Weekly Assessment of CVP and SWP Delta Operations on ESA-listed Species

1. Executive Summary

a. Operations anticipated during the week

See Weekly Fish and Water Operation Outlook document for February 2 – February 8

b. Winter-run Chinook Salmon summary

No loss of natural winter-run Chinook salmon (LAD) has occurred in the past week at the State or Federal fish salvage facilities (Facilities) (Figure 1, Figure 2). Loss of natural winter-run Chinook salmon at the Facilities is unlikely to occur over the next week. 45-75% of juvenile natural winter-run Chinook salmon from brood year (BY) 2020 are estimated to be present in the Delta. This percentage is likely to increase due to precipitation inflows, behavioral cues from other runs and maturation stage. Hatchery winter-run Chinook salmon were released 1/30/2021 (in-river Sacramento) and 2/1/2021 (Battle Creek) and are a part of Incidental Take Statements.

c. Spring-run Chinook salmon summary

No loss of natural Central Valley (CV) YOY spring-run Chinook salmon has occurred in the past week at the Facilities. Loss of young of year Central Valley spring-run Chinook salmon at the Facilities is unlikely to occur over the next week. 25-35% of spring-run Chinook salmon are estimated to be in the Delta. This percentage is likely to increase due to precipitation inflows, behavioral cues from other runs and maturation stage.

c. **Central Valley Steelhead summary**

No loss of natural California CV (CCV) steelhead occurred last week through 1/31/2021 at the Facilities (Figure 3, Figure 4). Loss of CCV steelhead at the Facilities may occur over the next week. 15-30% of juvenile CCV Steelhead are estimated to be present in the Delta. An estimated 0-5% have exited the Delta. This percentage is likely to increase due to precipitation inflows and maturation stage.

d. Green Sturgeon summary

Loss of green sturgeon at the Facilities is unlikely to occur over the next week due to their rare presence in the South Delta. Anticipated inflows are likely to influence emigration of juveniles from the tributaries.

e. Delta Smelt summary

Based on distribution patterns over the past decade and recent detections, Delta Smelt are unlikely to be prevalent in the South Delta. Limited detection data support Delta Smelt being present in Suisun Marsh, west of the Sacramento-San Joaquin confluence, and in the Sacramento Deep Water Ship Channel. The distribution of Delta Smelt is expected to extend upstream of the confluence which is supported by historical Spring Kodiak Trawl data analysis. Precipitation and in-stream flows may contribute to increases in turbidity at OBI, but it is unlikely to reach 12 FNU in the next 7 days. The likelihood of Delta Smelt adult entrainment is slightly elevated relative to the previous seven days due seasonal timing and widespread increases in turbidity. The overall probability of Delta Smelt moving into the south Delta is low. The projected OMR Index limits are at a level that is sufficiently protective.

f. Monitoring Teams summary

There were no non-consensus issues to report from the Salmon Monitoring Team.
There were no non-consensus issues to report from the Smelt Monitoring Team.

2. Operational and Regulatory Conditions

See current Weekly Fish and Water Operation Outlook document.

3. Biology, Distribution, and Evaluation
Winter-run Chinook salmon, Spring-run Chinook salmon, Central Valley Steelhead

POPULATION STATUS

Winter-run Chinook salmon

- **Delta Life Stages**:
    - Juveniles, Adults
- **Brood Year 2020 Productivity:**
    - Natural winter-run Chinook salmon: Preliminary interim juvenile production estimate (JPE) calculations were established for brood year (BY) 2020 winter-run Chinook salmon. The finalized estimate from the Winter-run JPE PWT for total natural production entering the Delta (JPE) is 330,130 winter-run Chinook salmon individuals. NMFS issued a final winter-run JPE letter on 1/25/21. The agencies in the SaMT have previously discussed the thiamine vitamin deficiency that is being observed again in broodstock at the Livingston Stone National Fish Hatchery (NFH) similar to last year's observations. Last year the thiamine deficiency appeared to negatively affect survival of juvenile fish as they migrate downstream towards the Delta. Estimated winter-run Chinook salmon passage at Red Bluff Diversion dam (RBDD) is greater than recent years (BY 2014 – 2018) with the exception of BY 2019. By 1/28/2021, 1,985,860 winter-run Chinook salmon were estimated to have passed RBDD compared to a cumulative passage of 3,799,460 winter-run Chinook salmon RBDD on 1/28/2020.
    - Few observations of natural winter-run Chinook salmon from brood year 20 (BY 2020) have been observed downstream of the Glenn-Colusa Irrigation District's (GCID) monitoring location this water year.
    - Hatchery winter-run Chinook salmon: Approximately 302,166 juvenile winter-run Chinook salmon were released from Livingston Stone NFH at Caldwell Park on 1/30/2021. The final estimate for the hatchery JPE released into the Sacramento River from Livingston Stone NFH is 97,888 fish.
    - The JPE for BY 2020 hatchery origin winter-run Chinook salmon juveniles released from Livingston Stone NFH into Battle Creek is 37,232 fish.

Spring-run Chinook salmon

- **Delta Life Stages:**
    - Young-of-year (YOY) and Yearlings
- **Brood Year 2020 Productivity:**
    - Natural spring-run Chinook salmon: No JPE has been established for spring-run Chinook salmon. Approximately 21.8% of the juvenile spring-run sized Chinook salmon population for BY 20 is expected to have passed passing Red Bluff Diversion dam as of 1/31 (see Ops Outlook) based on historical data.
    - Hatchery spring-run Chinook salmon surrogates: First hatchery releases of yearling spring-run Chinook salmon surrogates from Coleman NFH facility occurred on 1/8/2021, second hatchery releases occurred on 1/22/2021, third hatchery releases occurred on 1/29/2021.
    - First hatchery releases of yearling spring-run Chinook salmon from the SCARF facility occurred on 12/3/2020, the second hatchery releases occurred on 1/26/2021.
    - The agencies in the SaMT discussed the thiamine vitamin deficiency that is also currently being observed again in winter-run Chinook salmon broodstock at the Livingston Stone NFH similar to last year's observations. Last year the thiamine deficiency appeared to negatively affect survival of juvenile fish as they migrate downstream towards the Delta. The thiamine deficiency issue is also likely impacting spring-run Chinook salmon. The Feather River Fish Hatchery experienced issues with infertile males. It is

expected that the Feather River Hatchery will only meet about half of their production goals. On the Feather River, a larger than historical number of spring-run adults that entered the system and were tagged appear to be spawning in-river instead of returning to the hatchery. This is one reason that low returns are being observed at the hatcheries.

Central Valley Steelhead

- **Delta Life Stages**:
    - Spawning Adults, Kelts, Juveniles
- **Brood Year 2020 Productivity:**
    - Spawner abundance: There is limited information about the adult steelhead population. It is estimated to be small, contributing to the limited productivity of the population.
    - Natural steelhead: No JPE has been established for steelhead. Data are limited.
    - Hatchery steelhead: Reclamation's Proposed Action has no hatchery steelhead triggers.
    - Approximately 415,000 steelhead from Coleman NFH were released at Red Bluff in the first half of December, part of the CCV Steelhead DPS.
    - Approximately 216,500 steelhead from Coleman NFH were released into the Sacramento River from December 28-29, 2020, which are part of the CCV Steelhead DPS.

DISTRIBUTION

Winter-run Chinook Salmon

- **Current Distribution:**
    - On 2/2/2021, SaMT estimated 45-75% of juvenile winter-run Chinook salmon were present in the Delta (Table 1). In October through December 2020, the GCID RSTs observed 967 winter-run Chinook salmon juveniles (by length at date criteria) in their daily catches. In January (through 1/25/2021), the GCID RSTs have observed 36 winter-run Chinook salmon juveniles (by length at date criteria) in daily catches[1]. Since few winter-run Chinook salmon have been observed in RST monitoring locations farther downstream (14 at Tisdale 1/25/2021 – 1/31/2021; 0 at Knights Landing[2] 1/25/2021 – 1/29/2021), the fish appear to have begun to move in the middle reaches of the Sacramento River. 1 marked winter-run Chinook salmon was observed at Tisdale this past week.
    - Catch indices are calculated daily for juvenile winter-run Chinook salmon observed in RSTs at Knights Landing (Knights Landing Catch Index, KLCI) and Sacramento Trawl and Beach Seine (Sacramento Seine Catch Index, SCI Trawl and SCI Beach Seine) monitoring locations (Table 2). No catch indices for juvenile salmonid migration were triggered during the past week.
    - Mean daily flow and percent change (Wilkins Slough (WLK), Deer Creek (DCV), Mill Creek (MLM); cfs from CDEC) and temperature and percent change (Knights Landing RST (KL); °F from RST) are monitored as alerts for juvenile salmonid migration (Table 3).
- **Historic Trends**
    - Based on historical trends in salvage, 26.2% of winter-run Chinook salmon should have been observed in salvage by this time of the water year (Table 4). If historic trends in salvage were to continue winter-run Chinook salmon loss is expected to remain the same over the next week (Figure 1, Figure 2). Approximately 302,166 juvenile winter-run Chinook salmon were released from Livingston Stone NFH at Caldwell Park on 1/30/2021
- **Forecasted Distribution within Central Valley and Delta regions**

[1] 1/25/2021: The GCID RST cone was raised in anticipation of high flows, heavy debris, and hatchery released Chinook salmon.
[2] 1/29/2021 – 1/31/2021: Hubodometers not working, no revs data. Traps taken out of service.

- Movement of winter-run Chinook salmon juveniles into the lower reaches of the Sacramento River and upper Delta are likely to increase with precipitation events and increasing river flows and turbidity. Significant precipitation is anticipated to occur this week (see Ops Outlook) and given the seasonal timing (late-January / early-February) any precipitation during a very dry period may stimulate fish movement. Furthermore, based on the time of year, and the maturation of juvenile fish, downstream migration is expected to continue even without any substantial precipitation events occurring. The STARS model projects route-specific proportion of entrainment, survival, and travel times (Table 5). This model does not estimate entrainment into the lower Sacramento River sloughs (i.e. Three-Mile Slough). The DCC gates were closed 12/1/20 and are expected to remain closed through mid-May 2021. There may be a need to open the DCC gates to meet D-1641 water quality standards (see Operations Outlook document).
- The entrainment tool estimates a median loss of 0 fish and a maximum loss of 3 fish during this week (SacPAS last updated on 1/27/21).
- For results of entrainment into Delta strata regions from DSM2 model runs (North Delta into Interior and Central Delta, San Joaquin River and Central Delta into South Delta, and South Delta into fish facilities) refer to Attachment A.

<u>Spring-run Chinook salmon</u>

- **Current Distribution**
  - On 2/2/2021 SaMT estimated 25-35% of juvenile CV spring-run Chinook salmon were present in the Delta (Table 1). Flows at Mill Creek and Deer Creek are indicative that yearling spring-run Chinook salmon may begin to move out of tributaries into the mainstem Sacramento River, yearling spring-run Chinook salmon have also been detected in the Butte Creek monitoring locations. 2 unmarked spring-run Chinook salmon were observed at the Knights Landing RST and 6 at Tisdale RST in the past week.
  - No juvenile young-of-year CV spring-run Chinook salmon (LAD) have been observed near the DCC gates. Yearling CV spring run Chinook salmon may be migrating downstream based on increased flows in the Sacramento River tributaries and have been observed at the Butte Creek monitoring locations. Historical monitoring indicates that approximately 5% of YOY spring-run Chinook salmon are in the Delta at this time. Mill Creek and Deer Creek flows are indicative that downstream migration of yearling spring-run Chinook salmon may occur soon.
  - One clipped Chinook salmon was observed at the CVP on 1/18/2021.
- **Historical Trends**
  - Based on historical trends in salvage, 0% of spring-run Chinook salmon should have been observed in salvage by this time of the water year (Table 4). If historic trends in salvage were to continue spring-run Chinook salmon loss is expected to remain the same over the next week. The first, second, and third spring-run surrogate Chinook salmon groups were released into the Sacramento River at Battle Creek on 1/8/2021, 1/22/2021, and 1/29/2021, respectively.
- **Forecasted Distribution within Central Valley and Delta regions**
  - Movement of juvenile spring-run Chinook salmon into the lower reaches of the Sacramento River and upper Delta are likely to occur with increased river flows and turbidity due to recent precipitation events (see Weekly Fish and Water Operation Outlook document).
  - For results of entrainment into Delta strata regions from DSM2 model runs (North Delta into Interior and Central Delta, San Joaquin River and Central Delta into South Delta, and South Delta into fish facilities) refer to Attachment A.

<u>Central Valley Steelhead</u>

- **Current Distribution**

  - On 2/2/2021 SaMT estimated 15-30% of juvenile CCV steelhead were present in the Delta (Table 1).
- **Historical Trends**
  - Based on historical trends in salvage, 11.1% of juvenile CCV steelhead should have been observed in salvage by this time of the water year. If historic trends in salvage were to continue juvenile CCV steelhead loss is expected that it may increase over the next week.
- **Forecasted Distribution within Central Valley and Delta regions**
  - No juvenile Central Valley steelhead have been observed near the DCC gates in regional monitoring efforts and historical monitoring data does not detect juvenile steelhead in the Delta at this time. No hatchery steelhead was observed at Knights Landing this past week and 3 at Tisdale (1/25/2021 – 1/31/2021). SaMT estimated that 15-30% of the population of CCV steelhead may be present in the Delta at this time and 0-5% have exited the Delta past Chipps Island. Closure of the DCC gates would reduce exposure and possible entrainment of juvenile CCV steelhead into the interior Delta via the DCC gates. 4 marked and 1 unmarked steelhead were observed at the Sacramento Trawls. The first natural steelhead in salvage for WY 2021 occurred 1/11/2021 at the CVP (Figure 3, Figure 4). The first marked steelhead in salvage for WY 2021 occurred 1/20/2021 at the CVP.
  - Recent precipitation in the Central Valley may stimulate fish movement due to increased inflows.
  - The entrainment tool predicts a median loss of 0 fish will occur with a maximum loss of 17 fish (SacPAS last updated on 1/27/21).
  - For results of entrainment into Delta strata regions from DSM2 model runs (North Delta into Interior and Central Delta, San Joaquin River and Central Delta into South Delta, and South Delta into fish facilities) refer to Attachment A.

TABLE 1. Distribution estimates

Location	**Yet to Enter Delta**	**In the Delta**	**Exited the Delta (Past Chipps Island)**
Young-of-year (YOY) winter-run Chinook salmon	25-55%	45-75%	0%
YOY spring-run Chinook salmon	65-75%	25-35%	0%
YOY hatchery winter-run Chinook salmon	100%	0%	0%
Natural origin steelhead	70-80%	15-30%	0-5%

TABLE 2. Catch indices for juvenile winter-run Chinook salmon observed in RSTs at Knights Landing (Knights Landing Catch Index, KLCI) and Sacramento Trawl and Beach Seine (Sacramento Seine Catch Index, SCI Trawl and SCI Beach Seine) monitoring locations

Date	KLCI Winter Chinook	KLCI Older Chinook	SCI Trawl	SCI Beach Seines	Trigger Exceeded: Catch Index > 5	Trigger Exceeded: Catch Index 3 < X ≤ 5
2021-01-31	NA	NA	0			
2021-01-30	0	0				
2021-01-29	0	0	0			
2021-01-28	0	0	0			
2021-01-27	0	0				
2021-01-26	0	0	0	0		
2021-01-25	0	0	0			

TABLE 3. Mean daily flow and percent change (Wilkins Slough (WLK), Deer Creek (DCV), Mill Creek (MLM); cfs from CDEC) and temperature and percent change (Knights Landing RST (KL); °F from RST)

Date	MLM mean daily flow (cfs)	MLM flow % change	MLM Alert	DCV mean daily flow (cfs)	DCV flow % change	DCV Alert	WLK mean daily flow (cfs)	KL water temp (°F)	WLK-KNL: Alert
1/31/2021	159.1	-20.5%	Flow>95cfs	180.5	-9.5%	Flow>95cfs	10397.0		
1/30/2021	200.1	-39.3%	Flow>95cfs	199.5	-32.4%	Flow>95cfs	11274.5		
1/29/2021	329.5	-53.4%	Flow>95cfs	295.2	-50.3%	Flow>95cfs	8080.8		
1/28/2021	707.5	254.0%	Flow>95cfs Change>50%	593.9	184.2%	Flow>95cfs Change>50%	5343.3		
1/27/2021	199.9	81.4%	Flow>95cfs Change>50%	209.0	94.6%	Flow>95cfs Change>50%	4751.5		
1/26/2021	110.2	-6.1%	Flow>95cfs	107.4	-6.8%	Flow>95cfs	4440.8	46.4	
1/25/2021	117.4	7.6%	Flow>95cfs	115.2	9.2%	Flow>95cfs	4435.0	47.8	

TABLE 4. Historic migration and salvage patterns.

Date (1/31)	Red Bluff Diversion Dam	Tisdale RST	Knights Landing RST	Sac Trawl (Sherwood) Catch Index	Chipps Island Trawl Catch Index	Salvage
Chinook, Winter-run, Unclipped	97.9% (96.1%,99.6%) BY: 2011 - 2019	84.0% (60.5%,107.4%) BY: 2011 - 2019	82.0% (58.3%,105.7%) BY: 2011 - 2019	40.9% (10.4%,71.5%) BY: 2011 - 2019	4.3% (0.1%,8.4%) BY: 2011 - 2019	26.2% (6.3%,46.1%)
Chinook, Spring-run, Unclipped	21.8% (5.9%,37.7%) BY: 2011 - 2019	35.1% (2.7%,67.5%) BY: 2011 - 2019	23.9% (-2.7%,50.6%) BY: 2011 - 2019	5.3% (-3.3%,13.9%) BY: 2011 - 2019	0.0% (0.0%,0.0%) BY: 2011 - 2019	0.0% (-0.0%,0.0%)
Steelhead, Unclipped (Dec – March)						11.1% (-3.3%,25.5%)

TABLE 5. STARS model output

Date (1/31)	DCC	Georgiana Slough	Sacramento River	Sutter and Steamboat
Proportion of Entrainment	NA	26%	46%	28%
Survival	NA	20%	56%	45%
Travel Time	NA	15.6 d	9.3 d	10.0 d

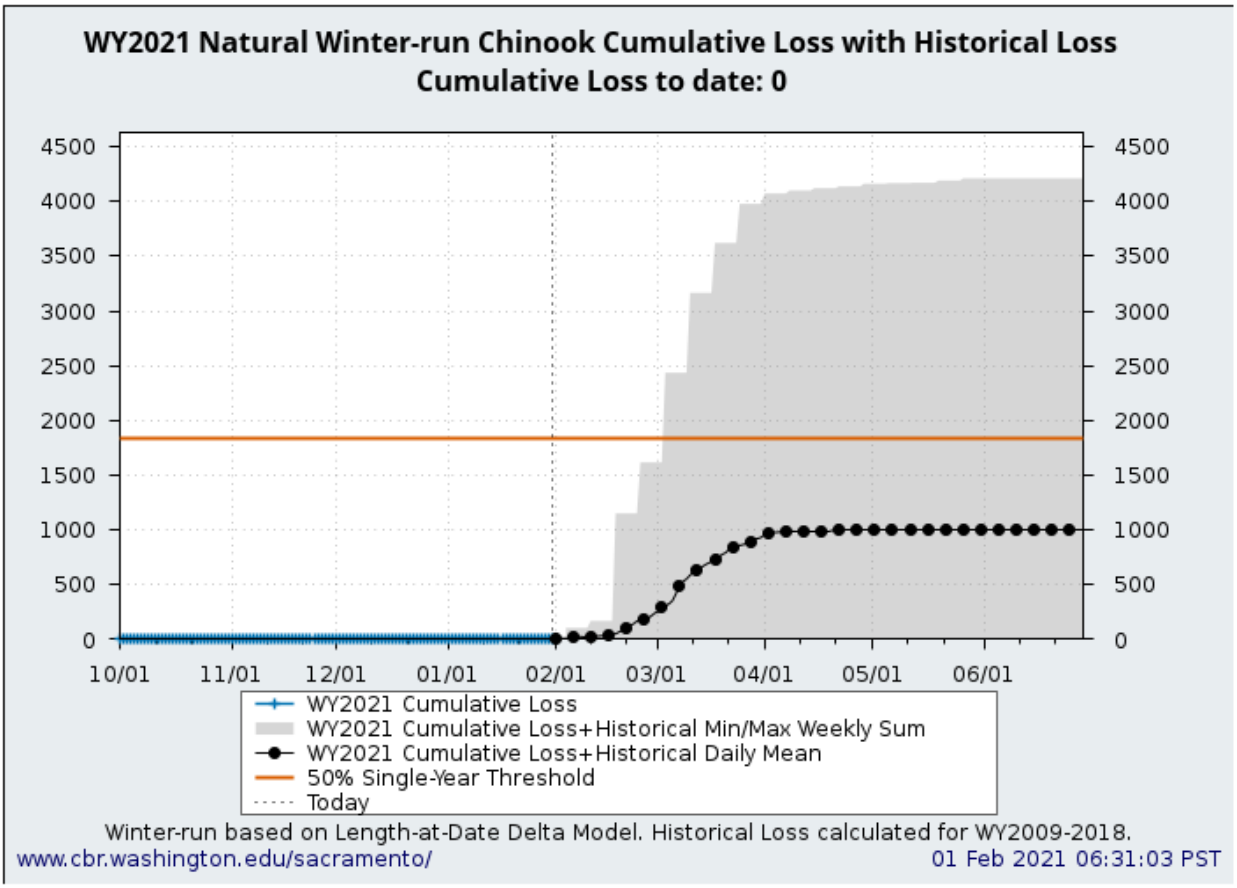


FIGURE 1. WY2021 natural winter-run Chinook salmon cumulative loss values through salvage season. Values depicted are not genetically corrected. No loss has occurred in WY2021. Based on historical cumulative loss values from 2009 – 2018, WY2021 observed loss (and potential future loss) are not likely to exceed the 50% loss threshold this week.

