



Technical Memorandum

Long-term Operation of the Central Valley Project and State Water Project

Summary of Modeling Used to Support the Weekly Delta Real-Time Forecast

Date: 04/30/2026

The U.S. Bureau of Reclamation's (Reclamation) Proposed Action (Reclamation 2025) requires increased accessibility to hydrodynamic and fish modeling to assess potential effects to Endangered Species Act (ESA) listed species due to export operations of the Central Valley Project (CVP) and State Water Project (SWP). To make information available weekly, new methods are described here to model the real-time hydrodynamic effects of export operations (zone of influence) and understand fish vital rates affected by exports using the DSM2 Ecological Particle Tracking Model (ECO-PTM). Two contrasting packages of these results are provided to assess how these vary under very different environmental and operations conditions during winter 2026. These packages are from one of the highest inflow and lowest inflow weeks during the winter (Attachments A and B) and were previously presented in the Delta Action Team, an interagency and interest holder technical team that reviews weekly operations, fish, and hydrodynamic data to assess real-time conditions and inform Reclamation about potential operational decisions.

The Delta weekly real-time assessment summary relies on the following modeling tools, data, and methods.

DSM2 HYDRO v8.2.2

The Delta Simulation Model II (DSM2) is a river, estuary, and land modeling system. It is a one-dimensional mathematical model for dynamic simulation of one-dimensional hydrodynamics, water quality and particle tracking in the Sacramento San-Joaquin Delta. DSM2 can calculate stages, flows, velocities, mass transport processes for conservative and non-conservative constituents including salts, water temperature, dissolved oxygen, and transport of individual particles using a series of nodes and channels (DWR 2025).

DSM2 currently consists of four modules: HYDRO, QUAL, GTM, and ECO-PTM. HYDRO simulates one-dimensional hydrodynamics including flows, velocities, depth, and water surface elevations. HYDRO provides the flow input for QUAL and ECO-PTM. QUAL simulates one-dimensional fate and transport of conservative and non-conservative water quality constituents given a flow field simulated by HYDRO. GTM simulates generalized transport processes, such as sediment, salinity, and mercury transport. ECO-PTM tracks three types of particles – neutrally buoyant, position oriented, and salmon particles – in a flow field simulated by DSM2 HYDRO.

The Delta real-time assessment application uses DSM version 8.2.2, currently available at [DSM2 v8.2.2 - Dataset - California Natural Resources Agency Open Data](#) (DWR 2024). An initial model configuration and boundary data reflecting actual historical data for the past several weeks and a three-week future period are provided to Reclamation by the California Department of Water Resources (DWR). Reclamation modifies boundary input data based on forecasts from the Reclamation Central Valley Office, and develops four separate forecast projections that vary CVP and SWP Delta exports to achieve four different combined Old and Middle River (OMR) flow rates

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using the Hutton (2008) equation: -2,000 cubic feet per second (cfs), -3,500 cfs, -5,000 cfs, and -6,500 cfs.

DSM2 Ecological Particle Tracking Model (ECO-PTM)

The ECO-PTM module simulates pseudo-3-D transport and fate of three types of particles throughout the Delta based on the flow field simulated by the DSM2 HYDRO module: (1) neutrally buoyant (representing Delta smelt larvae), (2) position-oriented particles (commonly used to represent Longfin Smelt larvae), and (3) salmon particles (representing Chinook salmon outmigrating smolts). Neutrally buoyant particles (NP) act as passive tracers, moving entirely with the water flow along the particle tracking model (PTM) defined velocity profile curve and dispersing randomly to simulate turbulence. Position-oriented particles (PP) have restricted movement to a user-defined layer in the water column, preventing vertical movement beyond that layer and are subject to the same velocity profile and dispersion as the NP particles. Salmon particles (SP) are neutrally buoyant particles that experience the velocity profile and random dispersion of particles with the additional component of user-specified swimming behaviors, including upstream or downstream swimming, probabilistic holding behaviors, and stochastic swimming velocity for each simulated particle at each 15-minute time-step (Wang et al. 2024). The term ECO-PTM is used to refer specifically to SP particle tracking, while the term PTM is used to refer to NP and PP particle tracking.

The current Delta real-time assessment uses ECO-PTM modules available with DSM version 8.2.2. For the NP and PP simulations, PTM particles are injected at specified DSM2 nodes at the start of a three-week forecast period and movement is simulated using a DSM2 HYDRO flow field for three weeks. At each injection node, 1,000 particles are injected over the course of one day in 15-minute increments. The fate of particles is tracked at flux boundaries in 15-min increments. For all simulations, the model uses the same random seed at the start of the simulation so as not to introduce random differences between model runs (i.e., new random seed is off). PTM models are run for each of the four OMR projections. NP and PP simulations function with the assumption that one-dimensional DSM2 channels and nodes have quasi-3D components of velocity profiles and random movement (transverse or vertical mixing). The dispersion created by the velocity and mixing components is then combined with flow-split routing (based on the hydrodynamics) to produce varying fates of particle locations.

For the SP simulations, 100 particles are injected every 15 minutes over the span of one day at the Sacramento River at Freeport. In addition to the hydrodynamic routing based on the HYDRO output and assumptions of mixing and flow splitting from NP/PP particles, statistical routing models at key junctions are applied in the SP simulations to determine particle movement. Salmon behavior is governed by parameters such as swimming velocity, diel holding, selective tidal transport, and swimming orientation. At the end of the simulation, the final route specific survival, combined survival, and travel time of particles are calculated by the SP model. Route specific survival and the ratio of survival to each route is specified along the following routes: Sutter Slough, Steamboat Slough, Georgiana Slough, Sacramento River, and Delta Cross Channel.

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Delta Export Zone of Influence

The Delta export Zone of Influence (ZOI) analysis follows the methods described in the 2024 LTO EIS (Reclamation 2024a) to evaluate the spatial extent of hydrologic alteration in the Delta considering changes to velocity and changes to the probability distribution of hourly average velocity from pumping under varying OMR flow conditions. Two DSM2 HYDRO simulations for each OMR projection are run to isolate hydrologic alteration by exports: (1) three-week forecasted inflows and Delta operations and (2) three-week forecasted inflows and Delta operations without CVP and SWP south Delta exports. The 15-minute DSM2 output data is resampled to an hourly average time step (average of four 15-minute time steps), and probability density curves of hourly average velocity at each DSM2 node are created for pumping (export) and no pumping conditions using a Gaussian Kernel Density Estimation. The proportion overlap of the curves is calculated at each node, and contour maps are developed to illustrate the extent of changes to velocity in the Delta due to CVP and SWP exports. The space outside each contour represents the area experiencing 25% or less hydrologic alteration (0.75 or more proportional overlap of velocity probability density curves). The space within each contour represents the ZOI, or the area experiencing 25% or more hydrologic alteration (less than 0.75 proportional overlap of velocity probability density curves). The current Delta real-time assessment estimates the ZOI for each week separately in the three-week forecast period.

Larval Longfin Smelt Abundance Model and Entrainment Estimate

Larval longfin smelt (LFS) entrainment estimates are made in a three-step process. First, abundance estimates of larval LFS are made within the study area of the Smelt Larval Survey (SLS) for subregions defined by the Enhanced Delta Smelt Monitoring (EDSM). Abundance is estimated following the design-based approach described for Delta smelt by Polansky and coauthors (2019), generalized by the 6-Agency Redesign design team for other juvenile pelagic fish in the Delta, and recently adopted by the California Department of Fish and Wildlife (CDFW) in their long-term monitoring reports (Malinich et al. 2023). Second, a PTM model is used to estimate the percentage of particles entrained into the CVP and SWP export facilities from each subregion on a weekly basis. The percentage of particles entrained is multiplied by the subregional abundance estimate to give the total larvae entrained that originated from each subregion. Third, the subregional abundance and entrainment estimates are aggregated and reported on a regional basis.

The abundance estimate for larval longfin smelt in a survey s , and geographic area, a , is the product of a region-specific habitat volume, V_r , and the catch per unit volume, $CPUV_{s,r}$ of LFS in the SLS tows in that region; $CPUV_{s,r}$ is calculated as the total catch across tows divided by total volume sampled. These regional estimates can then be summed to produce a Delta-wide (or estuary-wide, given the recent expansion of SLS sampling downstream into San Pablo Bay) abundance estimate. It is important to note that r can represent any level of geographic aggregation if the corresponding habitat volumes have been calculated. Finer-scale stratification can reduce the impact of selectivity bias, if present, because the effect of a non-representative station location impacts a smaller proportion of the overall Delta estimate (Polansky et al. 2019). The abundance method is currently expanding to the top 10 meters of each subregion (or less, if the depth is less than 10 meters) since the SLS gear can generally fish up to that depth. Recent research by Kimmerer and Gross (2022) suggests that some type of vertical migration is likely necessary to explain how LFS larvae are

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retained in the central Delta, rather than flushed downstream. Moreover, the small LFS are caught by both the midwater and bottom trawl gears deployed by the San Francisco Bay Study.

The abundance index, I_s , for a Delta-wide SLS is calculated as:

$$I_s = \sum_r^R V_r CPUV_{s,r}$$

with

$$CPUV_{s,r} = \frac{\sum c_{s,r}}{\sum v_{s,r}}$$

The variance of regional abundance, $I_{s,r}$ accounts for the variability in catch between tows within a region.

$$\widehat{var}(I_{s,r}) = \sum_a^A \frac{V_{s,r}^2 (\hat{s}_{s,r}^2)}{n_{s,r} (\bar{v}_{s,r})^2}$$

with

$$\hat{s}_{s,r}^2 = \sum_{j=1}^{n_{s,r}} \frac{(c_{s,r} - CPUV_{s,r} \times v_{s,r})^2}{n_{s,r} - 1}$$

where $c_{s,r}$ and $v_{s,r}$ are the catch and volume of a single tow j , $\bar{v}_{s,r}$ is the mean volume of tows in a survey and region and $n_{s,r}$ is the number of tows conducted. Polansky et al. (2019) add to this variance formula to incorporate uncertainty in size-selectivity and gear efficiency, but for larval fish we assume that the contribution of these variance components would be minimal. Since only point estimates are currently being used in the calculation of proportional entrainment estimates, this assumption is currently inconsequential. If the approach were expanded in the future to incorporate uncertainty associated with the abundance estimates, then this assumption could be revisited.

Regional abundance estimates are calculated for each EDSM subregion that contains at least one SLS station. 27 EDSM subregions are shown in Figure 1, however, the Upper Sacramento River subregion does not include an SLS station within its boundaries, so no abundance estimate is calculated for that subregion, and a total of 26 EDSM subregions are included in the analysis. Using the design-based approach, there is no catch data, and thus no abundance estimate, for subregions that fall outside of the SLS sampling area. The SLS in particular was designed to capture the majority of larval SLS distribution, and so while there are likely fish beyond the sample frame, their abundance is assumed to be negligible.

For reporting simplicity, abundance estimates from all 26 subregions are aggregated into seven LFS regions with boundaries that generally align with an EDSM subregion boundary (Figure 2). Each of the 26 subregions is assigned a DSM2 node where particles intended to represent LFS will be inserted then tracked over time using the PTM module. The injection points are selected based on three criteria: (1) spatially dispersed to represent hydrodynamic variability, (2) aligned with a node used by Contra Costa Water District (CCWD) in their PTM emulator tool to support model cross-validation, and (3) proximity to an SLS station. A crosswalk of the LFS region, EDSM subregion, DSM2 injection node, PTM emulator node, and SLS Station is provided in Table 1. Note, no DSM2



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nodes are west of the West Suisun Bay subregion, so the furthest west node in the DSM2 domain is used to represent particle entrainment for all subregions west of West Suisun Bay.

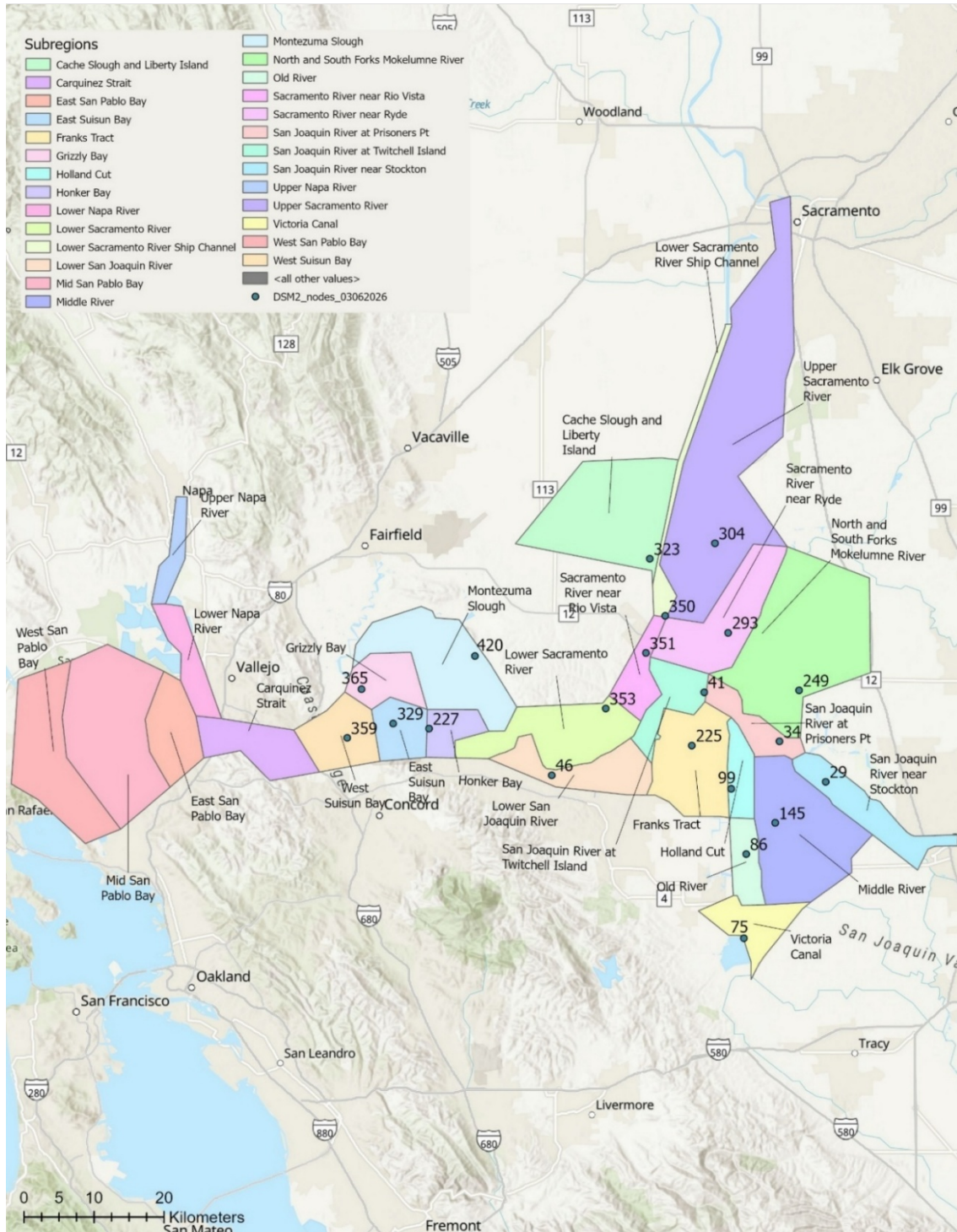


Figure 1. Enhanced Delta Smelt Monitoring Subregions



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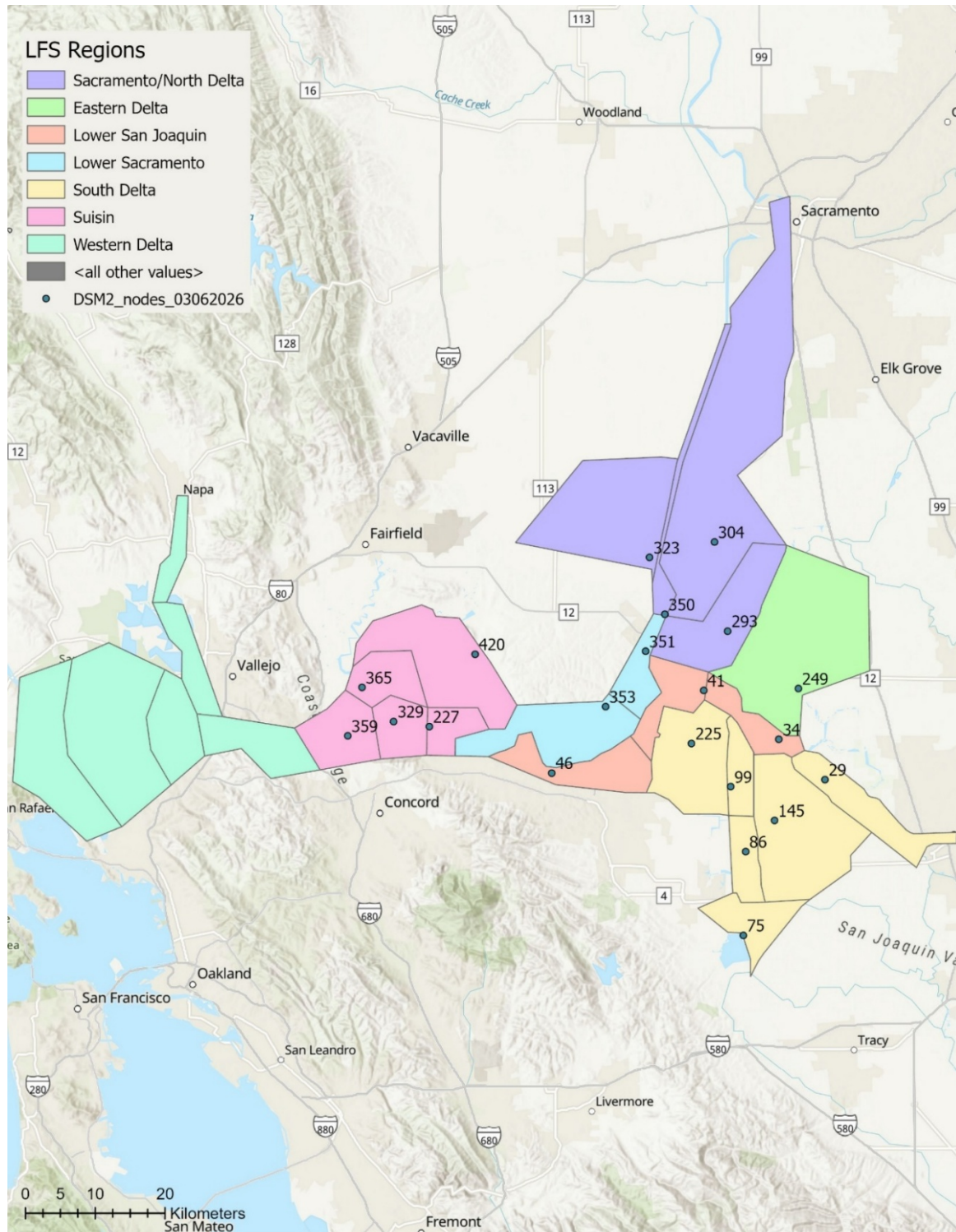


Figure 2. Larval Longfin Smelt Analysis Regions

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Table 1. Alignment of Delta Simulation Model II Nodes, Enhanced Delta Smelt Monitoring Subregion, Longfin Smelt Analysis Regions, and Smelt Larval Survey Stations

DSM2 Injection Node	EDSM Subregion	LFS Analysis Region	PTM Emulator Node	SLS Station
329	East Suisun Bay	Suisun		
365	Grizzly Bay	Suisun		602
227	Honker Bay	Suisun		519
420	Montezuma Slough	Suisun	X	610
359	West Suisun Bay	Suisun	X	411
359	Carquinez Strait	Western Delta	X	411
359	Upper Napa River	Western Delta	X	411
359	Lower Napa River	Western Delta	X	411
359	East San Pablo Bay	Western Delta	X	411
359	West San Pablo Bay	Western Delta	X	411
359	Mid San Pablo Bay	Western Delta	X	411
353	Lower Sacramento River	Lower Sacramento	X	706
351	Sacramento River near Rio Vista	Lower Sacramento	X	707
350	Lower Sacramento River Ship Channel	Sacramento/ North Delta	X	711
293	Sacramento River near Ryde	Sacramento/ North Delta		
323	Cache Slough and Liberty Island	Sacramento/ North Delta	X	723
304	Upper Sacramento River	Sacramento/ North Delta		
249	North and South Forks Mokelumne River	East	X	919
46	Lower San Joaquin River	Lower San Joaquin		804
41	San Joaquin River at Twitchell Island	Lower San Joaquin	X	
34	San Joaquin River at Prisoners Point	Lower San Joaquin	X	906
225	Franks Tract	South Delta		901
99	Holland Cut	South Delta	X	902
86	Old River	South Delta	X	915
29	San Joaquin River near Stockton	South Delta		910
145	Middle River	South Delta	X	914
75	Victoria Canal	South Delta	X	918

Key:

DSM2 = Delta Simulation Model II

EDSM = Enhanced Delta Smelt Monitoring

LFS = larval longfin smelt

PTM = particle tracking model

SLS = Smelt Larval Survey

To estimate proportional entrainment of LFS larva over a three-week forecast period, subregional abundance estimates are made using the most up to date fully processed SLS data, or if more than a month has passed, the most recent partially processed SLS data. An example of the percentage of samples from each LFS Analysis Region and survey that had been processed as of 03/03/2026 is shown in Table 2. For example, the assessment completed on 03/09/2026, the partial results from Survey 5 were used because it had been a month since Survey 4. In general, SLS catch data from the Lower San Joaquin and South Delta is processed first, and data from the Suisun and the Western Delta last. Selecting the most recent survey with incomplete data in the western Delta but complete data in the South Delta and Lower San Joaquin is viewed as a conservative approach that may

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overestimate proportional entrainment, since PTM results typically show more entrainment from the South Delta and Lower San Joaquin injection nodes and little to no entrainment from the Suisun and Western Delta injection nodes.

Table 2. Percentage of Samples from Each Longfin Smelt Analysis Region and Survey Processed as of 03/03/2026.

SLS Number	1	2	3	4	5
Survey Date	12/29/2025	1/12/2026	1/26/2026	2/9/2026	2/23/2026
Eastern Delta	100%	100%	100%	100%	100%
Lower Sacramento	100%	100%	100%	86%	57%
Lower San Joaquin	100%	100%	100%	100%	100%
Sacramento/ North Delta	100%	100%	100%	100%	100%
South Delta	100%	100%	100%	100%	100%
Suisun	100%	100%	100%	56%	78%
Western Delta	100%	100%	100%	88%	4%

Key:

LFS = larval longfin smelt

SLS = Smelt Larval Survey

Next, a DSM2 HYDRO model is run for the three-week forecast period, and the DSM2 PTM model is run at each injection point identified in Table 1 using surface-oriented particles (PP), which represent larval LFS that tend towards the top 10% of the water column (Reclamation 2024b). The cumulative flux of particles into the CVP and SWP export facilities is recorded at the end of each week for each injection point. The subregional abundance estimate is then multiplied by the subregional flux into CVP and SWP export facilities to estimate a whole number and percentage of LFS larva cumulatively entrained from that subregion at the end of each week. Figure 3 shows an example timeseries of cumulative subregional flux into CVP and SWP export facilities across a three-week period by injection node for one OMR projection (-6,500 cfs). Table 3 shows an example calculation of LFS larva entrainment at the end of one week for each subregion for one OMR projection (-6,500 cfs), with LFS abundance estimated using catch data from SLS 5 that was available as of 03/03/2026.

Two sensitivity assessments were completed to evaluate differences in methodologies. The first evaluated potential bias in regional entrainment due to injection node location and regional flux averaging (Appendix A). It was determined applying a regional average flux to a regional average abundance would bias the entrainment results high compared to applying a singular flux from individual injection points to regional average abundance. The second evaluated an alternative method developed by Kimmerer and Gross (2022) to estimate longfin smelt abundance (Appendix B), along with alternative injection node locations aligned with SLS stations. The design-based approach and the Kimmerer and Gross method produce different Delta-wide and regional abundance estimates, but similar Delta-wide entrainment estimates.

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**Average PTM Results by Injection Region for Position Oriented Particles
Entrained at CVP and SWP. OMR Scenario = -6,500. Particles Injected 3/3/2026.**

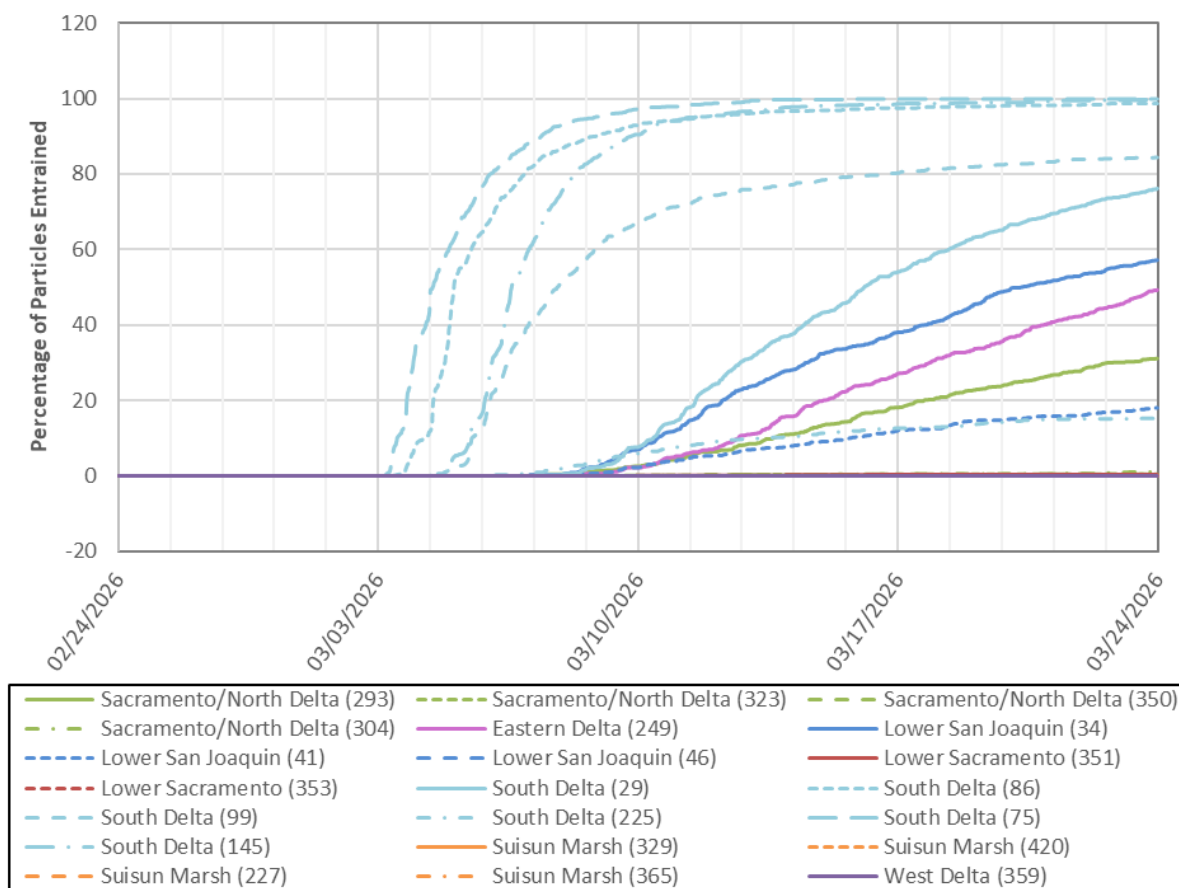


Figure 3. Example of Cumulative Average Regional Flux into Central Valley Project and State Water Project Export Facilities by Larval Longfin Smelt Analysis Region

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Table 3. Summary of Longfin Smelt Larva Proportional Entrainment by Subregion Three Weeks After Injection for Old and Middle River = -6,500 Cubic Feet per Second

Metric \ Subregion	West Suisun Bay	East Suisun Bay	Grizzly Bay	Montezuma Slough	Honker Bay	Carquinez Strait	Upper Napa River	Lower Napa River
DSM2 Injection Node	359	329	365	420	227	359	359	359
LFS Larva Abundance	32,956,757	12,946,486	5,628,649	120,721	9,301,622	0	0	0
PTM Entrained (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LFS Larva Entrained (#)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Metric \ Subregion	East San Pablo Bay	West San Pablo Bay	Mid San Pablo Bay	Lower Sacramento River Ship Channel	Sacramento River near Ryde	Cache Slough and Liberty Island	Upper Sacramento River	San Joaquin River at Prisoners Point
DSM2 Injection Node	359	359	359	350	293	323	304	34
LFS Larva Abundance	0	0	9,538,687	0	0	914,595	No abundance estimate	0
PTM Entrained (%)	0.0	0.0	0.0	0.4	30.1	0.4		55.6
LFS Larva Entrained (#)	0.0	0.0	0.0	0.0	0.0	3,658		0.0

Metric \ Subregion	San Joaquin River at Twitchell Island	Lower San Joaquin River	Lower Sacramento River	Sacramento River near Rio Vista	San Joaquin River near Stockton	Old River	Middle River	Victoria Canal
DSM2 Injection Node	41	46	353	351	29	86	145	75
LFS Larva Abundance	859,459	3,543,964	10,581,081	605,676	0	0	0	0
PTM Entrained (%)	17.0	0.0	0.0	0.3	74.0	98.7	99.6	99.9
LFS Larva Entrained (#)	146,108	0.0	0.0	1,817	0.0	0.0	0.0	0.0

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Metric \ Subregion	Holland Cut	Franks Tract	North and South Forks Mokelumne River	Delta-Wide Total (#)	Delta-Wide Total (% of estimated abundance)
DSM2 Injection Node	99	225	249	-	-
LFS Larva Abundance	0	0	0	86,997,697	-
PTM Entrained (%)	84.1	15.1	45.6	-	0.2%
LFS Larva Entrained (#)	0.0	0.0	0.0	151,583	-

Key:

DSM2 = Delta Simulation Model II

LFS = longfin smelt

PTM = particle tracking model

Table 4. Summary of Longfin Smelt Larva Proportional Entrainment by Longfin Smelt Analysis Region by Week After Injection for Old and Middle River = -6,500 Cubic Feet per Second

Week	Metric \ Region	West	Suisun	Sacramento/ North Delta	Lower San Joaquin	Lower Sacramento	South Delta	East	Delta-Wide Total (#)	Delta-Wide Total (%)
	LFS Larva Abundance	9,538,687	60,954,235	914,595	4,403,423	11,186,757	0	0	86,997,697	-
Week 1 (03/08/2026)	LFS Larva Entrained (%)	0.0	0.0	0.0	0.2	0.0	0.0	0.0	-	<0.1%
	LFS Larva Entrained (#)	0.0	0.0	0.0	6,876	0.0	0.0	0.0	6,876	-
Week 2 (03/15/2026)	LFS Larva Entrained (%)	0.0	0.0	0.4	2.0	<0.1	0.0	0.0	-	0.1%
	LFS Larva Entrained (#)	0.0	0.0	3,201	89,384	1,211	0.0	0.0	93,796	-
Week 3 (03/22/2026)	LFS Larva Entrained (%)	0.0	0.0	0.4	3.3	<0.1	0.0	0.0	-	0.2%
	LFS Larva Entrained (#)	0.0	0.0	3,658	146,108	1,817	0.0	0.0	151,583	-

Key:

LFS = longfin smelt



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Example description for End of Week 3:

- The Lower San Joaquin regional LFS larva abundance estimate is 4,403,423
- The number of larvae entrained from the Lower San Joaquin region is 146,108. This is calculated from Table 3 by summing the number of larva entrained from the San Joaquin River at Prisoners Point (0), San Joaquin River at Twitchell Island (146,108), and Lower San Joaquin River (0).
- The percent of larva entrained into CVP and SWP facilities from the Lower San Joaquin region is calculated as $146,108 / 4,403,423 = 3.3\%$.

The delta-wide estimate of LFS larva entrained into CVP and SWP facilities after 3 weeks is 151,583, or $151,583 / 86,997,697 = 0.2\%$ of estimated Delta-wide LFS larva abundance.

Entrainment Contours

To assess entrainment into CVP and SWP facilities based on initial location and injection point throughout the Delta, a contour map is created of the cumulative entrainment flux into CVP and SWP facilities at the end of each week. An example of a contour map at the end of the three-week simulation period is shown in Figure 4 for an OMR = -2,000 cfs scenario and in Figure 5 for an OMR = -6,500 cfs scenario. A scatter plot is created initially with each injection point colored by cumulative entrainment flux. A linear interpolation function is used that first tessellates scatter points into two-dimensional triangles. The value at any arbitrary point within the full range of scatter points is calculated as a weighted average of the values at the triangle vertices that contain the scatter point. A resulting contour surface is created by coloring all areas within the outer bounds of the scatter points by cumulative flux into CVP and SWP facilities.



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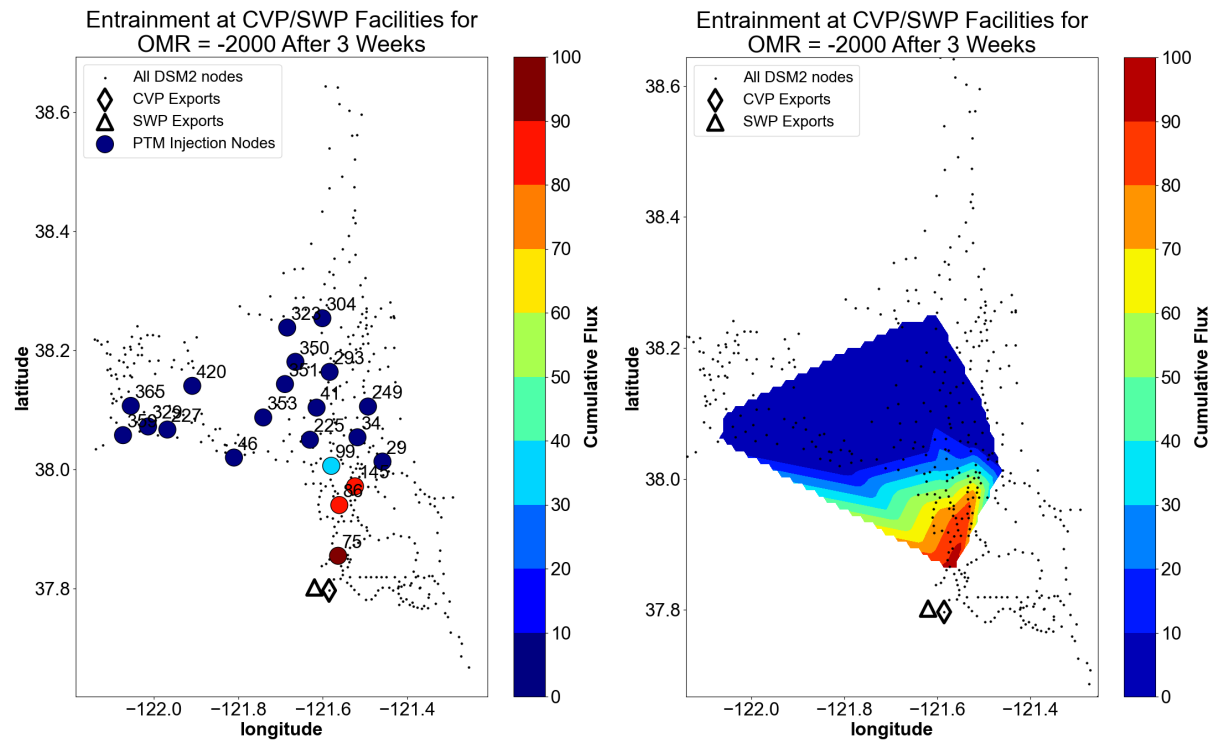


Figure 4. Scatter Plot (left) and Contour Map (right) of Cumulative Entrainment Flux from Each Injection Point at the End of 3 Weeks for an Old and Middle River = -2,000 Forecast Projection

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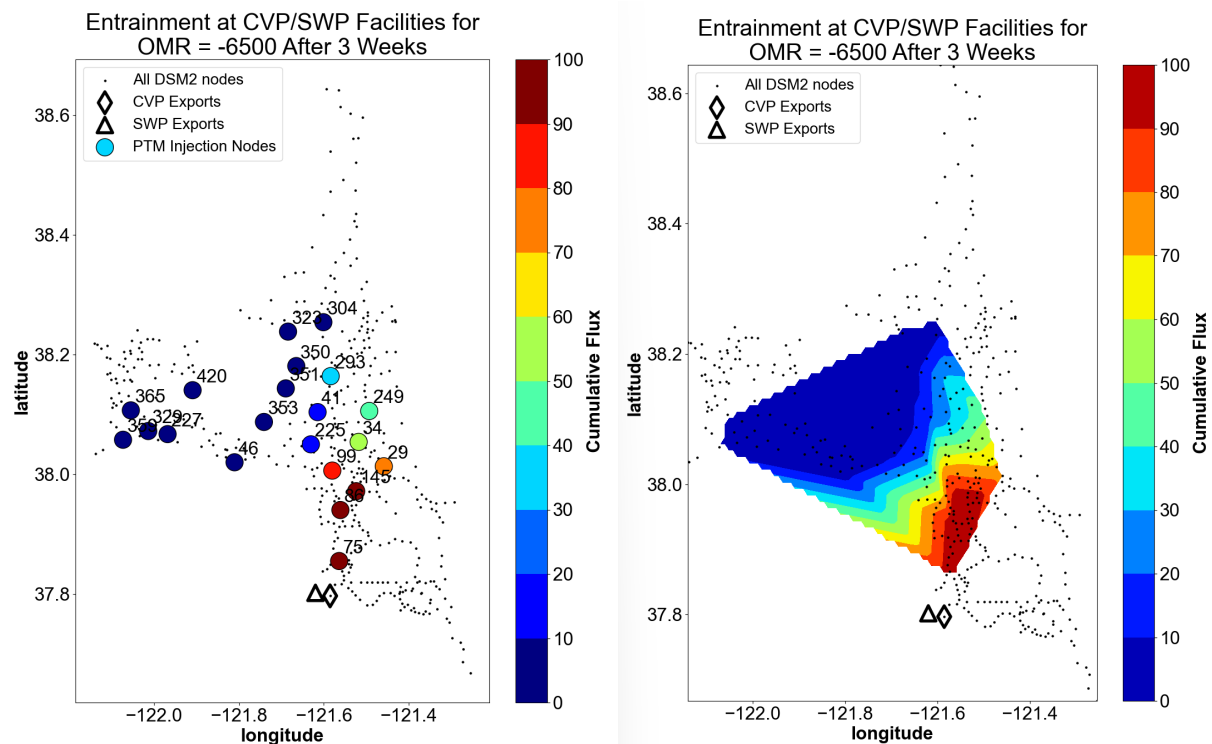


Figure 5. Scatter Plot (left) and Contour Map (right) of Cumulative Entrainment Flux from Each Injection Point at the End of 3 Weeks for an Old and Middle River = -6,500 Forecast Projection

Visualization Dashboard

For enhanced visualization purposes, the entrainment contours, ZOI contours, and LFS subregional abundance estimates are combined into an interactive map dashboard. Examples are shown as a static image in Figure 6 and Figure 7. The title indicates the OMR forecast scenario and SLS used to estimate abundance (e.g., OMR = -2,000 and SLS 5 for Figure 6). The entrainment contours and ZOI boundaries at the end of each week of the forecast period can be visualized by selecting them from a box in the top right of the map. LFS abundance is visualized as markers on the map, scaled by the abundance estimate of each subregion, or indicated with a small red marker if no LFS larva were estimated in that subregion, either due to no detections or because the samples have not yet been processed.

