Appendix AB-O, Tributary Habitat Restoration

# Attachment O.2 CVPIA SIT LCM Habitat Estimates

## O.2.1 Methods

### O.2.1.1 Model Overview

Estimates of suitable habitat for Chinook salmon life stages, including spawning adults and rearing juveniles, that vary as a function of flow are estimated in this analysis using two methods: 1) weighted usable area (WUA) based on hydraulic modeling and habitat suitability curves and 2) the combination of hydraulic modeling and minimum habitat quality thresholds (e.g., HEC-RAS). For both methods, reference tables were created that link flow values to corresponding estimates of habitat. These relationships are often non-linear, such that increasing flow can either increase or decrease estimates of available habitat. Reference tables and functions for linking flow to habitat estimates were obtained from the DSMhabitat package developed by FlowWest (Available at https://github.com/CVPIA-OSC/DSMhabitat), which is applied in support of CVPIA SIT Decision Support Models (DSMs) for Central Valley salmonids. Reclamation staff most recently installed the DSMhabitat package on 9/18/23. For rearing in-stream habitat, habitat estimates were obtained for the "juvenile" life stage category from the DSMhabitat functions (i.e., separate relationships were developed for "fry" and "juvenile"). Modeling details for flow-habitat relationships for selected watersheds (i.e., Upper Sacramento River, Clear Creek, American River, Stanislaus River, Yolo Bypass, Sutter Bypass) are provided in supporting documentation at the following site:
Habitat Data — habitat_data • DSMhabitat (cvpia-osc.github.io).

There are critiques of the WUA method that bear mentioning. Railsback (2016) describes several shortcomings of WUA methods, including 1) inconsistent handling of spatial scales, 2) failure to consider dynamic flow regimes, and 3) lack of clarity and biological meaning. Additionally, the shape of the habitat suitability curves used to generate WUA estimates can be sensitive to the choice of data filtering methods; an example of this sensitivity is documented in USFWS (2007). WUA methods also typically use substrate particle size, water depth, and flow velocity to determine spawning habitat suitability and cover, water depth, and flow velocity for juvenile habitat; other factors of potential relevance, including competition, food availability, and water quality, are not included. These criticisms are acknowledged and should be considered in the weight of evidence of these methods. However, calculations of WUA are included as the best quantitative information of habitat availability, as it relates to flow, for selected watersheds.

Flow values are obtained for each watershed using alternative-specific CalSim 3 output following the conventions described in the DSMflow R package (Available at https://github.com/CVPIA-OSC/DSMflow). In instances where node definitions were changed

from CalSim II to CalSim 3 (i.e., the DSMflow workflow and documentation is predicated on CalSim II data), Reclamation documented any changes and revisions in utilizing CalSim 3 data (see Appendix F, Attachments F.1 and F.2, for a more detailed description). The full workflow and corresponding annotation for this analysis is provided in the BDO Science repository.

### O.2.1.2 Run-, Life Stage-, and Watershed-Specific Habitat Estimates

Anticipated combinations of run types, life stages, and watersheds included in habitat quantity calculations for each alternative are summarized in Table O.2-1. Estimates of habitat are calculated for each CalSim 3 year (i.e., 1922-2021) and month relevant to each run type and life stage. For rearing juveniles in non-bypass habitats, separate habitat estimates are provided for in-stream and floodplain habitat types. Bypass habitat estimates are the same for all run types. Expected spawning months for winter-run are May through August and river rearing months are August through January (based on conceptual models in Appendix AB-D). Expected spawning months for spring-run are September and October and river rearing occurs in all months when young of year and yearlings are considered jointly. Expected spawning months for steelhead are January through April and river rearing occurs in all months.

Some researchers argue that WUA should not be expressed in units of area, as WUA is calculated as the product of total stream area and a unitless habitat suitability index (HSI) (Payne 2003). However, for consistency in reporting habitat values across watersheds, life stages, runs, and habitat modeling methods, results express WUA estimates in values in units of area (acres).

Table O.2-1. Combinations of run types, life stages, and watersheds included in habitat calculations for each alternative.

| Watershed | Runs Modeled | Life Stage | Method | Reference |
|---|---|---|---|---|
| Upper Sacramento River | Winter-run, spring-run, steelhead | Spawners | WUA [1] | USFWS 2003 |
| | | Juveniles | HEC-RAS [2] | Central Valley Floodplain Evaluation and Delineation (CVFED) HEC-RAS hydraulic model |
| Clear Creek | Spring-run, steelhead | Spawners | WUA [1] | USFWS 2007; USFWS 2011 |
| | | Juveniles | WUA (instream) [2]; HEC-RAS (floodplain) | USFWS 2011; USFWS 2013; USFWS 2017 [3] |
| American River | Steelhead | Spawners | WUA | Bratovich et al. 2017 |
| | | Juveniles | WUA (instream); HEC-RAS (floodplain) | USFWS 1985 |
| Stanislaus River | Steelhead | Spawners | WUA | Aceituno 1993 |
| | | Juveniles | WUA (instream); SRH-2D (floodplain) | USFWS 2012; Frank 2018 |
| Yolo Bypass | Winter-run, spring-run, steelhead | Juveniles | HEC-RAS | HEC-RAS model |

| Watershed | Runs Modeled | Life Stage | Method | Reference |
|---|---|---|---|---|
| Sutter Bypass | Winter-run, spring-run, steelhead | Juveniles | HEC-RAS | HEC-RAS model |

[1] Gravel additions conducted in Clear Creek since 2003, after data collection occurred to construct habitat suitability curves, are expected to have increased spawning habitat availability for spring-run Chinook salmon by 533% and 2397% in the Upper Alluvial and Canyon Reaches of Clear Creek, respectively, relative to the habitat amounts used in the CVPIA SIT DSMs (USFWS 2015). Therefore, estimates reported in the DSMs and in this Line of Evidence are expected to represent underestimates of current conditions. Recent gravel additions in the Upper Sacramento River may have similarly shifted realized spawning habitat availability relative to modeled quantities.
[2] Instream and floodplain flow-habitat curves all assumed to be the same for all run types and species in this watershed.
[3] This reference is used to generate estimates of floodplain habitat and was based on modeling conducted for Cottonwood Creek, as a nearby analogue.

### O.2.1.3 Assessing Expected Spawning Habitat Limitations

Potential spawning habitat limitations were assessed by comparing historical spawner abundances to potential spawner abundance capacity based on modeled habitat availability and expected redd size. Average spawner abundances for the past 20 years (i.e., 2002-2021) are as follows: 5554 winter-run spawners in the Upper Sacramento River, 95 spring-run spawners in the Upper Sacramento River, and 217 spring-run spawners in Clear Creek (Azat 2022). If an even sex ratio is assumed, consistent with the logic in the DSMs, the numbers of expected female spawners are 2777, 48, and 109, respectively. Reclamation staff calculated the potential, habitat-based female spawner capacity by dividing the estimated habitat quantities (i.e., estimated using WUA methods) by the expected redd size. The DSMs specify an average redd size of 9.29 $m^2$ (Peterson and Duarte 2019), and Reclamation staff used this same value as the expected redd size. Using a fixed, average redd size neglects to consider variability in estimated or observed redd sizes, which have ranged from approximately 4.5 $m^2$ to 20 $m^2$ (USFWS 2015). Lack of consistent spawner estimates for steelhead prevented Reclamation staff from calculating spawner limitation ratios for this species.

Spawner ratios (i.e., historical spawner abundance divided estimated spawner capacity) greater than one are generally expected to indicate potential limitations in spawning habitat capacity and ratios less than one should indicate spawning habitat is not limiting. These calculations assume all historical spawners would have spawned in a single month, such that the provided ratios likely reflect over-estimates of potential habitat limitation. Similar methods of estimating habitat capacity using WUA values have been described and applied in other systems (e.g., Bond et al. 2018; Roni et al. 2023).

## O.2.2 Results

Month- and watershed-specific mean values of spawning and rearing habitat for winter-run Chinook salmon, spring-run Chinook salmon, and steelhead, are presented for all alternatives and baseline scenarios in Table O.2-2 through Table O.2-37 and Figure O.2-1 through Figure O.2-42, below.

### O.2.2.1 Spawning Habitat

#### *O.2.2.1.1 EIS Takeaways*

Spawning habitat for winter-run adults in the Upper Sacramento River was lowest in July for all alternatives (e.g., 47.21 acres for Alt2woTUCPwoVA in July; Table O.2-2, Figure O.2-1); however, spawner ratios much less than one indicate spawning habitat may not be limiting across months and alternatives (Figure O.2-2). All four components of Alt2, in addition to Alt4, resulted in small decreases in winter-run spawning habitat quantity in May but larger increases in quantity in June, July, and August (i.e., between -0.5 and 2.7% changes in habitat quantity; Table O.2-2). Changes in habitat quantity were more variable for Alt1 and Alt 3 (i.e., between -3.8 and 4.6% changes; Table O.2-2). From May to August, the greatest expected Sacramento River flow below Keswick Dam occurs in July (see Appendix AB-B Water Operations and Ecosystem Analyses).

Spawning habitat for spring-run in the Upper Sacramento River increases slightly from September to October for all alternatives (e.g., 61.97 acres for Alt2woTUCPwoVA in October; Table O.2-3, Figure O.2-3), but spawner ratios much less than one indicate spawning habitat may not be limiting (Figure O.2-5). All four components of Alt2, in addition to Alt4, resulted in small decreases in spawning habitat in both months (i.e., between -0.4 and 0% changes; Table O.2-3). Habitat increased in both months for Alt1 and Alt3 (i.e., between 0.1 and 2.8% changes; Table O.2-3). Expected Sacramento River flow below Keswick Dam is greater in October than September.

Spawning habitat for spring-run adults in Clear Creek increases in October (e.g., 0.24 acres for Alt2woTUCPwoVA in October), but spawner ratios greater than one in September indicate potential spawning habitat limitation (Table O.2-4; Figure O.2-4, Figure O.2-6). Habitat decreased across all alternatives. The smallest decreases occurred for Alt4 and all components of Alt2 (i.e., between -12.0 and -9.4% changes), and the largest occurred for Alt1 (i.e., between -76.3 and -72.0% changes). Expected Clear Creek flow below Whiskeytown is greater in October than September.

Spawning habitat for steelhead adults increases in April in the Upper Sacramento River for all alternatives (e.g., 13.22 acres for Alt2woTUCPwoVA in April; Table O.2-5; Figure O.2-7). Habitat decreased slightly across all alternatives in January, February, and April, with similar magnitudes of decreases for each (i.e., between -1.3 and -0.2 % changes, excluding a 0.8% change for Alt3 in April). In March, all four components of Alt2 resulted in no change or small increases in habitat (i.e., between 0.0 and 0.7% changes) and Alt1, Alt3, Alt4 resulted in no change or small decreases in habitat (i.e., between -0.5 and 0.0% changes). From January to April, expected Sacramento River flow below Keswick Dam is lowest in April.

Steelhead spawning habitat remains relatively constant across months in Clear Creek for all alternatives (e.g., 2.07 acres for ALT2woTUCPwoVA in April; Table O.2-6; Figure O.2-8). Habitat changes were highly variable across months for all alternatives but Alt1; for Alt1, habitat decreased in all months (i.e., between -28.4 and -15.8% relative to NAA). For all other alternatives, habitat decreased slightly in January and March (i.e., between -1.9 and -0.6% changes) and increased to varying degrees in February and April (i.e., between 0.2 and 4.1% changes). From January to April, expected Clear Creek flow below Whiskeytown is highest in February.

Steelhead spawning habitat decreases for all alternatives in the American River in February (e.g., 116.61 acres for Alt2woTUCPwoVA in February; Table O.2-7; Figure O.2-9). With the exception of Alt3 in January (i.e., 2.0% change), all alternatives resulted in habitat decreases in all months. The smallest decreases occurred for Alt4 and all four components of Alt2 (i.e., between -3.1 and -1.4% changes). The largest decreases occurred for Alt1 (i.e., between -14.4 and -8.3% changes). From January to April, expected American River flow below Nimbus Dam is highest in February.

Steelhead spawning habitat decreases from January to April in the Stanislaus River (e.g., 16.72 acres for Alt2woTUCPwoVA in April; Table O.2-8; Figure O.2-10). All four components of Alt2 and Alt4 resulted in habitat decreases relative to NAA in January (i.e., between -4.3 and -3.5% changes) and variable increases in February, March, and April (i.e., between 2.3 and 12.3% changes). Habitat decreased in January, March, and April for Alt1 (i.e., between -25.7 and -6.0% changes) and decreased in February, March, and April for Alt3 (i.e., between -20.9 and -10.3% changes). From January to April, expected Stanislaus River flow below Goodwin Dam is highest in February.

#### *O.2.2.1.2 BA Takeaways*

Spawning habitat for winter-run adults in the Upper Sacramento River was lowest in July (e.g., 47.21 acres for Alt2woTUCPwoVA); however, spawner ratios much less than one indicate spawning habitat may not be limiting across months and alternatives (Table O.2-9; Figure O.2-11, Figure O.2-12). From May to August, the greatest expected Sacramento River flow below Keswick Dam occurs in July (see Appendix AB-B Water Operations and Ecosystem Analyses).

Spawning habitat for spring-run in the Upper Sacramento River increases slightly from September to October for all alternatives (e.g., 61.97 acres for Alt2woTUCPwoVA in October), but spawner ratios much less than one indicate spawning habitat may not be limiting (Table O.2-10; Figure O.2-13, Figure O.2-14). Expected Sacramento River flow below Keswick Dam is greater in October than September. Spawning habitat for spring-run adults in Clear Creek increases in October (e.g., 0.24 acres for Alt2woTUCPwoVA in October) and spawner ratios greater than one in September and October indicate potential spawning habitat limitation in both spawning months (Table O.2-11; Figure O.2-15, Figure O.2-16). Expected Clear Creek flow below Whiskeytown is greater in October than September.

Spawning habitat for steelhead adults increases in April in the Upper Sacramento River (e.g., 13.22 acres for Alt2woTUCPwoVA; Table O.2-12, Figure O.2-17), remains relatively constant across months in Clear Creek (e.g., 2.07 acres for Alt2woTUCPwoVA in April; Table O.2-13, Figure O.2-18), was lowest in February and highest in April in the American River for all alternatives (e.g., 116.61 acres for Alt2woTUCPwoVA in February and 150.11 acres in April; Table O.2-14, Figure O.2-19), and decreases from January to April in the Stanislaus River for all alternatives (e.g., 16.72 acres for Alt2woTUCPwoVA in April; Table O.2-15; Figure O.2-20). From January to April, the lowest expected flows in the Sacramento River below Keswick Dam, Clear Creek below Whiskeytown, American River below Nimbus Dam, and Stanislaus River below Goodwin Dam occur in April.

Table O.2-2. Predicted mean spawning habitat quantities, in acres, for adult winter-run Chinook salmon in the Upper Sacramento River. Parentheses indicate percent different from NAA (negative values indicate a decrease in expected habitat quantity).

| WYT | Month | NAA | Alt1 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | Alt3 | Alt4 |
|---|---|---|---|---|---|---|---|---|---|
| All | 5 | 54.75 | 54.69 (-0.1) | 54.50 (-0.5) | 54.49 (-0.5) | 54.47 (-0.5) | 54.59 (-0.3) | 52.68 (-3.8) | 54.59 (-0.3) |
| All | 6 | 53.65 | 52.31 (-2.5) | 54.03 (0.7) | 54.03 (0.7) | 54.06 (0.8) | 54.65 (1.9) | 54.77 (2.1) | 54.01 (0.7) |
| All | 7 | 46.15 | 47.02 (1.9) | 47.30 (2.5) | 47.21 (2.3) | 46.98 (1.8) | 47.41 (2.7) | 48.26 (4.6) | 47.09 (2.0) |
| All | 8 | 54.68 | 55.49 (1.5) | 54.82 (0.3) | 54.77 (0.2) | 54.65 (-0.1) | 54.81 (0.2) | 53.78 (-1.7) | 54.85 (0.3) |

Table O.2-3. Predicted mean spawning habitat quantities, in acres, for adult spring-run Chinook salmon in the Upper Sacramento River. Parentheses indicate percent different from NAA (negative values indicate a decrease in expected habitat quantity).

| WYT | Month | NAA | Alt1 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | Alt3 | Alt4 |
|---|---|---|---|---|---|---|---|---|---|
| All | 9 | 59.46 | 61.12 (2.8) | 59.36 (-0.2) | 59.37 (-0.2) | 59.40 (-0.1) | 59.23 (-0.4) | 60.52 (1.8) | 59.41 (-0.1) |
| All | 10 | 62.03 | 62.08 (0.1) | 62.06 (0.0) | 61.97 (-0.1) | 61.86 (-0.3) | 61.89 (-0.2) | 62.24 (0.3) | 62.00 (-0.1) |

Table O.2-4. Predicted mean spawning habitat quantities, in acres, for adult spring-run Chinook salmon in Clear Creek. Parentheses indicate percent different from NAA (negative values indicate a decrease in expected habitat quantity).

| WYT | Month | NAA | Alt1 | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA | Alt3 | Alt4 |
|---|---|---|---|---|---|---|---|---|---|
| All | 9 | 0.21 | 0.06 (-72.0) | 0.19 (-9.4) | 0.19 (-12.0) | 0.19 (-11.7) | 0.19 (-12.0) | 0.17 (-20.1) | 0.19 (-10.1) |
| All | 10 | 0.27 | 0.06 (-76.3) | 0.24 (-11.1) | 0.24 (-11.9) | 0.24 (-11.5) | 0.24 (-11.9) | 0.23 (-15.3) | 0.24 (-11.5) |

Table O.2-5. Predicted mean spawning habitat quantities, in acres, for adult steelhead in the Upper Sacramento River. Parentheses indicate percent different from NAA (negative values indicate a decrease in expected habitat quantity).

| WYT | Month | NAA | Alt1 | Alt2wTUCPwoVA | Alt2woTUCPwoVA | Alt2woTUCPDeltaVA | Alt2woTUCPAllVA | Alt3 | Alt4 |
|---|---|---|---|---|---|---|---|---|---|
| All | 1 | 9.85 | 9.81 (-0.4) | 9.74 (-1.2) | 9.80 (-0.5) | 9.82 (-0.3) | 9.80 (-0.5) | 9.73 (-1.3) | 9.80 (-0.5) |
| All | 2 | 9.28 | 9.27 (-0.2) | 9.17 (-1.2) | 9.19 (-0.9) | 9.20 (-0.9) | 9.17 (-1.2) | 9.25 (-0.4) | 9.20 (-0.9) |
| All | 3 | 10.13 | 10.08 (-0.5) | 10.14 (0.0) | 10.20 (0.7) | 10.17 (0.3) | 10.16 (0.3) | 10.13 (0.0) | 10.12 (-0.1) |
| All | 4 | 13.26 | 13.23 (-0.3) | 13.24 (-0.2) | 13.22 (-0.4) | 13.23 (-0.2) | 13.14 (-0.9) | 13.37 (0.8) | 13.24 (-0.2) |

Table O.2-6. Predicted mean spawning habitat quantities, in acres, for adult steelhead in Clear Creek. Parentheses indicate percent different from NAA (negative values indicate a decrease in expected habitat quantity).

| WYT | Month | NAA | Alt1 | Alt2wTUCPwoVA | Alt2woTUCPwoVA | Alt2woTUCPDeltaVA | Alt2woTUCPAllVA | Alt3 | Alt4 |
|---|---|---|---|---|---|---|---|---|---|
| All | 1 | 2.03 | 1.45 (-28.4) | 2.01 (-0.6) | 2.01 (-0.6) | 2.01 (-0.6) | 2.01 (-0.6) | 2.02 (-0.5) | 2.01 (-0.6) |
| All | 2 | 1.90 | 1.60 (-15.8) | 1.98 (4.1) | 1.98 (4.1) | 1.98 (4.1) | 1.98 (4.1) | 1.96 (3.4) | 1.98 (4.1) |
| All | 3 | 2.05 | 1.62 (-21.3) | 2.03 (-1.3) | 2.03 (-1.3) | 2.03 (-1.3) | 2.03 (-1.3) | 2.01 (-1.9) | 2.03 (-1.3) |
| All | 4 | 2.06 | 1.48 (-28.1) | 2.07 (0.3) | 2.07 (0.3) | 2.07 (0.3) | 2.07 (0.3) | 2.07 (0.2) | 2.07 (0.3) |

Table O.2-7. Predicted mean spawning habitat quantities, in acres, for adult steelhead in the American River. Parentheses indicate percent different from NAA (negative values indicate a decrease in expected habitat quantity).

| WYT | Month | NAA | Alt1 | Alt2wTUCPwoVA | Alt2woTUCPwoVA | Alt2woTUCPDeltaVA | Alt2woTUCPAllVA | Alt3 | Alt4 |
|---|---|---|---|---|---|---|---|---|---|
| All | 1 | 135.48 | 119.82 (-11.6) | 132.57 (-2.2) | 132.09 (-2.5) | 131.31 (-3.1) | 131.38 (-3.0) | 138.19 (2.0) | 132.30 (-2.3) |
| All | 2 | 119.11 | 109.24 (-8.3) | 116.12 (-2.5) | 116.61 (-2.1) | 116.46 (-2.2) | 116.47 (-2.2) | 117.17 (-1.6) | 116.16 (-2.5) |
| All | 3 | 149.55 | 128.00 (-14.4) | 147.41 (-1.4) | 146.24 (-2.2) | 145.75 (-2.5) | 146.37 (-2.1) | 144.86 (-3.1) | 146.73 (-1.9) |
| All | 4 | 154.25 | 133.25 (-13.6) | 151.23 (-2.0) | 150.11 (-2.7) | 150.90 (-2.2) | 151.22 (-2.0) | 140.13 (-9.1) | 151.62 (-1.7) |

Table O.2-8. Predicted mean spawning habitat quantities, in acres, for adult steelhead in the Stanislaus River. Parentheses indicate percent different from NAA (negative values indicate a decrease in expected habitat quantity).

| WYT | Month | NAA | Alt1 | Alt2wTUCPwoVA | Alt2woTUCPwoVA | Alt2woTUCPDeltaVA | Alt2woTUCPAllVA | Alt3 | Alt4 |
|---|---|---|---|---|---|---|---|---|---|
| All | 1 | 23.49 | 22.07 (-6.0) | 22.47 (-4.3) | 22.66 (-3.5) | 22.64 (-3.6) | 22.66 (-3.5) | 23.64 (0.7) | 22.47 (-4.3) |
| All | 2 | 21.14 | 19.45 (-8.0) | 21.88 (3.5) | 21.98 (4.0) | 21.97 (3.9) | 21.97 (3.9) | 17.80 (-15.8) | 21.88 (3.5) |
| All | 3 | 20.94 | 21.56 (3.0) | 21.42 (2.3) | 21.67 (3.5) | 21.67 (3.5) | 21.67 (3.5) | 16.56 (-20.9) | 21.44 (2.4) |
| All | 4 | 14.89 | 11.06 (-25.7) | 16.72 (12.3) | 16.72 (12.3) | 16.72 (12.3) | 16.72 (12.3) | 13.36 (-10.3) | 16.73 (12.3) |

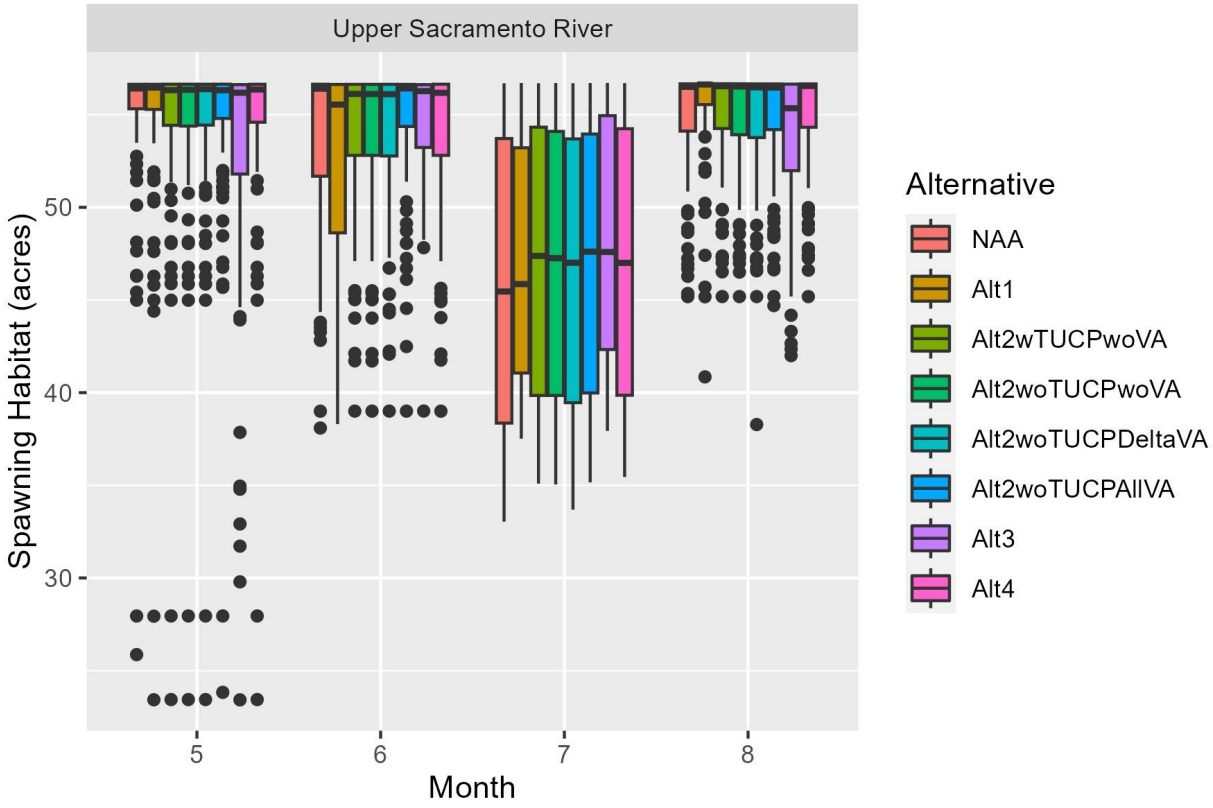


Figure O.2-1. Estimated spawning habitat for winter-run adults in the Upper Sacramento River. Variability within months reflects variation across CalSim WYs.

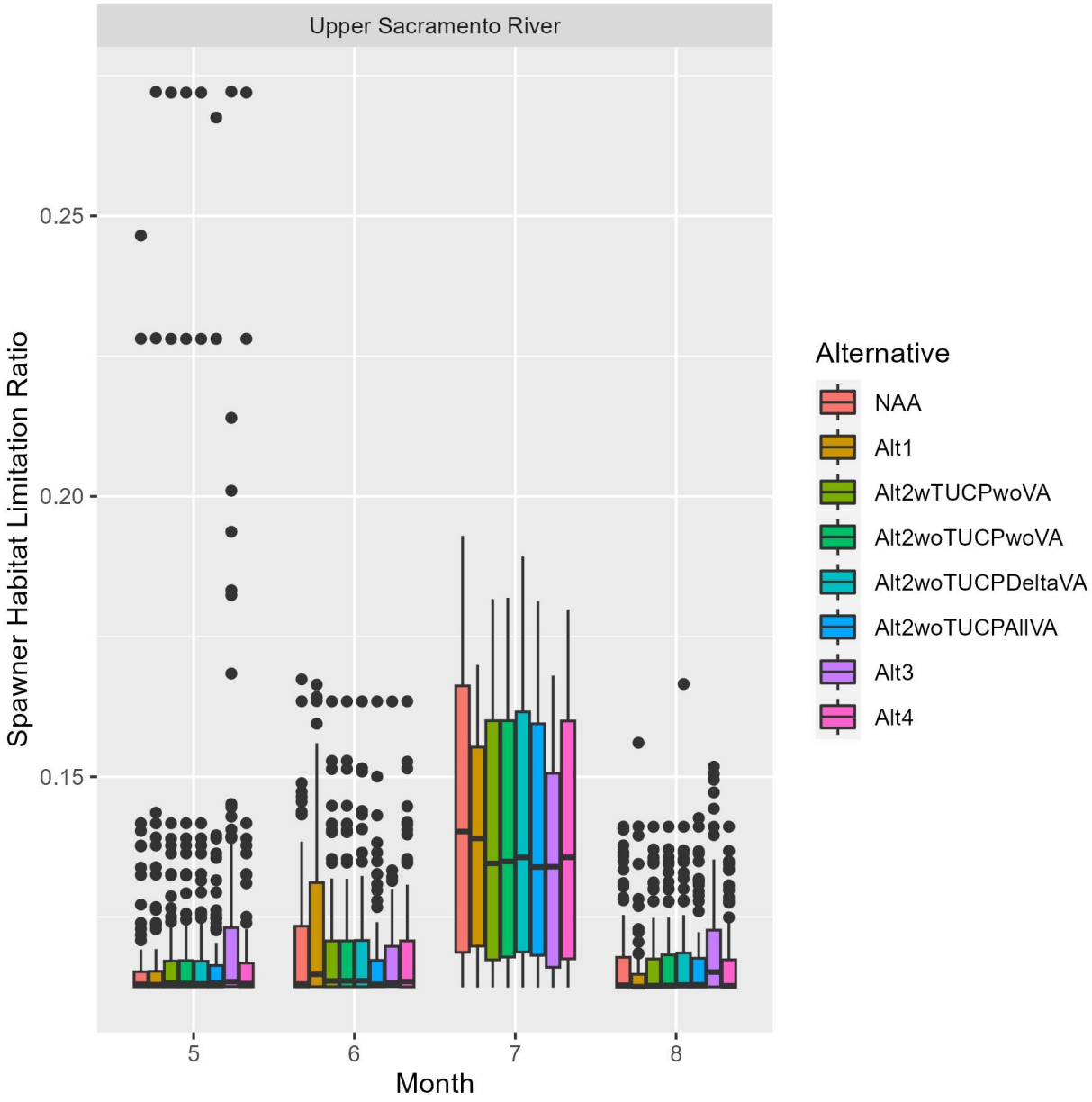


Figure O.2-2. Estimated spawning habitat limitation ratios for winter-run adults in the Upper Sacramento River. Variability within months reflects variation across CalSim WYs.

