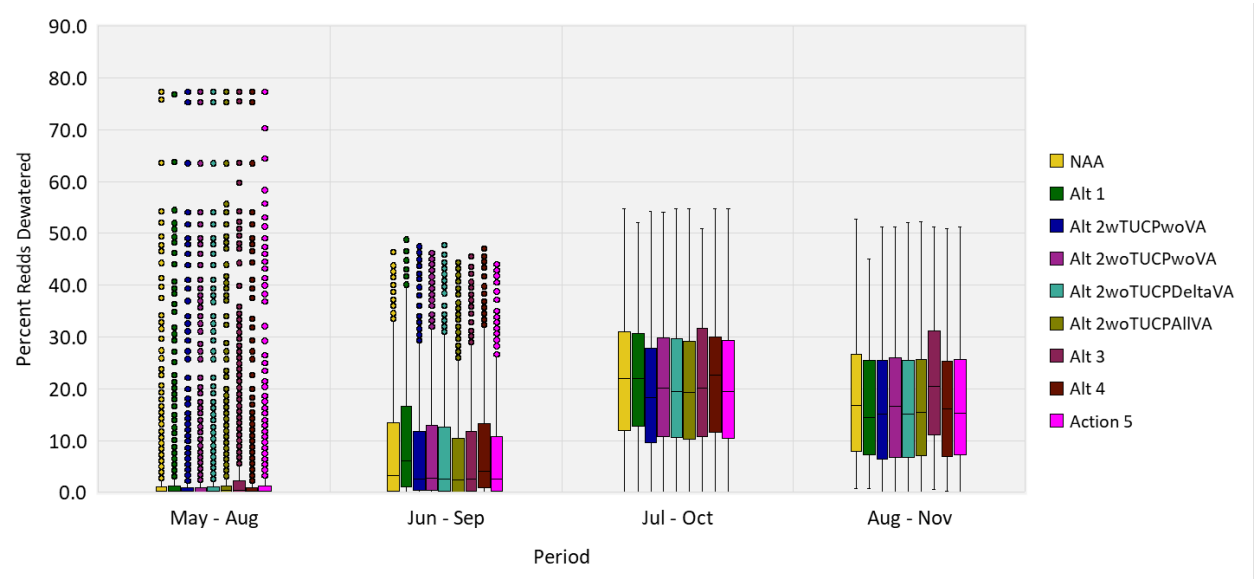



Figure L.4-2. Estimated percent of redd dewatering potential for Winter-run Chinook Salmon in the Sacramento River from Keswick Dam to the Battle Creek Confluence for the NAA Alternatives 1-4, and Action 5 by Incubation Period.

Figure L.4-3 and Figure L.4-4 give the results for winter-run redd dewatering grouped by water year type. The results are the same as those provided in Table L.4-11 and Table L.4-12, but additionally show the variation and range in the results.

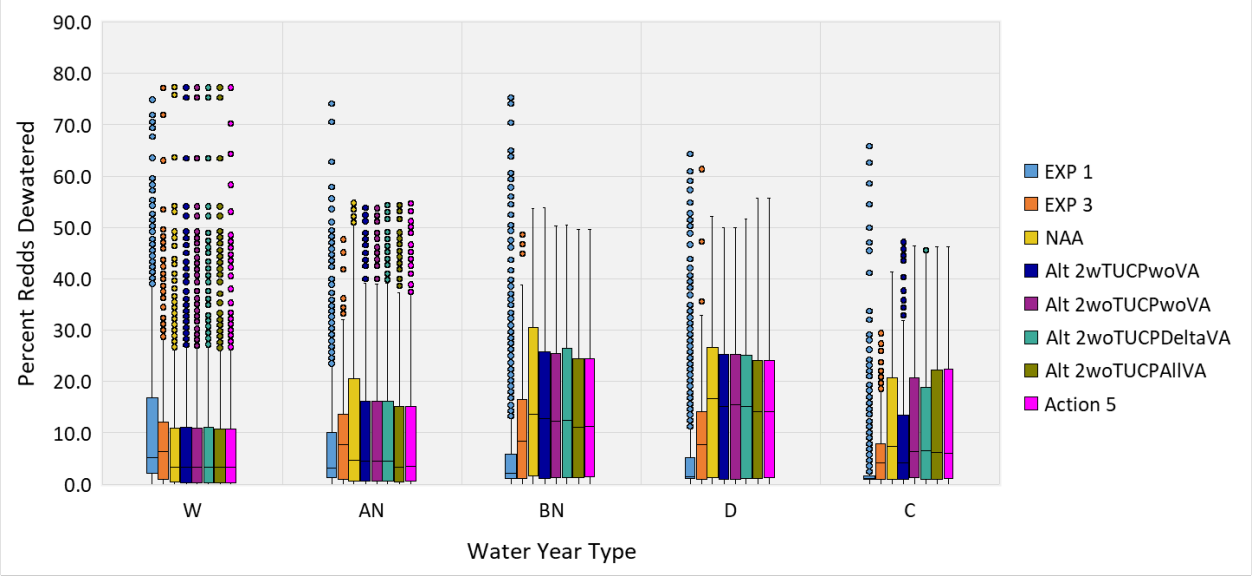



Figure L.4-3. Estimated percent of redd dewatering potential for Winter-run Chinook Salmon in the Sacramento River from Keswick Dam to the Battle Creek Confluence for EXP1, EXP3, NAA, four phases of Alternative 2, and Action 5 by Water Year Type.

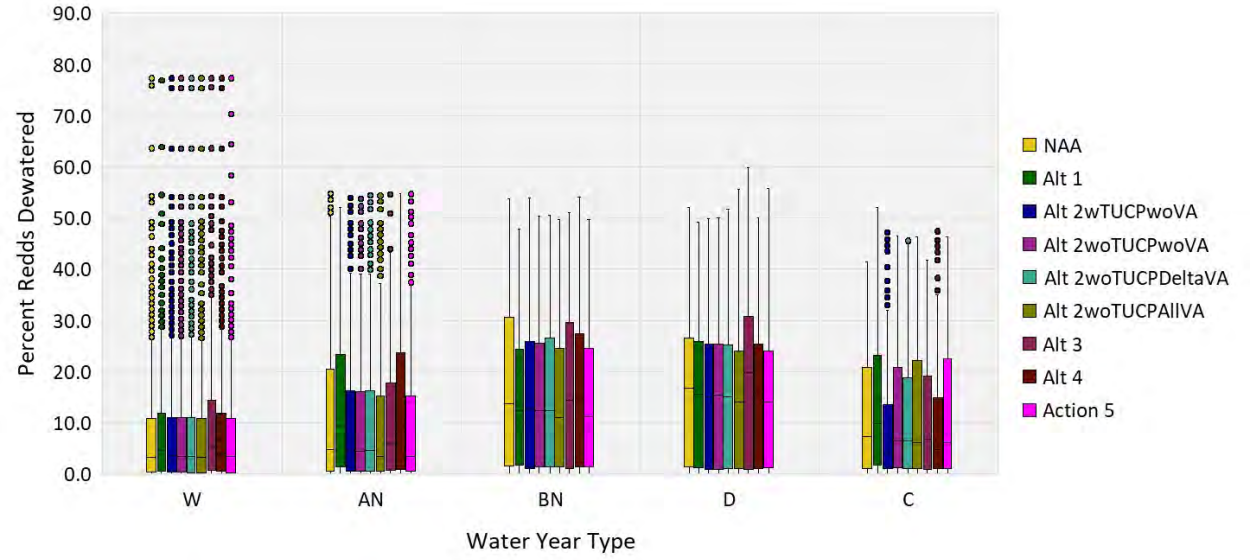



Figure L.4-4. Estimated percent of redd dewatering potential for Winter-run Chinook Salmon in the Sacramento River from Keswick Dam to the Battle Creek Confluence for the NAA Alternatives 1-4, and Action 5 by Water Year Type.