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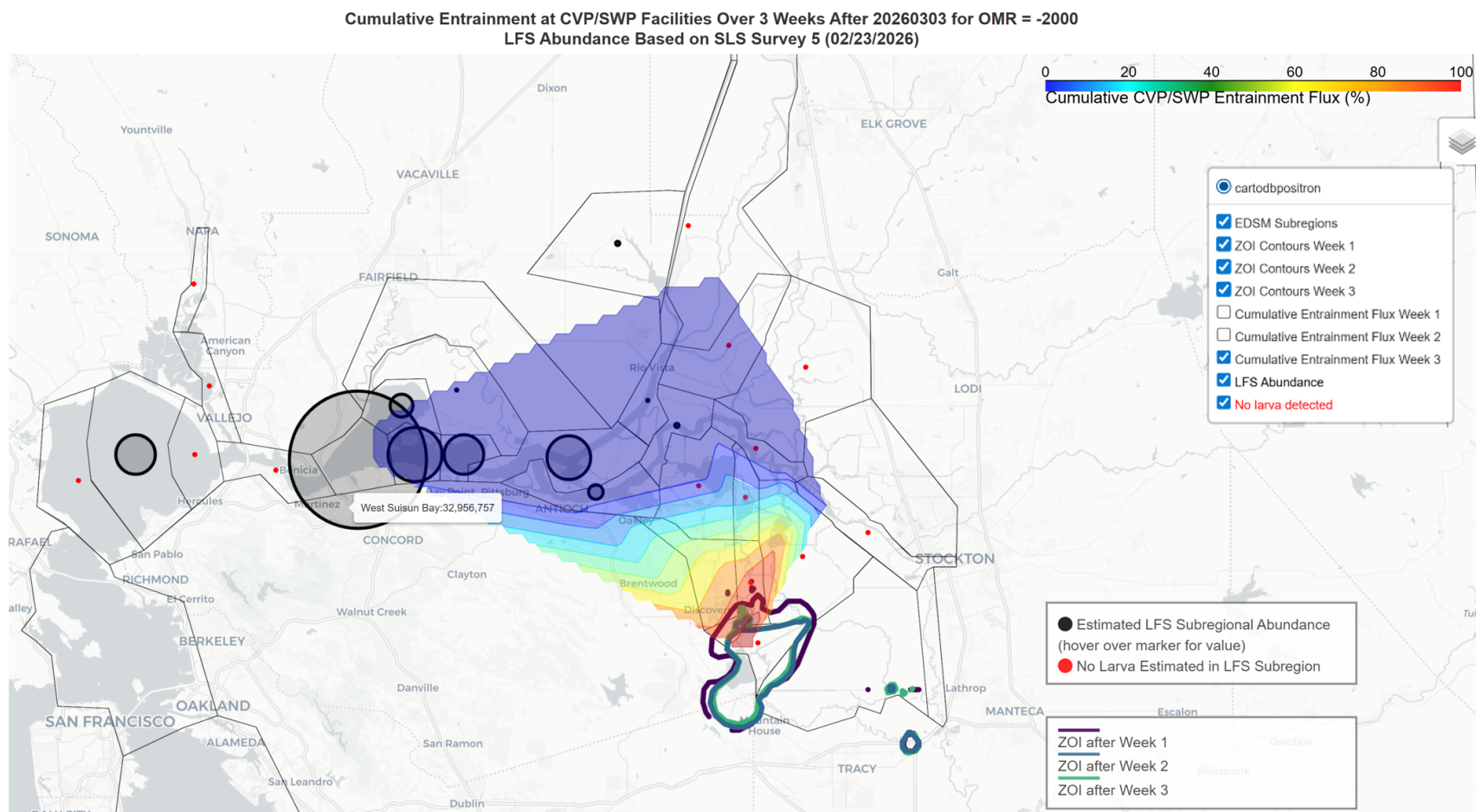


Figure 6. Static View of a Visualization Dashboard for Entrainment Contours, Zone of Influence, and Longfin Smelt Abundance Estimates for an Old and Middle River = -2,000 Projection Scenario

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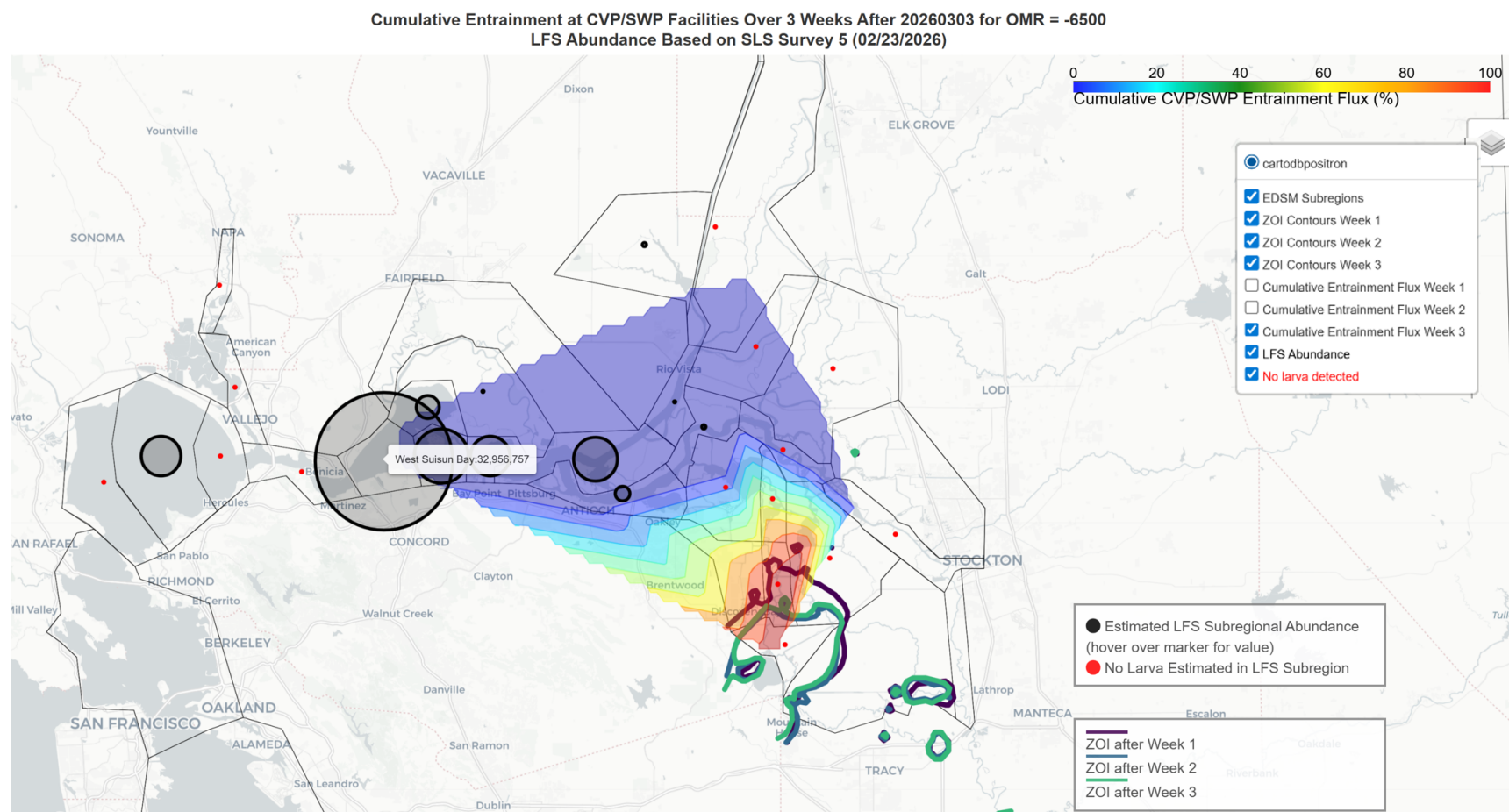


Figure 7. Static View of a Visualization Dashboard for Entrainment Contours, Zone of Influence, and Longfin Smelt Abundance Estimates for an Old and Middle River = -6,500 Projection Scenario



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References

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Appendix A

Sensitivity of Geographic Aggregation of Longfin Smelt Abundance, Entrainment Flux Averaging, and Entrainment Risk



Technical Memorandum

Long-Term Operation of the Central Valley Project and State Water Project

Appendix A. Sensitivity of Geographic Aggregation of Longfin Smelt Abundance, Entrainment Flux Averaging, and Entrainment Risk

An assessment was completed to analyze the sensitivity of regional longfin smelt (LFS) entrainment estimates to the scale of LFS abundance aggregation and the method of estimating regional entrainment flux with the Delta Simulation Model II (DSM2) Particle Tracking Model (PTM).

Methods

Current Method: The current method estimates LFS larva abundance by aggregating catch data from individual Smelt Larval Survey (SLS) trawl stations into seven LFS Regions defined for this analysis. Geographic aggregation can happen at any scale as long as corresponding habitat volumes at a given scale can be calculated. The seven LFS Region boundaries align with Enhanced Delta Smelt Monitoring (EDSM) program stratum boundaries (Figure A-1) and were created to simplify the resulting entrainment analysis and reporting. Particles are injected at up to 4 DSM2 nodes in each LFS Region, with a total of 18 injection points throughout the Delta, to represent LFS larva, (Figure A-1, Table A-1). A single regional cumulative entrainment flux for each region is calculated from PTM by averaging the cumulative entrainment flux of all nodes within a region. The regional cumulative entrainment flux is multiplied by LFS Region abundance to estimate LFS entrainment risk for each LFS Region at the end of each week over a three-week period.

Sensitivity Method: The sensitivity assessment estimates LFS larva abundance by aggregating catch data into 26 EDSM Subregions (Figure A-2). Finer-scale stratification can reduce the impact of selectivity bias, if present, because the effect of a non-representative station location impacts a smaller proportion of the overall Delta estimate. However, many finer scale regional estimates may not have a confidence interval associated with them because there are not multiple stations per subregion. Entrainment flux is estimated on a Subregion scale by using one DSM2 node within each Subregion (Table A-2). 15 of the same 18 DSM2 injection nodes from the Current Method are used, and some Subregions have the same DSM2 node, particularly in the Western Delta which is outside the boundary of the DSM2 grid. Subregional flux from PTM is multiplied by the Subregion abundance estimate to estimate LFS entrainment risk for each LFS region at the end of each week over a three-week period.

Results

Both methods were analyzed using LFS abundance data generated using catch data from SLS 2 conducted 01/12/2026-1/14/2026 and SLS 3¹ conducted 1/26/2026 – 01/28/2026. Results for Survey 3 using the DSM2 forecast model results for 02/03/2026 – 03/02/2026 are summarized in Table A-1 with more detailed results shown in Table A-2 through Table A-9b. Results were similar when using abundance data from SLS 2. Key findings are summarized below:

¹ Note, at the time of this analysis, CDFW had not yet processed about 1/3 of Survey 3 survey samples, with most of the unprocessed samples in the western extent of the sampling area. These areas generally see higher abundance, but minimal entrainment risk, so this was considered a conservative approach that may likely overestimate proportional entrainment until all SLS data are available. The

Appendix A - Sensitivity of Geographic Aggregation of Longfin Smelt Abundance, Entrainment Flux Averaging, and Entrainment Risk

- The Sensitivity Method shows the percentage of particles entrained is 70% to 100% less than the Current Method based on the current distribution of LFS in the Delta
- The primary difference in results is due to averaging of flux values across nodes in the South Delta and Lower San Joaquin regions. DSM2 injection nodes close to the export facilities (node 86, node 99, and node 29 in the South Delta LFS Region, node 34 in the Lower San Joaquin Region) produce high flux percentages, but typically are not estimated to contain any LFS larva or small numbers of Larva (see Table A-7 and Table A-8). The most recent SLS showed LFS larva in only one Subregion in the South Delta Region, Franks Tract. The cumulative PTM flux percentage for the DSM2 node in that Subregion was 19.5% at Old and Middle River (OMR) -6,250 after three weeks, while the cumulative PTM flux percentage for the other three DSM2 nodes in that same LFS Region were 98.2%, 84.9%, and 72.6% for the same scenario after three weeks. By including these three nodes in calculating the average flux for the LFS Region, it substantially increases the estimate of the # of larva entrained in Central Valley Project (CVP) and State Water Project (SWP) facilities and the % of Delta-wide larva entrained.

Recommendation

Based on these results, it is recommended the LFS entrainment analysis be conducted on a Subregion scale, with one node per EDSM subregion, then aggregated on the LFS region scale for reporting. This approach would provide a refined and more spatially explicit estimate of LFS larva entrainment that more accurately reflects Delta hydrodynamics and particle tracking results for a given forecast scenario.

Table A-1. Comparison of Current Method and Entrainment Analysis Sensitivity Results Using Catch Data from Smelt Larval Survey 3

Week End Date	OMR (cfs)	Total LFS Entrained (#)	Total (%)	Total LFS Entrained (#)	Total (%)	Difference (#)	Difference (%)
Week 1 End 02/16/2026	-6,250	150,360	0.4%	14,601	<0.1%	-135,759	-90%
Week 1 End 02/16/2026	-5,000	121,842	0.3%	6,563	<0.1%	-115,279	-95%
Week 1 End 02/16/2026	-3,500	85,897	0.2%	780	<0.1%	-85,117	-99%
Week 1 End 02/16/2026	-2,000	22,035	<0.1%	0	0.0%	-22,035	-100%
Week 2 End 02/23/2026	-6,250	566,149	1.5%	154,770	0.4%	-411,378	-73%
Week 2 End 02/23/2026	-5,000	376,103	1.0%	81,022	0.2%	-295,081	-78%
Week 2 End 02/23/2026	-3,500	217,030	0.6%	40,417	0.1%	-176,612	-81%
Week 2 End 02/23/2026	-2,000	78,651	0.2%	4,459	<0.1%	-74,192	-94%
Week 3 End 03/02/2026	-6,250	898,232	2.4%	259,470	0.7%	-638,762	-71%
Week 3 End 03/02/2026	-5,000	665,018	1.8%	173,149	0.5%	-491,869	-74%
Week 3 End 03/02/2026	-3,500	412,560	1.1%	95,803	0.3%	-316,757	-77%
Week 3 End 03/02/2026	-2,000	155,049	0.4%	23,200	<0.1%	-131,849	-85%

Key:

cfs = cubic feet per second

LFS = longfin smelt

OMR = Old and Middle River



Appendix A - Sensitivity of Geographic Aggregation of Longfin Smelt Abundance, Entrainment Flux Averaging, and Entrainment Risk

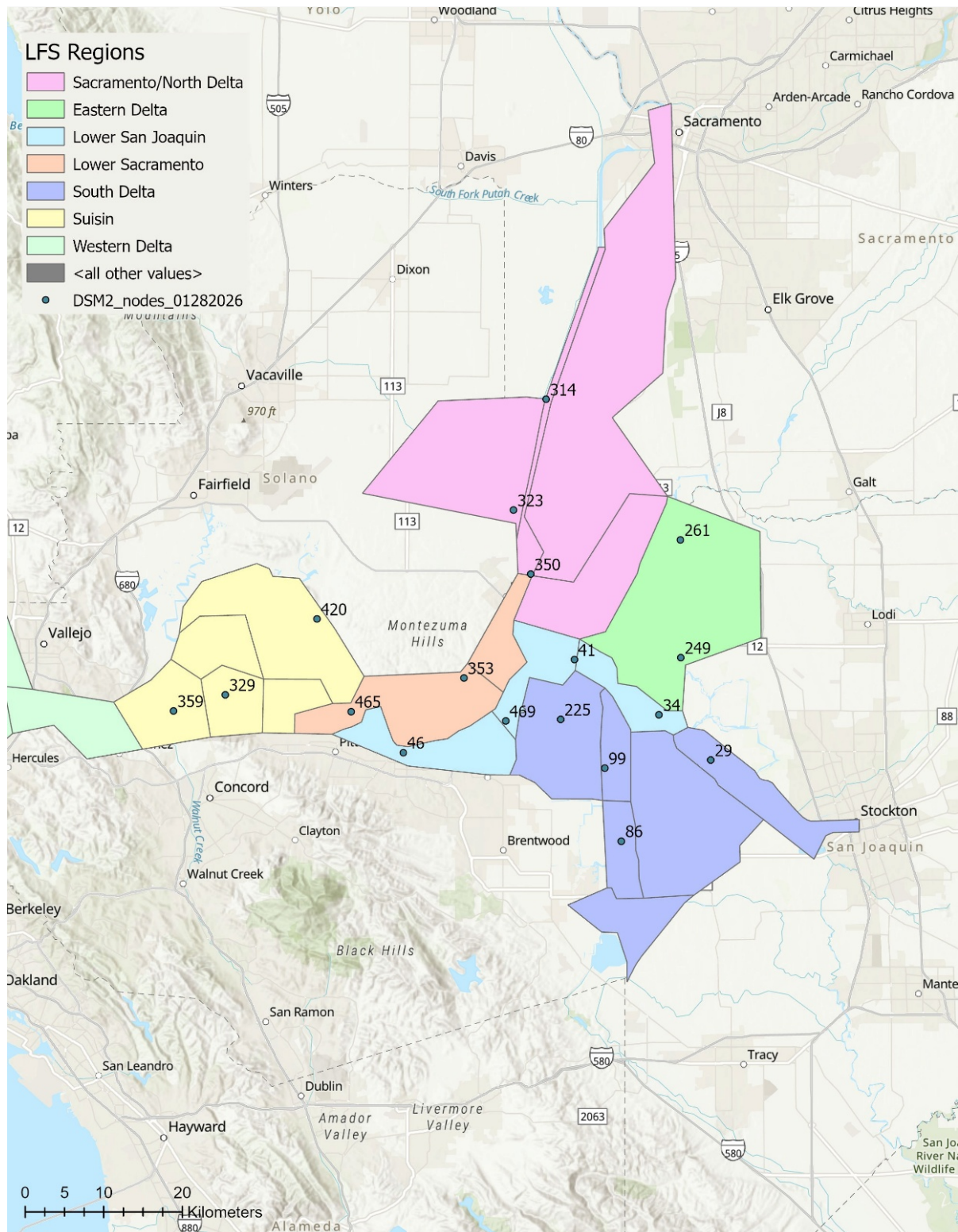


Figure A-1. Longfin Smelt Analysis Regions



Appendix A - Sensitivity of Geographic Aggregation of Longfin Smelt Abundance, Entrainment Flux Averaging, and Entrainment Risk

Table A-2. Longfin Smelt Analysis Regions and Delta Simulation Model II Nodes

LFS Analysis Region	EDSM Stratum	DSM2 Node(s)
Sacramento/ North Delta	Sac Deep Water Shipping Channel	314
	Cache Slough/Liberty Island	323
	Upper Sacramento	350
Eastern Delta	Eastern Delta	249, 261
Lower San Joaquin	Lower San Joaquin	34, 41, 46, 469
Lower Sacramento	Lower Sacramento	465, 353
South Delta	South Delta	29, 86, 99, 225
Suisun	Suisun Bay	329
	Suisun Marsh	420
Western Delta	Western Delta	359

Key:

EDSM = Enhanced Delta Smelt Monitoring

LFS = longfin smelt



Appendix A - Sensitivity of Geographic Aggregation of Longfin Smelt Abundance, Entrainment Flux Averaging, and Entrainment Risk

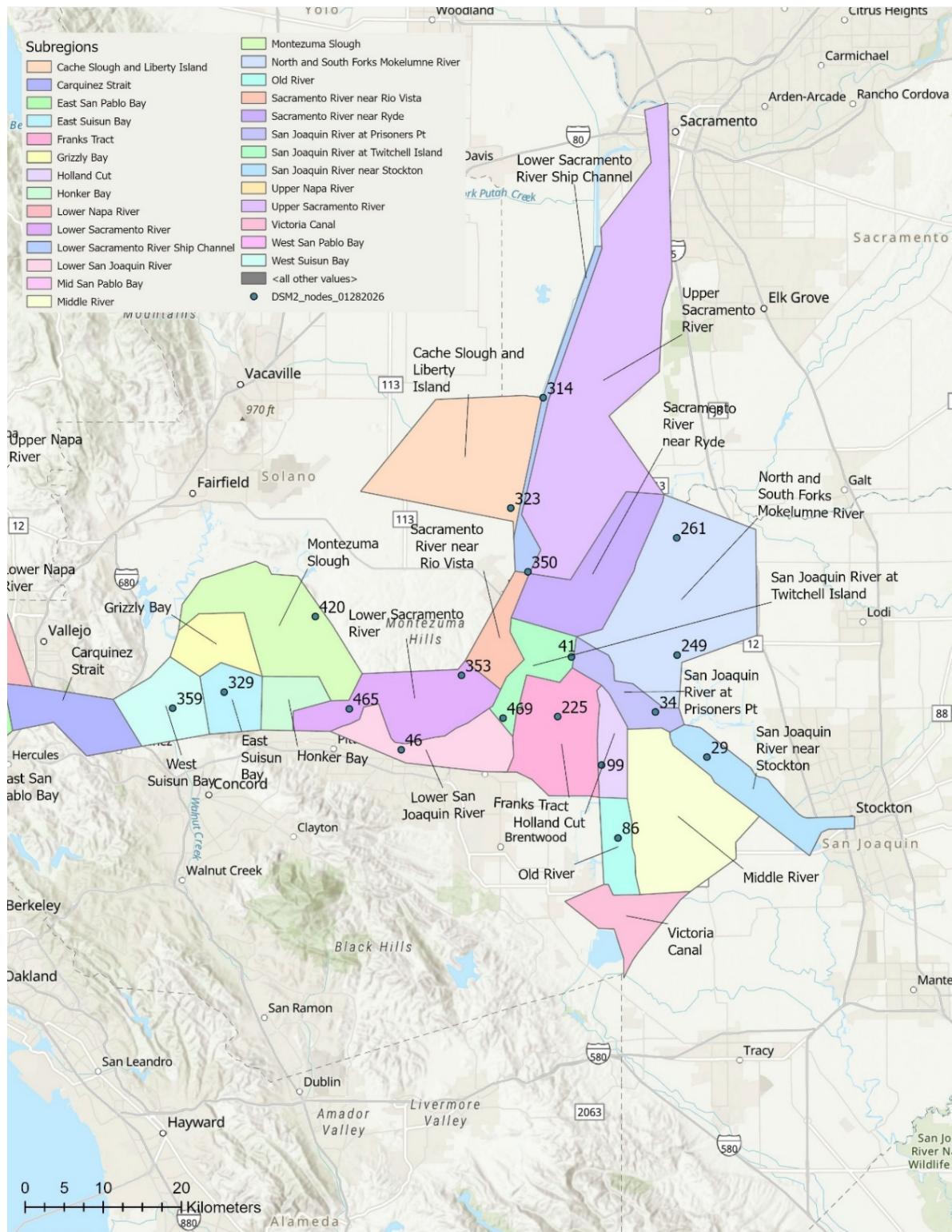


Figure A-2. Enhanced Delta Smelt Monitoring Subregions

Appendix A - Sensitivity of Geographic Aggregation of Longfin Smelt Abundance, Entrainment Flux Averaging, and Entrainment Risk

Table A-3. Delta Simulation Model II Nodes Assigned to Each Enhanced Delta Smelt Monitoring Subregion

DSM2 Node	EDSM Subregion	LFS Region
329	East Suisun Bay	Suisun
329	Grizzly Bay	Suisun
465	Honker Bay	Suisun
420	Montezuma Slough	Suisun
359	West Suisun Bay	Suisun
359	Carquinez Strait	Western Delta
359	Upper Napa River	Western Delta
359	Lower Napa River	Western Delta
359	East San Pablo Bay	Western Delta
359	West San Pablo Bay	Western Delta
359	Mid San Pablo Bay	Western Delta
353	Lower Sacramento River	Lower Sacramento
353	Sacramento River near Rio Vista	Lower Sacramento
465	Lower Sacramento River	Lower Sacramento
350	Lower Sacramento River Ship Channel	Sacramento/ North Delta
350	Sacramento River near Ryde	Sacramento/ North Delta
323	Cache Slough and Liberty Island	Sacramento/ North Delta
314	Lower Sacramento River Ship Channel	Sacramento/ North Delta
261	North and South Forks Mokelumne River	East
249	North and South Forks Mokelumne River	East
46	Lower San Joaquin River	Lower San Joaquin
41	San Joaquin River at Twitchell Island	Lower San Joaquin
34	San Joaquin River at Prisoners Pt	Lower San Joaquin
469	San Joaquin River at Twitchell Island	Lower San Joaquin
225	Franks Tract	South Delta
99	Holland Cut	South Delta
86	Old River	South Delta

Key:

DSM2 = Delta Simulation Model II

EDSM = Enhanced Delta Smelt Monitoring

LFS = longfin smelt

Appendix A - Sensitivity of Geographic Aggregation of Longfin Smelt Abundance, Entrainment Flux Averaging, and Entrainment Risk

Table A-4. Longfin Smelt Entrainment Estimate on Enhanced Delta Smelt Monitoring Region Scale Using Particle Tracking Model with Surface Oriented Particles: Week 1 Ending 02/16/2026

OMR (cfs)	Region Metric	West	Suisun	Sacramento/ North Delta	Lower San Joaquin	Lower Sacramento	South Delta	East	Delta-Wide Total (#)	Delta- Wide Total (%)
	DSM2 Injection Node	359	329, 420	314, 323, 350	34, 41, 46, 469	465, 353	29, 86, 99, 225	249, 261	-	-
	LFS Larva Abundance	7,811,222	20,722,667	91,333	2,616,019	5,068,667	390,000	0	36,699,908	-
-6,250	PTM Entrained (%)	0.0	0.0	0.0	0.5	0.0	35.2	0.2	-	-
-5,000	PTM Entrained (%)	0.0	0.0	0.0	0.2	0.0	29.9	0.0	-	-
-3,500	PTM Entrained (%)	0.0	0.0	0.0	0.0	0.0	22.0	0.0	-	-
-2,000	PTM Entrained (%)	0.0	0.0	0.0	0.0	0.0	5.7	0.0	-	-
-6,250	LFS Larva Entrained (#)	0.0	0.0	0.0	13,080	0.0	137,280	0.0	150,360	0.4%
-5,000	LFS Larva Entrained (#)	0.0	0.0	0.0	5,232	0.0	116,610	0.0	121,842	0.3%
-3,500	LFS Larva Entrained (#)	0.0	0.0	0.0	0	0.0	85,898	0.0	85,897	0.2%
-2,000	LFS Larva Entrained (#)	0.0	0.0	0.0	0	0.0	22,035	0.0	22,035	<0.1%

Key:

cfs = cubic feet per second

DSM2 = Delta Simulation Model II

LFS = longfin smelt

OMR = Old and Middle River

PTM = particle tracking model

Appendix A - Sensitivity of Geographic Aggregation of Longfin Smelt Abundance, Entrainment Flux Averaging, and Entrainment Risk

Table A-5. Longfin Smelt Entrainment Estimate Sensitivity: Computed at Enhanced Delta Smelt Monitoring Subregion Scale and Averaged at Region Scale Using Particle Tracking Model with Surface Oriented Particles: Week 1 Ending 02/16/2026

OMR (cfs)	Region	West	Suisun	Sacramento/ North Delta	Lower San Joaquin	Lower Sacramento	South Delta	East	Delta- Wide Total (#)	Delta- Wide Total (%)
	Metric									
	DSM2 Injection Node	359	329, 420	314, 323, 350	34, 41, 46, 469	465, 353	29, 86, 99, 225	249, 261	-	-
	LFS Larva Abundance	7,811,223	20,722,666	91,333	2,616,018	5,068,667	390,000	0	36,699,907	
-6,250	PTM Entrained (%)	0	0	0.0	0.5	0.0	51.6	0.2	-	-
-5,000	PTM Entrained (%)	0	0	0.0	0.2	0.0	45.2	0.0	-	-
-3,500	PTM Entrained (%)	0	0	0.0	0.0	0.0	36.7	0.0	-	-
-2,000	PTM Entrained (%)	0	0	0.0	0.0	0.0	11.2	0.0	-	-
-6,250	LFS Larva Entrained (#)	0	0	0	4,071	0	10,530	0	14,601	<0.1%
-5,000	LFS Larva Entrained (#)	0	0	0	713	0	5,850	0	6,563	<0.1%
-3,500	LFS Larva Entrained (#)	0	0	0	0	0	780	0	780	<0.1%
-2,000	LFS Larva Entrained (#)	0	0	0	0	0	0	0	0	0.0%

Key:

cfs = cubic feet per second

DSM2 = Delta Simulation Model II

LFS = longfin smelt

OMR = Old and Middle River

PTM = particle tracking model

Appendix A - Sensitivity of Geographic Aggregation of Longfin Smelt Abundance, Entrainment Flux Averaging, and Entrainment Risk

Table A-6a. Longfin Smelt Entrainment Estimate Sensitivity on Enhanced Delta Smelt Monitoring Subregion scale Using Particle Tracking Model with Surface Oriented Particles: Week 1 Ending 02/16/2026

OMR (cfs)	Region	Suisun	Suisun	Suisun	Suisun	Suisun	Western Delta	Western Delta	Western Delta	Western Delta	Western Delta	Western Delta	Sacramento/ North Delta	Sacramento/ North Delta	Sacramento/ North Delta
	Subregion Metric	West Suisun Bay	East Suisun Bay	Grizzly Bay	Montezuma Slough	Honker Bay	Carquinez Strait	Upper Napa River	Lower Napa River	East San Pablo Bay	West San Pablo Bay	Mid San Pablo Bay	Lower Sacramento River Ship Channel	Sacramento River near Ryde	Cache Slough and Liberty Island
	DSM2 Injection Node	359	329	329	420	465	359	359	359	359	359	359	350	350	323
	LFS Larva Abundance	9,588,444	3,837,111	4,450,000	297,778	2,549,333	6,222,667	80,333	1,135,556	372,667	0	0	91,333	0	0
-6,250	PTM Entrained (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
-5,000	PTM Entrained (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
-3,500	PTM Entrained (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
-2,000	PTM Entrained (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
-6,250	LFS Larva Entrained (#)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
-5,000	LFS Larva Entrained (#)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
-3,500	LFS Larva Entrained (#)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
-2,000	LFS Larva Entrained (#)	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Key:
cfs = cubic feet per second
DSM2 = Delta Simulation Model II
LFS = longfin smelt
OMR = Old and Middle River
PTM = particle tracking model

Table A-6b. Longfin Smelt Entrainment Estimate Sensitivity on Enhanced Delta Smelt Monitoring Subregion scale Using Particle Tracking Model with Surface Oriented Particles: Week 1 Ending 02/16/2026

OMR (cfs)	Region	Lower San Joaquin	Lower San Joaquin	Lower San Joaquin	Lower Sacramento	Lower Sacramento	South Delta	South Delta	South Delta	South Delta	South Delta	South Delta	East	Delta- Wide Total (#)	Delta- Wide Total (%)
	Subregion Metric	San Joaquin River at Prisoners Pt	San Joaquin River at Twitchell Island	Lower San Joaquin River	Lower Sacramento River	Sacramento River near Rio Vista	San Joaquin River near Stockton	Old River	Middle River	Victoria Canal	Holland Cut	Franks Tract	North and South Forks Mokelumne River		
	DSM2 Injection Node	34	41	46	353	353	29	86	86	86	99	225	249		
	LFS Larva Abundance	89,111	397,500	2,129,407	4,736,667	332,000	0	0	0	0	0	390,000	0	36,699,907	-
-6,250	PTM Entrained (%)	1.0	0.8	0.0	0.0	0.0	1.4	84.4	84.4	84.4	52.3	2.7	0.3	-	-
-5,000	PTM Entrained (%)	0.8	0.0	0.0	0.0	0.0	0.5	75.8	75.8	75.8	41.8	1.5	0.0	-	-
-3,500	PTM Entrained (%)	0.0	0.0	0.0	0.0	0.0	0.0	66.1	66.1	66.1	21.8	0.2	0.0	-	-
-2,000	PTM Entrained (%)	0.0	0.0	0.0	0.0	0.0	0.0	22.2	22.2	22.2	0.4	0.0	0.0	-	-
-6,250	LFS Larva Entrained (#)	891	3,180	0	0	0	0	0	0	0	0	10,530	0	14,601	<0.1%
-5,000	LFS Larva Entrained (#)	713	0	0	0	0	0	0	0	0	0	5,850	0	6,563	<0.1%
-3,500	LFS Larva Entrained (#)	0	0	0	0	0	0	0	0	0	0	780	0	780	<0.1%
-2,000	LFS Larva Entrained (#)	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0

Key:
cfs = cubic feet per second
DSM2 = Delta Simulation Model II
LFS = longfin smelt
OMR = Old and Middle River
PTM = particle tracking model

Appendix A - Sensitivity of Geographic Aggregation of Longfin Smelt Abundance, Entrainment Flux Averaging, and Entrainment Risk

Table A-7. Longfin Smelt Entrainment Estimate on Enhanced Delta Smelt Monitoring Region Scale Using Particle Tracking Model with Surface Oriented Particles: Week 2 Ending 02/23/2026

OMR (cfs)	Region	West	Suisun	Sacramento/ North Delta	Lower San Joaquin	Lower Sacramento	South Delta	East	Delta-Wide Total (#)	Delta- Wide Total (%)
	Metric									
	DSM2 Injection Node	359	329, 420	314, 323, 350	34, 41, 46, 469	465, 353	29, 86, 99, 225	249, 261	-	-
	LFS Larva Abundance	7,811,222	20,722,667	91,333	2,616,019	5,068,667	390,000	0	36,699,908	-
-6,250	PTM Entrained (%)	0.0	0.0	0.6	13.0	0.1	56.3	12.0	-	-
-5,000	PTM Entrained (%)	0.0	0.0	0.3	7.3	0.0	47.4	6.6	-	-
-3,500	PTM Entrained (%)	0.0	0.0	0.2	2.9	<0.1	35.7	1.8	-	-
-2,000	PTM Entrained (%)	0.0	0.0	<0.1	0.2	0.0	18.7	0.1	-	-
-6,250	LFS Larva Entrained (#)	0.0	0.0	578.4	340,736	5,069	219,765	0.0	566,149	1.5%
-5,000	LFS Larva Entrained (#)	0.0	0.0	274.0	190,969	0	184,860	0.0	376,103	1.0%
-3,500	LFS Larva Entrained (#)	0.0	0.0	152.2	75,211	2,534	139,133	0.0	217,030	0.6%
-2,000	LFS Larva Entrained (#)	0.0	0.0	30.4	5,886	0.0	72,735	0.0	78,651	0.2%

Key:

cfs = cubic feet per second

DSM2 = Delta Simulation Model II

LFS = longfin smelt

OMR = Old and Middle River

PTM = particle tracking model

Appendix A - Sensitivity of Geographic Aggregation of Longfin Smelt Abundance, Entrainment Flux Averaging, and Entrainment Risk

Table A-8. Longfin Smelt Entrainment Estimate Sensitivity: Computed at Enhanced Delta Smelt Monitoring Subregion Scale and Averaged at Region Scale Using Particle Tracking Model with Surface Oriented Particles: Week 2 Ending 02/23/2026

OMR (cfs)	Region	West	Suisun	Sacramento/ North Delta	Lower San Joaquin	Lower Sacramento	South Delta	East	Delta-Wide Total (#)	Delta- Wide Total (%)
	Metric									
	DSM2 Injection Node	359	329, 420	314, 323, 350	34, 41, 46, 469	465, 353	29, 86, 99, 225	249, 261	-	-
	LFS Larva Abundance	7,811,223	20,722,666	91,333	2,616,018	5,068,667	390,000	0	36,699,907	-
-6,250	PTM Entrained (%)	0	0	1.0	13.0	0.1	69.7	12.0	-	-
-5,000	PTM Entrained (%)	0	0	0.4	7.3	0.0	62.0	6.6	-	-
-3,500	PTM Entrained (%)	0	0	0.2	2.9	<0.1	50.7	1.8	-	-
-2,000	PTM Entrained (%)	0	0	<0.1	0.2	0.0	31.9	0.1	-	-
-6,250	LFS Larva Entrained (#)	0	0	1,005	92,148	10,137	51,480	0	154,770	0.4%
-5,000	LFS Larva Entrained (#)	0	0	365	44,777	0	35,880	0	81,022	0.2%
-3,500	LFS Larva Entrained (#)	0	0	183	18,396	5,069	16,770	0	40,417	0.1%
-2,000	LFS Larva Entrained (#)	0	0	91	1,638	0	2,730	0	4,459	<0.1%

Key:

cfs = cubic feet per second

DSM2 = Delta Simulation Model II

LFS = longfin smelt

OMR = Old and Middle River

PTM = particle tracking model

Appendix A - Sensitivity of Geographic Aggregation of Longfin Smelt Abundance, Entrainment Flux Averaging, and Entrainment Risk

Table A-9a. Longfin Smelt Entrainment Estimate Sensitivity on Enhanced Delta Smelt Monitoring Subregion Scale Using Particle Tracking Model with Surface Oriented Particles: Week 2 Ending 02/23/2026

OMR (cfs)	Region	Suisun	Suisun	Suisun	Suisun	Suisun	Western Delta	Western Delta	Western Delta	Western Delta	Western Delta	Western Delta	Sacramento/ North Delta	Sacramento/ North Delta	Sacramento/ North Delta
	Subregion Metric	West Suisun Bay	East Suisun Bay	Grizzly Bay	Montezuma Slough	Honker Bay	Carquinez Strait	Upper Napa River	Lower Napa River	East San Pablo Bay	West San Pablo Bay	Mid San Pablo Bay	Lower Sacramento River Ship Channel	Sacramento River near Ryde	Cache Slough and Liberty Island
	DSM2 Injection Node	359	329	329	420	465	359	359	359	359	359	359	350	350	323
	LFS Larva Abundance	9,588,444	3,837,111	4,450,000	297,778	2,549,333	6,222,667	80,333	1,135,556	372,667	0	0	91,333	0	0
-6,250	PTM Entrained (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	1.1	0.8
-5,000	PTM Entrained (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.4	0.5
-3,500	PTM Entrained (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.3
-2,000	PTM Entrained (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0
-6,250	LFS Larva Entrained (#)	0	0	0	0	0	0	0	0	0	0	0	1,005	0	0
-5,000	LFS Larva Entrained (#)	0	0	0	0	0	0	0	0	0	0	0	365	0	0
-3,500	LFS Larva Entrained (#)	0	0	0	0	0	0	0	0	0	0	0	183	0	0
-2,000	LFS Larva Entrained (#)	0	0	0	0	0	0	0	0	0	0	0	91	0	0

Key:
cfs = cubic feet per second
DSM2 = Delta Simulation Model II
LFS = longfin smelt
OMR = Old and Middle River
PTM = particle tracking model

Appendix A - Sensitivity of Geographic Aggregation of Longfin Smelt Abundance, Entrainment Flux Averaging, and Entrainment Risk

Table A-9b. Longfin Smelt Entrainment Estimate Sensitivity on Enhanced Delta Smelt Monitoring Subregion Scale Using Particle Tracking Model with Surface Oriented Particles: Week 2 Ending 02/23/2026

OMR (cfs)	Region	Lower San Joaquin	Lower San Joaquin	Lower San Joaquin	Lower Sacramento	Lower Sacramento	South Delta	South Delta	South Delta	South Delta	South Delta	South Delta	East	Delta-Wide Total (#)	Delta-Wide Total (%)		
	Metric \ Subregion	San Joaquin River at Prisoners Pt	San Joaquin River at Twitchell Island	Lower San Joaquin River	Lower Sacramento River	Sacramento River near Rio Vista	San Joaquin River near Stockton	Old River	Middle River	Victoria Canal	Holland Cut	Franks Tract	North and South Forks Mokelumne River				
	DSM2 Injection Node	34	41	46	353	353	29	86	86	86	99	225	249			-	-
	LFS Larva Abundance	89,111	397,500	2,129,407	4,736,667	332,000	0	0	0	0	0	390,000	0			36,699,907	-
-6,250	PTM Entrained (%)	35.0	14.8	0.1	0.2	0.2	38.4	96.5	96.5	96.5	77.3	13.2	23.5	-	-		
-5,000	PTM Entrained (%)	21.7	6.4	0.0	0.0	0.0	23.9	91.1	91.1	91.1	65.4	9.2	13.3	-	-		
-3,500	PTM Entrained (%)	8.6	2.7	0.0	0.1	0.1	8.3	80.9	80.9	80.9	49.2	4.3	3.6	-	-		
-2,000	PTM Entrained (%)	0.5	0.3	0.0	0.0	0.0	0.5	58.3	58.3	58.3	15.1	0.7	0.2	-	-		
-6,250	LFS Larva Entrained (#)	31,189	58,830	2,129	9,473	664	0	0	0	0	0	51,480	0	154,770	0.4%		
-5,000	LFS Larva Entrained (#)	19,337	25,440	0	0	0	0	0	0	0	0	35,880	0	81,022	0.2%		
-3,500	LFS Larva Entrained (#)	7,664	10,732	0	4,737	332	0	0	0	0	0	16,770	0	40,417	0.1%		
-2,000	LFS Larva Entrained (#)	446	1,193	0	0	0	0	0	0	0	0	2,730	0	4,459	<0.1%		

Key:
cfs = cubic feet per second
DSM2 = Delta Simulation Model II
LFS = longfin smelt
OMR = Old and Middle River
PTM = particle tracking model

Appendix A - Sensitivity of Geographic Aggregation of Longfin Smelt Abundance, Entrainment Flux Averaging, and Entrainment Risk

Table A-10. Longfin Smelt Entrainment Estimate on Enhanced Delta Smelt Monitoring Region Scale Using Particle Tracking Model with Surface Oriented Particles: Week 3 Ending 03/02/2026

OMR (cfs)	Region	West	Suisun	Sacramento/ North Delta	Lower San Joaquin	Lower Sacramento	South Delta	East	Delta- Wide Total (#)	Delta- Wide Total (%)
	Metric									
	DSM2 Injection Node	359	329, 420	314, 323, 350	34, 41, 46, 469	465, 353	29, 86, 99, 225	249, 261	-	-
	LFS Larva Abundance	7,811,222	20,722,667	91,333	2,616,019	5,068,667	390,000	0	36,699,908	
-6,250	PTM Entrained (%)	0.0	0.0	1.1	23.8	0.2	68.8	35.7	-	-
-5,000	PTM Entrained (%)	0.0	0.0	0.5	16.2	0.1	60.1	21.9	-	-
-3,500	PTM Entrained (%)	0.0	0.0	0.4	8.5	0.1	47.2	10.0	-	-
-2,000	PTM Entrained (%)	0.0	0.0	0.1	1.6	<0.1	28.2	1.1	-	-
-6,250	LFS Larva Entrained (#)	0.0	0.0	1,005	621,305	7,603	268,320	0.0	898,232	2.4%
-5,000	LFS Larva Entrained (#)	0.0	0.0	457	425,103	5,069	234,390	0.0	665,018	1.8%
-3,500	LFS Larva Entrained (#)	0.0	0.0	396	223,016	5,069	184,080	0.0	412,560	1.1%
-2,000	LFS Larva Entrained (#)	0.0	0.0	122	42,510	2,534	109,882	0.0	155,049	0.4%

Key:

cfs = cubic feet per second

DSM2 = Delta Simulation Model II

LFS = longfin smelt

OMR = Old and Middle River

PTM = particle tracking model

Appendix A - Sensitivity of Geographic Aggregation of Longfin Smelt Abundance, Entrainment Flux Averaging, and Entrainment Risk

Table A-11. Longfin Smelt Entrainment Estimate Sensitivity: Computed at Enhanced Delta Smelt Monitoring Subregion Scale and Averaged at Region scale Using Particle Tracking Model with Surface Oriented Particles: Week 3 Ending 03/02/2026

OMR (cfs)	Region Metric	West	Suisun	Sacramento/ North Delta	Lower San Joaquin	Lower Sacramento	South Delta	East	Delta- Wide Total (#)	Delta- Wide Total (%)
	DSM2 Injection Node	359	329, 420	314, 323, 350	34, 41, 46, 469	465, 353	29, 86, 99, 225	249, 261	-	-
	LFS Larva Abundance	7,811,223	20,722,666	91,333	2,616,018	5,068,667	390,000	0	36,699,907	
-6,250	PTM Entrained (%)	0	0	1.6	23.8	0.2	78.6	35.7	-	-
-5,000	PTM Entrained (%)	0	0	0.8	16.2	0.1	72.1	21.9	-	-
-3,500	PTM Entrained (%)	0	0	0.7	8.5	0.1	61.3	10.0	-	-
-2,000	PTM Entrained (%)	0	0	0.2	1.6	<0.1	43.6	1.1	-	-
-6,250	LFS Larva Entrained (#)	0	0	1,461	166,753	15,206	76,050	0	259,470	0.7%
-5,000	LFS Larva Entrained (#)	0	0	731	104,171	10,137	58,110	0	173,149	0.5%
-3,500	LFS Larva Entrained (#)	0	0	639	56,166	10,137	28,860	0	95,803	0.3%
-2,000	LFS Larva Entrained (#)	0	0	91	10,240	5,069	7,800	0	23,200	<0.1%

Key:

cfs = cubic feet per second

DSM2 = Delta Simulation Model II

LFS = longfin smelt

OMR = Old and Middle River

PTM = particle tracking model

Table A-12a. Longfin Smelt Entrainment Estimate Sensitivity on Enhanced Delta Smelt Monitoring Subregion Scale Using Particle Tracking Model with Surface Oriented Particles: Week 3 Ending 03/02/2026

OMR (cfs)	Region	Suisun	Suisun	Suisun	Suisun	Suisun	Western Delta	Western Delta	Western Delta	Western Delta	Western Delta	Western Delta	Sacramento/ North Delta	Sacramento/ North Delta	Sacramento/ North Delta
	Subregion Metric	West Suisun Bay	East Suisun Bay	Grizzly Bay	Montezuma Slough	Honker Bay	Carquinez Strait	Upper Napa River	Lower Napa River	East San Pablo Bay	West San Pablo Bay	Mid San Pablo Bay	Lower Sacramento River Ship Channel	Sacramento River near Ryde	Cache Slough and Liberty Island
	DSM2 Injection Node	359	329	329	420	465	359	359	359	359	359	359	350	350	323
	LFS Larva Abundance	9,588,444	3,837,111	4,450,000	297,778	2,549,333	6,222,667	80,333	1,135,556	372,667	0	0	91,333	0	0
-6,250	PTM Entrained (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.6	1.6	1.6
-5,000	PTM Entrained (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.8	0.7
-3,500	PTM Entrained (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.7	0.6
-2,000	PTM Entrained (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.3
-6,250	LFS Larva Entrained (#)	0	0	0	0	0	0	0	0	0	0	0	1,461	0	0
-5,000	LFS Larva Entrained (#)	0	0	0	0	0	0	0	0	0	0	0	731	0	0
-3,500	LFS Larva Entrained (#)	0	0	0	0	0	0	0	0	0	0	0	639	0	0
-2,000	LFS Larva Entrained (#)	0	0	0	0	0	0	0	0	0	0	0	91	0	0

Key:
cfs = cubic feet per second
DSM2 = Delta Simulation Model II
LFS = longfin smelt
OMR = Old and Middle River
PTM = particle tracking model

Appendix A - Sensitivity of Geographic Aggregation of Longfin Smelt Abundance, Entrainment Flux Averaging, and Entrainment Risk

Table A-12b. Longfin Smelt Entrainment Estimate Sensitivity on Enhanced Delta Smelt Monitoring Subregion Scale Using Particle Tracking Model with Surface Oriented Particles: Week 3 Ending 03/02/2026

OMR (cfs)	Region	Lower San Joaquin	Lower San Joaquin	Lower San Joaquin	Lower Sacramento	Lower Sacramento	South Delta	South Delta	South Delta	South Delta	South Delta	South Delta	East	Delta-Wide Total (#)	Delta- Wide Total (%)
	Subregion Metric	San Joaquin River at Prisoners Pt	San Joaquin River at Twitchell Island	Lower San Joaquin River	Lower Sacramento River	Sacramento River near Rio Vista	San Joaquin River near Stockton	Old River	Middle River	Victoria Canal	Holland Cut	Franks Tract	North and South Forks Mokelumne River		
	DSM2 Injection Node	34	41	46	353	353	29	86	86	86	99	225	249		
	LFS Larva Abundance	89,111	397,500	2,129,407	4,736,667	332,000	0	0	0	0	0	390,000	0		
-6,250	PTM Entrained (%)	64.3	27.0	0.1	0.3	0.3	72.6	98.2	98.2	98.2	84.9	19.5	52.9	-	-
-5,000	PTM Entrained (%)	47.6	15.0	0.1	0.2	0.2	54.3	96.2	96.2	96.2	75.0	14.9	34.8	-	-
-3,500	PTM Entrained (%)	25.4	7.9	0.1	0.2	0.2	31.6	89.6	89.6	89.6	60.2	7.4	16.6	-	-
-2,000	PTM Entrained (%)	4.8	1.5	0.0	0.1	0.1	6.3	74.5	74.5	74.5	29.9	2.0	2.0	-	-
-6,250	LFS Larva Entrained (#)	57,298	107,325	2,129	14,210	996	0	0	0	0	0	76,050	0	259,470	0.7%
-5,000	LFS Larva Entrained (#)	42,417	59,625	2,129	9,473	664	0	0	0	0	0	58,110	0	173,149	0.5%
-3,500	LFS Larva Entrained (#)	22,634	31,403	2,129	9,473	664	0	0	0	0	0	28,860	0	95,803	0.3%
-2,000	LFS Larva Entrained (#)	4,277	5,963	0	4,737	332	0	0	0	0	0	7,800	0	23,200	<0.1%

Key:
cfs = cubic feet per second
DSM2 = Delta Simulation Model II
LFS = longfin smelt
OMR = Old and Middle River
PTM = particle tracking model

Appendix B

Sensitivity of Abundance Methodology



Technical Memorandum

Long-Term Operation of the Central Valley Project and State Water Project

Appendix B. Sensitivity of Abundance Methodology

An assessment was completed to analyze the sensitivity of regional and Delta-wide longfin smelt (LFS) entrainment estimates to the method of calculating LFS abundance and the location of particle injection with the Delta Simulation Model II (DSM2) Particle Tracking Model (PTM).