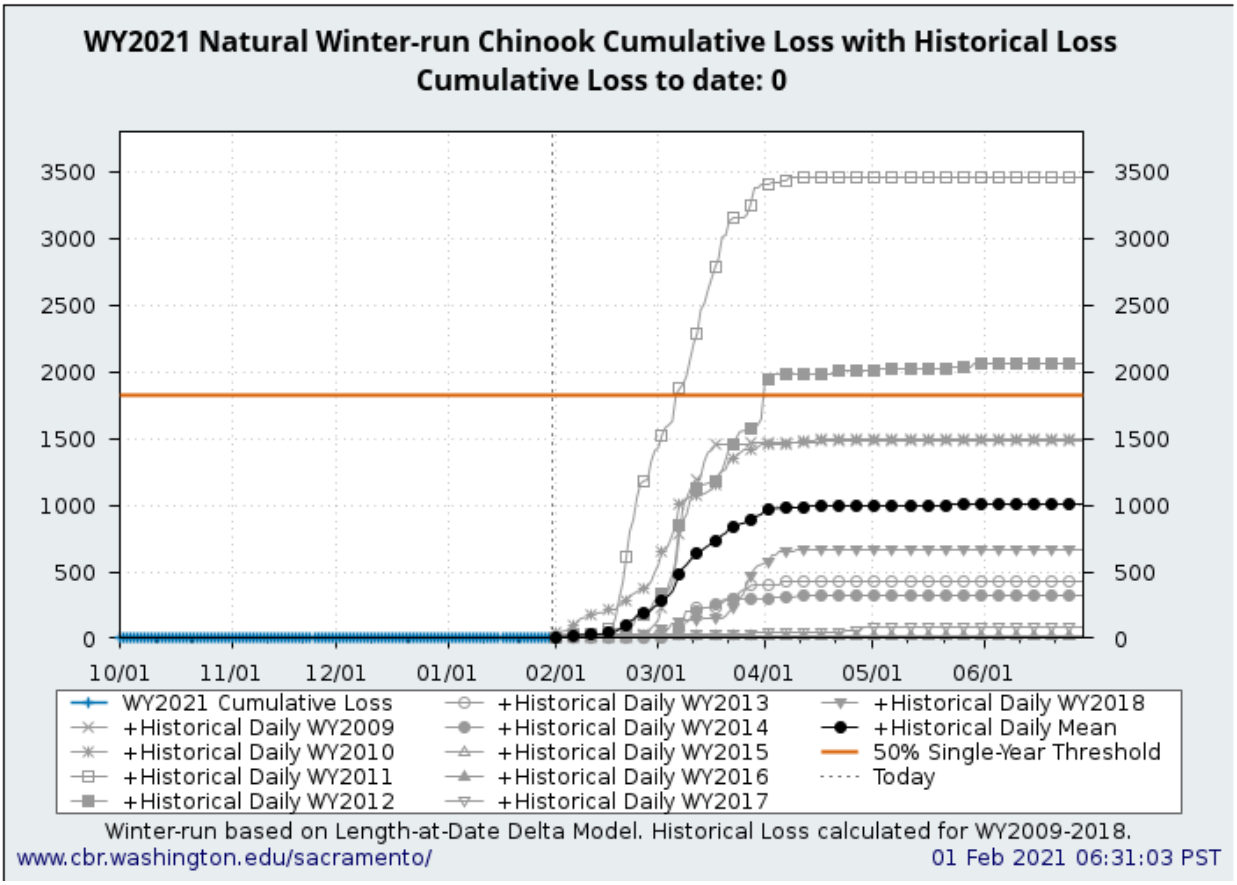


FIGURE 2. Daily natural winter-run Chinook salmon loss accumulates towards single-year loss threshold. Based on historical cumulative loss values from 2009 – 2018, WY2021 observed loss (and potential future loss) are not likely to exceed the 50% loss threshold this week.

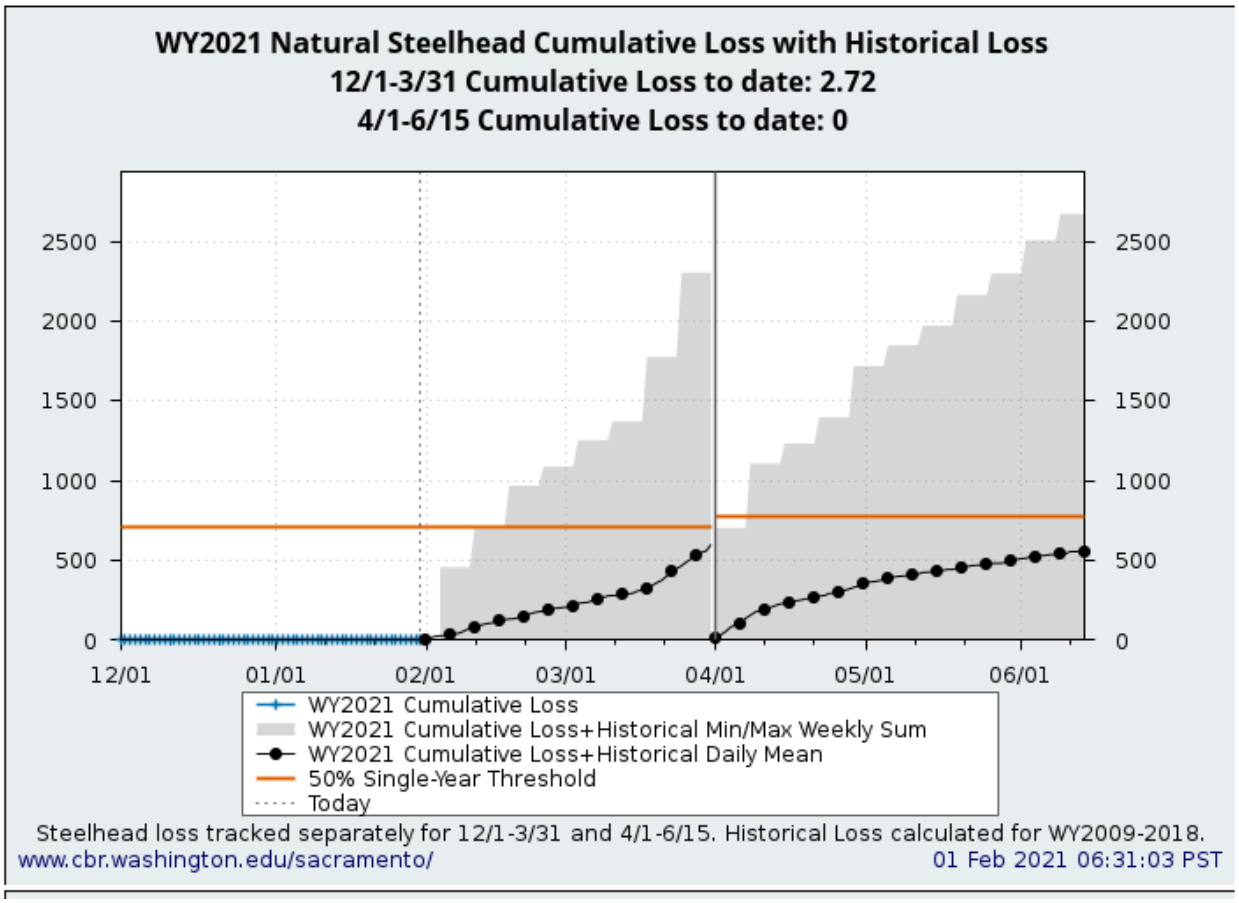


FIGURE 3. WY2021 natural steelhead cumulative loss values through salvage season: December 1 – March 31, April 1 – June 15. Based on historical cumulative loss values from 2009 – 2018, WY2021 observed loss (and potential future loss) are not likely to exceed the 50% loss threshold this week. The first steelhead loss occurred 1/18/2021.

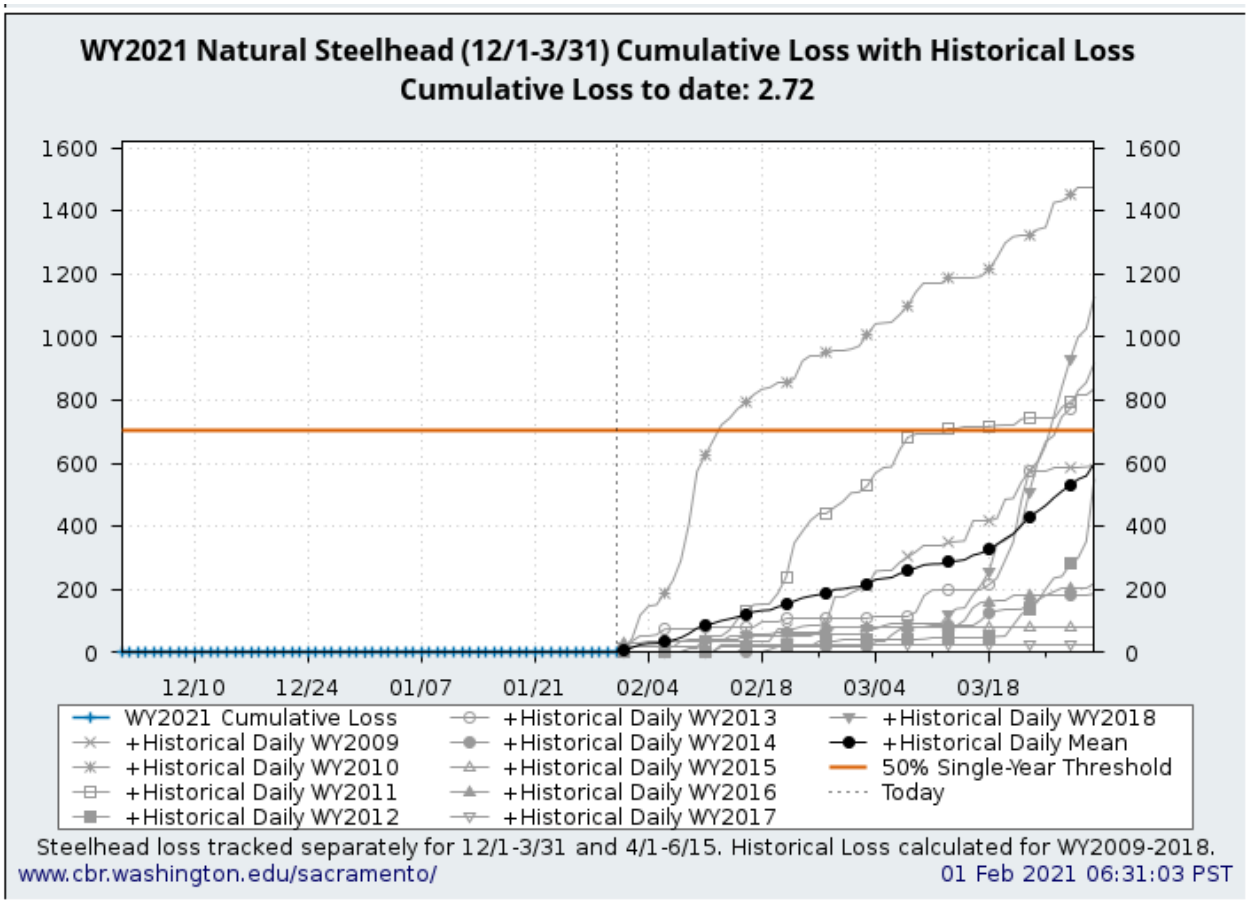


FIGURE 4. Daily natural steelhead loss accumulates towards single-year loss threshold: December 1 – March 31. Based on historical cumulative loss values from 2009 – 2018, WY2021 observed loss (and potential future loss) are not likely to exceed the 50% loss threshold this week.

EVALUATION

1. **After January 1, are more than 5% of juveniles from one or more salmonid species present in the Delta?**
   Yes. Greater than 5% of juvenile winter-run Chinook salmon, spring-run Chinook salmon, and steelhead are present in the Delta.
2. **Does the operational outlook's ranges impact fish movement and change the potential distribution of fish?**
   i. **Potential effects within the 7 days (near-term) in the operations outlook.**
   It appears that there is an increased risk of salmonids being exposed to export facilities and OMR flow is expected to remain at or below -5,000 cfs this upcoming week. The SaMT anticipates an increased number of salmonids entering the Delta currently due to hatchery steelhead and yearling spring-run Chinook salmon surrogate releases and the forecast for precipitation occurring this week.
   For DSM2 model run results refer to Attachment A.
   ii. **Potential effects longer than the 7 days (longer-term) in the operations outlook.**
   The members of SaMT are not confident in projecting beyond 7 days due to uncertainty regarding weather forecasting. Precipitation is forecasted for this week. Furthermore, if current trends were to continue then it is anticipated that more fish may appear at export facilities as fish begin to outmigrate based on historical trends.

3. **What is the likelihood of increased loss exceeding the next annual loss threshold (50%, 75% or 90% of threshold) resulting in OMR management actions based on population distribution, abundance, and behavior of fish in the Delta?**
   Reduced exports at the facilities reduces risk of entraining ESA-listed species.
   Winter-run Chinook salmon
   Total juvenile winter-run Chinook salmon (LAD) loss is 0 fish (as of 1/31/2021). The agencies in the SaMT assessed the likelihood of exceeding the next annual loss threshold and believe that loss occurring in the next week is unlikely to lead to exceedance of the 50% single-year loss threshold.
   Spring-run Chinook salmon
   Total juvenile spring-run Chinook salmon (LAD) loss is 0 fish (as of 1/31/2021). The agencies in the SaMT assessed the likelihood of exceeding the next annual loss threshold and believe that loss occurring in the next week is unlikely to lead to exceedance of the 50% single-year loss threshold
   Central Valley Steelhead
   Total juvenile steelhead loss is 2.72 fish (as of 1/31/2021). The first steelhead of the season was salvaged 1/11/2021. The agencies in the SaMT assessed the likelihood of exceeding the next annual loss threshold and believe that loss occurring in the next week is unlikely to lead to exceedance of the 50% single-year loss threshold.
4. **If an annual loss threshold has been exceeded, do continued OMR restrictions benefit fish movement and survival based on real-time information?**
   Winter-run Chinook salmon
   The annual loss threshold for winter-run Chinook salmon has not been exceeded in WY 2021.
   Spring-run Chinook salmon
   The annual loss threshold for spring-run Chinook salmon has not been exceeded in WY 2021.
   Central Valley Steelhead
   The annual loss threshold for steelhead (December 1 – March 31) has not been exceeded in WY 2021.
5. **If OMR is more negative than -5,000 cfs are there changes in spawning, rearing, foraging, sheltering, or migration behavior beyond those anticipated to occur under OMR management at -5,000 cfs?**
   OMR index levels in the upcoming week are not anticipated to be more negative than -5,000 cfs.

Green Sturgeon

POPULATION STATUS

- **Delta Life Stages:**
  - Adults and Juveniles
- **Juvenile Abundance:**
  - No empirical estimates of the juvenile population (ages 0 – 3) in the Delta are available. Information about their rearing and distribution patterns within the Delta is limited. In 2019, 73 larval green sturgeon and six juvenile green sturgeon were observed at the Red Bluff Diversion Dam fish monitoring RSTs in the upper Sacramento River. In WY 2019, no green sturgeon were observed at the Delta fish salvage facilities. In WY 2020, two green were caught at the Delta fish salvage facilities (salvage = 8).

DISTRIBUTION

- **Current Distribution**
  - Juvenile and adult green sturgeon present in the San Joaquin and Sacramento rivers and Delta during the next week. Acoustically tagged green sturgeon have been detected and remain in the vicinity of Sherman Island.
  - One dead green sturgeon was collected in Clifton Court (1/22/2021). Take estimate to be determined by NMFS and DWR.

- **Historical Trends**
  - Juvenile and adult green sturgeon are historically present in the San Joaquin and Sacramento rivers and Delta.
- **Forecasted Distribution within Central Valley and Delta regions**
  - Juvenile and adult green sturgeon are present in the San Joaquin and Sacramento rivers and Delta during the next week.

EVALUATION

1. **Is there likely to be salvage that may exceed the annual loss limit?**
   Currently, green sturgeon salvage is 0 fish (as of 1/31/2021). There may have been one green sturgeon salvaged this past week at the SWP fish salvage facility (refer to sturgeon section above for details). The agencies in the SaMT assessed the likelihood of salvage occurring in the next week is unlikely to occur.

Delta Smelt

POPULATION STATUS

- **Delta Smelt Life Stages:**
  - Adult
- **Brood Year 2020:**
  - **Abundance estimate**: The most recent population abundance estimate for Delta Smelt was 1,746 . This estimate was calculated from the sampling between1/25/2021-1/29/2021. The most recent detection of a Delta Smelt was a 47 mm juvenile collected in the Sacramento Deep Water Ship Channel by EDSM on 1/26/2021. The most recent collection of a Delta Smelt for FCCL broodstock was on 1/21/2021. In order to reduce handling stress broodstock collections do not take additional data such as length or expression and are treated as adults in this assessment.
  - **Biological Conditions**: The Smelt Monitoring Team discussed the most recent monitoring data (Table 4) and considered professional opinion on the historical trends in regional distribution. Based on those discussions, the agency participants on SMT estimate Delta Smelt subadult/adults should be holding in the Suisun Marsh and west of the Sacramento-San Joaquin confluence in anticipation of migration but analysis of historic Spring Kodiak Trawl (SKT) supports Delta Smelt distribution being above the confluence and less tightly correlated to X2 position (available upon request from USFWS). They are also present in the Sacramento Deep Water Ship Channel.

DISTRIBUTION

- **Current Distribution**
  - Real time detection data is currently limited to EDSM sampling, and SLS. Due to the low number of detections of Delta Smelt, the SMT is also closely monitoring FCCL Broodstock Collections to inform distribution estimates. Since there are only a few recent detections, the Smelt Monitoring Team's capacity to estimate where Delta Smelt are within the Delta is limited.
  - The last Delta Smelt detection was on 1/26/2021 in the Sacramento Deep Water Ship Channel by EDSM.
  - Larval sampling is not being conducted at the state or federal salvage facilities.

TABLE 6. Summary of recently reported detections of Delta Smelt by Region and Salvage Facilities between 1/19/2021 and 1/26/2021. Start and End dates reflect period of time between updates to SMT. Regional categories are determined from EDSM sampling. Delta Smelt >58mm FL are considered adults.

Life Stage	North	South	West	Far West	Salvage
Adult	0	0	0	0	0
Larvae/Juvenile	0	0	0	0	0

TABLE 7. Summary of recent Delta Smelt detections reported since last assessment and the total detections for the current water year. Notes reflect latest information on reported detections or completion of survey for the water year and include both larval and adult detections.