### L.4.3.2 Spring-run Chinook

Table L.4-13 and Table L.4-14 provide the redd dewatering results for Sacramento River spring-run Chinook salmon under the BA modeled scenarios and EIS modeled scenarios, respectively. The results are the means for all years analyzed, weighted by their expected spawning distribution among months (Table L.4-10). The table for the EIS modeled scenarios includes the percent differences between the results of the NAA and the alternatives including Action 5 (Table L.4-14).

The results for both the BA and EIS modeled scenarios show modest and inconsistent variation in estimates of spring-run redd dewatering potential with water year type for EXP 1 and EXP 3. However, under the NAA and all BA and EIS modeled scenarios for the alternatives, the variation among water year types is consistent, with the lowest estimates of redd dewatered potential in critical water years and highest estimates in wet and above normal water years (Table L.4-13 and Table L.4-14). This pattern of variation is expected for spring-run Chinook because their spawning occurs in the fall, with incubation extending into early winter. During wet winters, periodic storms and high runoff increase flow fluctuations, which tends to result in greater estimates of redd dewatering potential. In drier winters, flow fluctuations are reduced and fewer redds are potentially dewatered. For the EIS modeled scenarios, reductions in the estimates of redd dewatering potential from the NAA tend to be larger and more frequent than increases (Table L.4-14). The largest reduction is 40.6% for Alt 4 in above normal years. The largest increase is 11.3% for Alt 1 in dry water years.

Table L.4-13. Estimated percent of redd dewatering potential for Spring-run Chinook Egg Incubation in the Sacramento River from Keswick Dam to the Battle Creek Confluence for EXP1, EXP3, NAA, Four Phases of Alternative 2, and Action 5.

| Water Year Type | EXP1 | EXP3 | NAA | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Act5 |
|---|---|---|---|---|---|---|---|---|
| Wet | 3.3 | 8.6 | 25.7 | 24.6 | 24.7 | 24.8 | 25.0 | 25.5 |
| AN | 3.0 | 8.9 | 27.4 | 28.8 | 28.8 | 28.8 | 28.7 | 29.7 |
| BN | 2.8 | 10.6 | 14.4 | 13.2 | 12.6 | 12.8 | 14.4 | 14.1 |
| Dry | 2.5 | 11.5 | 12.7 | 13.1 | 12.8 | 12.1 | 12.5 | 12.3 |
| Critical | 1.4 | 11.2 | 9.5 | 8.2 | 8.1 | 7.9 | 7.9 | 8.0 |
| All | 2.7 | 10.1 | 18.2 | 17.8 | 17.6 | 17.5 | 17.9 | 18.1 |

Table L.4-14. Estimated percent of redds dewatering potential for Spring-run Chinook Egg Incubation in the Sacramento River from Keswick Dam to the Battle Creek Confluence for the NAA, Alternatives 1-4, and Action 5. The lower panel gives the percent differences of the Alternatives and Action 5 and the NAA

| Water Year Type | NAA | Alt 1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt 3 | Alt 4 | Act5 |
|---|---|---|---|---|---|---|---|---|---|
| W | 25.7 | 22.3 | 25.1 | 25.2 | 25.4 | 25.5 | 22.9 | 19.8 | 25.5 |
| AN | 27.4 | 16.7 | 29.1 | 29.2 | 29.4 | 29.7 | 22.5 | 16.3 | 29.7 |
| BN | 14.4 | 15.6 | 13.9 | 13.3 | 14.1 | 14.1 | 14.2 | 13.8 | 14.1 |
| D | 12.7 | 14.2 | 12.8 | 12.7 | 12.1 | 12.3 | 13.9 | 13.0 | 12.3 |
| C | 9.5 | 8.5 | 7.8 | 7.8 | 7.4 | 8.0 | 9.1 | 8.5 | 8.0 |
| All | 18.2 | 16.2 | 18.0 | 17.9 | 17.9 | 18.1 | 16.9 | 14.8 | 18.1 |
| **Water Year Type** | **NAA** | **Alt 1** | **Alt2 wTUCP woVA** | **Alt2 woTUCP woVA** | **Alt2 woTUCP DeltaVA** | **Alt2 woTUCP AllVA** | **Alt 3** | **Alt 4** | **Act5** |
| W | - | -13.4 | -2.3 | -2.1 | -1.3 | -1.0 | -10.8 | -23.0 | -1.0 |
| AN | - | -39.2 | 6.1 | 6.4 | 7.3 | 8.3 | -17.9 | -40.6 | 8.3 |
| BN | - | 8.4 | -3.8 | -7.4 | -2.3 | -2.1 | -1.4 | -3.9 | -2.1 |
| D | - | 11.3 | 0.4 | -0.1 | -5.1 | -3.1 | 9.2 | 2.3 | -3.1 |
| C | - | -9.8 | -18.1 | -17.3 | -22.0 | -15.7 | -4.4 | -10.2 | -15.7 |
| All | - | -11.4 | -1.6 | -1.9 | -2.0 | -0.7 | -7.1 | -18.8 | -0.7 |

The results for spring-run redd dewatering potential grouped by incubation period indicate that for both BA and EIS modeled scenarios redd dewatering peaks in the September – December period and is generally similar under the NAA, four phases of Alternative 2, and Action 5 (Figure L.4-5 and Figure L.4-6).

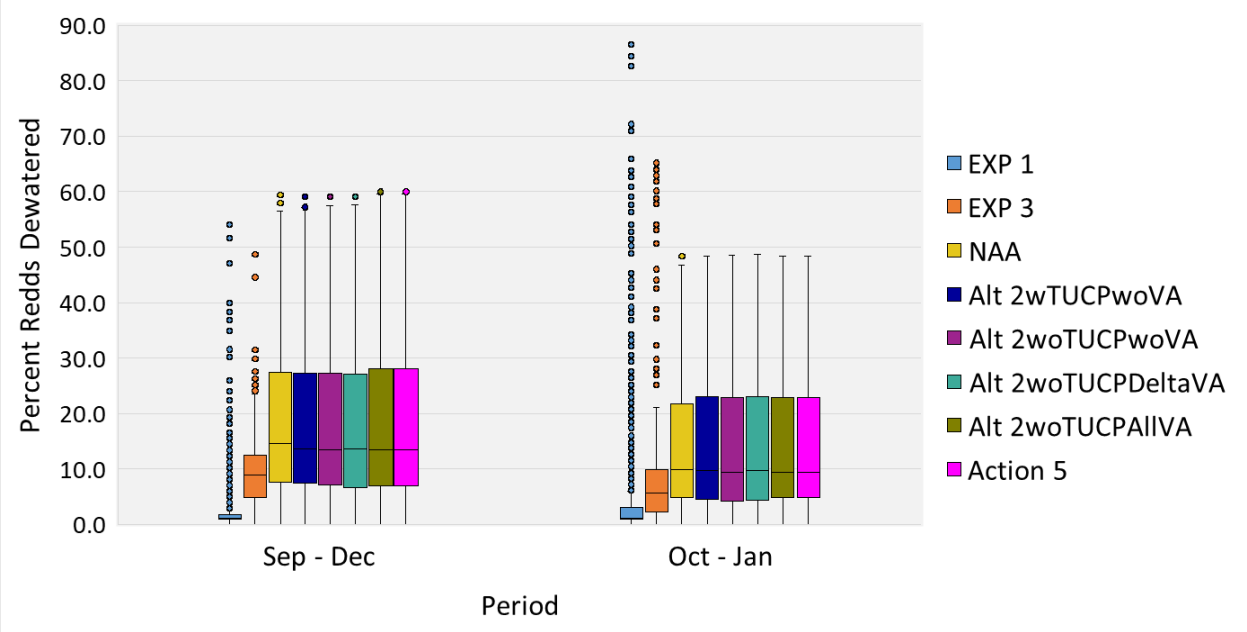



Figure L.4-5. Estimated percent of redd dewatering potential for Spring-run Chinook Salmon in the Sacramento River from Keswick Dam to the Battle Creek Confluence for EXP1, EXP3, NAA, four phases of Alternative 2, and Action 5 by Incubation Period