Abundance Methods

The primary method for estimating larval LFS abundance, as described above in the section Larval Longfin Smelt Abundance Model and Entrainment Estimate, is the design-based approach (Design Method) described for Delta smelt by Polansky and coauthors (2019), generalized by the 6-Agency Redesign design team for other juvenile pelagic fish in the Delta, and recently adopted by California Department of Fish and Wildlife (CDFW) in their long-term monitoring reports (Malinich et al., 2023).

As an alternative, we also calculated larval LFS abundance for individual Smelt Larval Surveys (SLS) using a more involved method developed by Kimmerer and Gross (2022). Code for the published model was requested and obtained from the corresponding author, and the model structure remains the same as in the original publication: a process model linking environmental covariates to true larval density, and an observation model capturing sampling variability. While a more complete description of the modeling approach is provided in Kimmerer and Gross (2022), a summary of the key steps is provided below.

Process Model: For each survey i and station k , the expected larval catch per tow (mean density) is modeled as a quadratic function of salinity plus a linear effect of water clarity. Specifically, the log-density is:

$$\ln(\mu_{i,k}) = a_i + b_i S_{i,k} + c_i S_{i,k}^2 + d_i D_{i,k},$$

where $S_{i,k}$ is salinity (log-transformed) and $D_{i,k}$ is Secchi depth (water clarity). The coefficients a_i , b_i , c_i , and d_i are survey-specific (treated as random effects with broad normal priors) and have sign constraints (b positive; c , d negative) to enforce a unimodal salinity response (peak larval density at intermediate salinity ~ 2 Practical Salinity Units (PSU)) and a negative clarity effect. This quadratic-in-log-salinity formulation yields a roughly Gaussian peak in larval density around low salinity, consistent with biological expectations, while higher Secchi depth (clearer water) is associated with lower larval density.

Observation Model: Observed larval counts $C_{i,k}$ are modeled with an overdispersed negative binomial error distribution to account for clustered catches and excess zeros. Using the JAGS parameterization, the success probability is defined as $p_{i,k} = 1/[1 + \alpha \mu_{i,k}]$, where $\mu_{i,k}$ is the process-model mean, and α is the overdispersion parameter (common to all samples/surveys). The observed larval counts are calculated using

Appendix B - Sensitivity of Abundance Methodology

$$C_{i,k} \sim \text{NegBinomial} \left(p_{i,k}, r = \frac{1}{\alpha} \right),$$

meaning the variance exceeds the mean when $\alpha > 0$, (if $\alpha \rightarrow 0$, the distribution reduces to Poisson). In our implementation, a single α was estimated for all surveys (as in Kimmerer & Gross's original model) since allowing survey-specific dispersion did not notably improve fit during their extensive model comparison. We also followed their approach in not adding a separate zero-inflation term, on the rationale that the negative binomial's overdispersion adequately captures the frequency of zero catches (i.e. no evidence of an additional zero-generating process).

Model Implementation: The extended model was fit in a Bayesian framework (via JAGS MCMC), using uninformative priors and verifying convergence, exactly mirroring the Kimmerer and Gross (2022) methodology. By applying this hierarchical model to data through 2026, we obtained updated larval abundance estimates while maintaining methodological consistency with the original analysis. The result is a robust set of abundance indices based on a Bayesian hierarchical model with an environmental process sub-model and a negative binomial observation model, now informed by the larger 2009–2026 dataset.

Entrainment Method

To estimate proportional entrainment using the Kimmerer and Gross (2022) LFS abundance method, the PTM model was used with one injection node at each SLS station. A map of DSM2 injection nodes is shown in Figure B-1, and a table mapping the DSM2 injection node to SLS station is shown in Table B-1. Some of these injection locations differed slightly from the design-based approach injection node per LFS subregion.

To estimate proportional entrainment of LFS larva over the three-week forecast period, the DSM2 PTM model is run for each DSM2 injection node identified in Table B-1 using position-oriented particles (PP), which represent larval LFS that tend towards the top 10% of the water column (Reclamation 2024b). The cumulative flux of particles into the Central Valley Project (CVP) and State Water Project (SWP) export facilities is recorded at the end of each week for each injection point. The abundance estimate associated with each SLS station is then multiplied by the cumulative flux into CVP and SWP export facilities from the corresponding DSM2 injection node to estimate a whole number and percentage of LFS larva cumulatively entrained from that SLS station region at the end of each week. For reporting simplicity, abundance estimates from all 28 SLS stations regions are aggregated into the same seven LFS regions as the primary method. The LFS region corresponding to the SLS station region is also shown in Table B-1.



Appendix B - Sensitivity of Abundance Methodology

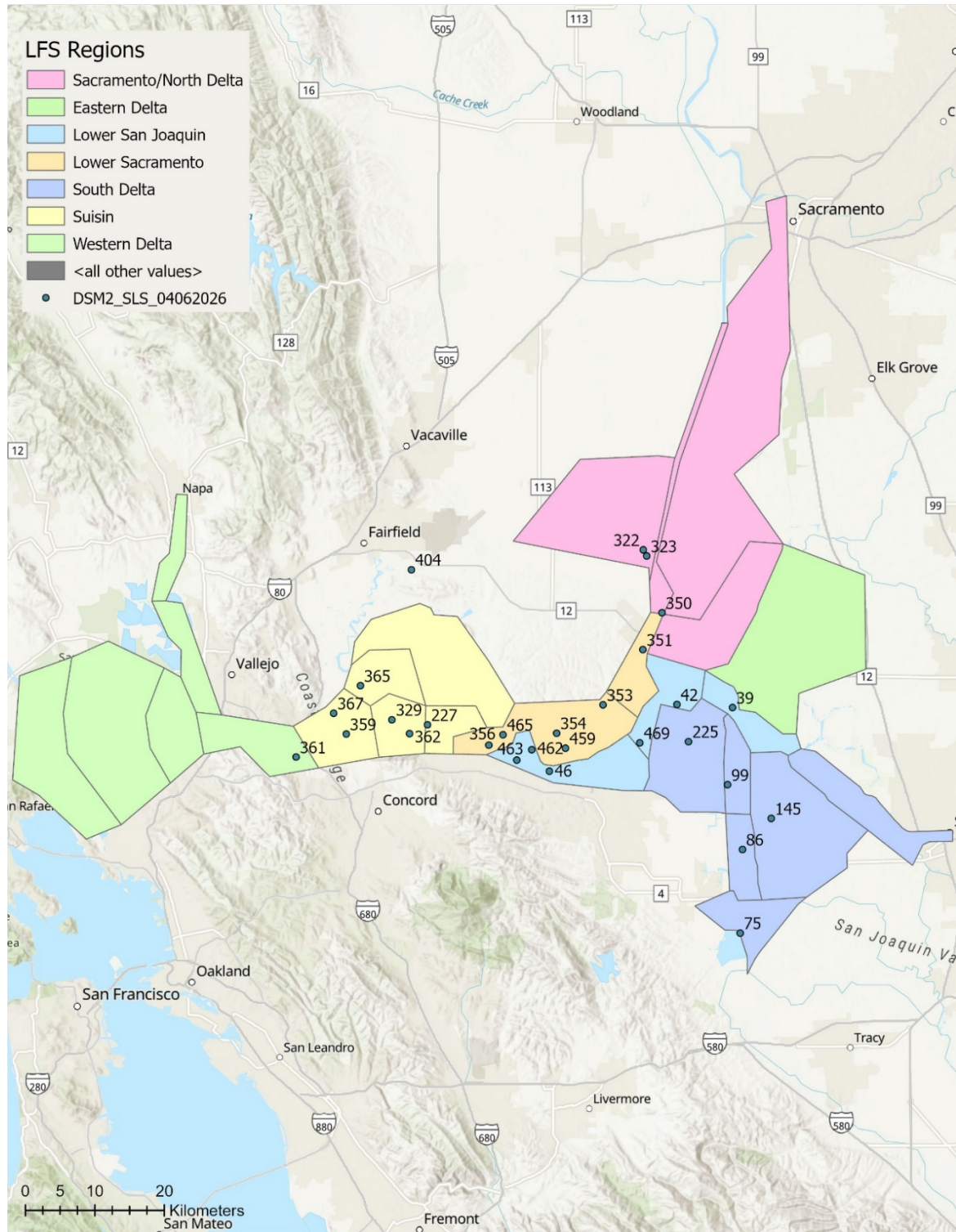


Figure B-1. Longfin Smelt Analysis Regions for Entrainment Estimate Using Kimmerer and Gross Abundance Model



Appendix B - Sensitivity of Abundance Methodology

Table B-1. Delta Simulation Model II Injection Nodes Assigned to Each Smelt Larval Survey Station and Enhanced Delta Smelt Monitoring Subregion

SLS Station	DSM2 Injection Node	EDSM Subregion	LFS Region
815	39	San Joaquin River at Prisoners Pt	Lower San Joaquin
812	42	San Joaquin River at Twitchell Island	Lower San Joaquin
804	46	Lower San Joaquin River	Lower San Joaquin
918	75	Victoria Canal	South Delta
915	86	Old River	South Delta
902	99	Holland Cut	South Delta
914	145	Middle River	South Delta
901	225	Franks Tract	South Delta
519	227	Honker Bay	Suisun
716	322	Cache Slough and Liberty Island	Sacramento/ North Delta
723	323	Cache Slough and Liberty Island	Sacramento/ North Delta
501	329	East Suisun Bay	Suisun
711	350	Lower Sacramento River Ship Channel	Sacramento/ North Delta
707	351	Sacramento River near Rio Vista	Lower Sacramento
706	353	Lower Sacramento River	Lower Sacramento
704	354	Lower Sacramento River	Lower Sacramento
508	356	Lower Sacramento River	Lower Sacramento
411	359	West Suisun Bay	Suisun
405	361	Carquinez Strait	Western Delta
504	362	East Suisun Bay	Suisun
602	365	Grizzly Bay	Suisun
418	367	West Suisun Bay	Suisun
705	352	Sacramento River near Rio Vista	Lower Sacramento
703	459	Lower Sacramento River	Lower Sacramento
801	462	Lower San Joaquin River	Lower San Joaquin
520	463	Lower San Joaquin River	Lower San Joaquin
513	465	Lower Sacramento River	Lower Sacramento
809	469	San Joaquin River at Twitchell Island	Lower San Joaquin

Key:

DSM2 = Delta Simulation Model II

EDSM = Enhanced Delta Smelt Monitoring

LFS = longfin smelt

SLS = Smelt Larval Survey



Appendix B - Sensitivity of Abundance Methodology

Abundance Differences

LFS abundance based on the two different methods is calculated using SLS catch data processed as of 04/09/2026. The percentage of each SLS catch data processed as of 04/09/2026 is shown in Table B-2.

Table B-2. Percentage of Each Smelt Larval Survey Catch Data Processed as of 04/09/2026

SLS Number	1	2	3	4	5	6
Survey Date	12/29/2025	1/12/2026	1/26/2026	2/9/2026	2/23/2026	3/9/2026
Eastern Delta	100%	100%	100%	100%	100%	100%
Lower Sacramento	100%	100%	100%	100%	100%	71%
Lower San Joaquin	100%	100%	100%	100%	100%	86%
Sacramento/ North Delta	100%	100%	100%	100%	100%	67%
South Delta	100%	100%	100%	100%	100%	100%
Suisun	100%	100%	100%	100%	100%	78%
Western Delta	100%	100%	100%	100%	92%	28%

Key:

SLS = Smelt Larval Survey

Abundance estimates from each method are shown in Table B-3. The Kimmerer and Gross method is typically estimating higher regional LFS abundance and Delta-wide abundance for each survey. Delta-wide abundance estimates range from -12% lower to 40% greater for the Kimmerer and Gross method than the design-based method, with higher estimated abundance for 5 of 6 surveys.

Appendix B - Sensitivity of Abundance Methodology

Table B-3. Estimate Abundance for Each Smelt Larval Survey by Survey Date and Longfin Smelt Region

SLS Number and Date	Abundance Estimate Method	Eastern Delta	Lower Sacramento	Lower San Joaquin	Sacramento/North Delta	South Delta	Suisun	Western Delta	Total
1 (12/29/2025)	Design-Based	0	1,612,703	2,726,126	0	0	23,008,649	8,497,748	35,845,226
	Kimmerer and Gross	N/A	4,170,297	1,496,724	66,809	63,182	21,192,745	15,128,157	42,117,913
	Difference (%)	N/A	159%	-45%	N/A	N/A	-8%	78%	17%
2 (1/12/2026)	Design-Based	0	1,410,811	2,065,405	0	0	48,668,108	94,139,189	146,283,513
	Kimmerer and Gross	N/A	4,188,835	1,019,333	22,354	40,883	64,529,285	58,624,962	128,425,651
	Difference (%)	N/A	197%	-51%	N/A	N/A	33%	-38%	-12%
3 (1/26/2026)	Design-Based	0	24,658,378	12,726,577	444,324	1,897,297	104,789,369	52,156,324	196,672,269
	Kimmerer and Gross	N/A	40,794,089	16,563,076	1,136,742	1,017,556	131,451,896	84,422,228	275,385,587
	Difference (%)	N/A	65%	30%	156%	-46%	25%	62%	40%
4 (2/9/2026)	Design-Based	0	108,955,946	15,306,847	1,054,054	1,493,514	719,293,874	16,755,586	862,859,821
	Kimmerer and Gross	N/A	135,549,272	44,428,961	5,087,536	5,011,068	585,925,196	145,343,979	921,346,012
	Difference (%)	N/A	24%	190%	383%	236%	-19%	767%	7%
5 (2/23/2026)	Design-Based	0	14,782,703	4,403,423	914,595	0	178,273,153	196,803,269	395,177,143
	Kimmerer and Gross	N/A	24,152,049	7,535,550	649,085	367,323	143,374,112	267,666,766	443,744,885
	Difference (%)	N/A	63%	71%	-29%	N/A	-20%	36%	12%
6 (3/9/2026)	Design-Based	0	3,225,405	3,645,225	304,865	0	42,108,829	4,086,950	53,371,274
	Kimmerer and Gross	N/A	7,196,704	4,176,013	382,525	355,018	45,970,510	19,965,533	78,046,302
	Difference (%)	N/A	123%	15%	25%	N/A	9%	389%	46%

Key:

N/A = not applicable

SLS = Smelt Larval Survey

Appendix B - Sensitivity of Abundance Methodology

Conditions Assessed

The sensitivity analysis of regional and Delta-wide entrainment estimates is carried out for four three-week periods with start dates of 01/06/2026, 03/03/2026, 03/17/2026, and 03/31/2026. These weeks incorporate a range of different flow conditions on the Sacramento and San Joaquin Rivers (Figure B-2), with inflow bins as defined in Reclamation (2024) of himed, hihi, medhi, and lomed, respectively.

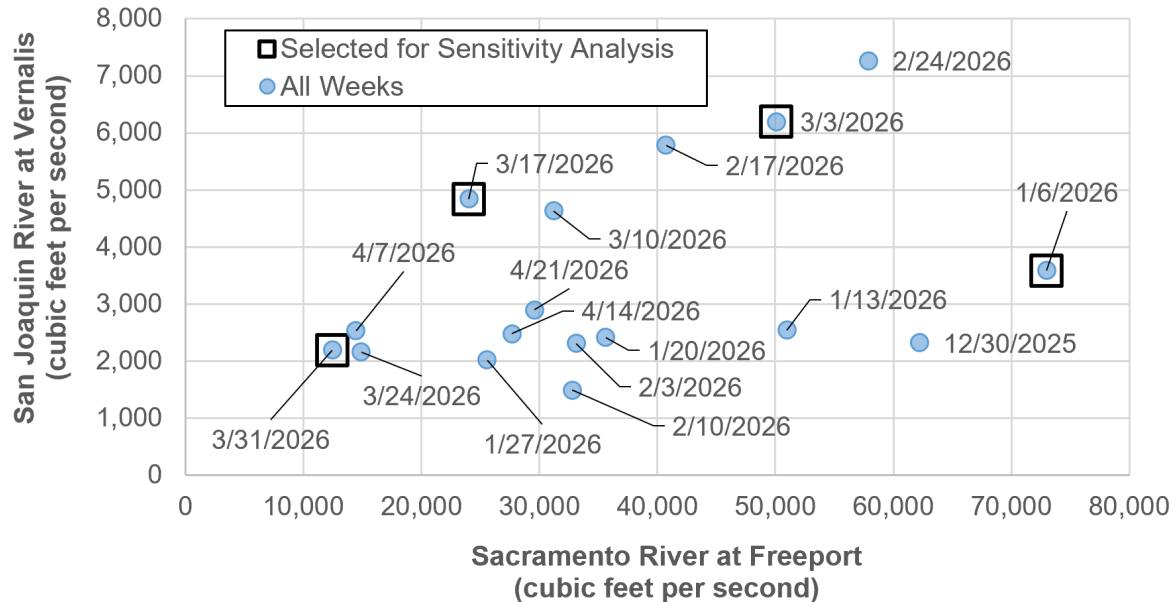


Figure B-2. Weekly Average Flow in the Sacramento River and San Joaquin River for each Weekly Assessment.

Abundance estimates for each of the four three-week periods are calculated using data from the SLS survey completed prior to the start of each three-week period. The first three-week period is assessed using fully processed data from SLS 1, completed 12/29/2025. The second three-week period includes nearly fully processed data from SLS 5, completed 2/23/2026. The third and fourth flow three-week periods are assessed using partially processed data from SLS 6, completed 3/9/2026.

The sensitivity assessment in this appendix was completed later in the season, based on SLS catch data processing as of 04/09/2026. At this time, 100% of catch data was processed for Surveys 1 through 4. Survey 5 had 92% of Western Delta subregion data processed and 100% processed for all other regions. Survey 6 had 100% of Eastern Delta and Southern Delta processed, with between 28% and 86% of catch data processed for the remaining regions. Within the OMR season, there was often a lag of several weeks to months between the SLS survey and the date when fully processed SLS data was available. To deal with this lag, a conservative approach was taken, which used either

Appendix B - Sensitivity of Abundance Methodology

the most recent fully processed SLS survey, or if 1 month had passed since the survey, the next most recent survey².

Entrainment Estimates for Flow Condition 1: 01/06/2026

Entrainment estimates for the three-week forecast period starting 01/06/2026 using the two different abundance methods are shown in Tables B-4 through B-9. Weekly average inflows during this period were 50,975 cubic feet per second (cfs), 34,132 cfs, and 30,000 for the Sacramento River, and 2,546 cfs, 2,400 cfs, and 2,400 cfs for the San Joaquin River, with each week classified as a hined flow condition. Primary observations across the two methods include:

- During Week 1, the design-based method is estimating no larva abundance in the South Delta, and abundance of 2.7 million in the Lower San Joaquin region but no entrainment based on the injection nodes used.
- During Week 1, the Kimmerer and Gross method is estimating relatively less abundance in the Lower San Joaquin, but some entrainment based on the injection nodes used. The method also estimates some abundance in the South Delta, with higher rates of entrainment than the Lower San Joaquin.
- Over the course of three weeks, the maximum cumulative entrainment of LFS larva is estimated at the Old and Middle River (OMR) = -6,500 cfs scenario as <0.1% of the Delta-wide population using the design-based method, and 0.1% using the Kimmerer and Gross method. Entrainment is limited to the Lower Sacramento region for the design-based method and the Lower San Joaquin, Lower Sacramento, and South Delta regions for the Kimmerer and Gross method.

² During the OMR flow management season, full processing of the SLS catch data often lagged the actual SLS catch, such that abundance estimates used in the weekly assessment reflected either (1) partial results processed since the most recent catch, or (2) fully processed results from a catch made several weeks prior. SLS stations in the potential zone of entrainment in the Southern Delta and Lower San Joaquin subregions are typically processed first, while SLS stations in the western Delta may lag several weeks. Estimating proportional Delta-wide entrainment using fully processed SLS catch data from the Southern Delta and Lower San Joaquin and partially processed or no data from the western Delta will result in a conservative (higher) estimate of proportional entrainment, as Delta-wide longfin smelt abundance would increase if the western SLS stations were included but Delta-wide entrainment would not.

Appendix B - Sensitivity of Abundance Methodology

Table B-4. Design-Based Longfin Smelt Abundance Estimate and Entrainment Using Surface Oriented Particles: Week 1 Ending 01/12/2026

OMR (cfs)	Region Metric	West	Suisun	Sacra- mento/ North Delta	Lower San Joaquin	Lower Sacra- mento	South Delta	East	Delta-Wide Total (#)	Delta- Wide Total (%)
	LFS Larva Abundance (Survey 1: 12/29/2025)	8,497,748	23,008,649	0	2,726,126	1,612,703	0	0	35,845,226	-
-6,500	PTM Entrained (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	-
-5,000	PTM Entrained (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	-
-3,500	PTM Entrained (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	-
-2,000	PTM Entrained (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	-
-6,500	LFS Larva Entrained (#)	0	0	0	0	0	0	0	0	0.0%
-5,000	LFS Larva Entrained (#)	0	0	0	0	0	0	0	0	0.0%
-3,500	LFS Larva Entrained (#)	0	0	0	0	0	0	0	0	0.0%
-2,000	LFS Larva Entrained (#)	0	0	0	0	0	0	0	0	0.0%

Notes:

Values between 0.0 and 0.1 are indicated with <0.1

The PTM entrained (%) value reflects the total entrained particles from all subregions within an LFS Region divided by the estimated LFS Region abundance

Key:

cfs = cubic feet per second

LFS = longfin smelt

OMR = Old and Middle River

PTM = particle tracking model

Appendix B - Sensitivity of Abundance Methodology

Table B-5. Kimmerer and Gross Longfin Smelt Abundance Estimate and Entrainment Using Surface Oriented Particles: Week 1 Ending 01/12/2026

OMR (cfs)	Region	West	Suisun	Sacramento/ North Delta	Lower San Joaquin	Lower Sacramento	South Delta	East	Delta-Wide Total (#)	Delta-Wide Total (%)
	Metric									
	LFS Larva Abundance (Survey 1: 12/29/2025)	15,840,121	21,874,417	66,830	1,463,162	4,088,426	70,143	0	43,403,099	-
-6,500	PTM Entrained (%)	0.0	0.0	0.0	0.1	0.0	36.0	0.0	-	-
-5,000	PTM Entrained (%)	0.0	0.0	0.0	<0.1	0.0	30.9	0.0	-	-
-3,500	PTM Entrained (%)	0.0	0.0	0.0	<0.1	0.0	19.1	0.0	-	-
-2,000	PTM Entrained (%)	0.0	0.0	0.0	0.0	0.0	9.1	0.0	-	-
-6,500	LFS Larva Entrained (#)	0	0	0	1,491	0	25,279	0	26,770	<0.1%
-5,000	LFS Larva Entrained (#)	0	0	0	503	0	21,701	0	22,204	<0.1%
-3,500	LFS Larva Entrained (#)	0	0	0	73	0	13,391	0	13,464	<0.1%
-2,000	LFS Larva Entrained (#)	0	0	0	0	0	6,357	0	6,357	<0.1%

Notes:

Values between 0.0 and 0.1 are indicated with <0.1

The PTM entrained (%) value reflects the total entrained particles from all subregions within an LFS Region divided by the estimated LFS Region abundance

Key:

cfs = cubic feet per second

LFS = longfin smelt

OMR = Old and Middle River

PTM = particle tracking model

Appendix B - Sensitivity of Abundance Methodology

Table B-6. Design-Based Longfin Smelt Abundance Estimate and Entrainment Using Surface Oriented Particles: Week 2 Ending 01/19/2026

OMR (cfs)	Region	West	Suisun	Sacramento/ North Delta	Lower San Joaquin	Lower Sacramento	South Delta	East	Delta-Wide Total (#)	Delta-Wide Total (%)
	Metric									
	LFS Larva Abundance (Survey 1: 12/29/2025)	8,497,748	23,008,649	0	2,726,126	1,612,703	0	0	35,845,226	-
-6,500	PTM Entrained (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	-
-5,000	PTM Entrained (%)	0.0	0.0	0.0	0.0	<0.1	0.0	0.0	-	-
-3,500	PTM Entrained (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	-
-2,000	PTM Entrained (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	-
-6,500	LFS Larva Entrained (#)	0	0	0	0	0	0	0	0	0.0%
-5,000	LFS Larva Entrained (#)	0	0	0	0	202	0	0	202	<0.1%
-3,500	LFS Larva Entrained (#)	0	0	0	0	0	0	0	0	0.0%
-2,000	LFS Larva Entrained (#)	0	0	0	0	0	0	0	0	0.0%

Notes:

Values between 0.0 and 0.1 are indicated with <0.1

The PTM entrained (%) value reflects the total entrained particles from all subregions within an LFS Region divided by the estimated LFS Region abundance

Key:

cfs = cubic feet per second

LFS = longfin smelt

OMR = Old and Middle River

PTM = particle tracking model

Appendix B - Sensitivity of Abundance Methodology

Table B-7. Kimmerer and Gross Longfin Smelt Abundance Estimate and Entrainment Using Surface Oriented Particles: Week 2 Ending 01/19/2026

OMR (cfs)	Region Metric	West	Suisun	Sacra- mento/ North Delta	Lower San Joaquin	Lower Sacra- mento	South Delta	East	Delta-Wide Total (#)	Delta- Wide Total (%)
	LFS Larva Abundance (Survey 1: 12/29/2025)	15,840,121	21,874,417	66,830	1,463,162	4,088,426	70,143	0	43,403,099	-
-6,500	PTM Entrained (%)	0.0	0.0	<0.1	0.7	<0.1	48.0	0.0	-	-
-5,000	PTM Entrained (%)	0.0	0.0	0.0	0.4	<0.1	44.0	0.0	-	-
-3,500	PTM Entrained (%)	0.0	0.0	0.0	0.1	0.0	36.1	0.0	-	-
-2,000	PTM Entrained (%)	0.0	0.0	0.0	<0.1	0.0	22.7	0.0	-	-
-6,500	LFS Larva Entrained (#)	0	0	47	10,028	33	33,633	0	43,742	0.1%
-5,000	LFS Larva Entrained (#)	0	0	0	5,777	31	30,894	0	36,702	<0.1%
-3,500	LFS Larva Entrained (#)	0	0	0	2,075	0	25,323	0	27,398	<0.1%
-2,000	LFS Larva Entrained (#)	0	0	0	146	0	15,932	0	16,078	<0.1%

Notes:

Values between 0.0 and 0.1 are indicated with <0.1

The PTM entrained (%) value reflects the total entrained particles from all subregions within an LFS Region divided by the estimated LFS Region abundance.

Key:

cfs = cubic feet per second

LFS = longfin smelt

OMR = Old and Middle River

PTM = particle tracking model

Appendix B - Sensitivity of Abundance Methodology

Table B-8. Design-Based Longfin Smelt Abundance Estimate and Entrainment Using Surface Oriented Particles: Week 3 Ending 01/26/2026

OMR (cfs)	Region	West	Suisun	Sacramento/ North Delta	Lower San Joaquin	Lower Sacramento	South Delta	East	Delta-Wide Total (#)	Delta-Wide Total (%)
	Metric									
	LFS Larva Abundance (Survey 1: 12/29/2025)	8,497,748	23,008,649	0	2,726,126	1,612,703	0	0	35,845,226	-
-6,500	PTM Entrained (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	-
-5,000	PTM Entrained (%)	0.0	0.0	0.0	0.0	<0.1	0.0	0.0	-	-
-3,500	PTM Entrained (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	-
-2,000	PTM Entrained (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	-
-6,500	LFS Larva Entrained (#)	0	0	0	0	0	0	0	0	0.0%
-5,000	LFS Larva Entrained (#)	0	0	0	0	202	0	0	202	<0.1%
-3,500	LFS Larva Entrained (#)	0	0	0	0	0	0	0	0	0.0%
-2,000	LFS Larva Entrained (#)	0	0	0	0	0	0	0	0	0.0%

Notes:

Values between 0.0 and 0.1 are indicated with <0.1

The PTM entrained (%) value reflects the total entrained particles from all subregions within an LFS Region divided by the estimated LFS Region abundance.

Key:

cfs = cubic feet per second

LFS = longfin smelt

OMR = Old and Middle River

PTM = particle tracking model

Appendix B - Sensitivity of Abundance Methodology

Table B-9. Kimmerer and Gross Longfin Smelt Abundance Estimate and Entrainment Using Surface Oriented Particles: Week 3 Ending 01/26/2026

OMR (cfs)	Region Metric	West	Suisun	Sacra- mento/ North Delta	Lower San Joaquin	Lower Sacra- mento	South Delta	East	Delta-Wide Total (#)	Delta- Wide Total (%)
	LFS Larva Abundance (Survey 1: 12/29/2025)	15,840,121	21,874,417	66,830	1,463,162	4,088,426	70,143	0	43,403,099	-
-6,500	PTM Entrained (%)	0.0	0.0	<0.1	0.9	<0.1	50.6	0.0	-	-
-5,000	PTM Entrained (%)	0.0	0.0	0.0	0.6	<0.1	47.9	0.0	-	-
-3,500	PTM Entrained (%)	0.0	0.0	0.0	0.3	<0.1	41.8	0.0	-	-
-2,000	PTM Entrained (%)	0.0	0.0	0.0	<0.1	0.0	30.2	0.0	-	-
-6,500	LFS Larva Entrained (#)	0	0	47	13,270	33	35,522	0	48,873	0.1%
-5,000	LFS Larva Entrained (#)	0	0	0	8,665	31	33,570	0	42,266	<0.1%
-3,500	LFS Larva Entrained (#)	0	0	0	3,872	33	29,300	0	33,206	<0.1%
-2,000	LFS Larva Entrained (#)	0	0	0	875	0	21,172	0	22,047	<0.1%

Notes:

Values between 0.0 and 0.1 are indicated with <0.1

The PTM entrained (%) value reflects the total entrained particles from all subregions within an LFS Region divided by the estimated LFS Region abundance.

Key:

cfs = cubic feet per second

LFS = longfin smelt

OMR = Old and Middle River

PTM = particle tracking model



Appendix B - Sensitivity of Abundance Methodology

Entrainment Estimates for Flow Condition 2: 03/03/2026

Entrainment estimates for the three-week forecast period starting 03/03/2026 using the two different abundance methods are shown in Tables B-10 through B-15. Weekly average inflows during this period were 50,076 cfs, 33,048 cfs, and 32,000 cfs for the Sacramento River, and 6,194 cfs, 3,571 cfs, and 2,500 cfs for the San Joaquin River, with the first week classified as a hihi flow condition and the following two weeks as a himed flow condition. Primary observations across the two methods include:

- The design-based method is estimating no larva abundance in the South Delta. Entrainment is observed first from the Lower San Joaquin region in Week 1, then from the Sacramento/North Delta, Lower San Joaquin, and Lower Sacramento regions for Week 2 and Week 3.
- In regions where entrainment is observed, the Kimmerer and Gross method is estimating relatively more abundance in the Lower San Joaquin, South Delta, and Lower Sacramento regions and relatively less in the Sacramento/North Delta than the design-based method. Entrainment from Lower San Joaquin and South Delta regions is observed in Week 1, and from Lower San Joaquin, South Delta, Lower Sacramento, and the Sacramento/North Delta regions in Week 2 and Week 3.
- Over the course of three weeks, the maximum cumulative entrainment of LFS larva is estimated at the OMR = -6,500 cfs scenario as <0.1% of the Delta-wide population using the design-based method, and 0.1% using the Kimmerer and Gross method.

Appendix B - Sensitivity of Abundance Methodology

Table B-10. Design-Based Longfin Smelt Abundance Estimate and Entrainment Using Surface Oriented Particles: Week 1 Ending 03/09/2026

OMR (cfs)	Region	West	Suisun	Sacramento/ North Delta	Lower San Joaquin	Lower Sacramento	South Delta	East	Delta-Wide Total (#)	Delta-Wide Total (%)
	Metric									
	LFS Larva Abundance (Survey 5: 2/23/2026)	196,803,269	178,273,154	914,595	4,403,423	14,782,703	0	0	395,177,144	-
-6,500	PTM Entrained (%)	0.0	0.0	0.0	0.2	0.0	0.0	0.0	-	-
-5,000	PTM Entrained (%)	0.0	0.0	0.0	<0.1	0.0	0.0	0.0	-	-
-3,500	PTM Entrained (%)	0.0	0.0	0.0	<0.1	0.0	0.0	0.0	-	-
-2,000	PTM Entrained (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	-
-6,500	LFS Larva Entrained (#)	0	0	0	6,876	0	0	0	6,876	<0.1%
-5,000	LFS Larva Entrained (#)	0	0	0	2,578	0	0	0	2,578	<0.1%
-3,500	LFS Larva Entrained (#)	0	0	0	859	0	0	0	859	<0.1%
-2,000	LFS Larva Entrained (#)	0	0	0	0	0	0	0	0	0.0%

Notes:

Values between 0.0 and 0.1 are indicated with <0.1

The PTM entrained (%) value reflects the total entrained particles from all subregions within an LFS Region divided by the estimated LFS Region abundance

Key:

cfs = cubic feet per second

LFS = longfin smelt

OMR = Old and Middle River

PTM = particle tracking model

Appendix B - Sensitivity of Abundance Methodology

Table B-11. Kimmerer and Gross Longfin Smelt Abundance Estimate and Entrainment Using Surface Oriented Particles: Week 1 Ending 03/09/2026

OMR (cfs)	Region	West	Suisun	Sacramento/ North Delta	Lower San Joaquin	Lower Sacramento	South Delta	East	Delta-Wide Total (#)	Delta-Wide Total (%)
	Metric									
	LFS Larva Abundance (Survey 5: 2/23/2026)	186,446,828	123,660,868	599,001	7,736,255	23,568,325	379,642	0	342,390,919	-
-6,500	PTM Entrained (%)	0.0	0.0	0.0	0.2	0.0	42.2	0.0	-	-
-5,000	PTM Entrained (%)	0.0	0.0	0.0	<0.1	0.0	34.3	0.0	-	-
-3,500	PTM Entrained (%)	0.0	0.0	0.0	<0.1	0.0	25.7	0.0	-	-
-2,000	PTM Entrained (%)	0.0	0.0	0.0	0.0	0.0	8.6	0.0	-	-
-6,500	LFS Larva Entrained (#)	0	0	0	13,941	0	160,366	0	174,307	<0.1%
-5,000	LFS Larva Entrained (#)	0	0	0	4,877	0	130,209	0	135,086	<0.1%
-3,500	LFS Larva Entrained (#)	0	0	0	2,364	0	97,395	0	99,759	<0.1%
-2,000	LFS Larva Entrained (#)	0	0	0	0	0	32,507	0	32,507	<0.1%

Notes:

Values between 0.0 and 0.1 are indicated with <0.1

The PTM entrained (%) value reflects the total entrained particles from all subregions within an LFS Region divided by the estimated LFS Region abundance

Key:

cfs = cubic feet per second

LFS = longfin smelt

OMR = Old and Middle River

PTM = particle tracking model

Appendix B - Sensitivity of Abundance Methodology

Table B-12. Design-Based Longfin Smelt Abundance Estimate and Entrainment Using Surface Oriented Particles: Week 2 Ending 03/16/2026

OMR (cfs)	Region	West	Suisun	Sacramento/ North Delta	Lower San Joaquin	Lower Sacramento	South Delta	East	Delta-Wide Total (#)	Delta-Wide Total (%)
	Metric									
	LFS Larva Abundance (Survey 5: 2/23/2026)	196,803,269	178,273,154	914,595	4,403,423	14,782,703	0	0	395,177,144	-
-6,500	PTM Entrained (%)	0.0	0.0	0.4	2.0	<0.1	0.0	0.0	-	-
-5,000	PTM Entrained (%)	0.0	0.0	0.3	1.2	<0.1	0.0	0.0	-	-
-3,500	PTM Entrained (%)	0.0	0.0	0.0	0.4	<0.1	0.0	0.0	-	-
-2,000	PTM Entrained (%)	0.0	0.0	0.0	0.1	0.0	0.0	0.0	-	-
-6,500	LFS Larva Entrained (#)	0	0	3,201	89,384	3,230	0	0	95,815	<0.1%
-5,000	LFS Larva Entrained (#)	0	0	2,744	53,286	3,230	0	0	59,261	<0.1%
-3,500	LFS Larva Entrained (#)	0	0	0	18,908	1,615	0	0	20,523	<0.1%
-2,000	LFS Larva Entrained (#)	0	0	0	6,016	0	0	0	6,016	<0.1%

Notes:

Values between 0.0 and 0.1 are indicated with <0.1

The PTM entrained (%) value reflects the total entrained particles from all subregions within an LFS Region divided by the estimated LFS Region abundance

Key:

cfs = cubic feet per second

LFS = longfin smelt

OMR = Old and Middle River

PTM = particle tracking model

Appendix B - Sensitivity of Abundance Methodology

Table B-13. Kimmerer and Gross Longfin Smelt Abundance Estimate and Entrainment Using Surface Oriented Particles: Week 2 Ending 03/16/2026

OMR (cfs)	Region Metric	West	Suisun	Sacra- mento/ North Delta	Lower San Joaquin	Lower Sacra- mento	South Delta	East	Delta-Wide Total (#)	Delta- Wide Total (%)
	LFS Larva Abundance (Survey 5: 2/23/2026)	186,446,828	123,660,868	599,001	7,736,255	23,568,325	379,642	0	342,390,919	-
-6,500	PTM Entrained (%)	0.0	0.0	0.3	1.1	<0.1	52.2	0.0	-	-
-5,000	PTM Entrained (%)	0.0	0.0	0.2	0.7	<0.1	48.1	0.0	-	-
-3,500	PTM Entrained (%)	0.0	0.0	<0.1	0.3	<0.1	42.1	0.0	-	-
-2,000	PTM Entrained (%)	0.0	0.0	0.0	<0.1	0.0	30.9	0.0	-	-
-6,500	LFS Larva Entrained (#)	0	0	1,862	87,969	954	198,043	0	288,828	<0.1%
-5,000	LFS Larva Entrained (#)	0	0	908	51,418	837	182,516	0	235,678	<0.1%
-3,500	LFS Larva Entrained (#)	0	0	469	24,743	536	159,679	0	185,427	<0.1%
-2,000	LFS Larva Entrained (#)	0	0	0	4,270	0	117,181	0	121,451	<0.1%

Notes:

Values between 0.0 and 0.1 are indicated with <0.1

The PTM entrained (%) value reflects the total entrained particles from all subregions within an LFS Region divided by the estimated LFS Region abundance

Key:

cfs = cubic feet per second

LFS = longfin smelt

OMR = Old and Middle River

PTM = particle tracking model

Appendix B - Sensitivity of Abundance Methodology

Table B-14. Design-Based Longfin Smelt Abundance Estimate and Entrainment Using Surface Oriented Particles: Week 3 Ending 03/23/2026

OMR (cfs)	Region	West	Suisun	Sacramento/ North Delta	Lower San Joaquin	Lower Sacramento	South Delta	East	Delta-Wide Total (#)	Delta-Wide Total (%)
	Metric									
	LFS Larva Abundance (Survey 5: 2/23/2026)	196,803,269	178,273,154	914,595	4,403,423	14,782,703	0	0	395,177,144	-
-6,500	PTM Entrained (%)	0.0	0.0	0.4	3.3	<0.1	0.0	0.0	-	-
-5,000	PTM Entrained (%)	0.0	0.0	0.4	2.3	<0.1	0.0	0.0	-	-
-3,500	PTM Entrained (%)	0.0	0.0	0.1	0.8	<0.1	0.0	0.0	-	-
-2,000	PTM Entrained (%)	0.0	0.0	0.0	0.3	0.0	0.0	0.0	-	-
-6,500	LFS Larva Entrained (#)	0	0	3,658	146,108	4,845	0	0	154,612	<0.1%
-5,000	LFS Larva Entrained (#)	0	0	3,658	101,416	3,230	0	0	108,305	<0.1%
-3,500	LFS Larva Entrained (#)	0	0	915	35,238	1,615	0	0	37,768	<0.1%
-2,000	LFS Larva Entrained (#)	0	0	0	14,611	0	0	0	14,611	<0.1%

Notes:

Values between 0.0 and 0.1 are indicated with <0.1

The PTM entrained (%) value reflects the total entrained particles from all subregions within an LFS Region divided by the estimated LFS Region abundance

Key:

cfs = cubic feet per second

LFS = longfin smelt

OMR = Old and Middle River

PTM = particle tracking model

Appendix B - Sensitivity of Abundance Methodology

Table B-15. Kimmerer and Gross Longfin Smelt Abundance Estimate and Entrainment Using Surface Oriented Particles: Week 3 Ending 03/23/2026

OMR (cfs)	Region Metric	West	Suisun	Sacra- mento/ North Delta	Lower San Joaquin	Lower Sacra- mento	South Delta	East	Delta-Wide Total (#)	Delta- Wide Total (%)
	LFS Larva Abundance (Survey 5: 2/23/2026)	186,446,828	123,660,868	599,001	7,736,255	23,568,325	379,642	0	342,390,919	-
-6,500	PTM Entrained (%)	0.0	0.0	0.5	1.7	<0.1	54.5	0.0	-	-
-5,000	PTM Entrained (%)	0.0	0.0	0.3	1.2	<0.1	52.0	0.0	-	-
-3,500	PTM Entrained (%)	0.0	0.0	0.2	0.5	<0.1	46.5	0.0	-	-
-2,000	PTM Entrained (%)	0.0	0.0	<0.1	0.1	0.0	37.4	0.0	-	-
-6,500	LFS Larva Entrained (#)	0	0	3,285	132,299	1,608	206,821	0	344,013	0.1%
-5,000	LFS Larva Entrained (#)	0	0	1,507	90,780	954	197,515	0	290,756	<0.1%
-3,500	LFS Larva Entrained (#)	0	0	1,192	40,607	536	176,488	0	218,823	<0.1%
-2,000	LFS Larva Entrained (#)	0	0	173	9,922	0	142,082	0	152,176	<0.1%

Notes:

Values between 0.0 and 0.1 are indicated with <0.1

The PTM entrained (%) value reflects the total entrained particles from all subregions within an LFS Region divided by the estimated LFS Region abundance

Key:

cfs = cubic feet per second

LFS = longfin smelt

OMR = Old and Middle River

PTM = particle tracking model



Appendix B - Sensitivity of Abundance Methodology

Entrainment Estimates for Flow Condition 3: 03/17/2026

Entrainment estimates for the three-week forecast period starting 03/17/2026 using the two different abundance methods are shown in Tables B-16 through B-21. Weekly average inflows during this period were 24,011 cfs, 21,866 cfs, and 20,000 cfs for the Sacramento River, and 4,844 cfs, 4,543 cfs, and 4,500 cfs for the San Joaquin River, with all three weeks classified as a medhi flow condition. Primary observations across the two methods include:

- The design-based method is estimating no larva abundance in the South Delta. Entrainment is observed first from the Lower San Joaquin region in Week 1, then from the Sacramento/North Delta, Lower San Joaquin, and Lower Sacramento regions for Week 2 and Week 3.
- In regions where entrainment is observed, the Kimmerer and Gross method is estimating relatively more abundance in the Lower San Joaquin, South Delta, and Lower Sacramento, and Sacramento/North Delta regions than the design-based method. For Week 1, entrainment from all four regions is observed at OMR = -6,500 cfs, but only from the South Delta for OMR = -2,000 cfs. By Week 3, entrainment is observed across all four regions and OMR flow scenarios.
- Over the course of three weeks, the maximum cumulative entrainment of LFS larva is estimated at the OMR = -6,500 cfs scenario as 0.6% of the Delta-wide population using the design-based method, and 0.5% using the Kimmerer and Gross method. The methods show similar levels of Delta-wide entrainment at different OMR levels.