Sampling Method	New Detections	WY2021	Notes
EDSM	0	3	Phase 1 begins 11/30/20 Last Detection: 1/26/2021
SKT	0		SKT Started: 02/1-4/2021
SLS	0	0	Survey 2: Processing Survey 3 Started: 2/8/2021
20-mm	0	0	Begins: March
Bay Study	0	0	Suspended due to COVID-19 restrictions
FMWT	0	0	Ended 12/15/2020
Chipps Island Trawl	0	0	5 day per week sampling began 12/7/2020 Ends: mid-May.
Brood Stock Collections	0	2	Last Catch: 1/21/2021

- **Historical Trends**
  - Based on historical analysis of SKT, the centroid of Delta Smelt distribution is anticipated to be above the Sacramento-San Joaquin confluence, but less closely correlated to X2 which is currently estimated to be at 96 km (Polansky et al 2018).
  - The recent Delta Smelt detections in the Deep Water ship channel are upstream of the confluence, but may be freshwater residents and not representative of the migratory life history patterns in Delta Smelt (Hobbs 2019).

- **Forecasted Distribution within Central Valley and Delta regions**
  - Delta Smelt distribution may change in response to recent precipitation and widespread wind driven turbidity. However, predicting the distribution is currently difficult because detection data is limited to a few individuals and historic patterns may not be representative of the low population levels of Delta Smelt. The SMT is using turbidity as a surrogate for Delta Smelt presence in making risk assessments.

ABIOTIC CONDITIONS

- **Turbidity**
  - Changes in Freeport flows and turbidity (Table 8) that would create "First Flush" conditions did not occur in WY 2021.
  - High winds (South Southeast 40-50 mph) and precipitation on the 1/26/2021 and 1/27/2021 increased turbidity in the lower San Joaquin River, Central Delta, and South Delta which reached OBI on 1/27/2021.This area of high turbidity is not indicative of localized wind driven turbidity or sensor error. As of 2/1/2021 turbidity is decreasing at all central and south Delta stations (see Attachment B). In addition, runoff from upstream precipitation is beginning to reach the Delta and could contribute to turbidity in some areas.

TABLE 8. Relevant Environmental Factors to the current management actions for Delta Smelt.

Date Reported	OBI Daily Average Turbidity (FNU)
2/2/2021	12.3

- **X2 Conditions**
  - X2 is estimated to be greater than 10 km upstream of the confluence of San Joaquin and Sacramento Rivers.
- **Other Environmental Conditions**
  - The Smelt Monitoring Team expects environmental conditions to change based on the volume of precipitation and the associated increases of in-river flow on turbidity.
  - The Fish and Water Operation Outlook OMR Index values are expected to range between –2,000 to –3,000 from 2/2/2021 to 2/9/2021.
  - Real time tracking of environmental conditions, relevant thresholds and Delta Smelt catch data are updated daily at: http://www.cbr.washington.edu/sacramento/workgroups/delta_smelt.html

EVALUATION

1. **Between December 1 and January 31, has any first flush condition been exceeded?**
2. The running 3-day average flows and running 3-day average turbidity at Freeport did not exceeded the triggers for "First Flush" conditions in WY2021. **Do DSM have a high risk of migration and dispersal into areas at high risk of future entrainment? (December 1- January 31)**

   Delta Smelt were not detected in the South Delta between 12/1/2021 and 1/31/2021. The detection on 11/9/2020 supported Delta Smelt being present in Suisun Marsh and west of the Sacramento-San Joaquin confluence. Additional detections on the 6th, 15th , 21st and 26th of January support a presence of the species in the Sacramento Deep Water Ship Channel, but these fish may represent the freshwater resident population and may not be representative of the migratory life history pattern.

3. **Has a spent female been collected?**

   As of 2/2/2021 no spent female Delta Smelt have been observed.
4. **If OMR of -2000 does not reduce OBI turbidity below 12NTU/FNU, what OMR target is deemed protective between -2000 and -5000?**

   OBI turbidity is currently below 12 FNU. The expected OMR range is -2,000 to -3,000 cfs and no turbidity bridge avoidance action has been taken.
5. **If OBI is 12 NTU/FNU, what do other station locations show?**

   OBI turbidity is currently below 12 FNU. Daily average turbidity is calculated starting on February 1st for the Turbidity Bridge Avoidance. Current turbidity conditions in the central delta still show a widespread increase due to previous week's the wind and precipitation event. Turbidity at OBI reached 14.29 FNU on 1/27/2021, as of 2/2/2021 it is 5.10 FNU. The daily average turbidities on 2/1/2021 at Prisoners Point (5.21 NTU), Holland Cut (8.27 FNU) and Victoria Canal (3.33 NTU) all show peaks in turbidity since 1/27/2021 and are currently to decreasing. While the increase in turbidity was wind driven, its widespread influence across multiple stations supports the turbidity change not being a localized event like the previous wind driven turbidity events this season. Wind, precipitation, and runoff may all contribute to changes in turbidity during the next 7 days.
6. **If OBI is 12 NTU/FNU, is a turbidity bridge avoidance action not warranted? What is the supporting information?**

The turbidity at OBI is below 12 FNU and no turbidity bridge avoidance action is warranted as of 2/2/2021. Wind, precipitation, and runoff may create changes in turbidity in the next seven days and should OBI exceed 12 FNU while turbidity is widespread a turbidity bridge avoidance action would be warranted.

7. **After March 15 and if QWEST is negative, are Larval or juvenile DSM within the entrainment zone of the CVP and SWP pumps based on surveys?**
   This question is not applicable until March 15th.
8. **Based on real-time spatial distribution of Delta Smelt and currently available turbidity information, what is the OMR level between -3,500 and -5,000 cfs that manages weekly entrainment in the context of annual larval and juvenile entrainment levels?**
   This question is not applicable until March 15th.
9. **What do hydrodynamic models, informed by EDSM or other relevant data, suggest the estimated percentage of larval and juvenile DSM that could be entrained may be?**
   This question is not applicable until March 15th.

DELTA SMELT REFERENCES

Hobbs, J. A., Lewis, L. S., Willmes, M., Denney, C., & Bush, E. (2019). Complex life histories discovered in a critically endangered fish. Scientific Reports, 9(1). https://doi.org/10.1038/s41598-019-52273-8

Polansky, L., Newman, K.B., Nobriga, M.L. et al. Spatiotemporal Models of an Estuarine Fish Species to Identify Patterns and Factors Impacting Their Distribution and Abundance. Estuaries and Coasts 41, 572–581 (2018). https://doi.org/10.1007/s12237-017-0277-3

Attachment A: DSM2 modeling

Table of Contents

Objective

Weekly modeling efforts are conducted to examine the effects of varying OMR conditions on the behavior of salmonids present in the Delta in a one-week "look ahead" or outlook. Members of the Salmon Monitoring Team (SaMT) use DSM2 modeling results to help answer how changing pumping regimes translates to differences in flows and velocities modeled at various channel locations within the Delta and what impact modeled environmental parameters have on rearing, foraging, migrating, and holding salmonids.

Each series of runs consists of three OMR conditions: minimum and maximum scenarios bounded by expected OMR index values for that week (Ops Outlook, Table 1) and a baseline which represents an anticipated operational value. Assumptions are made to best estimate future hydrologic characteristics. These inputs are more confident for the future one, two, and three-day timeframes; days four through six have lower confidence. Model scenarios hold hydrology inputs between runs constant and adjust Delta export pumping rates to compare between scenario OMR index values. Although hydrologic ensembles could be used, a single value or deterministic projection is used for efficiency.

SaMT members use weekly DSM2 model results from a range of scenarios as part of a suite of tools to help assess distribution and changes to behavior of salmonids providing WOMT with advice on changes to operations. At each channel location over a six-day action period, environmental parameters are examined: modeled flow and velocity general statistics (e.g., magnitude, range, percent positive), differences in modeled flow and velocity values compared with the baseline scenario, etc. That information, in conjunction with channel location (e.g., close to the Delta pumping facilities, closer to areas with higher tidal influence, etc.) and other environmental considerations (e.g., tidal cycle, upcoming storms, etc.), is then interpreted from a biological perspective. SaMT explores the possible effects to salmonids of changing OMR index scenarios, assuming each of those potential operations could be that week's controlling factor, which feeds into advice to WOMT.

Conditions / Assumptions

Hydraulic footprint information	
DWR Baseline forecast range	1/26/2021 to 2/15/2021
CVO updated Baseline and Scenarios	2/1/2021
DSM2 modeling results range	2/2/2021 to 2/8/2021
OMR index value scenarios	
Baseline	-2,500 cfs
Scenario 1	-2,000 cfs (decreasing from Baseline; Δ 500 cfs)
Scenario 2	-3,000 cfs (increasing from Baseline; Δ 500 cfs)
Changes between scenarios	
Hydrology	No
Delta Exports	Yes
Common assumptions	
DSM2 run results based on the following assumptions	1. CCFB Gates are operating to Priority 2 throughout the forecast period. 2. The Delta Cross Channel gates are closed throughout the forecast period. 3. Suisun Marsh salinity control flashboards are in, and 2 of the Suisun Marsh Salinity Control gates are in tidal operation and 1 gate is closed for maintenance. 4. San Joaquin River flow at Vernalis is at 2,100 cfs at the beginning of the forecast period and is estimated to decrease to 1,000 cfs by the end of the forecast period. 5. Sacramento River flow at Freeport is at 11,300 cfs at the beginning of the forecast period and is expected to increase to 10,550 cfs by the end of the forecast period.
Additional considerations	
Additional considerations for this week's DSM2 run	No special considerations.

DSM2 model results: summary tables

Table 1. Reported Kolmogorov-Smirnov (KS) statistic values for each scenario's OMR value compared with baseline OMR value. For Baseline, Scenario 1, and Scenario 2 values refer to "Hydraulic Footprint Information" in the conditions / assumptions section above. The KS-statistic quantifies a comparison between two empirical cumulative distribution functions (ECDFs): 0 (very similar / equal) and 1 (very dissimilar / not equal).

DSM2 Channel	Flow (cfs): Scenario 1 OMR	Flow (cfs): Scenario 2 OMR	Velocity (ft/s): Scenario 1 OMR	Velocity (ft/s): Scenario 2 OMR
6	0.02	0.03	0.01	0.01
21	0.01	0.02	0.02	0.02
49	0.01	0.01	0.01	0.01
81	0.08	0.06	0.10	0.06
94	0.03	0.04	0.03	0.04
107	0.02	0.03	0.02	0.03
124	0.01	0.02	0.01	0.02
148	0.03	0.03	0.03	0.04
160	0.03	0.04	0.03	0.04
434	0.00	0.01	0.00	0.01

Table 2. Summary of minimum, maximum, mean, and percent positive flows (cfs) and velocities (ft/s) by DSM2 channel for OMR scenarios over a 6-day time period. For Baseline, Scenario 1, and Scenario 2 values refer to "Hydraulic Footprint Information" in the conditions / assumptions section above.

Scenario (cfs)	DSM2 Channel	Flow Min.	Flow Max.	Flow Mean	Flow % Positive	Velocity Min.	Velocity Max.	Velocity Mean	Velocity % Positive
Baseline	6	-446	2826	1846	99	-0.19	1.44	0.93	99
Scenario 1	6	-468	2826	1845	99	-0.2	1.44	0.92	99
Scenario 2	6	-388	2819	1846	99	-0.17	1.44	0.93	99
Baseline	21	-7197	7126	850	56	-0.49	0.47	0.06	56
Scenario 1	21	-7197	7146	872	56	-0.49	0.47	0.06	56
Scenario 2	21	-7172	7090	822	56	-0.48	0.47	0.06	56
Baseline	49	-160756	145239	3878	53	-2.02	1.91	0.08	53
Scenario 1	49	-160684	145687	4208	53	-2.02	1.92	0.08	53
Scenario 2	49	-160968	144652	3370	53	-2.02	1.91	0.07	53
Baseline	81	-5741	2633	-1563	38	-1.52	0.76	-0.42	38
Scenario 1	81	-5146	2631	-1403	41	-1.41	0.76	-0.37	41
Scenario 2	81	-5903	2422	-1625	36	-1.55	0.7	-0.44	36
Baseline	94	-15128	10470	-837	51	-1.96	1.46	-0.08	51
Scenario 1	94	-14649	10610	-616	51	-1.94	1.48	-0.05	51
Scenario 2	94	-15333	10345	-1167	50	-1.99	1.45	-0.12	50
Baseline	107	-6376	4385	-411	52	-1.72	1.24	-0.09	52
Scenario 1	107	-6361	4431	-351	52	-1.71	1.25	-0.08	52
Scenario 2	107	-6412	4329	-502	51	-1.73	1.23	-0.12	51
Baseline	124	-19965	12498	-2463	46	-0.62	0.42	-0.07	46
Scenario 1	124	-19940	12561	-2357	46	-0.62	0.42	-0.07	46
Scenario 2	124	-20050	12424	-2626	45	-0.63	0.41	-0.07	45
Baseline	148	-8921	6302	-525	51	-0.92	0.7	-0.04	51
Scenario 1	148	-8732	6394	-421	52	-0.91	0.7	-0.03	52
Scenario 2	148	-8996	6180	-681	51	-0.93	0.69	-0.06	51

Scenario (cfs)	DSM2 Channel	Flow Min.	Flow Max.	Flow Mean	Flow % Positive	Velocity Min.	Velocity Max.	Velocity Mean	Velocity % Positive
Baseline	160	-5032	3632	-151	52	-0.51	0.47	0.01	52
Scenario 1	160	-4892	3661	-105	53	-0.5	0.47	0.01	53
Scenario 2	160	-5143	3615	-218	52	-0.52	0.47	0	52
Baseline	434	-166845	160199	9114	54	-1.87	1.87	0.14	54
Scenario 1	434	-166844	160322	9196	54	-1.87	1.87	0.14	54
Scenario 2	434	-166907	160121	8977	54	-1.87	1.87	0.14	54

DSM2 model results: figures

The following captions apply to the Empirical Cumulative Distribution Function (ECDF) and time-series plots for flow and velocity in selected locations (see Figure A11 and Table 3 for channel location information) below:

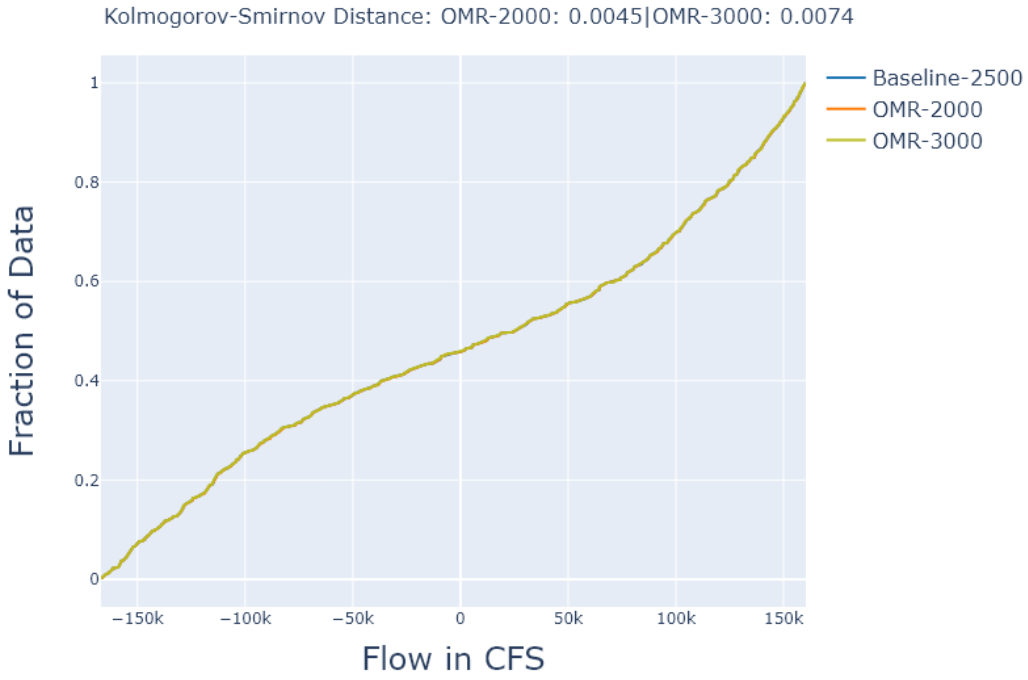
(a) ECDF plot: Baseline vs Scenario 1 OMR and Scenario 2 OMR. X-axis represents flow (cfs) and y-axis represents percentage of 15-minute time-step flow values. For Baseline, Scenario 1, and Scenario 2 values refer to "Hydraulic Footprint Information" in the section above. Reported Kolmogorov-Smirnov (KS) statistic values are found in Table 1.

(b) ECDF plot: Baseline vs Scenario 1 OMR and Scenario 2 OMR. X-axis represents velocity (cfs) and y-axis represents percentage of 15-minute time-step velocity values. For Baseline, Scenario 1, and Scenario 2 values refer to "Hydraulic Footprint Information" in the section above. Reported Kolmogorov-Smirnov (KS) statistic values are found in Table 1.

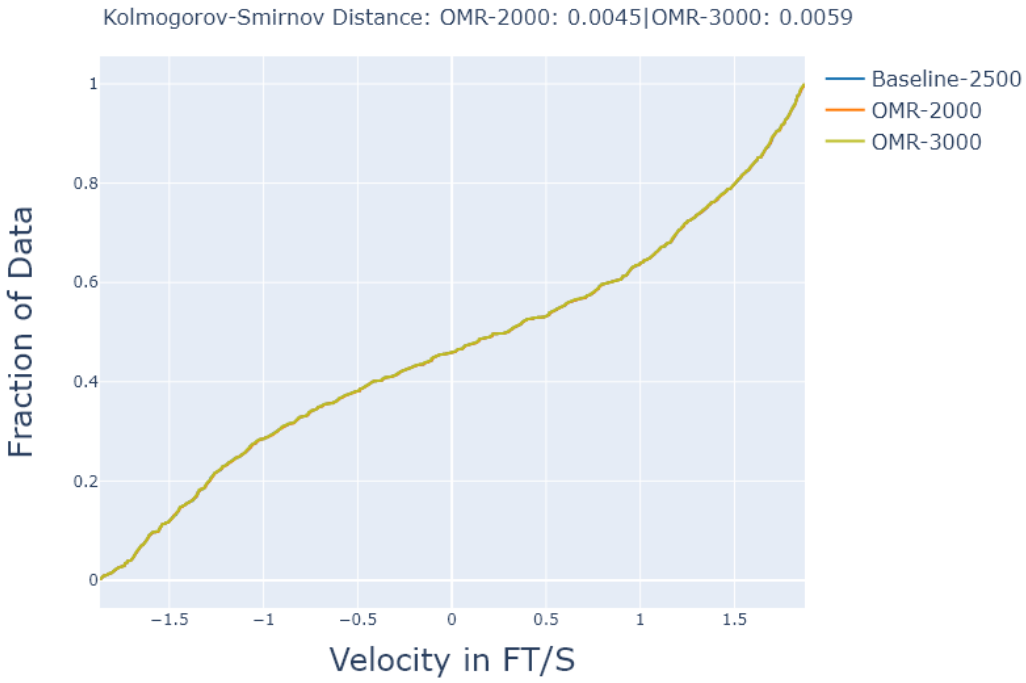
(c) Time-series plot (1-day aggregated): Baseline vs Scenario 1 OMR and Scenario 2 OMR. X-axis represents daily time steps and y-axis represents flow (cfs) values. For Baseline, Scenario 1, and Scenario 2 values refer to "Hydraulic Footprint Information" in the section above. Reported summary statistics (minimum, maximum, etc.) are found in Table 2.

(d) Time-series plot (1-day aggregated): Baseline vs Scenario 1 OMR and Scenario 2 OMR. X-axis represents daily time steps and y-axis represents velocity (cfs) values. For Baseline, Scenario 1, and Scenario 2 values refer to "Hydraulic Footprint Information" in the section above. Reported summary statistics (minimum, maximum, etc.) are found in Table 2.