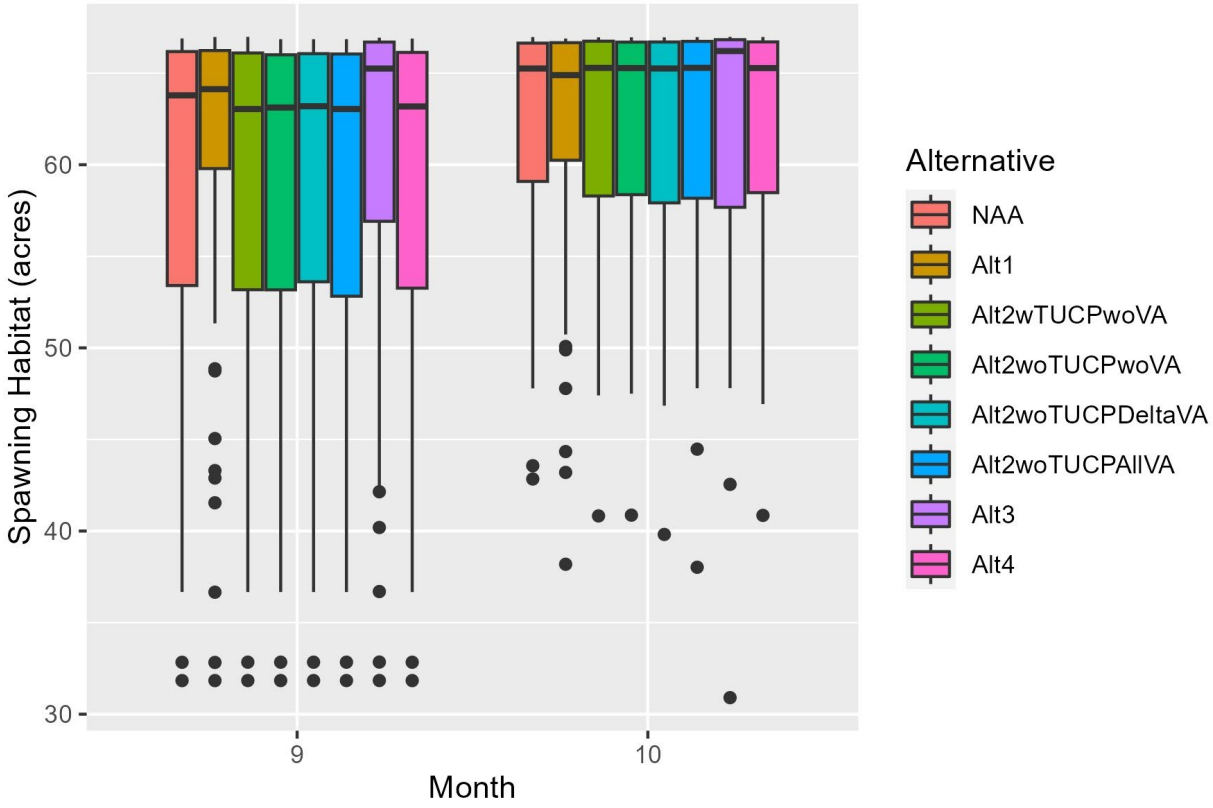


Figure O.2-3. Estimated spawning habitat for spring-run adults in the Upper Sacramento River. Variability within months reflects variation across CalSim WYs.

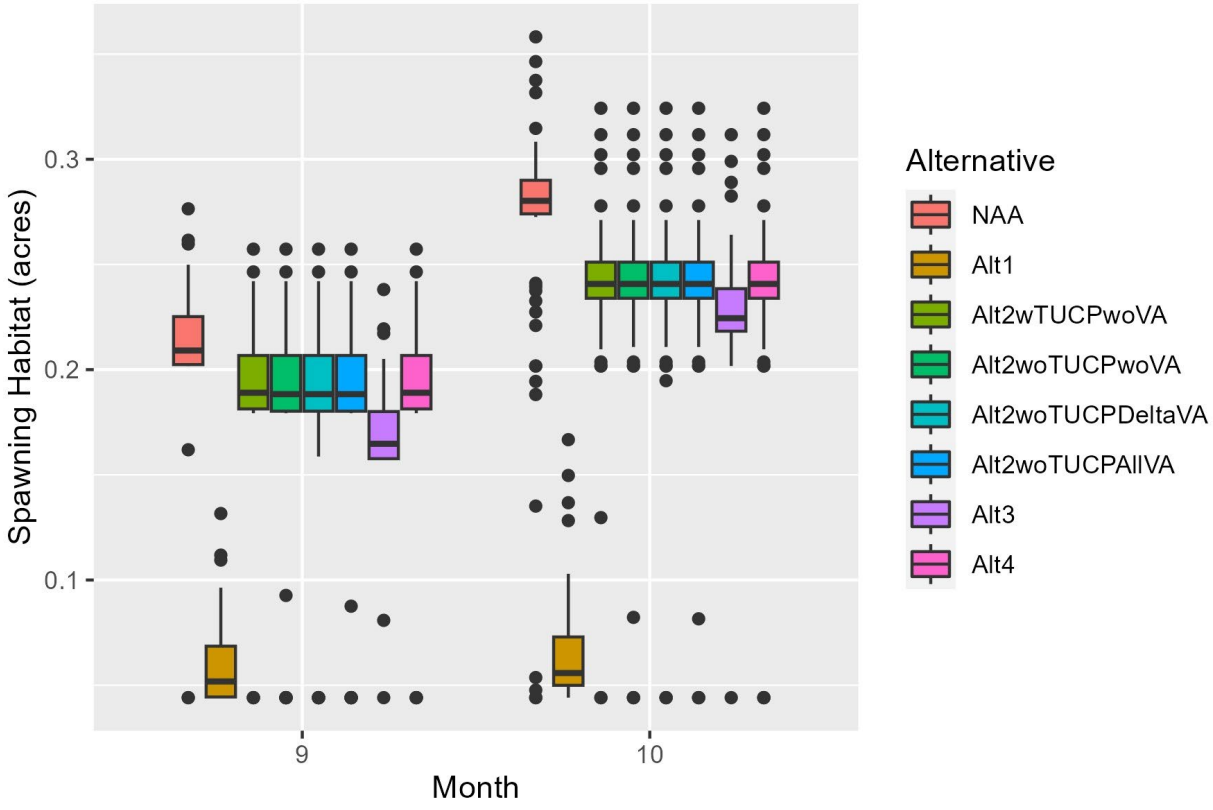


Figure O.2-4. Estimated spawning habitat for spring-run adults in Clear Creek. Variability within months reflects variation across CalSim WYs.

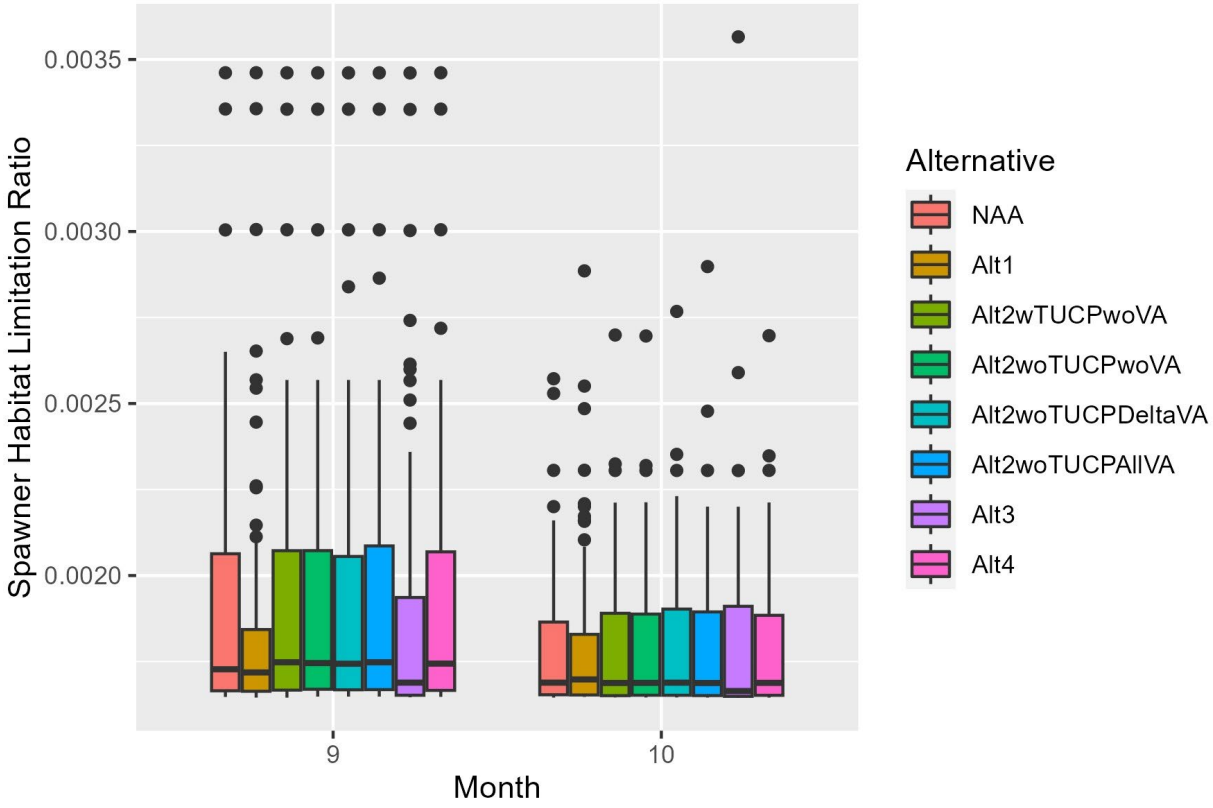


Figure O.2-5. Estimated spawning habitat limitation ratios for spring-run adults in the Upper Sacramento River. Variability within months reflects variation across CalSim WYs.

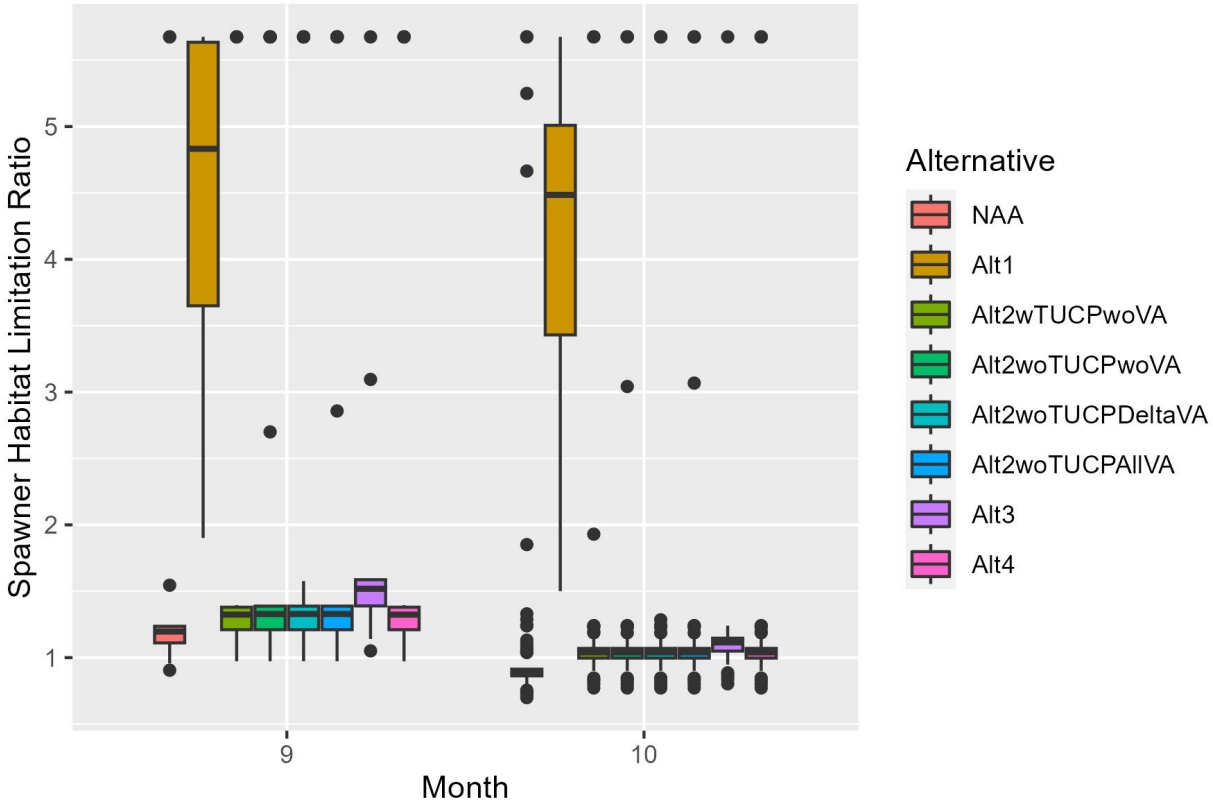


Figure O.2-6. Estimated spawning habitat limitation ratios for spring-run adults in Clear Creek. Variability within months reflects variation across CalSim WYs.

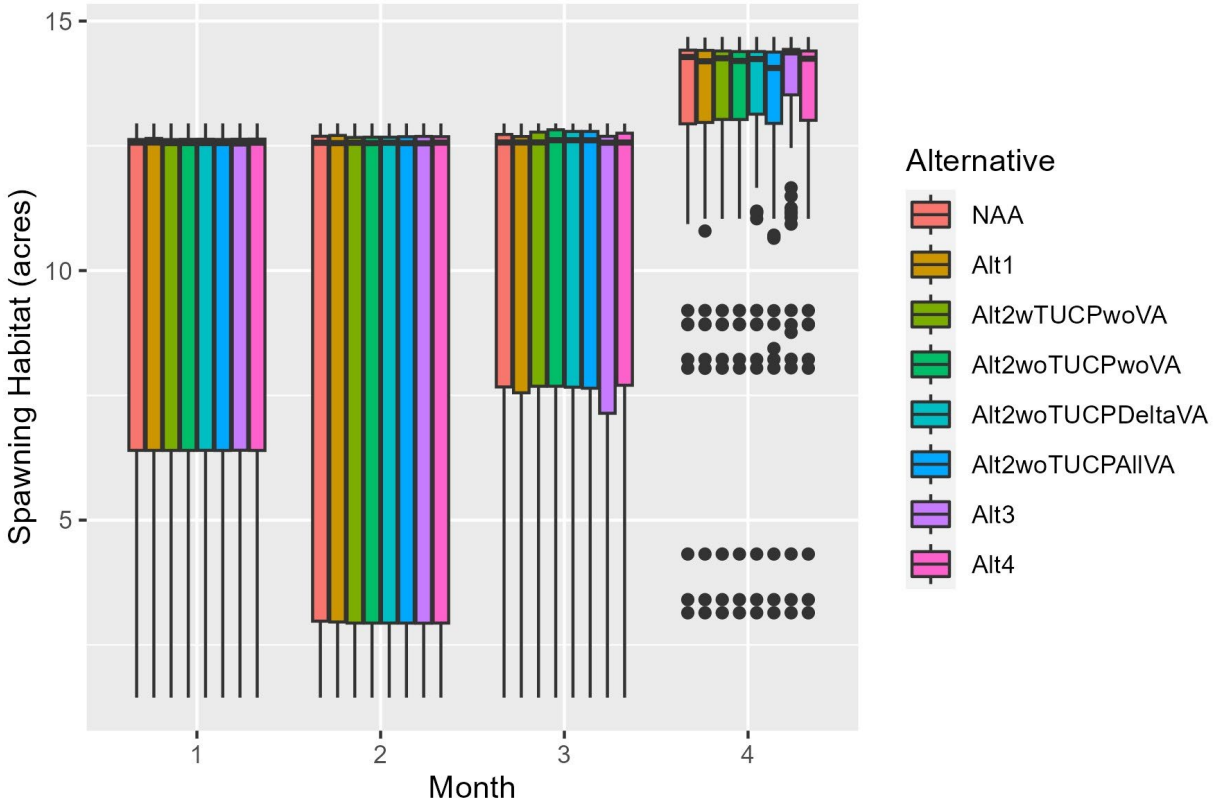


Figure O.2-7. Estimated spawning habitat for steelhead adults in the Upper Sacramento River. Variability within months reflects variation across CalSim WYs.

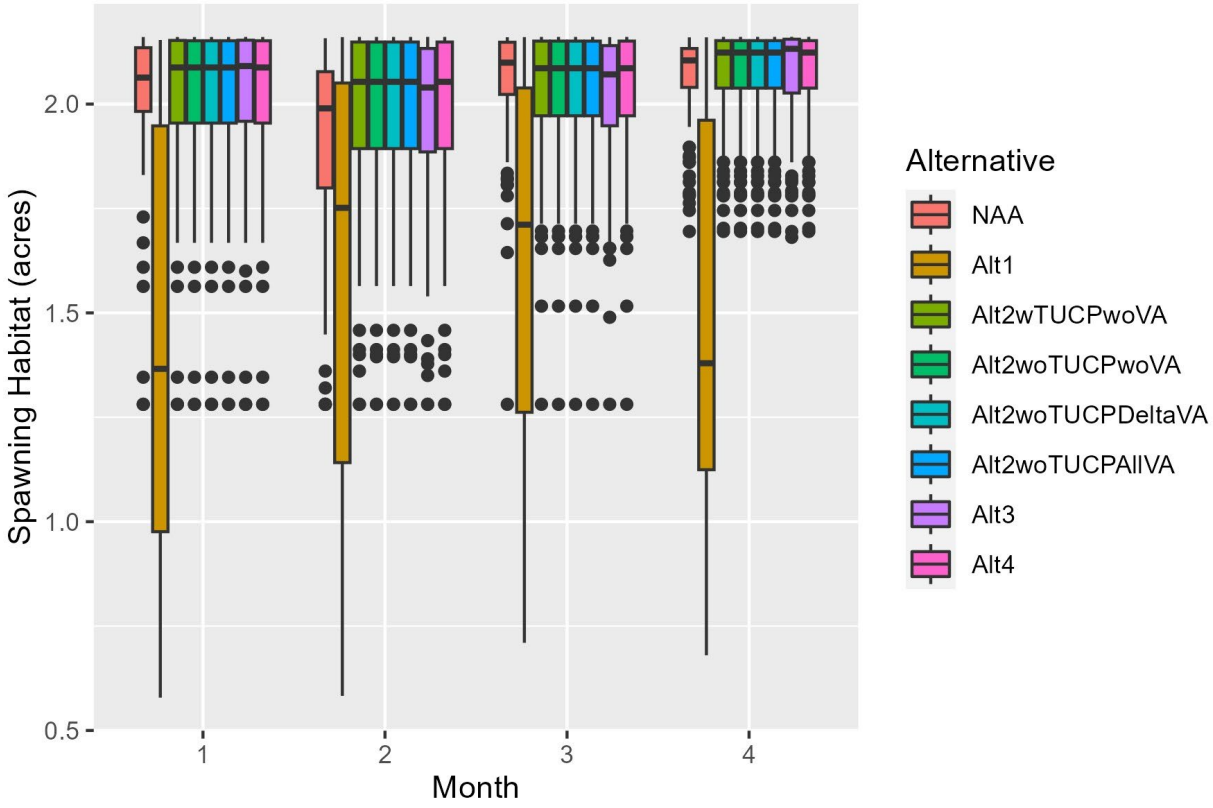


Figure O.2-8. Estimated spawning habitat for steelhead adults in Clear Creek. Variability within months reflects variation across CalSim WYs.

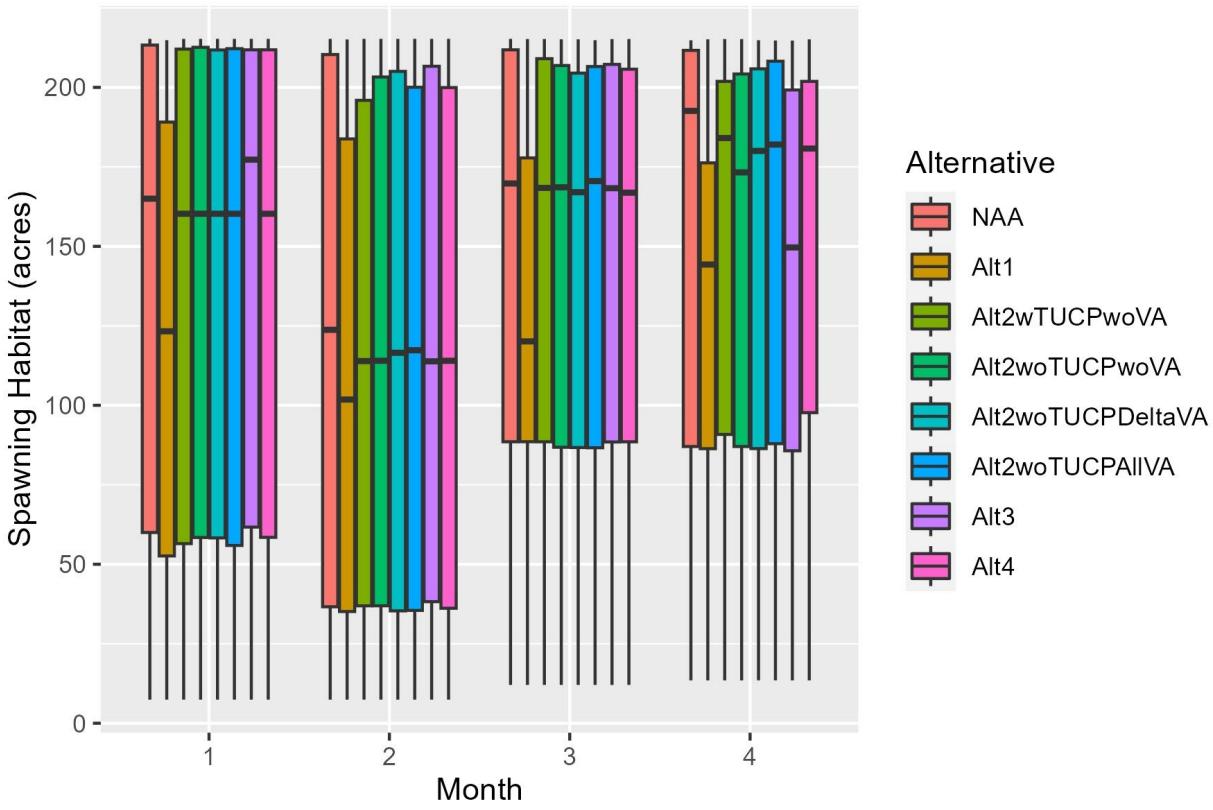


Figure O.2-9. Estimated spawning habitat for steelhead adults in the American River. Variability within months reflects variation across CalSim WYs.

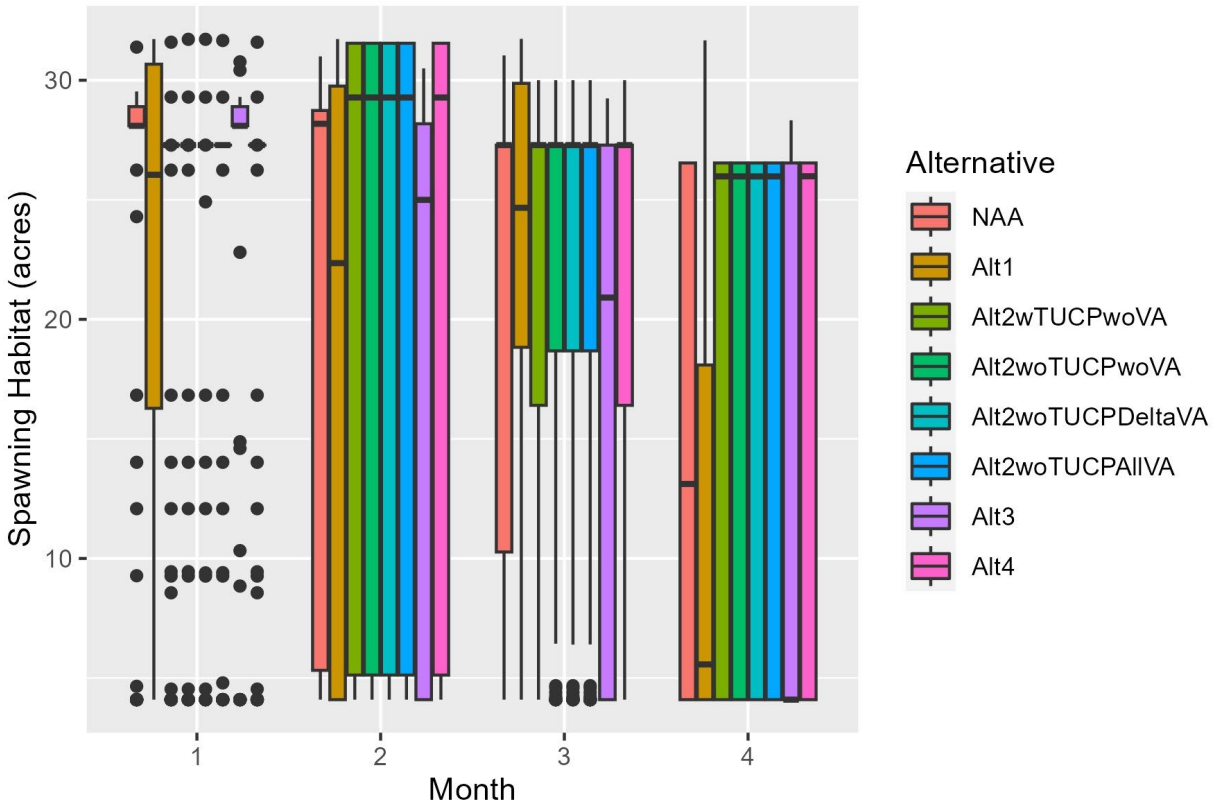


Figure O.2-10. Estimated spawning habitat for steelhead adults in the Stanislaus River. Variability within months reflects variation across CalSim WYs.