Appendix B - Sensitivity of Abundance Methodology

Table B-16. Design-Based Longfin Smelt Abundance Estimate and Entrainment Using Surface Oriented Particles: Week 1 Ending 03/23/2026

OMR (cfs)	Region	West	Suisun	Sacramento/ North Delta	Lower San Joaquin	Lower Sacramento	South Delta	East	Delta-Wide Total (#)	Delta-Wide Total (%)
	Metric									
	LFS Larva Abundance (Survey 6: 3/9/2026)	4,086,949	42,108,829	304,865	3,645,226	3,225,406	0	0	53,371,275	0
-6,500	PTM Entrained (%)	0.0	0.0	0.0	0.3	<0.1	0.0	0.0	-	-
-5,000	PTM Entrained (%)	0.0	0.0	0.0	<0.1	0.0	0.0	0.0	-	-
-3,500	PTM Entrained (%)	0.0	0.0	0.0	<0.1	0.0	0.0	0.0	-	-
-2,000	PTM Entrained (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	-
-6,500	LFS Larva Entrained (#)	0	0	0	10,684	404	0	0	11,088	<0.1%
-5,000	LFS Larva Entrained (#)	0	0	0	2,810	0	0	0	2,810	<0.1%
-3,500	LFS Larva Entrained (#)	0	0	0	646	0	0	0	646	<0.1%
-2,000	LFS Larva Entrained (#)	0	0	0	0	0	0	0	0	0.0%

Notes:

Values between 0.0 and 0.1 are indicated with <0.1

The PTM entrained (%) value reflects the total entrained particles from all subregions within an LFS Region divided by the estimated LFS Region abundance

Key:

cfs = cubic feet per second

LFS = longfin smelt

OMR = Old and Middle River

PTM = particle tracking model

Appendix B - Sensitivity of Abundance Methodology

Table B-17. Kimmerer and Gross Longfin Smelt Abundance Estimate and Entrainment Using Surface Oriented Particles: Week 1 Ending 03/23/2026

OMR (cfs)	Region Metric	West	Suisun	Sacra- mento/ North Delta	Lower San Joaquin	Lower Sacra- mento	South Delta	East	Delta-Wide Total (#)	Delta- Wide Total (%)
	LFS Larva Abundance (Survey 6: 3/9/2026)	19,965,533	45,970,510	382,525	4,176,013	7,196,704	355,018	0	78,046,302	0
-6,500	PTM Entrained (%)	0.0	0.0	<0.1	0.4	<0.1	36.5	0.0	-	-
-5,000	PTM Entrained (%)	0.0	0.0	0.0	0.1	0.0	28.1	0.0	-	-
-3,500	PTM Entrained (%)	0.0	0.0	0.0	<0.1	0.0	21.1	0.0	-	-
-2,000	PTM Entrained (%)	0.0	0.0	0.0	0.0	0.0	10.6	0.0	-	-
-6,500	LFS Larva Entrained (#)	0	0	326	15,058	149	129,637	0	145,170	0.2%
-5,000	LFS Larva Entrained (#)	0	0	0	4,263	0	99,672	0	103,935	0.1%
-3,500	LFS Larva Entrained (#)	0	0	0	752	0	74,892	0	75,644	<0.1%
-2,000	LFS Larva Entrained (#)	0	0	0	0	0	37,775	0	37,775	<0.1%

Notes:

Values between 0.0 and 0.1 are indicated with <0.1

The PTM entrained (%) value reflects the total entrained particles from all subregions within an LFS Region divided by the estimated LFS Region abundance

Key:

cfs = cubic feet per second

LFS = longfin smelt

OMR = Old and Middle River

PTM = particle tracking model

Appendix B - Sensitivity of Abundance Methodology

Table B-18. Design-Based Longfin Smelt Abundance Estimate and Entrainment Using Surface Oriented Particles: Week 2 Ending 03/30/2026

OMR (cfs)	Region	West	Suisun	Sacramento/ North Delta	Lower San Joaquin	Lower Sacramento	South Delta	East	Delta-Wide Total (#)	Delta-Wide Total (%)
	Metric									
	LFS Larva Abundance (Survey 6: 3/9/2026)	4,086,949	42,108,829	304,865	3,645,226	3,225,406	0	0	53,371,275	0
-6,500	PTM Entrained (%)	0.0	0.0	0.8	3.9	0.2	0.0	0.0	-	-
-5,000	PTM Entrained (%)	0.0	0.0	0.7	2.4	0.2	0.0	0.0	-	-
-3,500	PTM Entrained (%)	0.0	0.0	0.2	0.9	<0.1	0.0	0.0	-	-
-2,000	PTM Entrained (%)	0.0	0.0	0.0	0.1	0.0	0.0	0.0	-	-
-6,500	LFS Larva Entrained (#)	0	0	2,439	143,248	5,244	0	0	150,931	0.3%
-5,000	LFS Larva Entrained (#)	0	0	2,134	86,624	7,258	0	0	96,017	0.2%
-3,500	LFS Larva Entrained (#)	0	0	610	32,607	2,822	0	0	36,039	<0.1%
-2,000	LFS Larva Entrained (#)	0	0	0	4,320	0	0	0	4,320	<0.1%

Notes:

Values between 0.0 and 0.1 are indicated with <0.1

The PTM entrained (%) value reflects the total entrained particles from all subregions within an LFS Region divided by the estimated LFS Region abundance

Key:

cfs = cubic feet per second

LFS = longfin smelt

OMR = Old and Middle River

PTM = particle tracking model

Appendix B - Sensitivity of Abundance Methodology

Table B-19. Kimmerer and Gross Longfin Smelt Abundance Estimate and Entrainment Using Surface Oriented Particles: Week 2 Ending 03/30/2026

OMR (cfs)	Region	West	Suisun	Sacramento/ North Delta	Lower San Joaquin	Lower Sacramento	South Delta	East	Delta-Wide Total (#)	Delta-Wide Total (%)
	Metric									
	LFS Larva Abundance (Survey 6: 3/9/2026)	19,965,533	45,970,510	382,525	4,176,013	7,196,704	355,018	0	78,046,302	0
-6,500	PTM Entrained (%)	0.0	0.0	0.9	3.0	<0.1	50.2	0.0	-	-
-5,000	PTM Entrained (%)	0.0	0.0	0.4	1.5	<0.1	43.6	0.0	-	-
-3,500	PTM Entrained (%)	0.0	0.0	0.2	0.6	<0.1	35.0	0.0	-	-
-2,000	PTM Entrained (%)	0.0	0.0	<0.1	0.2	0.0	23.2	0.0	-	-
-6,500	LFS Larva Entrained (#)	0	0	3,278	123,640	2,166	178,272	0	307,356	0.4%
-5,000	LFS Larva Entrained (#)	0	0	1,348	61,087	1,073	154,811	0	218,319	0.3%
-3,500	LFS Larva Entrained (#)	0	0	738	25,812	365	124,089	0	151,004	0.2%
-2,000	LFS Larva Entrained (#)	0	0	149	7,112	0	82,305	0	89,566	0.1%

Notes:

Values between 0.0 and 0.1 are indicated with <0.1

The PTM entrained (%) value reflects the total entrained particles from all subregions within an LFS Region divided by the estimated LFS Region abundance

Key:

cfs = cubic feet per second

LFS = longfin smelt

OMR = Old and Middle River

PTM = particle tracking model

Appendix B - Sensitivity of Abundance Methodology

Table B-20. Design-Based Longfin Smelt Abundance Estimate and Entrainment Using Surface Oriented Particles: Week 3 Ending 04/06/2026

OMR (cfs)	Region Metric	West	Suisun	Sacra- mento/ North Delta	Lower San Joaquin	Lower Sacra- mento	South Delta	East	Delta-Wide Total (#)	Delta- Wide Total (%)
	LFS Larva Abundance (Survey 6: 3/9/2026)	4,086,949	42,108,829	304,865	3,645,226	3,225,406	0	0	53,371,275	0
-6,500	PTM Entrained (%)	0.0	0.0	1.7	7.4	0.8	0.0	0.0	-	-
-5,000	PTM Entrained (%)	0.0	0.0	1.3	4.9	0.2	0.0	0.0	-	-
-3,500	PTM Entrained (%)	0.0	0.0	0.3	2.3	0.2	0.0	0.0	-	-
-2,000	PTM Entrained (%)	0.0	0.0	0.1	0.6	0.0	0.0	0.0	-	-
-6,500	LFS Larva Entrained (#)	0	0	5,183	268,965	26,616	0	0	300,763	0.6%
-5,000	LFS Larva Entrained (#)	0	0	3,963	178,370	7,662	0	0	189,995	0.4%
-3,500	LFS Larva Entrained (#)	0	0	915	82,960	6,855	0	0	90,730	0.2%
-2,000	LFS Larva Entrained (#)	0	0	305	21,828	0	0	0	22,133	<0.1%

Notes:

Values between 0.0 and 0.1 are indicated with <0.1

The PTM entrained (%) value reflects the total entrained particles from all subregions within an LFS Region divided by the estimated LFS Region abundance

Key:

cfs = cubic feet per second

LFS = longfin smelt

OMR = Old and Middle River

PTM = particle tracking model

Appendix B - Sensitivity of Abundance Methodology

Table B-21. Kimmerer and Gross Longfin Smelt Abundance Estimate and Entrainment Using Surface Oriented Particles: Week 3 Ending 04/06/2026

OMR (cfs)	Region	West	Suisun	Sacramento/ North Delta	Lower San Joaquin	Lower Sacramento	South Delta	East	Delta-Wide Total (#)	Delta-Wide Total (%)
	Metric									
	LFS Larva Abundance (Survey 6: 3/9/2026)	19,965,533	45,970,510	382,525	4,176,013	7,196,704	355,018	0	78,046,302	0
-6,500	PTM Entrained (%)	0.0	0.0	2.4	5.2	0.1	54.2	0.0	-	-
-5,000	PTM Entrained (%)	0.0	0.0	0.8	3.1	<0.1	48.9	0.0	-	-
-3,500	PTM Entrained (%)	0.0	0.0	0.3	1.5	<0.1	41.0	0.0	-	-
-2,000	PTM Entrained (%)	0.0	0.0	0.1	0.4	<0.1	29.2	0.0	-	-
-6,500	LFS Larva Entrained (#)	0	0	9,042	218,647	7,468	192,367	0	427,523	0.5%
-5,000	LFS Larva Entrained (#)	0	0	3,168	129,752	2,331	173,550	0	308,801	0.4%
-3,500	LFS Larva Entrained (#)	0	0	1,297	64,230	924	145,454	0	211,904	0.3%
-2,000	LFS Larva Entrained (#)	0	0	505	18,325	101	103,719	0	122,650	0.2%

Notes:

Values between 0.0 and 0.1 are indicated with <0.1

The PTM entrained (%) value reflects the total entrained particles from all subregions within an LFS Region divided by the estimated LFS Region abundance

Key:

cfs = cubic feet per second

LFS = longfin smelt

OMR = Old and Middle River

PTM = particle tracking model



Appendix B - Sensitivity of Abundance Methodology

Entrainment Estimates for Flow Condition 4: 03/31/2026

Entrainment estimates for the three-week forecast period starting 03/31/2026 using the two different abundance methods are shown in Tables B-22 through B-27. Weekly average inflows during this period were 12,428 cfs, 11,423 cfs, and 10,500 cfs for the Sacramento River, and 2,196 cfs, 2,200 cfs, and 2,200 cfs for the San Joaquin River, with all three weeks classified as a lomed flow condition. For this forecast period, the OMR bin for all three weeks reflects the forecasted OMR levels at the beginning of Week 1. However, forecasted SWP and CVP exports were reduced during and after Week 1 due to State Water Project Incidental Take Permit requirements and D-1641 water quality control requirements (Figure B-3). The OMR level designation from the beginning of week 1 is kept for the entire period for consistency with other flow condition estimates. Primary observations across the two methods include:

- The design-based method is estimating no larva abundance in the South Delta. Entrainment is observed first from the Lower San Joaquin region in Week 1, then from the Sacramento/North Delta, Lower San Joaquin, and Lower Sacramento regions for Week 2 and Week 3.
- In regions where entrainment is observed, the Kimmerer and Gross method is estimating relatively more abundance in the Lower San Joaquin, South Delta, and Lower Sacramento, and Sacramento/North Delta regions than the design-based method. For Week 1, entrainment from all four regions is observed at OMR = -6,500 cfs, but only from the South Delta for OMR = -2,000 cfs. By Week 3, entrainment is observed across all four regions and OMR flow scenarios.
- Over the course of three weeks, the maximum cumulative entrainment of LFS larva is estimated at the OMR = -6,500 cfs scenario as 0.6% of the Delta-wide population using the design-based method, and 0.5% using the Kimmerer and Gross method. The methods show similar levels of Delta-wide entrainment at different OMR levels.



Appendix B - Sensitivity of Abundance Methodology

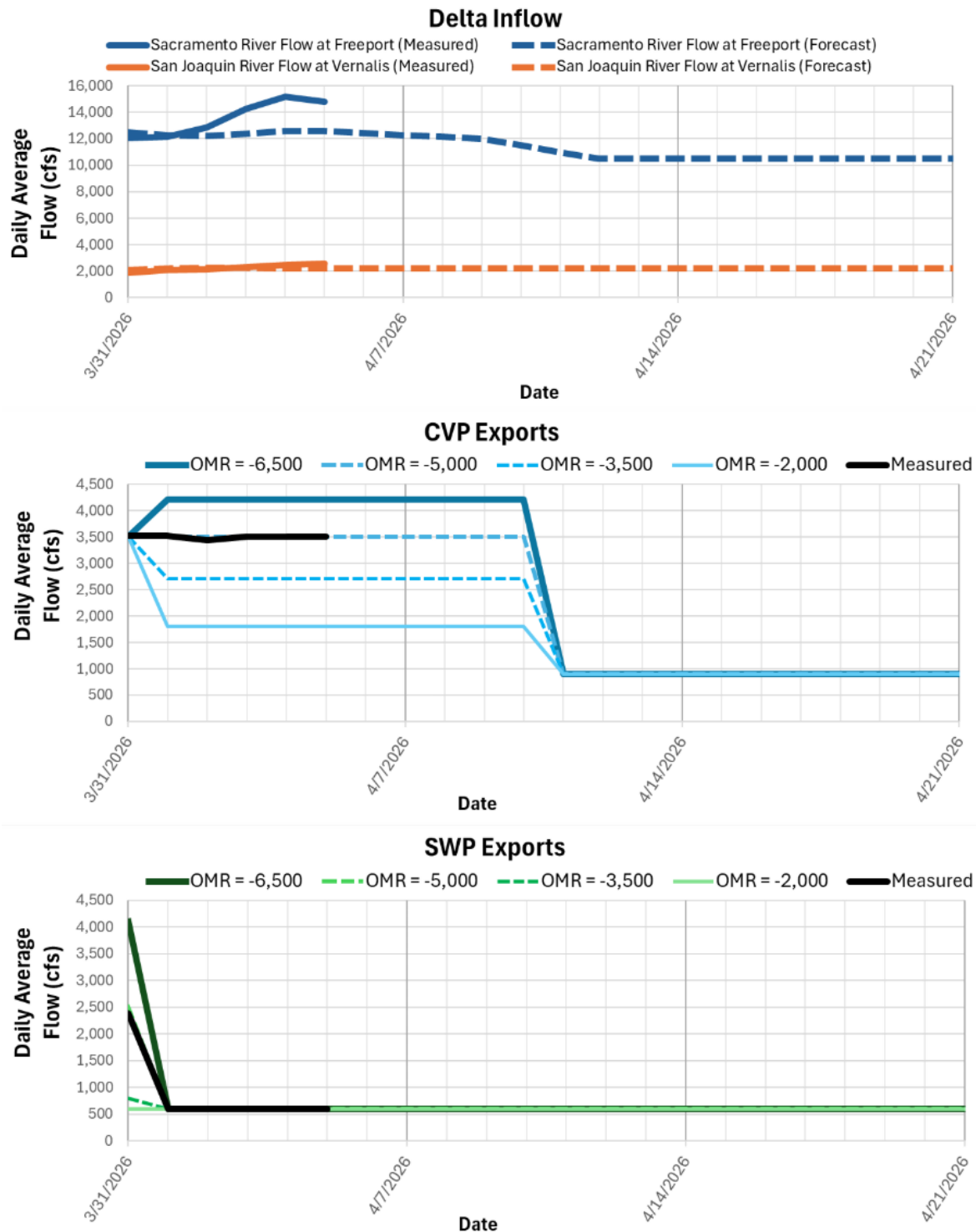


Figure B-3. Three Week Forecast for Delta Inflow (top), Central Valley Project Exports (middle), and State Water Project Exports (bottom)

Appendix B - Sensitivity of Abundance Methodology

Table B-22. Design-Based Longfin Smelt Abundance Estimate and Entrainment Using Surface Oriented Particles: Week 1 Ending 04/06/2026

OMR (cfs)	Region	West	Suisun	Sacramento/ North Delta	Lower San Joaquin	Lower Sacramento	South Delta	East	Delta-Wide Total (#)	Delta-Wide Total (%)
	Metric									
	LFS Larva Abundance (Survey 6: 3/9/2026)	4,086,949	42,108,829	304,865	3,645,226	3,225,406	0	0	53,371,275	-
-6,500	PTM Entrained (%)	0.0	0.0	0.0	<0.1	0.0	0.0	0.0	-	-
-5,000	PTM Entrained (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	-
-3,500	PTM Entrained (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	-
-2,000	PTM Entrained (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	-
-6,500	LFS Larva Entrained (#)	0	0	0	434	0	0	0	434	<0.1%
-5,000	LFS Larva Entrained (#)	0	0	0	0	0	0	0	0	0.0%
-3,500	LFS Larva Entrained (#)	0	0	0	0	0	0	0	0	0.0%
-2,000	LFS Larva Entrained (#)	0	0	0	0	0	0	0	0	0.0%

Notes:

Values between 0.0 and 0.1 are indicated with <0.1

The PTM entrained (%) value reflects the total entrained particles from all subregions within an LFS Region divided by the estimated LFS Region abundance

Key:

cfs = cubic feet per second

LFS = longfin smelt

OMR = Old and Middle River

PTM = particle tracking model

Appendix B - Sensitivity of Abundance Methodology

Table B-23. Kimmerer and Gross Longfin Smelt Abundance Estimate and Entrainment Using Surface Oriented Particles: Week 1 Ending 04/06/2026

OMR (cfs)	Region	West	Suisun	Sacramento/ North Delta	Lower San Joaquin	Lower Sacramento	South Delta	East	Delta-Wide Total (#)	Delta-Wide Total (%)
	Metric									
	LFS Larva Abundance (Survey 6: 3/9/2026)	10,750,390	26,992,953	234,793	3,049,475	6,628,432	224,274	0	47,880,317	-
-6,500	PTM Entrained (%)	0.0	0.0	0.0	<0.1	0.0	25.4	0.0	-	-
-5,000	PTM Entrained (%)	0.0	0.0	0.0	<0.1	0.0	19.7	0.0	-	-
-3,500	PTM Entrained (%)	0.0	0.0	0.0	0.0	0.0	13.2	0.0	-	-
-2,000	PTM Entrained (%)	0.0	0.0	0.0	0.0	0.0	9.1	0.0	-	-
-6,500	LFS Larva Entrained (#)	0	0	0	1,044	0	57,006	0	58,050	0.1%
-5,000	LFS Larva Entrained (#)	0	0	0	783	0	44,226	0	45,009	<0.1%
-3,500	LFS Larva Entrained (#)	0	0	0	0	0	29,581	0	29,581	<0.1%
-2,000	LFS Larva Entrained (#)	0	0	0	0	0	20,340	0	20,340	<0.1%

Notes:

Values between 0.0 and 0.1 are indicated with <0.1

The PTM entrained (%) value reflects the total entrained particles from all subregions within an LFS Region divided by the estimated LFS Region abundance

Key:

cfs = cubic feet per second

LFS = longfin smelt

OMR = Old and Middle River

PTM = particle tracking model

Appendix B - Sensitivity of Abundance Methodology

Table B-24. Design-Based Longfin Smelt Abundance Estimate and Entrainment Using Surface Oriented Particles: Week 2 Ending 04/13/2026

OMR (cfs)	Region	West	Suisun	Sacramento/ North Delta	Lower San Joaquin	Lower Sacramento	South Delta	East	Delta-Wide Total (#)	Delta-Wide Total (%)
	Metric									
	LFS Larva Abundance (Survey 6: 3/9/2026)	4,086,949	42,108,829	304,865	3,645,226	3,225,406	0	0	53,371,275	-
-6,500	PTM Entrained (%)	0.0	0.0	0.4	0.7	<0.1	0.0	0.0	-	-
-5,000	PTM Entrained (%)	0.0	0.0	0.1	0.2	<0.1	0.0	0.0	-	-
-3,500	PTM Entrained (%)	0.0	0.0	0.0	0.2	0.0	0.0	0.0	-	-
-2,000	PTM Entrained (%)	0.0	0.0	0.0	<0.1	0.0	0.0	0.0	-	-
-6,500	LFS Larva Entrained (#)	0	0	1,219	26,593	2,822	0	0	30,634	<0.1%
-5,000	LFS Larva Entrained (#)	0	0	305	9,096	1,211	0	0	10,612	<0.1%
-3,500	LFS Larva Entrained (#)	0	0	0	7,528	0	0	0	7,528	<0.1%
-2,000	LFS Larva Entrained (#)	0	0	0	217	0	0	0	217	<0.1%

Notes:

Values between 0.0 and 0.1 are indicated with <0.1

The PTM entrained (%) value reflects the total entrained particles from all subregions within an LFS Region divided by the estimated LFS Region abundance

Key:

cfs = cubic feet per second

LFS = longfin smelt

OMR = Old and Middle River

PTM = particle tracking model

Appendix B - Sensitivity of Abundance Methodology

Table B-25. Kimmerer and Gross Longfin Smelt Abundance Estimate and Entrainment Using Surface Oriented Particles: Week 2 Ending 04/13/2026

OMR (cfs)	Region Metric	West	Suisun	Sacra- mento/ North Delta	Lower San Joaquin	Lower Sacra- mento	South Delta	East	Delta-Wide Total (#)	Delta- Wide Total (%)
	LFS Larva Abundance (Survey 6: 3/9/2026)	10,750,390	26,992,953	234,793	3,049,475	6,628,432	224,274	0	47,880,317	-
-6,500	PTM Entrained (%)	0.0	0.0	0.2	0.6	<0.1	35.3	0.0	-	-
-5,000	PTM Entrained (%)	0.0	0.0	<0.1	0.3	<0.1	31.3	0.0	-	-
-3,500	PTM Entrained (%)	0.0	0.0	0.0	<0.1	0.0	24.2	0.0	-	-
-2,000	PTM Entrained (%)	0.0	0.0	0.0	<0.1	0.0	15.8	0.0	-	-
-6,500	LFS Larva Entrained (#)	0	0	410	16,846	243	79,141	0	96,640	0.2%
-5,000	LFS Larva Entrained (#)	0	0	34	9,565	410	70,306	0	80,315	0.2%
-3,500	LFS Larva Entrained (#)	0	0	0	2,977	0	54,279	0	57,256	0.1%
-2,000	LFS Larva Entrained (#)	0	0	0	261	0	35,385	0	35,646	<0.1%

Notes:

Values between 0.0 and 0.1 are indicated with <0.1

The PTM entrained (%) value reflects the total entrained particles from all subregions within an LFS Region divided by the estimated LFS Region abundance

Key:

cfs = cubic feet per second

LFS = longfin smelt

OMR = Old and Middle River

PTM = particle tracking model

Appendix B - Sensitivity of Abundance Methodology

Table B-26. Design-Based Longfin Smelt Abundance Estimate and Entrainment Using Surface Oriented Particles: Week 3 Ending 04/20/2026

OMR (cfs)	Region	West	Suisun	Sacramento/ North Delta	Lower San Joaquin	Lower Sacramento	South Delta	East	Delta-Wide Total (#)	Delta-Wide Total (%)
	Metric									
	LFS Larva Abundance (Survey 6: 3/9/2026)	4,086,949	42,108,829	304,865	3,645,226	3,225,406	0	0	53,371,275	-
-6,500	PTM Entrained (%)	0.0	0.0	0.4	1.0	<0.1	0.0	0.0	-	-
-5,000	PTM Entrained (%)	0.0	0.0	0.2	0.4	<0.1	0.0	0.0	-	-
-3,500	PTM Entrained (%)	0.0	0.0	0.0	0.3	0.0	0.0	0.0	-	-
-2,000	PTM Entrained (%)	0.0	0.0	0.0	<0.1	<0.1	0.0	0.0	-	-
-6,500	LFS Larva Entrained (#)	0	0	1,219	35,031	2,822	0	0	39,072	<0.1%
-5,000	LFS Larva Entrained (#)	0	0	610	15,162	1,211	0	0	16,983	<0.1%
-3,500	LFS Larva Entrained (#)	0	0	0	10,768	0	0	0	10,768	<0.1%
-2,000	LFS Larva Entrained (#)	0	0	0	867	404	0	0	1,271	<0.1%

Notes:

Values between 0.0 and 0.1 are indicated with <0.1

The PTM entrained (%) value reflects the total entrained particles from all subregions within an LFS Region divided by the estimated LFS Region abundance

Key:

cfs = cubic feet per second

LFS = longfin smelt

OMR = Old and Middle River

PTM = particle tracking model

Appendix B - Sensitivity of Abundance Methodology

Table B-27. Kimmerer and Gross Longfin Smelt Abundance Estimate and Entrainment Using Surface Oriented Particles: Week 3 Ending 04/20/2026

OMR (cfs)	Region	West	Suisun	Sacramento/ North Delta	Lower San Joaquin	Lower Sacramento	South Delta	East	Delta-Wide Total (#)	Delta-Wide Total (%)
	Metric									
	LFS Larva Abundance (Survey 6: 3/9/2026)	10,750,390	26,992,953	234,793	3,049,475	6,628,432	224,274	0	47,880,317	-
-6,500	PTM Entrained (%)	0.0	0.0	0.3	0.7	<0.1	37.5	0.0	-	-
-5,000	PTM Entrained (%)	0.0	0.0	0.1	0.3	<0.1	33.7	0.0	-	-
-3,500	PTM Entrained (%)	0.0	0.0	0.0	0.1	<0.1	26.7	0.0	-	-
-2,000	PTM Entrained (%)	0.0	0.0	0.0	<0.1	<0.1	18.5	0.0	-	-
-6,500	LFS Larva Entrained (#)	0	0	811	20,500	308	84,060	0	105,678	0.2%
-5,000	LFS Larva Entrained (#)	0	0	250	10,661	410	75,652	0	86,973	0.2%
-3,500	LFS Larva Entrained (#)	0	0	0	3,342	32	59,932	0	63,307	0.1%
-2,000	LFS Larva Entrained (#)	0	0	0	992	147	41,431	0	42,570	<0.1%

Notes:

Values between 0.0 and 0.1 are indicated with <0.1

The PTM entrained (%) value reflects the total entrained particles from all subregions within an LFS Region divided by the estimated LFS Region abundance.

Key:

cfs = cubic feet per second

LFS = longfin smelt

OMR = Old and Middle River

PTM = particle tracking model

Appendix B - Sensitivity of Abundance Methodology

Summary

Estimates of Delta-wide entrainment of LFS larva using two different sets of particle tracking model injection nodes and two different abundance methods, the design-based method and the Kimmerer and Gross method, showed minimal differences in the final outputs. Delta-wide entrainment estimates are generally similar at the end of each week and for comparable OMR scenarios, typically within 0.2% or less of each other. The design-based method is relatively simplistic and makes strong assumptions about the homogeneity of LFS catches within a spatial stratum. In contrast, the Kimmerer and Gross method is a more complex approach to abundance estimation that incorporates environmental covariates and can estimate abundance beyond the sampled extent of the estuary by incorporating salinity data. However, the Kimmerer and Gross method is also more analytically intensive from both a coding, run-time, and model diagnostic perspective. Based on the results of this comparison, the two abundance estimation methods seem to produce consistently similar results, and either approach should therefore be appropriate for further proportional entrainment analyses.



Attachment A. Delta Real-Time Forecast Summary for 03/03/2026

Date Published: 03/09/2026

Forecast Period: 03/03/2026 – 03/22/2026

Forecast Week 1: 03/03/2026 – 03/08/2026

Forecast Week 2: 03/09/2026 – 03/15/2026

Forecast Week 3: 03/16/2026 – 03/22/2026

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- [Reclamation Forecast Flow and Export Data](#)
- [Delta Export Zone of Influence](#)
- [PTM \(Particle Tracking Model\)](#)
 - [Neutrally Buoyant Particles \(NP\)](#)
 - [Surface-Oriented Particles](#)
- [ECO-PTM \(Ecological Particle Tracking Model\)](#)
- [Longfin Smelt Larval Population and PTM Analysis](#)

A.1 Common Assumptions

The model run results cover the period March 3, 2026 through March 23, 2026 and are based on the following assumptions established by the California Department of Water Resources:

1. Clifton Court Forebay (CCFB) Gates are operating to Priority 3.
2. The Delta Cross Channel gates are closed.
3. Suisun Marsh Salinity Control flashboards are in. All three gates are in open position from March 2.
4. San Joaquin River flow at Vernalis is at 6,611 cubic feet per second (cfs) at the beginning of the forecast period and is estimated to decrease 4,000 cfs by the end of the forecast period.
5. San Joaquin River EC at Vernalis is at 266 micromhos per centimeter ($\mu\text{mhos}/\text{cm}$) at the beginning of the forecast period and is estimated to increase to 366 $\mu\text{mhos}/\text{cm}$ at the end of the forecast period.
6. Sacramento River flow at Freeport is at 60,568 cfs at the beginning of the forecast period and is expected to decrease to 22,500 cfs by the end of the forecast period.
7. CCFB inflow is at 4,491 cfs at the beginning of the forecast period and is expected to decrease to 3,000 cfs by the end of the forecast period.
8. Export at Jones Pumping Plant is at 4,244 cfs at the beginning of the forecast period and is expected to decrease to 4,200 cfs to the end of the forecast period.

As shown in the next section, assumptions 4 and 6 are updated based on Reclamation forecast data, and assumption 8 and exports at Banks Pumping Plant have been modified to include four different forecast scenarios at an Old and Middle River (OMR) index of -6,500 cfs, -5,000 cfs, -3,500 cfs, and -2,000 cfs.

A.2 Reclamation Forecast Flow and Export Data

Table 1. Weekly Averaged Forecasted Flow Data and Flow Bins

Forecast Week	Sacramento River at Freeport (cfs)	Sac Flow Bin	San Joaquin River at Vernalis (cfs)	SJR Flow Bin	Delta Inflow Bin
Week 1 03/03/2026 - 03/08/2026	50,076	hi	6,194	hi	hihi
Week 2 03/09/2026 - 03/15/2026	33,048	hi	3,571	med	himed
Week 3 03/16/2026 - 03/22/2026	32,000	hi	2,500	med	himed

Key:

cfs = cubic feet per second

Sac = Sacramento River

SJR = San Joaquin River



Attachment A. Delta Real-Time Forecast Summary for 03/03/2026

Table 2. Weekly Averaged CVP and SWP Exports by OMR Bin

Forecast Week	OMR Bin (cfs)	CVP Exports ¹ (cfs)	SWP Exports (cfs)	Total Exports (cfs)	CVP Exports (% of total)	SWP Exports (% of total)
Week 1: 03/03/2026 - 03/08/2026	-6,500	4,208	5,968	10,175	41%	59%
	-5,000	4,208	4,308	8,515	49%	51%
	-3,500	4,208	2,690	6,898	61%	39%
	-2,000	3,134	2,075	5,209	60%	40%
Week 2: 03/09/2026 - 03/15/2026	-6,500	4,208	4,680	8,887	47%	53%
	-5,000	4,208	3,034	7,242	58%	42%
	-3,500	3,606	2,004	5,610	64%	36%
	-2,000	2,447	1,488	3,935	62%	38%
Week 3: 03/16/2026 - 03/22/2026	-6,500	4,208	3,907	8,115	52%	48%
	-5,000	4,208	2,204	6,412	66%	34%
	-3,500	3,506	1,303	4,809	73%	27%
	-2,000	1,803	1,303	3,106	58%	42%

Note:

¹ One pumping unit is currently out of service at Jones Pumping Plant until August 2026. The current maximum pumping rate at Jones Pumping Plant (CVP Exports) is 4,200 cfs.

Key:

cfs = cubic feet per second

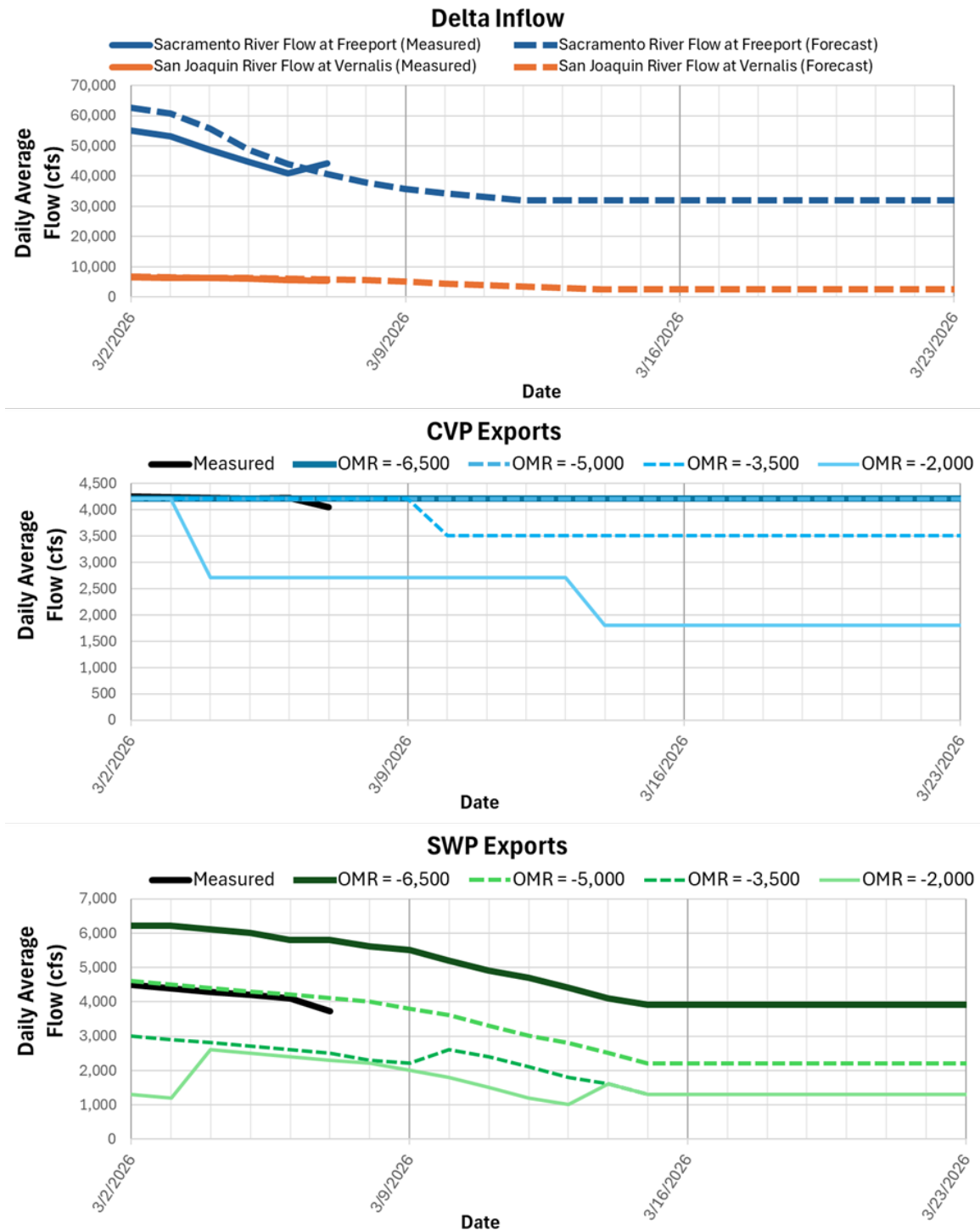
CVP = Central Valley Project

OMR = Old and Middle River

SWP = State Water Project



Attachment A. Delta Real-Time Forecast Summary for 03/03/2026

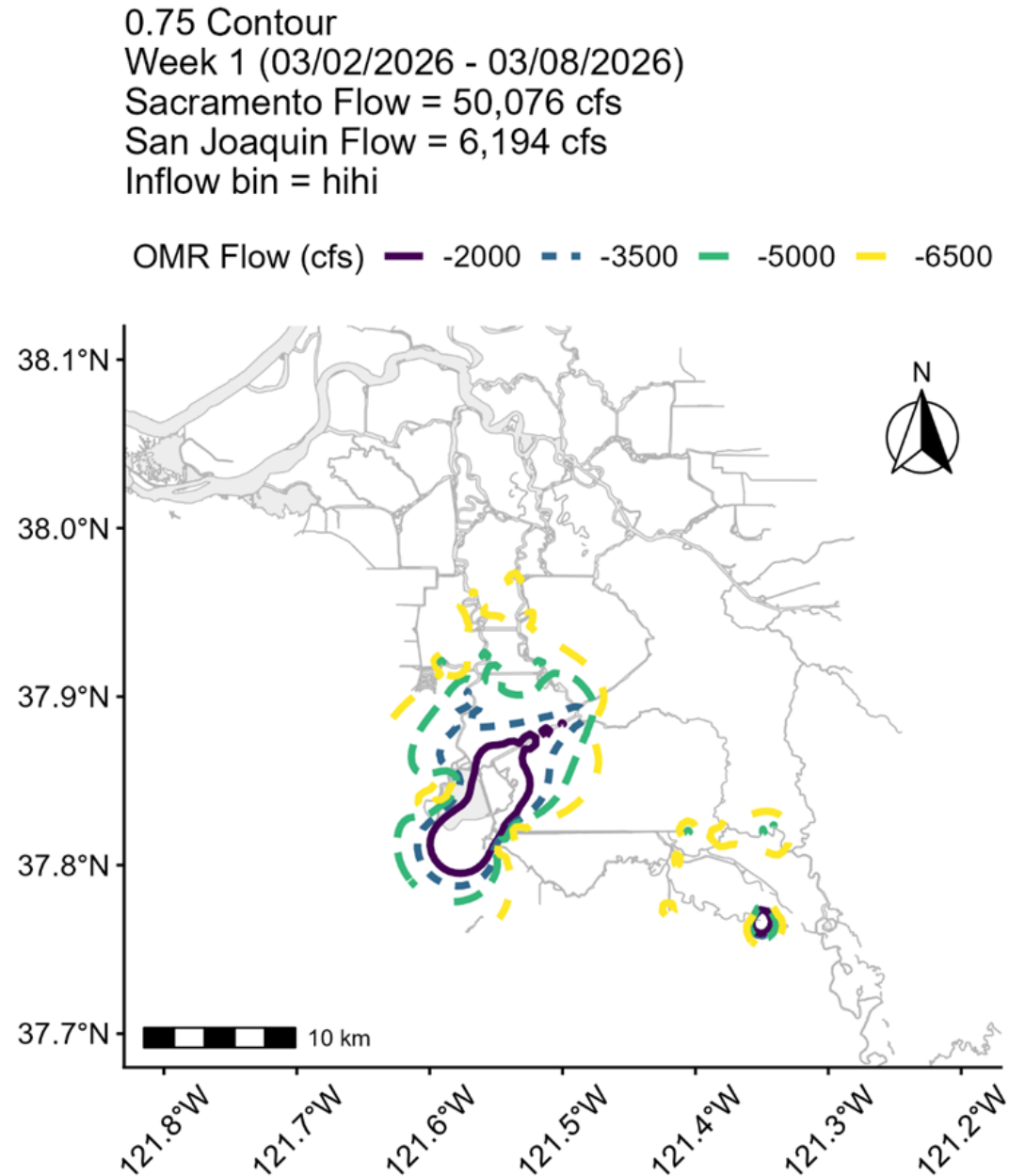


Key: CVP = Central Valley Project, OMR = Old and Middle River, SWP = State Water Project

Figure 1. Daily Average Flow for Measured and Forecasted Delta Inflow, CVP Exports, and SWP Exports



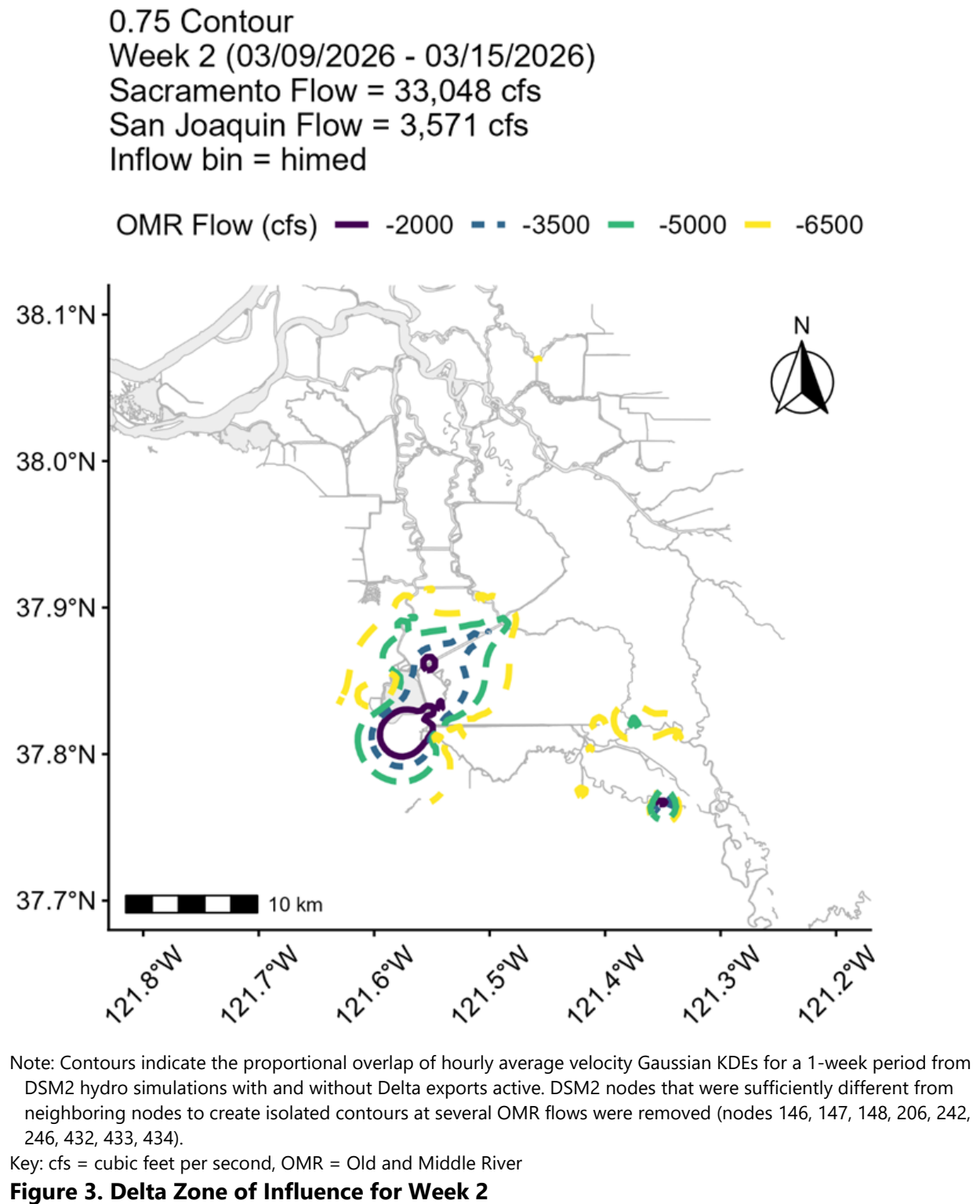
A.3 Delta Export Zone of Influence



Note: Contours indicate the proportional overlap of hourly average velocity Gaussian KDEs for a 1-week period from DSM2 hydro simulations with and without Delta exports active. DSM2 nodes that were sufficiently different from neighboring nodes to create isolated contours at several OMR flows were removed (nodes 146, 147, 148, 206, 242, 246, 432, 433, 434).