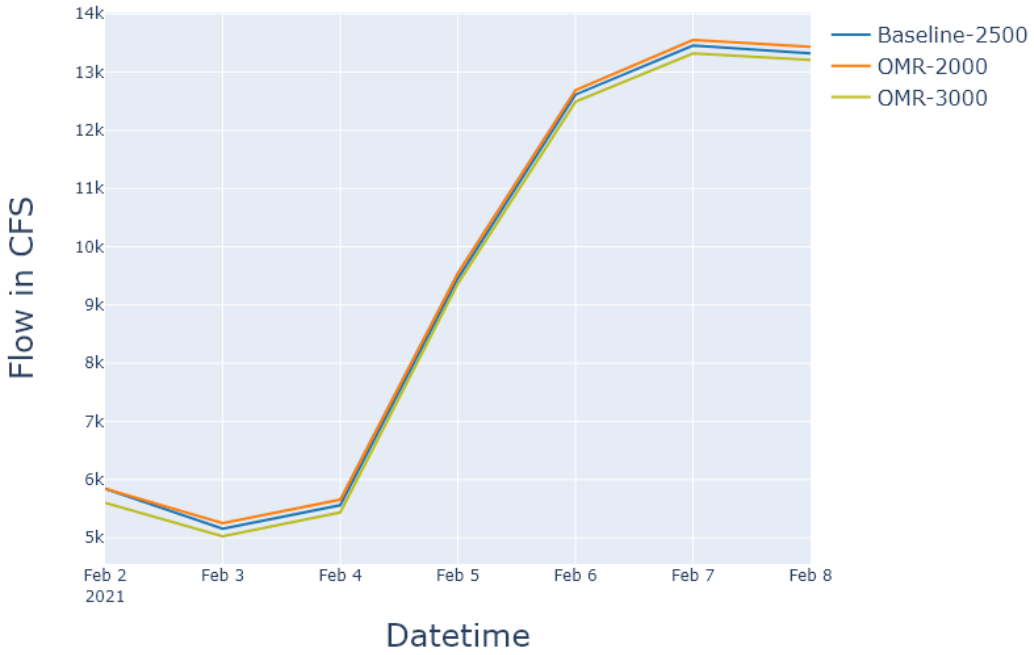
Figure A1: Sacramento River at Sherman Island (CHAN434)



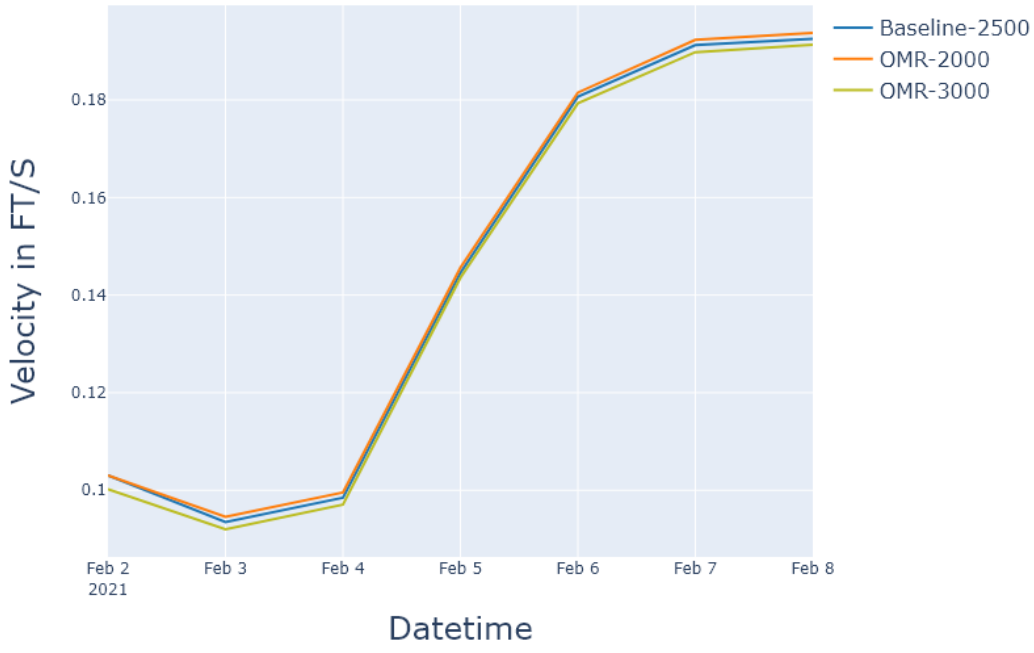
(a)



(b)

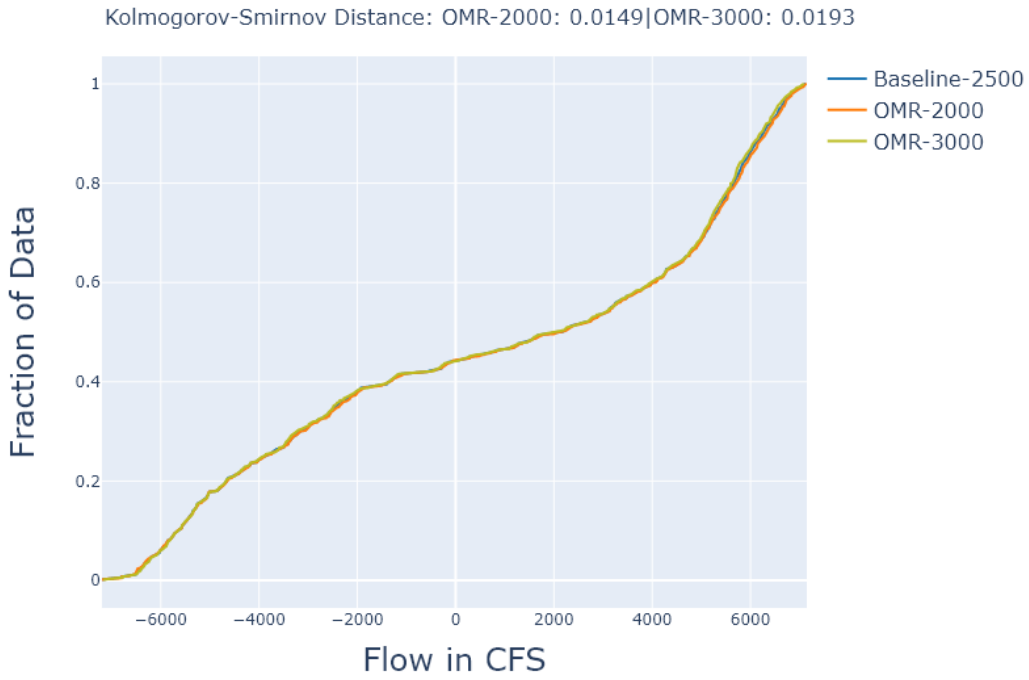


(c)

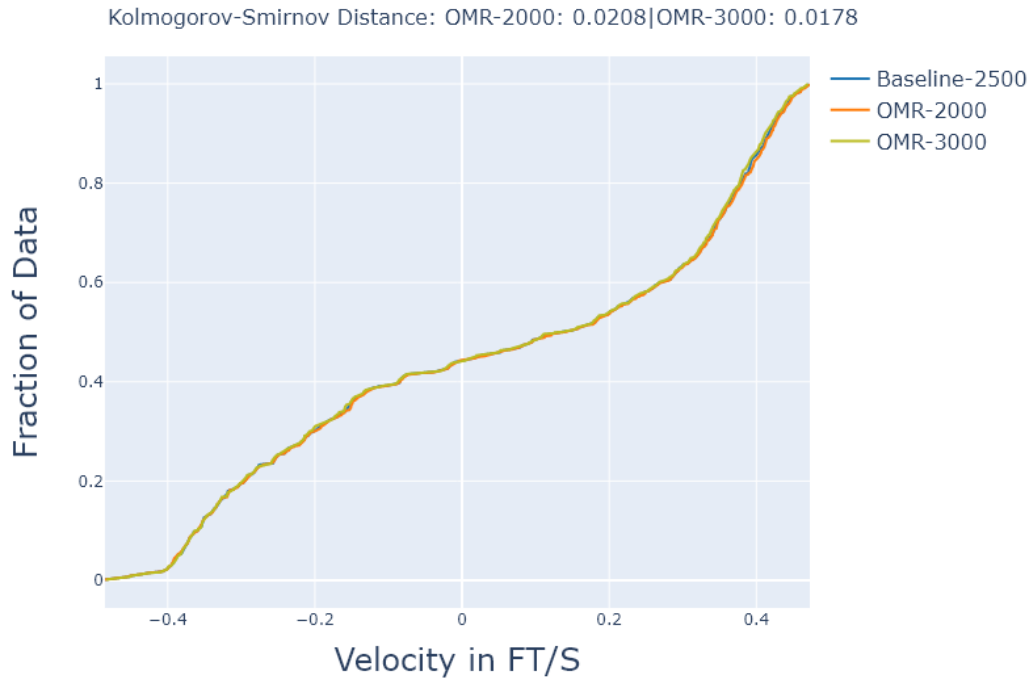


(d)

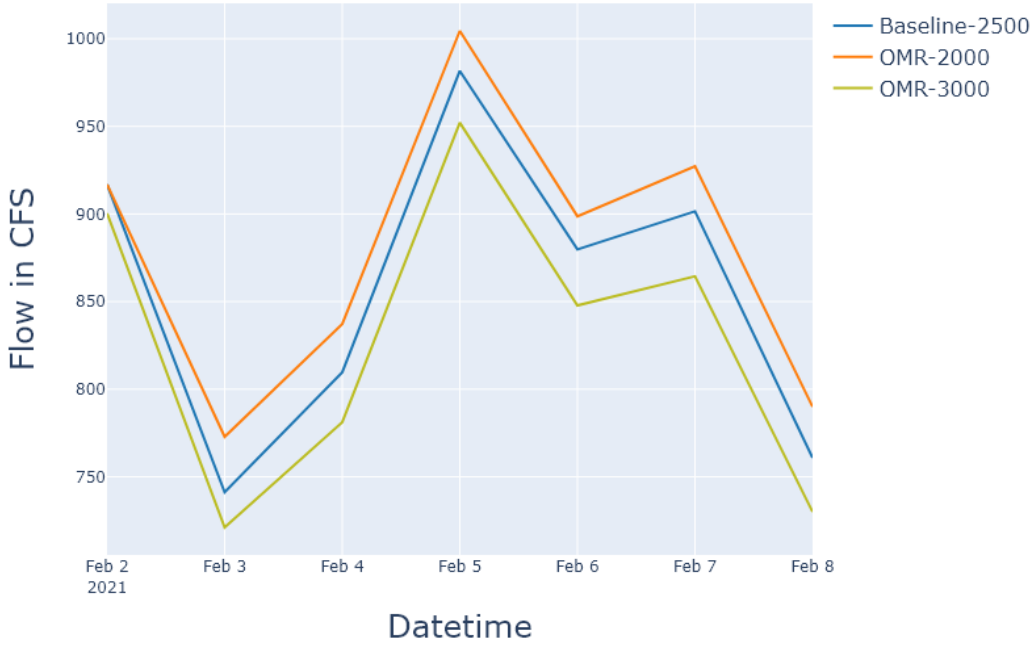
Figure A2: San Joaquin River downstream of confluence with Calaveras River (CHAN021)


Kolmogorov-Smirnov Distance: OMR-2000: 0.0149|OMR-3000: 0.0193
Baseline-2500
OMR-2000
OMR-3000
Fraction of Data
0
0.2
0.4
0.6
0.8
1
−6000
−4000
−2000
0
2000
4000
6000
Flow in CFS

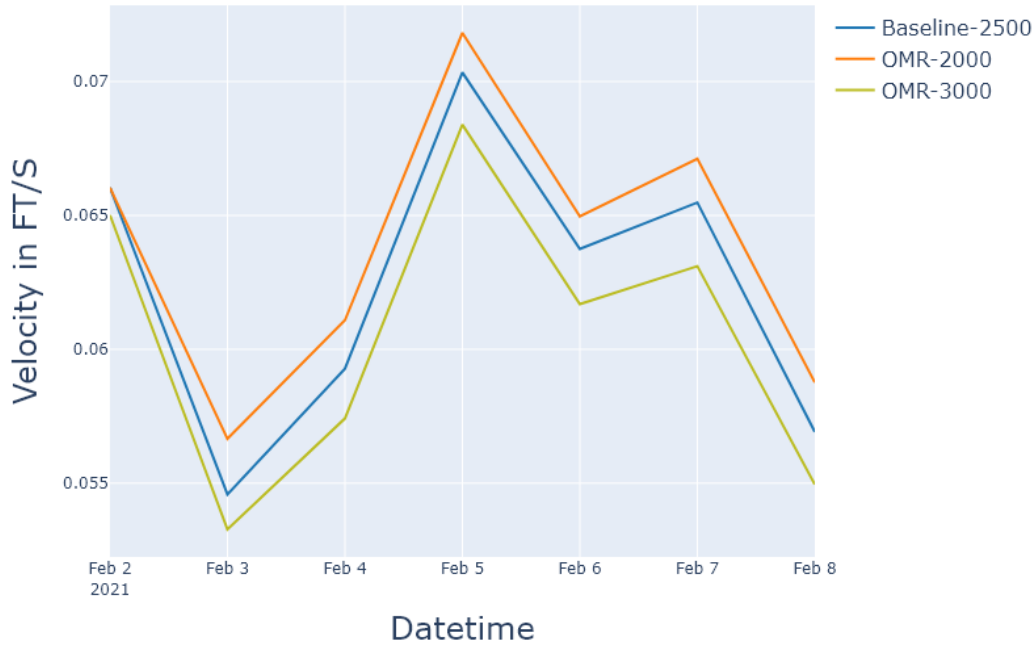
(a)


Kolmogorov-Smirnov Distance: OMR-2000: 0.0208|OMR-3000: 0.0178
Baseline-2500
OMR-2000
OMR-3000
Fraction of Data
0
0.2
0.4
0.6
0.8
1
−0.4
−0.2
0
0.2
0.4
Velocity in FT/S

(b)

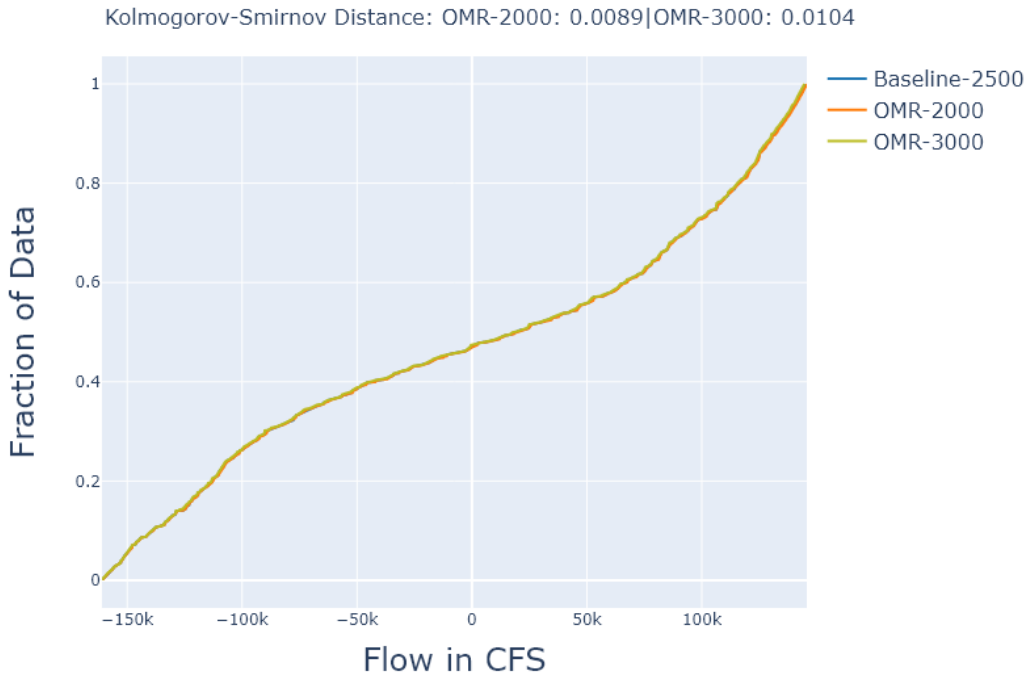


(c)

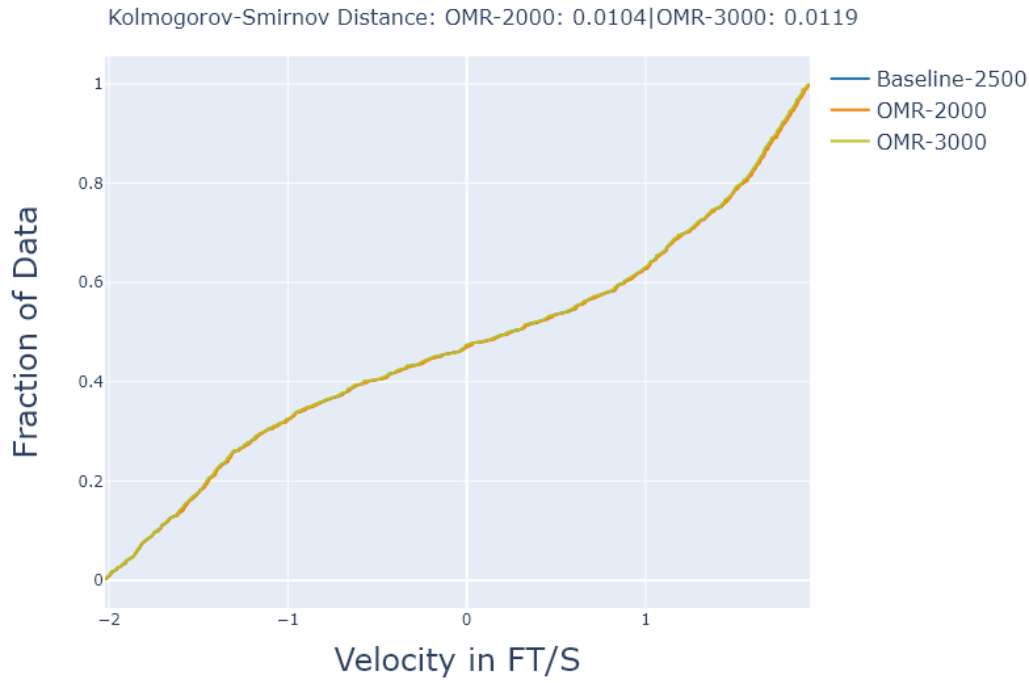


(d)

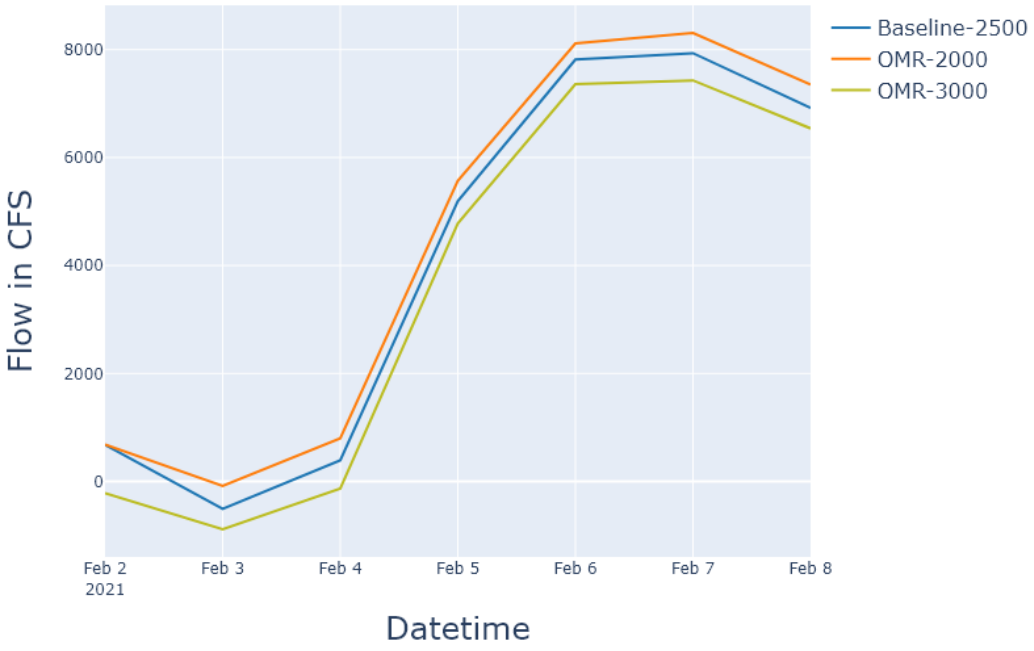
Figure A3: San Joaquin River at Sherman Island (CHAN049)