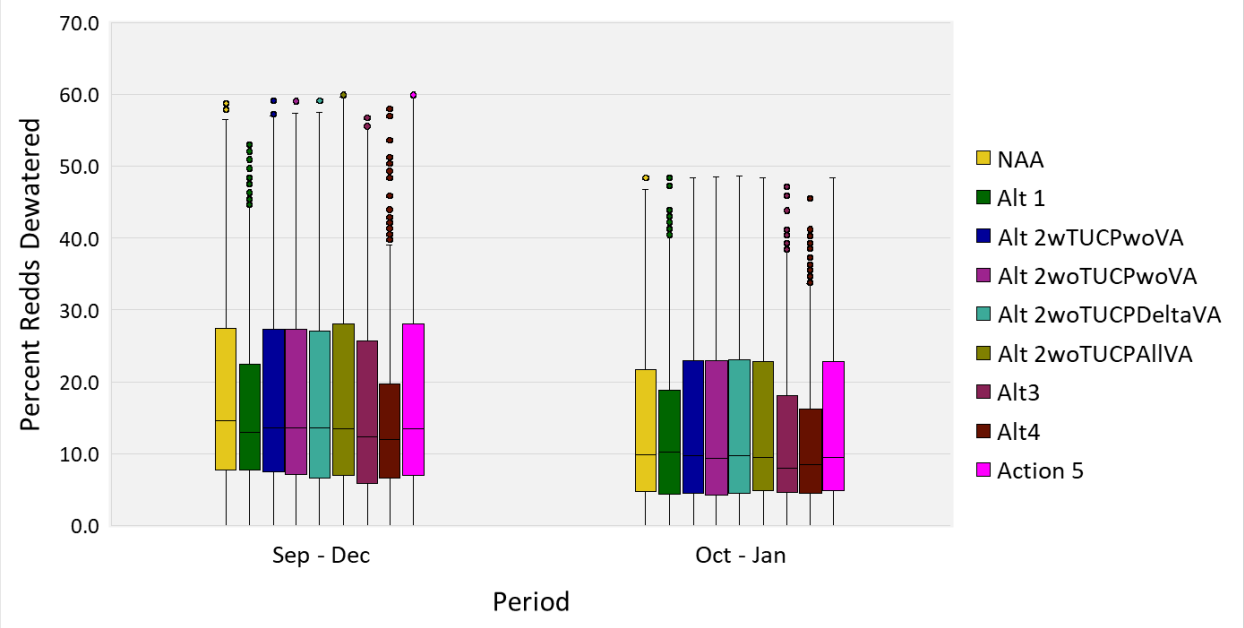



Figure L.4-6. Estimated percent of redd dewatering potential for Spring-run Chinook Salmon in the Sacramento River from Keswick Dam to the Battle Creek Confluence for the NAA Alternatives 1-4, and Action 5 by Incubation Period.

Figure L.4-7 and Figure L.4-8 give the results for spring-run estimated redd dewatering potential grouped by water year type. The results are the same as those provided in Table L.4-13 and Table L.4-14, but additionally show the variation and range in the results. As described above for Table L.4-13 and Table L.4-14, redd dewatering potential is highest in Wet and Above Normal years, reflecting the greater flow fluctuations in those years during the spring-run egg incubation period.

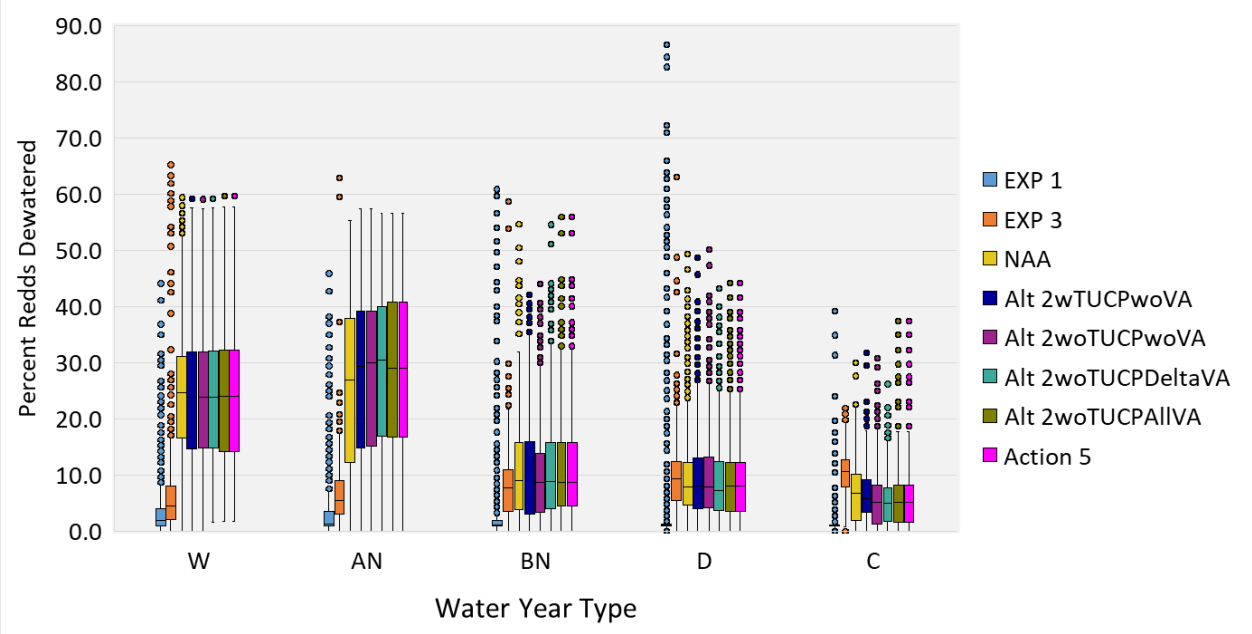



Figure L.4-7. Estimated percent of redd dewatering potential for Spring-run Chinook Salmon in the Sacramento River from Keswick Dam to the Battle Creek Confluence for EXP1, EXP3, the NAA, four phases of Alternative 2, and Action 5 by Water Year Type.

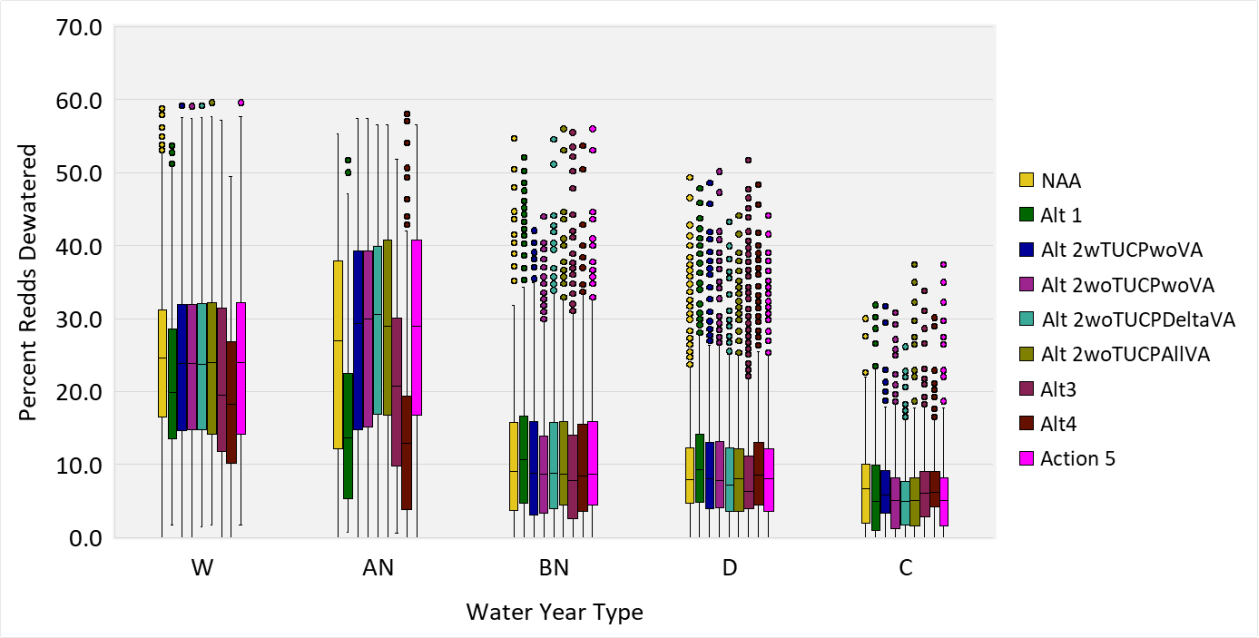



Figure L.4-8. Estimated percent of redd dewatering potential for Spring-run Chinook Salmon in the Sacramento River from Keswick Dam to the Battle Creek Confluence for the NAA, Alternatives 1-4, and Action 5 by Water Year Type.