Key: cfs = cubic feet per second, OMR = Old and Middle River

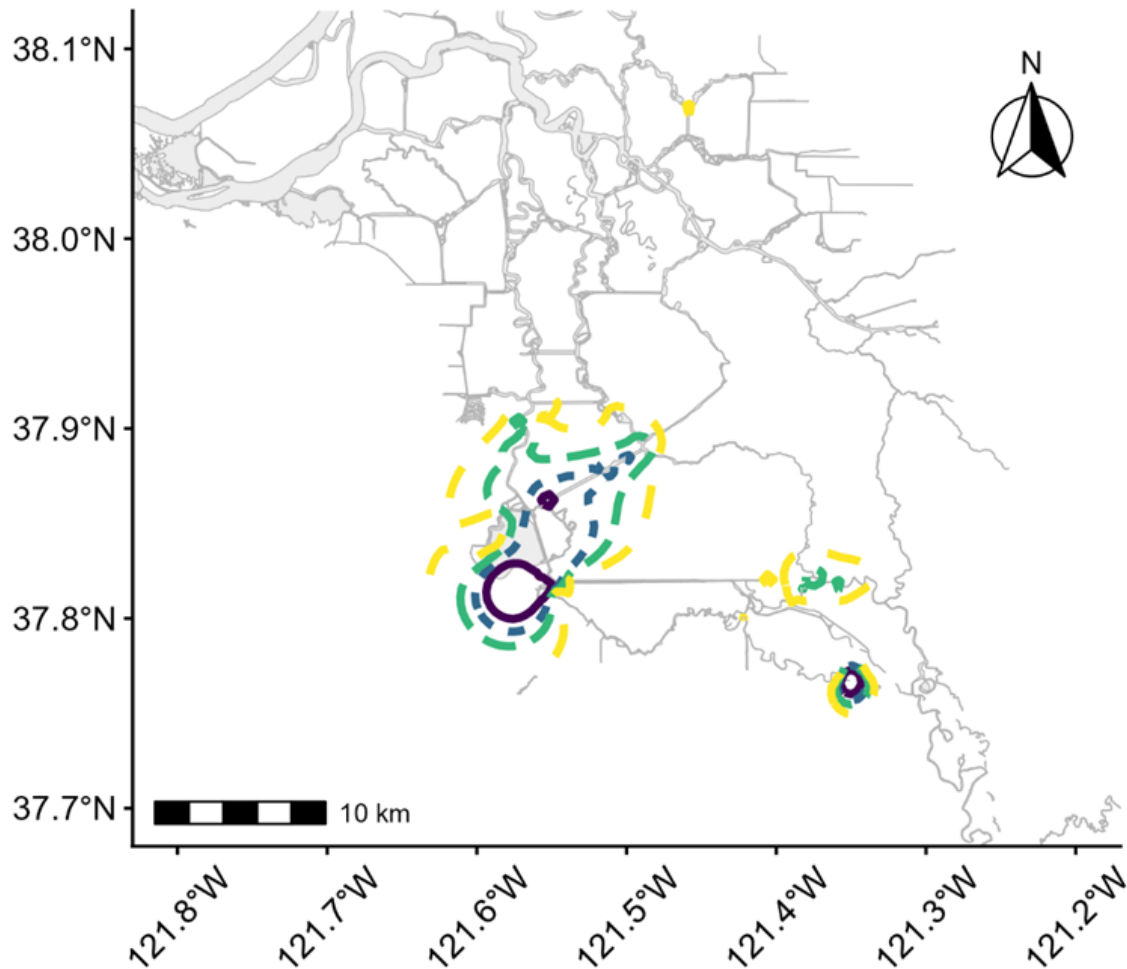
Figure 2. Delta Zone of Influence for Week 1





0.75 Contour
Week 3 (03/16/2026 - 03/22/2026)
Sacramento Flow = 32,000 cfs
San Joaquin Flow = 2,500 cfs
Inflow bin = himed

OMR Flow (cfs) — -2000 — -3500 — -5000 — -6500



Note: Contours indicate the proportional overlap of hourly average velocity Gaussian KDEs for a 1-week period from DSM2 hydro simulations with and without Delta exports active. DSM2 nodes that were sufficiently different from neighboring nodes to create isolated contours at several OMR flows were removed (nodes 146, 147, 148, 206, 242, 246, 432, 433, 434).

Key: cfs = cubic feet per second, OMR = Old and Middle River

Figure 4. Delta Zone of Influence for Week 3



Attachment A. Delta Real-Time Forecast Summary for 03/03/2026

Table 3. Proportion of DSM2 Channel Length with Hydrologic Alteration from Pumping

Weekly Model Run	OMR Bin (cfs)	Sum Channel Length with Low HA (miles)	Channel Length with Low HA (%)	Sum Channel Length with Medium HA (miles)	Channel Length with Medium HA (%)	Sum Channel Length with High HA (miles)	Channel Length with High HA (%)
Week 1: 03/03/2026 - 03/08/2026	-6,500	613.9	91.4%	57.2	8.5%	0.9	0.1%
	-5,000	630.0	93.8%	41.1	6.1%	0.9	0.1%
	-3,500	649.0	96.6%	22.1	3.3%	0.9	0.1%
	-2,000	657.0	97.8%	14.1	2.1%	0.9	0.1%
Week 2: 03/09/2026 - 03/15/2026	-6,500	633.0	94.2%	37.3	5.5%	1.7	0.3%
	-5,000	646.9	96.3%	23.4	3.5%	1.7	0.3%
	-3,500	657.1	97.8%	14.1	2.1%	0.9	0.1%
	-2,000	666.7	99.2%	4.4	0.7%	0.9	0.1%
Week 3: 03/16/2026 - 03/22/2026	-6,500	624.9	93.0%	45.3	6.7%	1.7	0.3%
	-5,000	636.7	94.7%	33.6	5.0%	1.7	0.3%
	-3,500	652.3	97.1%	18.0	2.7%	1.7	0.3%
	-2,000	667.9	99.4%	3.2	0.5%	0.9	0.1%

Note:

Sum channel length includes the length of channels within the Delta that have a calculated hydrologic alteration level falling within each category

Key:

cfs = cubic feet per second

HA = hydrologic alteration

OMR = Old and Middle River



Attachment A. Delta Real-Time Forecast Summary for 03/03/2026

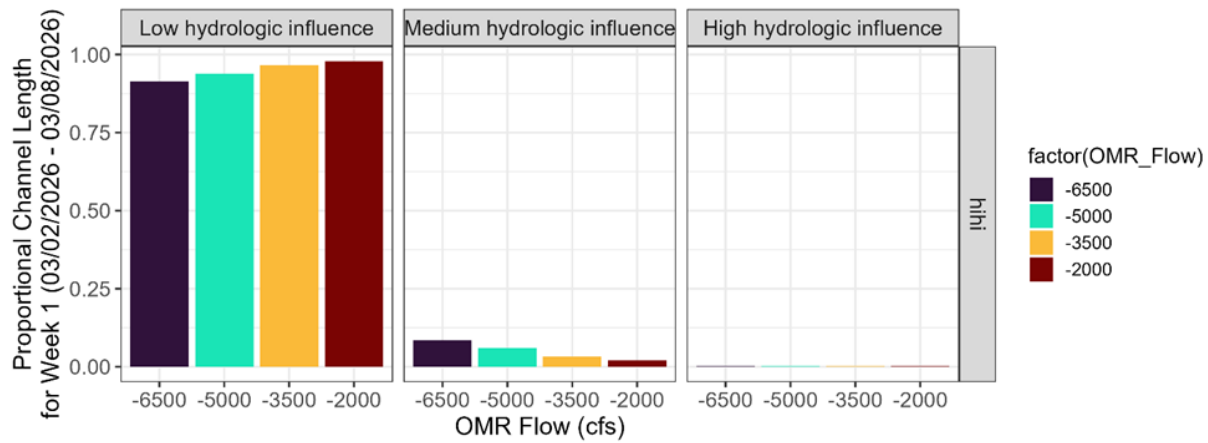


Figure 5. Proportional Channel Length for Week 1

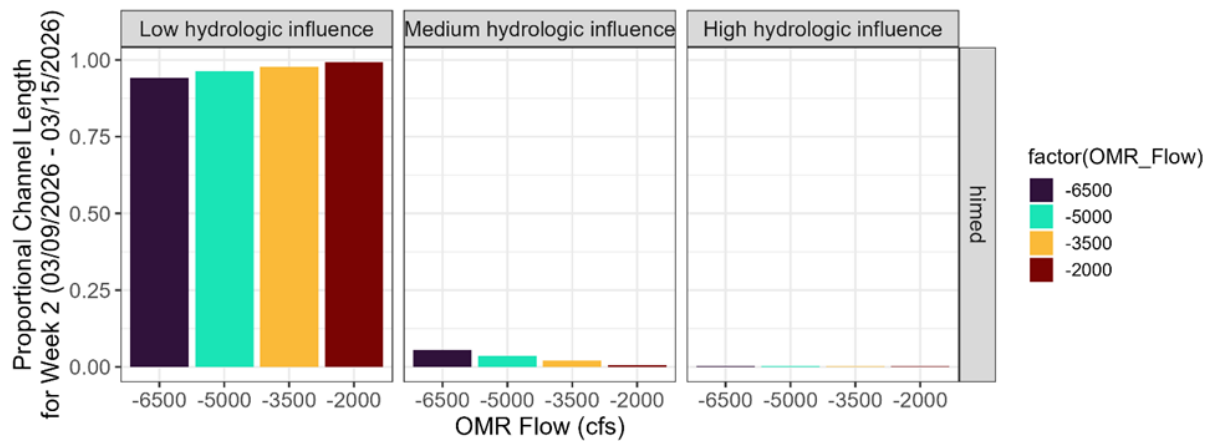
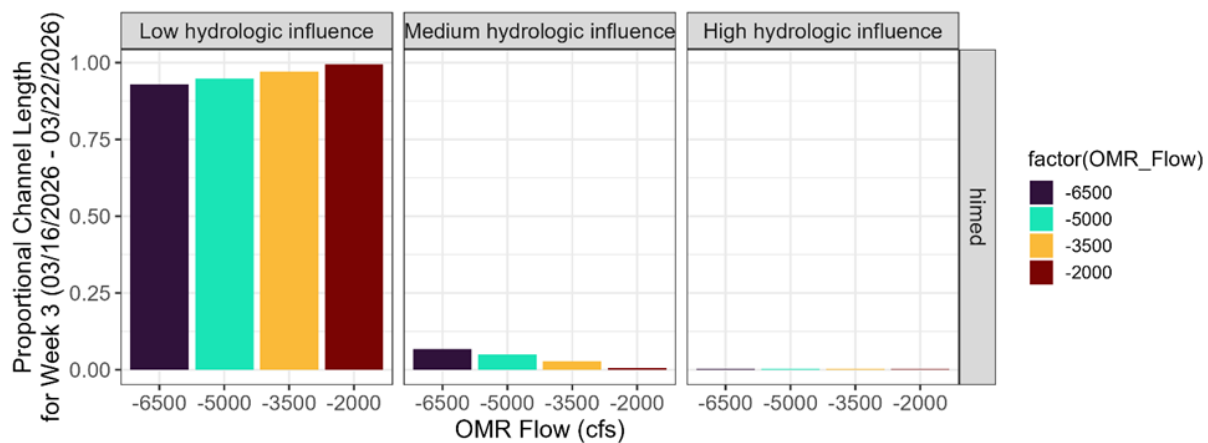


Figure 6. Proportional Channel Length for Week 2



Key: cfs = cubic feet per second, OMR = Old and Middle River

Figure 7. Proportional Channel Length for Week 3

PTM Flux Evaluation Period: 03/03/2026 – 03/22/2026

Particles Injected: 03/03/2026

 = Injection Point (DSM2 node)

 = Flux Location

← = Reference Flux Direction



Attachment A. Delta Real-Time Forecast Summary for 03/03/2026

A.4.1 Neutrally Buoyant Particles

Table 4. Neutral Particle Fate (percent flux across boundary) for Particles Injected at Chipps (DSM2 Node 465)

Forecast Week	OMR Flow Bin	Past Chipps	Upstream of Decker	Unresolved in Central Delta	Unresolved in OMR corridor	CVP Entrainment	SWP Entrainment
Week 1: 03/03/2026 - 03/08/2026	-6,500	99.0	0.0	1.0	0.0	0.0	0.0
	-5,000	99.1	0.0	0.9	0.0	0.0	0.0
	-3,500	99.2	0.0	0.8	0.0	0.0	0.0
	-2,000	99.4	0.0	0.6	0.0	0.0	0.0
Week 2: 03/09/2026 - 03/15/2026	-6,500	99.1	0.0	0.9	0.0	0.0	0.0
	-5,000	99.1	0.0	0.9	0.0	0.0	0.0
	-3,500	99.4	0.0	0.6	0.0	0.0	0.0
	-2,000	99.4	0.0	0.6	0.0	0.0	0.0
Week 3: 03/16/2026 - 03/22/2026	-6,500	99.1	0.0	0.9	0.0	0.0	0.0
	-5,000	99.1	0.0	0.9	0.0	0.0	0.0
	-3,500	99.4	0.0	0.6	0.0	0.0	0.0
	-2,000	99.4	0.0	0.6	0.0	0.0	0.0

Note: Values between 0.0 and 0.1 are indicated with <0.1.

Key: CVP = Central Valley Project, OMR = Old and Middle River, SWP = State Water Project

Table 5. Neutral Particle Fate (percent flux across boundary) for Particles Injected at Cache Slough (DSM2 Node 350)

Forecast Week	OMR Flow Bin	Past Chipps	Upstream of Decker	Unresolved in Central Delta	Unresolved in OMR corridor	CVP Entrainment	SWP Entrainment
Week 1: 03/03/2026 - 03/08/2026	-6,500	83.6	87.9	16.4	0.0	0.0	0.0
	-5,000	86.8	88.0	13.2	0.0	0.0	0.0
	-3,500	88.9	88.3	11.2	0.1	0.0	0.0
	-2,000	90.4	88.9	9.6	0.0	0.0	0.0
Week 2: 03/09/2026 - 03/15/2026	-6,500	93.8	89.2	6.6	0.1	0.0	0.2
	-5,000	96.5	88.9	3.9	0.1	0.2	0.1
	-3,500	97.0	89.0	3.1	0.1	0.0	0.0
	-2,000	97.7	89.4	2.3	0.0	0.0	0.0
Week 3: 03/16/2026 - 03/22/2026	-6,500	95.9	89.6	4.4	<0.1	0.1	0.2
	-5,000	98.0	89.0	2.4	0.0	0.2	0.2
	-3,500	97.9	89.1	2.2	0.1	0.0	0.0
	-2,000	98.2	89.5	1.8	0.0	0.0	0.0

Note: Values between 0.0 and 0.1 are indicated with <0.1.

Key: CVP = Central Valley Project, OMR = Old and Middle River, SWP = State Water Project

Attachment A. Delta Real-Time Forecast Summary for 03/03/2026

Table 6. Neutral Particle Fate (percent flux across boundary) for Particles Injected at Jersey Point (DSM2 Node 469)

Forecast Week	OMR Flow Bin	Past Chipps	Upstream of Decker	Unresolved in Central Delta	Unresolved in OMR corridor	CVP Entrainment	SWP Entrainment
Week 1: 03/03/2026 - 03/08/2026	-6,500	42.5	9.0	57.9	0.3	0.0	0.1
	-5,000	52.4	8.2	47.9	0.3	0.0	0.0
	-3,500	57.1	6.8	43.2	0.3	0.0	0.0
	-2,000	65.0	6.0	35.0	0.0	0.0	0.0
Week 2: 03/09/2026 - 03/15/2026	-6,500	84.5	11.5	16.2	0.3	0.0	0.4
	-5,000	90.9	9.1	9.8	0.2	0.4	0.1
	-3,500	94.4	7.0	6.1	0.1	0.2	0.2
	-2,000	96.4	6.4	3.6	0.0	0.0	0.0
Week 3: 03/16/2026 - 03/22/2026	-6,500	93.1	12.4	8.0	0.6	0.1	0.4
	-5,000	95.2	9.2	5.5	<0.1	0.4	0.2
	-3,500	96.7	7.1	3.8	0.1	0.2	0.2
	-2,000	98.0	6.4	2.0	0.0	0.0	0.0

Note: Values between 0.0 and 0.1 are indicated with <0.1.

Key: CVP = Central Valley Project, OMR = Old and Middle River, SWP = State Water Project

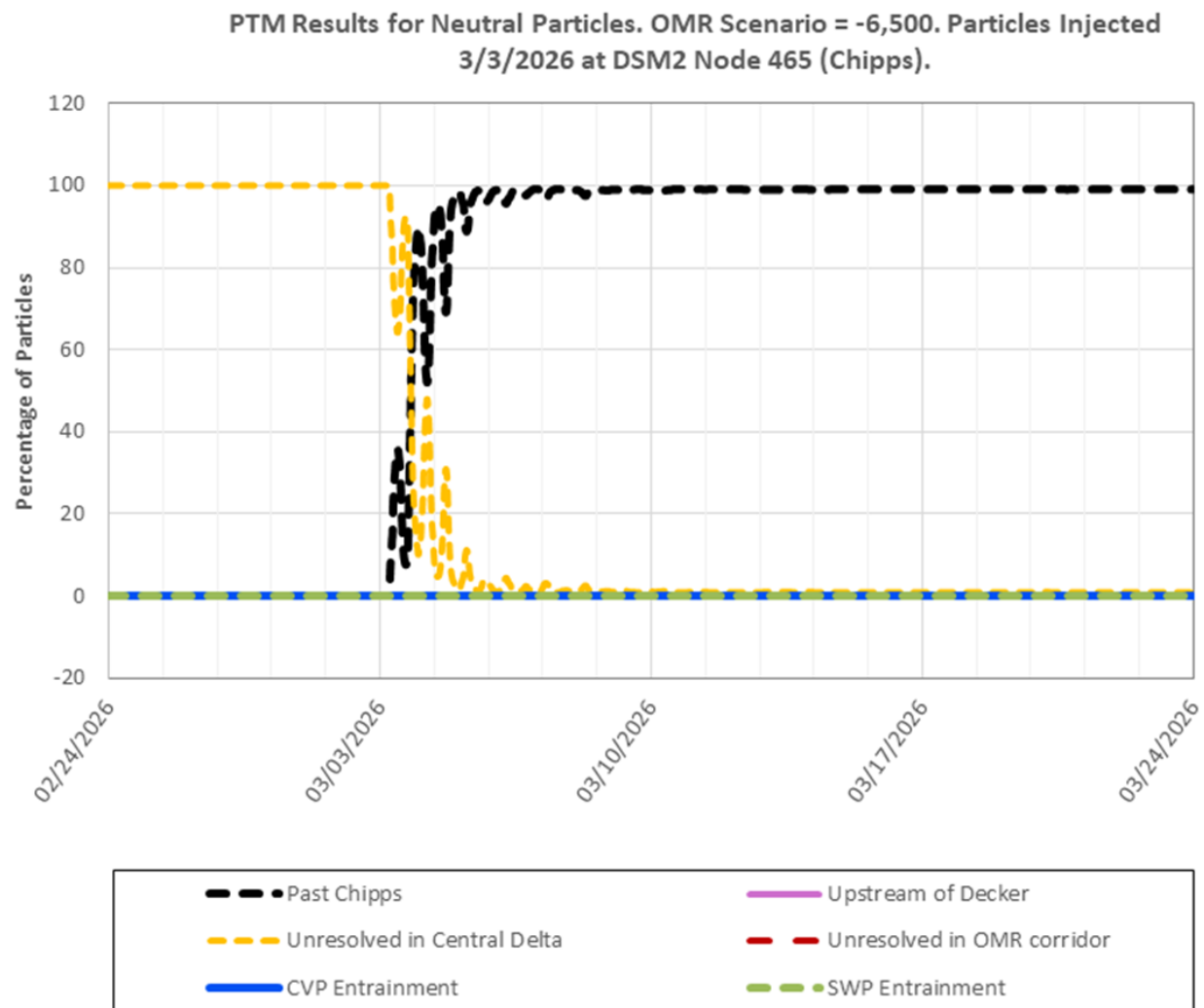
Table 7. Neutral Particle Fate (percent flux across boundary) for Particles Injected at Old River (DSM2 Node 99)

Forecast Week	OMR Flow Bin	Past Chipps	Upstream of Decker	Unresolved in Central Delta	Unresolved in OMR corridor	CVP Entrainment	SWP Entrainment
Week 1: 03/03/2026 - 03/08/2026	-6,500	0.7	1.2	9.9	33.6	21.4	34.4
	-5,000	0.8	1.0	17.6	42.3	23.3	16.0
	-3,500	0.8	0.8	32.1	51.6	13.1	2.5
	-2,000	2.0	2.5	57.3	40.4	0.2	0.1
Week 2: 03/09/2026 - 03/15/2026	-6,500	3.3	1.7	5.0	11.0	25.9	54.8
	-5,000	6.9	2.5	8.4	15.4	30.6	38.7
	-3,500	8.7	3.3	18.0	25.3	28.2	19.8
	-2,000	17.6	6.5	35.0	29.6	13.8	3.9
Week 3: 03/16/2026 - 03/22/2026	-6,500	5.3	2.7	2.3	7.4	26.9	58.0
	-5,000	9.3	3.1	5.3	9.3	32.7	43.5
	-3,500	16.1	4.5	8.3	17.5	31.6	26.5
	-2,000	31.1	8.2	18.3	23.0	17.9	9.8

Note: Values between 0.0 and 0.1 are indicated with <0.1.

Key: CVP = Central Valley Project, OMR = Old and Middle River, SWP = State Water Project

Attachment A. Delta Real-Time Forecast Summary for 03/03/2026

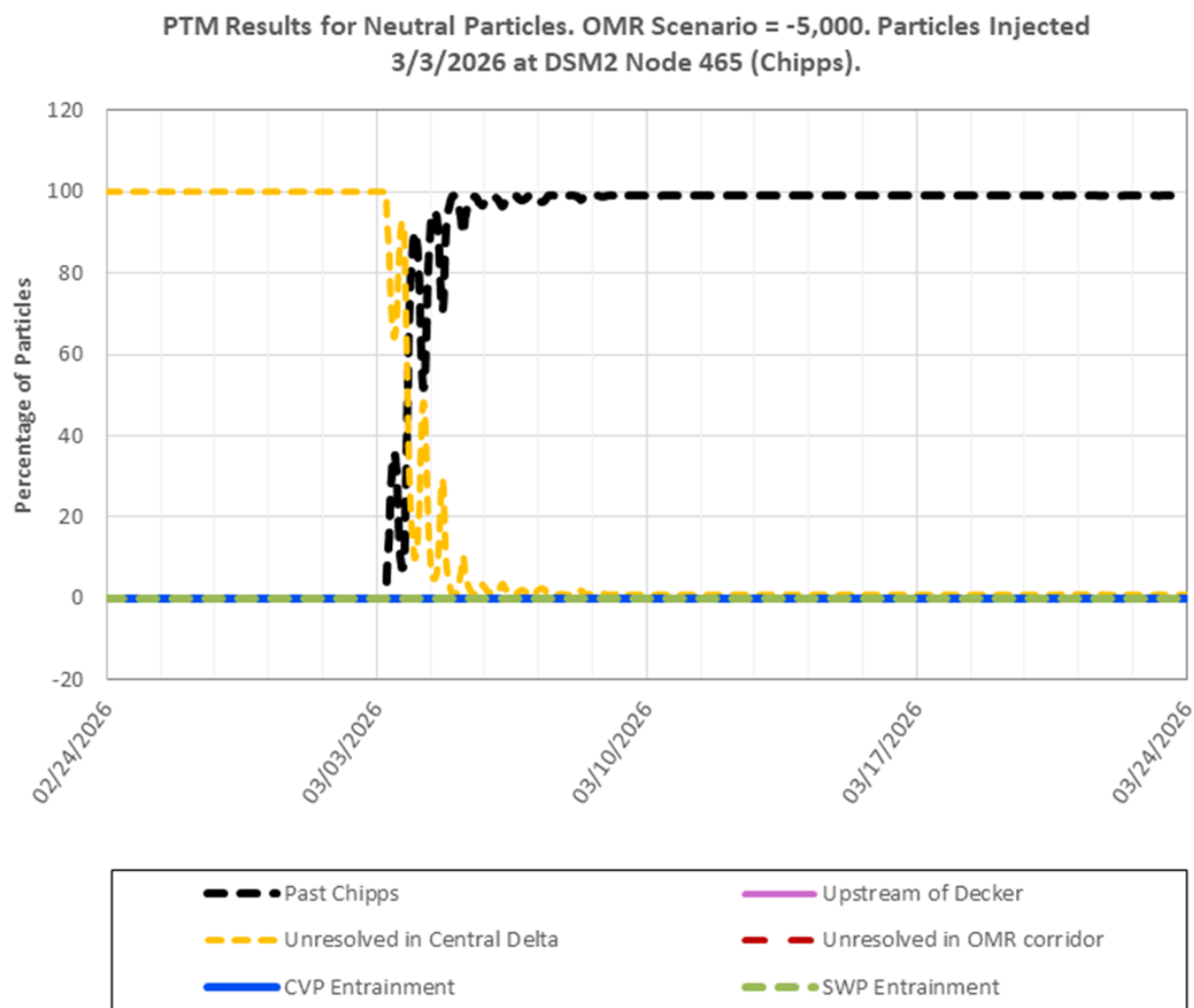


Note: Particles Injected 03/03/2026 at DSM2 Node 465 (Chippis)

Key: cfs = cubic feet per second; OMR = Old and Middle River; PTM = particle tracking model

Figure 9. PTM Results for Neutral Particles – OMR Scenario -6,500 cfs

Attachment A. Delta Real-Time Forecast Summary for 03/03/2026

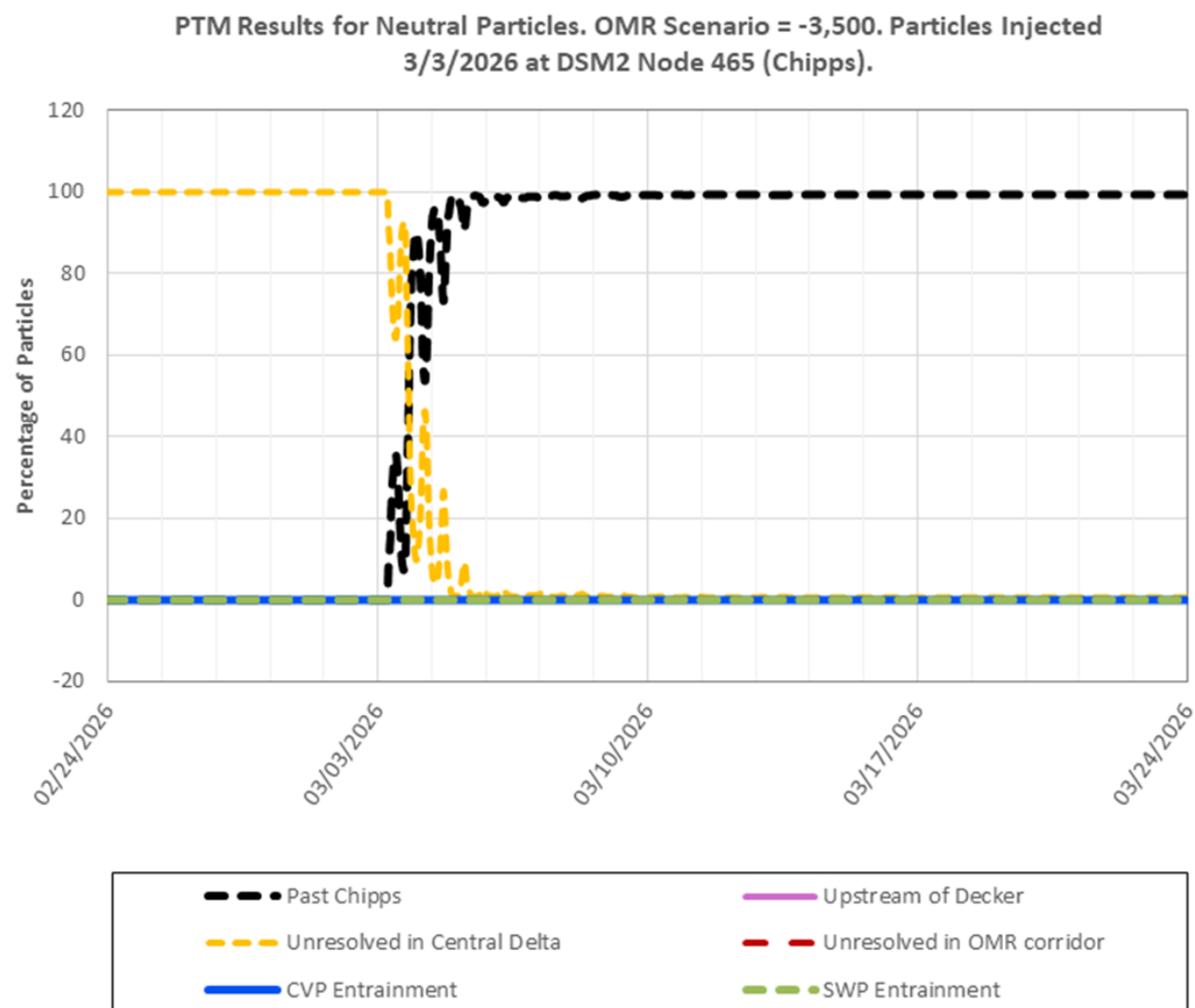


Note: Particles Injected 03/03/2026 at DSM2 Node 465 (Chippis)

Key: cfs = cubic feet per second; OMR = Old and Middle River; PTM = particle tracking model

Figure 10. PTM Results for Neutral Particles – OMR Scenario -5,000 cfs

Attachment A. Delta Real-Time Forecast Summary for 03/03/2026

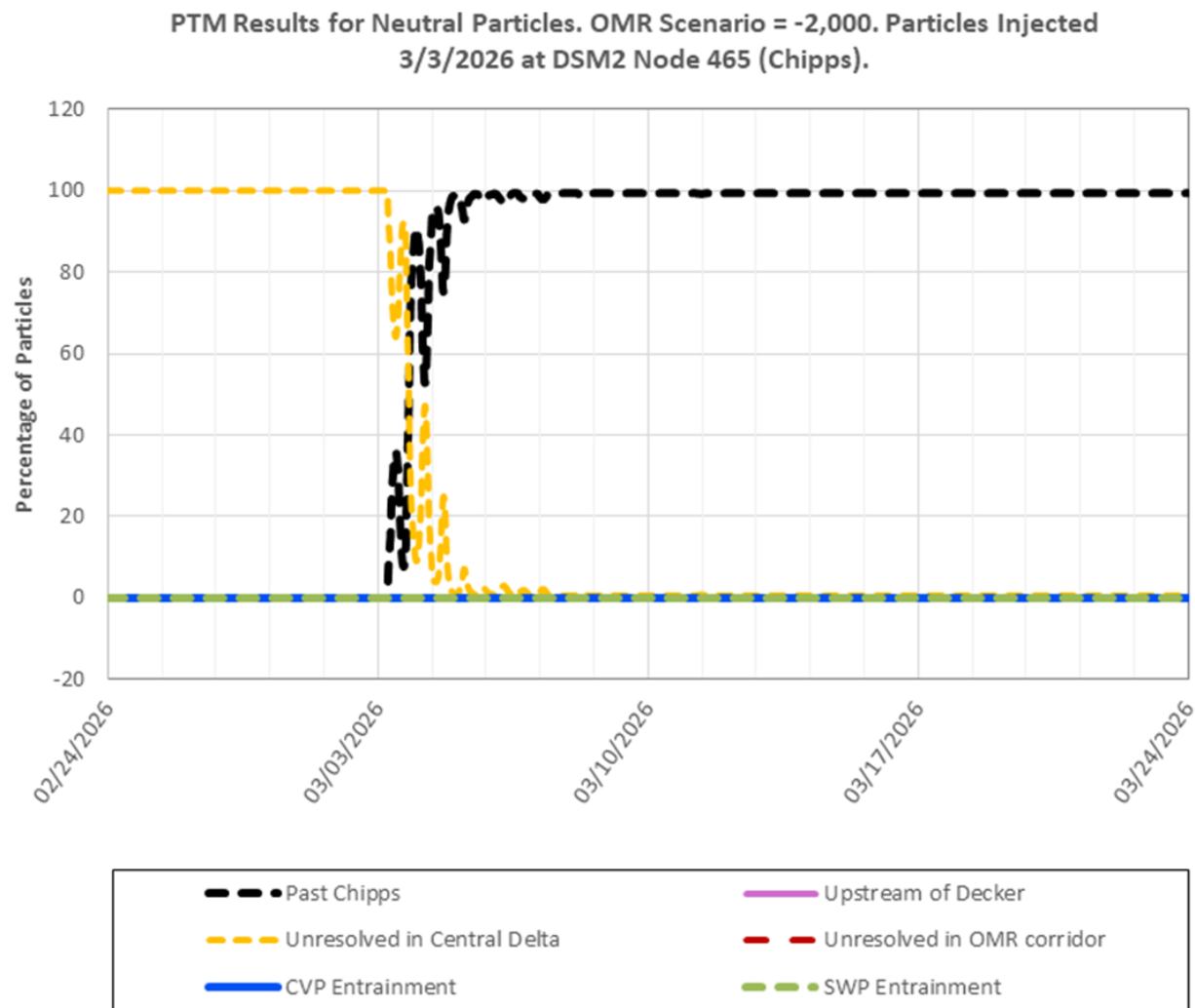


Note: Particles Injected 03/03/2026 at DSM2 Node 465 (Chippis)

Key: cfs = cubic feet per second; OMR = Old and Middle River; PTM = particle tracking model

Figure 11. PTM Results for Neutral Particles – OMR Scenario -3,500 cfs

Attachment A. Delta Real-Time Forecast Summary for 03/03/2026

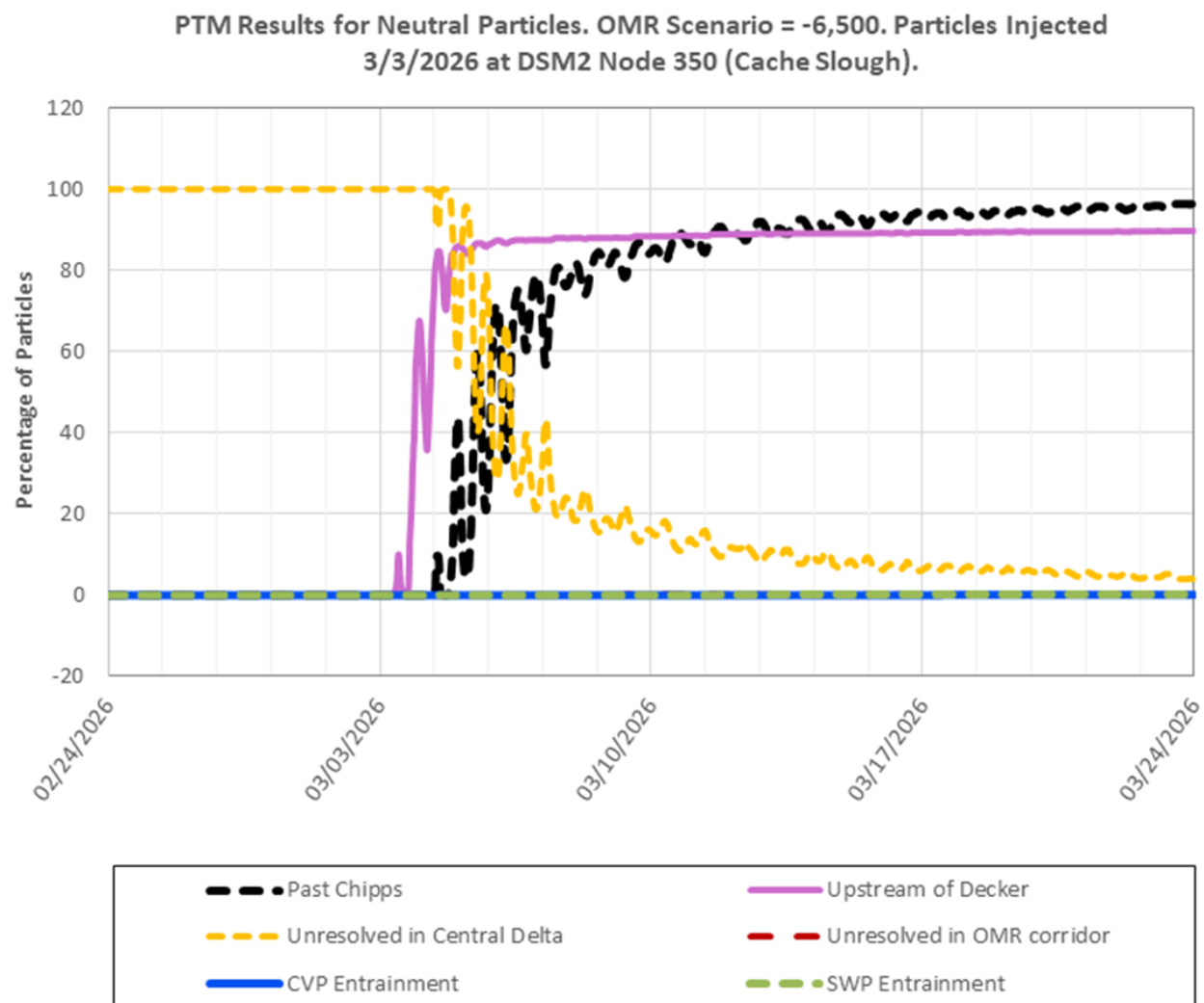


Note: Particles Injected 03/03/2026 at DSM2 Node 465 (Chippis)

Key: cfs = cubic feet per second; OMR = Old and Middle River; PTM = particle tracking model

Figure 12. PTM Results for Neutral Particles – OMR Scenario -2,000 cfs

Attachment A. Delta Real-Time Forecast Summary for 03/03/2026

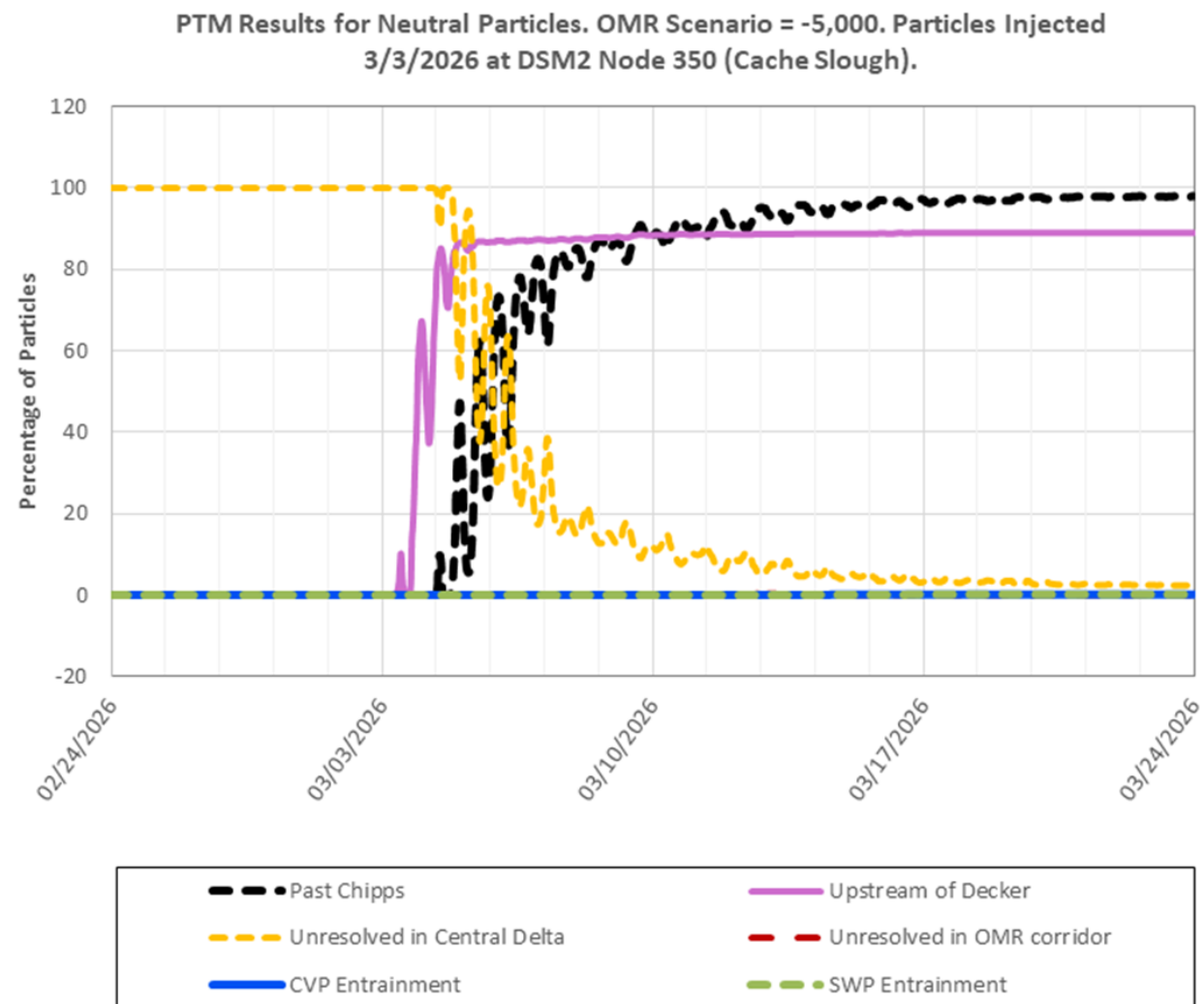


Note: Injected 03/03/2026 at DSM2 Node 350 (Cache Slough)