Kolmogorov-Smirnov Distance: OMR-2000: 0.0089|OMR-3000: 0.0104
Baseline-2500
OMR-2000
OMR-3000
Fraction of Data
1
0.8
0.6
0.4
0.2
0
−150k
−100k
−50k
0
50k
100k
Flow in CFS

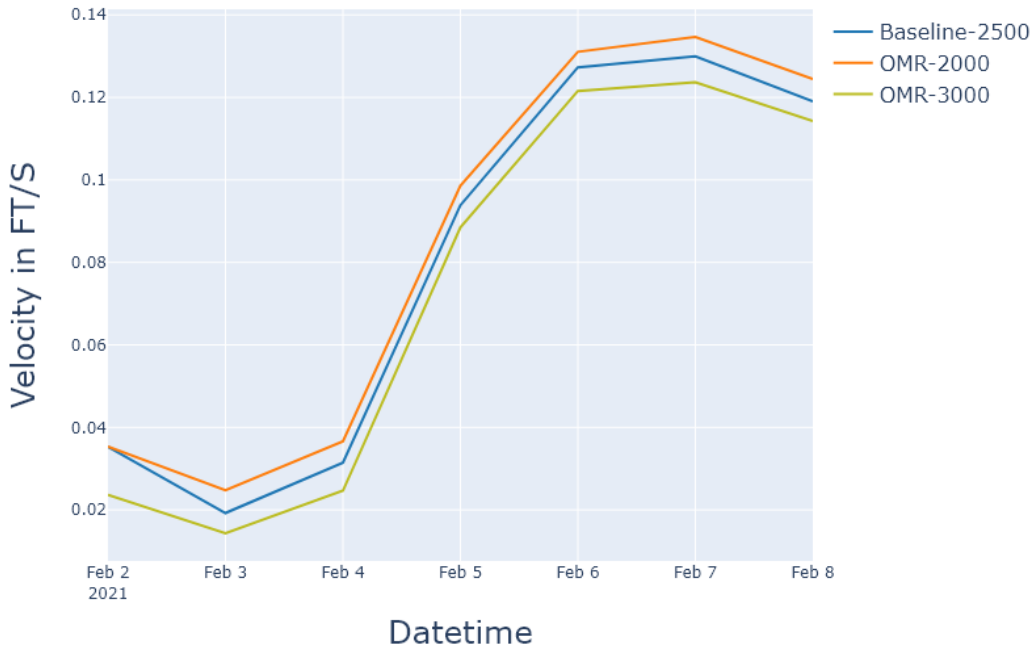
(a)


Kolmogorov-Smirnov Distance: OMR-2000: 0.0104|OMR-3000: 0.0119
Baseline-2500
OMR-2000
OMR-3000
Fraction of Data
1
0.8
0.6
0.4
0.2
0
−2
−1
0
1
Velocity in FT/S

(b)

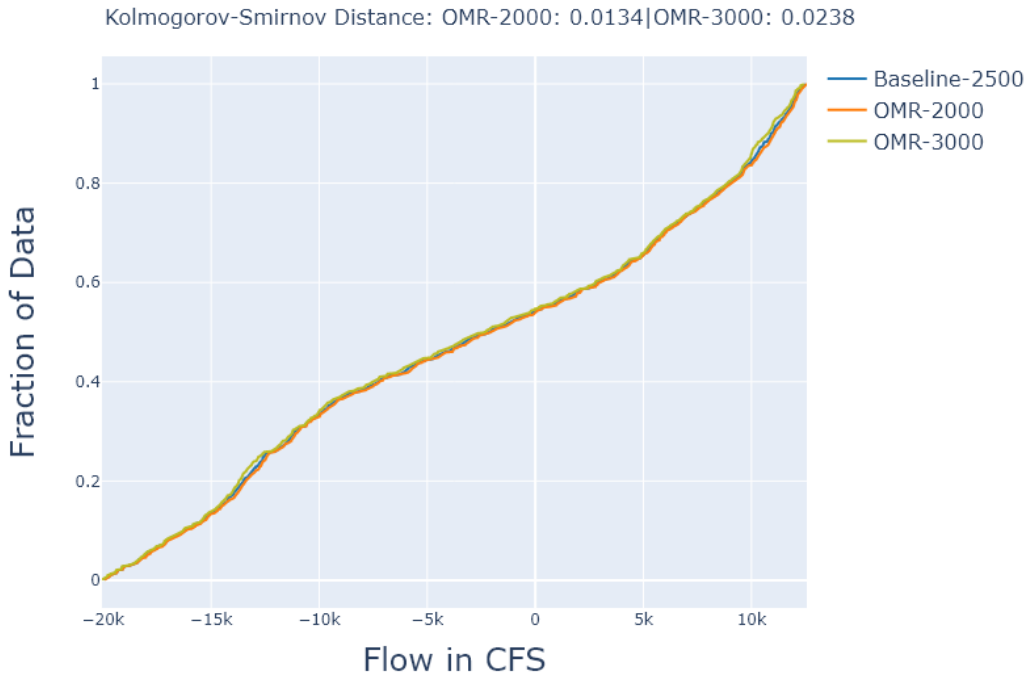


(c)

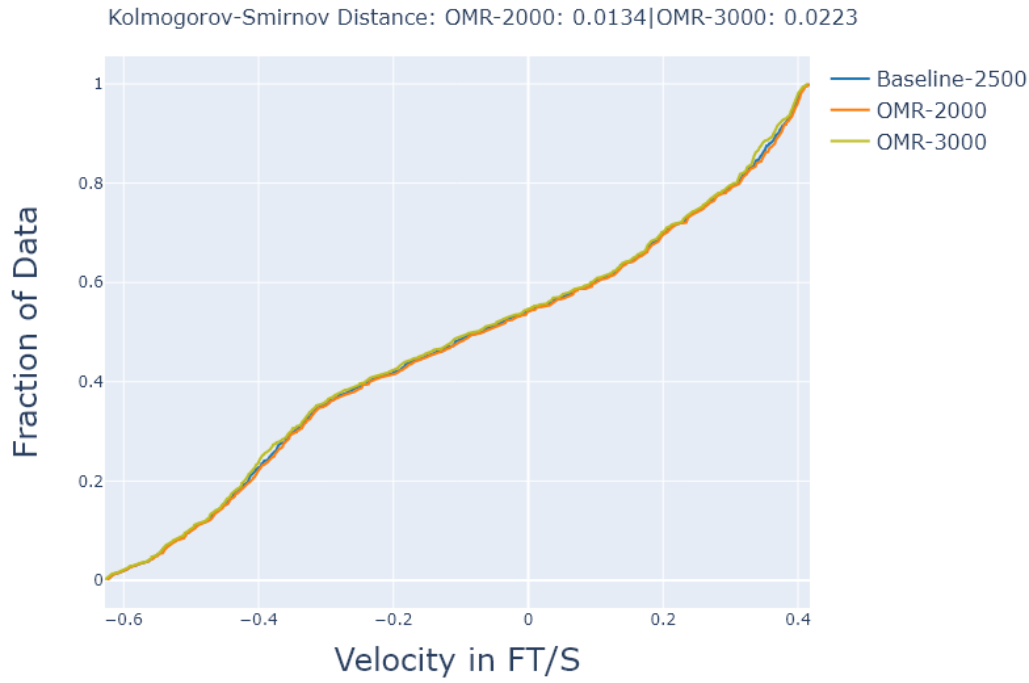


(d)

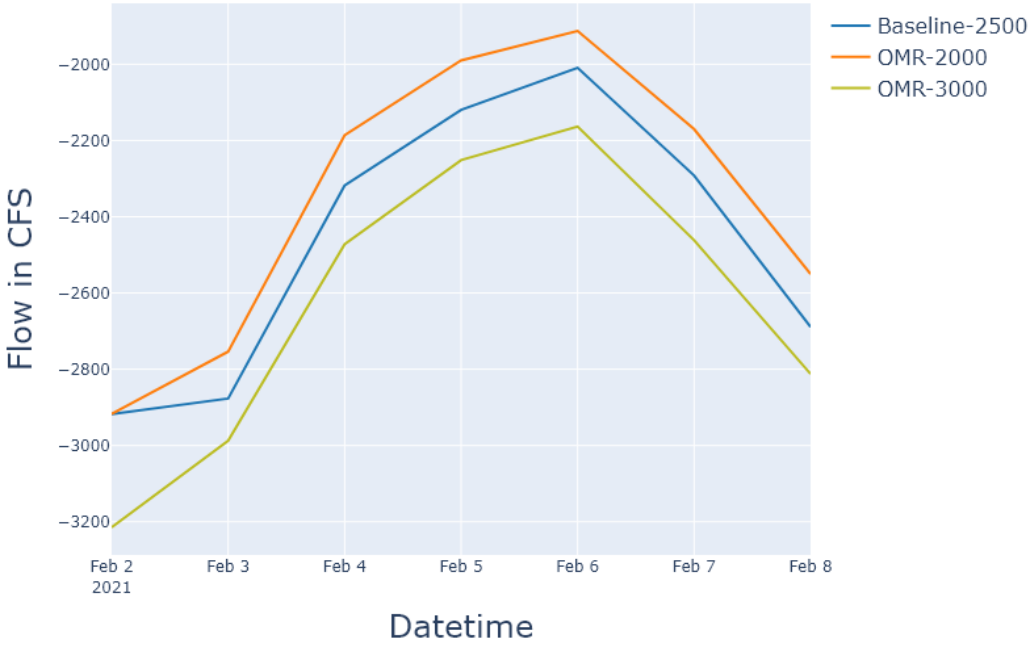
Figure A4: Old River between Franks Tract and San Joaquin River (CHAN124)


Kolmogorov-Smirnov Distance: OMR-2000: 0.0134|OMR-3000: 0.0238
Baseline-2500
OMR-2000
OMR-3000
Fraction of Data
1
0.8
0.6
0.4
0.2
0
−20k
−15k
−10k
−5k
0
5k
10k
Flow in CFS

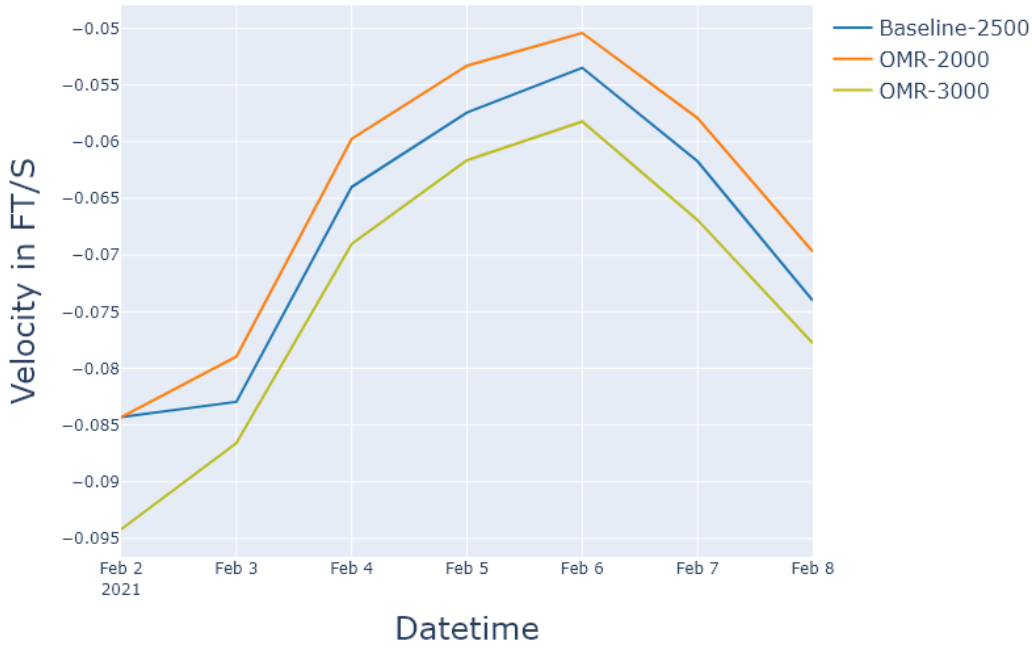
(a)


Kolmogorov-Smirnov Distance: OMR-2000: 0.0134|OMR-3000: 0.0223
Baseline-2500
OMR-2000
OMR-3000
Fraction of Data
1
0.8
0.6
0.4
0.2
0
−0.6
−0.4
−0.2
0
0.2
0.4
Velocity in FT/S

(b)

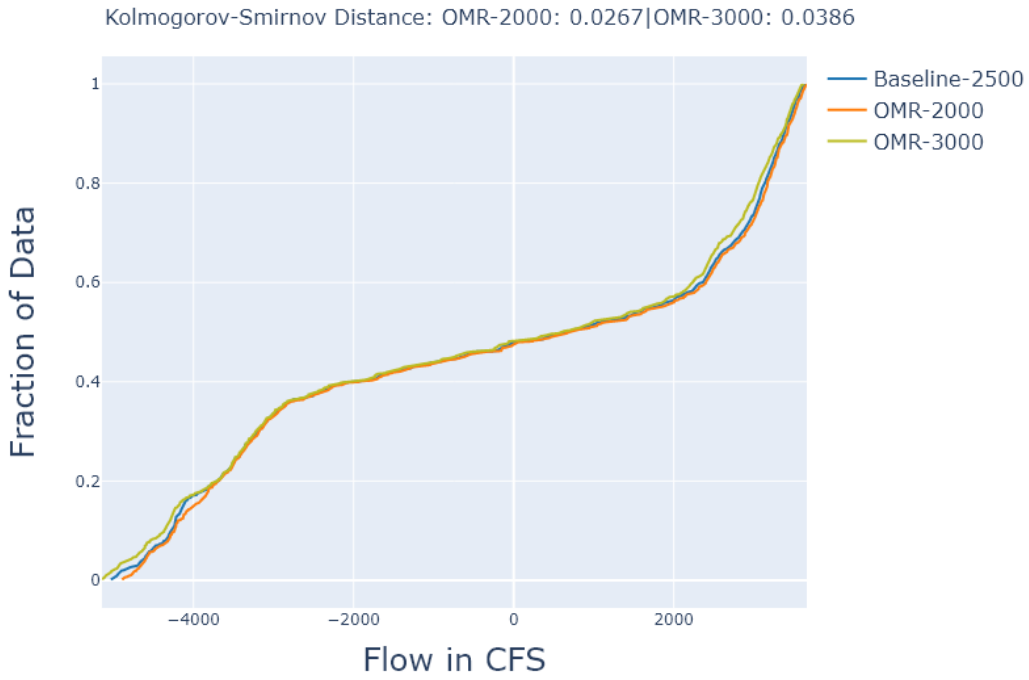


(c)

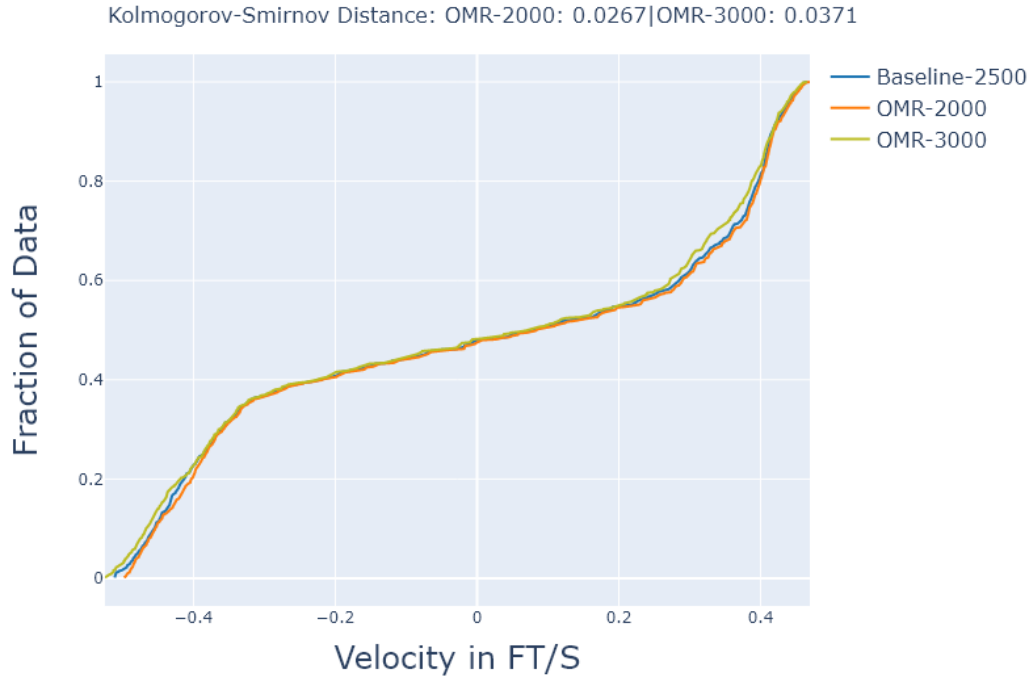


(d)

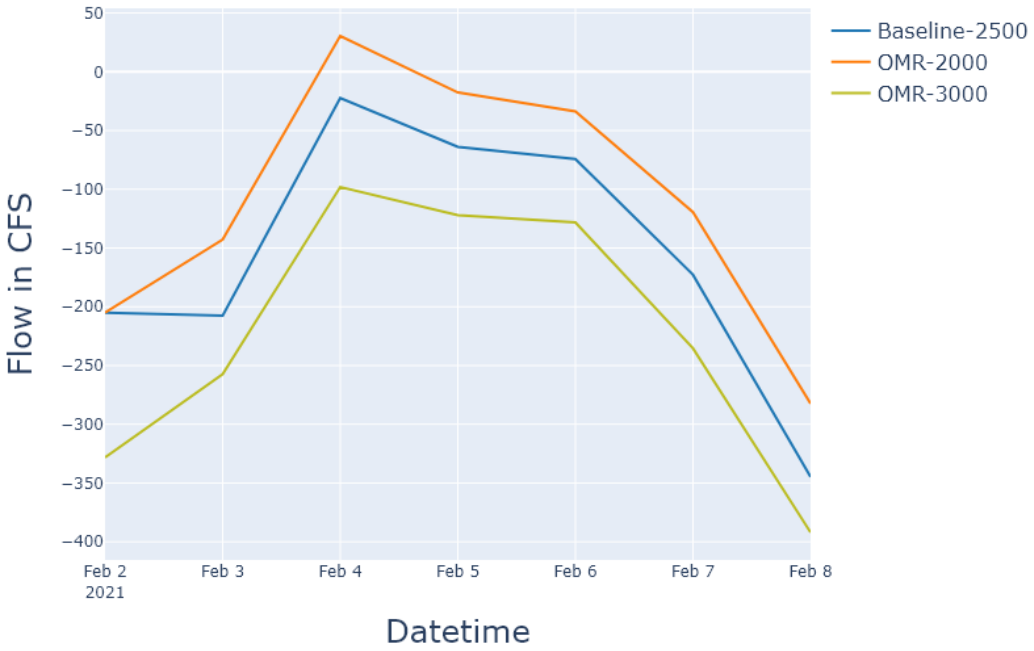
Figure A5: Lower San Joaquin River at Columbia Cut (CHAN160)


Kolmogorov-Smirnov Distance: OMR-2000: 0.0267|OMR-3000: 0.0386
Baseline-2500
OMR-2000
OMR-3000
Fraction of Data
1
0.8
0.6
0.4
0.2
0
−4000
−2000
0
2000
Flow in CFS