Table O.2-9. Predicted mean spawning habitat quantities, in acres, for adult winter-run Chinook salmon in the Upper Sacramento River.

| WYT | Month | EXP1 | EXP3 | NAA | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA |
|---|---|---|---|---|---|---|---|---|
| All | 5 | 51.06 | 54.36 | 54.75 | 54.50 | 54.49 | 54.47 | 54.59 |
| All | 6 | 48.49 | 56.07 | 53.65 | 54.03 | 54.03 | 54.06 | 54.65 |
| All | 7 | 46.66 | 56.57 | 46.15 | 47.30 | 47.21 | 46.98 | 47.41 |
| All | 8 | 41.44 | 55.98 | 54.68 | 54.82 | 54.77 | 54.65 | 54.81 |

Table O.2-10. Predicted mean spawning habitat quantities, in acres, for adult spring-run Chinook salmon in the Upper Sacramento River.

| WYT | Month | EXP1 | EXP3 | NAA | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA |
|---|---|---|---|---|---|---|---|---|
| All | 9 | 63.06 | 66.49 | 59.46 | 59.36 | 59.37 | 59.40 | 59.23 |
| All | 10 | 63.40 | 66.26 | 62.03 | 62.06 | 61.97 | 61.86 | 61.89 |

Table O.2-11. Predicted mean spawning habitat quantities, in acres, for adult spring-run Chinook salmon in Clear Creek.

| WYT | Month | EXP1 | EXP3 | NAA | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA |
|---|---|---|---|---|---|---|---|---|
| All | 9 | 0.09 | 0.18 | 0.21 | 0.19 | 0.19 | 0.19 | 0.19 |
| All | 10 | 0.09 | 0.22 | 0.27 | 0.24 | 0.24 | 0.24 | 0.24 |

Table O.2-12. Predicted mean spawning habitat quantities, in acres, for adult steelhead in the Upper Sacramento River.).

| WYT | Month | EXP1 | EXP3 | NAA | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA |
|---|---|---|---|---|---|---|---|---|
| All | 1 | 7.70 | 9.52 | 9.85 | 9.74 | 9.80 | 9.82 | 9.80 |
| All | 2 | 6.58 | 8.93 | 9.28 | 9.17 | 9.19 | 9.20 | 9.17 |
| All | 3 | 6.87 | 9.80 | 10.13 | 10.14 | 10.20 | 10.17 | 10.16 |
| All | 4 | 10.74 | 13.46 | 13.26 | 13.24 | 13.22 | 13.23 | 13.14 |

Table O.2-13. Predicted mean spawning habitat quantities, in acres, for adult steelhead in Clear Creek.

| WYT | Month | EXP1 | EXP3 | NAA | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA |
|---|---|---|---|---|---|---|---|---|
| All | 1 | 1.52 | 1.62 | 2.03 | 2.01 | 2.01 | 2.01 | 2.01 |
| All | 2 | 1.54 | 1.59 | 1.90 | 1.98 | 1.98 | 1.98 | 1.98 |
| All | 3 | 1.59 | 1.73 | 2.05 | 2.03 | 2.03 | 2.03 | 2.03 |
| All | 4 | 1.71 | 1.87 | 2.06 | 2.07 | 2.07 | 2.07 | 2.07 |

Table O.2-14. Predicted mean spawning habitat quantities, in acres, for adult steelhead in the American River.

| WYT | Month | EXP1 | EXP3 | NAA | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA |
|---|---|---|---|---|---|---|---|---|
| All | 1 | 124.84 | 129.54 | 135.48 | 132.57 | 132.09 | 131.31 | 131.38 |
| All | 2 | 110.39 | 114.02 | 119.11 | 116.12 | 116.61 | 116.46 | 116.47 |
| All | 3 | 103.21 | 150.46 | 149.55 | 147.41 | 146.24 | 145.75 | 146.37 |
| All | 4 | 116.47 | 155.51 | 154.25 | 151.23 | 150.11 | 150.90 | 151.22 |

Table O.2-15. Predicted mean spawning habitat quantities, in acres, for adult steelhead in the Stanislaus River.

| WYT | Month | EXP1 | EXP3 | NAA | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA |
|---|---|---|---|---|---|---|---|---|
| All | 1 | 12.32 | 17.71 | 23.49 | 22.47 | 22.66 | 22.64 | 22.66 |
| All | 2 | 9.10 | 14.39 | 21.14 | 21.88 | 21.98 | 21.97 | 21.97 |
| All | 3 | 8.51 | 12.82 | 20.94 | 21.42 | 21.67 | 21.67 | 21.67 |
| All | 4 | 8.59 | 17.71 | 14.89 | 16.72 | 16.72 | 16.72 | 16.72 |

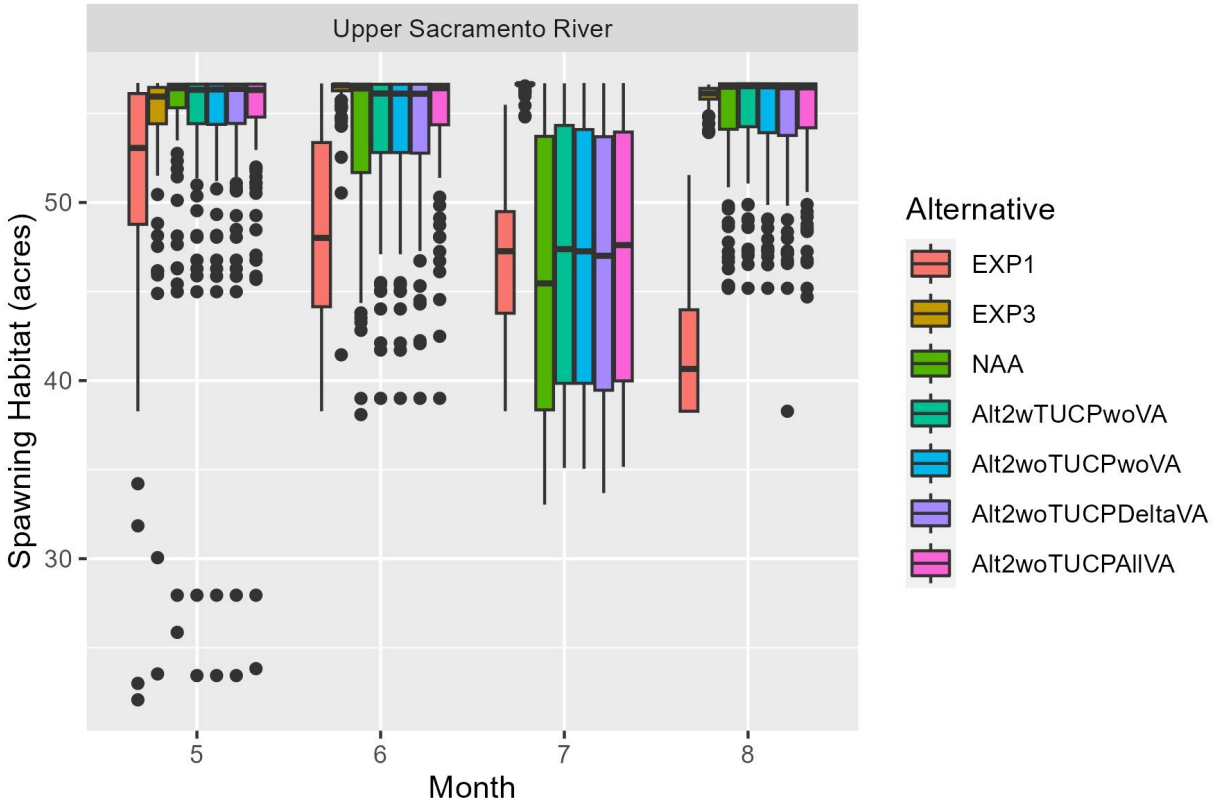


Figure O.2-11. Estimated spawning habitat for winter-run adults in the Upper Sacramento River. Variability within months reflects variation across CalSim WYs.

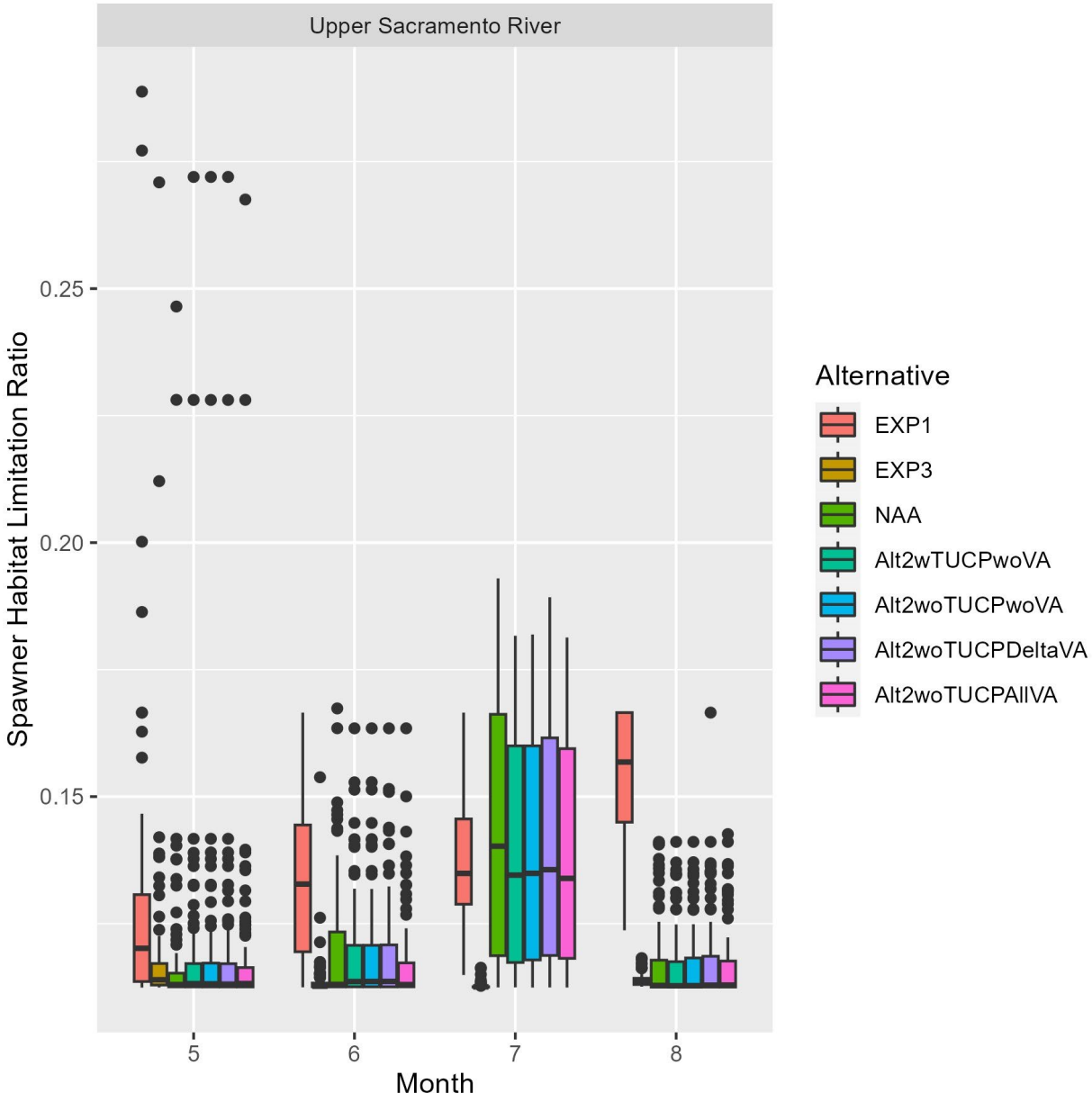


Figure O.2-12. Estimated spawning habitat limitation ratios for winter-run adults in the Upper Sacramento River. Variability within months reflects variation across CalSim WYs.

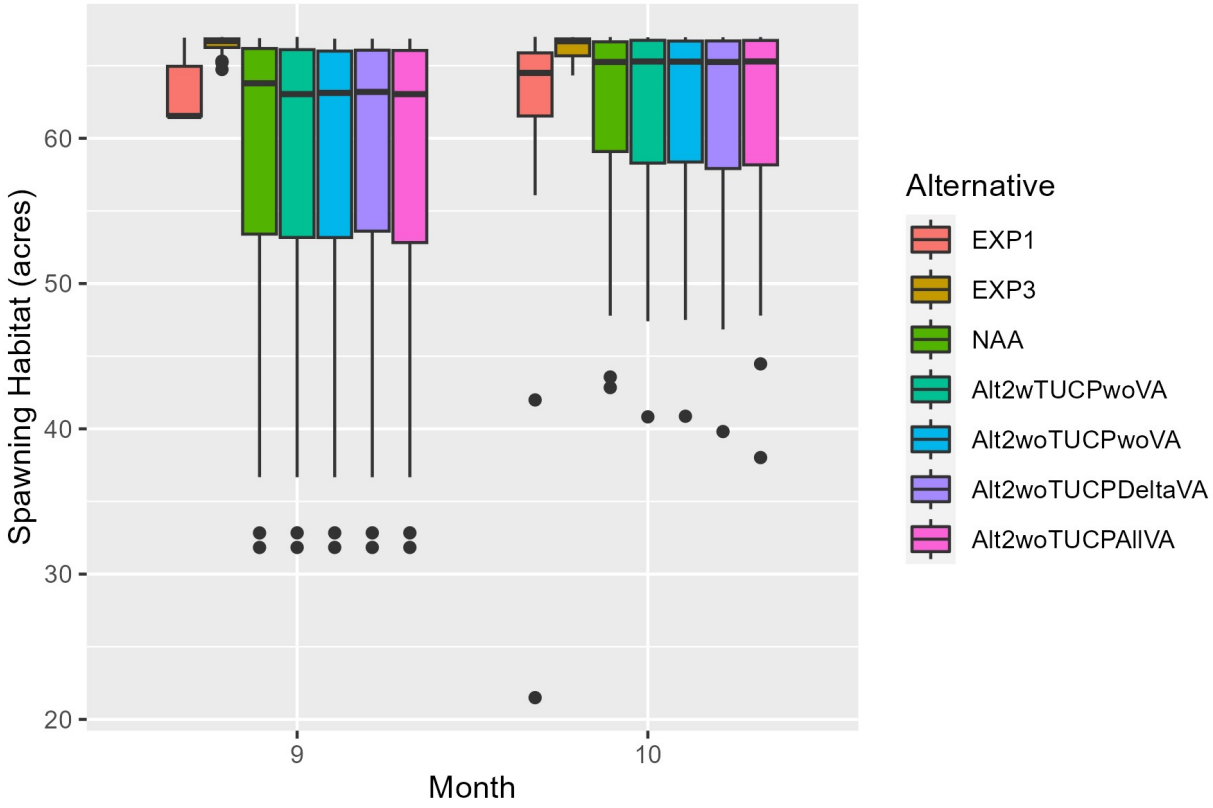


Figure O.2-13. Estimated spawning habitat for spring-run adults in the Upper Sacramento River. Variability within months reflects variation across CalSim WYs.

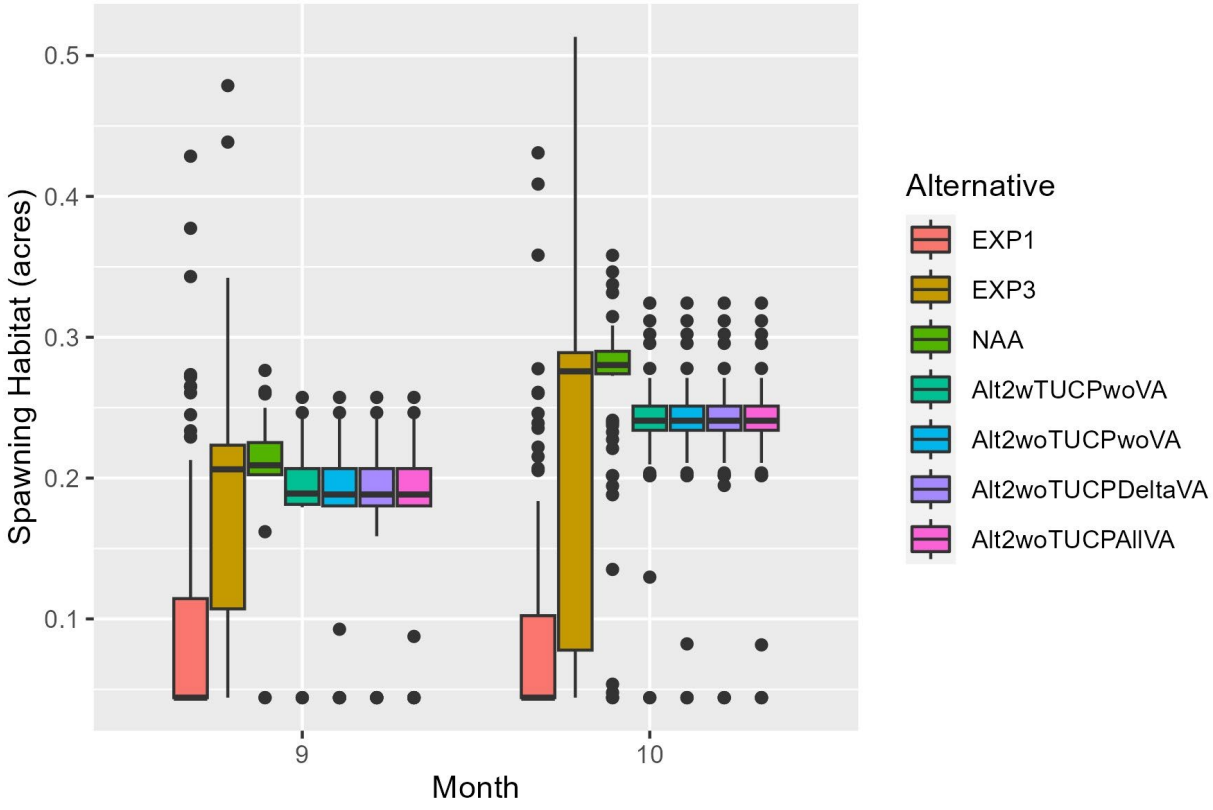


Figure O.2-14. Estimated spawning habitat for spring-run adults in Clear Creek. Variability within months reflects variation across CalSim WYs.

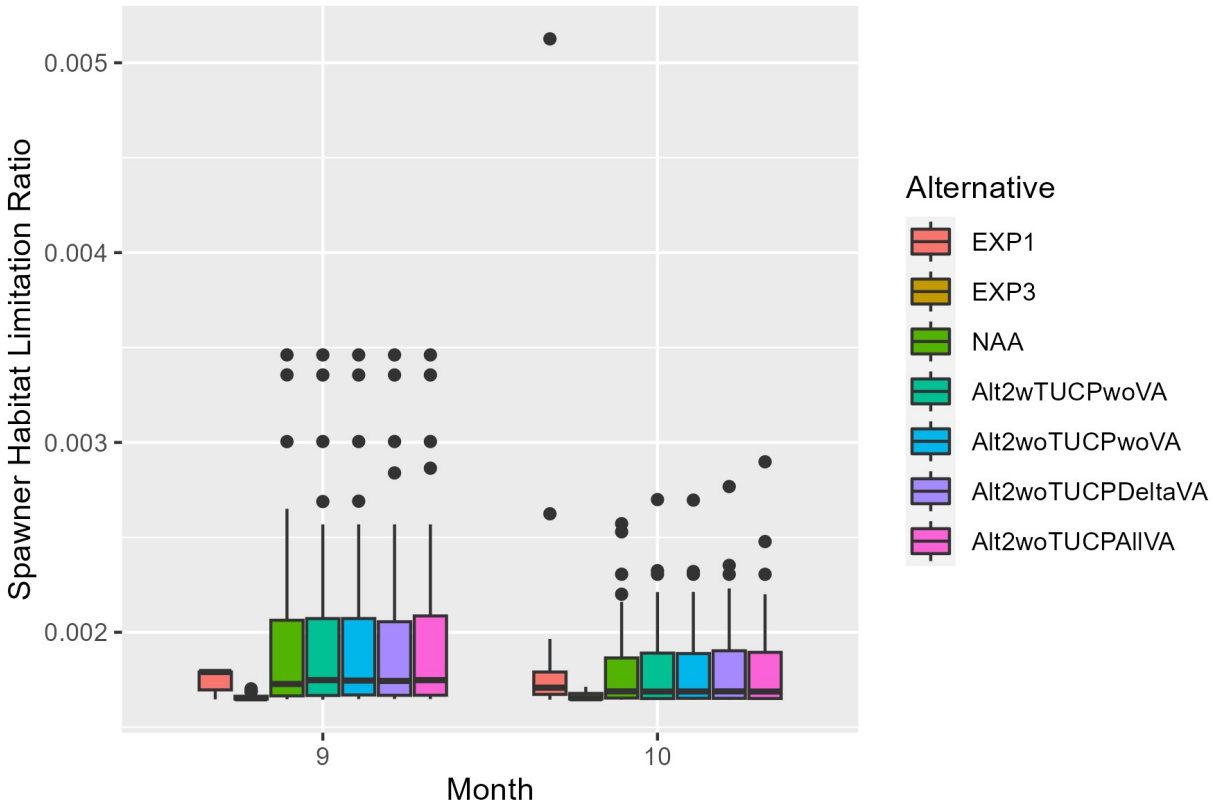


Figure O.2-15. Estimated spawning habitat limitation ratios for spring-run adults in the Upper Sacramento River. Variability within months reflects variation across CalSim WYs.

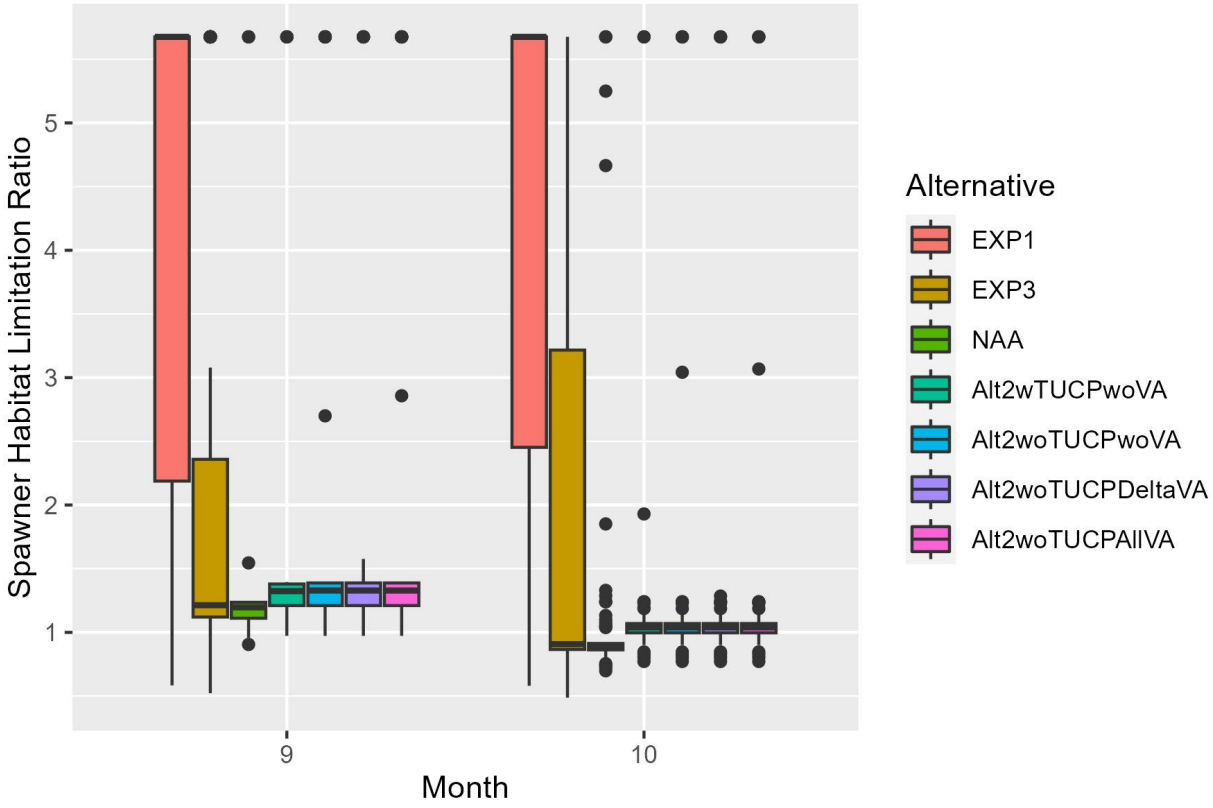


Figure O.2-16. Estimated spawning habitat limitation ratios for spring-run adults in Clear Creek. Variability within months reflects variation across CalSim WYs.

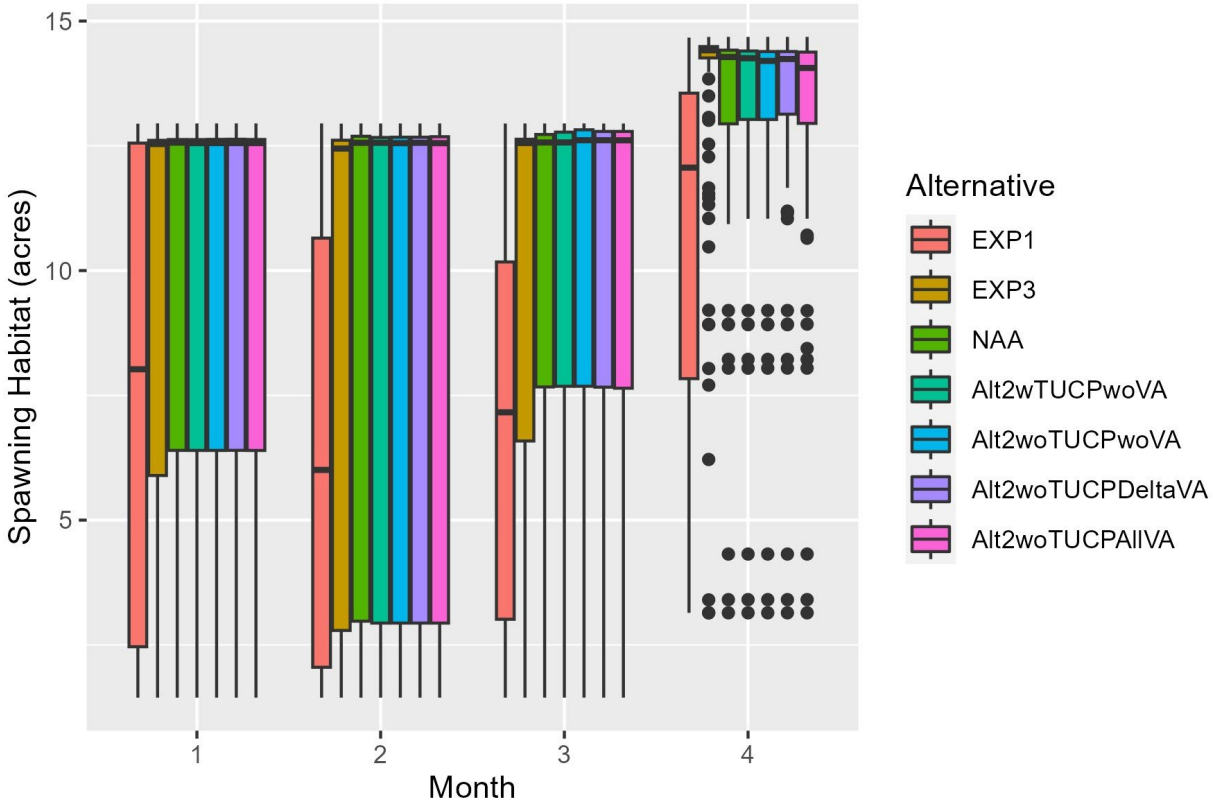


Figure O.2-17. Estimated spawning habitat for steelhead adults in the Upper Sacramento River. Variability within months reflects variation across CalSim WYs.

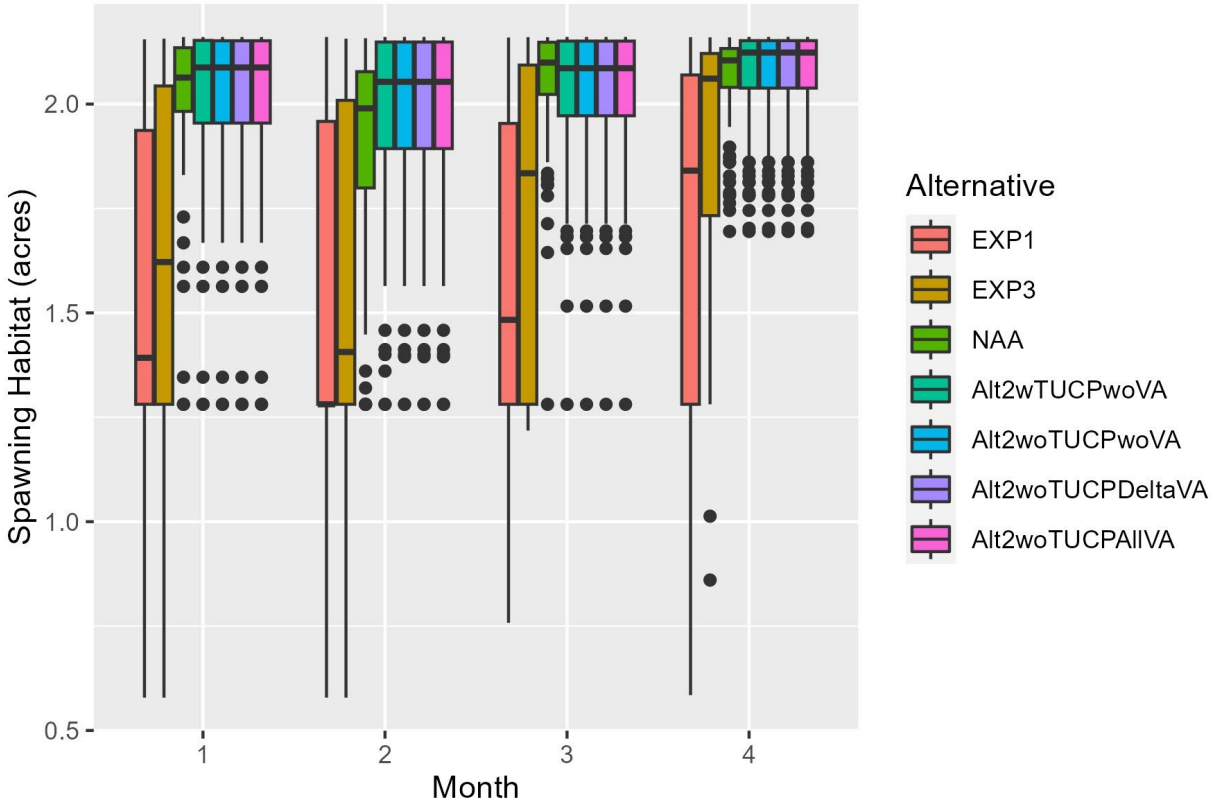


Figure O.2-18. Estimated spawning habitat for steelhead adults in Clear Creek. Variability within months reflects variation across CalSim WYs.