Key: cfs = cubic feet per second; OMR = Old and Middle River; PTM = particle tracking model

Figure 13. PTM Results for Neutral Particles – OMR Scenario -6,500 cfs

Attachment A. Delta Real-Time Forecast Summary for 03/03/2026

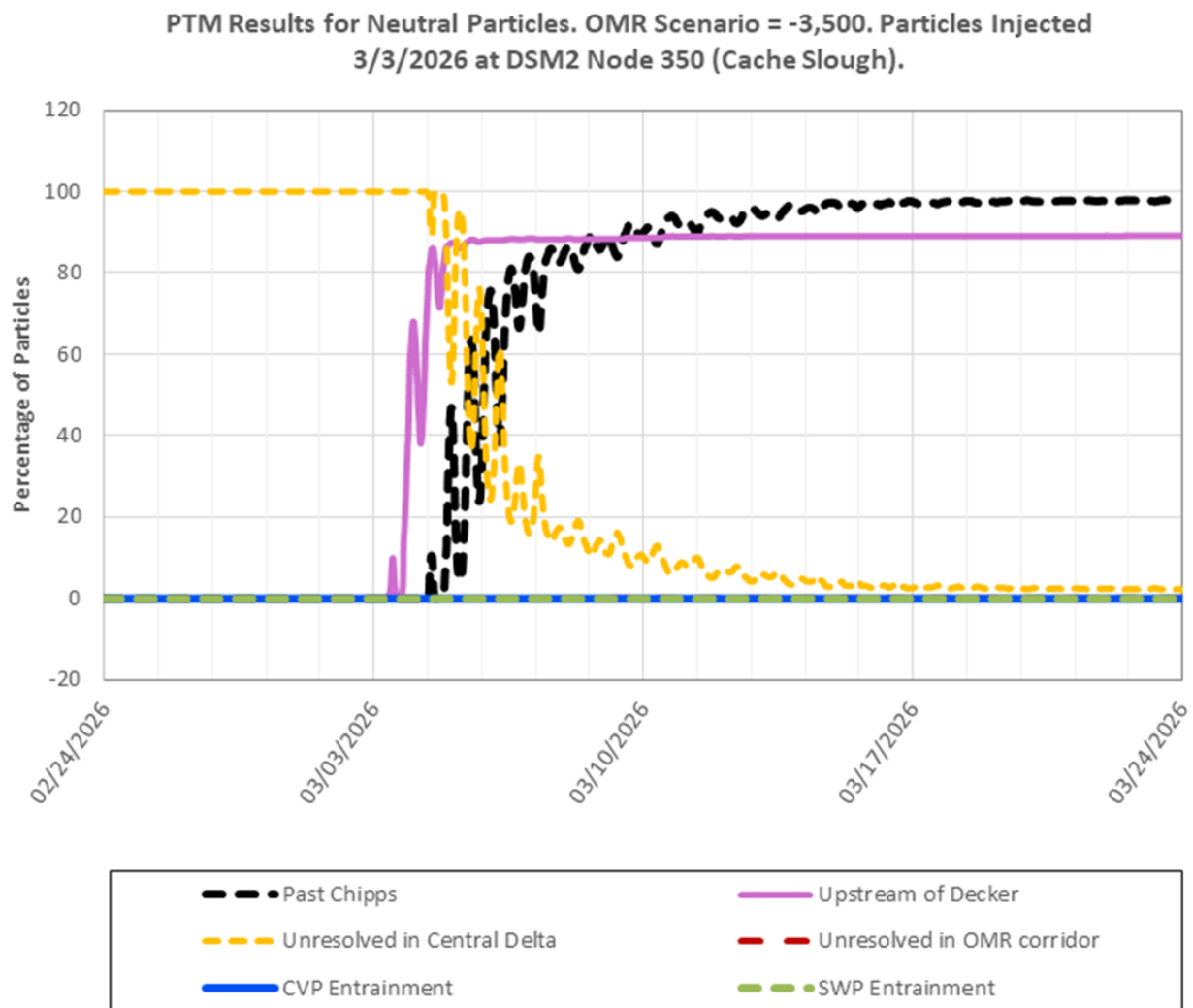


Note: Particles Injected 03/03/2026 at DSM2 Node 350 (Cache Slough)

Key: cfs = cubic feet per second; OMR = Old and Middle River; PTM = particle tracking model

Figure 14. PTM Results for Neutral Particles – OMR Scenario -5,000 cfs

Attachment A. Delta Real-Time Forecast Summary for 03/03/2026

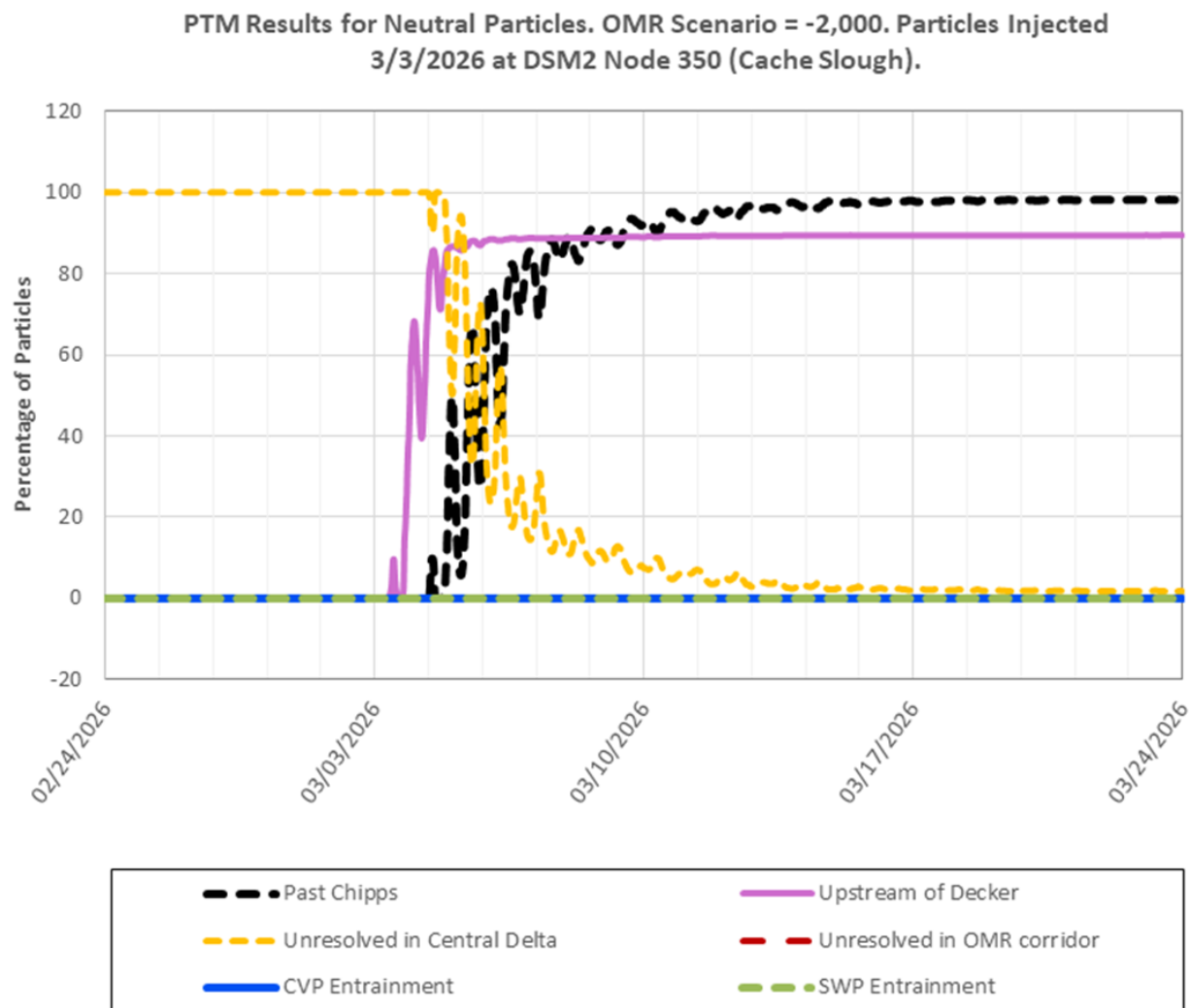


Note: Particles Injected 03/03/2026 at DSM2 Node 350 (Cache Slough)

Key: cfs = cubic feet per second; OMR = Old and Middle River; PTM = particle tracking model

Figure 15. PTM Results for Neutral Particles – OMR Scenario -3,500 cfs

Attachment A. Delta Real-Time Forecast Summary for 03/03/2026

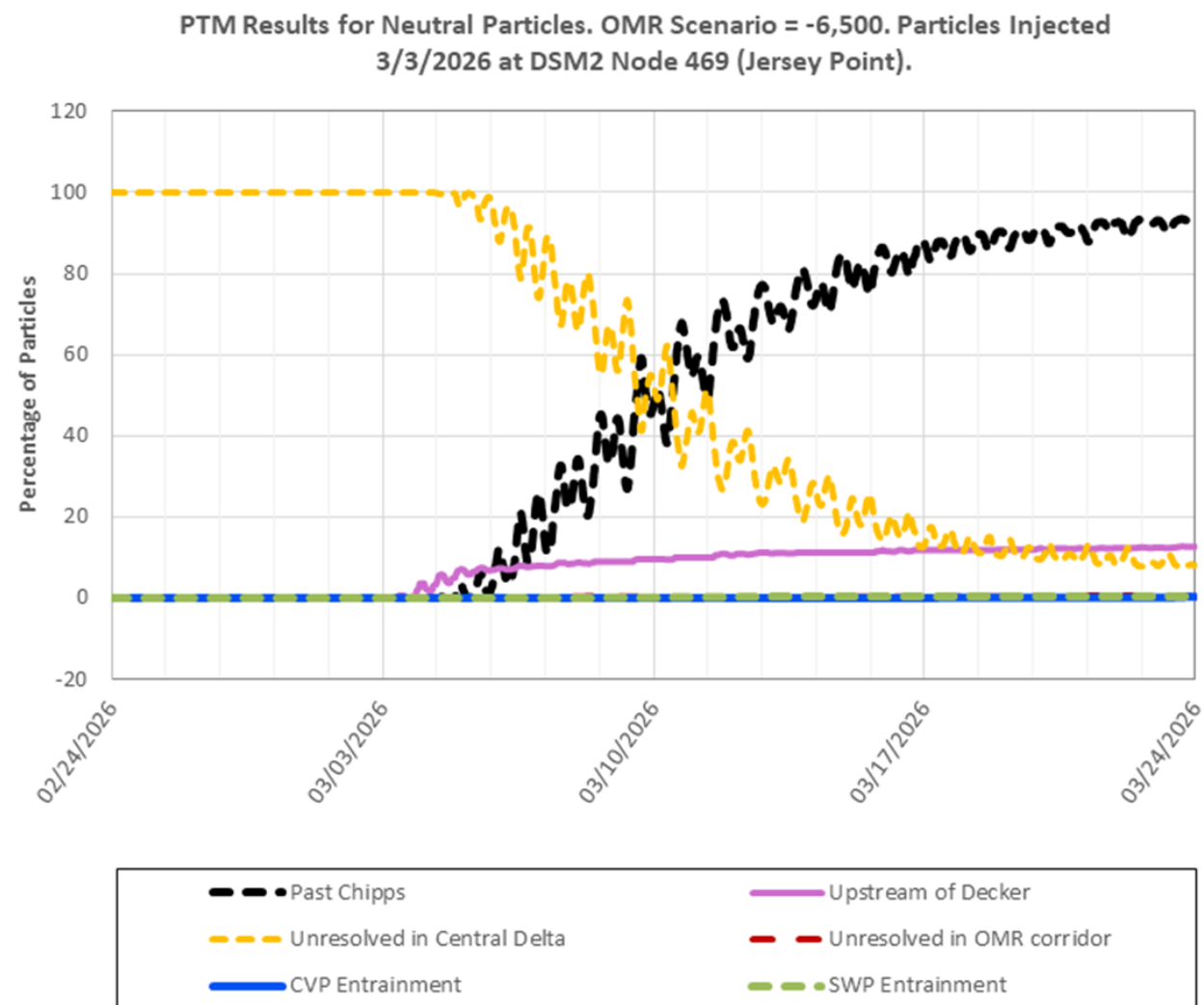


Note: Particles Injected 03/03/2026 at DSM2 Node 350 (Cache Slough)

Key: cfs = cubic feet per second; OMR = Old and Middle River; PTM = particle tracking model

Figure 16. PTM Results for Neutral Particles – OMR Scenario -2,000 cfs

Attachment A. Delta Real-Time Forecast Summary for 03/03/2026

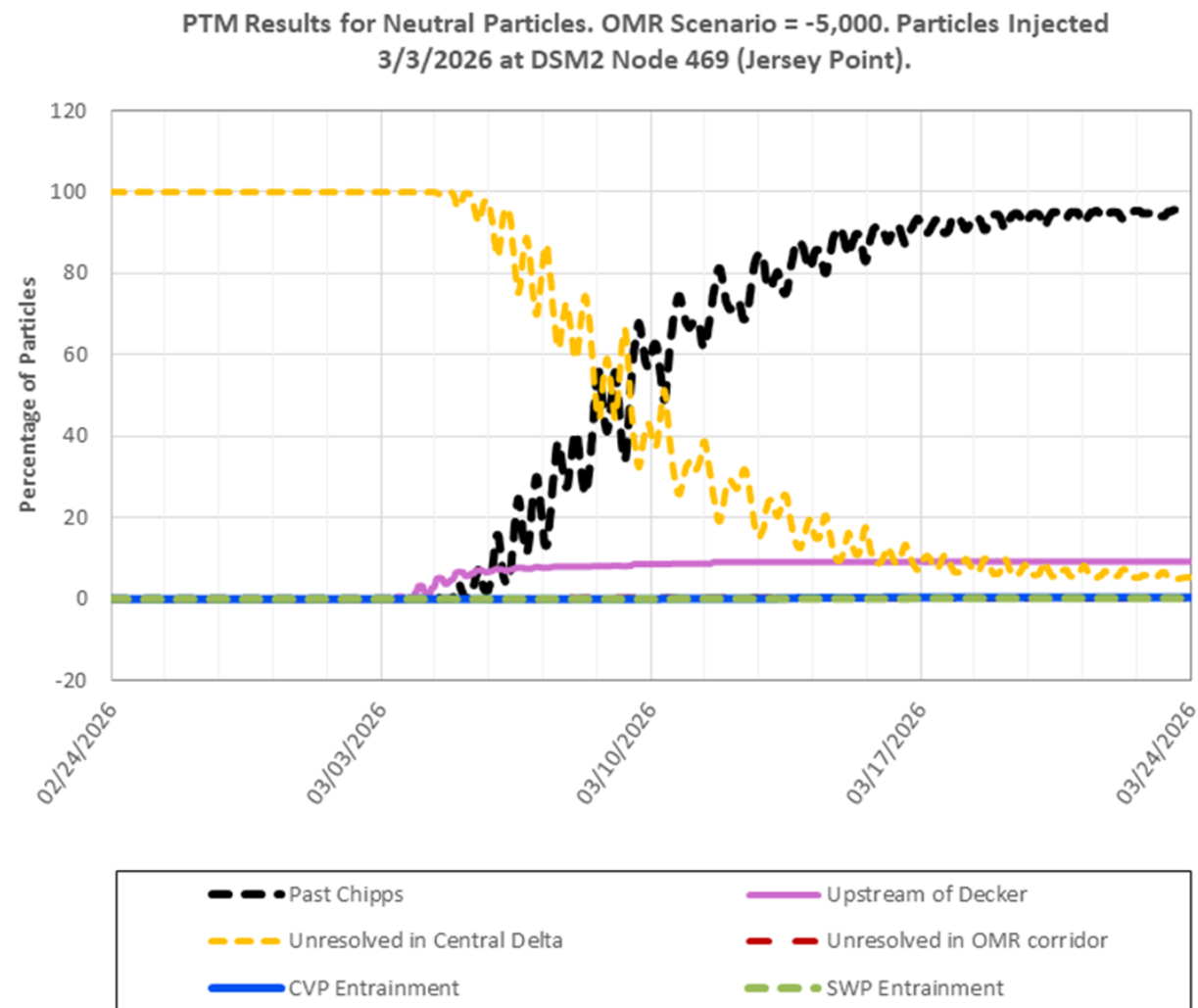


Note: Particles Injected 03/03/2026 at DSM2 Node 469 (Jersey Point)

Key: cfs = cubic feet per second; OMR = Old and Middle River; PTM = particle tracking model

Figure 17. PTM Results for Neutral Particles – OMR Scenario -6,500 cfs

Attachment A. Delta Real-Time Forecast Summary for 03/03/2026

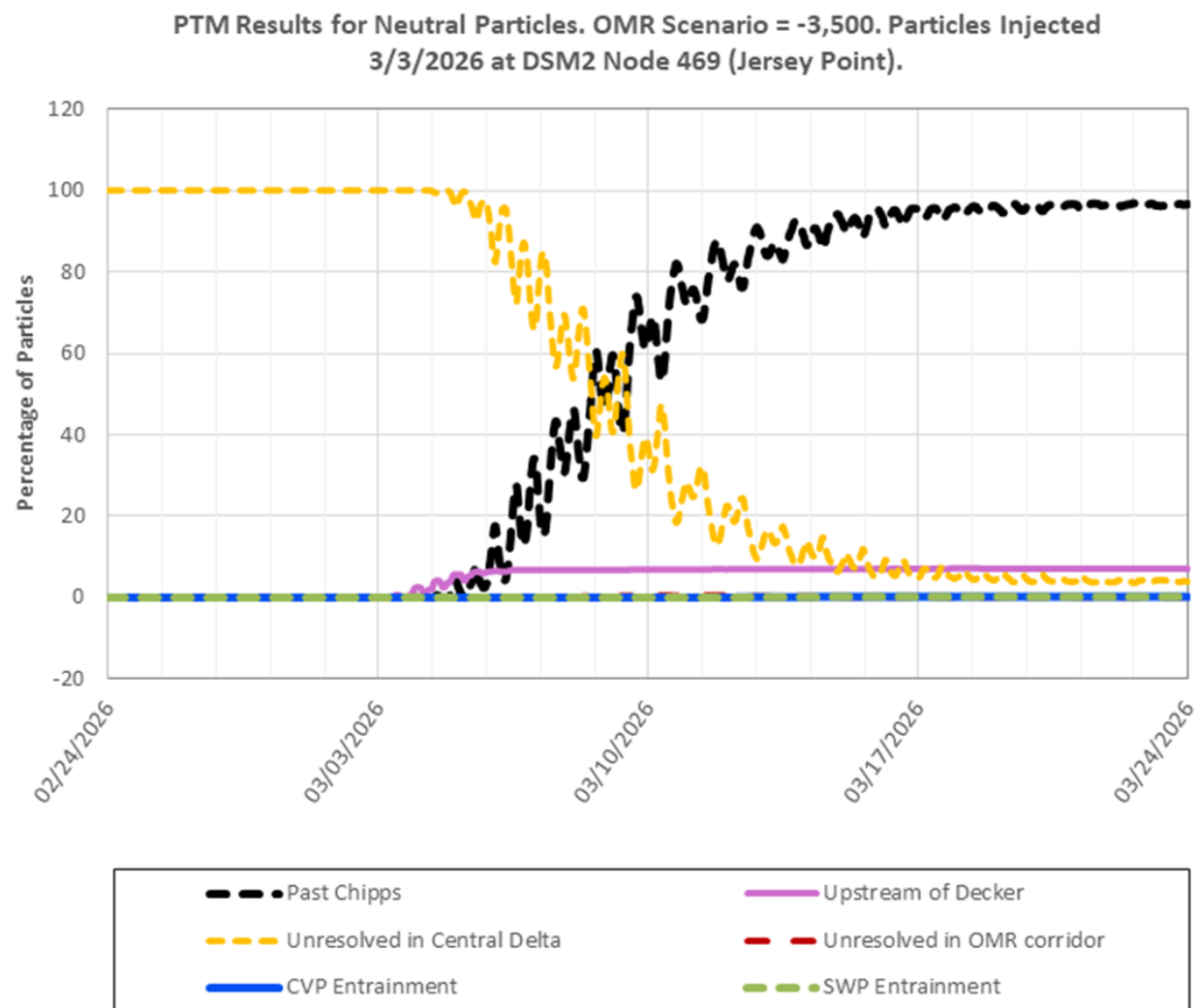


Note: Particles Injected 03/03/2026 at DSM2 Node 469 (Jersey Point)

Key: cfs = cubic feet per second; OMR = Old and Middle River; PTM = particle tracking model

Figure 18. PTM Results for Neutral Particles – OMR Scenario -5,000 cfs

Attachment A. Delta Real-Time Forecast Summary for 03/03/2026

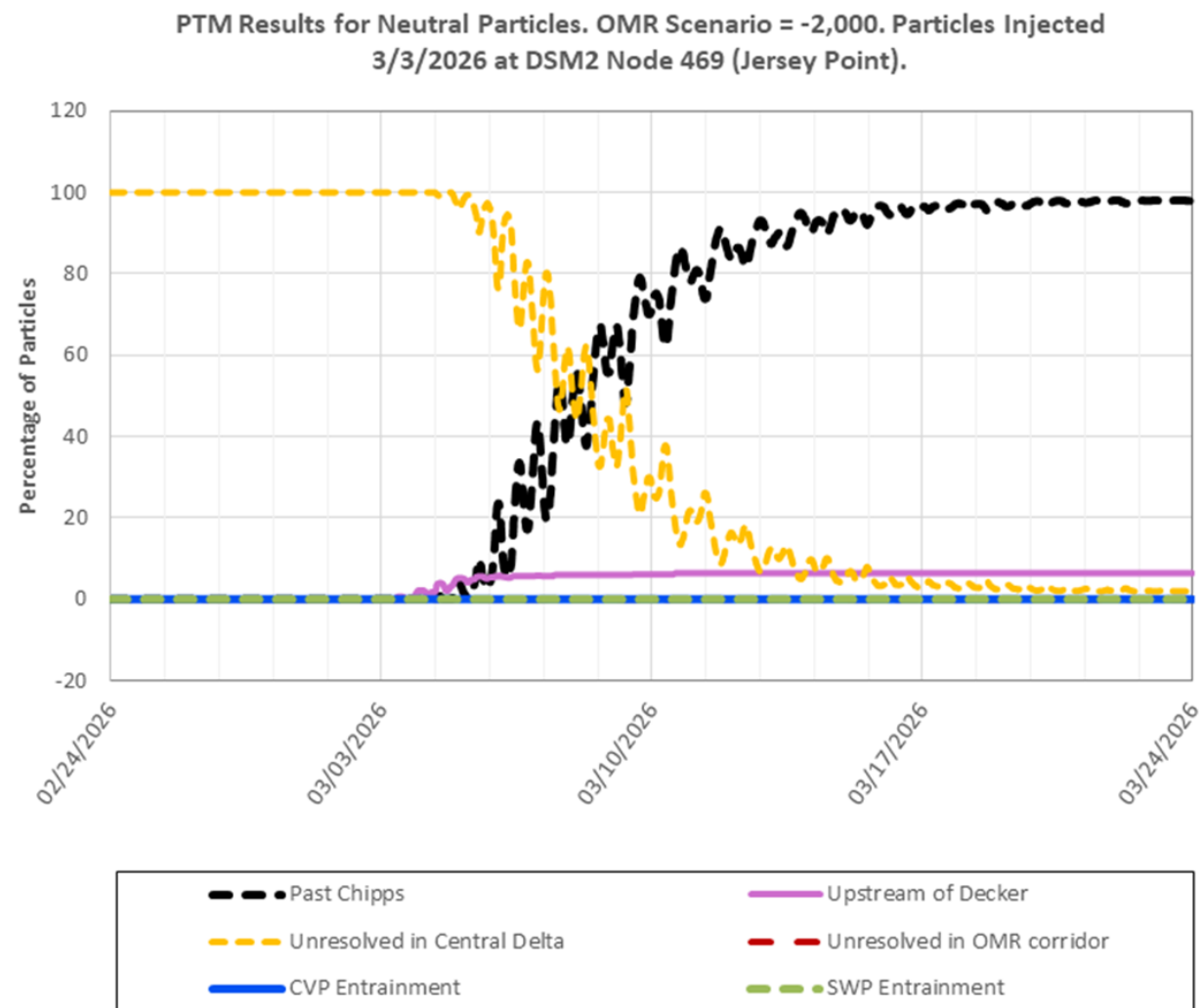


Note: Particles Injected 03/03/2026 at DSM2 Node 469 (Jersey Point)

Key: cfs = cubic feet per second; OMR = Old and Middle River; PTM = particle tracking model

Figure 19. PTM Results for Neutral Particles – OMR Scenario -3,500 cfs

Attachment A. Delta Real-Time Forecast Summary for 03/03/2026

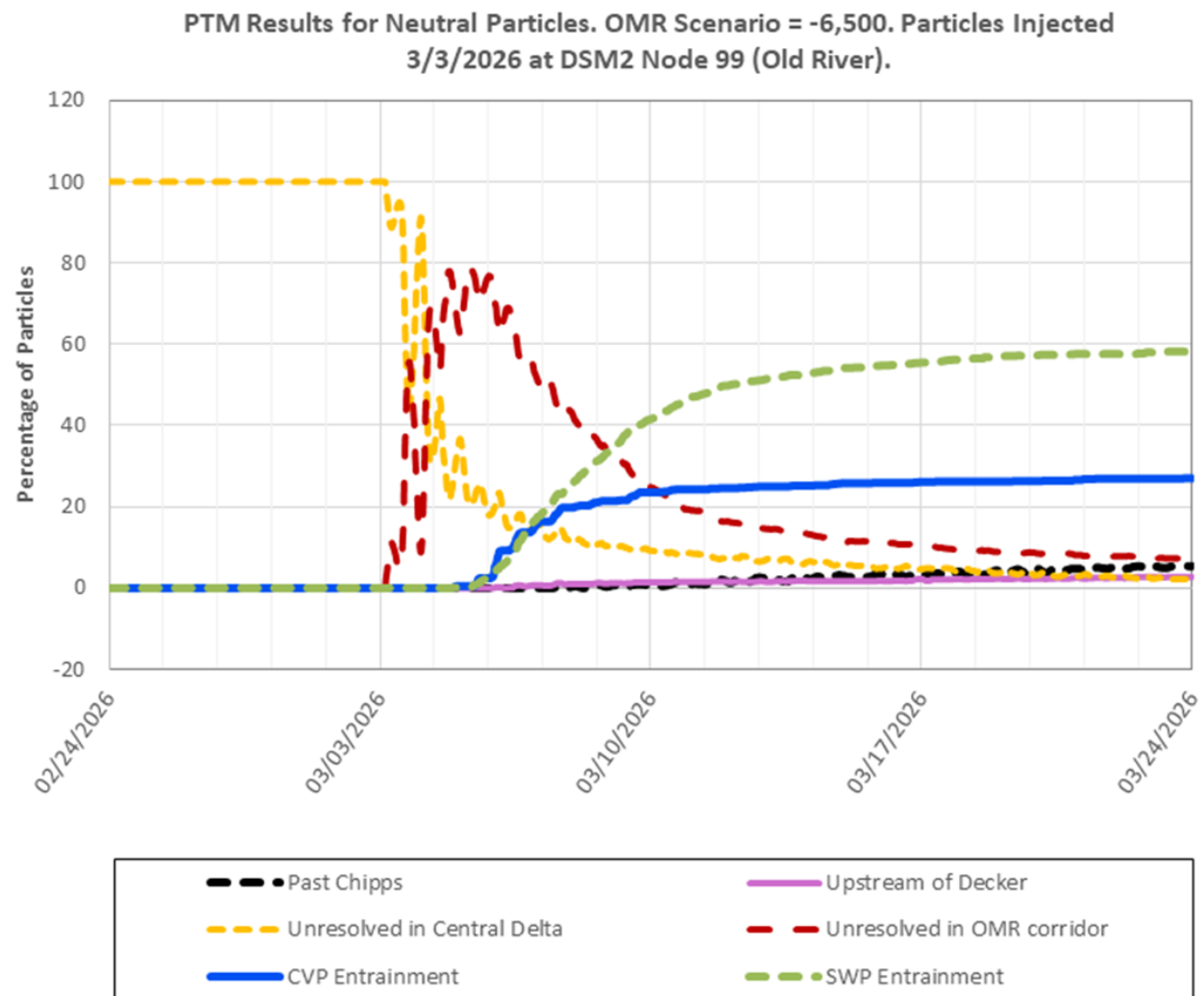


Note: Particles Injected 03/03/2026 at DSM2 Node 469 (Jersey Point)

Key: cfs = cubic feet per second; OMR = Old and Middle River; PTM = particle tracking model

Figure 20. PTM Results for Neutral Particles – OMR Scenario -2,000 cfs

Attachment A. Delta Real-Time Forecast Summary for 03/03/2026

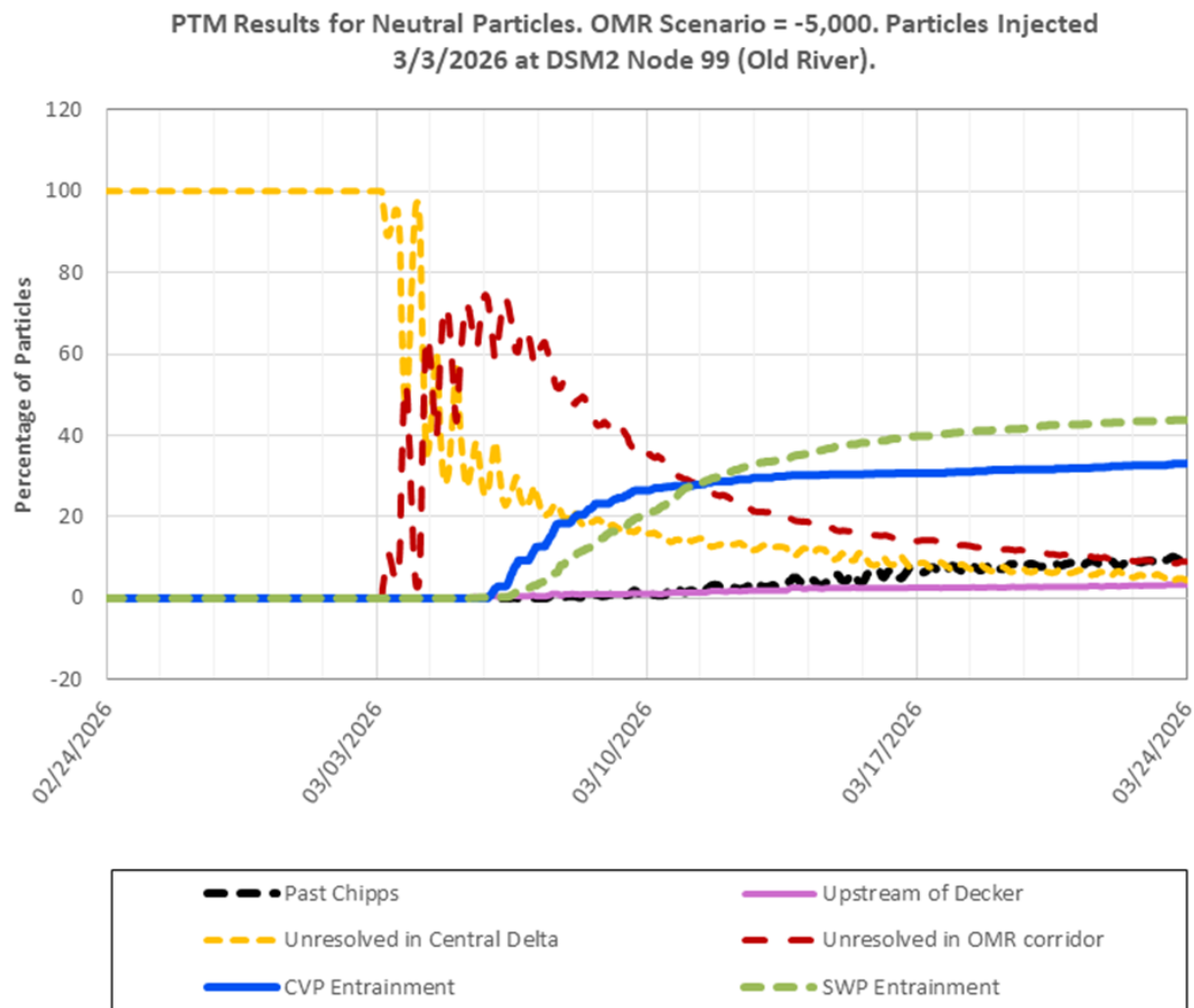


Note: Particles Injected 03/03/2026 at DSM2 Node 99 (Old River)

Key: cfs = cubic feet per second; OMR = Old and Middle River; PTM = particle tracking model

Figure 21. PTM Results for Neutral Particles – OMR Scenario -6,500 cfs

Attachment A. Delta Real-Time Forecast Summary for 03/03/2026

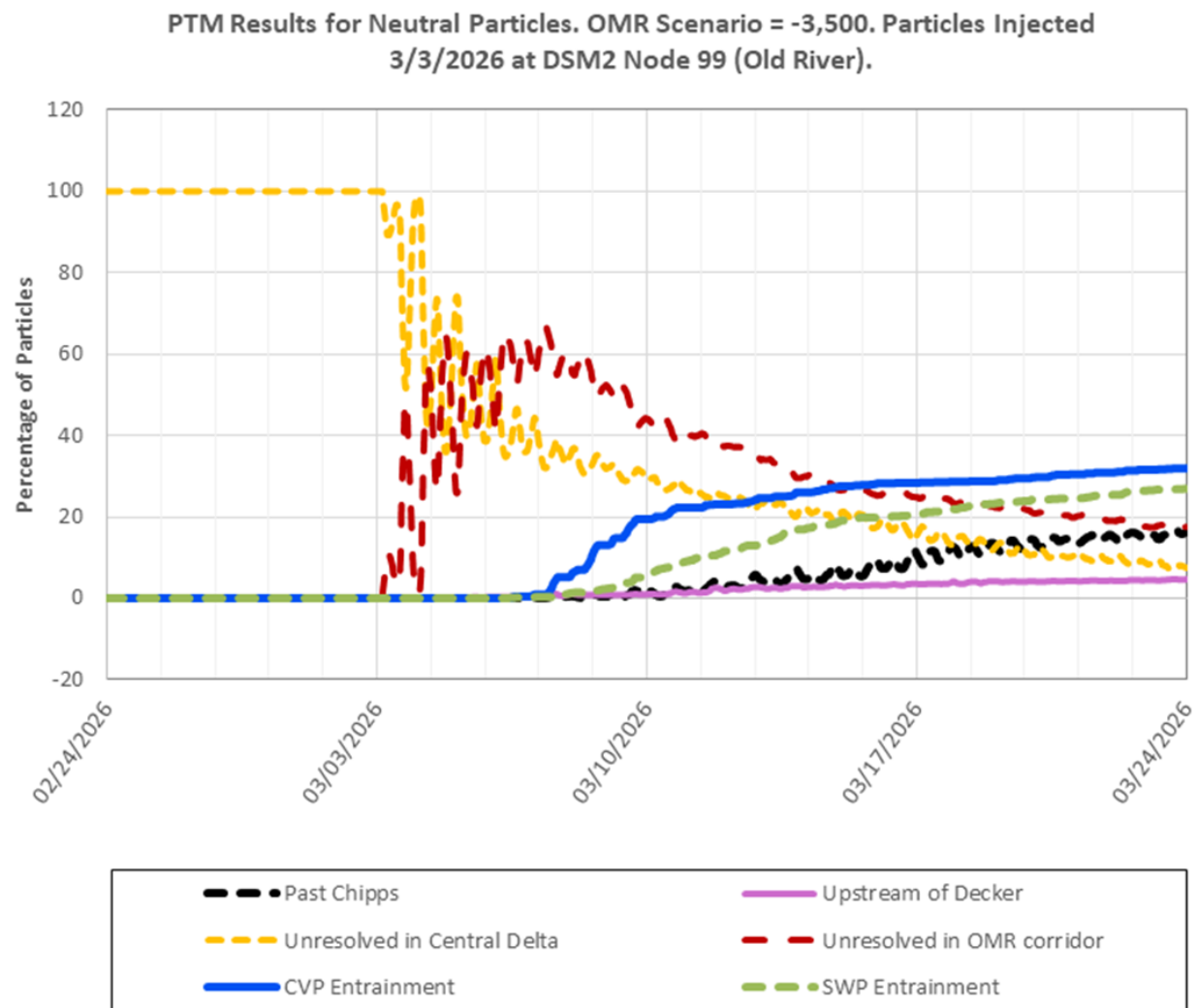


Note: Particles Injected 03/03/2026 at DSM2 Node 99 (Old River)

Key: cfs = cubic feet per second; OMR = Old and Middle River; PTM = particle tracking model

Figure 22. PTM Results for Neutral Particles – OMR Scenario -5,000 cfs

Attachment A. Delta Real-Time Forecast Summary for 03/03/2026

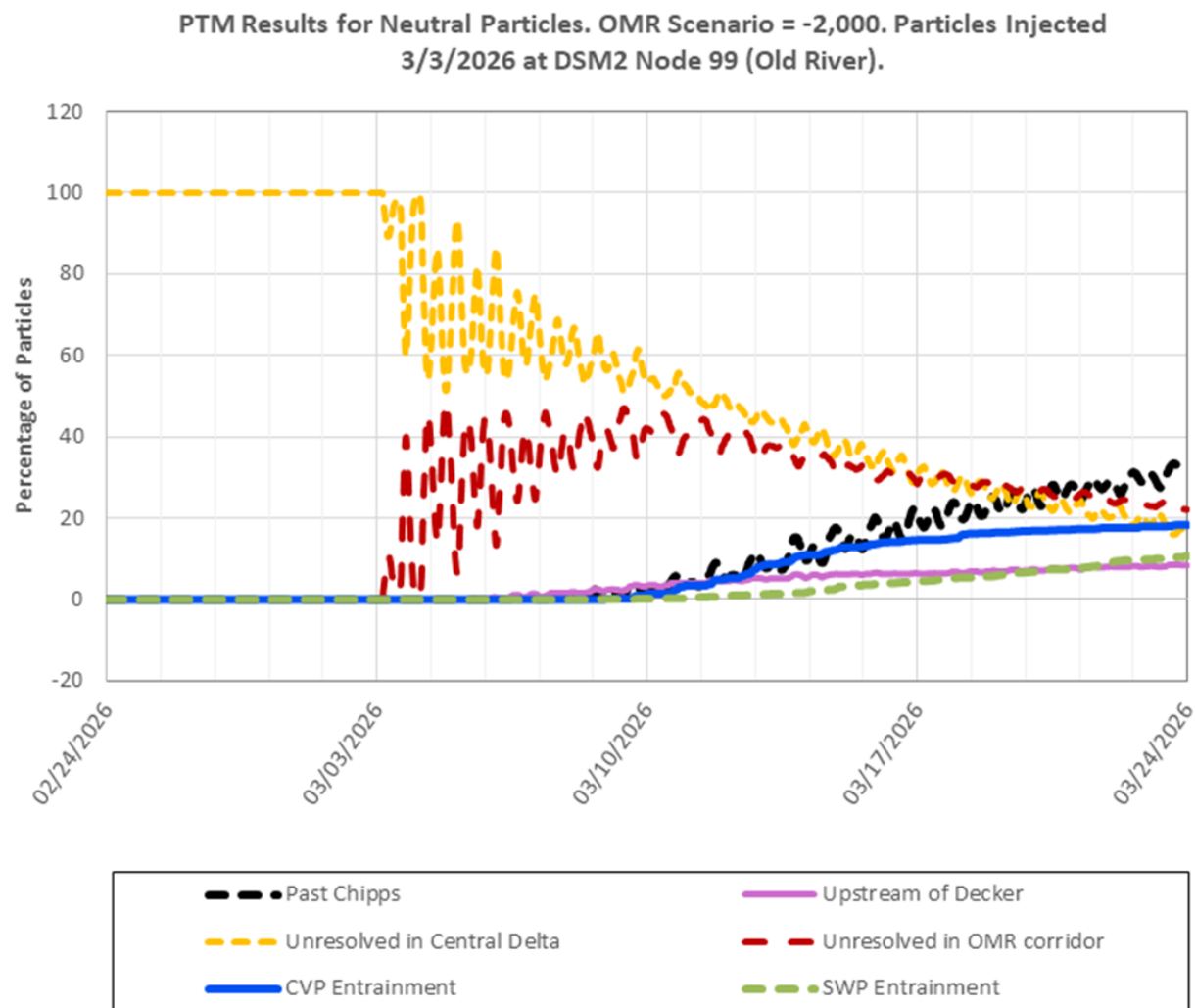


Note: Particles Injected 03/03/2026 at DSM2 Node 99 (Old River)

Key: cfs = cubic feet per second; OMR = Old and Middle River; PTM = particle tracking model

Figure 23. PTM Results for Neutral Particles – OMR Scenario -3,500 cfs

Attachment A. Delta Real-Time Forecast Summary for 03/03/2026



Note: Particles Injected 03/03/2026 at DSM2 Node 99 (Old River)

Key: cfs = cubic feet per second; OMR = Old and Middle River; PTM = particle tracking model

Figure 24. PTM Results for Neutral Particles – OMR Scenario -2,000 cfs

A.4.2 Surface-Oriented Particles

Table 8. Surface Oriented Particle Fate (percent flux across boundary) for Particles Injected at Chipps (DSM2 Node 465)

Forecast Week	OMR Flow Bin	Past Chipps	Upstream of Decker	Unresolved in Central Delta	Unresolved in OMR Corridor	CVP Entrainment	SWP Entrainment
Week 1: 03/03/2026 - 03/08/2026	-6,500	99.0	0.0	1.0	0.0	0.0	0.0
	-5,000	99.1	0.0	0.9	0.0	0.0	0.0
	-3,500	99.0	0.0	1.0	0.0	0.0	0.0
	-2,000	99.4	0.0	0.6	0.0	0.0	0.0
Week 2: 03/09/2026 - 03/15/2026	-6,500	99.2	0.0	0.8	0.0	0.0	0.0
	-5,000	99.1	0.0	0.9	0.0	0.0	0.0
	-3,500	99.2	0.0	0.8	0.0	0.0	0.0
	-2,000	99.4	0.0	0.6	0.0	0.0	0.0
Week 3: 03/16/2026 - 03/22/2026	-6,500	99.2	0.0	0.8	0.0	0.0	0.0
	-5,000	99.1	0.0	0.9	0.0	0.0	0.0
	-3,500	99.2	0.0	0.8	0.0	0.0	0.0
	-2,000	99.4	0.0	0.6	0.0	0.0	0.0

Note: Values between 0.0 and 0.1 are indicated with <0.1.

Key: CVP = Central Valley Project, OMR = Old and Middle River, SWP = State Water Project

Table 9. Surface Oriented Particle Fate (percent flux across boundary) for Particles Injected at Cache Slough (DSM2 Node 350)

Forecast Week	OMR Flow Bin	Past Chipps	Upstream of Decker	Unresolved in Central Delta	Unresolved in OMR Corridor	CVP Entrainment	SWP Entrainment
Week 1: 03/03/2026 - 03/08/2026	-6,500	88.8	87.4	11.4	0.2	0.0	0.0
	-5,000	90.1	88.7	10.2	0.3	0.0	0.0
	-3,500	91.2	87.5	8.9	0.1	0.0	0.0
	-2,000	91.5	89.2	8.5	0.0	0.0	0.0
Week 2: 03/09/2026 - 03/15/2026	-6,500	95.8	88.4	4.5	<0.1	0.1	0.2
	-5,000	97.0	89.5	3.4	0.1	0.1	0.2
	-3,500	97.1	88.4	3.0	0.0	0.0	0.1
	-2,000	96.6	89.9	3.5	0.1	0.0	0.0
Week 3: 03/16/2026 - 03/22/2026	-6,500	96.8	89.1	3.7	<0.1	0.1	0.3
	-5,000	97.7	89.6	2.7	0.0	0.1	0.3
	-3,500	98.1	88.8	2.0	0.0	0.0	0.1
	-2,000	97.3	90.4	2.8	0.0	0.1	0.0

Note: Values between 0.0 and 0.1 are indicated with <0.1.