### L.4.3.3 Steelhead

Table L.4-15 and Table L.4-16 provide the estimated redd dewatering potential results for Sacramento River steelhead under the BA modeled scenarios and EIS modeled scenarios, respectively. The results are the means for all years analyzed, weighted by their expected spawning distributions among months (Table L.4-10). The table for the EIS modeled scenarios includes the percent differences between the results of the NAA and the alternatives including Action 5 (Table L.4-16).

The results for both the BA and EIS modeled scenarios show large and consistent variation in percentage of steelhead redds dewatered with water year type under the BA and EIS modeled scenarios, although the variation for EXP1 is somewhat reduced in comparison to that for the other scenarios (Table L.4-15 and Table L.4-16). For EXP3, the NAA, and all BA and EIS modeled scenarios, the mean redd dewatering is much higher in wet water years than in the other water year types and steadily declines with drier water year types. This pattern of variation reflects flow conditions for the winter and early spring months when steelhead spawning and incubation occurs. During wet winters and springs, periodic storms and high runoff increase flow fluctuations, which tends to result in greater redd dewatering. In drier years, flow fluctuations are reduced and fewer redds are dewatered. For the EIS modeled scenarios, reductions in redd dewatering from the NAA tend to be larger and more frequent than increases (Table L.4-16). The largest reduction is 30.3% for Alt 2 Without TUCP With Delta VA in critical water years. The largest increase is 13.0% for Alt 3 in below normal years.

Table L.4-15. Expected Percentage of Redds Dewatered for Steelhead Egg Incubation in the Sacramento River from Keswick Dam to the Battle Creek Confluence for EXP1, EXP3, the NAA, four phases of Alternative 2, and Action 5

| Water Year Type | EXP1 | EXP3 | NAA | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Act5 |
|---|---|---|---|---|---|---|---|---|
| Wet | 50.3 | 44.9 | 45.4 | 45.3 | 45.4 | 45.3 | 45.0 | 45.0 |
| AN | 49.3 | 28.7 | 26.8 | 26.0 | 25.8 | 25.6 | 25.1 | 24.7 |
| BN | 34.5 | 11.1 | 10.5 | 10.8 | 10.4 | 10.6 | 9.3 | 9.1 |
| Dry | 32.8 | 8.9 | 7.1 | 6.4 | 6.5 | 6.2 | 6.5 | 6.1 |
| Critical | 20.9 | 2.9 | 4.8 | 4.8 | 5.2 | 5.1 | 4.9 | 5.2 |
| All | 38.4 | 21.2 | 20.8 | 20.6 | 20.6 | 20.5 | 20.1 | 20.0 |

Table L.4-16. Expected Percentage of Redds Dewatered for Steelhead Egg Incubation in the Sacramento River from Keswick Dam to the Battle Creek Confluence for the NAA, Alternatives 1-4, and Action 5. The Lower Panel Gives the Percent Differences of the Alternatives and Action 5 and the NAA

| Water Year Type | NAA | Alt 1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt 3 | Alt 4 | Act5 |
|---|---|---|---|---|---|---|---|---|---|
| W | 45.4 | 46.6 | 45.3 | 45.3 | 45.3 | 45.0 | 46.1 | 45.3 | 45.0 |
| AN | 26.8 | 27.4 | 26.4 | 25.7 | 26.0 | 24.7 | 28.5 | 26.2 | 24.7 |
| BN | 10.5 | 11.1 | 10.5 | 10.2 | 10.6 | 9.1 | 11.9 | 10.4 | 9.1 |
| D | 7.1 | 6.5 | 6.4 | 6.4 | 6.1 | 6.1 | 6.7 | 5.7 | 6.1 |
| C | 4.8 | 3.7 | 4.3 | 4.5 | 3.4 | 5.2 | 4.0 | 4.8 | 5.2 |
| All | 20.8 | 21.0 | 20.5 | 20.3 | 20.2 | 20.0 | 21.3 | 20.4 | 20.0 |
| **Water Year Type** | **NAA** | **Alt 1** | **Alt2 wTUCP woVA** | **Alt2 woTUCP woVA** | **Alt2 woTUCP DeltaVA** | **Alt2 woTUCP AllVA** | **Alt 3** | **Alt 4** | **Act5** |
| W | - | 2.6 | -0.2 | -0.3 | -0.2 | -0.8 | 1.6 | -0.2 | -0.8% |
| AN | - | 2.4 | -1.5 | -4.2 | -3.0 | -7.8 | 6.3 | -2.0 | -7.8% |
| BN | - | 5.5 | 0.3 | -3.2 | 0.5 | -13.7 | 13.0 | -0.9 | -13.7% |
| D | - | -8.6 | -10.0 | -9.8 | -14.4 | -14.1 | -6.5 | -19.2 | -14.1% |
| C | - | -22.6 | -11.1 | -7.5 | -30.3 | 7.7 | -17.4 | -0.1 | 7.7% |
| All | - | 1.0 | -1.6 | -2.3 | -3.0 | -4.0 | 2.1 | -2.2 | -4.0% |

The results for steelhead redd dewatering grouped by months indicate that for both the BA and EIS modeled scenarios redd dewatering is consistently variable throughout the egg incubation period (Figure L.4-9 and

Figure L.4-10). For the BA modeled scenarios, EXP1 has the highest median percent of redds dewatered in March - June. The lowest median percent of redds dewatered occurs in April – July for EXP3, the NAA, and four Alternative 2 scenarios. For the EIS modeled scenarios, Alternative 1 and Alternative 3 have the highest median percent of redds dewatered in February - May. The lowest median percent of redds dewatered occurs in April – July under the EIS scenarios.