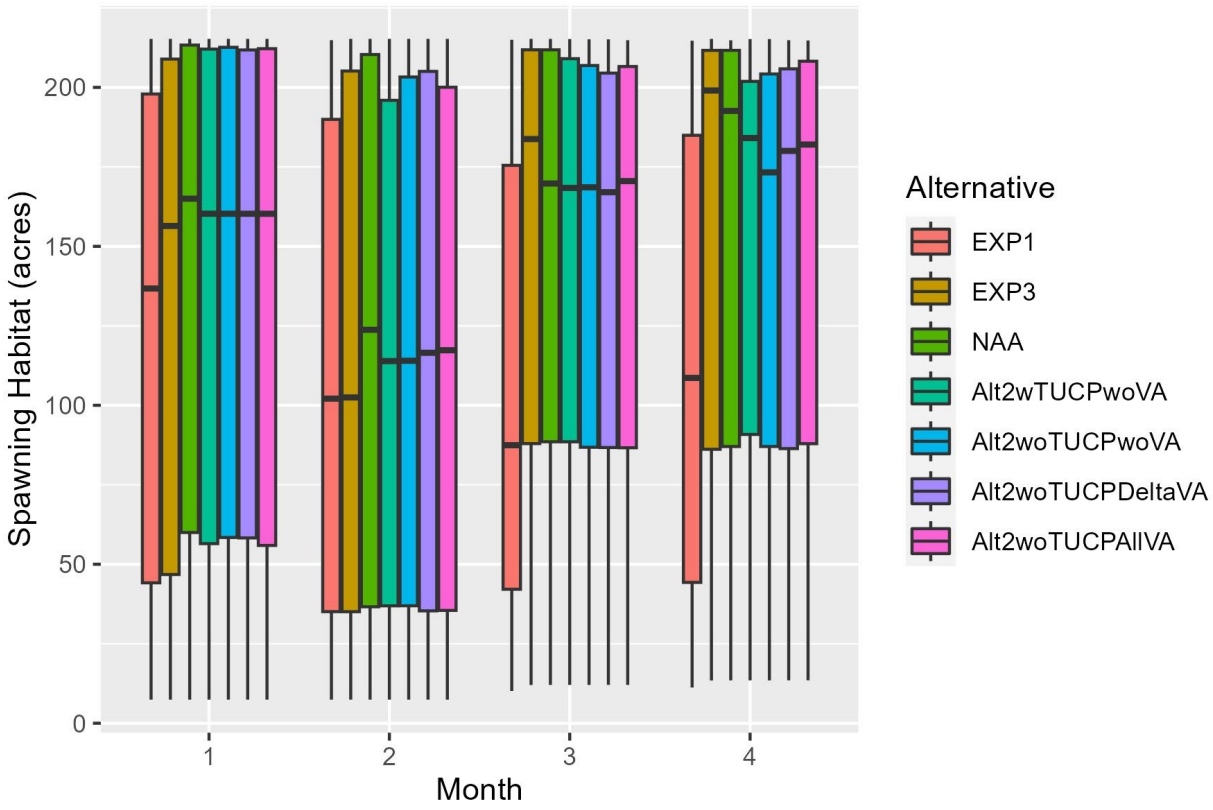


Figure O.2-19. Estimated spawning habitat for steelhead adults in the American River. Variability within months reflects variation across CalSim WYs.

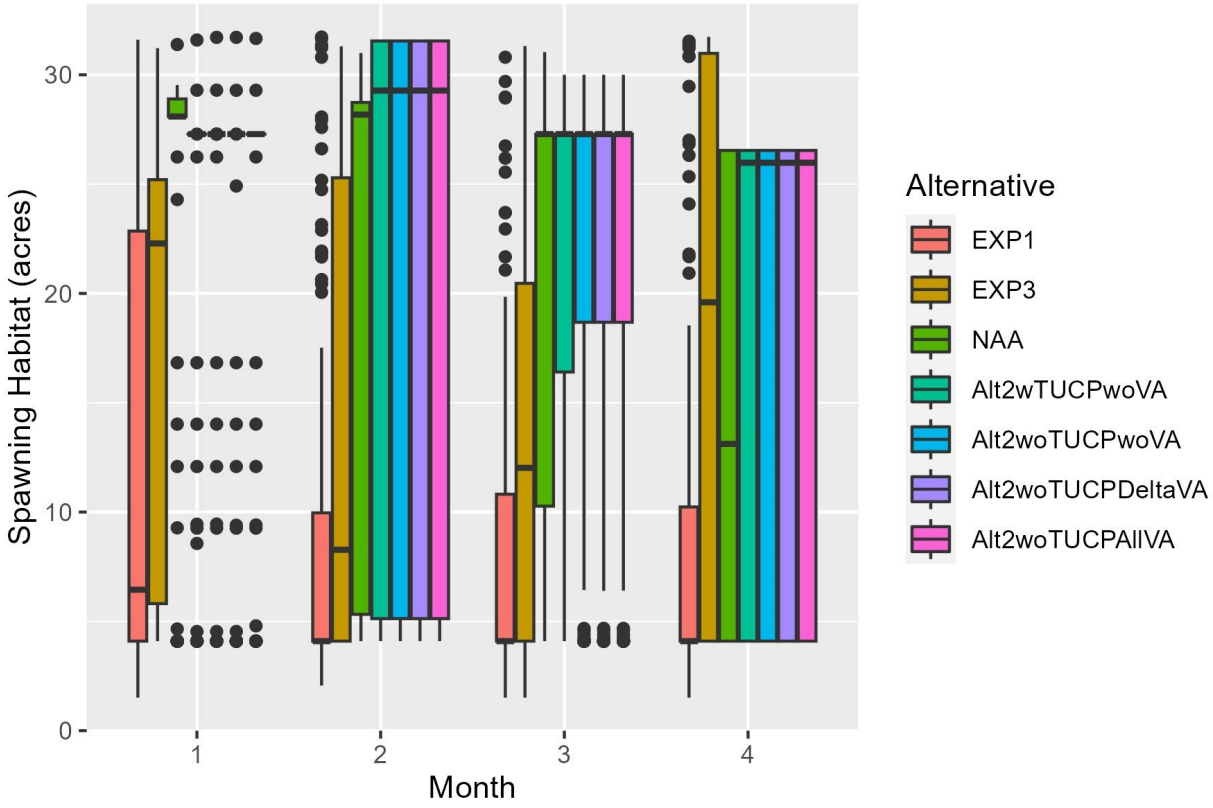


Figure O.2-20. Estimated spawning habitat for steelhead adults in the Stanislaus River. Variability within months reflects variation across CalSim WYs.

### O.2.2.2 Rearing Habitat, Natal Tributaries

#### *O.2.2.2.1 EIS Takeaways*

Instream rearing habitat for winter-run juveniles in the Upper Sacramento River generally increases for all alternatives moving from August to January (e.g., 52.81 acres for Alt2woTUCPwoVA in January; Table O.2-16; Figure O.2-21). All four components of Alt2, in addition to Alt4, resulted in decreased instream rearing habitat relative to NAA in all rearing months but August. Differences in habitat quantity were more variable for Alt1 and Alt3. From August to January, expected Sacramento River flow below Keswick Dam was generally greatest in August.

Floodplain rearing habitat was generally low for winter-run juveniles in the Upper Sacramento River but exhibited infrequent increases among WYs for December and January (e.g., 28.69 acres for Alt2woTUCPwoVA in January; Table O.2-17; Figure O.2-22). All four components of Alt2, in addition to Alt4, resulted in decreased floodplain rearing habitat relative to NAA in August (i.e., between -9.4 and -5.5% changes) but increased floodplain rearing in September through January. Changes in habitat quantity relative to NAA were positive for all natal rearing months for Alt3 and only negative for August and September for Alt1. From August to January, expected Sacramento River flow below Keswick Dam was generally greatest in August.

Instream rearing habitat was highly variable across months for spring-run Chinook salmon and steelhead juveniles in the Upper Sacramento River, peaking generally in the winter and lowest in July (October through April; 52.81 acres for Alt2woTUCPwoVA in January; Table O.2-16; Figure O.2-21). All four components of Alt2, in addition to Alt4, resulted in decreased instream rearing habitat relative to NAA in October through March (i.e., between -2.6 and -0.4% changes) but generally increased rearing habitat in remaining months. Differences in habitat were less consistent and more variable for Alt1 and Alt3. Across all months, expected Sacramento River flow below Keswick Dam is generally greatest in winter (i.e., January-March) and summer (i.e., June-August).

Instream rearing habitat was highly variable across months for spring-run Chinook salmon and steelhead juveniles in Clear Creek, peaking generally in the winter (December through April; 12.61 acres for Alt2woTUCPwoVA in January; Table O.2-18; Figure O.2-23). All four components of Alt2, in addition to Alt4, resulted in decreased instream rearing habitat in February and June through October (i.e., between -15.6 and -1.2% changes) but generally increased habitat in remaining months. The Alt1 alternative resulted in larger decreases in rearing habitat for all months (i.e., between -56.4 and -27.3% changes), while Alt3 resulted in decreases in rearing habitat from July through October (i.e., between -20.3 and -9.1% changes) but generally increased habitat in remaining months. Across all months, expected Clear Creek flow below Whiskeytown is generally greatest in winter (i.e., December-March).

Juvenile floodplain habitat for spring-run Chinook salmon and steelhead in the Upper Sacramento River was generally low but exhibited higher maximums and greater variability in winter and spring months (December through April; 55.86 acres for Alt2woTUCPwoVA in February; Table O.2-17; Figure O.2-22). All four components of Alt2, in addition to Alt4, resulted in generally decreased floodplain habitat, relative to NAA, for March through August (i.e., between -19.9% and 0.0% changes) but generally increased floodplain habitat in remaining months (i.e., between -6.8 and 16.8% changes). The Alt1 and Alt3 alternatives resulted in more variable differences relative to NAA across months (i.e., between -30.6 and 60.4% changes). Across all months, expected Sacramento River flow below Keswick Dam is generally greatest in winter (i.e., January-March) and summer (i.e., June-August).

Juvenile floodplain habitat for spring-run Chinook salmon in Clear Creek was generally low but exhibited higher maximums and greater variability in winter and spring months (January through March; 4.99 acres for Alt2woTUCPwoVA in January; Table O.2-19; Figure O.2-24). All four components of Alt2, in addition to Alt4, resulted in generally decreased floodplain habitat, relative to NAA, in February and June through September (i.e., between -29.3% and -8.7% changes) but generally increased floodplain habitat in remaining months (i.e., between 10.4 and 24.6% changes). The alternative Alt3 exhibited similar differences relative to NAA as Alt2 and Alt4, while Alt1 resulted in decreased habitat in all months (i.e., between -77.0 and -35.4% changes). Across all months, expected Clear Creek flow below Whiskeytown is generally greatest in winter (i.e., December-March).

Instream rearing habitat for steelhead juveniles was lowest in summer months (July through August, 143.58 acres for Alt2woTUCPwoVA in July) and greatest in fall and winter months (September through December, 233.95 acres for Alt2woTUCPwoVA in October) in the American River (Table O.2-20; Figure O.2-25). All four components of Alt2, in addition to Alt4, resulted in

generally decreased instream habitat, relative to NAA, in April through July (i.e., between -4.7% and 0.5% changes) but generally increased instream habitat in remaining months (i.e., between -0.3 and 3.7% changes). The Alt3 alternative resulted in decreased habitat for January through May and August (i.e., between -16.4 and -0.5% changes) and increased habitat in remaining months, while Alt1 resulted in similarly variable changes with less clear seasonal differences (i.e., between -9.0 and 13.0% changes). Across all months, expected American River flow below Nimbus Dam is generally greatest in winter months (i.e., January-February).

Instream rearing habitat for steelhead exhibited relatively little seasonal variability in the Stanislaus River, but both habitat values and variability in habitat values were lowest in summer and fall months (July through September; 7.37 acres for Alt2woTUCPwoVA in July; Table O.2-21; Figure O.2-26). All four components of Alt2, in addition to Alt1, Alt3, and Alt4, resulted in increased instream habitat in February relative to NAA (i.e., between 3.3 and 5.6% change) but no other consistent seasonal changes in habitat. Across all months, expected Stanislaus River flow below Goodwin Dam is generally greatest in winter and spring months (i.e., January-May).

Juvenile steelhead floodplain habitat was generally lower and less variable in summer and fall in Clear Creek (June through October; 1.40 acres for Alt2woTUCPwoVA in July; Table O.2-22; Figure O.2-27). All four components of Alt2, in addition to Alt4, resulted in generally decreased floodplain habitat, relative to NAA, in February and June through September (i.e., between -29.3% and -8.7% changes) but generally increased floodplain habitat in remaining months (i.e., between 10.4 and 24.6% changes). The alternative Alt3 exhibited similar differences relative to NAA as Alt2 and Alt4, while Alt1 resulted in decreased habitat in all months (i.e., between -76.9 and -40.3% changes). Across all months, expected Clear Creek flow below Whiskeytown is generally greatest in winter (i.e., December-March).

Juvenile steelhead floodplain habitat was generally lower and less variable in fall in the American River (September through October; 12.96 acres for Alt2woTUCPwoVA in October; Table O.2-23; Figure O.2-28). All four components of Alt2 resulted in generally decreased floodplain habitat, relative to NAA, in July and October (i.e., between -12.0 and -0.1% changes) but generally increased floodplain habitat in remaining months. The alternative Alt4 generally modest increases in habitat for all months (between -0.3 and 6.8% changes), Alt1 generally resulted in more variable increases in habitat across all months (i.e., between -22.8 and 66.6% changes), and Alt3 resulted in highly variable habitat differences with no clear seasonality (i.e., between -50.1 and 55.8% changes). Across all months, expected American River flow below Nimbus Dam is generally greatest in winter months (i.e., January-February).

Juvenile steelhead floodplain habitat exhibited relatively little seasonal variability in the Stanislaus River, but habitat values were greatest in winter and spring months (February through May; 50.72 acres for Alt2woTUCPwoVA in April; Table O.2-24; Figure O.2-29). All four components of Alt2, in addition to Alt4, resulted in generally decreased floodplain habitat, relative to NAA, in March through May and October, November, and January (i.e., between -12.5% and 0.0% changes) but generally increased floodplain habitat in remaining months (i.e., between 3.4 and 997.7% changes). The alternatives Alt1 and Alt3 resulted in variable percent differences with no clear seasonal trends. Across all months, expected Stanislaus River flow below Goodwin Dam is generally greatest in winter and spring months (i.e., January-May).

#### *O.2.2.2.2 BA Takeaways*

Instream rearing habitat for winter-run juveniles in the Upper Sacramento River generally increases across alternatives moving from August to January (e.g., 52.81 acres for Alt2woTUCPwoVA in January) (e.g., 83.81 acres; Table O.2-25; Figure O.2-30). Floodplain rearing habitat was generally low for winter-run juveniles in the Upper Sacramento River but exhibited infrequent increases among WYs for December and January, likely as a function of floodplain inundating flows, across all alternatives (e.g., 28.69 acres for Alt2woTUCPwoVA in January; Table O.2-26; Figure O.2-31). From August to January, expected Sacramento River flow below Keswick Dam was generally greatest in August.

Instream rearing habitat was highly variable across months for spring-run and steelhead juveniles in the Upper Sacramento River and Clear Creek (i.e., both species had the same assumed rearing months and flow-habitat relationships), peaking generally in the winter (October through April; 12.90 acres for Alt2woTUCPwoVA in February in Clear Creek; Table O.2-25, Table O.2-27; Figure O.2-30, Figure O.2-32). Juvenile floodplain habitat for spring-run and steelhead in the Upper Sacramento River was generally low but exhibited higher maximums and greater variability in winter and spring months (December through April; Table O.2-26; Figure O.2-31). Juvenile floodplain habitat for spring-run in Clear Creek was generally but again exhibited the greatest variability in winter and spring months (December through April; 5.48 acres for Alt2woTUCPwoVA in February in Clear Creek; Table O.2-28; Figure O.2-33). Across all months, expected Sacramento River flow below Keswick Dam is generally greatest in winter (i.e., January-March) and summer (i.e., June-August) and expected Clear Creek flow below Whiskeytown is generally greatest in winter (i.e., December-March).

Instream rearing habitat for steelhead juveniles peaked in fall in the American River (September through November; 233.95 acres for Alt2woTUCPwoVA in October; Table O.2-29; Figure O.2-34) but did not display any obvious seasonal trends in the Stanislaus River (e.g., 8.75 acres for Alt2woTUCPwoVA in October; Table O.2-30; Figure O.2-35). Juvenile steelhead floodplain habitat was generally lower and less variable in summer and fall in Clear Creek, American River, and Stanislaus River (June through October; 1.42, 53.03, and 16.99 acres for Alt2woTUCPwoVA in Clear Creek, American River, and Stanislaus River, respectively, in August; Table O.2-31 through Table O.2-33; Figure O.2-36 through Figure O.2-38). Across all months, expected Clear Creek flow below Whiskeytown is generally greatest in winter (i.e., December-March), expected American River flow below Nimbus Dam is generally greatest in winter months (i.e., January-February), and expected Stanislaus River flow below Goodwin Dam is generally greatest in winter and spring months (i.e., January-May).

Table O.2-16. Predicted mean instream rearing habitat quantities, in acres, for juvenile winter-run Chinook salmon, spring-run Chinook salmon, and steelhead in the Upper Sacramento River. Parentheses indicate percent different from NAA (negative values indicate a decrease in expected habitat quantity).

| WYT | Month | NAA | Alt1 | Alt2wTUCPwoVA | Alt2woTUCPwoVA | Alt2woTUCPDeltaVA | Alt2woTUCPAllVA | Alt3 | Alt4 |
|---|---|---|---|---|---|---|---|---|---|
| All | 1 | 54.05 | 53.56 (-0.9) | 52.64 (-2.6) | 52.81 (-2.3) | 53.31 (-1.4) | 53.34 (-1.3) | 52.41 (-3.0) | 53.16 (-1.6) |
| All | 2 | 48.97 | 48.78 (-0.4) | 48.43 (-1.1) | 48.49 (-1.0) | 48.73 (-0.5) | 48.22 (-1.5) | 48.52 (-0.9) | 48.63 (-0.7) |
| All | 3 | 53.55 | 53.76 (0.4) | 53.43 (-0.2) | 53.17 (-0.7) | 53.08 (-0.9) | 53.13 (-0.8) | 53.17 (-0.7) | 53.30 (-0.5) |
| All | 4 | 57.11 | 57.09 (0.0) | 57.11 (0.0) | 56.69 (-0.7) | 57.02 (-0.2) | 55.19 (-3.4) | 59.00 (3.3) | 57.06 (-0.1) |
| All | 5 | 49.79 | 49.05 (-1.5) | 50.34 (1.1) | 50.26 (0.9) | 50.35 (1.1) | 49.83 (0.1) | 48.44 (-2.7) | 50.37 (1.2) |
| All | 6 | 41.45 | 39.45 (-4.8) | 42.63 (2.9) | 42.37 (2.2) | 42.40 (2.3) | 44.22 (6.7) | 46.16 (11.4) | 41.88 (1.1) |
| All | 7 | 30.45 | 30.66 (0.7) | 32.09 (5.4) | 31.16 (2.3) | 31.06 (2.0) | 31.55 (3.6) | 32.87 (7.9) | 31.85 (4.6) |
| All | 8 | 42.24 | 44.66 (5.7) | 42.60 (0.9) | 42.87 (1.5) | 42.79 (1.3) | 43.49 (3.0) | 39.91 (-5.5) | 42.61 (0.9) |
| All | 9 | 56.77 | 58.76 (3.5) | 56.37 (-0.7) | 56.83 (0.1) | 57.01 (0.4) | 56.71 (-0.1) | 58.64 (3.3) | 56.35 (-0.7) |
| All | 10 | 60.92 | 60.82 (-0.2) | 60.27 (-1.1) | 60.70 (-0.4) | 60.48 (-0.7) | 60.50 (-0.7) | 60.96 (0.1) | 60.10 (-1.3) |
| All | 11 | 60.13 | 61.54 (2.3) | 58.80 (-2.2) | 58.71 (-2.4) | 58.90 (-2.0) | 58.83 (-2.2) | 60.58 (0.8) | 58.66 (-2.4) |
| All | 12 | 55.48 | 54.98 (-0.9) | 55.02 (-0.8) | 54.97 (-0.9) | 54.88 (-1.1) | 55.13 (-0.7) | 54.41 (-1.9) | 55.23 (-0.5) |

Table O.2-17. Predicted mean floodplain rearing habitat quantities, in acres, for juvenile winter-run Chinook salmon, spring-run Chinook salmon, and steelhead in the Upper Sacramento River. Parentheses indicate percent different from NAA (negative values indicate a decrease in expected habitat quantity).

| WYT | Month | NAA | Alt1 | Alt2wTUCPwoVA | Alt2woTUCPwoVA | Alt2woTUCPDeltaVA | Alt2woTUCPAllVA | Alt3 | Alt4 |
|---|---|---|---|---|---|---|---|---|---|
| All | 1 | 27.66 | 28.74 (3.9) | 28.93 (4.6) | 28.69 (3.7) | 28.62 (3.5) | 29.12 (5.3) | 30.86 (11.6) | 28.28 (2.2) |
| All | 2 | 55.58 | 57.28 (3.1) | 56.12 (1.0) | 55.86 (0.5) | 55.79 (0.4) | 56.18 (1.1) | 56.45 (1.6) | 56.09 (0.9) |
| All | 3 | 22.38 | 22.66 (1.3) | 22.38 (0.0) | 22.16 (-1.0) | 22.11 (-1.2) | 22.11 (-1.2) | 22.50 (0.6) | 22.33 (-0.2) |
| All | 4 | 4.12 | 4.84 (17.5) | 4.10 (-0.3) | 4.04 (-1.9) | 4.02 (-2.3) | 4.26 (3.5) | 4.12 (-0.1) | 4.10 (-0.5) |
| All | 5 | 1.69 | 1.71 (1.2) | 1.58 (-6.8) | 1.59 (-6.2) | 1.59 (-5.9) | 1.58 (-6.8) | 2.40 (41.7) | 1.57 (-7.2) |
| All | 6 | 3.52 | 4.08 (15.9) | 3.28 (-6.7) | 3.36 (-4.5) | 3.38 (-3.8) | 2.82 (-19.9) | 2.48 (-29.6) | 3.32 (-5.6) |
| All | 7 | 6.84 | 6.84 (-0.1) | 6.55 (-4.3) | 6.68 (-2.4) | 6.72 (-1.8) | 6.48 (-5.3) | 6.22 (-9.1) | 6.59 (-3.7) |
| All | 8 | 2.94 | 2.06 (-30.0) | 2.67 (-9.0) | 2.66 (-9.4) | 2.78 (-5.5) | 2.72 (-7.4) | 3.69 (25.6) | 2.68 (-9.0) |
| All | 9 | 0.84 | 0.59 (-30.6) | 0.86 (1.5) | 0.88 (5.0) | 0.85 (1.2) | 0.88 (4.6) | 0.92 (8.8) | 0.83 (-1.2) |
| All | 10 | 0.49 | 0.51 (4.4) | 0.48 (-0.3) | 0.50 (1.9) | 0.49 (0.6) | 0.48 (-0.3) | 0.53 (9.5) | 0.45 (-6.8) |
| All | 11 | 0.82 | 1.31 (60.4) | 0.85 (4.0) | 0.83 (1.2) | 0.81 (-0.6) | 0.96 (16.8) | 1.16 (41.2) | 0.80 (-2.3) |
| All | 12 | 11.86 | 12.52 (5.6) | 12.32 (3.9) | 12.31 (3.8) | 12.33 (4.0) | 12.33 (4.0) | 12.72 (7.2) | 12.31 (3.8) |

Table O.2-18. Predicted mean instream rearing habitat quantities, in acres, for juvenile spring-run Chinook salmon and steelhead in Clear Creek. Parentheses indicate percent different from NAA (negative values indicate a decrease in expected habitat quantity).

| WYT | Month | NAA | Alt1 | Alt2wTUCPwoVA | Alt2woTUCPwoVA | Alt2woTUCPDeltaVA | Alt2woTUCPAllVA | Alt3 | Alt4 |
|---|---|---|---|---|---|---|---|---|---|
| All | 1 | 11.42 | 7.98 (-30.2) | 12.61 (10.4) | 12.61 (10.4) | 12.61 (10.4) | 12.61 (10.4) | 12.59 (10.2) | 12.61 (10.4) |
| All | 2 | 13.06 | 8.90 (-31.9) | 12.90 (-1.2) | 12.90 (-1.2) | 12.90 (-1.2) | 12.90 (-1.2) | 13.03 (-0.3) | 12.90 (-1.2) |
| All | 3 | 11.77 | 8.59 (-27.0) | 12.61 (7.2) | 12.61 (7.2) | 12.61 (7.2) | 12.61 (7.2) | 12.77 (8.5) | 12.61 (7.2) |
| All | 4 | 11.23 | 7.71 (-31.3) | 11.70 (4.2) | 11.70 (4.2) | 11.70 (4.2) | 11.70 (4.2) | 11.84 (5.5) | 11.70 (4.2) |
| All | 5 | 10.45 | 6.33 (-39.4) | 11.77 (12.7) | 11.77 (12.7) | 11.77 (12.7) | 11.77 (12.7) | 11.92 (14.2) | 11.77 (12.7) |
| All | 6 | 11.97 | 5.22 (-56.4) | 10.13 (-15.4) | 10.17 (-15.1) | 10.17 (-15.1) | 10.17 (-15.1) | 10.35 (-13.6) | 10.17 (-15.1) |
| All | 7 | 8.36 | 4.71 (-43.7) | 7.08 (-15.4) | 7.06 (-15.6) | 7.06 (-15.6) | 7.06 (-15.6) | 7.14 (-14.7) | 7.09 (-15.3) |
| All | 8 | 8.24 | 4.56 (-44.7) | 7.18 (-13.0) | 7.14 (-13.4) | 7.18 (-13.0) | 7.18 (-13.0) | 6.57 (-20.3) | 7.18 (-13.0) |
| All | 9 | 8.13 | 4.47 (-45.0) | 7.68 (-5.5) | 7.55 (-7.1) | 7.57 (-6.9) | 7.55 (-7.1) | 7.18 (-11.7) | 7.65 (-5.9) |
| All | 10 | 9.31 | 4.58 (-50.8) | 8.70 (-6.6) | 8.65 (-7.1) | 8.67 (-6.8) | 8.65 (-7.1) | 8.47 (-9.1) | 8.68 (-6.8) |
| All | 11 | 9.62 | 6.99 (-27.3) | 10.19 (5.9) | 10.14 (5.5) | 10.15 (5.5) | 10.15 (5.6) | 10.01 (4.1) | 10.18 (5.9) |
| All | 12 | 10.89 | 8.61 (-20.9) | 11.91 (9.3) | 11.85 (8.8) | 11.85 (8.8) | 11.85 (8.8) | 11.78 (8.2) | 11.90 (9.3) |

Table O.2-19. Predicted mean floodplain rearing habitat quantities, in acres, for juvenile spring-run Chinook salmon in Clear Creek. Parentheses indicate percent different from NAA (negative values indicate a decrease in expected habitat quantity).

| WYT | Month | NAA | Alt1 | Alt2wTUCPwoVA | Alt2woTUCPwoVA | Alt2woTUCPDeltaVA | Alt2woTUCPAllVA | Alt3 | Alt4 |
|---|---|---|---|---|---|---|---|---|---|
| All | 1 | 4.00 | 2.39 (-40.3) | 4.99 (24.6) | 4.99 (24.6) | 4.99 (24.6) | 4.99 (24.6) | 4.96 (23.9) | 4.99 (24.6) |
| All | 2 | 6.07 | 2.81 (-53.7) | 5.49 (-9.7) | 5.48 (-9.7) | 5.48 (-9.7) | 5.48 (-9.7) | 5.65 (-7.0) | 5.49 (-9.7) |
| All | 3 | 3.99 | 2.32 (-41.9) | 4.76 (19.3) | 4.76 (19.3) | 4.76 (19.3) | 4.76 (19.3) | 4.94 (23.6) | 4.76 (19.3) |
| All | 4 | 3.30 | 1.68 (-49.0) | 3.64 (10.4) | 3.64 (10.4) | 3.64 (10.4) | 3.64 (10.4) | 3.76 (14.0) | 3.64 (10.4) |
| All | 5 | 2.74 | 1.15 (-58.0) | 3.52 (28.3) | 3.52 (28.3) | 3.52 (28.3) | 3.52 (28.3) | 3.63 (32.3) | 3.52 (28.3) |
| All | 6 | 3.65 | 0.84 (-77.0) | 2.58 (-29.3) | 2.59 (-29.0) | 2.59 (-29.0) | 2.59 (-29.0) | 2.69 (-26.3) | 2.59 (-29.0) |
| All | 7 | 1.70 | 0.70 (-58.7) | 1.31 (-22.9) | 1.30 (-23.2) | 1.30 (-23.2) | 1.30 (-23.2) | 1.33 (-21.9) | 1.31 (-22.7) |
| All | 8 | 1.66 | 0.66 (-60.4) | 1.34 (-19.3) | 1.32 (-20.2) | 1.34 (-19.3) | 1.34 (-19.3) | 1.19 (-28.3) | 1.34 (-19.3) |
| All | 9 | 1.61 | 0.62 (-61.7) | 1.47 (-8.7) | 1.42 (-11.8) | 1.42 (-11.6) | 1.42 (-11.8) | 1.34 (-16.9) | 1.45 (-9.6) |
| All | 10 | 2.17 | 0.65 (-69.9) | 1.83 (11.9) | 1.82 (11.1) | 1.82 (11.2) | 1.82 (11.2) | 1.73 (-20.1) | 1.82 (-15.9) |
| All | 11 | 2.35 | 1.33 (-43.5) | 2.63 (23.5) | 2.62 (22.8) | 2.62 (22.8) | 2.62 (22.8) | 2.53 (7.3) | 2.63 (11.7) |
| All | 12 | 3.16 | 2.04 (-35.4) | 3.91 (23.5) | 3.88 (22.8) | 3.88 (22.8) | 3.88 (22.8) | 3.80 (20.1) | 3.91 (23.5) |