Key: CVP = Central Valley Project, OMR = Old and Middle River, SWP = State Water Project

Attachment A. Delta Real-Time Forecast Summary for 03/03/2026

Table 10. Surface Oriented Particle Fate (percent flux across boundary) for Particles Injected at Jersey Point (DSM2 Node 469)

Forecast Week	OMR Flow Bin	Past Chipps	Upstream of Decker	Unresolved in Central Delta	Unresolved in OMR Corridor	CVP Entrainment	SWP Entrainment
Week 1: 03/03/2026 - 03/08/2026	-6,500	66.8	10.3	33.6	0.3	0.0	0.1
	-5,000	75.4	10.0	24.7	0.1	0.0	0.0
	-3,500	82.3	8.8	17.9	0.1	0.0	0.0
	-2,000	85.0	7.6	15.2	0.2	0.0	0.0
Week 2: 03/09/2026 - 03/15/2026	-6,500	94.8	11.5	6.1	0.4	0.1	0.3
	-5,000	97.0	10.7	3.3	0.1	0.0	0.2
	-3,500	97.5	8.9	2.7	0.1	0.0	0.1
	-2,000	96.8	7.6	3.5	0.2	0.0	0.1
Week 3: 03/16/2026 - 03/22/2026	-6,500	97.3	11.6	3.5	0.1	0.2	0.5
	-5,000	98.0	10.7	2.5	<0.1	0.2	0.2
	-3,500	98.0	9.0	2.2	0.1	0.0	0.1
	-2,000	97.1	7.7	3.3	0.2	0.1	0.1

Note: Values between 0.0 and 0.1 are indicated with <0.1.

Key: CVP = Central Valley Project, OMR = Old and Middle River, SWP = State Water Project

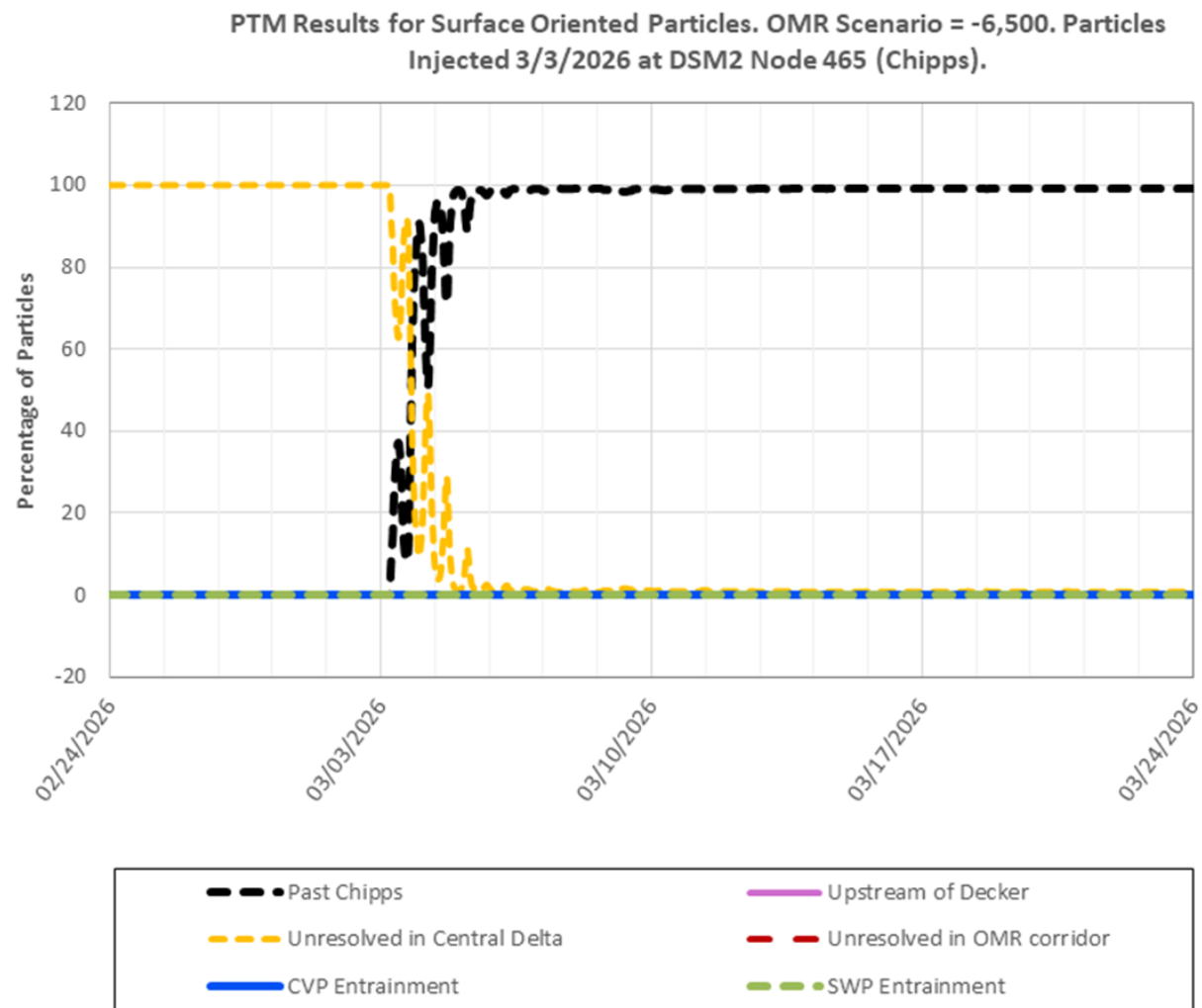
Table 11. Surface Oriented Particle Fate (percent flux across boundary) for Particles Injected at Old River (DSM2 Node 99)

Forecast Week	OMR Flow Bin	Past Chipps	Upstream of Decker	Unresolved in Central Delta	Unresolved in OMR Corridor	CVP Entrainment	SWP Entrainment
Week 1: 03/03/2026 - 03/08/2026	-6,500	1.2	1.3	9.8	27.3	22.7	39.0
	-5,000	2.1	1.1	14.8	36.0	26.7	20.4
	-3,500	3.0	1.5	27.8	41.0	22.6	5.5
	-2,000	3.9	2.9	52.5	41.5	1.9	0.3
Week 2: 03/09/2026 - 03/15/2026	-6,500	5.3	2.0	3.6	11.6	25.5	54.0
	-5,000	8.4	2.1	6.3	12.8	32.1	40.4
	-3,500	14.6	3.7	12.9	19.5	33.1	19.9
	-2,000	24.8	5.9	24.8	28.2	16.5	5.7
Week 3: 03/16/2026 - 03/22/2026	-6,500	7.6	2.5	0.6	7.7	27.0	57.1
	-5,000	11.6	3.3	2.6	7.1	34.4	44.3
	-3,500	20.5	4.6	5.3	13.6	36.2	24.4
	-2,000	34.9	7.9	12.0	21.1	20.2	11.7

Note: Values between 0.0 and 0.1 are indicated with <0.1.

Key: CVP = Central Valley Project, OMR = Old and Middle River, SWP = State Water Project

Attachment A. Delta Real-Time Forecast Summary for 03/03/2026

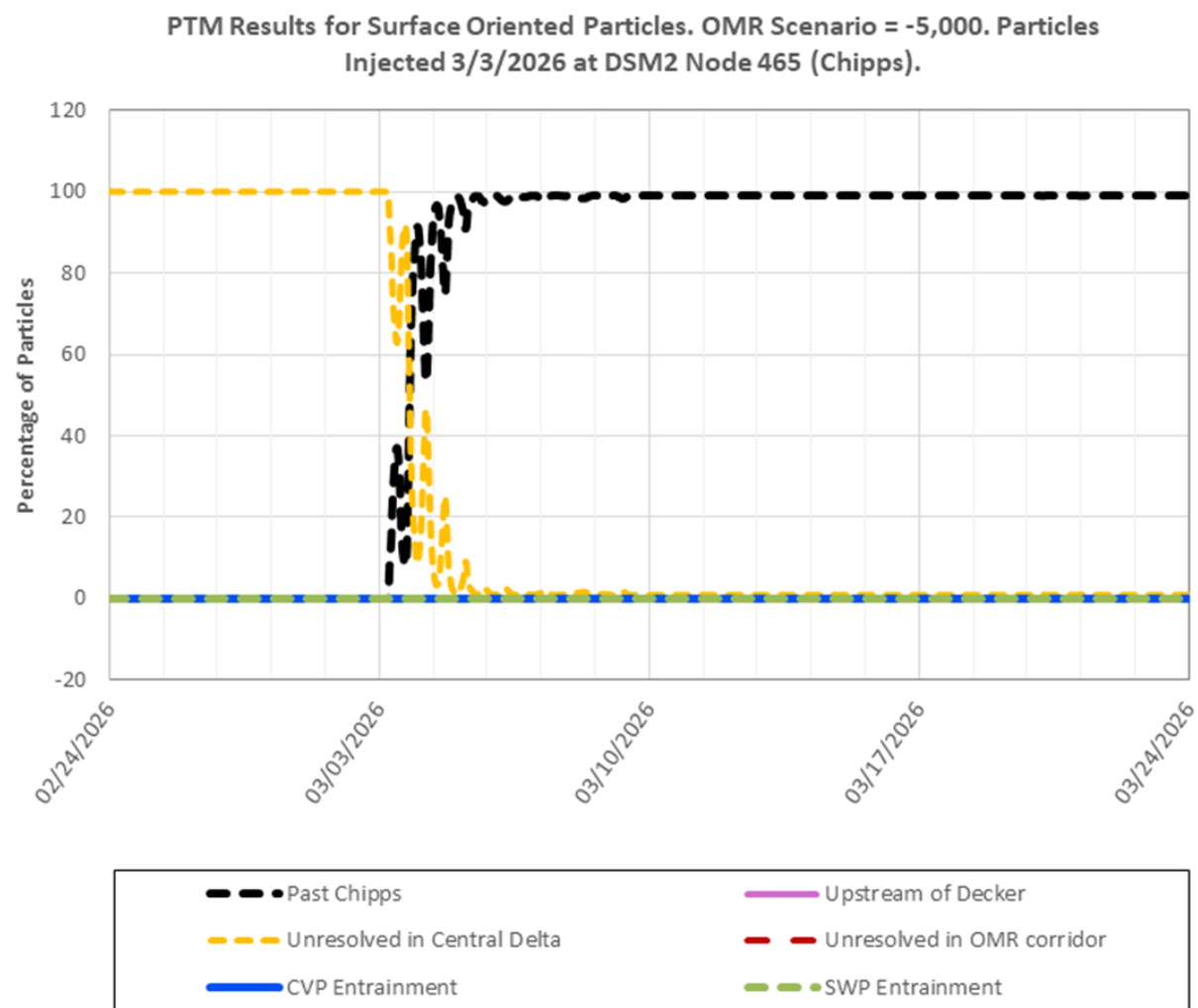


Note: Particles Injected 03/03/2026 at DSM2 Node 465 (Chippis)

Key: cfs = cubic feet per second; OMR = Old and Middle River; PTM = particle tracking model

Figure 25. PTM Results for Surface Oriented Particles – OMR Scenario -6,500 cfs

Attachment A. Delta Real-Time Forecast Summary for 03/03/2026

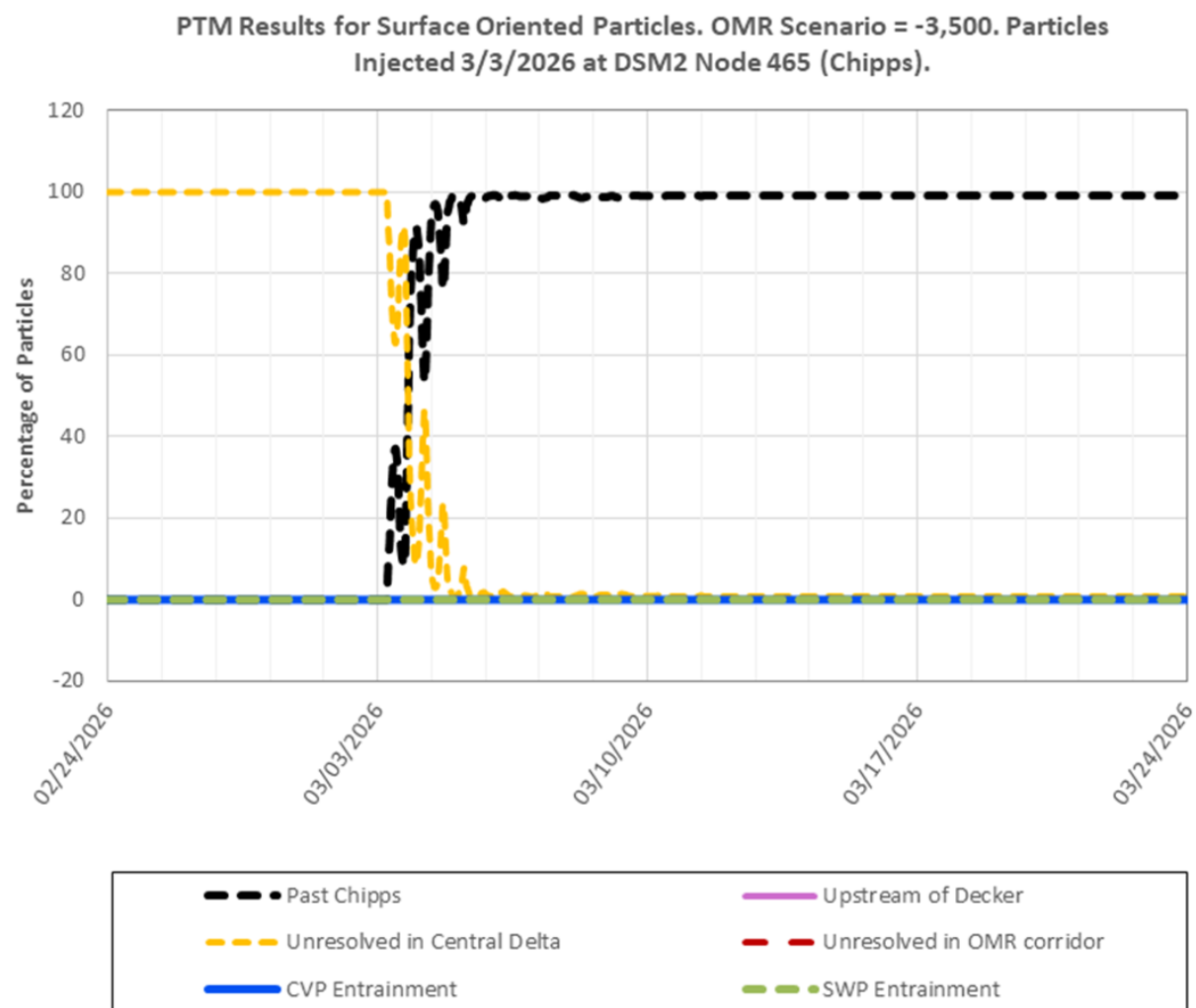


Note: Particles Injected 03/03/2026 at DSM2 Node 465 (Chippis)

Key: cfs = cubic feet per second; OMR = Old and Middle River; PTM = particle tracking model

Figure 26. PTM Results for Surface Oriented Particles – OMR Scenario -5,000 cfs

Attachment A. Delta Real-Time Forecast Summary for 03/03/2026

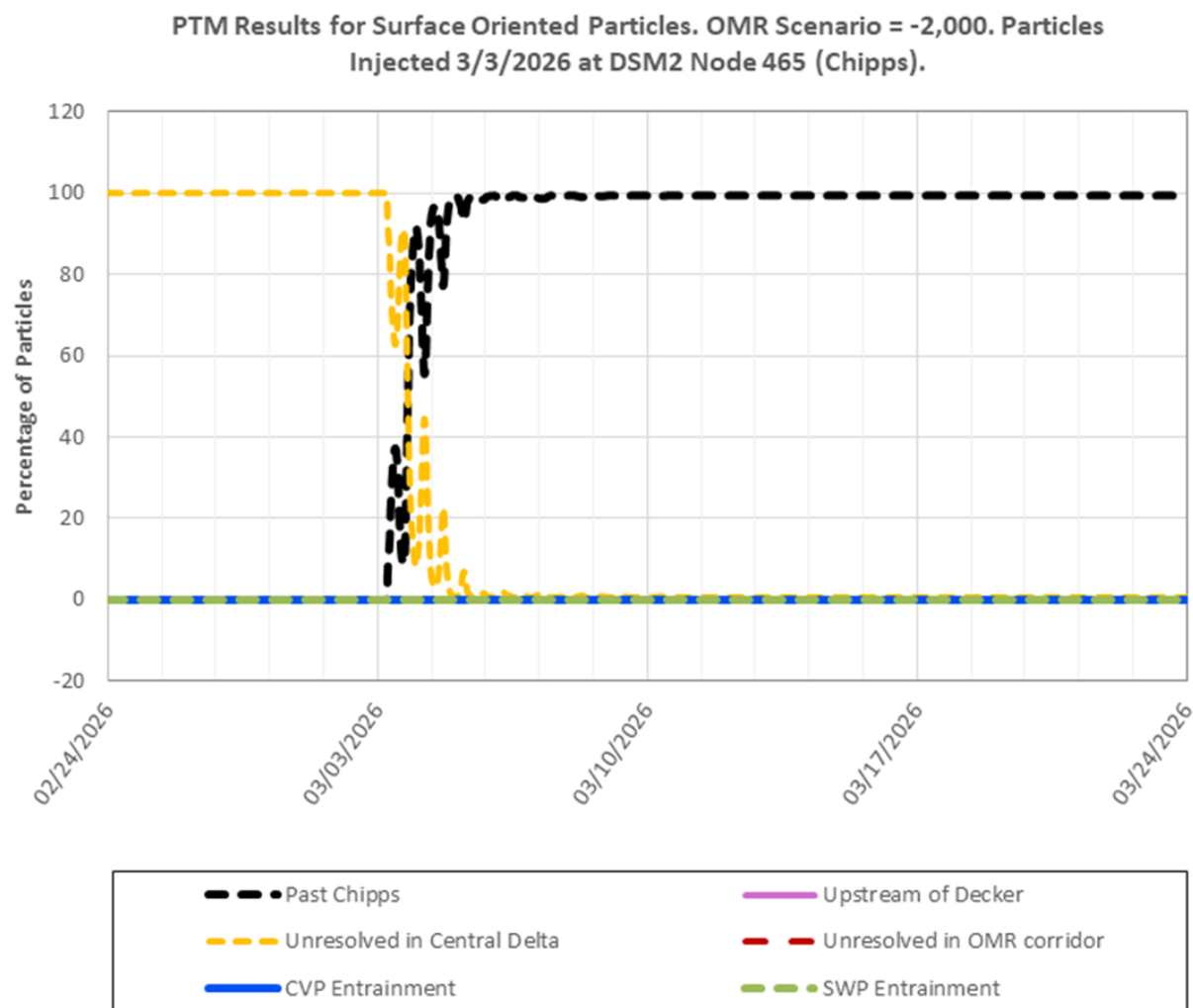


Note: Particles Injected 03/03/2026 at DSM2 Node 465 (Chippis)

Key: cfs = cubic feet per second; OMR = Old and Middle River; PTM = particle tracking model

Figure 27. PTM Results for Surface Oriented Particles – OMR Scenario -3,500 cfs

Attachment A. Delta Real-Time Forecast Summary for 03/03/2026

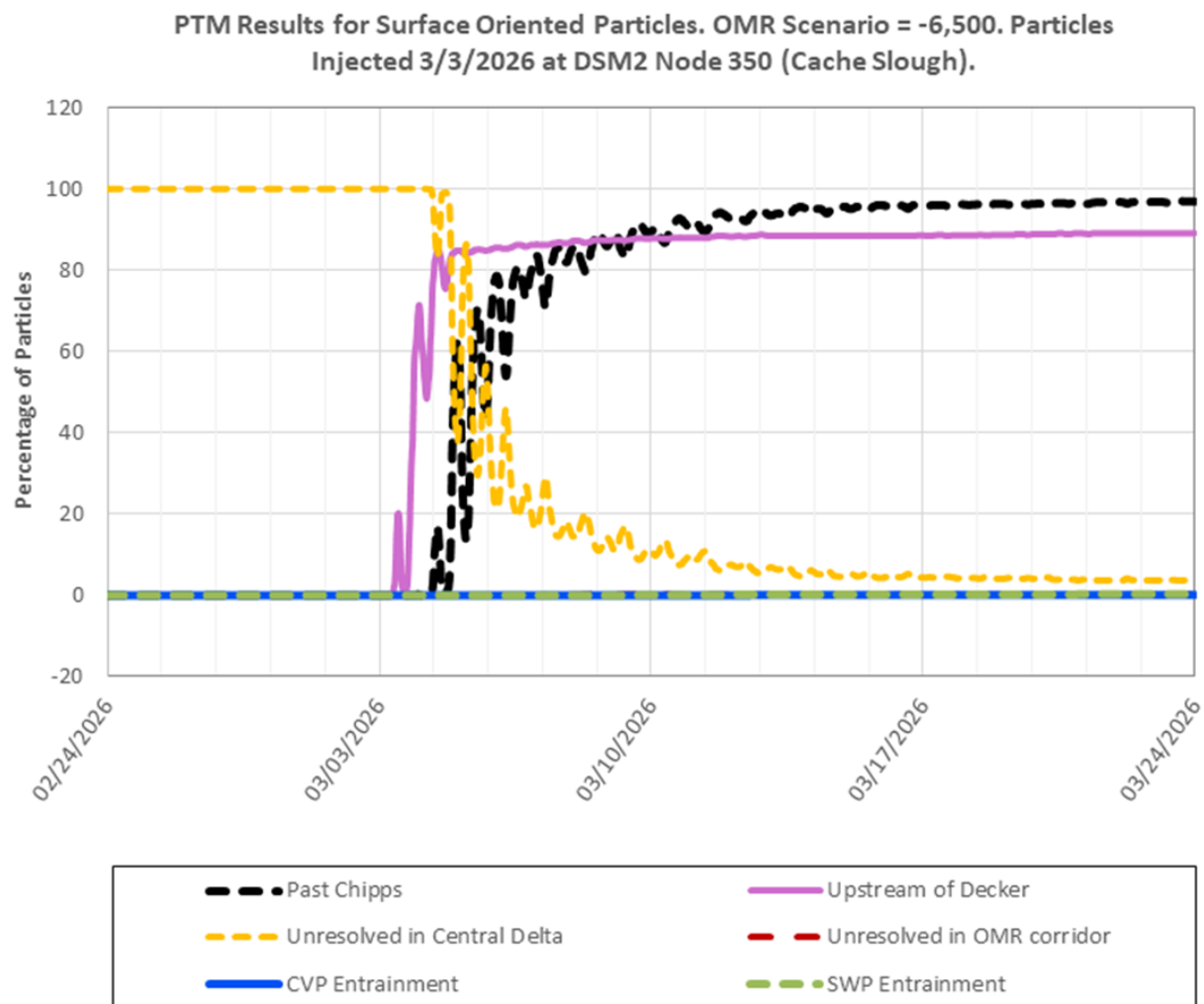


Note: Particles Injected 03/03/2026 at DSM2 Node 465 (Chippis)

Key: cfs = cubic feet per second; OMR = Old and Middle River; PTM = particle tracking model

Figure 28. PTM Results for Surface Oriented Particles – OMR Scenario -2,000 cfs

Attachment A. Delta Real-Time Forecast Summary for 03/03/2026

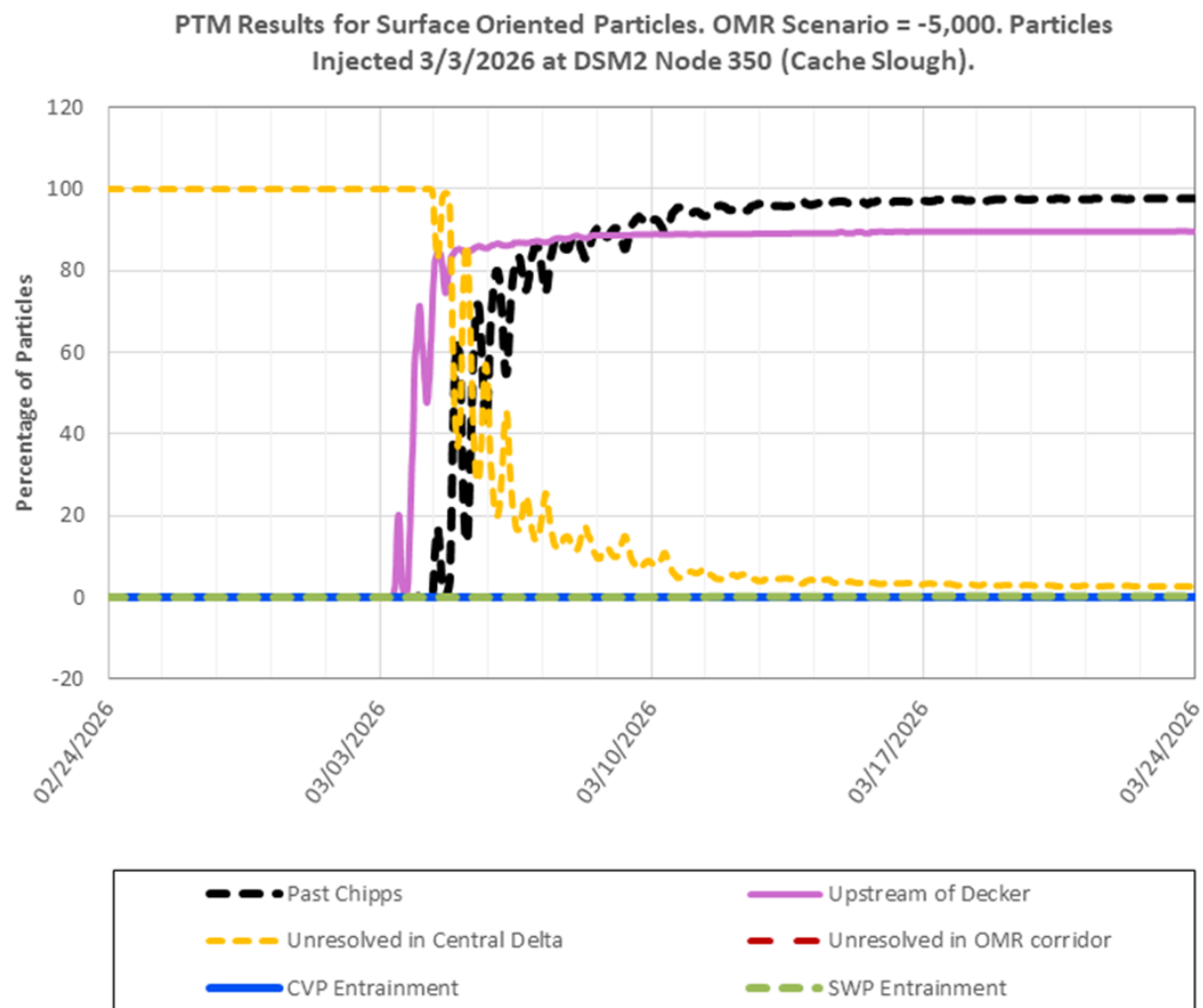


Note: Particles Injected 03/03/2026 at DSM2 Node 350 (Cache Slough)

Key: cfs = cubic feet per second; OMR = Old and Middle River; PTM = particle tracking model

Figure 29. PTM Results for Surface Oriented Particles – OMR Scenario -6,500 cfs

Attachment A. Delta Real-Time Forecast Summary for 03/03/2026

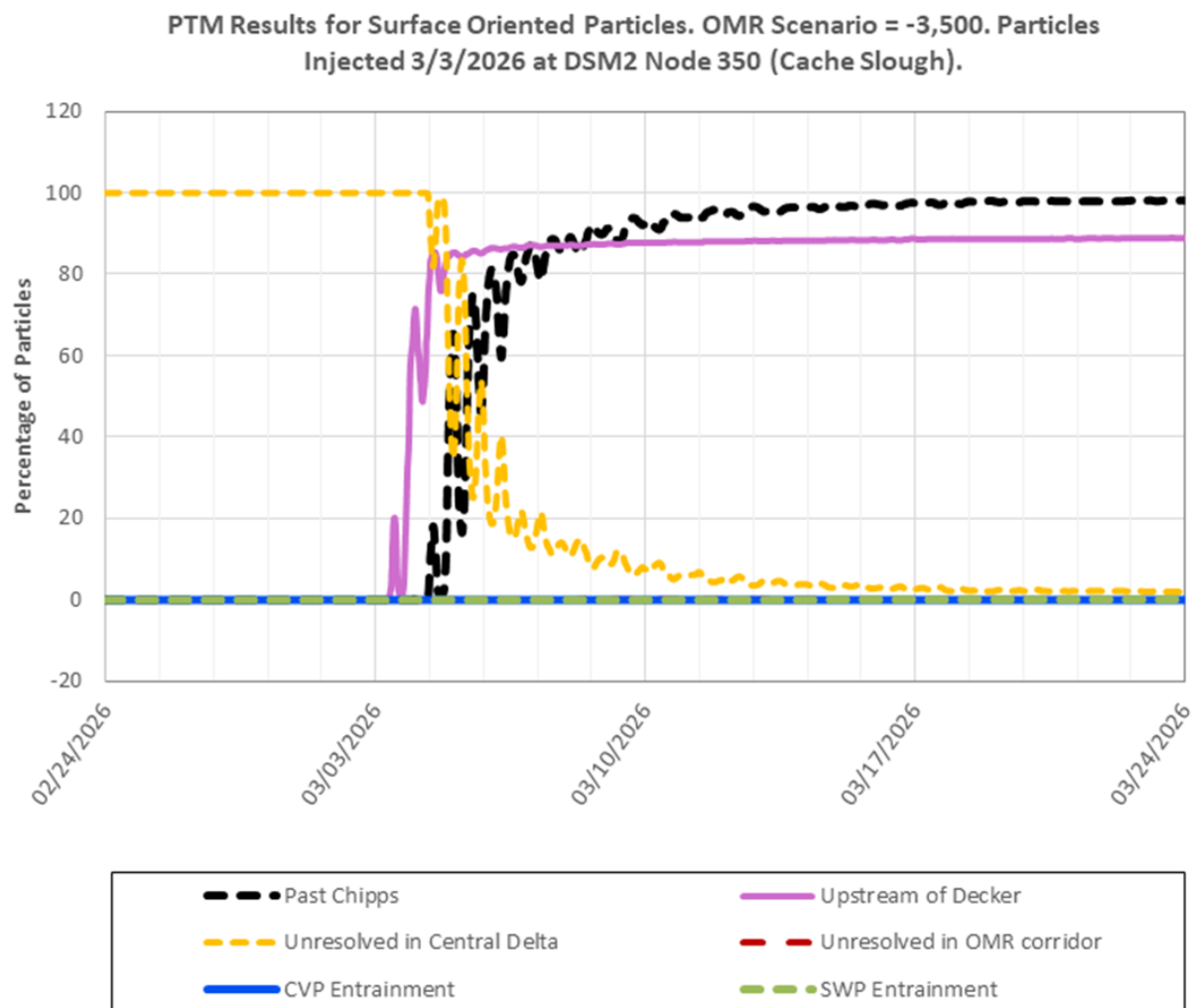


Note: Particles Injected 03/03/2026 at DSM2 Node 350 (Cache Slough)

Key: cfs = cubic feet per second; OMR = Old and Middle River; PTM = particle tracking model

Figure 30. PTM Results for Surface Oriented Particles – OMR Scenario -5,000 cfs

Attachment A. Delta Real-Time Forecast Summary for 03/03/2026

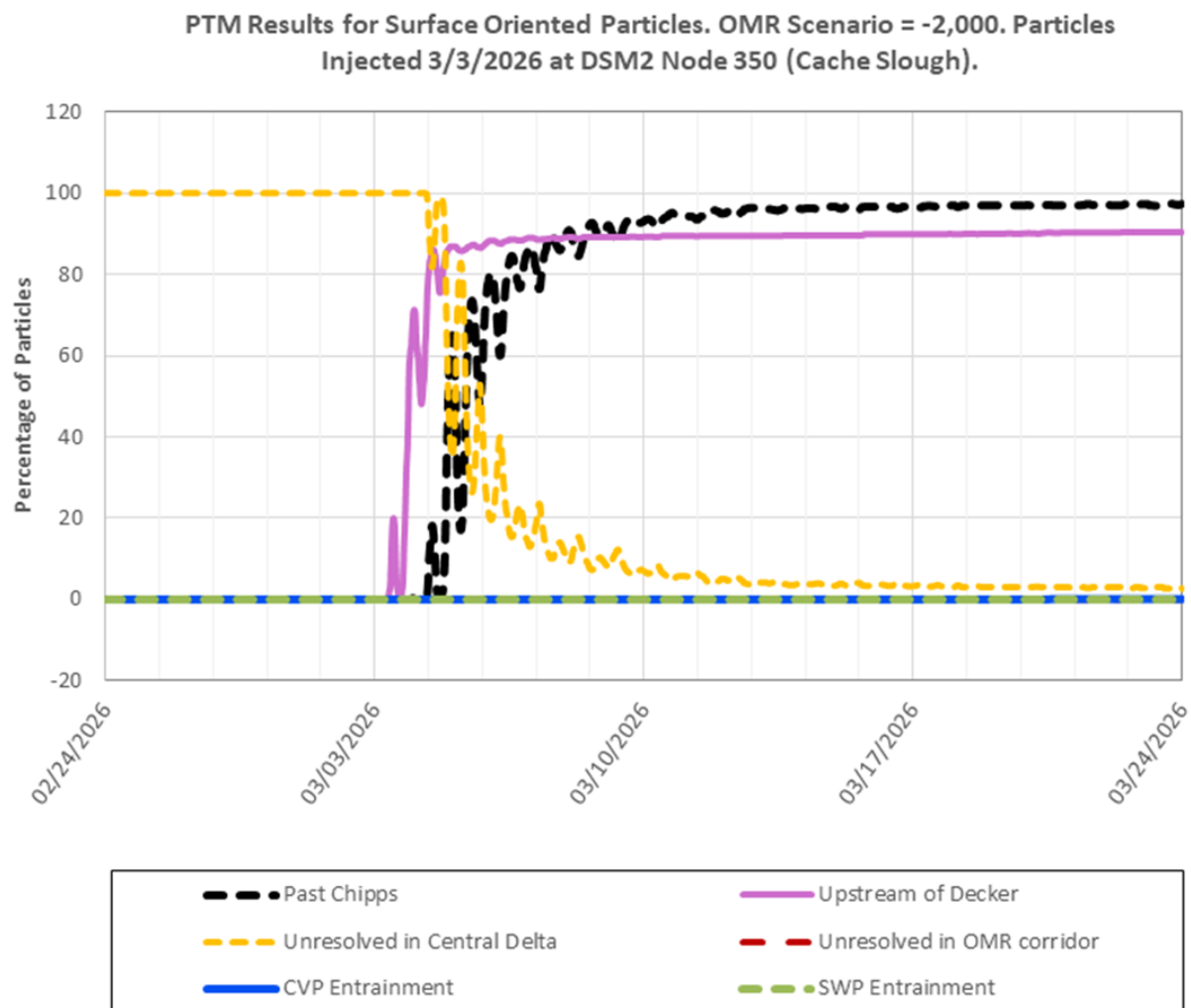


Note: Particles Injected 03/03/2026 at DSM2 Node 350 (Cache Slough)

Key: cfs = cubic feet per second; OMR = Old and Middle River; PTM = particle tracking model

Figure 31. PTM Results for Surface Oriented Particles – OMR Scenario -3,500 cfs

Attachment A. Delta Real-Time Forecast Summary for 03/03/2026

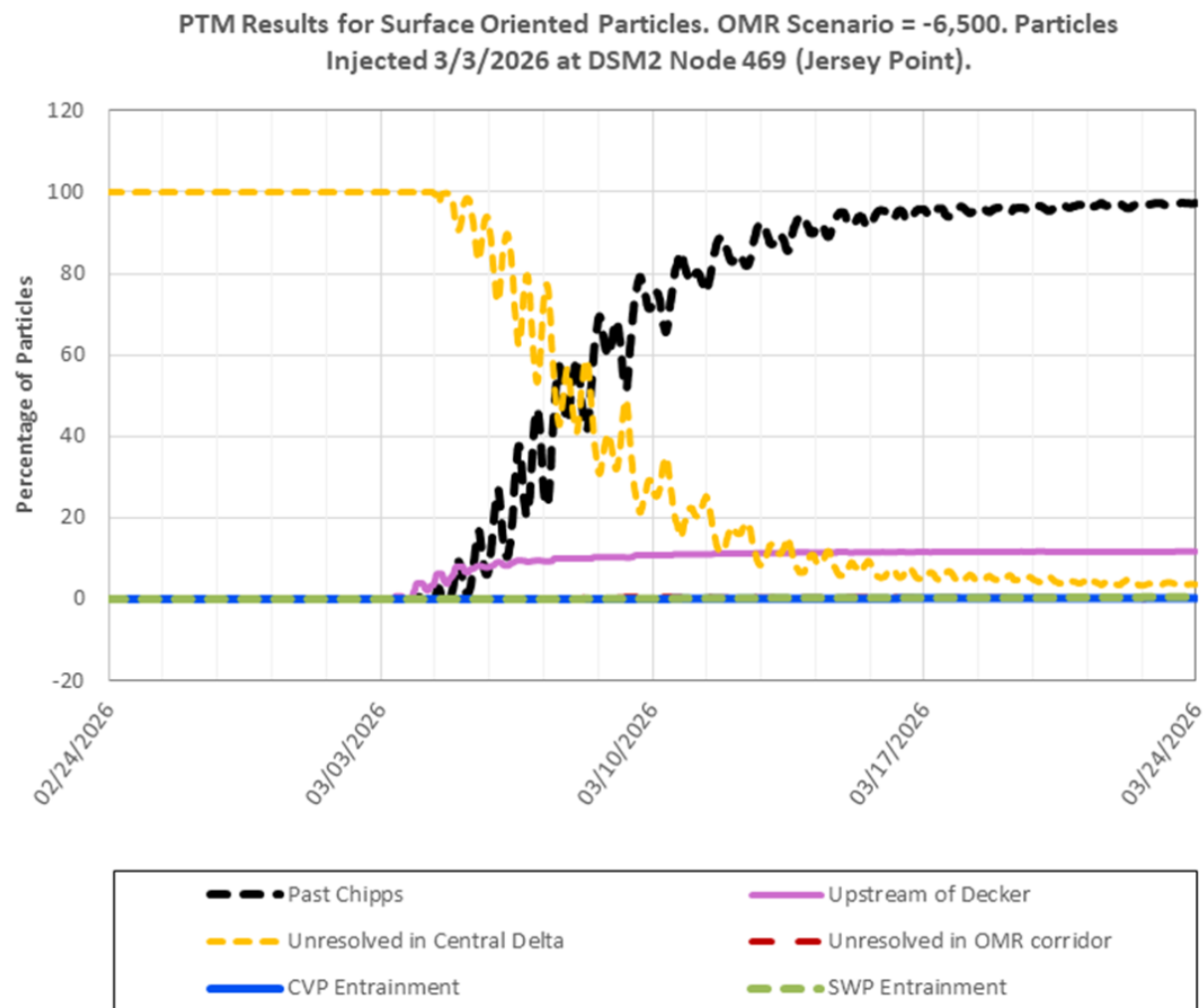


Note: Particles Injected 03/03/2026 at DSM2 Node 350 (Cache Slough)

Key: cfs = cubic feet per second; OMR = Old and Middle River; PTM = particle tracking model

Figure 32. PTM Results for Surface Oriented Particles – OMR Scenario -2,000 cfs

Attachment A. Delta Real-Time Forecast Summary for 03/03/2026

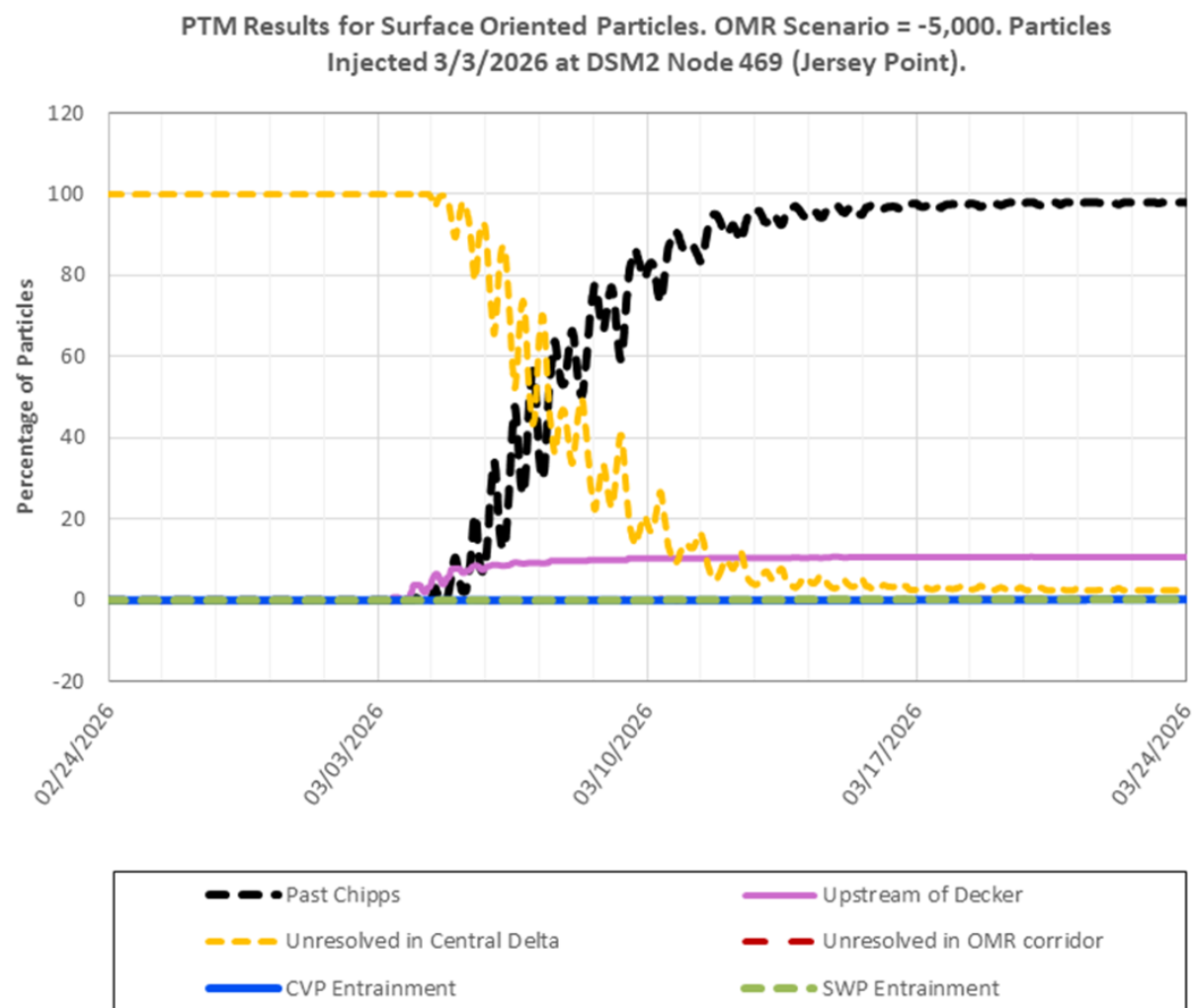


Note: Particles Injected 03/03/2026 at DSM2 Node 469 (Jersey Point)