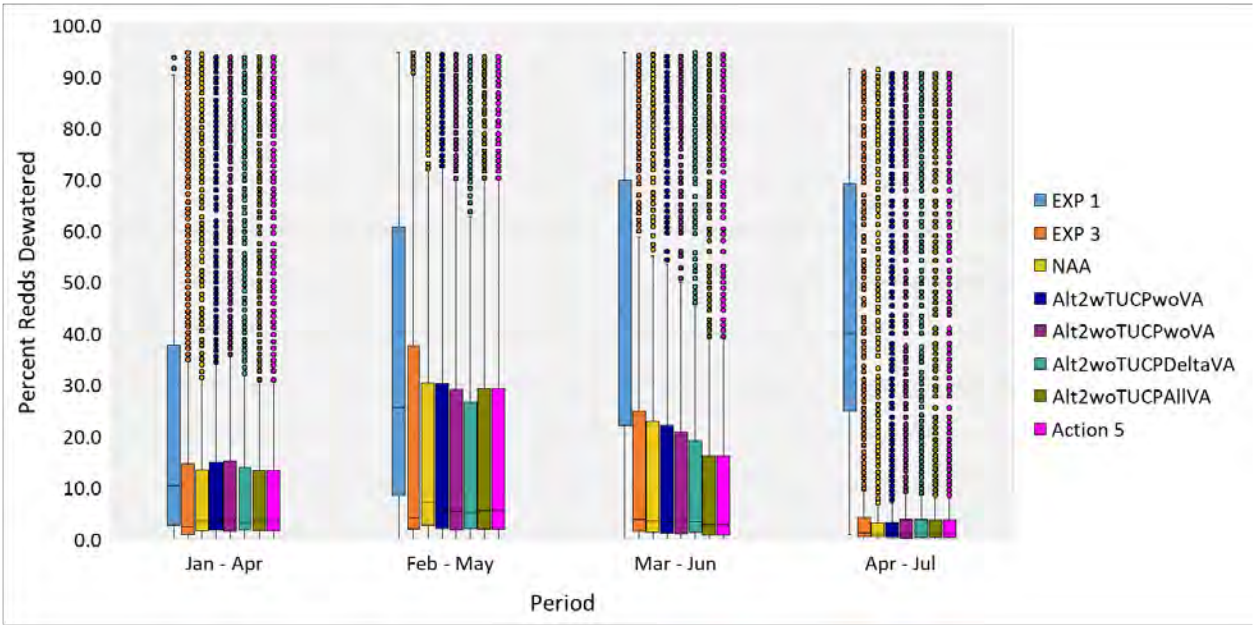



Figure L.4-9. Expected Mean Percent Redds Dewatered for Steelhead in the Sacramento River from Keswick Dam to the Battle Creek Confluence for EXP1, EXP3, the NAA, four phases of Alternative 2, and Action 5 by Incubation Period.

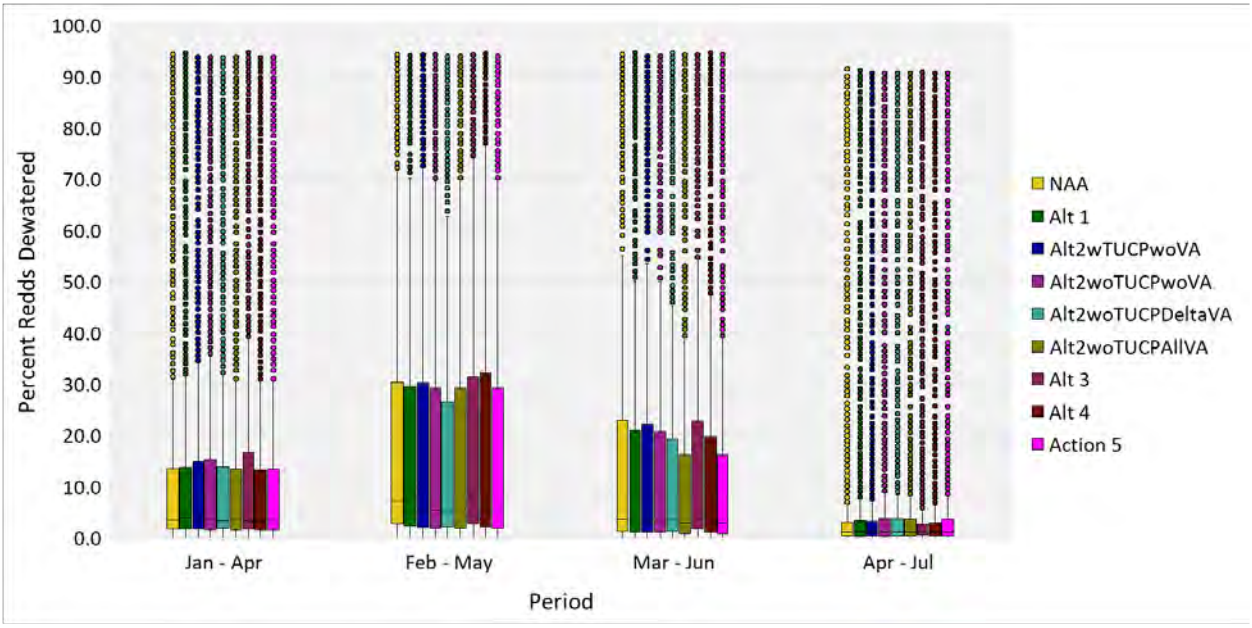



Figure L.4-10. Expected Mean Percent Redds Dewatered for Steelhead in the Sacramento River for the NAA, Alternatives 1-4, and Action 5 by Incubation Period.

Figure L.4-11 and Figure L.4-12 give the results for steelhead redd dewatering grouped by water year type. The results are the same as those provided in Table L.4-15 and Table L.4-16, but additionally show the variation in the results. In the BA modeled scenarios, EXP1 has the most variation in the median percent redds dewatered across water year types and consistently has the highest values (Figure L.4-11). The four phases of Alternative 2 and the NAA are relatively consistent within each water year type. In the EIS modeled scenarios, Alternative 3 has the highest percent of redds dewatered across most water year types, but differences are relatively small (Figure L.4-12). Wet years have the highest median redd dewatering rates because, as discussed for Table L.4-15 and Table L.4-16, flow fluctuations are greatest in wet years during much of the steelhead spawning and incubation period.

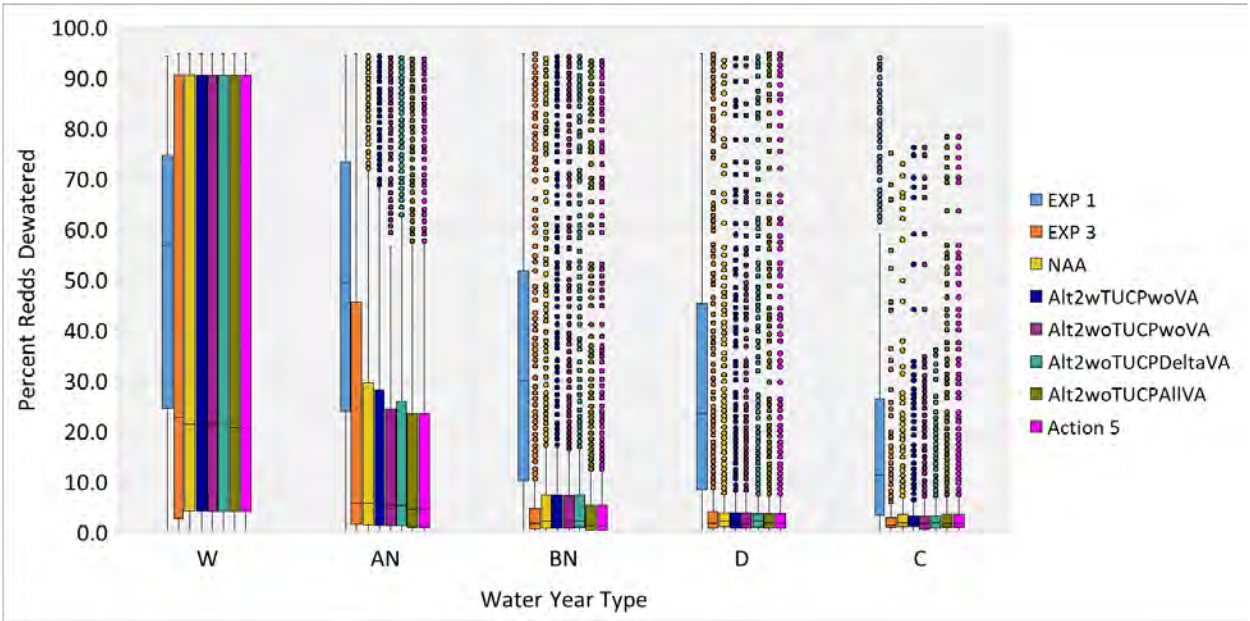



Figure L.4-11. Expected Mean Percent Redds Dewatered for Steelhead in the Sacramento River from Keswick Dam to the Battle Creek Confluence for EXP1, EXP3, the NAA, four phases of Alternative 2, and Action 5 by Water Year Type.