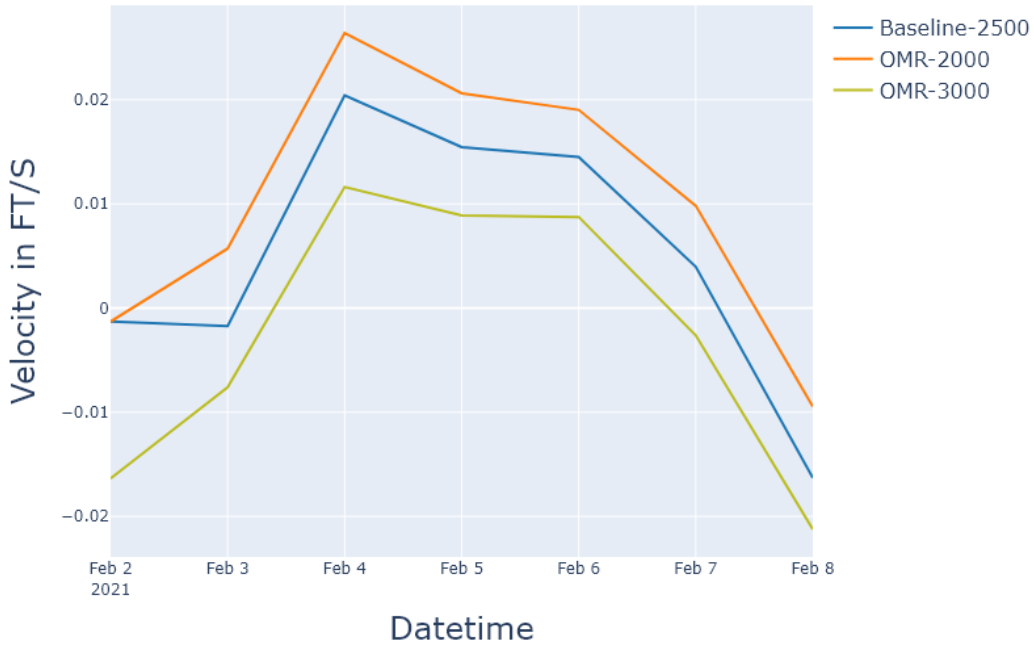
(a)


Kolmogorov-Smirnov Distance: OMR-2000: 0.0267|OMR-3000: 0.0371
Baseline-2500
OMR-2000
OMR-3000
Fraction of Data
1
0.8
0.6
0.4
0.2
0
−0.4
−0.2
0
0.2
0.4
Velocity in FT/S

(b)

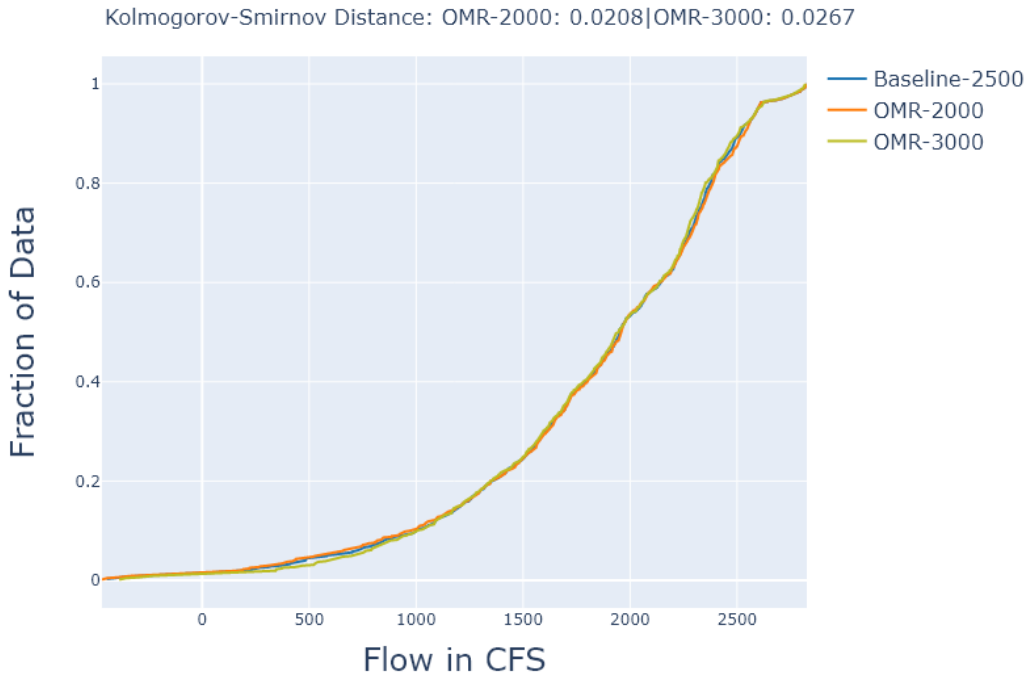


(c)

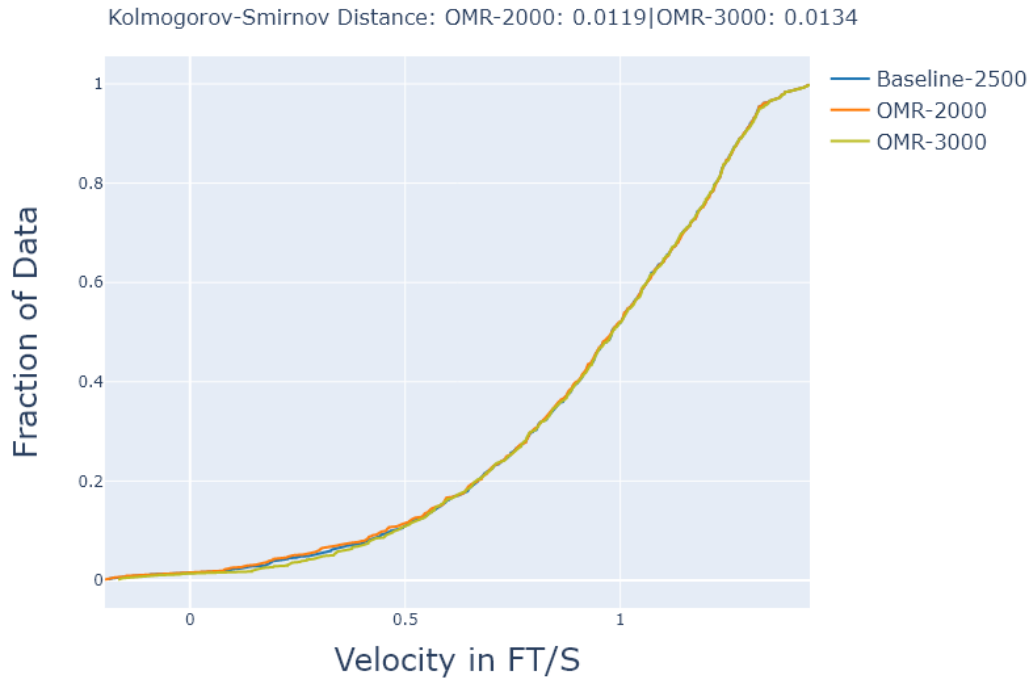


(d)

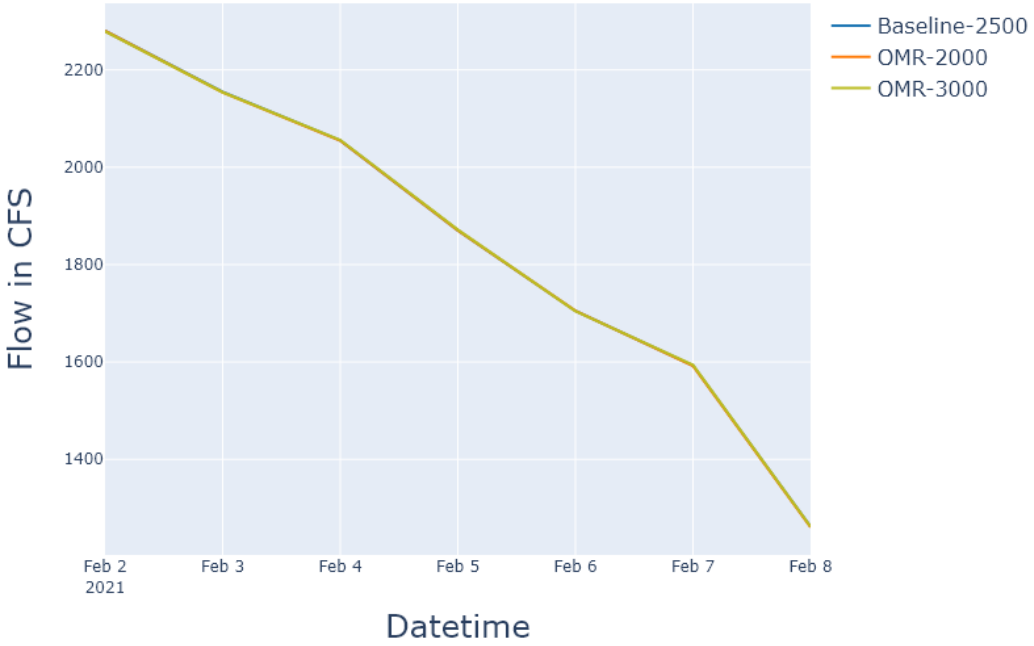
Figure A6: Slightly upstream of Head of Old River (CHAN006)


Kolmogorov-Smirnov Distance: OMR-2000: 0.0208|OMR-3000: 0.0267
Baseline-2500
OMR-2000
OMR-3000
Fraction of Data
0
0.2
0.4
0.6
0.8
1
0
500
1000
1500
2000
2500
Flow in CFS

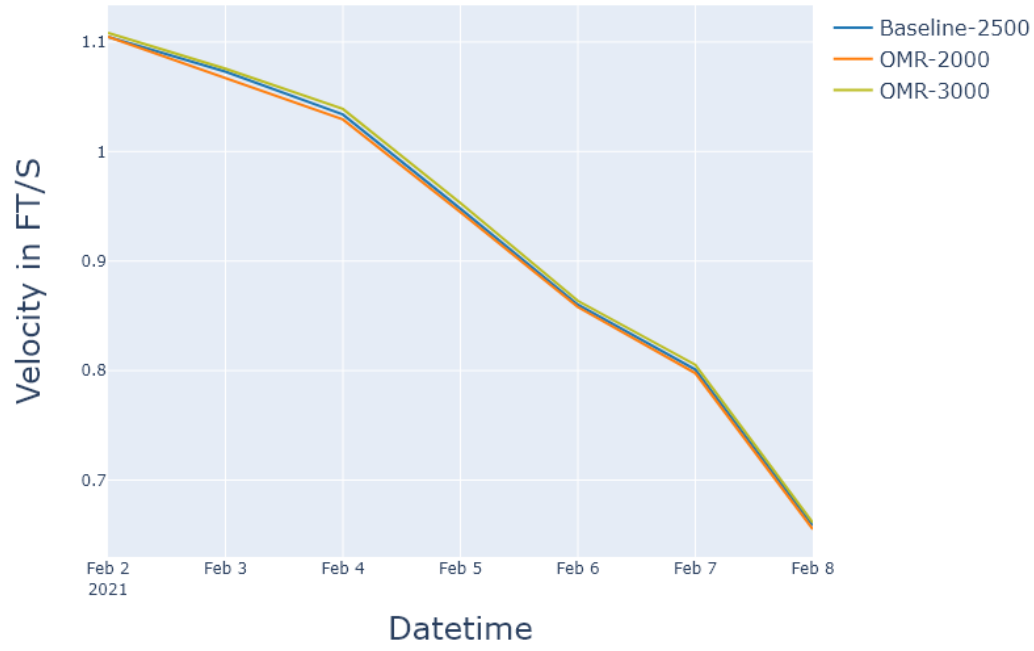
(a)


Kolmogorov-Smirnov Distance: OMR-2000: 0.0119|OMR-3000: 0.0134
Baseline-2500
OMR-2000
OMR-3000
Fraction of Data
0
0.2
0.4
0.6
0.8
1
0
0.5
1
Velocity in FT/S

(b)

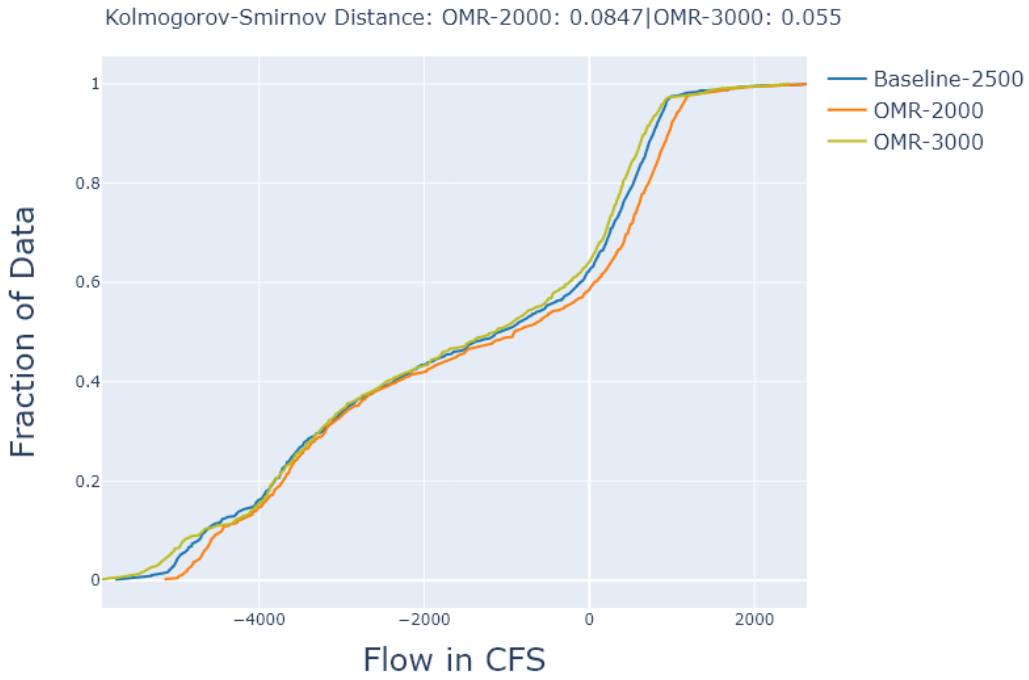


(c)

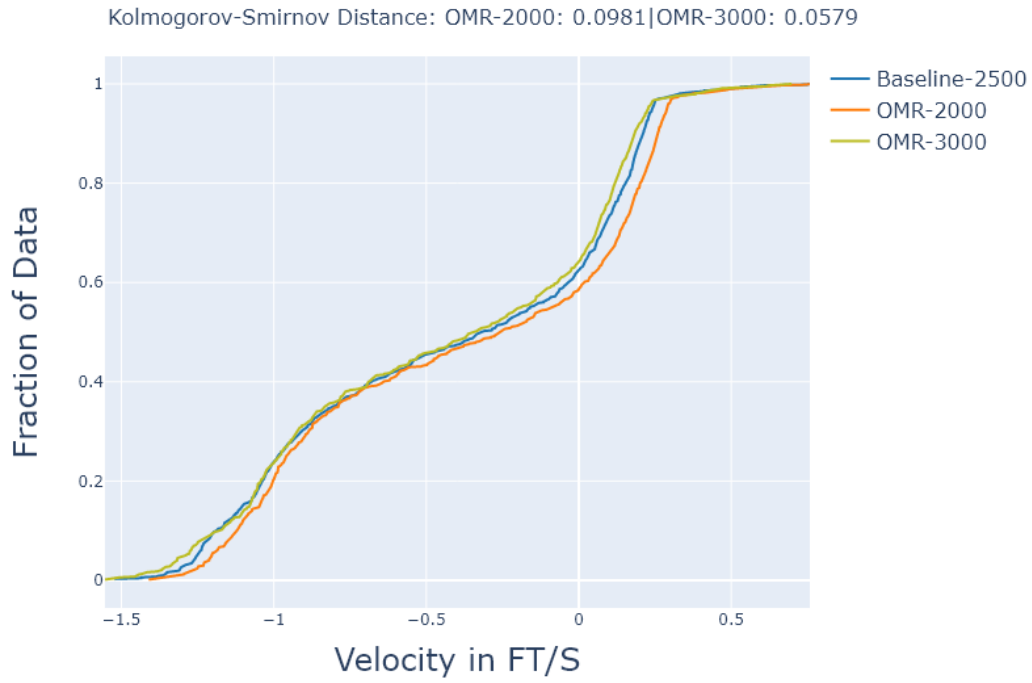


(d)

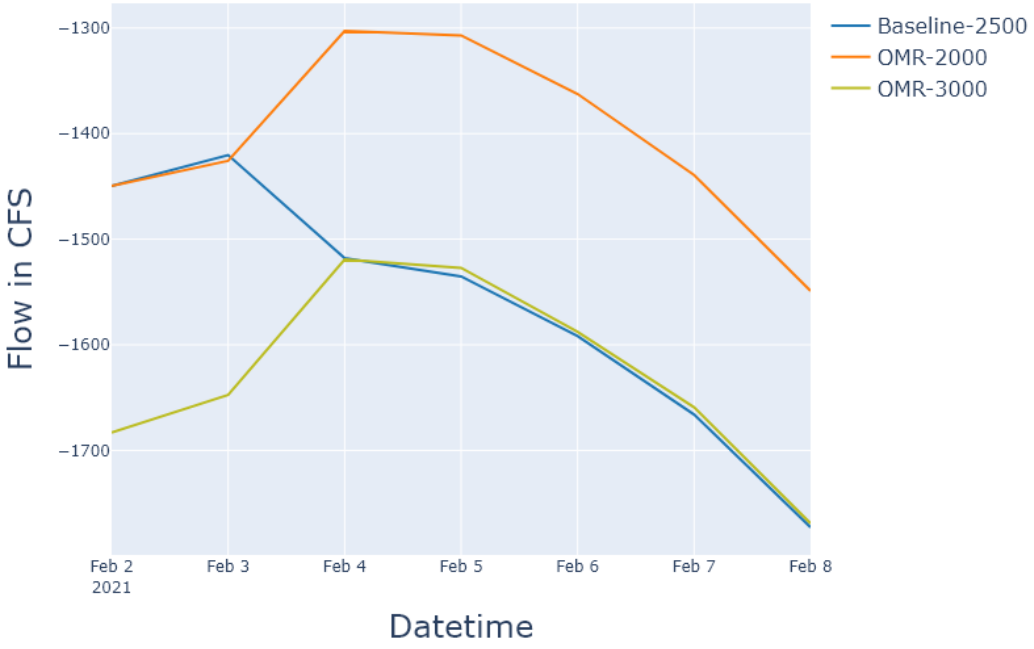
Figure A7: Old River adjacent to Grant Line Canal (CHAN081)


Kolmogorov-Smirnov Distance: OMR-2000: 0.0847|OMR-3000: 0.055
Baseline-2500
OMR-2000
OMR-3000
Fraction of Data
Flow in CFS
1
0.8
0.6
0.4
0.2
0
−4000
−2000
0
2000

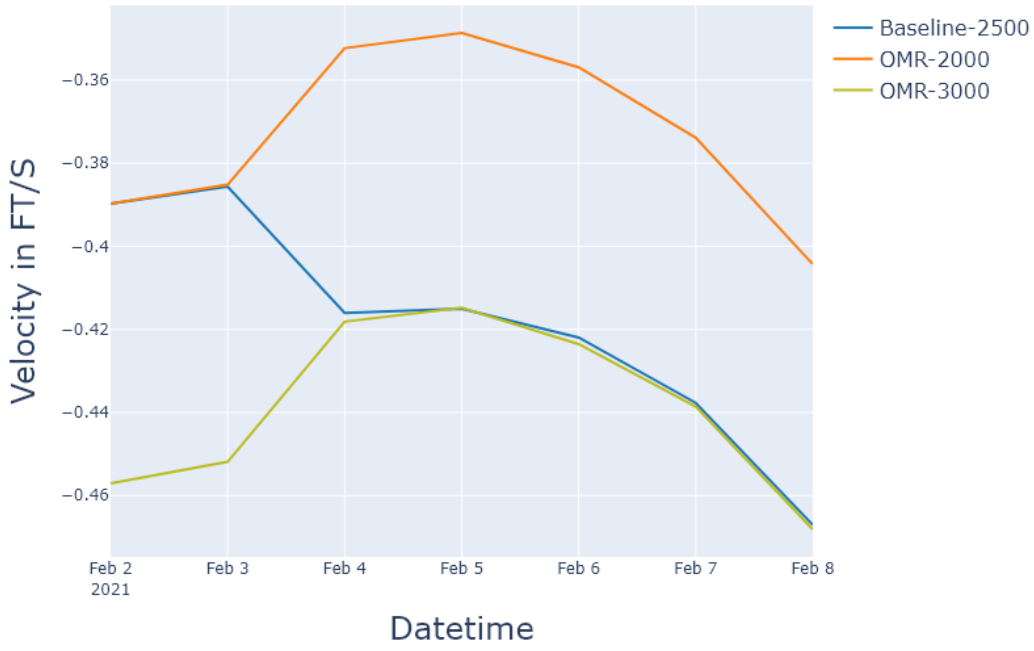
(a)