Table O.2-20. Predicted mean instream rearing habitat quantities, in acres, for juvenile steelhead in the American River. Parentheses indicate percent different from NAA (negative values indicate a decrease in expected habitat quantity).

| WYT | Month | NAA | Alt1 | Alt2 wTUCP woVA | Alt2 woTUCP woVA | Alt2 woTUCP DeltaVA | Alt2 woTUCP AllVA | Alt3 | Alt4 |
|---|---|---|---|---|---|---|---|---|---|
| All | 1 | 177.82 | 178.53 (0.4) | 180.23 (1.4) | 184.32 (3.7) | 182.89 (2.9) | 182.48 (2.6) | 174.47 (-1.9) | 179.67 (1.0) |
| All | 2 | 158.47 | 149.82 (-5.5) | 158.52 (0.0) | 159.67 (0.8) | 161.14 (1.7) | 160.55 (1.3) | 157.31 (-0.7) | 157.94 (-0.3) |
| All | 3 | 177.13 | 191.29 (8.0) | 181.25 (2.3) | 178.90 (1.0) | 178.99 (1.1) | 176.53 (-0.3) | 162.56 (-8.2) | 181.75 (2.6) |
| All | 4 | 185.95 | 175.69 (-5.5) | 186.80 (0.5) | 177.20 (-4.7) | 180.09 (-3.2) | 177.38 (-4.6) | 155.49 (-16.4) | 186.52 (0.3) |
| All | 5 | 176.25 | 175.99 (-0.2) | 172.15 (-2.3) | 173.50 (-1.6) | 175.56 (-0.4) | 173.35 (-1.7) | 175.32 (-0.5) | 172.09 (-2.4) |
| All | 6 | 166.43 | 151.42 (-9.0) | 166.11 (-0.2) | 164.16 (-1.4) | 164.57 (-1.1) | 163.38 (-1.8) | 204.53 (22.9) | 164.97 (-0.9) |
| All | 7 | 146.06 | 142.70 (-2.3) | 143.35 (-1.9) | 145.58 (-0.3) | 146.38 (0.2) | 146.41 (0.2) | 154.06 (5.5) | 141.81 (-2.9) |
| All | 8 | 177.54 | 187.52 (5.6) | 178.52 (0.6) | 181.00 (2.0) | 181.64 (2.3) | 186.03 (4.8) | 164.14 (-7.5) | 179.58 (1.2) |
| All | 9 | 203.18 | 229.52 (13.0) | 204.36 (0.6) | 204.00 (0.4) | 203.44 (0.1) | 203.78 (0.3) | 205.32 (1.1) | 204.13 (0.5) |
| All | 10 | 230.42 | 226.20 (-1.8) | 232.71 (1.0) | 233.95 (1.5) | 234.63 (1.8) | 233.89 (1.5) | 233.16 (1.2) | 232.47 (0.9) |
| All | 11 | 193.73 | 212.96 (9.9) | 196.27 (1.3) | 196.66 (1.5) | 197.35 (1.9) | 195.94 (1.1) | 198.01 (2.2) | 196.19 (1.3) |
| All | 12 | 189.85 | 190.53 (0.4) | 190.42 (0.3) | 193.77 (2.1) | 194.47 (2.4) | 193.70 (2.0) | 182.82 (-3.7) | 192.42 (1.4) |

Table O.2-21. Predicted mean instream rearing habitat quantities, in acres, for juvenile steelhead in the Stanislaus River. Parentheses indicate percent different from NAA (negative values indicate a decrease in expected habitat quantity).

| WYT | Month | NAA | Alt1 | Alt2wTUCPwoVA | Alt2woTUCPwoVA | Alt2woTUCPDeltaVA | Alt2woTUCPAllVA | Alt3 | Alt4 |
|---|---|---|---|---|---|---|---|---|---|
| All | 1 | 7.73 | 7.94 (2.7) | 7.73 (0.0) | 7.71 (-0.2) | 7.71 (-0.2) | 7.71 (-0.2) | 7.68 (-0.6) | 7.73 (0.0) |
| All | 2 | 7.91 | 8.19 (3.5) | 8.35 (5.6) | 8.34 (5.4) | 8.34 (5.4) | 8.34 (5.4) | 8.17 (3.3) | 8.35 (5.6) |
| All | 3 | 7.84 | 7.98 (1.7) | 7.83 (-0.1) | 7.82 (-0.3) | 7.82 (-0.3) | 7.82 (-0.3) | 8.06 (2.8) | 7.83 (-0.1) |
| All | 4 | 8.49 | 8.54 (0.6) | 8.50 (0.1) | 8.50 (0.1) | 8.50 (0.1) | 8.50 (0.1) | 8.49 (0.0) | 8.50 (0.1) |
| All | 5 | 8.58 | 8.63 (0.5) | 8.60 (0.2) | 8.59 (0.2) | 8.59 (0.2) | 8.59 (0.2) | 8.63 (0.6) | 8.60 (0.2) |
| All | 6 | 7.79 | 7.88 (1.1) | 7.74 (-0.7) | 7.75 (-0.6) | 7.75 (-0.6) | 7.75 (-0.6) | 7.87 (1.0) | 7.74 (-0.7) |
| All | 7 | 7.36 | 7.38 (0.3) | 7.36 (0.0) | 7.37 (0.1) | 7.37 (0.1) | 7.37 (0.1) | 7.35 (-0.2) | 7.36 (0.0) |
| All | 8 | 7.57 | 7.56 (-0.2) | 7.59 (0.3) | 7.60 (0.4) | 7.60 (0.4) | 7.60 (0.4) | 7.52 (-0.7) | 7.59 (0.3) |
| All | 9 | 7.38 | 7.42 (0.5) | 7.36 (-0.3) | 7.36 (-0.3) | 7.36 (-0.3) | 7.36 (-0.3) | 7.34 (-0.7) | 7.36 (-0.3) |
| All | 10 | 8.76 | 7.57 (-13.6) | 8.75 (-0.1) | 8.75 (-0.1) | 8.75 (-0.1) | 8.75 (-0.1) | 8.75 (-0.1) | 8.75 (-0.1) |
| All | 11 | 7.34 | 7.67 (4.5) | 7.34 (0.0) | 7.34 (0.0) | 7.34 (0.0) | 7.34 (0.0) | 7.34 (0.0) | 7.34 (0.0) |
| All | 12 | 7.53 | 7.78 (3.3) | 7.56 (0.3) | 7.56 (0.3) | 7.56 (0.3) | 7.56 (0.3) | 7.48 (-0.7) | 7.56 (0.3) |

Table O.2-22. Predicted mean floodplain rearing habitat quantities, in acres, for juvenile steelhead in Clear Creek. Parentheses indicate percent different from NAA (negative values indicate a decrease in expected habitat quantity).

| WYT | Month | NAA | Alt1 | Alt2wTUCPwoVA | Alt2woTUCPwoVA | Alt2woTUCPDeltaVA | Alt2woTUCPAllVA | Alt3 | Alt4 |
|---|---|---|---|---|---|---|---|---|---|
| All | 1 | 4.29 | 2.56 (-40.3) | 5.35 (24.6) | 5.34 (24.5) | 5.34 (24.5) | 5.34 (24.5) | 5.31 (23.8) | 5.34 (24.5) |
| All | 2 | 6.51 | 3.01 (-53.7) | 5.88 (-9.7) | 5.88 (-9.7) | 5.88 (-9.7) | 5.88 (-9.7) | 6.05 (-7.0) | 5.88 (-9.7) |
| All | 3 | 4.28 | 2.49 (-41.9) | 5.10 (19.3) | 5.10 (19.3) | 5.10 (19.3) | 5.10 (19.3) | 5.29 (23.6) | 5.10 (19.3) |
| All | 4 | 3.54 | 1.81 (-49.0) | 3.91 (10.4) | 3.91 (10.4) | 3.91 (10.4) | 3.91 (10.4) | 4.03 (14.0) | 3.91 (10.4) |
| All | 5 | 2.94 | 1.24 (-57.9) | 3.78 (28.2) | 3.78 (28.2) | 3.78 (28.2) | 3.78 (28.2) | 3.89 (32.2) | 3.78 (28.2) |
| All | 6 | 3.91 | 0.90 (-76.9) | 2.77 (-29.3) | 2.78 (-28.9) | 2.78 (-28.9) | 2.78 (-28.9) | 2.89 (-26.2) | 2.78 (-28.9) |
| All | 7 | 1.82 | 0.75 (-58.7) | 1.41 (-22.9) | 1.40 (-23.2) | 1.40 (-23.2) | 1.40 (-23.2) | 1.42 (-21.9) | 1.41 (-22.7) |
| All | 8 | 1.78 | 0.71 (-60.3) | 1.44 (-19.3) | 1.42 (-20.2) | 1.44 (-19.3) | 1.44 (-19.3) | 1.28 (-28.3) | 1.44 (-19.3) |
| All | 9 | 1.73 | 0.66 (-61.6) | 1.58 (-8.7) | 1.52 (-11.8) | 1.53 (-11.6) | 1.52 (-11.8) | 1.44 (-16.9) | 1.56 (-9.6) |
| All | 10 | 2.33 | 0.70 (-69.8) | 1.97 (-15.4) | 1.95 (-16.1) | 1.96 (-15.8) | 1.95 (-16.1) | 1.86 (-20.0) | 1.96 (-15.9) |
| All | 11 | 2.53 | 1.43 (-43.5) | 2.83 (11.8) | 2.81 (11.1) | 2.81 (11.1) | 2.81 (11.1) | 2.71 (7.3) | 2.82 (-11.7) |
| All | 12 | 3.39 | 2.19 (-35.3) | 4.19 (23.5) | 4.16 (22.8) | 4.16 (22.8) | 4.16 (22.8) | 4.07 (20.1) | 4.19 (23.5) |

Table O.2-23. Predicted mean floodplain rearing habitat quantities, in acres, for juvenile steelhead in the American River. Parentheses indicate percent different from NAA (negative values indicate a decrease in expected habitat quantity).

| WYT | Month | NAA | Alt1 | Alt2wTUCPwoVA | Alt2woTUCPwoVA | Alt2woTUCPDeltaVA | Alt2woTUCPAllVA | Alt3 | Alt4 |
|---|---|---|---|---|---|---|---|---|---|
| All | 1 | 217.64 | 231.21 (6.2) | 222.11 (2.1) | 219.13 (0.7) | 221.47 (1.8) | 221.44 (1.8) | 215.61 (-0.9) | 222.22 (2.1) |
| All | 2 | 271.97 | 289.32 (6.4) | 276.43 (1.6) | 275.53 (1.3) | 275.52 (1.3) | 274.87 (1.1) | 277.23 (1.9) | 276.64 (1.7) |
| All | 3 | 164.68 | 169.26 (2.8) | 164.65 (0.0) | 168.27 (2.2) | 169.17 (2.7) | 171.02 (3.9) | 177.26 (7.6) | 165.38 (0.4) |
| All | 4 | 144.39 | 168.09 (16.4) | 146.77 (1.7) | 155.11 (7.4) | 152.69 (5.8) | 155.28 (7.5) | 181.00 (25.4) | 146.12 (1.2) |
| All | 5 | 147.64 | 152.75 (3.5) | 158.53 (7.4) | 155.15 (5.1) | 150.64 (2.0) | 151.96 (2.9) | 143.92 (-2.5) | 157.67 (6.8) |
| All | 6 | 105.69 | 142.15 (34.5) | 106.30 (0.6) | 112.25 (6.2) | 111.16 (5.2) | 111.59 (5.6) | 52.79 (-50.1) | 106.77 (1.0) |
| All | 7 | 148.56 | 128.79 (-13.3) | 148.38 (-0.1) | 147.53 (-0.7) | 146.05 (-1.7) | 141.81 (-4.5) | 122.29 (-17.7) | 151.66 (2.1) |
| All | 8 | 51.36 | 48.52 (-5.5) | 53.57 (4.3) | 53.03 (3.3) | 51.49 (0.3) | 46.05 (-10.3) | 80.00 (55.8) | 51.27 (-0.2) |
| All | 9 | 26.80 | 20.70 (-22.8) | 27.92 (4.2) | 28.02 (4.6) | 28.73 (7.2) | 28.04 (4.7) | 20.00 (-25.4) | 28.62 (6.8) |
| All | 10 | 14.73 | 24.54 (66.6) | 14.17 (-3.8) | 12.96 (-12.0) | 13.04 (-11.5) | 14.50 (-1.6) | 12.84 (-12.8) | 14.88 (1.0) |
| All | 11 | 87.11 | 94.31 (8.3) | 88.08 (1.1) | 88.94 (2.1) | 88.88 (2.0) | 91.55 (5.1) | 84.71 (-2.7) | 87.53 (0.5) |
| All | 12 | 144.86 | 161.61 (11.6) | 146.15 (0.9) | 144.89 (0.0) | 144.25 (-0.4) | 145.20 (0.2) | 151.85 (4.8) | 144.45 (-0.3) |

Table O.2-24. Predicted mean floodplain rearing habitat quantities, in acres, for juvenile steelhead in the Stanislaus River. Parentheses indicate percent different from NAA (negative values indicate a decrease in expected habitat quantity).

| WYT | Month | NAA | Alt1 | Alt2wTUCPwoVA | Alt2woTUCPwoVA | Alt2woTUCPDeltaVA | Alt2woTUCPAllVA | Alt3 | Alt4 |
|---|---|---|---|---|---|---|---|---|---|
| All | 1 | 65.83 | 55.28 (-16.0) | 62.50 (-5.1) | 62.39 (-5.2) | 62.39 (-5.2) | 62.29 (-5.4) | 59.77 (-9.2) | 62.50 (-5.1) |
| All | 2 | 85.54 | 90.16 (5.4) | 88.44 (3.4) | 88.37 (3.3) | 88.37 (3.3) | 88.19 (3.1) | 98.49 (15.1) | 88.44 (3.4) |
| All | 3 | 65.19 | 60.53 (-7.2) | 63.79 (-2.1) | 63.02 (-3.3) | 63.02 (-3.3) | 63.02 (-3.3) | 73.33 (12.5) | 63.78 (-2.2) |
| All | 4 | 57.96 | 53.36 (-7.9) | 50.74 (-12.5) | 50.72 (-12.5) | 50.75 (-12.4) | 50.74 (-12.5) | 85.99 (48.4) | 50.72 (-12.5) |
| All | 5 | 64.43 | 72.73 (12.9) | 63.20 (-1.9) | 63.00 (-2.2) | 63.00 (-2.2) | 62.95 (-2.3) | 100.17 (55.5) | 63.20 (-1.9) |
| All | 6 | 3.64 | 12.44 (241.5) | 5.17 (41.9) | 6.21 (70.4) | 6.21 (70.4) | 6.21 (70.4) | 24.55 (574.1) | 5.17 (41.9) |
| All | 7 | 0.31 | 0.34 (10.9) | 2.34 (660.9) | 3.38 (997.7) | 3.38 (997.7) | 3.38 (997.7) | 0.28 (-9.3) | 2.34 (660.9) |
| All | 8 | 12.49 | 10.62 (-15.0) | 15.95 (27.7) | 16.99 (36.0) | 16.99 (36.0) | 16.99 (36.0) | 4.35 (-65.1) | 15.95 (27.7) |
| All | 9 | 15.53 | 15.56 (0.2) | 16.95 (9.1) | 16.87 (8.6) | 16.87 (8.6) | 16.85 (8.5) | 14.89 (-4.2) | 16.95 (9.1) |
| All | 10 | 9.27 | 3.93 (-57.6) | 9.06 (-2.3) | 9.07 (-2.2) | 9.07 (-2.1) | 9.05 (-2.4) | 9.57 (3.2) | 9.06 (-2.3) |
| All | 11 | 12.27 | 13.89 (13.2) | 12.27 (0.0) | 12.26 (-0.1) | 12.27 (0.0) | 12.27 (0.0) | 12.67 (3.3) | 12.27 (0.0) |
| All | 12 | 30.85 | 30.69 (-0.5) | 32.17 (4.3) | 32.17 (4.3) | 32.17 (4.3) | 32.15 (4.2) | 18.48 (-40.1) | 32.17 (4.3) |

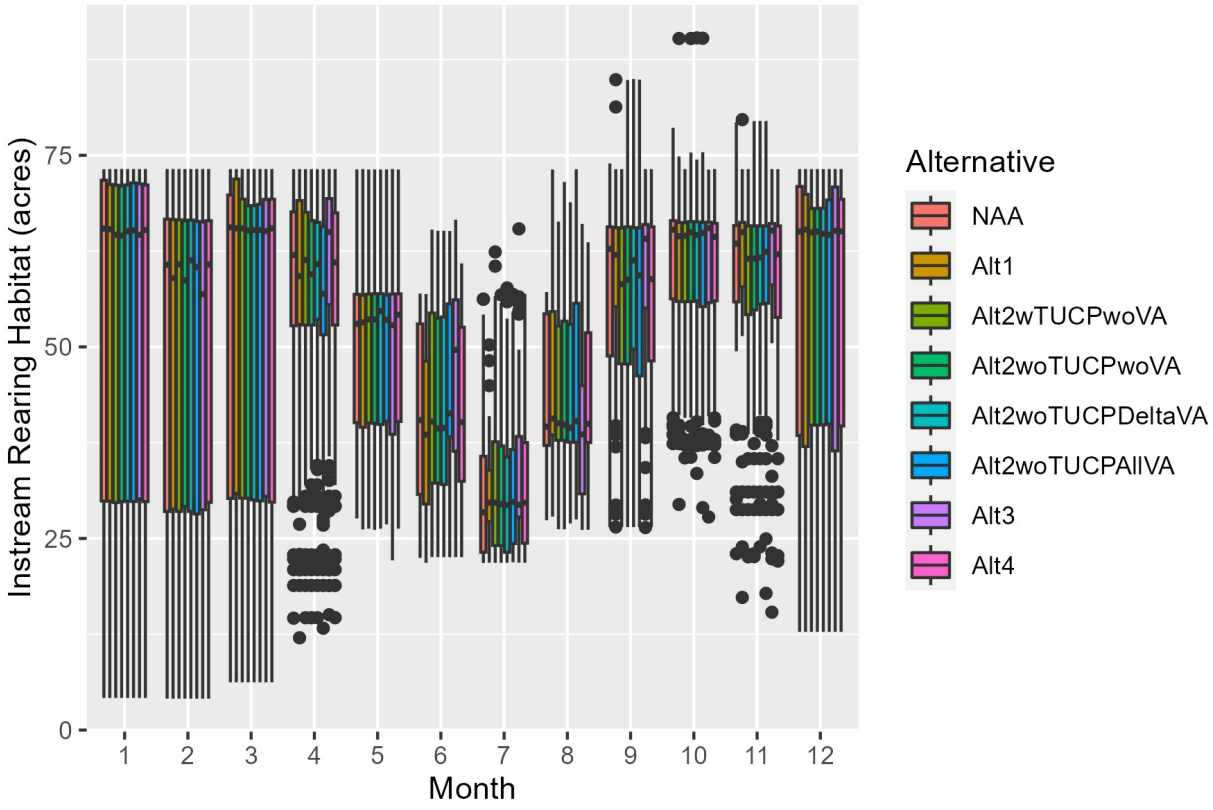


Figure O.2-21. Estimated instream rearing habitat for juvenile winter-run Chinook salmon, spring-run Chinook salmon, and steelhead in the Upper Sacramento River. Variability within months reflects variation across CalSim WYs.

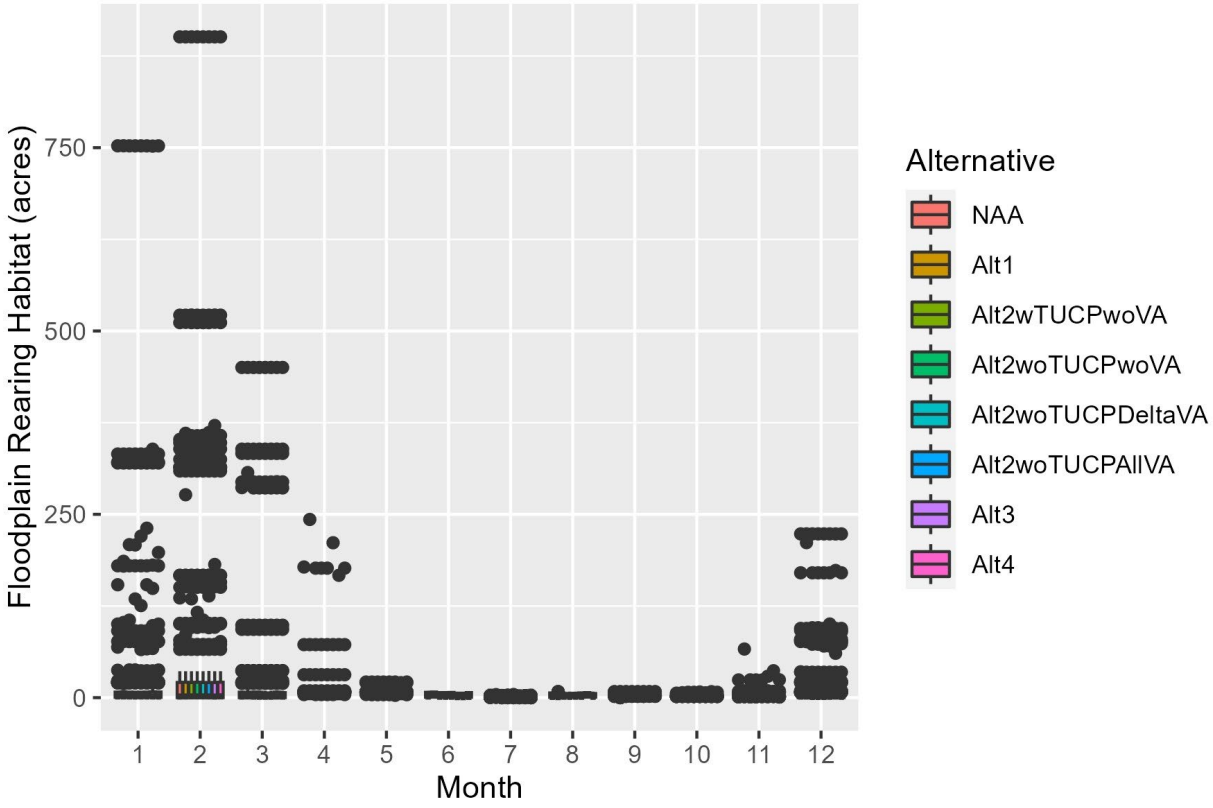


Figure O.2-22. Estimated floodplain rearing habitat for juvenile winter-run Chinook salmon, spring-run Chinook salmon, and steelhead in the Upper Sacramento River. Variability within months reflects variation across CalSim WYs.

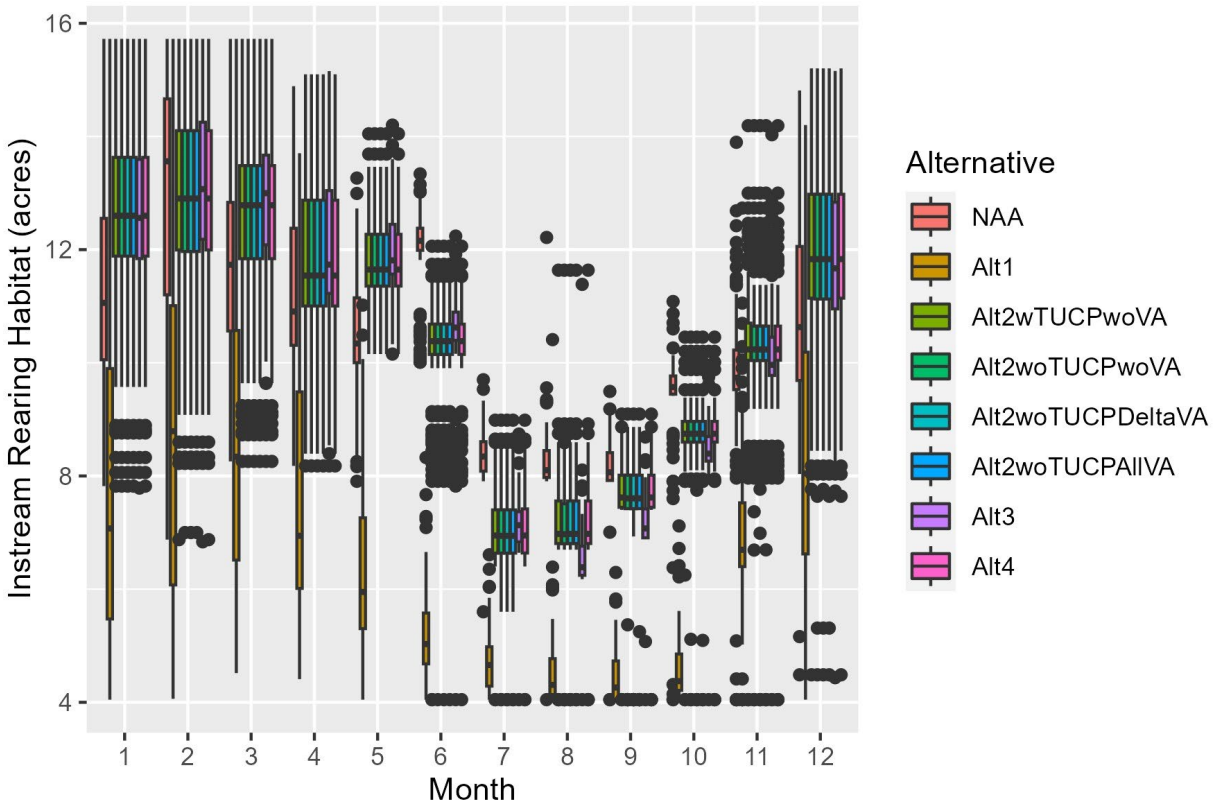


Figure O.2-23. Estimated instream rearing habitat for juvenile spring-run Chinook salmon and steelhead in Clear Creek. Variability within months reflects variation across CalSim WYs.

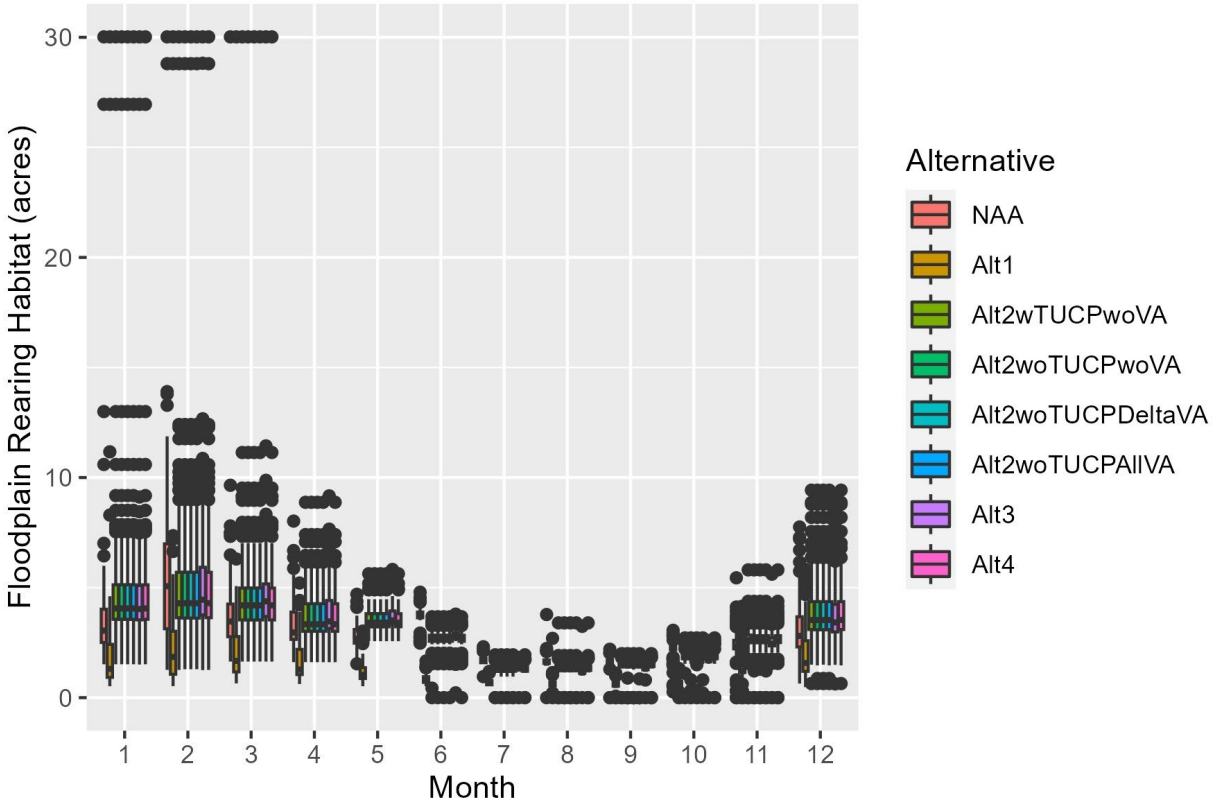


Figure O.2-24. Estimated floodplain rearing habitat for spring-run juveniles in Clear Creek. Variability within months reflects variation across CalSim WYs.