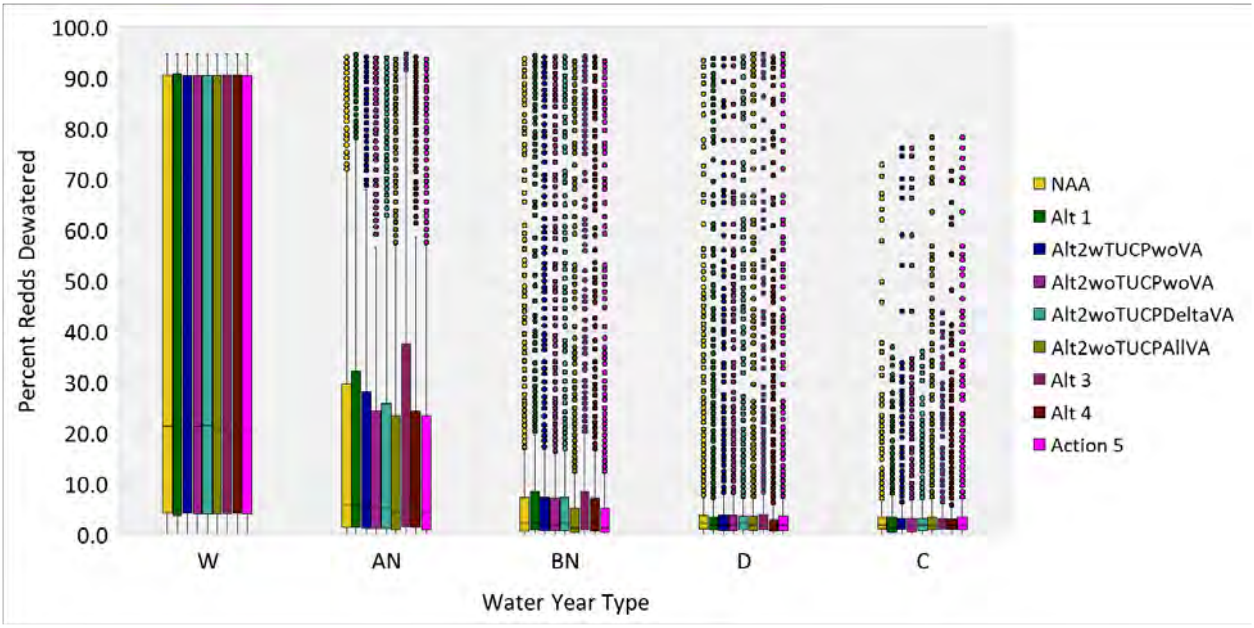



Figure L.4-12. Expected Mean Percent Redds Dewatered for Steelhead in the Sacramento River from Keswick Dam to the Battle Creek Confluence for the NAA, Alternatives 1-4, and Action 5 by Water Year Type

### L.4.3.4 Fall-run Chinook

Table L.4 17 provides the redd dewatering results for Sacramento River fall-run Chinook salmon under the EIS modeled scenarios. The results are the means for all years analyzed, weighted by their expected spawning distributions among months (Table L.4 10). The table includes the percent differences between the results of the NAA and the EIS modeled scenarios alternatives including Action 5 (Table L.4-17).

The results show modest and generally consistent variation in percentage of fall-run redds dewatered with water year type (Table L.4-17). Under NAA and all EIS modeled scenarios for the alternatives, the percent of redds dewatered is lowest in critical water years and, is highest in either wet water years or above normal years. As discussed for spring-run, this pattern of variation is expected for fall-run Chinook because their spawning occurs in the fall and early winter, with incubation extending through winter. During wet winters, periodic storms and high runoff increase flow fluctuations, which tends to result in greater redd dewatering. In drier winters, flow fluctuations are reduced and fewer redds are dewatered. For the EIS modeled scenarios, increases and reductions in redd dewatering from the NAA are similar in number (Table L.4-17). The largest difference is a reduction of 26.6% for Alt 1 in above normal years and the largest increase is 15.6% for Alt 2 Without TUCP Without VA in critical water years.

As noted above, the pattern of variation for fall-run Chinook resembles that reported for spring-run Chinook (see Table L.4 14 and Table L.4-17). This similarity is expected given that the two races have similar spawning periods (Table L.4-10) and redd dewatering for spring-run was determined using the fall-run redd dewatering tables, as discussed in Section L.4.2.1, *Methods*. The main difference in redd dewatering between the two races is that redd dewatering percentages are somewhat higher for spring-run than for fall-run.

Table L.4-17. Expected Percentage of Redds Dewatered for Fall-run Chinook Egg Incubation in the Sacramento River from Keswick Dam to the Battle Creek Confluence for the NAA and Alternatives 1-4. The Lower Panel Gives the Percent Differences of the Alternatives and Action 5 and the NAA

| Water Year Type | NAA | Alt 1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt 3 | Alt 4 | Act5 |
|---|---|---|---|---|---|---|---|---|---|
| W | 14.7 | 13.6 | 14.4 | 14.4 | 14.7 | 14.8 | 13.3 | 13.6 | 14.8 |
| AN | 14.5 | 10.6 | 15.1 | 14.9 | 15.3 | 15.4 | 12.8 | 11.5 | 15.4 |
| BN | 9.2 | 9.5 | 8.7 | 8.6 | 9.3 | 10.0 | 8.6 | 9.6 | 10.0 |
| D | 9.0 | 8.7 | 8.6 | 8.5 | 9.2 | 9.5 | 9.3 | 8.7 | 9.5 |
| C | 6.3 | 5.9 | 6.4 | 7.3 | 6.2 | 6.7 | 7.1 | 6.7 | 6.7 |
| All | 11.0 | 10.1 | 10.9 | 10.9 | 11.2 | 11.5 | 10.5 | 10.3 | 11.5 |
| **Water Year Type** | **NAA** | **Alt 1** | **Alt2 wTUCP woVA** | **Alt2 woTUCP woVA** | **Alt2 woTUCP DeltaVA** | **Alt2 woTUCP AllVA** | **Alt 3** | **Alt 4** | **Act5** |
| W | - | -7.6 | -2.1 | -2.0 | 0.1 | 0.8 | -9.6 | -7.3 | 0.8 |
| AN | - | -26.6 | 4.1 | 3.3 | 5.4 | 6.3 | -11.2 | -20.7 | 6.3 |
| BN | - | 2.9 | -6.3 | -7.2 | 0.5 | 8.3 | -7.3 | 3.7 | 8.3 |
| D | - | -2.5 | -4.1 | -5.2 | 2.8 | 6.1 | 3.9 | -3.2 | 6.1 |
| C | - | -6.8 | 2.0 | 15.6 | -0.5 | 6.4 | 12.7 | 6.8 | 6.4 |
| All | - | -8.6 | -1.6 | -0.9 | 1.7 | 4.5 | -5.0 | -6.2 | 4.5 |

The results for fall-run redd dewatering grouped by months indicate that for EIS modeled scenarios redd dewatering has a large range throughout the egg incubation period (Figure L.4-13). The lowest median percent of redds dewatered are similar October through March, during peak egg incubation. The highest median value for redd dewatering occurs September – December under Alternative 2 without TUCP with Systemwide VA and the No Action Alternative. The lowest median value for redd dewatering occurs under Alternative 1 November – February.