Kolmogorov-Smirnov Distance: OMR-2000: 0.0981|OMR-3000: 0.0579
Baseline-2500
OMR-2000
OMR-3000
Fraction of Data
Velocity in FT/S
1
0.8
0.6
0.4
0.2
0
−1.5
−1
−0.5
0
0.5

(b)

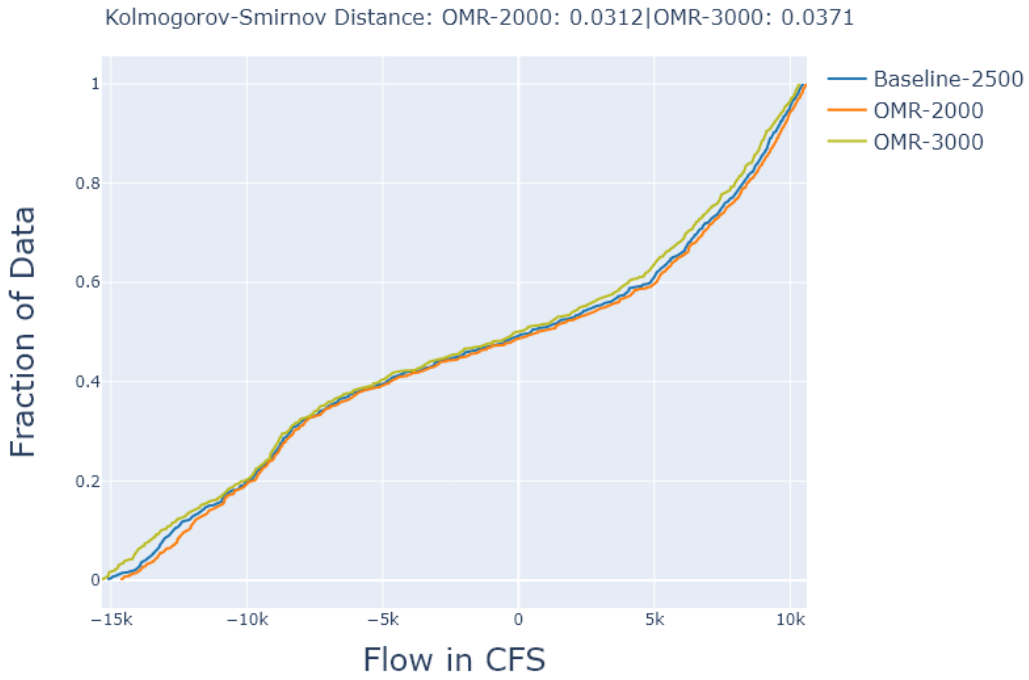


(c)

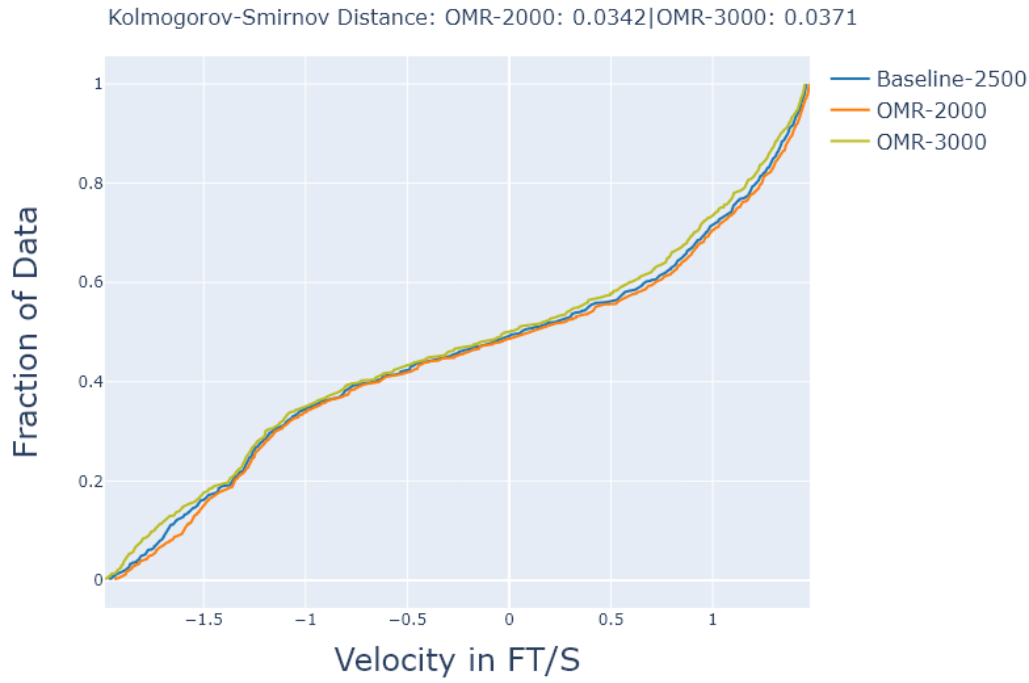


(d)

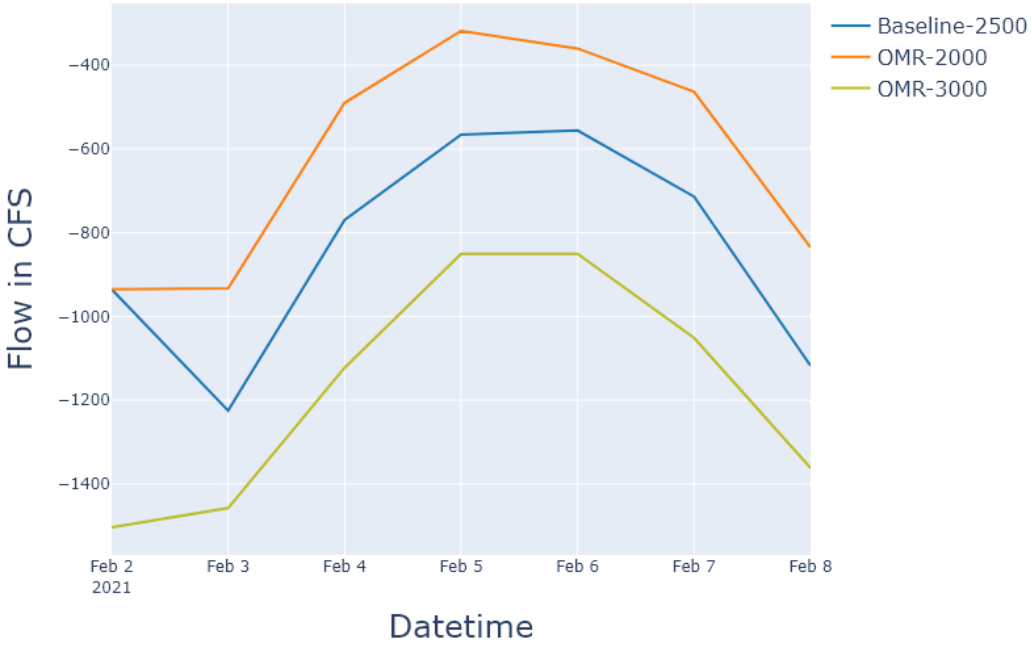
Figure A8: South Delta along Old River (CHAN094)


Kolmogorov-Smirnov Distance: OMR-2000: 0.0312|OMR-3000: 0.0371
Baseline-2500
OMR-2000
OMR-3000
Fraction of Data
1
0.8
0.6
0.4
0.2
0
−15k
−10k
−5k
0
5k
10k
Flow in CFS

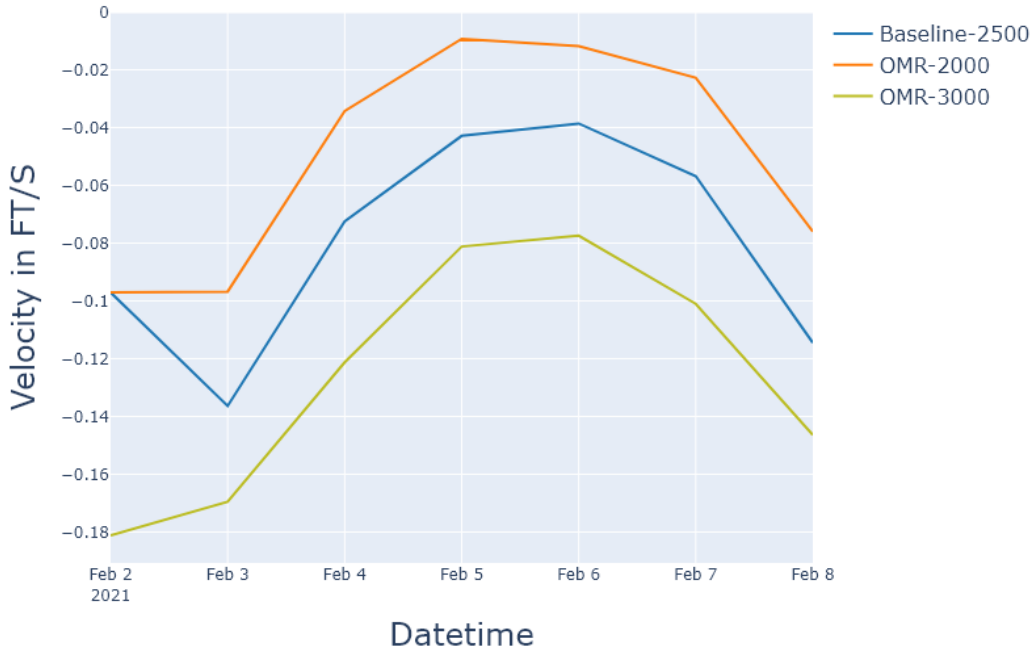
(a)


Kolmogorov-Smirnov Distance: OMR-2000: 0.0342|OMR-3000: 0.0371
Baseline-2500
OMR-2000
OMR-3000
Fraction of Data
1
0.8
0.6
0.4
0.2
0
−1.5
−1
−0.5
0
0.5
1
Velocity in FT/S

(b)

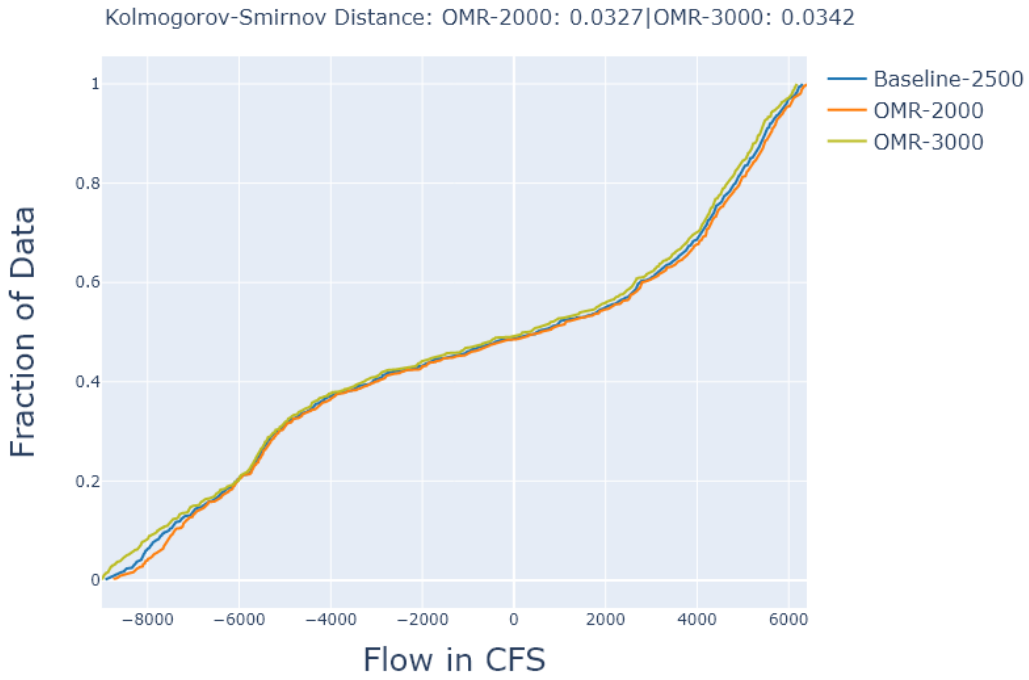


(c)

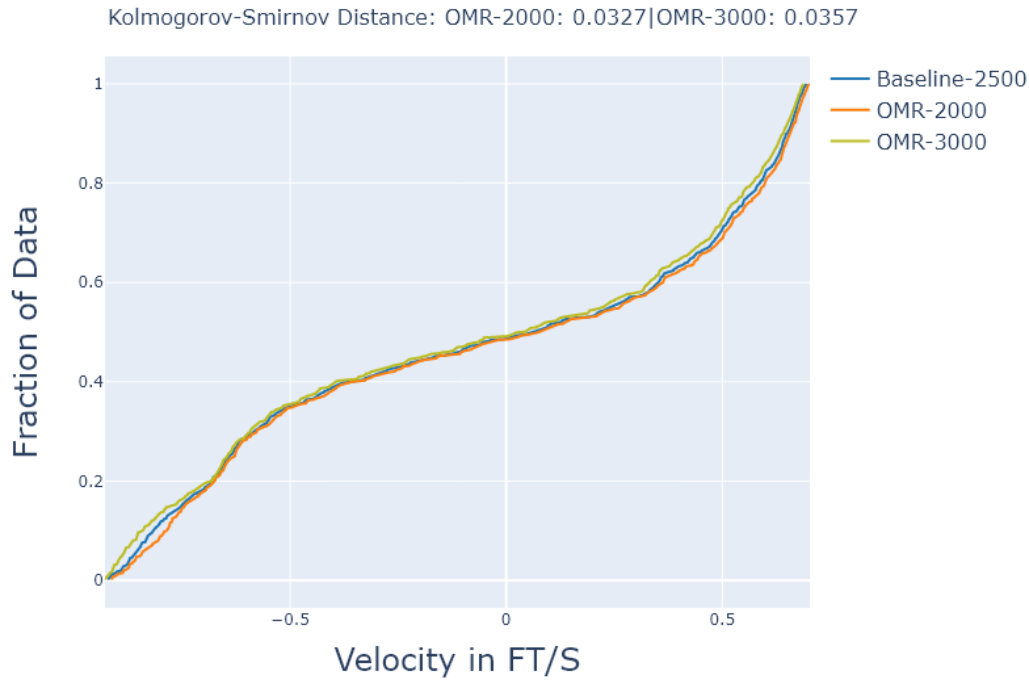


(d)

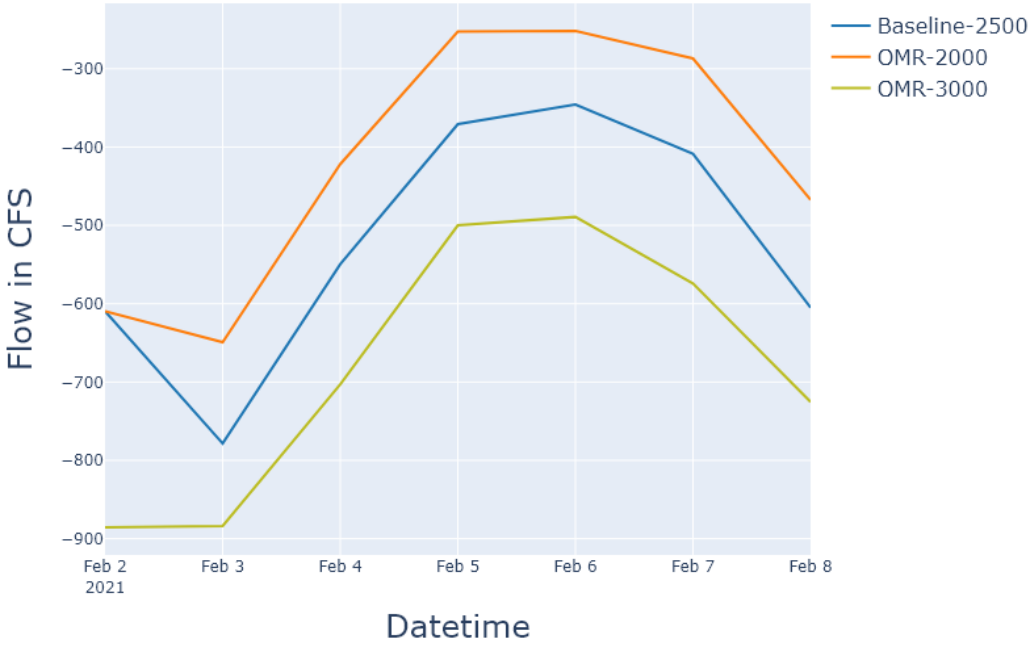
Figure A9: South Delta along Middle River (CHAN148)


Kolmogorov-Smirnov Distance: OMR-2000: 0.0327|OMR-3000: 0.0342
Baseline-2500
OMR-2000
OMR-3000
Fraction of Data
Flow in CFS
1
0.8
0.6
0.4
0.2
0
−8000
−6000
−4000
−2000
0
2000
4000
6000

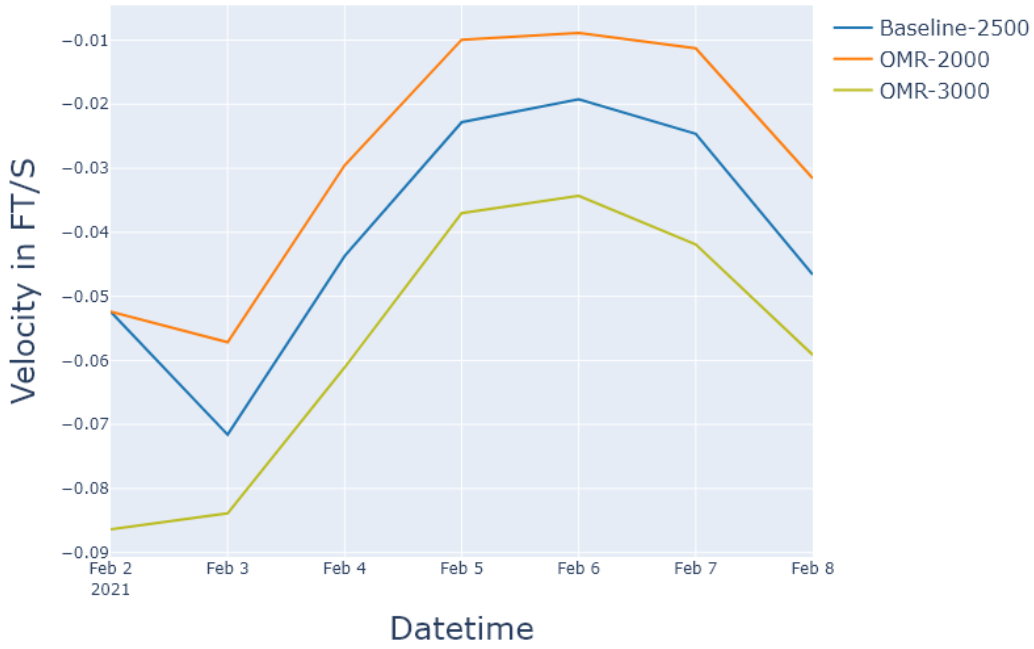
(a)


Kolmogorov-Smirnov Distance: OMR-2000: 0.0327|OMR-3000: 0.0357
Baseline-2500
OMR-2000
OMR-3000
Fraction of Data
Velocity in FT/S
1
0.8
0.6
0.4
0.2
0
−0.5
0
0.5

(b)