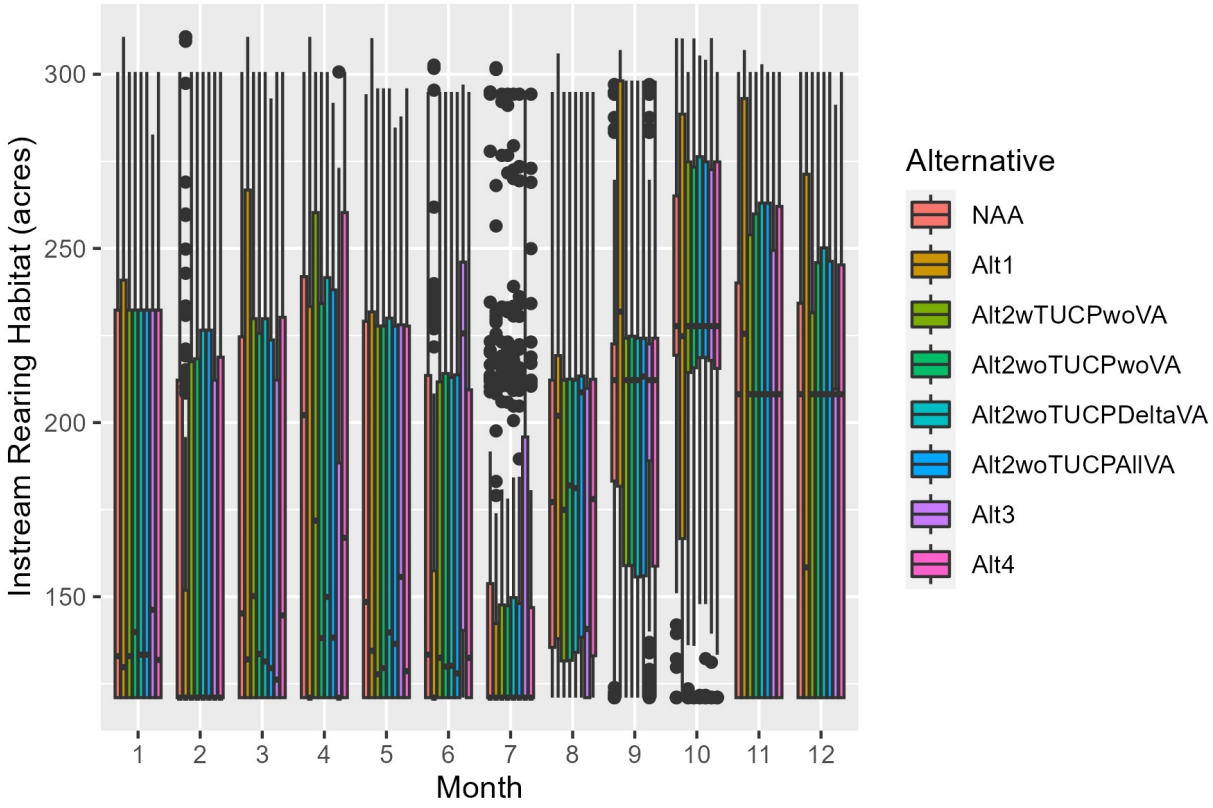


Figure O.2-25. Estimated instream rearing habitat for steelhead juveniles in the American River. Variability within months reflects variation across CalSim WYs.

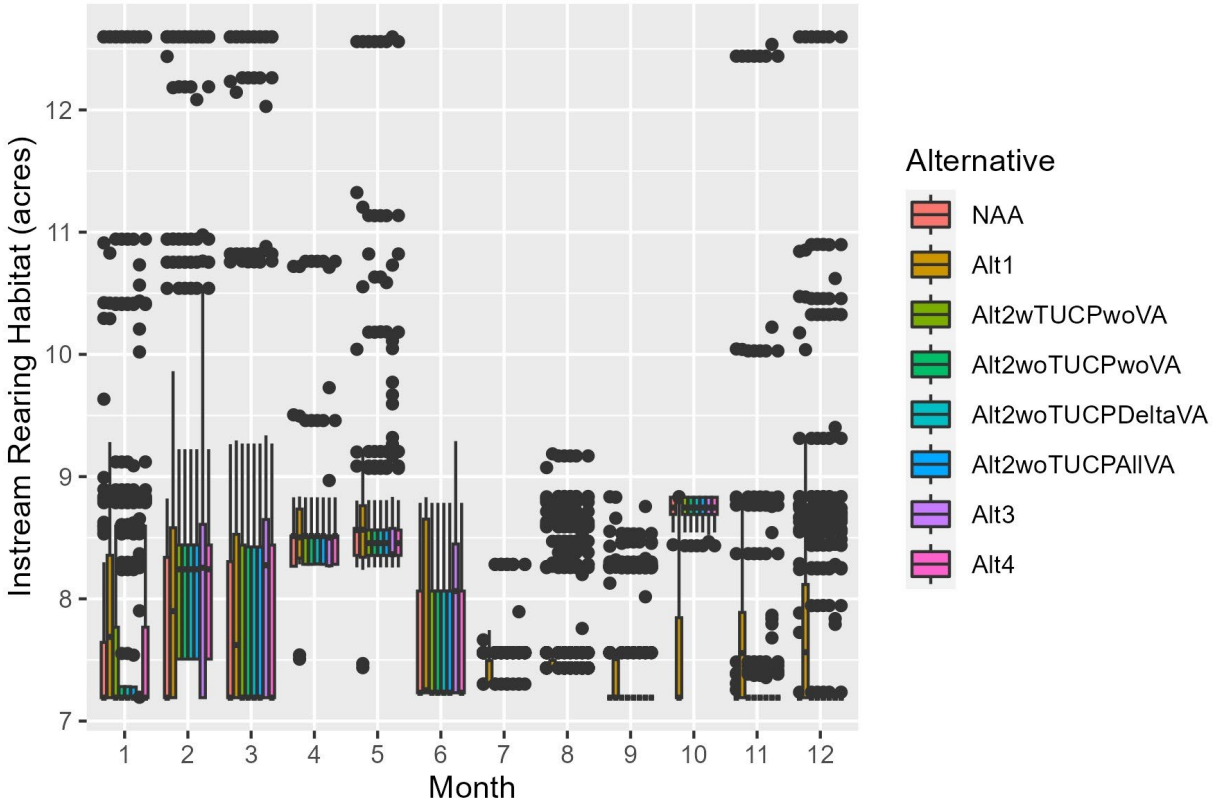


Figure O.2-26. Estimated instream rearing habitat for steelhead juveniles in the Stanislaus River. Variability within months reflects variation across CalSim WYs.

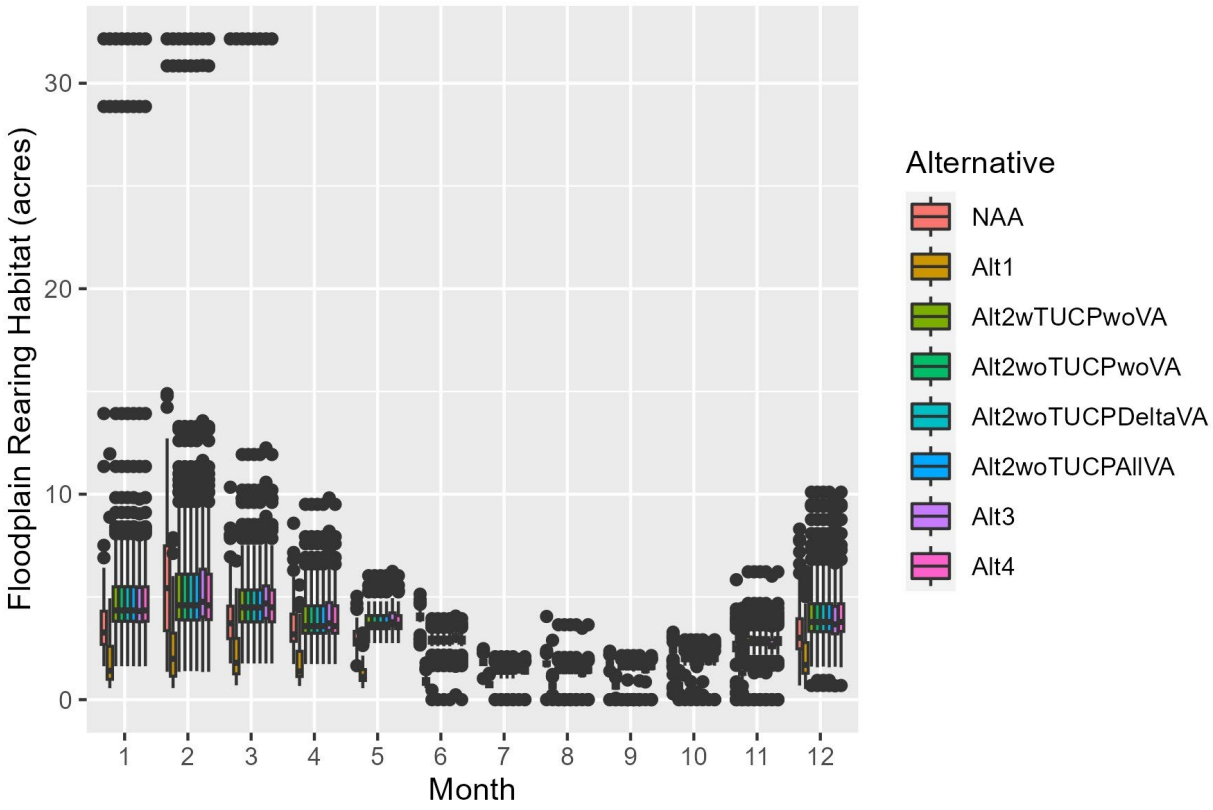


Figure O.2-27. Estimated floodplain rearing habitat for steelhead juveniles in Clear Creek. Variability within months reflects variation across CalSim WYs.

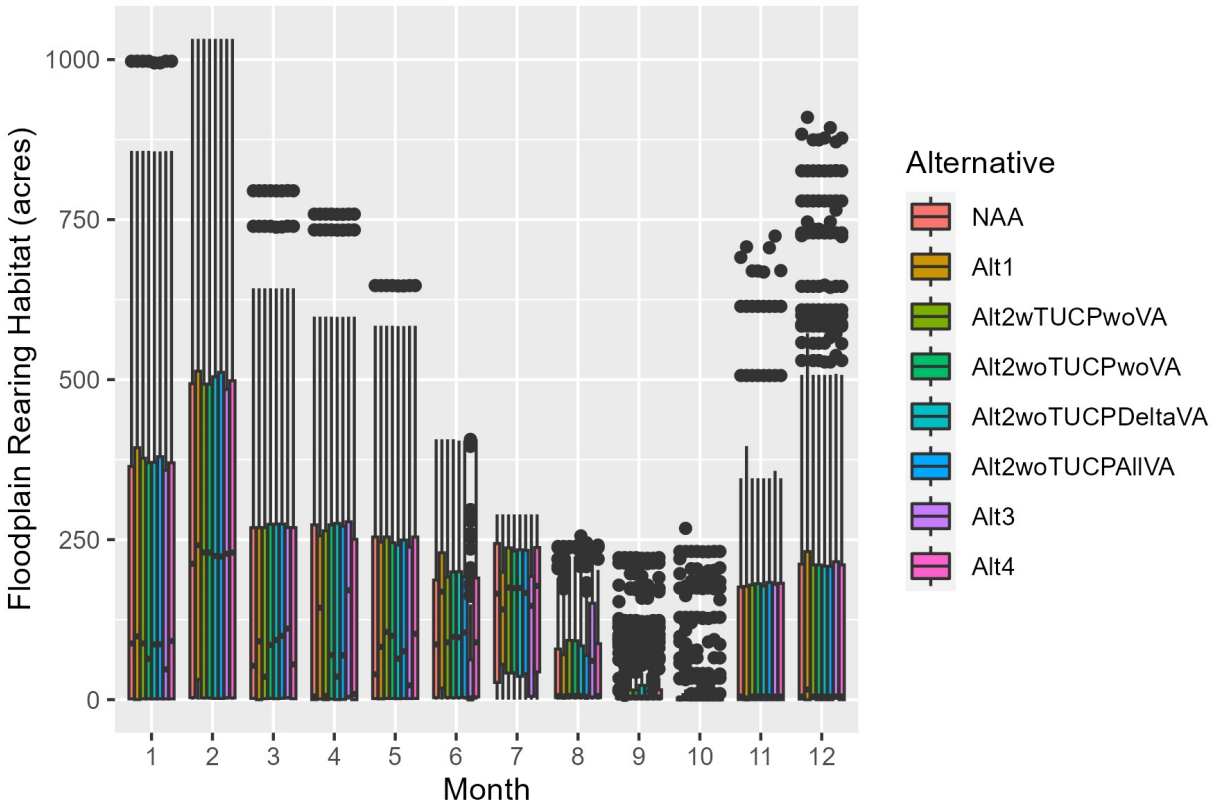


Figure O.2-28. Estimated floodplain rearing habitat for steelhead juveniles in the American River. Variability within months reflects variation across CalSim WYs.

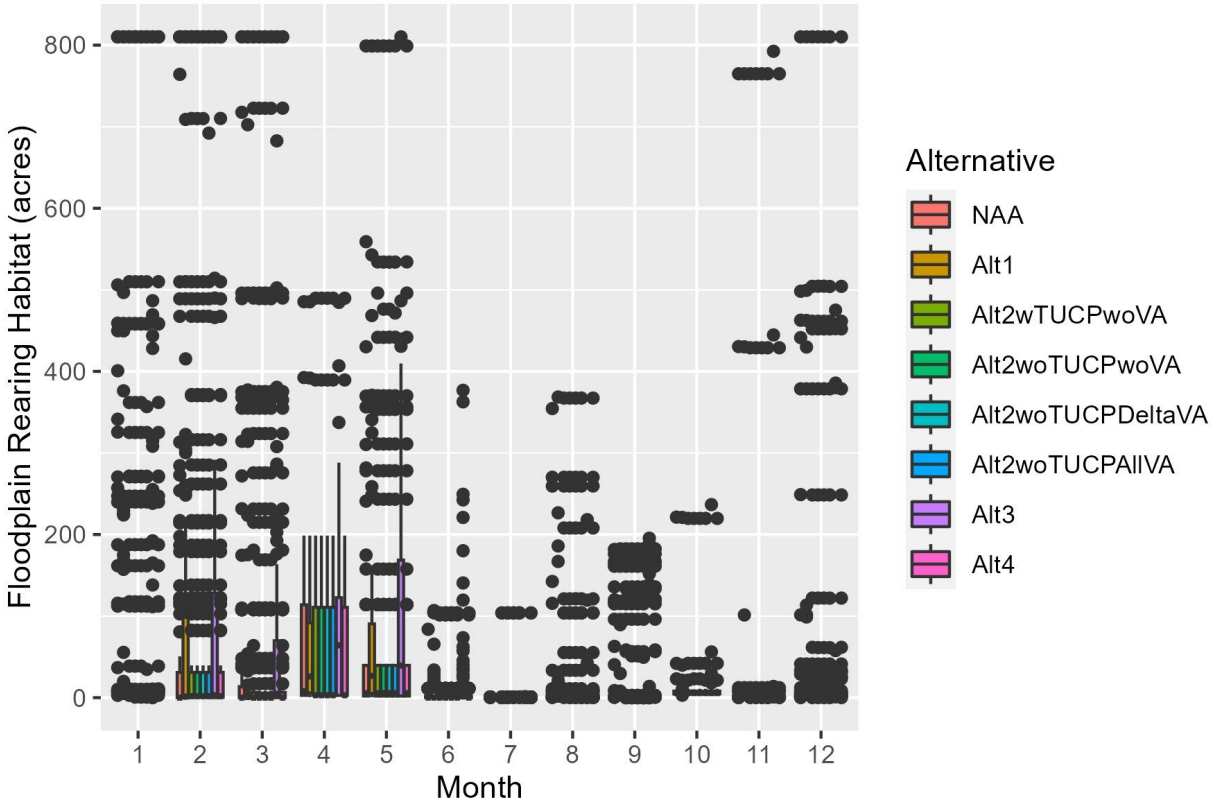


Figure O.2-29. Estimated floodplain rearing habitat for steelhead juveniles in the Stanislaus River. Variability within months reflects variation across CalSim WYs.

Table O.2-25. Predicted mean instream rearing habitat quantities, in acres, for juvenile winter-run Chinook salmon, spring-run Chinook salmon, and steelhead in the Upper Sacramento River.

| WYT | Month | EXP1 | EXP3 | NAA | Alt2wTUCP woVA | ALT2v1 woTUCP | ALT2v2 noTUCP | ALT2v3 noTUCP |
|---|---|---|---|---|---|---|---|---|
| All | 1 | 40.13 | 51.56 | 54.05 | 52.64 | 52.81 | 53.31 | 53.34 |
| All | 2 | 34.47 | 47.65 | 48.97 | 48.43 | 48.49 | 48.73 | 48.22 |
| All | 3 | 34.43 | 52.58 | 53.55 | 53.43 | 53.17 | 53.08 | 53.13 |
| All | 4 | 42.38 | 61.97 | 57.11 | 57.11 | 56.69 | 57.02 | 55.19 |
| All | 5 | 54.11 | 54.71 | 49.79 | 50.34 | 50.26 | 50.35 | 49.83 |
| All | 6 | 65.98 | 55.09 | 41.45 | 42.63 | 42.37 | 42.40 | 44.22 |
| All | 7 | 70.24 | 48.78 | 30.45 | 32.09 | 31.16 | 31.06 | 31.55 |
| All | 8 | 72.29 | 56.02 | 42.24 | 42.60 | 42.87 | 42.79 | 43.49 |
| All | 9 | 83.81 | 66.78 | 56.77 | 56.37 | 56.83 | 57.01 | 56.71 |
| All | 10 | 72.67 | 69.18 | 60.92 | 60.27 | 60.70 | 60.48 | 60.50 |
| All | 11 | 61.18 | 67.68 | 60.13 | 58.80 | 58.71 | 58.90 | 58.83 |
| All | 12 | 45.96 | 40.29 | 55.48 | 55.02 | 54.97 | 54.88 | 55.13 |

Table O.2-26. Predicted mean floodplain rearing habitat quantities, in acres, for juvenile winter-run Chinook salmon, spring-run Chinook salmon, and steelhead in the Upper Sacramento River.

| WYT | Month | EXP1 | EXP3 | NAA | Alt2wTUCP woVA | Alt2woTUCP woVA | Alt2woTUCP DeltaVA | Alt2woTUCP AllVA |
|---|---|---|---|---|---|---|---|---|
| All | 1 | 36.92 | 31.58 | 27.66 | 28.93 | 28.69 | 28.62 | 29.12 |
| All | 2 | 52.35 | 61.51 | 55.58 | 56.12 | 55.86 | 55.79 | 56.18 |
| All | 3 | 27.76 | 21.89 | 22.38 | 22.38 | 22.16 | 22.11 | 22.11 |
| All | 4 | 9.85 | 6.04 | 4.12 | 4.10 | 4.04 | 4.02 | 4.26 |
| All | 5 | 2.20 | 1.06 | 1.69 | 1.58 | 1.59 | 1.59 | 1.58 |
| All | 6 | 0.77 | 0.31 | 3.52 | 3.28 | 3.36 | 3.38 | 2.82 |
| All | 7 | 1.01 | 0.57 | 6.84 | 6.55 | 6.68 | 6.72 | 6.48 |
| All | 8 | 0.63 | 0.04 | 2.94 | 2.67 | 2.66 | 2.78 | 2.72 |
| All | 9 | 0.46 | 0.30 | 0.84 | 0.86 | 0.88 | 0.85 | 0.88 |
| All | 10 | 0.75 | 0.92 | 0.49 | 0.48 | 0.50 | 0.49 | 0.48 |
| All | 11 | 2.51 | 1.14 | 0.82 | 0.85 | 0.83 | 0.81 | 0.96 |
| All | 12 | 18.64 | 44.72 | 11.86 | 12.32 | 12.31 | 12.33 | 12.33 |

Table O.2-27. Predicted mean instream rearing habitat quantities, in acres, for juvenile spring-run Chinook salmon and steelhead in Clear Creek.

| WYT | Month | EXP1 | EXP3 | NAA | Alt2wTUCPwoVA | Alt2woTUCPwoVA | Alt2woTUCPDeltaVA | Alt2woTUCPAllVA |
|---|---|---|---|---|---|---|---|---|
| All | 1 | 12.64 | 12.55 | 11.42 | 12.61 | 12.61 | 12.61 | 12.61 |
| All | 2 | 13.54 | 13.59 | 13.06 | 12.90 | 12.90 | 12.90 | 12.90 |
| All | 3 | 13.80 | 13.07 | 11.77 | 12.61 | 12.61 | 12.61 | 12.61 |
| All | 4 | 12.96 | 11.79 | 11.23 | 11.70 | 11.70 | 11.70 | 11.70 |
| All | 5 | 11.07 | 11.18 | 10.45 | 11.77 | 11.77 | 11.77 | 11.77 |
| All | 6 | 8.26 | 11.45 | 11.97 | 10.13 | 10.17 | 10.17 | 10.17 |
| All | 7 | 7.22 | 7.86 | 8.36 | 7.08 | 7.06 | 7.06 | 7.06 |
| All | 8 | 5.90 | 7.52 | 8.24 | 7.18 | 7.14 | 7.18 | 7.18 |
| All | 9 | 5.14 | 7.28 | 8.13 | 7.68 | 7.55 | 7.57 | 7.55 |
| All | 10 | 5.17 | 8.19 | 9.31 | 8.70 | 8.65 | 8.67 | 8.65 |
| All | 11 | 7.32 | 8.97 | 9.62 | 10.19 | 10.14 | 10.15 | 10.15 |
| All | 12 | 11.09 | 11.11 | 10.89 | 11.91 | 11.85 | 11.85 | 11.85 |

Table O.2-28. Predicted mean floodplain rearing habitat quantities, in acres, for juvenile spring-run Chinook salmon in Clear Creek.

| WYT | Month | EXP1 | EXP3 | NAA | Alt2wTUCPwoVA | Alt2woTUCPwoVA | Alt2woTUCPDeltaVA | Alt2woTUCPAllVA |
|---|---|---|---|---|---|---|---|---|
| All | 1 | 11.08 | 10.38 | 4.00 | 4.99 | 4.99 | 4.99 | 4.99 |
| All | 2 | 13.82 | 13.26 | 6.07 | 5.49 | 5.48 | 5.48 | 5.48 |
| All | 3 | 12.54 | 10.30 | 3.99 | 4.76 | 4.76 | 4.76 | 4.76 |
| All | 4 | 9.36 | 6.18 | 3.30 | 3.64 | 3.64 | 3.64 | 3.64 |
| All | 5 | 4.63 | 4.31 | 2.74 | 3.52 | 3.52 | 3.52 | 3.52 |
| All | 6 | 2.03 | 3.52 | 3.65 | 2.58 | 2.59 | 2.59 | 2.59 |
| All | 7 | 1.44 | 1.52 | 1.70 | 1.31 | 1.30 | 1.30 | 1.30 |
| All | 8 | 1.07 | 1.45 | 1.66 | 1.34 | 1.32 | 1.34 | 1.34 |
| All | 9 | 0.55 | 1.32 | 1.61 | 1.47 | 1.42 | 1.42 | 1.42 |
| All | 10 | 0.63 | 1.83 | 2.17 | 1.83 | 1.82 | 1.82 | 1.82 |
| All | 11 | 2.52 | 2.99 | 2.35 | 2.63 | 2.62 | 2.62 | 2.62 |
| All | 12 | 8.39 | 7.25 | 3.16 | 3.91 | 3.88 | 3.88 | 3.88 |

Table O.2-29. Predicted mean instream rearing habitat quantities, in acres, for juvenile steelhead in the American River.

| WYT | Month | EXP1 | EXP3 | NAA | Alt2wTUCPwoVA | Alt2woTUCPwoVA | Alt2woTUCPDeltaVA | Alt2woTUCPAllVA |
|---|---|---|---|---|---|---|---|---|
| All | 1 | 166.27 | 167.49 | 177.82 | 180.23 | 184.32 | 182.89 | 182.48 |
| All | 2 | 147.28 | 154.49 | 158.47 | 158.52 | 159.67 | 161.14 | 160.55 |
| All | 3 | 140.96 | 177.76 | 177.13 | 181.25 | 178.90 | 178.99 | 176.53 |
| All | 4 | 152.54 | 192.36 | 185.95 | 186.80 | 177.20 | 180.09 | 177.38 |
| All | 5 | 178.59 | 190.97 | 176.25 | 172.15 | 173.50 | 175.56 | 173.35 |
| All | 6 | 199.31 | 205.09 | 166.43 | 166.11 | 164.16 | 164.57 | 163.38 |
| All | 7 | 245.36 | 147.88 | 146.06 | 143.35 | 145.58 | 146.38 | 146.41 |
| All | 8 | 243.37 | 217.80 | 177.54 | 178.52 | 181.00 | 181.64 | 186.03 |
| All | 9 | 230.05 | 220.80 | 203.18 | 204.36 | 204.00 | 203.44 | 203.78 |
| All | 10 | 253.52 | 241.52 | 230.42 | 232.71 | 233.95 | 234.63 | 233.89 |
| All | 11 | 217.50 | 168.72 | 193.73 | 196.27 | 196.66 | 197.35 | 195.94 |
| All | 12 | 162.83 | 175.33 | 189.85 | 190.42 | 193.77 | 194.47 | 193.70 |

Table O.2-30. Predicted mean instream rearing habitat quantities, in acres, for juvenile steelhead in the Stanislaus River.

| WYT | Month | EXP1 | EXP3 | NAA | Alt2wTUCPwoVA | Alt2woTUCPwoVA | Alt2woTUCPDeltaVA | Alt2woTUCPAllVA |
|---|---|---|---|---|---|---|---|---|
| All | 1 | 8.72 | 8.12 | 7.73 | 7.73 | 7.71 | 7.71 | 7.71 |
| All | 2 | 9.02 | 8.43 | 7.91 | 8.35 | 8.34 | 8.34 | 8.34 |
| All | 3 | 8.80 | 7.96 | 7.84 | 7.83 | 7.82 | 7.82 | 7.82 |
| All | 4 | 8.60 | 8.09 | 8.49 | 8.50 | 8.50 | 8.50 | 8.50 |
| All | 5 | 8.65 | 8.30 | 8.58 | 8.60 | 8.59 | 8.59 | 8.59 |
| All | 6 | 7.77 | 7.70 | 7.79 | 7.74 | 7.75 | 7.75 | 7.75 |
| All | 7 | 7.45 | 7.47 | 7.36 | 7.36 | 7.37 | 7.37 | 7.37 |
| All | 8 | 7.67 | 7.47 | 7.57 | 7.59 | 7.60 | 7.60 | 7.60 |
| All | 9 | 7.44 | 7.53 | 7.38 | 7.36 | 7.36 | 7.36 | 7.36 |
| All | 10 | 7.29 | 8.68 | 8.76 | 8.75 | 8.75 | 8.75 | 8.75 |
| All | 11 | 7.84 | 7.68 | 7.34 | 7.34 | 7.34 | 7.34 | 7.34 |
| All | 12 | 8.49 | 7.87 | 7.53 | 7.56 | 7.56 | 7.56 | 7.56 |

Table O.2-31. Predicted mean floodplain rearing habitat quantities, in acres, for juvenile steelhead in Clear Creek.

| WYT | Month | EXP1 | EXP3 | NAA | Alt2wTUCPwoVA | Alt2woTUCPwoVA | Alt2woTUCPDeltaVA | Alt2woTUCPAllVA |
|---|---|---|---|---|---|---|---|---|
| All | 1 | 11.87 | 11.12 | 4.29 | 5.35 | 5.34 | 5.34 | 5.34 |
| All | 2 | 14.81 | 14.20 | 6.51 | 5.88 | 5.88 | 5.88 | 5.88 |
| All | 3 | 13.43 | 11.03 | 4.28 | 5.10 | 5.10 | 5.10 | 5.10 |
| All | 4 | 10.02 | 6.63 | 3.54 | 3.91 | 3.91 | 3.91 | 3.91 |
| All | 5 | 4.96 | 4.62 | 2.94 | 3.78 | 3.78 | 3.78 | 3.78 |
| All | 6 | 2.17 | 3.77 | 3.91 | 2.77 | 2.78 | 2.78 | 2.78 |
| All | 7 | 1.55 | 1.64 | 1.82 | 1.41 | 1.40 | 1.40 | 1.40 |
| All | 8 | 1.15 | 1.56 | 1.78 | 1.44 | 1.42 | 1.44 | 1.44 |
| All | 9 | 0.59 | 1.42 | 1.73 | 1.58 | 1.52 | 1.53 | 1.52 |
| All | 10 | 0.68 | 1.96 | 2.33 | 1.97 | 1.95 | 1.96 | 1.95 |
| All | 11 | 2.70 | 3.21 | 2.53 | 2.83 | 2.81 | 2.81 | 2.81 |
| All | 12 | 8.99 | 7.77 | 3.39 | 4.19 | 4.16 | 4.16 | 4.16 |

Table O.2-32. Predicted mean floodplain rearing habitat quantities, in acres, for juvenile steelhead in the American River.