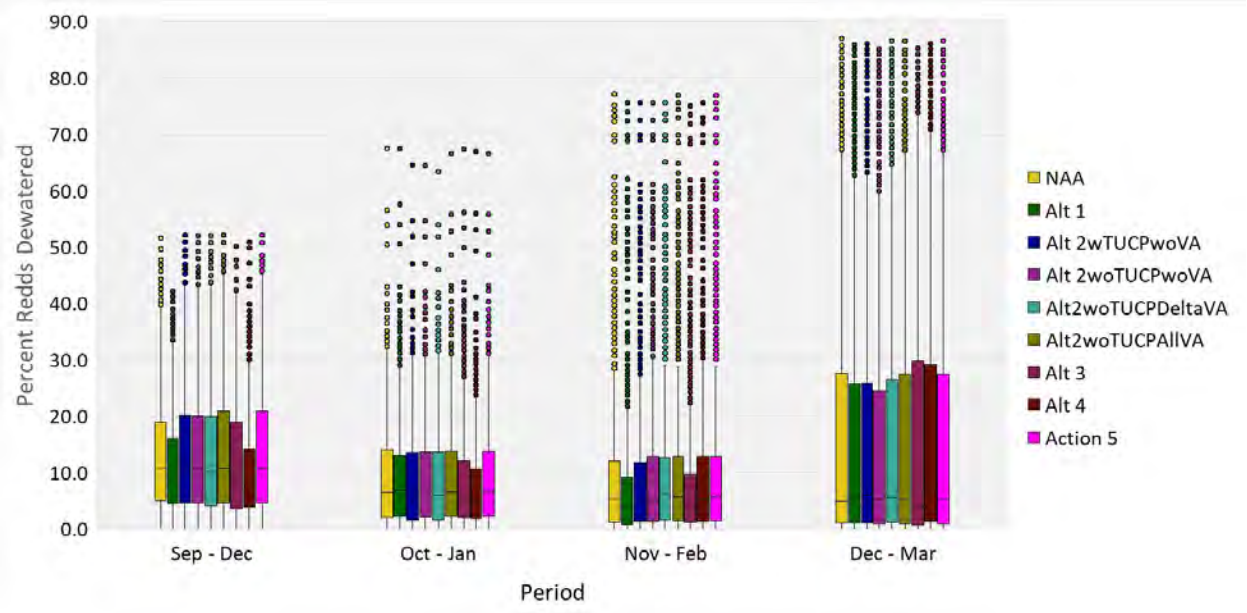



Figure L.4-13. Expected Mean Percent Redds Dewatered for Fall-run Chinook Salmon in the Sacramento River from Keswick Dam to the Battle Creek Confluence for the NAA, Alternatives 1-4, and Action 5 by Incubation Period.

Figure L.4 14 gives the results for fall-run redd dewatering grouped by water year type. The results are the same as those provided in Table L.4 17, but additionally show the variation and range in the results. The four Alternative 2 phases and the NAA are relatively consistent within each water year type. Alternatives 1, 3, and 4 have the lowest median value in Wet and Above Normal years and are relatively similar to the other scenarios in Below Normal, Dry, and

Critically Dry years (Figure L.4 14). As noted previously, the higher redd dewatering rates in the wetter years result from greater fluctuations in flow during such years.

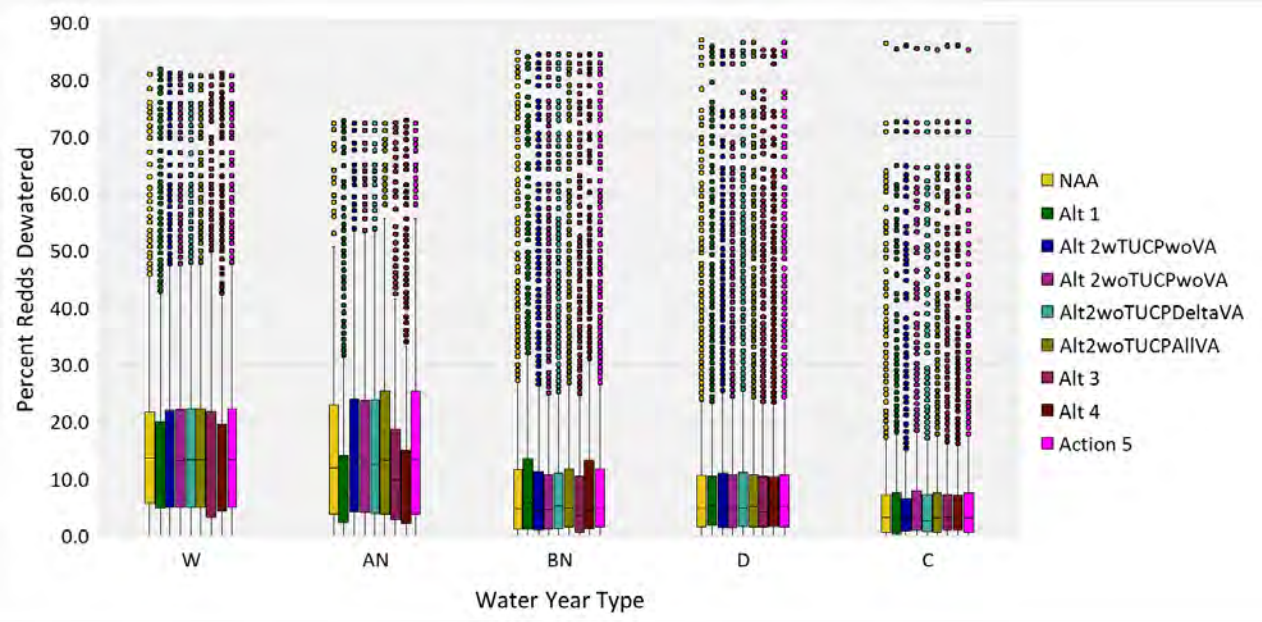



Figure L.4-14. Expected Mean Percent Redds Dewatered for Fall-run Chinook Salmon in the Sacramento River from Keswick Dam to the Battle Creek Confluence for the NAA, Alternatives 1-4, and Action 5 by Water Year Type.

### L.4.3.5 Late Fall-run Chinook

Table L.4-18 provides the redd dewatering results for Sacramento River late fall-run Chinook salmon under the EIS modeled scenarios. The results are the means for all years analyzed, weighted by their expected spawning distributions among months (Table L.4-10). The table includes the percent differences between the results of the NAA and for the EIS modeled scenarios alternatives including Action 5 (Table L.4-18).

The results show large and consistent variation in percentage of late fall-run redds dewatered with water year type under the NAA and the EIS and alternatives (Table L.4-18). For the NAA and EIS modeled scenarios, the mean redd dewatering is higher in wet water years than in the other water year types and steadily declines with drier water year types. This pattern of variation reflects flow conditions for the winter and early spring months when late fall-run spawning and incubation occurs. During wet winters and springs, periodic storms and high runoff increase flow fluctuations, which tends to result in greater redd dewatering. In drier years, flow fluctuations are reduced and fewer redds are dewatered. For the EIS modeled scenarios, increases in redd dewatering from the NAA tend to be larger and more frequent than reductions (Table L.4-18). The largest increase is 35.5% for Alt 3 in critical water years and the largest reduction in 39.2% for Alt 2 Without TUCP Delta VA in critical water years. For all alternatives scenarios except Alt 1, the largest differences in redd dewatering from the NAA occur for critical or dry water years (Table L.4-18).

The pattern of variation for late fall-run Chinook redd dewatering resembles that previously reported for steelhead (Table L.4-15 and Table L.4-16). This similarity is expected given that the two races have similar spawning periods (Table L.4-10). The main difference between late fall-run and steelhead redd dewatering is that redd dewatering percentages are higher for steelhead in wet and above normal water years (see Table L.4-16 and Table L.4-18). Such a difference suggests that steelhead redds are more vulnerable than late fall-run redds to dewatering at high, fluctuating flows, as might be true if they tended to spawn at shallower depths, but there no evidence of such a difference has been shown (Gard 2023).