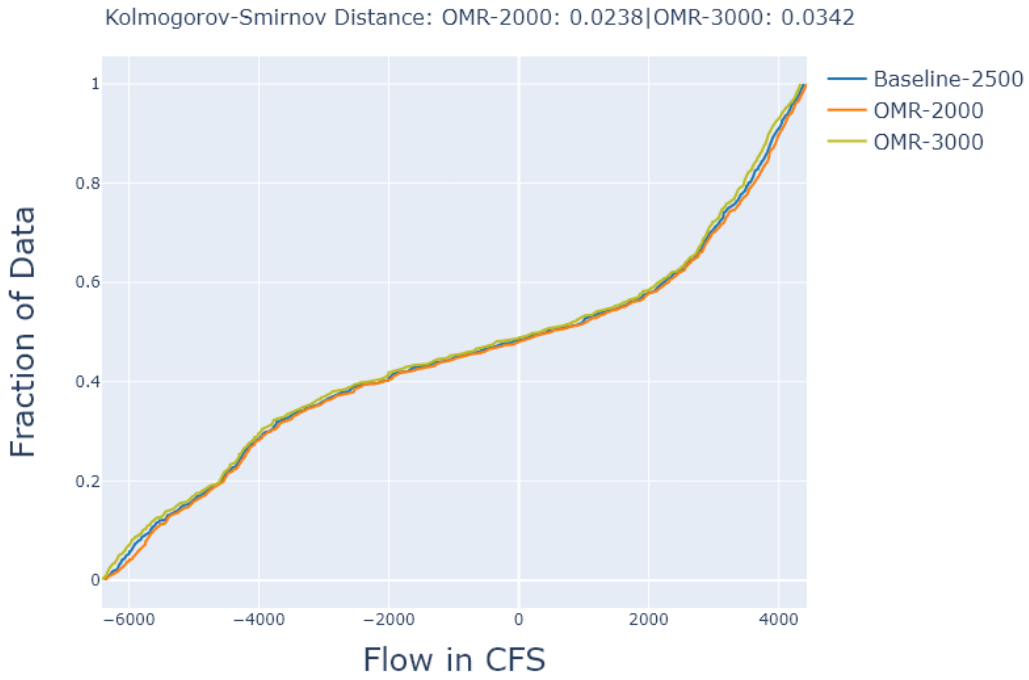


(c)

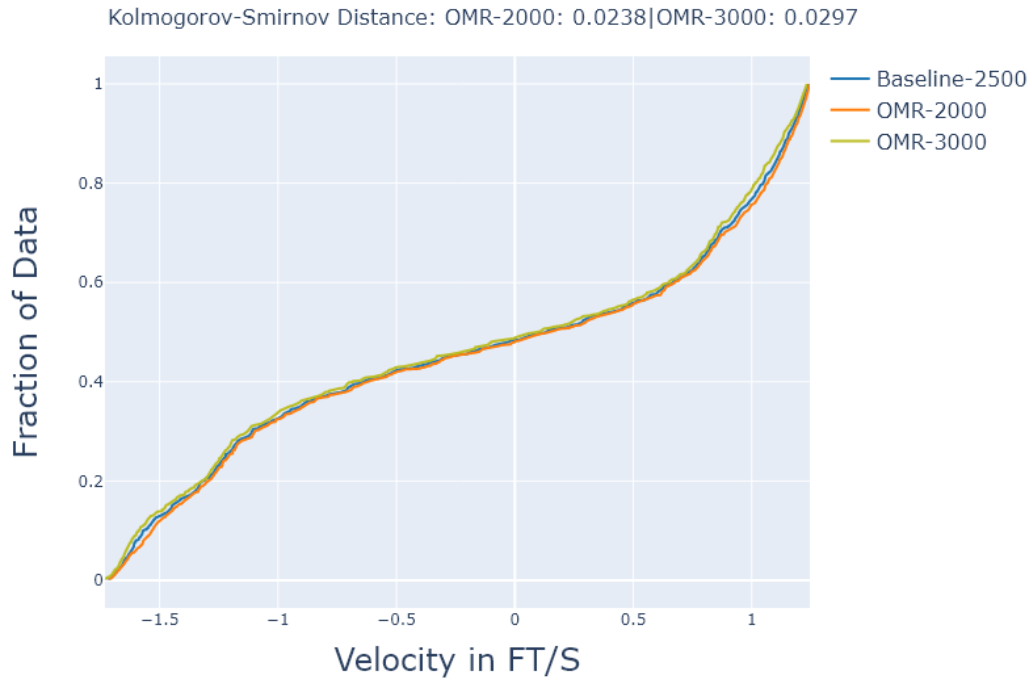


(d)

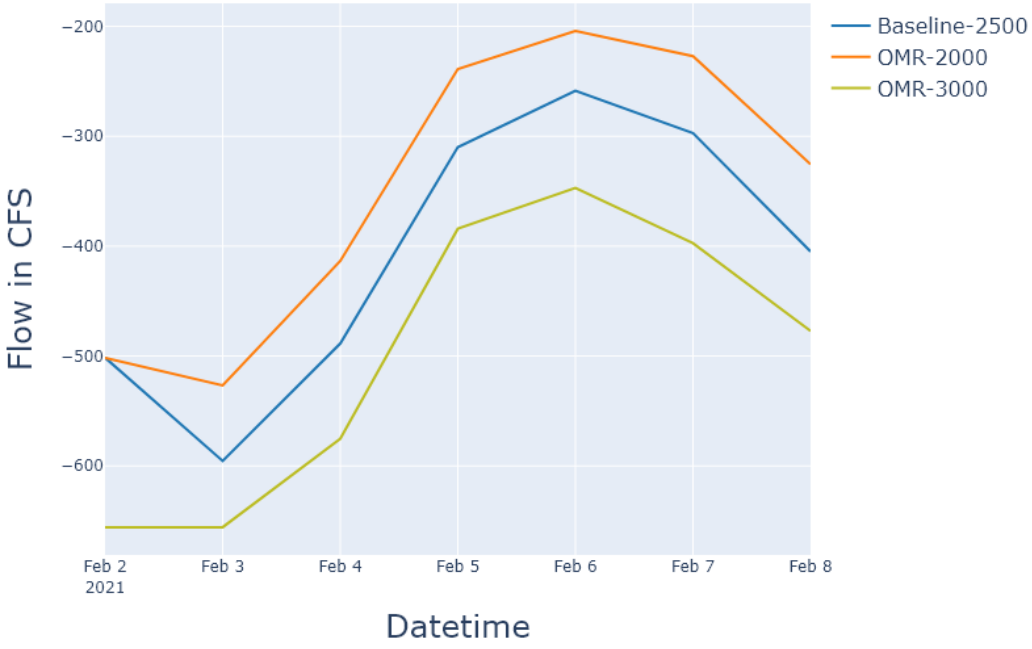
Figure A10: South Delta along Middle River (CHAN107)


Kolmogorov-Smirnov Distance: OMR-2000: 0.0238|OMR-3000: 0.0342
Baseline-2500
OMR-2000
OMR-3000
Fraction of Data
Flow in CFS
1
0.8
0.6
0.4
0.2
0
−6000
−4000
−2000
0
2000
4000

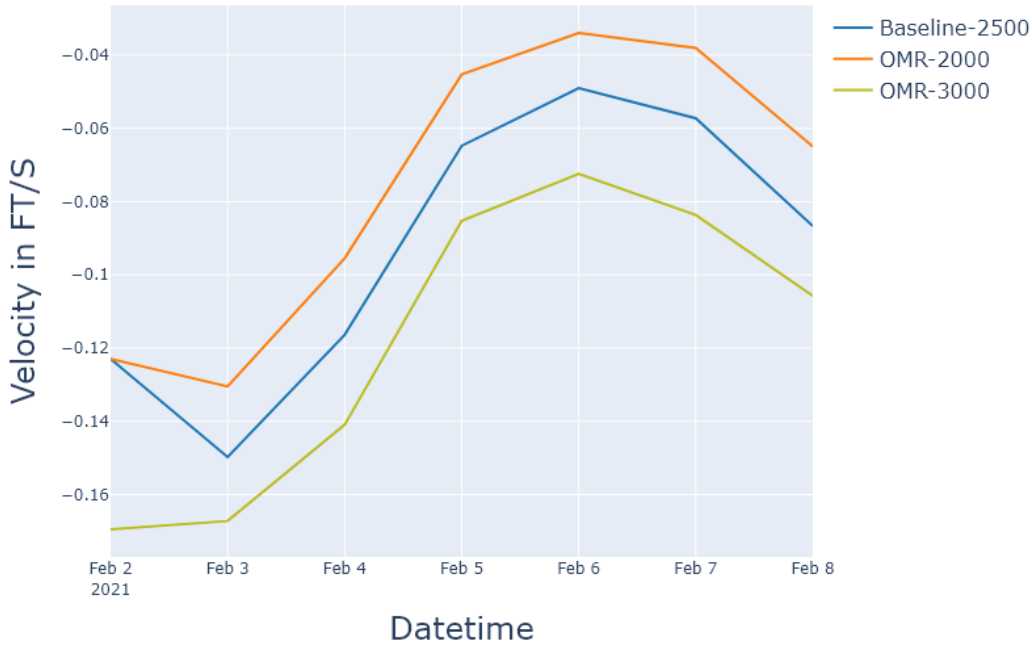
(a)


Kolmogorov-Smirnov Distance: OMR-2000: 0.0238|OMR-3000: 0.0297
Baseline-2500
OMR-2000
OMR-3000
Fraction of Data
Velocity in FT/S
1
0.8
0.6
0.4
0.2
0
−1.5
−1
−0.5
0
0.5
1

(b)


Baseline-2500
OMR-2000
OMR-3000
Flow in CFS
−200
−300
−400
−500
−600
Feb 2
2021
Feb 3
Feb 4
Feb 5
Feb 6
Feb 7
Feb 8
Datetime

(c)


Baseline-2500
OMR-2000
OMR-3000
Velocity in FT/S
−0.04
−0.06
−0.08
−0.1
−0.12
−0.14
−0.16
Feb 2
2021
Feb 3
Feb 4
Feb 5
Feb 6
Feb 7
Feb 8
Datetime

(d)

DSM2 model interpretation entrainment in Delta strata regions

North Delta into Interior and Central Delta

Channels: 49 and 434

It is unlikely that listed salmonids will experience changes to rearing, foraging, sheltering or migrating related to modeled OMR conditions this week (Channels 49 and 434).

San Joaquin River and Central Delta into South Delta

Channels: 6, 21, 107, 124, and 160

Listed salmonids are present, but recent surveys suggest low densities. Changes in velocity related to modeled OMR conditions this week may be undetectable by fish that are rearing or foraging but may increase transit rates for those that are present and migrating in the area (Channels 6, 21, 107, 124, and 160).

South Delta into facilities

Channels: 81, 94, and 148

Modeled hydrodynamic effects related to modeled OMR conditions this week suggest no changes to migrating salmonid transit times (Channels 81, 94, and 148). For example, transit times would be delayed for salmonids coming from the north; whereas, transit times would be faster for salmonids moving from the head of Old River to the export facilities.

DSM2 channel locations information

Figure A11. Highlighted DSM2 channels by Delta Strata.

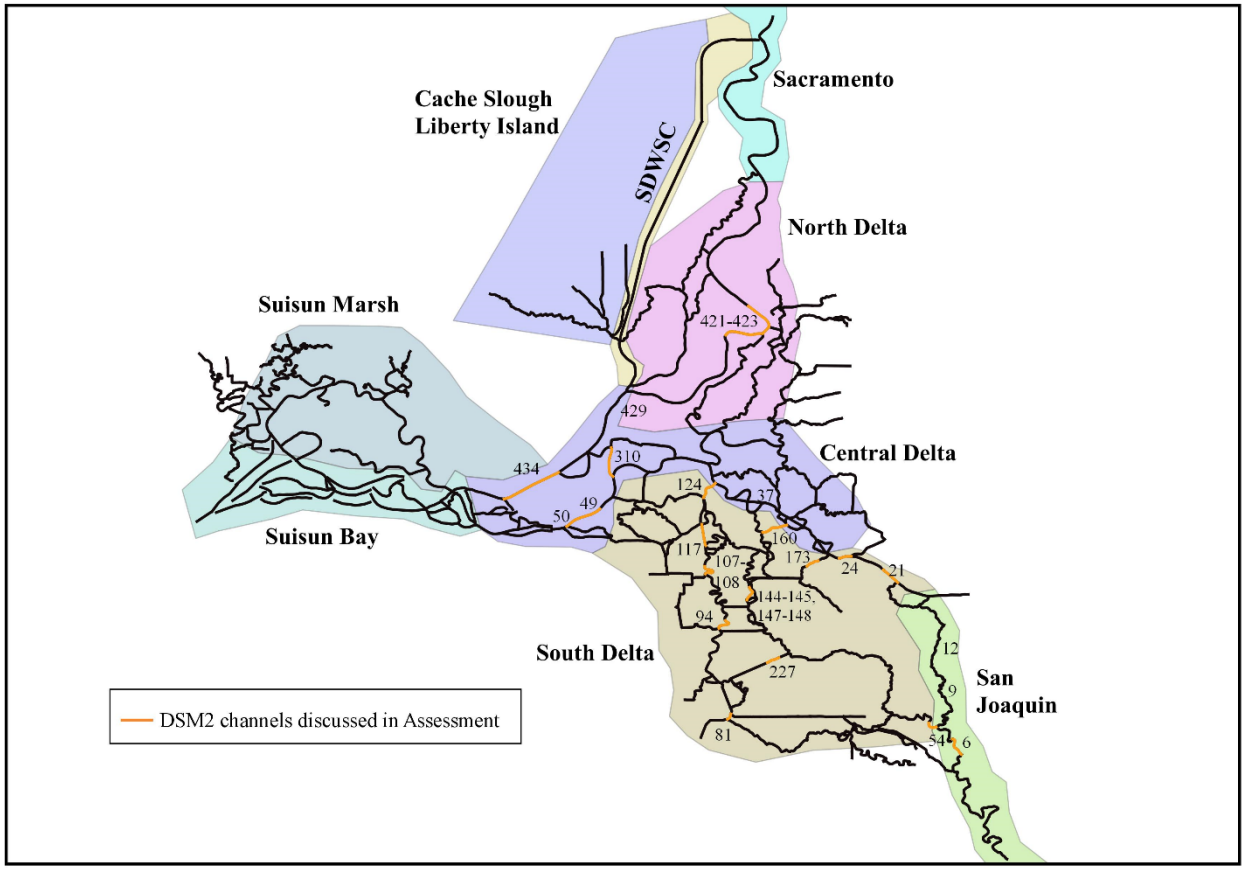


Table 3. Description of channel location, by Delta Strata region. Not all listed channels have model results presented in every weekly Proposed Action Assessment.

DSM2 Channel	**Description**
North Delta into Interior and Central Delta	
CHAN049	San Joaquin River at Sherman Island
CHAN310	Three-Mile Slough
CHAN421	Sacramento River at Delta Cross Channel
CHAN422	Sacramento River at Delta Cross Channel
CHAN423	Sacramento River at Delta Cross Channel
CHAN434	Sacramento River at Sherman Island
San Joaquin River and Central Delta into South Delta	
CHAN006	San Joaquin River at Head of Old River (HOR)
CHAN021	San Joaquin River downstream from confluence with Calaveras River
CHAN024	San Joaquin River upstream of Turner Cut
CHAN054	Old River at confluence with San Joaquin River (HOR)
CHAN107	Old River north of Rock Slough
CHAN117	Old River south of Franks Tract
CHAN124	Old River between Franks Tract and San Joaquin River
CHAN160	Columbia Cut
CHAN173	Turner Cut
South Delta into Facilities	
CHAN148	Middle River
CHAN227	Victoria Canal
CHAN081	Grant Line Canal
CHAN094	Old River

Attachment B: Delta Turbidity Report

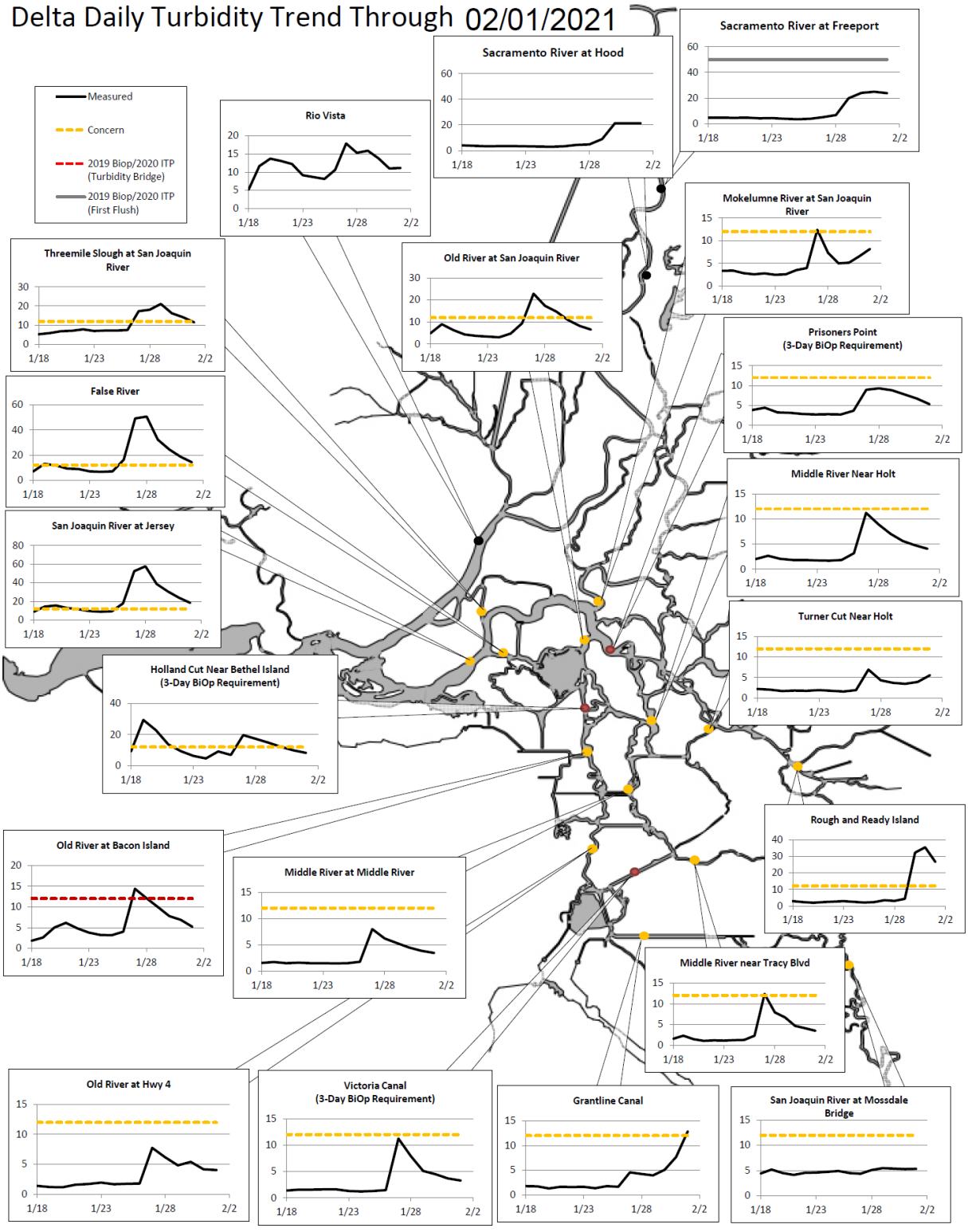
Department of Water Resources
Division of Operations and Maintenance
SWP Water Operations Office

Delta Turbidity Conditions Report

For conditions through: **February 1, 2021**

General Conditions:

Inflows:		
	Freeport	15096 CFS
	Yolo Bypass	25 CFS
	Vernalis	2330 CFS
	Cosumnes	187 CFS
	Mokelumne	452 CFS
	Calaveras	30 CFS
Exports:		
	Clifton Court	1390 CFS
	Jones	1669 CFS
Other:		
	OMR (Index)	-1795 CFS
	QWEST	11914 CFS
	NDOI	30375 CFS


Delta Daily Turbidity Trend Through 02/01/2021
Measured
Concern
2019 Biop/2020 ITP (Turbidity Bridge)
2019 Biop/2020 ITP (First Flush)
Rio Vista
Sacramento River at Hood
Sacramento River at Freeport
Mokelumne River at San Joaquin River
Threemile Slough at San Joaquin River
Old River at San Joaquin River
Prisoners Point (3-Day BiOp Requirement)
False River
Middle River Near Holt
San Joaquin River at Jersey
Turner Cut Near Holt
Holland Cut Near Bethel Island (3-Day BiOp Requirement)
Rough and Ready Island
Old River at Bacon Island
Middle River at Middle River
Middle River near Tracy Blvd
Old River at Hwy 4
Victoria Canal (3-Day BiOp Requirement)
Grantline Canal
San Joaquin River at Mossdale Bridge
1/18
1/23
1/28
2/2