| WYT | Month | EXP1 | EXP3 | NAA | Alt2wTUCPwoVA | Alt2woTUCPwoVA | Alt2woTUCPDeltaVA | Alt2woTUCPAllVA |
|---|---|---|---|---|---|---|---|---|
| All | 1 | 245.69 | 238.10 | 217.64 | 222.11 | 219.13 | 221.47 | 221.44 |
| All | 2 | 294.13 | 285.64 | 271.97 | 276.43 | 275.53 | 275.52 | 274.87 |
| All | 3 | 296.50 | 164.21 | 164.68 | 164.65 | 168.27 | 169.17 | 171.02 |
| All | 4 | 249.66 | 140.74 | 144.39 | 146.77 | 155.11 | 152.69 | 155.28 |
| All | 5 | 186.14 | 138.43 | 147.64 | 158.53 | 155.15 | 150.64 | 151.96 |
| All | 6 | 58.03 | 56.36 | 105.69 | 106.30 | 112.25 | 111.16 | 111.59 |
| All | 7 | 1.95 | 132.41 | 148.56 | 148.38 | 147.53 | 146.05 | 141.81 |
| All | 8 | 1.26 | 3.48 | 51.36 | 53.57 | 53.03 | 51.49 | 46.05 |
| All | 9 | 7.95 | 4.54 | 26.80 | 27.92 | 28.02 | 28.73 | 28.04 |
| All | 10 | 12.91 | 7.65 | 14.73 | 14.17 | 12.96 | 13.04 | 14.50 |
| All | 11 | 51.10 | 199.54 | 87.11 | 88.08 | 88.94 | 88.88 | 91.55 |
| All | 12 | 189.48 | 171.59 | 144.86 | 146.15 | 144.89 | 144.25 | 145.20 |

Table O.2-33. Predicted mean floodplain rearing habitat quantities, in acres, for juvenile steelhead in the Stanislaus River.

| WYT | Month | EXP1 | EXP3 | NAA | Alt2wTUCPwoVA | Alt2woTUCPwoVA | Alt2woTUCPDeltaVA | Alt2woTUCPAllVA |
|---|---|---|---|---|---|---|---|---|
| All | 1 | 139.27 | 88.52 | 65.83 | 62.50 | 62.39 | 62.39 | 62.29 |
| All | 2 | 192.92 | 143.84 | 85.54 | 88.44 | 88.37 | 88.37 | 88.19 |
| All | 3 | 172.79 | 75.27 | 65.19 | 63.79 | 63.02 | 63.02 | 63.02 |
| All | 4 | 164.79 | 39.49 | 57.96 | 50.74 | 50.72 | 50.75 | 50.74 |
| All | 5 | 194.65 | 64.65 | 64.43 | 63.20 | 63.00 | 63.00 | 62.95 |
| All | 6 | 47.80 | 3.11 | 3.64 | 5.17 | 6.21 | 6.21 | 6.21 |
| All | 7 | 0.63 | 0.49 | 0.31 | 2.34 | 3.38 | 3.38 | 3.38 |
| All | 8 | 1.16 | 39.05 | 12.49 | 15.95 | 16.99 | 16.99 | 16.99 |
| All | 9 | 0.57 | 33.13 | 15.53 | 16.95 | 16.87 | 16.87 | 16.85 |
| All | 10 | 1.82 | 12.06 | 9.27 | 9.06 | 9.07 | 9.07 | 9.05 |
| All | 11 | 27.28 | 24.90 | 12.27 | 12.27 | 12.26 | 12.27 | 12.27 |
| All | 12 | 87.74 | 59.25 | 30.85 | 32.17 | 32.17 | 32.17 | 32.15 |

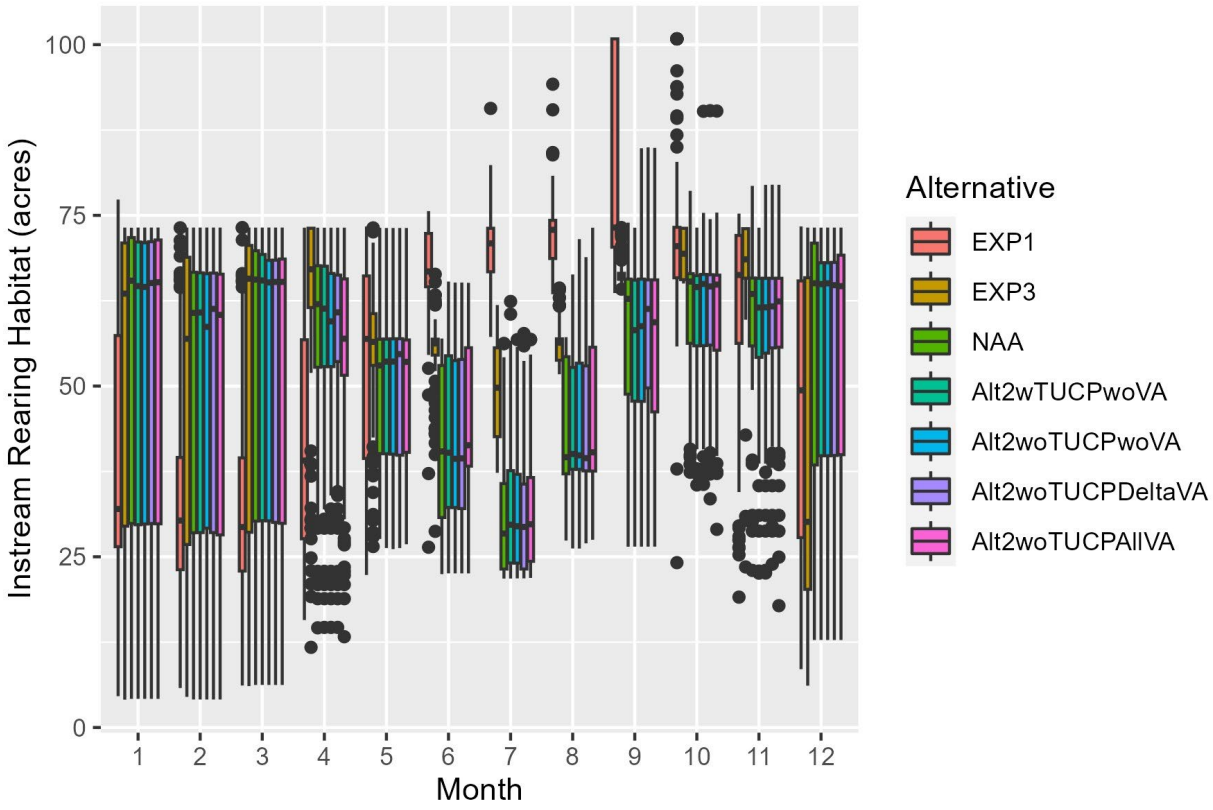


Figure O.2-30. Estimated instream rearing habitat for juvenile winter-run Chinook salmon, spring-run Chinook salmon, and steelhead in the Upper Sacramento River. Variability within months reflects variation across CalSim WYs.

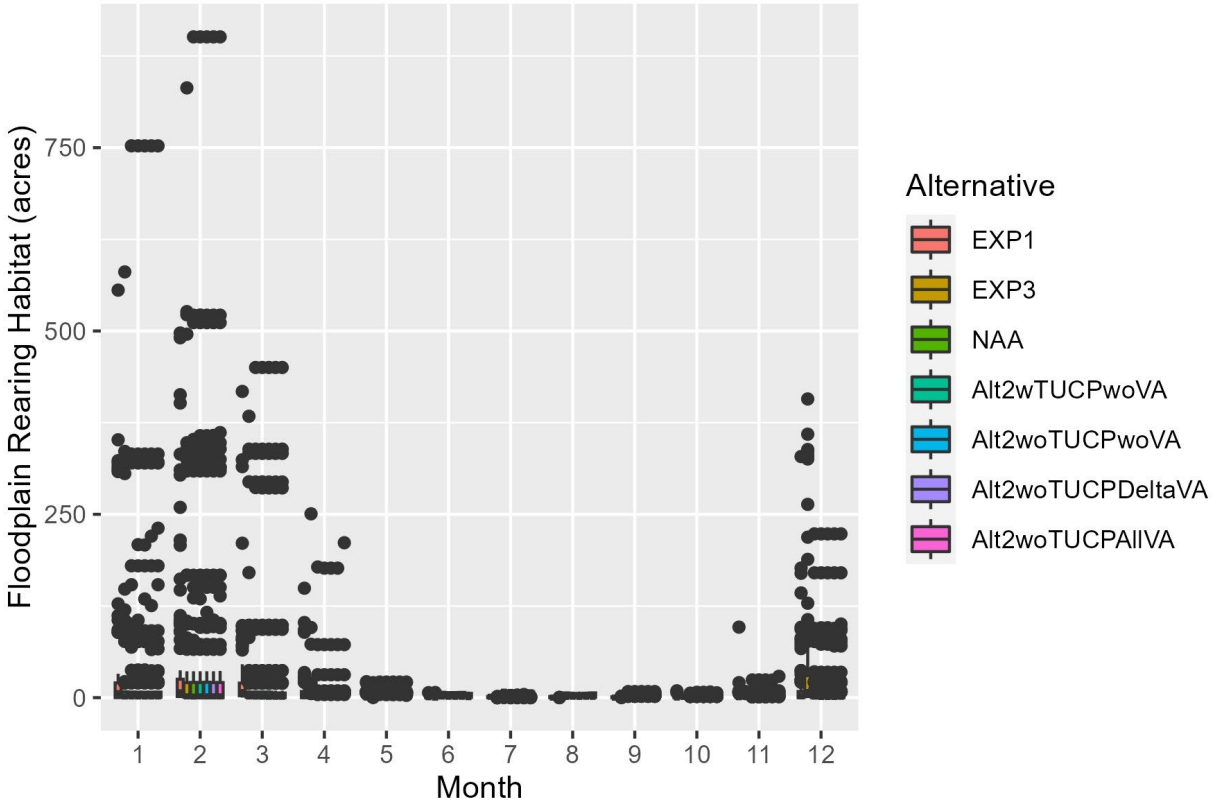


Figure O.2-31. Estimated floodplain rearing habitat for juvenile winter-run Chinook salmon, spring-run Chinook salmon, and steelhead in the Upper Sacramento River. Variability within months reflects variation across CalSim WYs.

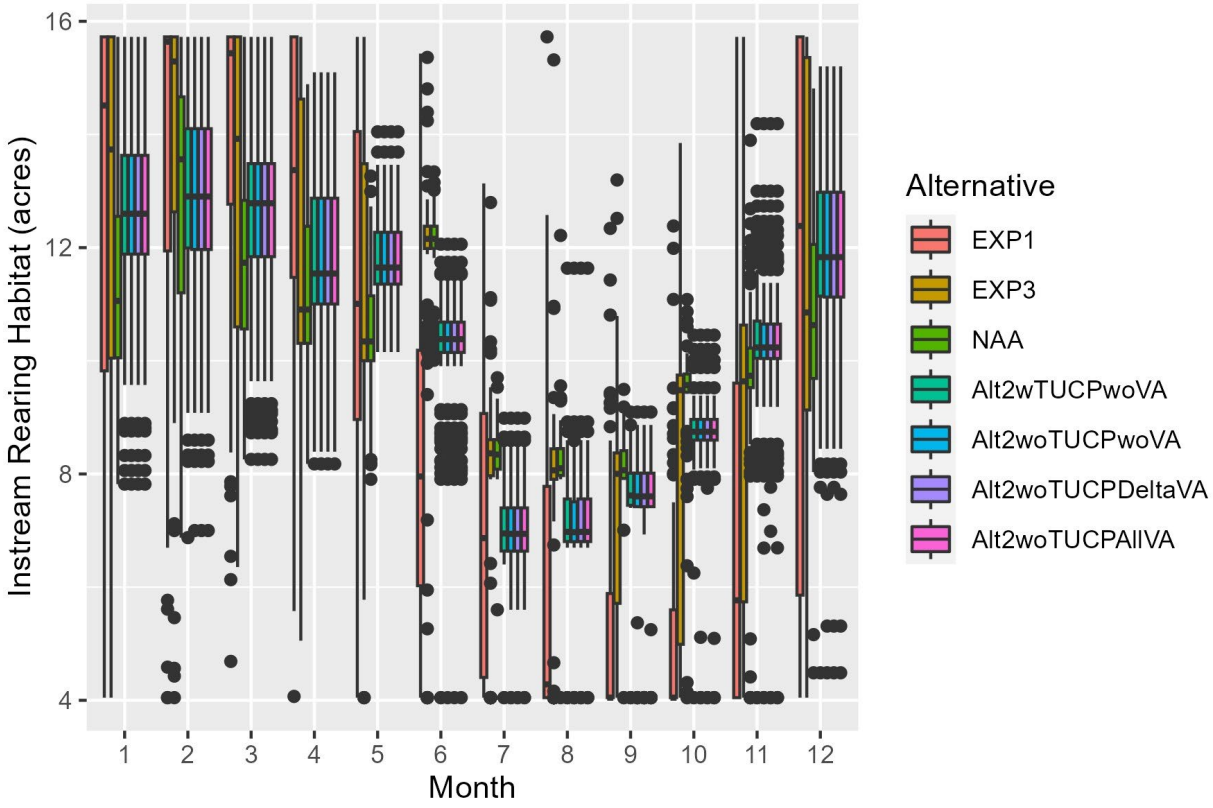


Figure O.2-32. Estimated instream rearing habitat for juvenile spring-run Chinook salmon and steelhead in Clear Creek. Variability within months reflects variation across CalSim WYs.

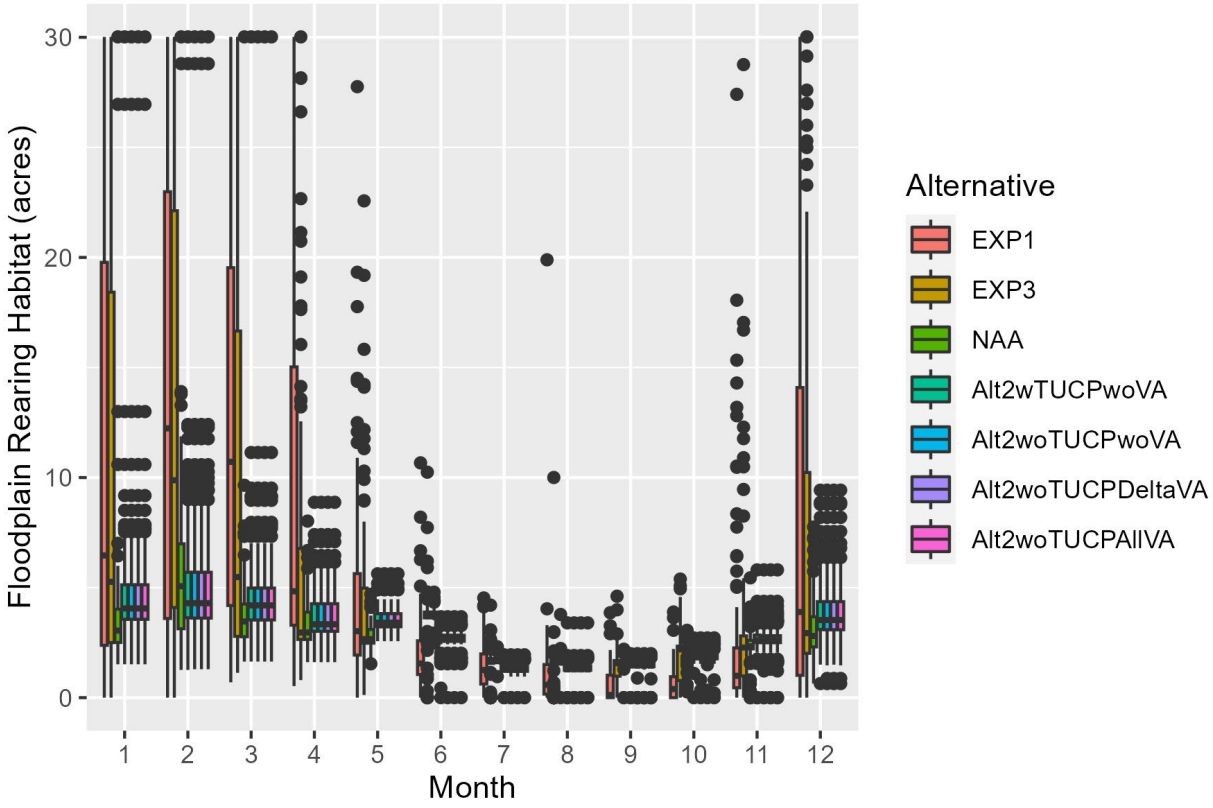


Figure O.2-33. Estimated floodplain rearing habitat for spring-run juveniles in Clear Creek. Variability within months reflects variation across CalSim WYs.

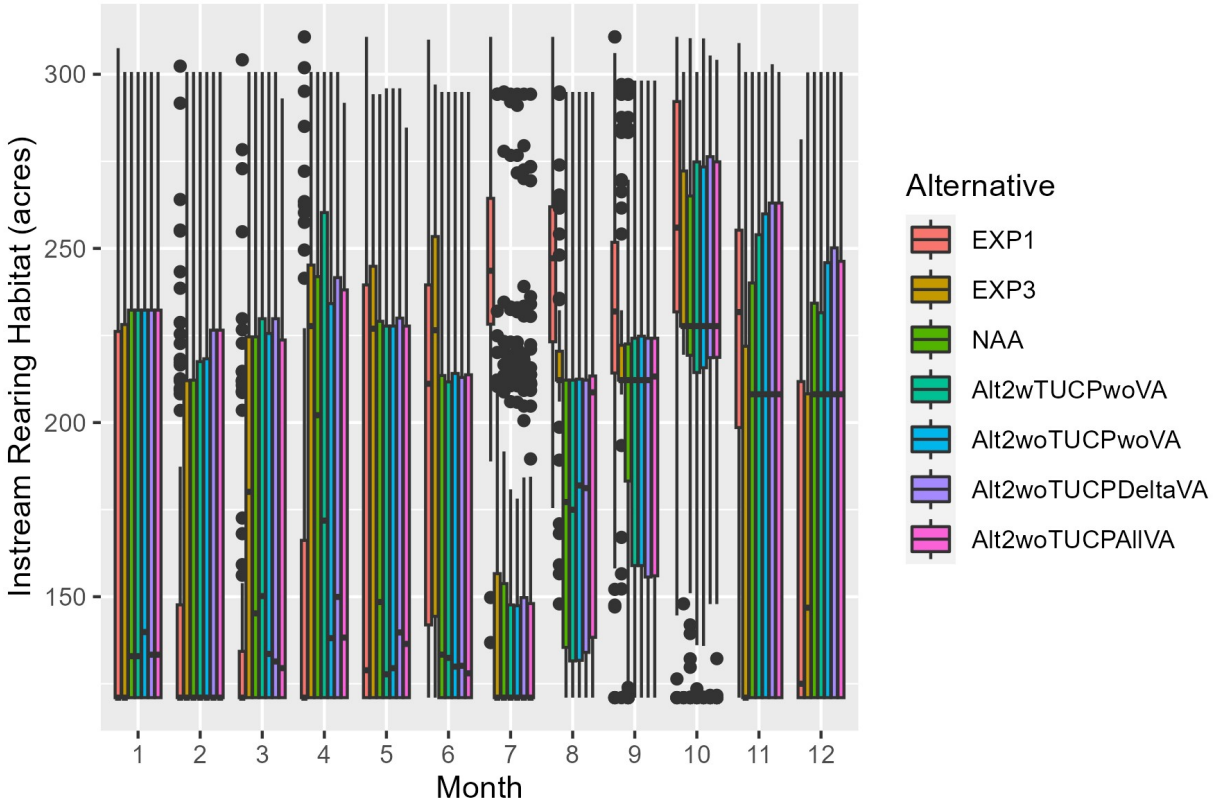


Figure O.2-34. Estimated instream rearing habitat for steelhead juveniles in the American River. Variability within months reflects variation across CalSim WYs.

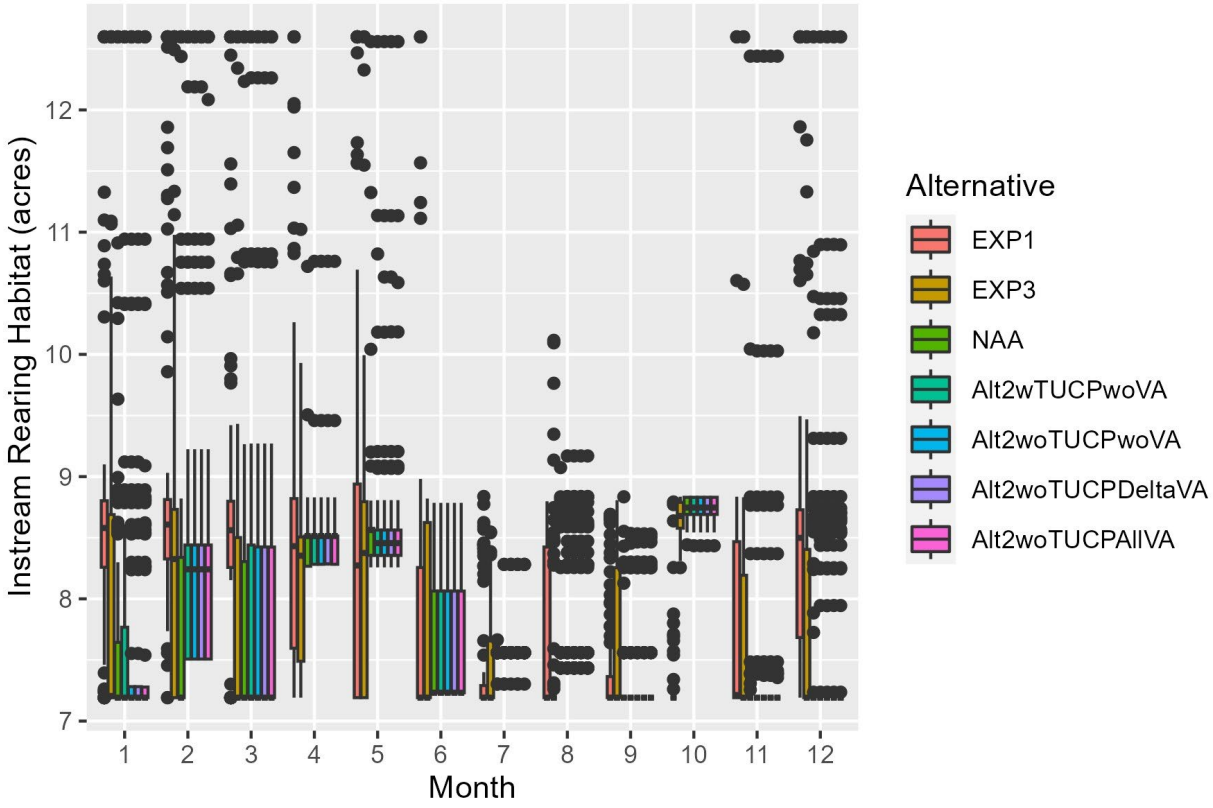


Figure O.2-35. Estimated instream rearing habitat for steelhead juveniles in the Stanislaus River. Variability within months reflects variation across CalSim WYs.

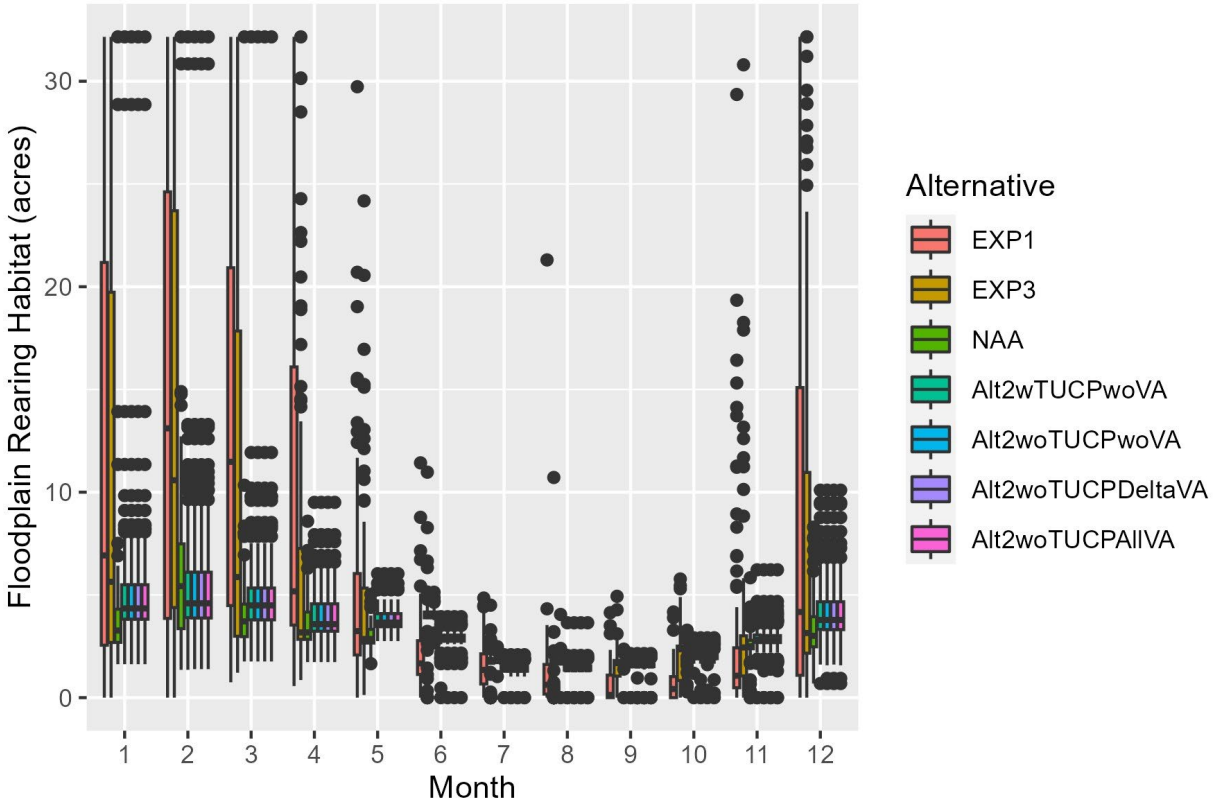


Figure O.2-36. Estimated floodplain rearing habitat for steelhead juveniles in Clear Creek. Variability within months reflects variation across CalSim WYs.

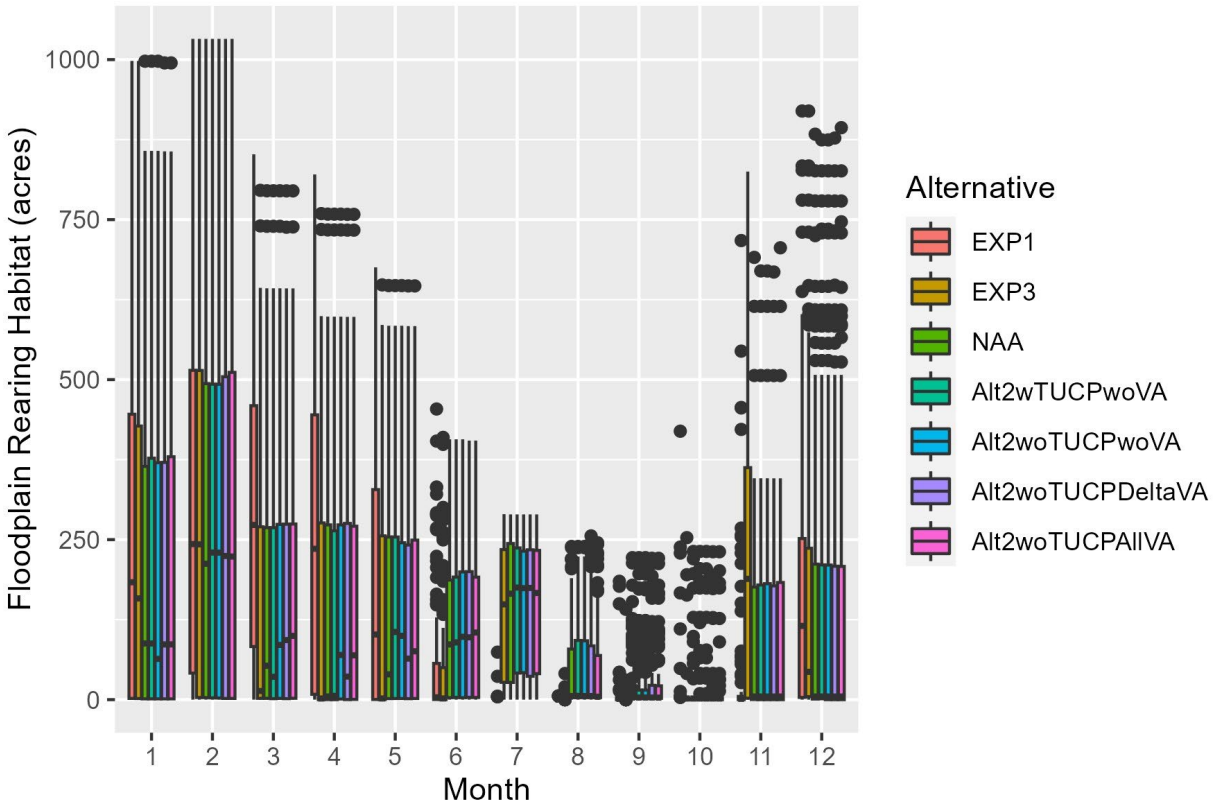


Figure O.2-37. Estimated floodplain rearing habitat for steelhead juveniles in the American River. Variability within months reflects variation across CalSim WYs.