Table L.4-18. Expected Percentage of Redds Dewatered for Late Fall-run Chinook Egg Incubation in the Sacramento River from Keswick Dam to the Battle Creek Confluence for the NAA and Alternatives 1-4. The lower panel gives the percent differences of the Alternatives and Action 5 and the NAA

| Water Year Type | NAA | Alt 1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt 3 | Alt 4 | Act5 |
|---|---|---|---|---|---|---|---|---|---|
| W | 29.9 | 30.5 | 30.2 | 30.2 | 30.1 | 30.0 | 30.6 | 31.3 | 29.4 |
| AN | 17.8 | 20.1 | 17.7 | 17.0 | 17.3 | 17.1 | 20.2 | 18.3 | 16.8 |
| BN | 10.1 | 10.2 | 10.3 | 10.2 | 10.7 | 10.7 | 11.2 | 10.2 | 10.5 |
| D | 7.8 | 7.8 | 8.2 | 8.0 | 8.6 | 9.2 | 7.9 | 7.5 | 9.0 |
| C | 2.3 | 2.3 | 2.3 | 2.1 | 1.4 | 2.8 | 3.2 | 2.7 | 2.7 |
| All | 15.0 | 15.5 | 15.2 | 15.0 | 15.1 | 15.4 | 15.8 | 15.4 | 15.1 |
| **Water Year Type** | **NAA** | **Alt 1** | **Alt2 wTUCP woVA** | **Alt2 woTUCP woVA** | **Alt2 woTUCP DeltaVA** | **Alt2 woTUCP AllVA** | **Alt 3** | **Alt 4** | **Act5** |
| W | - | 1.8 | 1.0 | 1.0 | 0.5 | 0.3 | 2.1 | 4.5 | -1.7 |
| AN | - | 12.6 | -0.8 | -4.4 | -3.2 | -4.2 | 13.1 | 2.7 | -5.9 |
| BN | - | 0.6 | 1.9 | 1.2 | 6.2 | 5.5 | 10.2 | 0.5 | 4.1 |
| D | - | 0.7 | 5.4 | 2.8 | 10.2 | 18.7 | 2.0 | -3.1 | 15.5 |
| C | - | -0.2 | -0.5 | -9.9 | -39.2 | 20.2 | 35.5 | 15.6 | 13.9 |
| All | - | 3.4 | 1.3 | 0.1 | 0.8 | 2.9 | 5.8 | 3.1 | 0.9 |

The results for late fall-run redd dewatering grouped by months indicate that for EIS modeled scenarios redd dewatering has a large range throughout the egg incubation period (Figure L.4-15). The lowest median percent of redds dewatered occurs in March – June across all scenarios. These reduced redd dewatering rates may result from the installation of the ACID Dam beginning in April, which results in reduced flow fluctuation in the reach below Keswick, where most late fall-run Chinook spawn (Table L.4-9). The Keswick reach redd dewatering table for April through October (Table L.4-2) reflects this change. The highest median value for redd dewatering occurs in February – May period under Alternative 1.

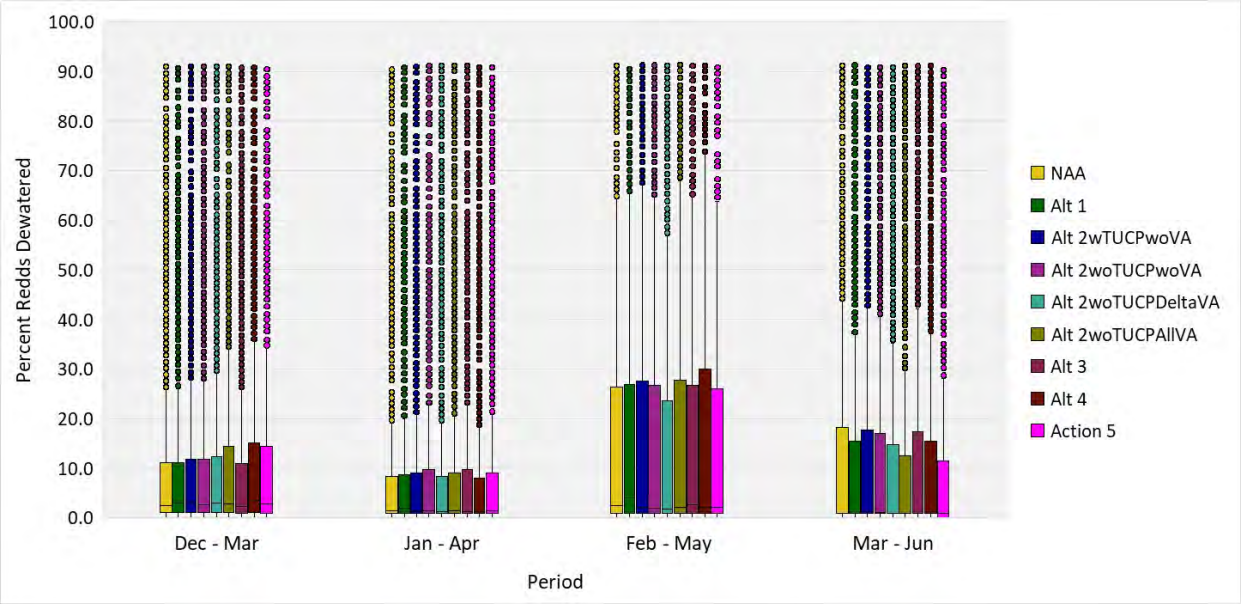



Figure L.4-15. Expected Mean Percent Redds Dewatered for Late Fall-run Chinook Salmon in the Sacramento River from Keswick Dam to the Battle Creek Confluence for the NAA, Alternatives 1-4, and Action 5 by Incubation Period.

Figure L.4-16 gives the results for late fall-run redd dewatering grouped by water year type. The results are the same as those provided in Table L.4-18, but additionally show the variation and range in the results. Critically dry years have the least amount of variation in redd dewatering and below normal, dry, and critical water year types have very low median values. The four Alternative 2 phases and the NAA are relatively consistent within each water year type.

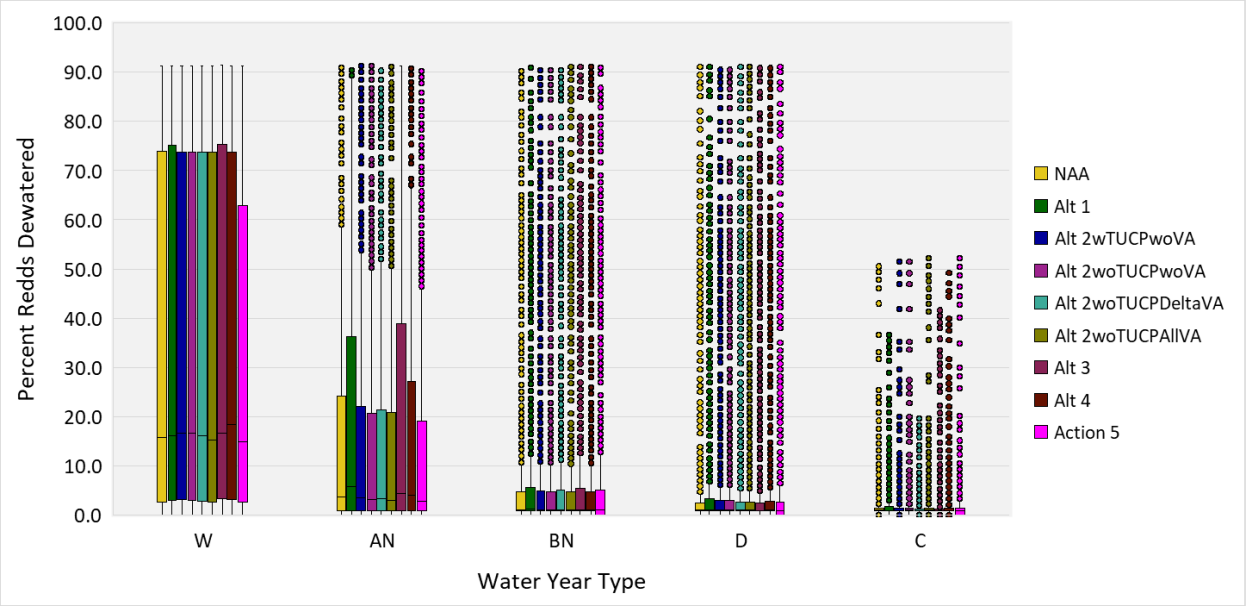



Figure L.4-16. Expected Mean Percent Redds Dewatered for Late Fall-run Chinook Salmon in the Sacramento River from Keswick Dam to the Battle Creek Confluence for the NAA, Alternatives 1-4, and Action 5 by Water Year Type.

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