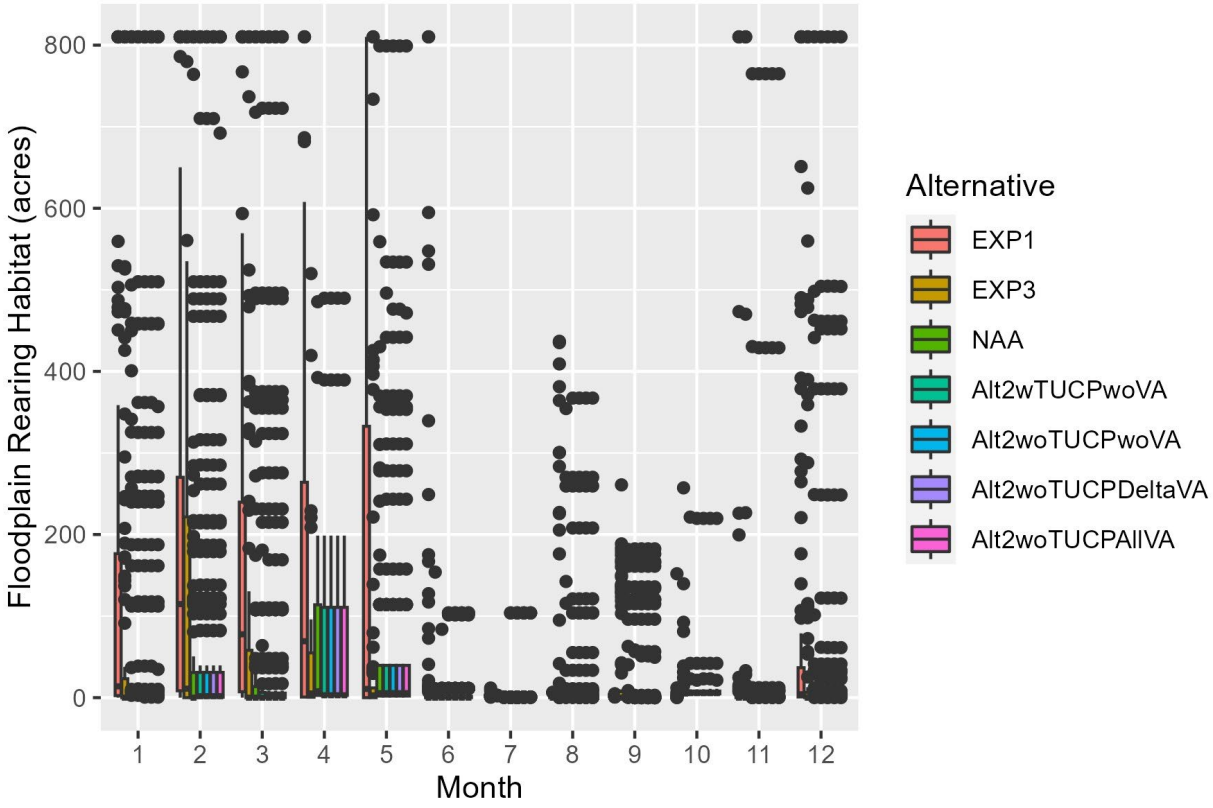


Figure O.2-38. Estimated floodplain rearing habitat for steelhead juveniles in the Stanislaus River. Variability within months reflects variation across CalSim WYs.

### O.2.2.3 Rearing Habitat, Yolo and Sutter Bypasses

#### *O.2.2.3.1 EIS Takeaways*

Expected rearing habitat for salmonid juveniles in the Sutter Bypass is highly variable across months and exhibits the lowest values and least variability in summer and fall months (July through August; 3173.91 acres for Alt2wTUCPwoVA in July; Table O.2-34; Figure O.2-39). All alternatives generally resulted in small decreases in habitat relative to NAA for all months (i.e., between -5.6 and 0.8% changes). Across all months, expected Sacramento River flow near Wilkins Slough is generally lowest in summer months (i.e., May through September).

Rearing habitat for salmonid juveniles in the Yolo Bypass is highly variable across months and exhibits the lowest values and least variability in summer and fall months (July through October; 63.18 acres for Alt2wTUCPwoVA in July; Table O.2-35; Figure O.2-40). All four components of Alt2, in addition to Alt4, resulted in generally increased habitat, relative to NAA, in January through April (i.e., between -0.2% and 1.0% changes) but generally decreased habitat in remaining months. The alternative Alt1 resulted in decreased habitat relative to NAA in December through February (i.e., between -1.0 and -0.4% changes) but increased habitat in all other months (i.e., between 0.1 and 16.9% changes). The alternative Alt3 resulted in more variable differences relative to NAA with less discernible seasonal trends (i.e., between -26.5 and 11.5% changes). Across all months, expected Sacramento River flow near Wilkins Slough is generally lowest in summer months (i.e., May through September).

#### *O.2.2.3.2 BA Takeaways*

Rearing habitat for salmonid juveniles in both the Yolo and Sutter Bypass is highly variable across months and exhibits greater values and variability in winter and spring (December through March; 4802.67 and 4619.96 acres for Alt2wTUCPwoVA in Sutter and Yolo Bypass, respectively, in January; Table O.2-36, Table O.2-37; Figure O.2-41, Figure O.2-42). Across all months, expected Sacramento River flow near Wilkins Slough is generally lowest in summer months (i.e., May through September).

Table O.2-34. Predicted mean rearing habitat quantities, in acres, for juvenile salmonids in the Sutter Bypass. Parentheses indicate percent different from NAA (negative values indicate a decrease in expected habitat quantity).

| WYT | Month | NAA | Alt1 | Alt2wTUCPwoVA | Alt2woTUCPwoVA | Alt2woTUCPDeltaVA | Alt2woTUCPAllVA | Alt3 | Alt4 |
|---|---|---|---|---|---|---|---|---|---|
| All | 1 | 4805.87 | 4774.72 (-0.7) | 4802.67 (-0.1) | 4790.41 (-0.3) | 4771.84 (-0.7) | 4755.44 (-1.1) | 4797.36 (-0.2) | 4797.86 (-0.2) |
| All | 2 | 4883.38 | 4877.61 (-0.1) | 4883.33 (0.0) | 4869.81 (-0.3) | 4861.52 (-0.5) | 4863.21 (-0.4) | 4892.71 (0.2) | 4884.95 (0.0) |
| All | 3 | 4500.50 | 4537.51 (0.8) | 4495.53 (-0.1) | 4535.75 (0.8) | 4523.70 (0.5) | 4521.69 (0.5) | 4451.73 (-1.1) | 4496.72 (-0.1) |
| All | 4 | 4395.80 | 4389.24 (-0.2) | 4393.71 (-0.1) | 4392.46 (-0.1) | 4419.13 (0.5) | 4411.30 (0.4) | 4351.19 (-1.0) | 4396.79 (0.0) |
| All | 5 | 5644.95 | 5645.01 (0.0) | 5642.18 (-0.1) | 5641.67 (-0.1) | 5650.96 (0.1) | 5579.09 (-1.2) | 5586.57 (-1.0) | 5643.50 (0.0) |
| All | 6 | 3241.20 | 3240.84 (0.0) | 3232.35 (-0.3) | 3230.70 (-0.3) | 3240.62 (0.0) | 3144.79 (-3.0) | 3066.35 (-5.4) | 3235.97 (-0.2) |
| All | 7 | 3182.68 | 3182.19 (0.0) | 3173.91 (-0.3) | 3172.35 (-0.3) | 3175.57 (-0.2) | 3044.70 (-4.3) | 3004.39 (-5.6) | 3175.61 (-0.2) |
| All | 8 | 3554.81 | 3552.40 (-0.1) | 3547.79 (-0.2) | 3547.76 (-0.2) | 3542.45 (-0.4) | 3396.31 (-4.5) | 3404.99 (-4.2) | 3550.70 (-0.1) |
| All | 9 | 5267.45 | 5262.44 (-0.1) | 5261.18 (-0.1) | 5261.06 (-0.1) | 5267.49 (0.0) | 5183.15 (-1.6) | 5215.78 (-1.0) | 5263.34 (-0.1) |
| All | 10 | 3777.81 | 3785.51 (0.2) | 3750.59 (-0.7) | 3742.34 (-0.9) | 3745.88 (-0.8) | 3711.00 (-1.8) | 3655.48 (-3.2) | 3757.73 (-0.5) |
| All | 11 | 5381.18 | 5375.19 (-0.1) | 5348.28 (-0.6) | 5338.82 (-0.8) | 5275.74 (-2.0) | 5232.96 (-2.8) | 5367.50 (-0.3) | 5350.10 (-0.6) |
| All | 12 | 5108.33 | 5059.09 (-1.0) | 5087.59 (-0.4) | 5093.77 (-0.3) | 5013.94 (-1.9) | 4979.63 (-2.5) | 5090.38 (-0.4) | 5106.25 (0.0) |

Table O.2-35. Predicted mean rearing habitat quantities, in acres, for juvenile salmonids in the Yolo Bypass. Parentheses indicate percent different from NAA (negative values indicate a decrease in expected habitat quantity).

| WYT | Month | NAA | Alt1 | Alt2wTUCPwoVA | Alt2woTUCPwoVA | Alt2woTUCPDeltaVA | Alt2woTUCPAllVA | Alt3 | Alt4 |
|---|---|---|---|---|---|---|---|---|---|
| All | 1 | 4586.43 | 4565.44 (-0.5) | 4619.96 (0.7) | 4622.29 (0.8) | 4599.93 (0.3) | 4616.37 (0.7) | 4601.88 (0.3) | 4595.10 (0.2) |
| All | 2 | 4964.66 | 4916.96 (-1.0) | 4956.08 (-0.2) | 4961.85 (-0.1) | 4964.22 (0.0) | 4976.98 (0.3) | 4961.67 (-0.1) | 4965.98 (0.0) |
| All | 3 | 4504.53 | 4510.13 (0.1) | 4515.73 (0.3) | 4528.37 (0.5) | 4531.69 (0.6) | 4547.65 (1.0) | 4544.27 (0.9) | 4517.62 (0.3) |
| All | 4 | 2230.12 | 2231.28 (0.1) | 2237.97 (0.4) | 2230.46 (0.0) | 2231.94 (0.1) | 2245.66 (0.7) | 2221.84 (-0.4) | 2240.56 (0.5) |
| All | 5 | 1428.69 | 1434.09 (0.4) | 1426.12 (-0.2) | 1421.65 (-0.5) | 1426.69 (-0.1) | 1441.30 (0.9) | 1395.69 (-2.3) | 1426.98 (-0.1) |
| All | 6 | 366.21 | 369.30 (0.8) | 362.78 (-0.9) | 361.63 (-1.3) | 362.46 (-1.0) | 365.08 (-0.3) | 352.99 (-3.6) | 363.83 (-0.7) |
| All | 7 | 61.01 | 63.18 (3.6) | 63.18 (3.6) | 61.64 (1.0) | 63.18 (3.6) | 63.32 (3.8) | 68.04 (11.5) | 63.52 (4.1) |
| All | 8 | 32.66 | 32.78 (0.4) | 31.22 (-4.4) | 30.96 (-5.2) | 31.97 (-2.1) | 32.62 (-0.1) | 24.00 (-26.5) | 32.24 (-1.3) |
| All | 9 | 614.84 | 642.19 (4.5) | 607.08 (-1.3) | 608.58 (-1.0) | 615.78 (0.2) | 619.77 (0.8) | 580.81 (-5.5) | 613.29 (-0.3) |
| All | 10 | 381.99 | 446.46 (16.9) | 379.78 (-0.6) | 380.85 (-0.3) | 381.54 (-0.1) | 385.87 (1.0) | 421.41 (10.3) | 382.90 (0.2) |
| All | 11 | 1949.45 | 1976.41 (1.4) | 1947.71 (-0.1) | 1950.19 (0.0) | 1952.07 (0.1) | 2029.48 (4.1) | 1984.98 (1.8) | 1949.43 (0.0) |
| All | 12 | 3701.27 | 3686.56 (-0.4) | 3692.48 (-0.2) | 3691.33 (-0.3) | 3694.56 (-0.2) | 3739.61 (1.0) | 3662.24 (-1.1) | 3693.32 (-0.2) |

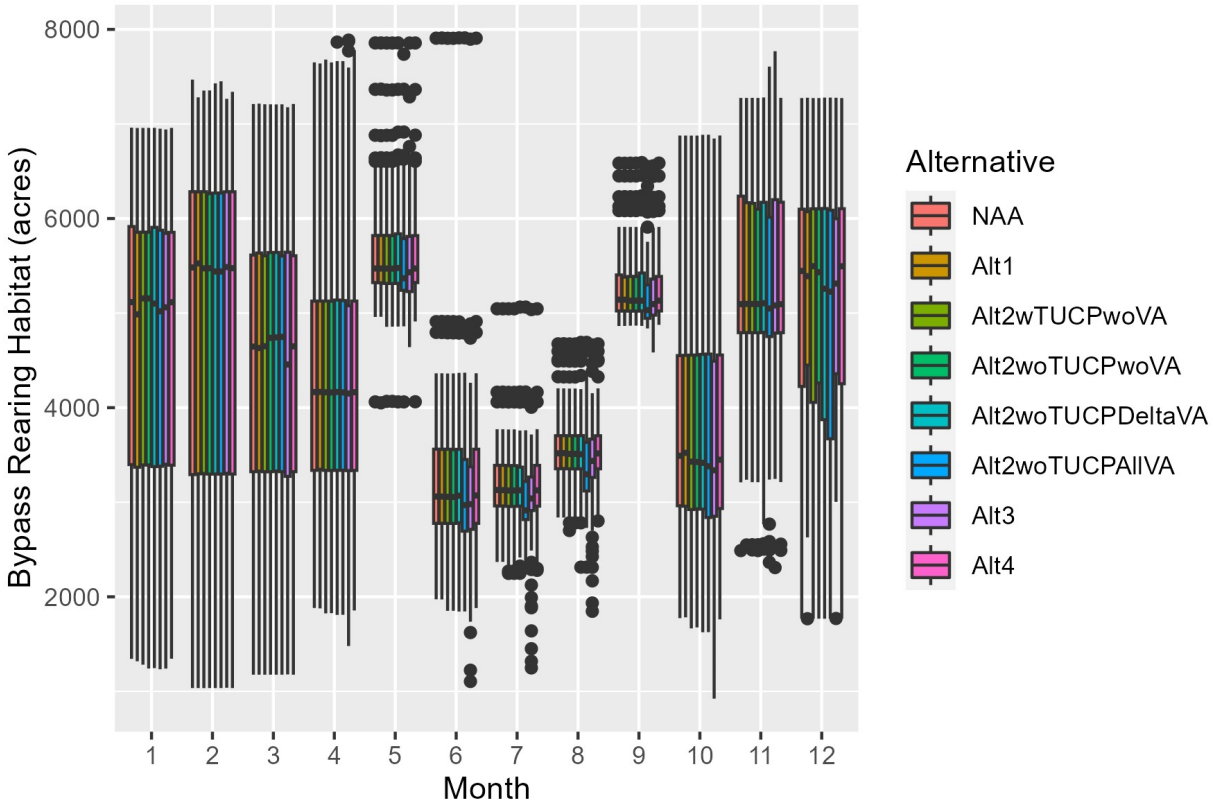


Figure O.2-39. Estimated rearing habitat for salmonid juveniles in the Sutter Bypass. Variability within months reflects variation across CalSim WYs.

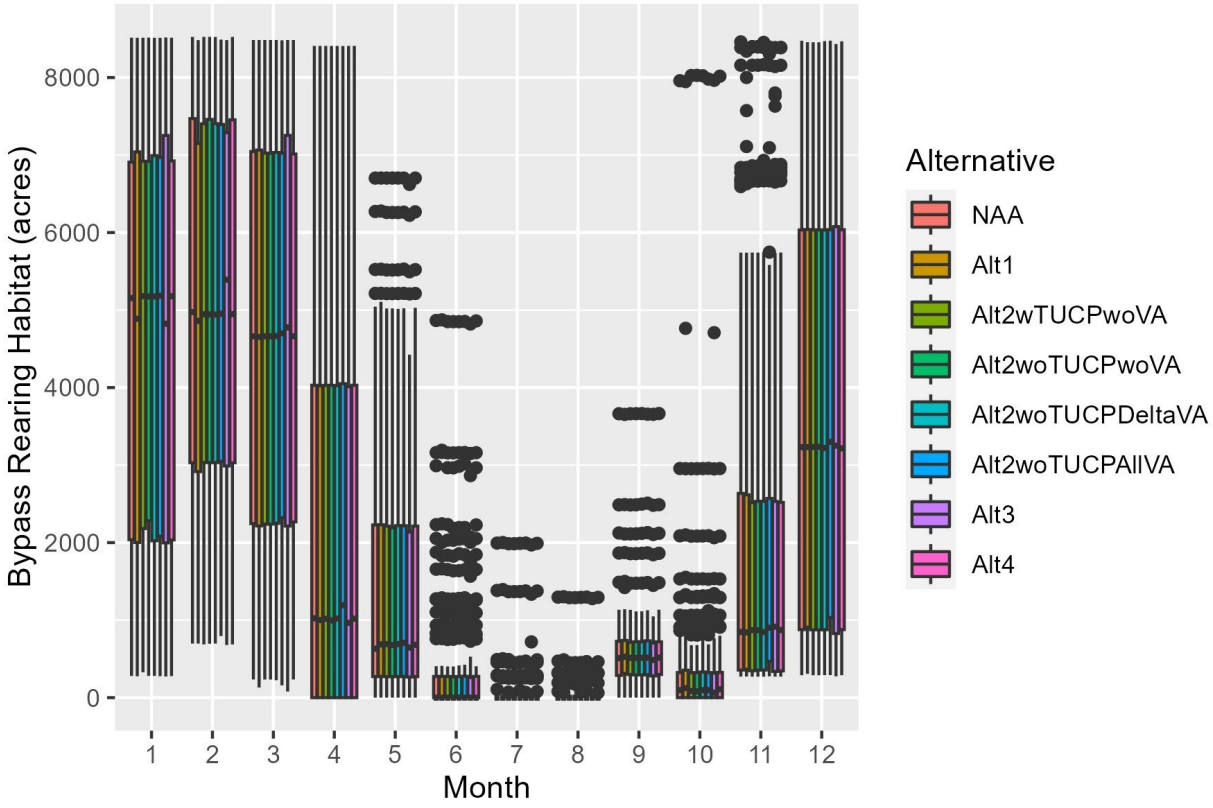


Figure O.2-40. Estimated rearing habitat for salmonid juveniles in the Yolo Bypass. Variability within months reflects variation across CalSim WYs.

Table O.2-36. Predicted mean rearing habitat quantities, in acres, for juvenile salmonids in the Sutter Bypass.

| WYT | Month | EXP1 | EXP3 | NAA | Alt2wTUCPwoVA | Alt2woTUCPwoVA | Alt2woTUCPDeltaVA | Alt2woTUCPAllVA |
|---|---|---|---|---|---|---|---|---|
| All | 1 | 4593.31 | 4801.91 | 4805.87 | 4802.67 | 4790.41 | 4771.84 | 4755.44 |
| All | 2 | 4495.00 | 4829.56 | 4883.38 | 4883.33 | 4869.81 | 4861.52 | 4863.21 |
| All | 3 | 4527.74 | 4439.18 | 4500.50 | 4495.53 | 4535.75 | 4523.70 | 4521.69 |
| All | 4 | 4185.08 | 4346.74 | 4395.80 | 4393.71 | 4392.46 | 4419.13 | 4411.30 |
| All | 5 | 5495.74 | 5643.68 | 5644.95 | 5642.18 | 5641.67 | 5650.96 | 5579.09 |
| All | 6 | 2862.83 | 3207.75 | 3241.20 | 3232.35 | 3230.70 | 3240.62 | 3144.79 |
| All | 7 | 2837.46 | 3142.54 | 3182.68 | 3173.91 | 3172.35 | 3175.57 | 3044.70 |
| All | 8 | 3253.09 | 3514.95 | 3554.81 | 3547.79 | 3547.76 | 3542.45 | 3396.31 |
| All | 9 | 5096.80 | 5248.76 | 5267.45 | 5261.18 | 5261.06 | 5267.49 | 5183.15 |
| All | 10 | 3483.95 | 3763.67 | 3777.81 | 3750.59 | 3742.34 | 3745.88 | 3711.00 |
| All | 11 | 5266.27 | 5473.59 | 5381.18 | 5348.28 | 5338.82 | 5275.74 | 5232.96 |
| All | 12 | 4939.17 | 4858.97 | 5108.33 | 5087.59 | 5093.77 | 5013.94 | 4979.63 |

Table O.2-37. Predicted mean rearing habitat quantities, in acres, for juvenile salmonids in the Yolo Bypass.

| WYT | Month | EXP1 | EXP3 | NAA | Alt2wTUCPwoVA | Alt2woTUCPwoVA | Alt2woTUCPDeltaVA | Alt2woTUCPAllVA |
|---|---|---|---|---|---|---|---|---|
| All | 1 | 4845.69 | 4617.21 | 4586.43 | 4619.96 | 4622.29 | 4599.93 | 4616.37 |
| All | 2 | 5208.80 | 4881.52 | 4964.66 | 4956.08 | 4961.85 | 4964.22 | 4976.98 |
| All | 3 | 5091.48 | 4552.11 | 4504.53 | 4515.73 | 4528.37 | 4531.69 | 4547.65 |
| All | 4 | 2558.40 | 2061.48 | 2230.12 | 2237.97 | 2230.46 | 2231.94 | 2245.66 |
| All | 5 | 1318.36 | 1200.96 | 1428.69 | 1426.12 | 1421.65 | 1426.69 | 1441.30 |
| All | 6 | 511.24 | 226.83 | 366.21 | 362.78 | 361.63 | 362.46 | 365.08 |
| All | 7 | 682.96 | 22.76 | 61.01 | 63.18 | 61.64 | 63.18 | 63.32 |
| All | 8 | 409.83 | 10.17 | 32.66 | 31.22 | 30.96 | 31.97 | 32.62 |
| All | 9 | 496.33 | 490.77 | 614.84 | 607.08 | 608.58 | 615.78 | 619.77 |
| All | 10 | 302.50 | 320.31 | 381.99 | 379.78 | 380.85 | 381.54 | 385.87 |
| All | 11 | 2006.80 | 1783.62 | 1949.45 | 1947.71 | 1950.19 | 1952.07 | 2029.48 |
| All | 12 | 3986.81 | 4388.85 | 3701.27 | 3692.48 | 3691.33 | 3694.56 | 3739.61 |

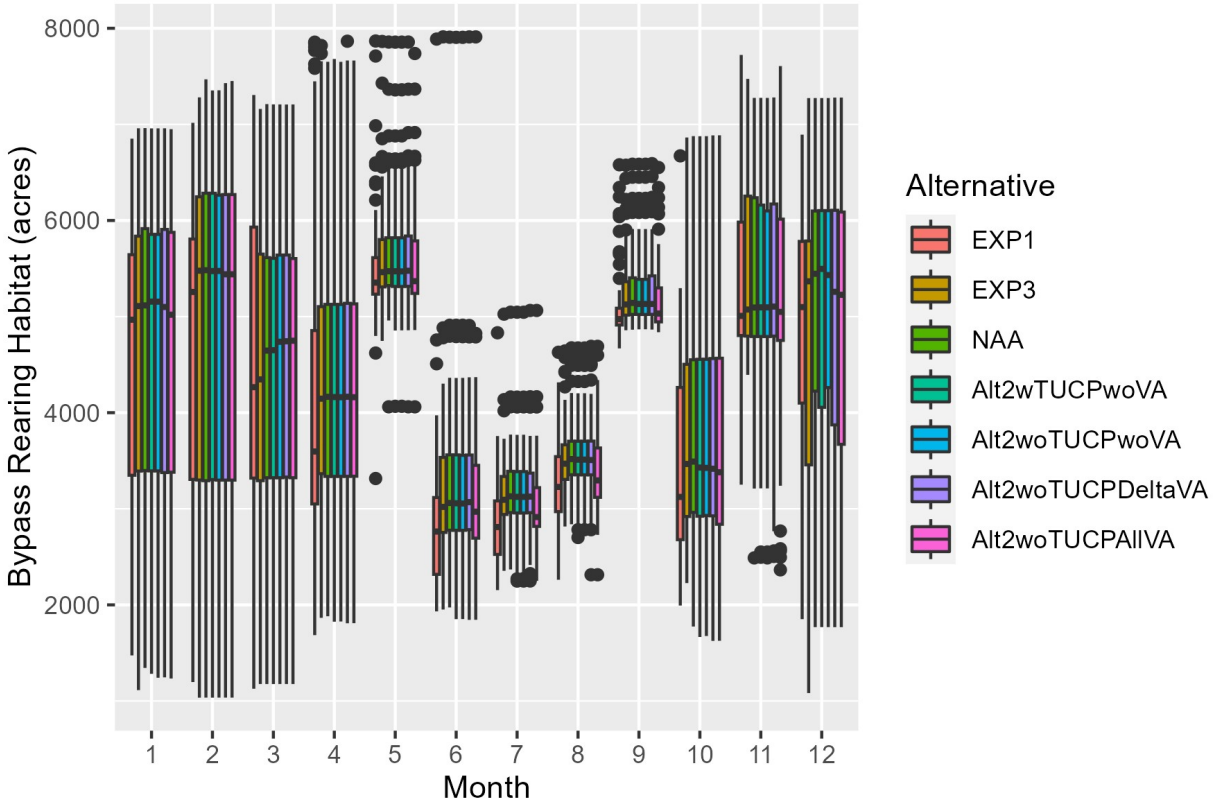


Figure O.2-41. Estimated rearing habitat for salmonid juveniles in the Sutter Bypass. Variability within months reflects variation across CalSim WYs.

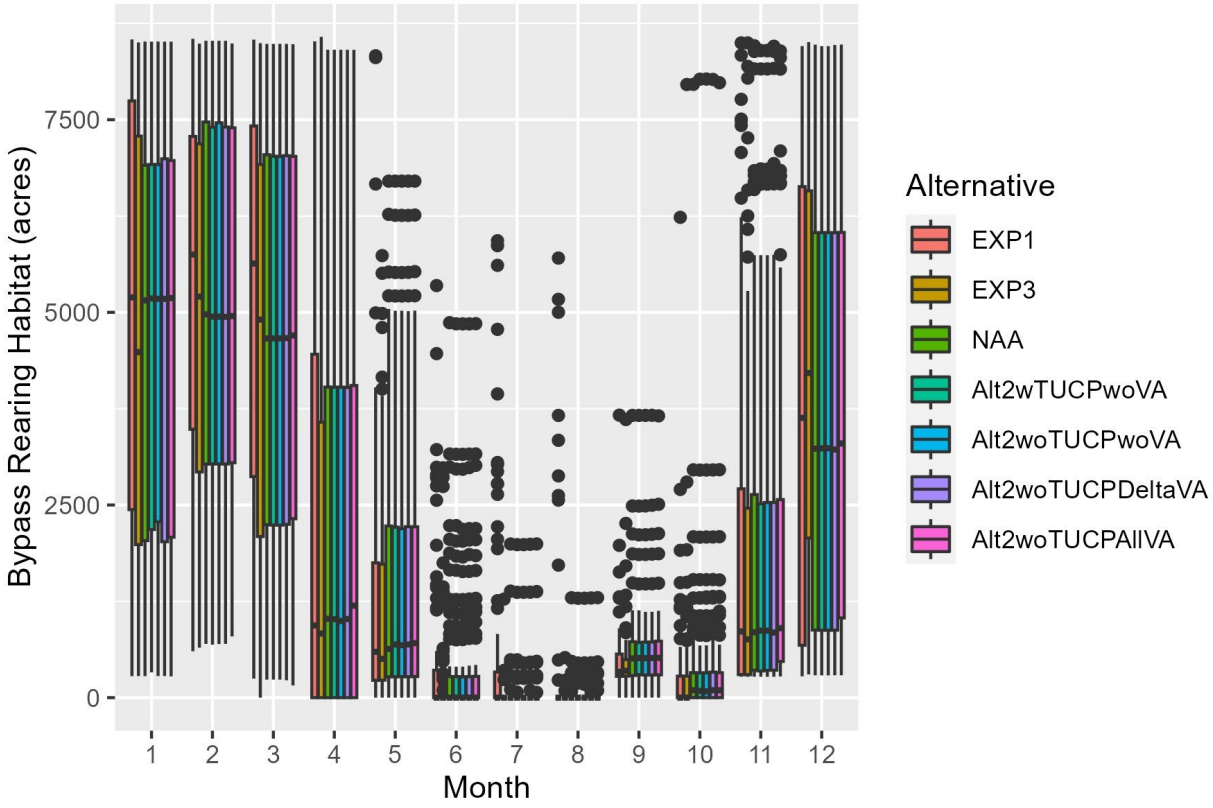


Figure O.2-42. Estimated rearing habitat for salmonid juveniles in the Yolo Bypass. Variability within months reflects variation across CalSim WYs.

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