Key: cfs = cubic feet per second; OMR = Old and Middle River; PTM = particle tracking model

Figure 33. PTM Results for Surface Oriented Particles – OMR Scenario -6,500 cfs

Attachment A. Delta Real-Time Forecast Summary for 03/03/2026

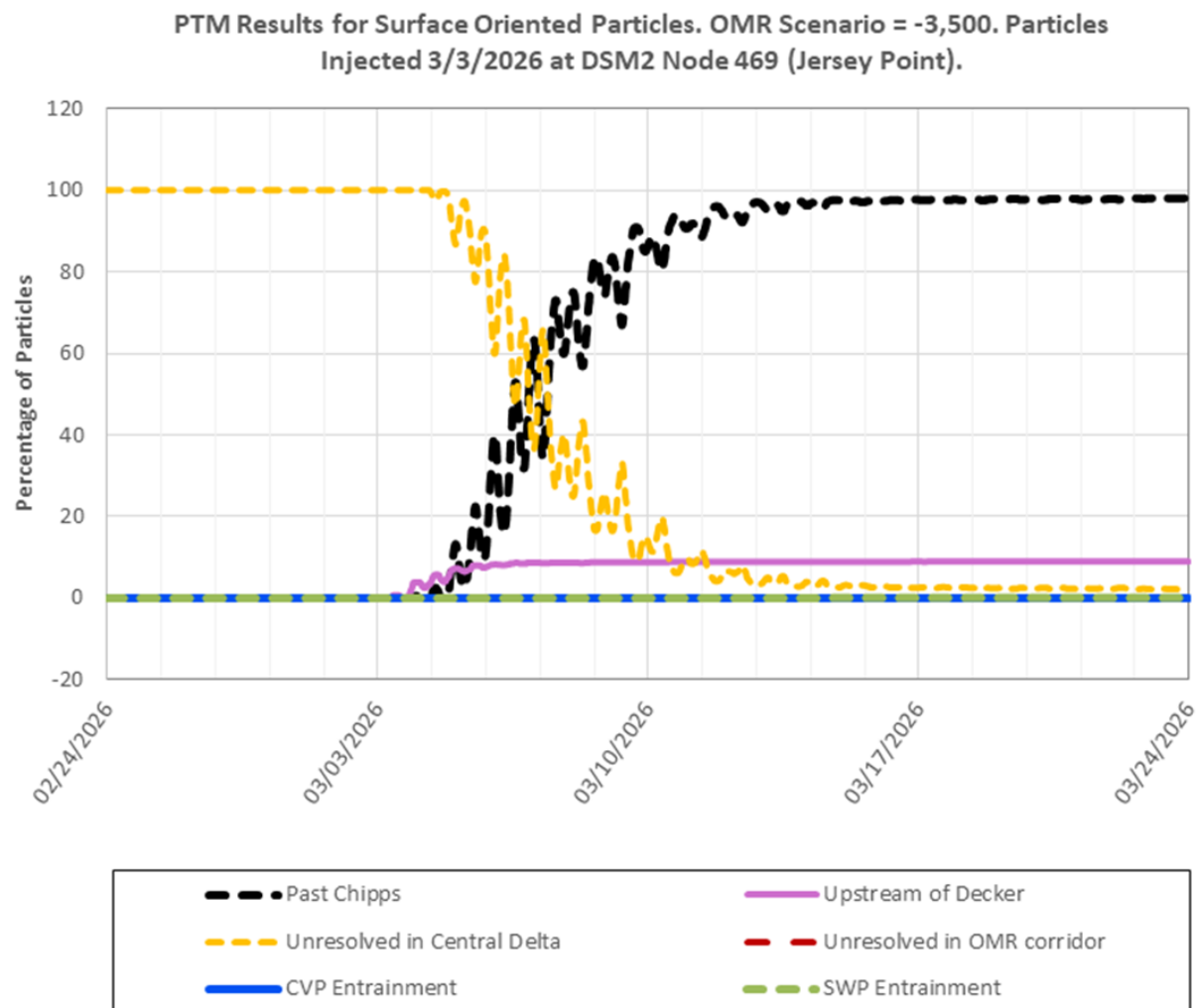


Note: Particles Injected 03/03/2026 at DSM2 Node 469 (Jersey Point)

Key: cfs = cubic feet per second; OMR = Old and Middle River; PTM = particle tracking model

Figure 34. PTM Results for Surface Oriented Particles – OMR Scenario -5,000 cfs

Attachment A. Delta Real-Time Forecast Summary for 03/03/2026

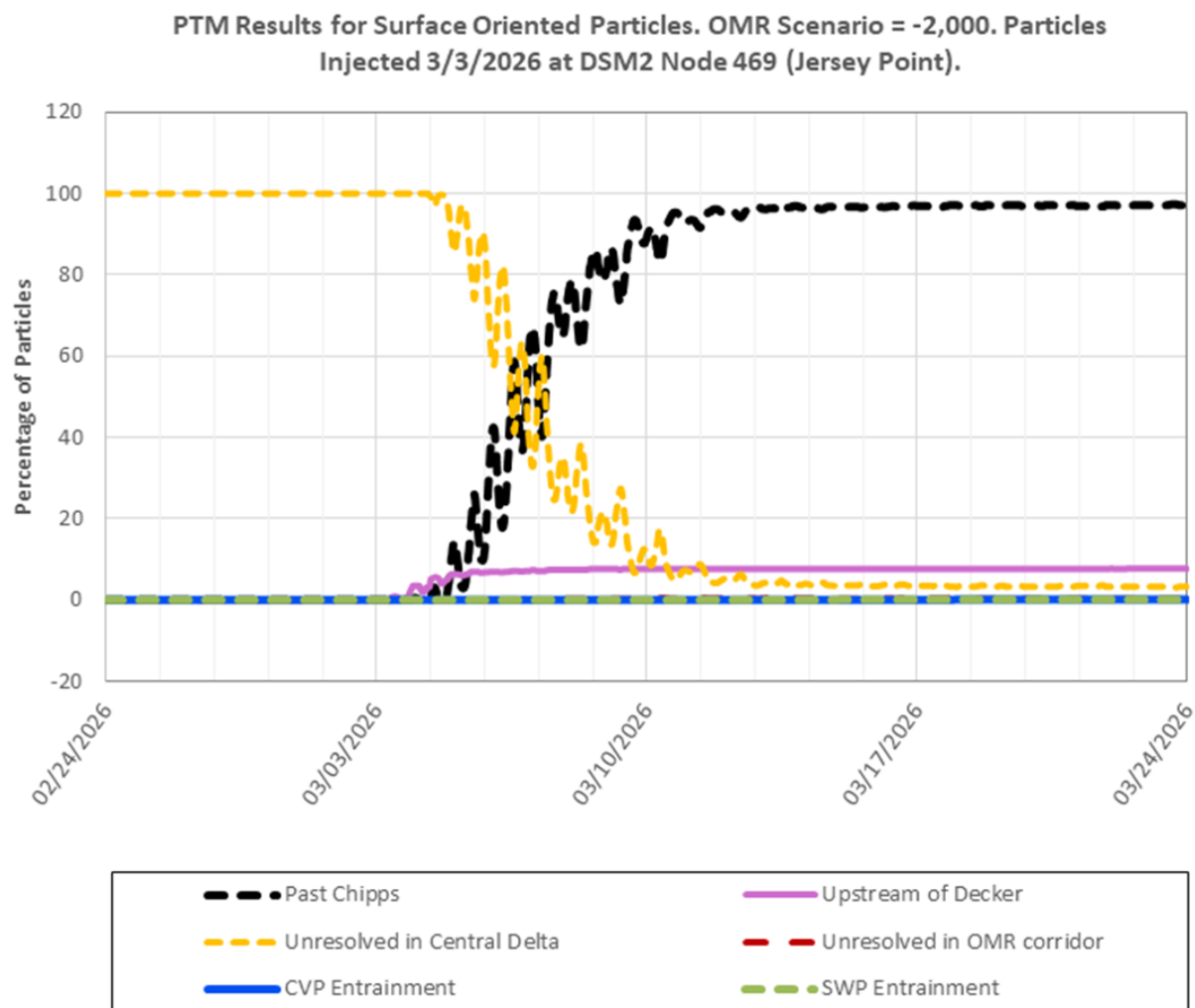


Note: Particles Injected 03/03/2026 at DSM2 Node 469 (Jersey Point)

Key: cfs = cubic feet per second; OMR = Old and Middle River; PTM = particle tracking model

Figure 35. PTM Results for Surface Oriented Particles – OMR Scenario -3,500 cfs

Attachment A. Delta Real-Time Forecast Summary for 03/03/2026

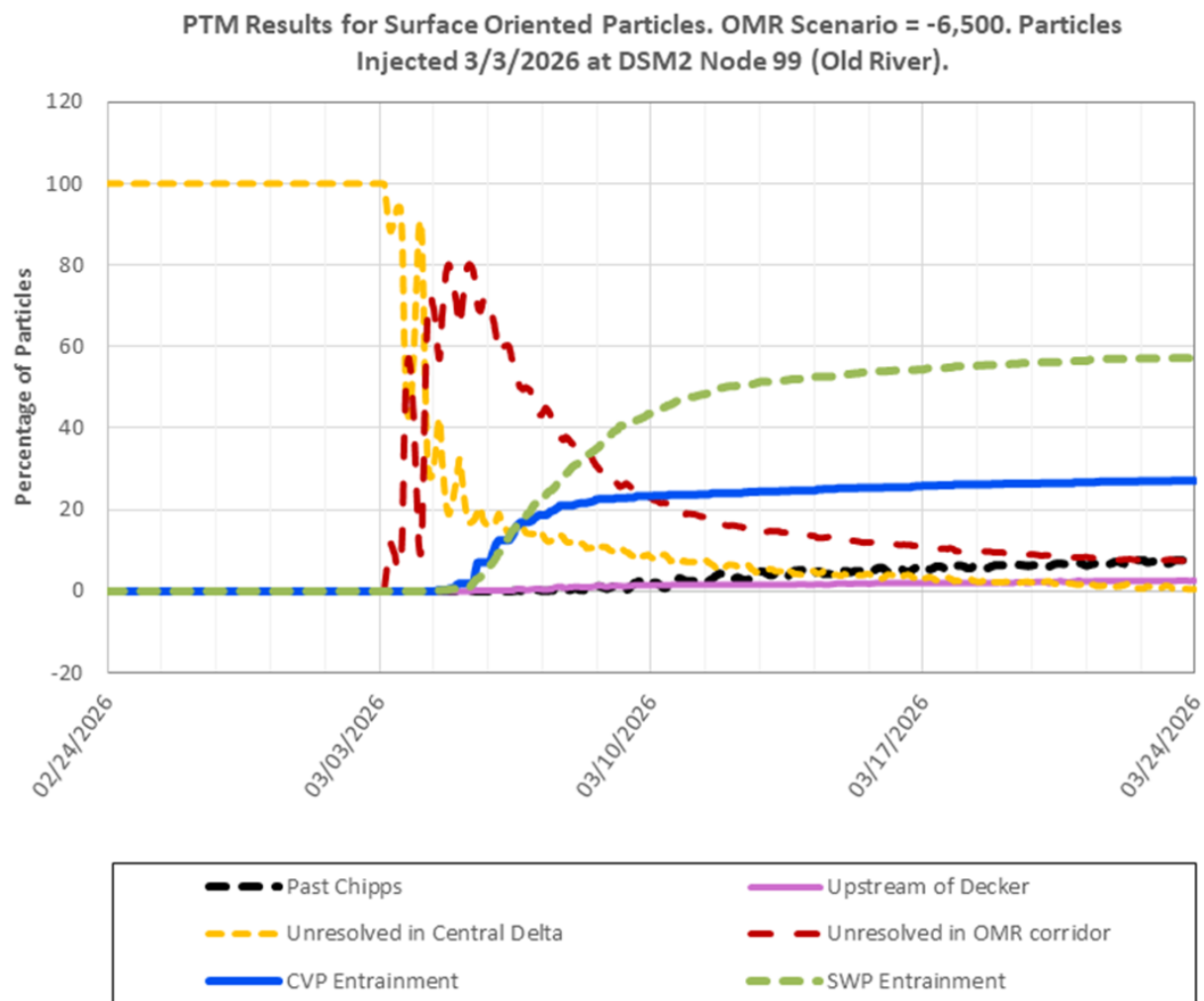


Note: Particles Injected 03/03/2026 at DSM2 Node 469 (Jersey Point)

Key: cfs = cubic feet per second; OMR = Old and Middle River; PTM = particle tracking model

Figure 36. PTM Results for Surface Oriented Particles – OMR Scenario -2,000 cfs

Attachment A. Delta Real-Time Forecast Summary for 03/03/2026

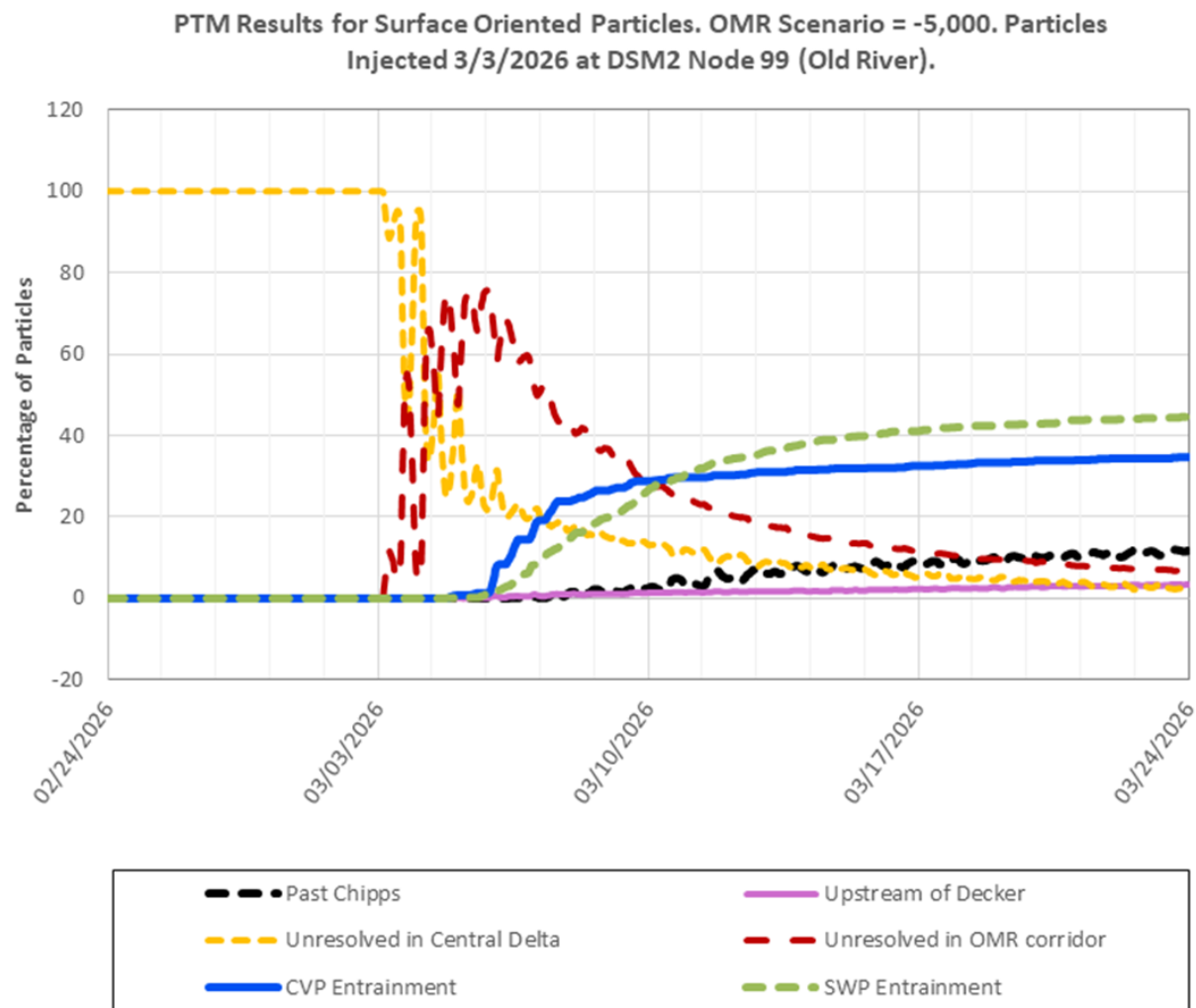


Note: Particles Injected 03/03/2026 at DSM2 Node 99 (Old River)

Key: cfs = cubic feet per second; OMR = Old and Middle River; PTM = particle tracking model

Figure 37. PTM Results for Surface Oriented Particles – OMR Scenario -6,500 cfs

Attachment A. Delta Real-Time Forecast Summary for 03/03/2026

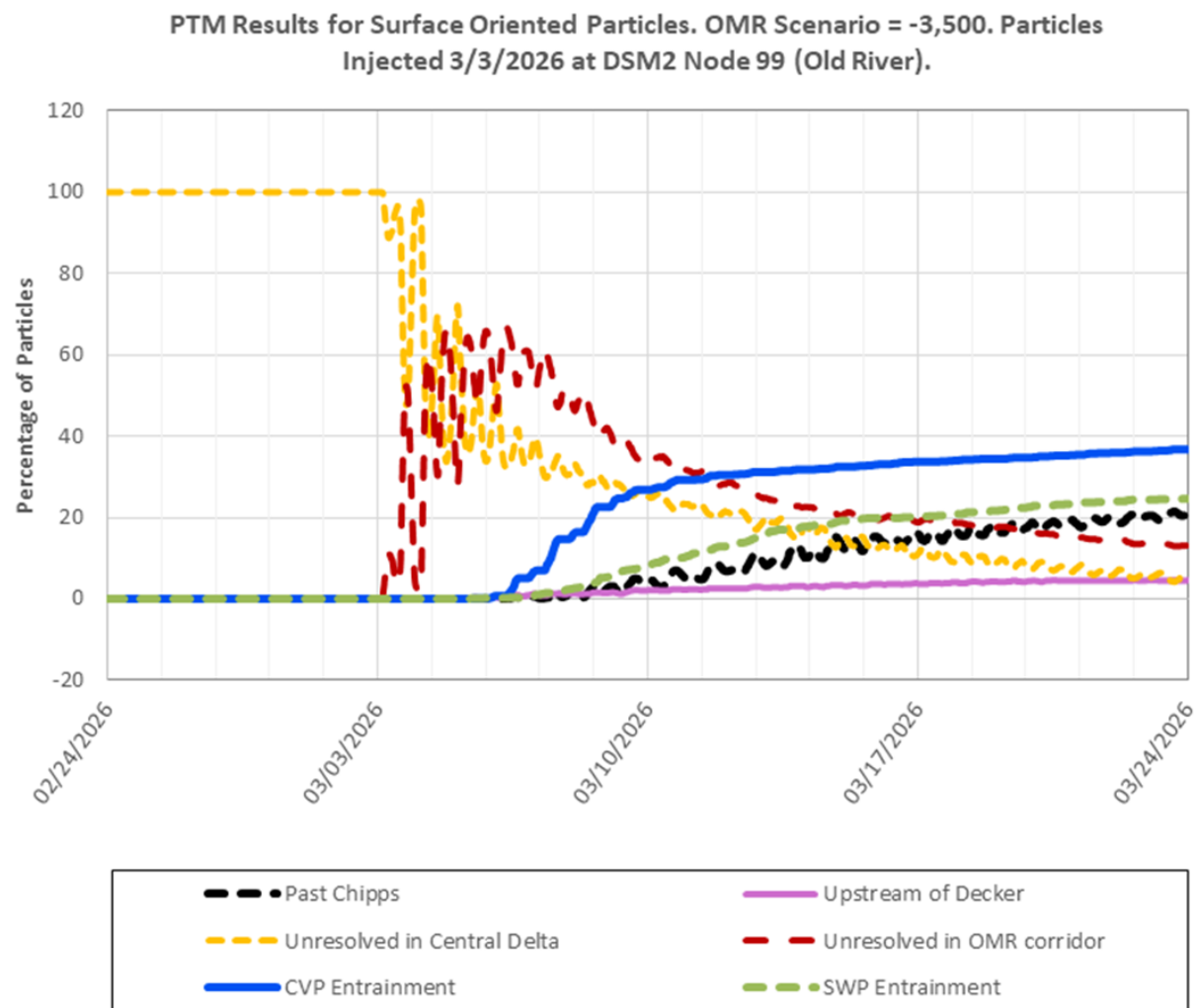


Note: Particles Injected 03/03/2026 at DSM2 Node 99 (Old River)

Key: cfs = cubic feet per second; OMR = Old and Middle River; PTM = particle tracking model

Figure 38. PTM Results for Surface Oriented Particles – OMR Scenario -5,000 cfs

Attachment A. Delta Real-Time Forecast Summary for 03/03/2026

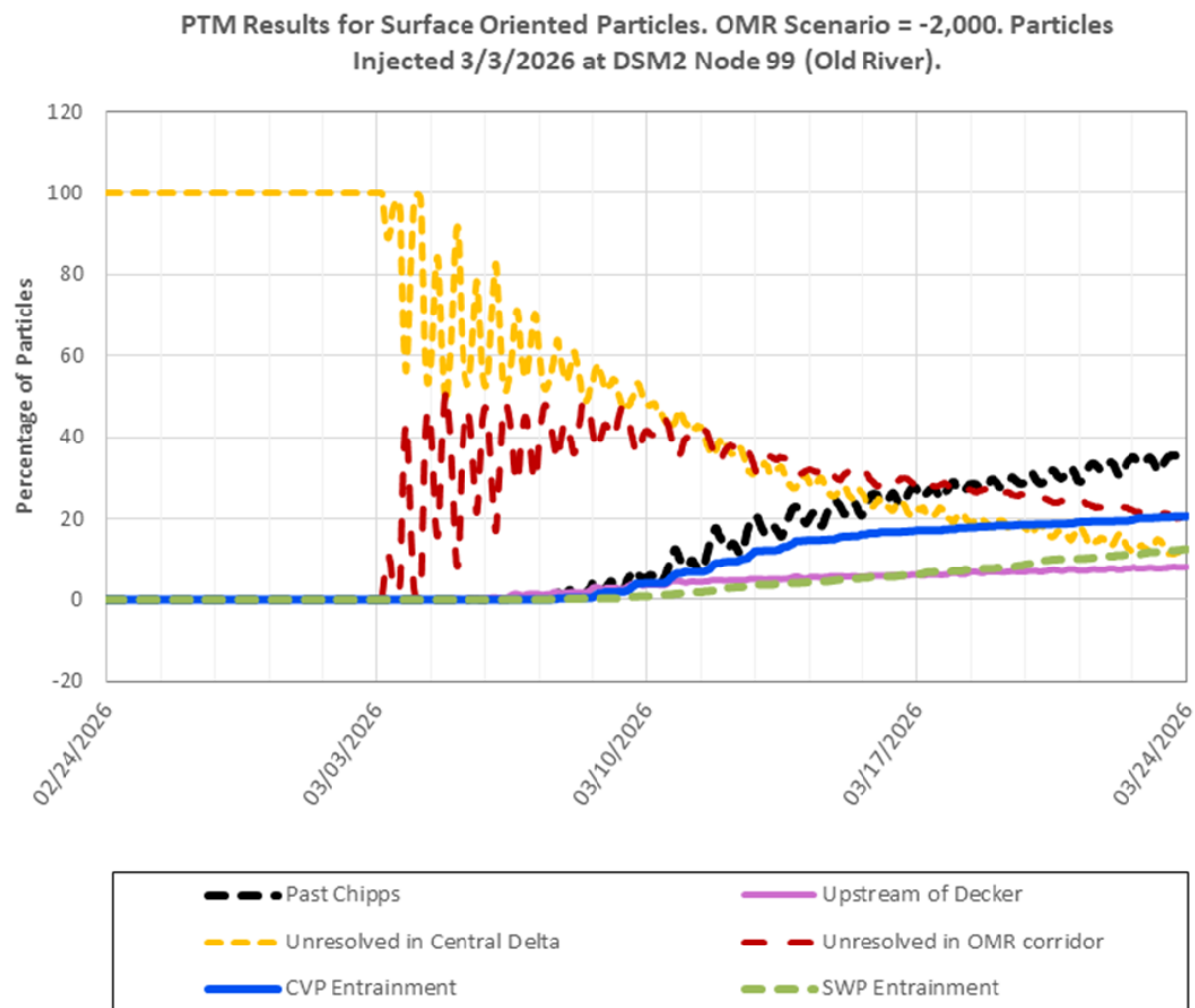


Note: Particles Injected 03/03/2026 at DSM2 Node 99 (Old River)

Key: cfs = cubic feet per second; OMR = Old and Middle River; PTM = particle tracking model

Figure 39. PTM Results for Surface Oriented Particles – OMR Scenario -3,500 cfs

Attachment A. Delta Real-Time Forecast Summary for 03/03/2026



Note: Particles Injected 03/03/2026 at DSM2 Node 99 (Old River)

Key: cfs = cubic feet per second; OMR = Old and Middle River; PTM = particle tracking model

Figure 40. PTM Results for Surface Oriented Particles – OMR Scenario -2,000 cfs

A.5 ECO-PTM (Ecological Particle Tracking Model)

ECO-PTM Results Evaluation Period: 03/03/2026 – 03/22/2026

Particles Injected: 03/03/2026

Injection Location: Sacramento River at Freeport

Table 12. Salmon Particle Route Ratio After 3 Weeks Ending 03/22/2026

OMR Flow Bin (cfs)	Sutter Slough Route	Steamboat Slough Route	Sacramento River (SS) Route	Sacramento River (GEO) Route	Georgiana Slough Route
-6,500	0.14	0.30	0.56	0.81	0.19
-5,000	0.14	0.31	0.55	0.81	0.19
-3,500	0.14	0.31	0.56	0.82	0.18
-2,000	0.13	0.30	0.57	0.82	0.18

Note: Salmon particle route ratio for the Sacramento River (SS) Route reflects particles inserted at Freeport that are not routed through either Sutter Slough or Steamboat Slough. Salmon particle route ratio for the Sacramento River (GEO) Route reflects particles inserted at Freeport that are not routed through either Sutter Slough, Steamboat Slough, Georgiana Slough, or the Delta Cross Channel (when operational).

Key: cfs = cubic feet per second, GEO = Georgiana Slough, OMR = Old and Middle River, SS = Sutter Slough

Table 13. Salmon Particle Route-Specific Survival After 3 Weeks Ending 03/22/2026

OMR Flow Bin (cfs)	Sutter Slough Route	Steamboat Slough Route	Sacramento River Route	Georgiana Slough Route	All Routes Combined
-6,500	62%	68%	64%	33%	62%
-5,000	62%	69%	65%	34%	62%
-3,500	60%	67%	64%	34%	61%
-2,000	60%	67%	63%	30%	60%

Key: cfs = cubic feet per second, OMR = Old and Middle River

A.6 Longfin Smelt Larval Population and PTM Analysis

PTM Results Evaluation Period: 03/03/2026 – 03/22/2026

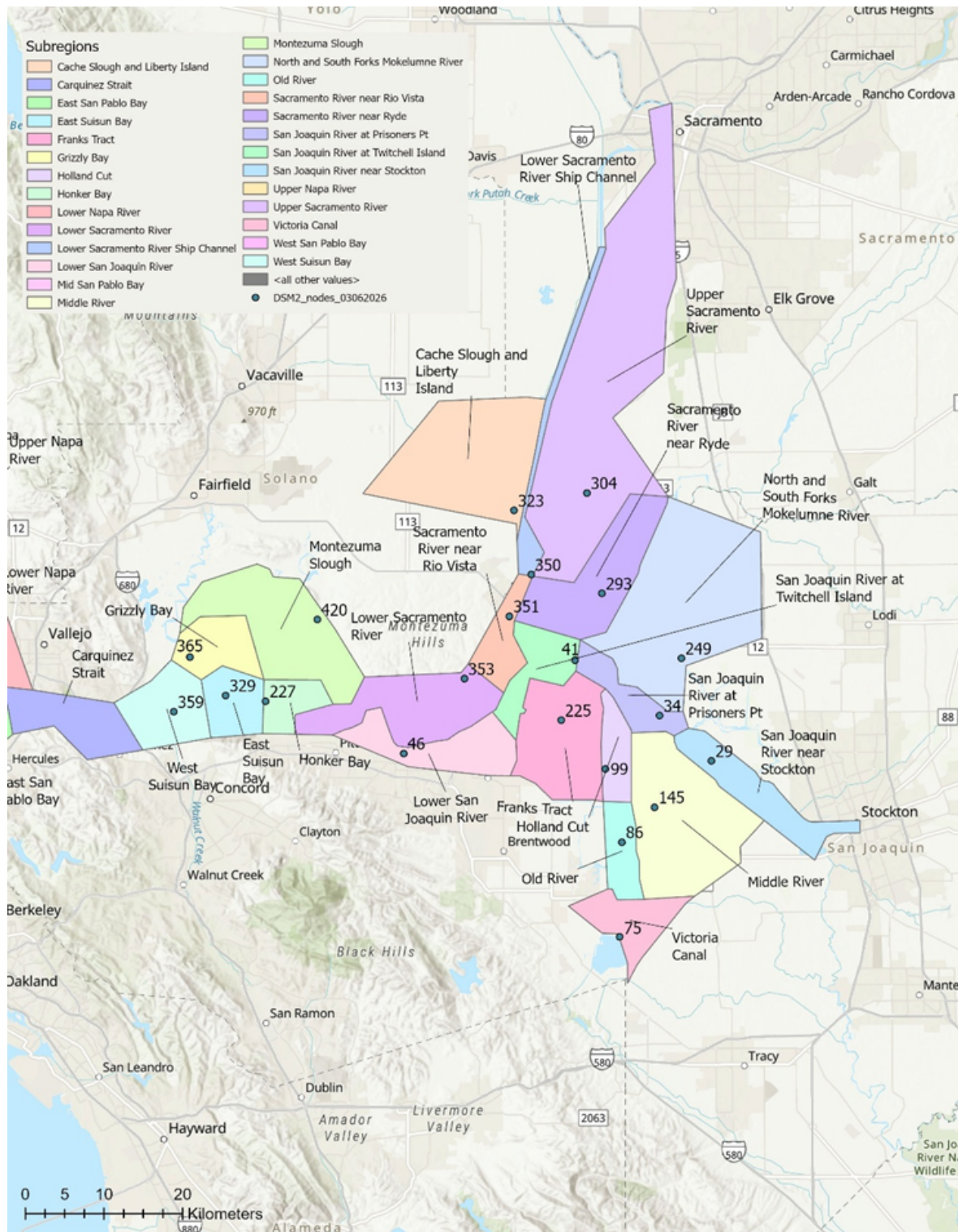
Particles Injected: 03/03/2026

PTM Injection Location: node(s) within each Delta Region identified in map below

PTM Analysis Method: Longfin smelt (LFS) larva abundance is estimated in each Enhanced Delta Smelt Monitoring (EDSM) program subregion. Cumulative particle flux into Central Valley Project (CVP) and State Water Project (SWP) facilities are represented in PTM by one injection location per subregion ([Figure 41](#)). LFS larva entrainment is estimated by multiplying the LFS subregion abundance by cumulative particle flux into CVP and SWP facilities from the corresponding subregion injection point. LFS entrainment from each subregion is added together and reported at the LFS Region scale ([Figure 42](#)).



Attachment A. Delta Real-Time Forecast Summary for 03/03/2026



Note: No DSM2 nodes are west of the West Suisun Bay subregion, so the furthest west node in the DSM2 domain is used to represent particle entrainment for all subregions west of West Suisun Bay.

Figure 41. Map of Delta Showing Longfin Smelt Subregions and DSM2 Nodes



Attachment A. Delta Real-Time Forecast Summary for 03/03/2026

Regional and Delta-wide LFS larval population is estimated using Smelt Larva Survey data from Survey 5 (2/23/2026 – 2/25/2026) and volumetric expansion methods developed by the Six-Agency Monitoring Survey Design Team. The percent of samples processed each survey is shown in [Table 14](#). Results from the most recent survey are used as a conservative approach because it's more recent and likely to overestimate proportional entrainment since the unprocessed western stations generally see higher abundances, but minimal entrainment risk.

Table 14. Percent of Smelt Larva Survey Sample Results Processed as of 04/09/2026

SLS Survey Number	Survey Date	Eastern Delta	Lower Sacramento	Lower San Joaquin	Sacramento/ North Delta	South Delta	Suisun	Western Delta
1	12/29/2025	100%	100%	100%	100%	100%	100%	100%
2	1/12/2026	100%	100%	100%	100%	100%	100%	100%
3	1/26/2026	100%	100%	100%	100%	100%	100%	100%
4	2/9/2026	100%	100%	100%	100%	100%	100%	100%
5	2/23/2026	100%	100%	100%	100%	100%	100%	92%

Key: SLS = Smelt Larva Survey

The DSM2 node used as an injection point, EDSM subregion, and LFS Region for reporting are shown in [Table 15](#).

Table 15. DSM2 Injection Node, EDSM Subregion, and LFS Region

DSM2 Injection Node	EDSM Subregion	LFS Region
329	East Suisun Bay	Suisun
365	Grizzly Bay	Suisun
227	Honker Bay	Suisun
420	Montezuma Slough	Suisun
359	West Suisun Bay	Suisun
359	Carquinez Strait	Western Delta
359	Upper Napa River	Western Delta
359	Lower Napa River	Western Delta
359	East San Pablo Bay	Western Delta
359	West San Pablo Bay	Western Delta
359	Mid San Pablo Bay	Western Delta
353	Lower Sacramento River	Lower Sacramento
351	Sacramento River near Rio Vista	Lower Sacramento
350	Lower Sacramento River Ship Channel	Sacramento/ North Delta
293	Sacramento River near Ryde	Sacramento/ North Delta
323	Cache Slough and Liberty Island	Sacramento/ North Delta
304	Upper Sacramento River	Sacramento/ North Delta
249	North and South Forks Mokelumne River	East
46	Lower San Joaquin River	Lower San Joaquin
41	San Joaquin River at Twitchell Island	Lower San Joaquin
34	San Joaquin River at Prisoners Point	Lower San Joaquin
225	Franks Tract	South Delta
99	Holland Cut	South Delta
86	Old River	South Delta
29	San Joaquin River near Stockton	South Delta

Attachment A. Delta Real-Time Forecast Summary for 03/03/2026

DSM2 Injection Node	EDSM Subregion	LFS Region
145	Middle River	South Delta
75	Victoria Canal	South Delta

Key:

EDSM = Enhanced Delta Smelt Monitoring

LFS = longfin smelt

Attachment A. Delta Real-Time Forecast Summary for 03/03/2026

Table 16. LFS Entrainment Estimate Using PTM with Surface Oriented Particles: Week 1 Ending 03/08/2026

OMR (cfs)	Combined Exports (cfs)	Region	West	Suisun	Sacra- mento/ North Delta	Lower San Joaquin	Lower Sacra- mento	South Delta	East	Delta-wide Total (#)	Delta- wide Total (%)
		Metric									
		LFS Larva Abundance (Survey 5: 2/23/2026)	9,538,687	60,954,235	914,595	4,403,423	11,186,757	0	0	86,997,697	-
-6,500	10,175	PTM Entrained (%)	0.0	0.0	0.0	0.2	0.0	0.0	0.0	-	-
-5,000	8,515	PTM Entrained (%)	0.0	0.0	0.0	<0.1	0.0	0.0	0.0	-	-
-3,500	6,898	PTM Entrained (%)	0.0	0.0	0.0	<0.1	0.0	0.0	0.0	-	-
-2,000	5,209	PTM Entrained (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	-
-6,500	10,175	LFS Larva Entrained (#)	0	0	0	6,876	0	0	0	6,876	<0.1%
-5,000	8,515	LFS Larva Entrained (#)	0	0	0	2,578	0	0	0	2,578	<0.1%
-3,500	6,898	LFS Larva Entrained (#)	0	0	0	859	0	0	0	859	<0.1%
-2,000	5,209	LFS Larva Entrained (#)	0	0	0	0	0	0	0	0	0.0%

Notes:

Values between 0.0 and 0.1 are indicated with <0.1.

The PTM entrained (%) value reflects the total entrained particles from all subregions within an LFS Region divided by the estimated LFS Region abundance.

Key:

cfs = cubic feet per second

LFS = longfin Smelt

OMR = Old and Middle River

Attachment A. Delta Real-Time Forecast Summary for 03/03/2026

Table 17. LFS Entrainment Estimate Using PTM with Surface Oriented Particles: Week 2 Ending 03/15/2026

OMR (cfs)	Combined Exports (cfs)	Region	West	Suisun	Sacra- mento/ North Delta	Lower San Joaquin	Lower Sacra- mento	South Delta	East	Delta-wide Total (#)	Delta- wide Total (%)
		Metric									
		LFS Larva Abundance (Survey 5: 2/23/2026)	9,538,687	60,954,235	914,595	4,403,423	11,186,757	0	0	86,997,697	-
-6,500	8,887	PTM Entrained (%)	0.0	0.0	0.4	2.0	<0.1	0.0	0.0	-	-
-5,000	7,242	PTM Entrained (%)	0.0	0.0	0.3	1.2	<0.1	0.0	0.0	-	-
-3,500	5,610	PTM Entrained (%)	0.0	0.0	0.0	0.4	<0.1	0.0	0.0	-	-
-2,000	3,935	PTM Entrained (%)	0.0	0.0	0.0	0.1	0.0	0.0	0.0	-	-
-6,500	8,887	LFS Larva Entrained (#)	0	0	3,201	89,384	1,211	0	0	93,796	0.1%
-5,000	7,242	LFS Larva Entrained (#)	0	0	2,744	53,286	1,211	0	0	57,242	<0.1%
-3,500	5,610	LFS Larva Entrained (#)	0	0	0.0	18,908	606	0	0	19,514	<0.1%
-2,000	3,935	LFS Larva Entrained (#)	0	0	0.0	6,016	0.0	0	0	6,016	<0.1%

Notes:

Values between 0.0 and 0.1 are indicated with <0.1.

The PTM entrained (%) value reflects the total entrained particles from all subregions within an LFS Region divided by the estimated LFS Region abundance.

Key:

cfs = cubic feet per second

LFS = longfin Smelt

OMR = Old and Middle River

PTM = particle tracking model

Attachment A. Delta Real-Time Forecast Summary for 03/03/2026

Table 18. LFS Entrainment Estimate Using PTM with Surface Oriented Particles: Week 3 ending 03/22/2026

OMR (cfs)	Combined Exports (cfs)	Region	West	Suisun	Sacra- mento/ North Delta	Lower San Joaquin	Lower Sacra- mento	South Delta	East	Delta-wide Total (#)	Delta- wide Total (%)
		Metric									
		LFS Larva Abundance (Survey 5: 2/23/2026)	9,538,687	60,954,235	914,595	4,403,423	11,186,757	0	0	86,997,697	-
-6,500	8,115	PTM Entrained (%)	0.0	0.0	0.4	3.3	<0.1	0.0	0.0	-	-
-5,000	6,412	PTM Entrained (%)	0.0	0.0	0.4	2.3	<0.1	0.0	0.0	-	-
-3,500	4,809	PTM Entrained (%)	0.0	0.0	0.1	0.8	<0.1	0.0	0.0	-	-
-2,000	3,106	PTM Entrained (%)	0.0	0.0	0.0	0.3	0.0	0.0	0.0	-	-
-6,500	8,115	LFS Larva Entrained (#)	0	0	3,658	146,108	1,817	0	0	151,583	0.2%
-5,000	6,412	LFS Larva Entrained (#)	0	0	3,658	101,416	1,211	0	0	106,286	0.1%
-3,500	4,809	LFS Larva Entrained (#)	0	0	915	35,238	606	0	0	36,758	<0.1%
-2,000	3,106	LFS Larva Entrained (#)	0	0	0.0	14,611	0.0	0	0	14,611	<0.1%

Notes:

Values between 0.0 and 0.1 are indicated with <0.1

The PTM entrained (%) value reflects the total entrained particles from all subregions within an LFS Region divided by the estimated LFS Region abundance.

Key:

cfs = cubic feet per second

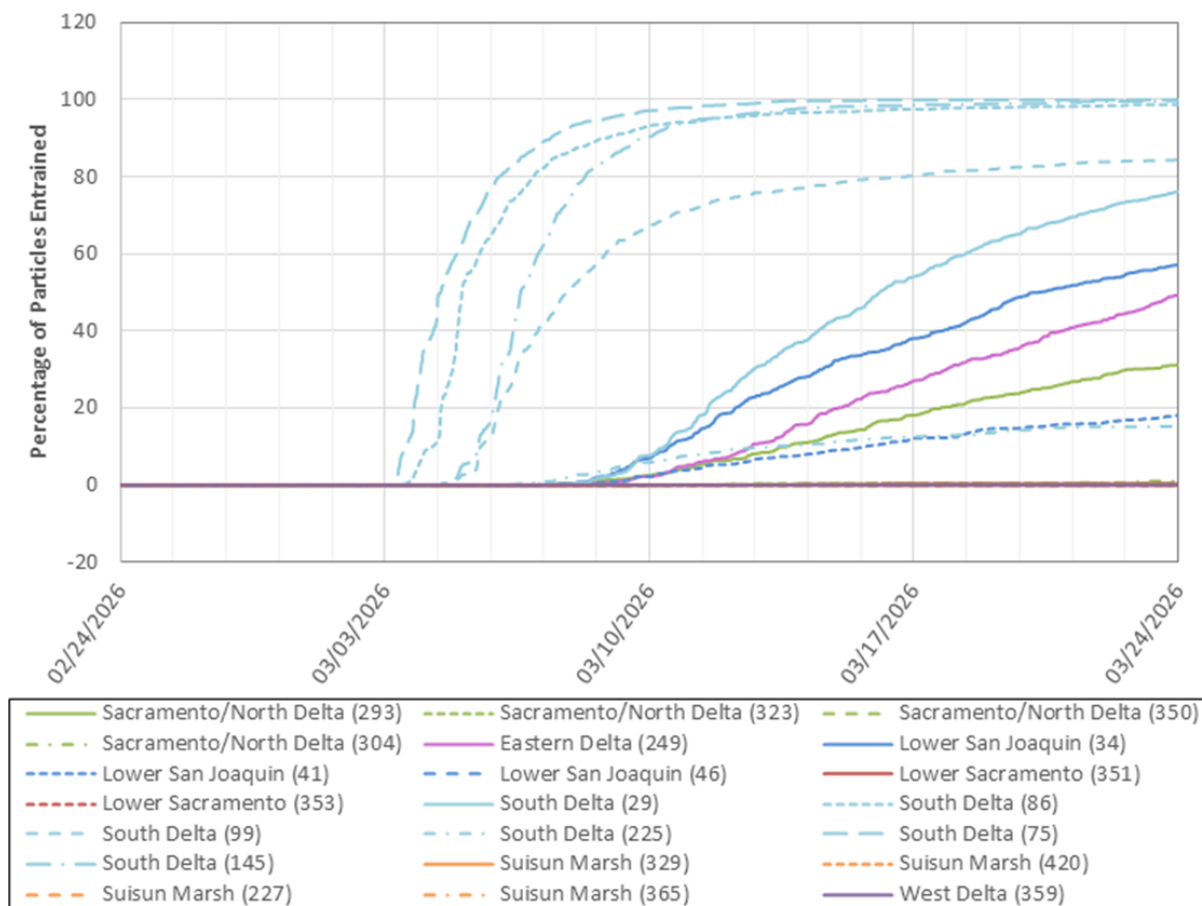
LFS = longfin Smelt

OMR = Old and Middle River

PTM = particle tracking model

Attachment A. Delta Real-Time Forecast Summary for 03/03/2026

**Average PTM Results by Injection Region for Position Oriented Particles
Entrained at CVP and SWP. OMR Scenario = -6,500. Particles Injected 3/3/2026.**



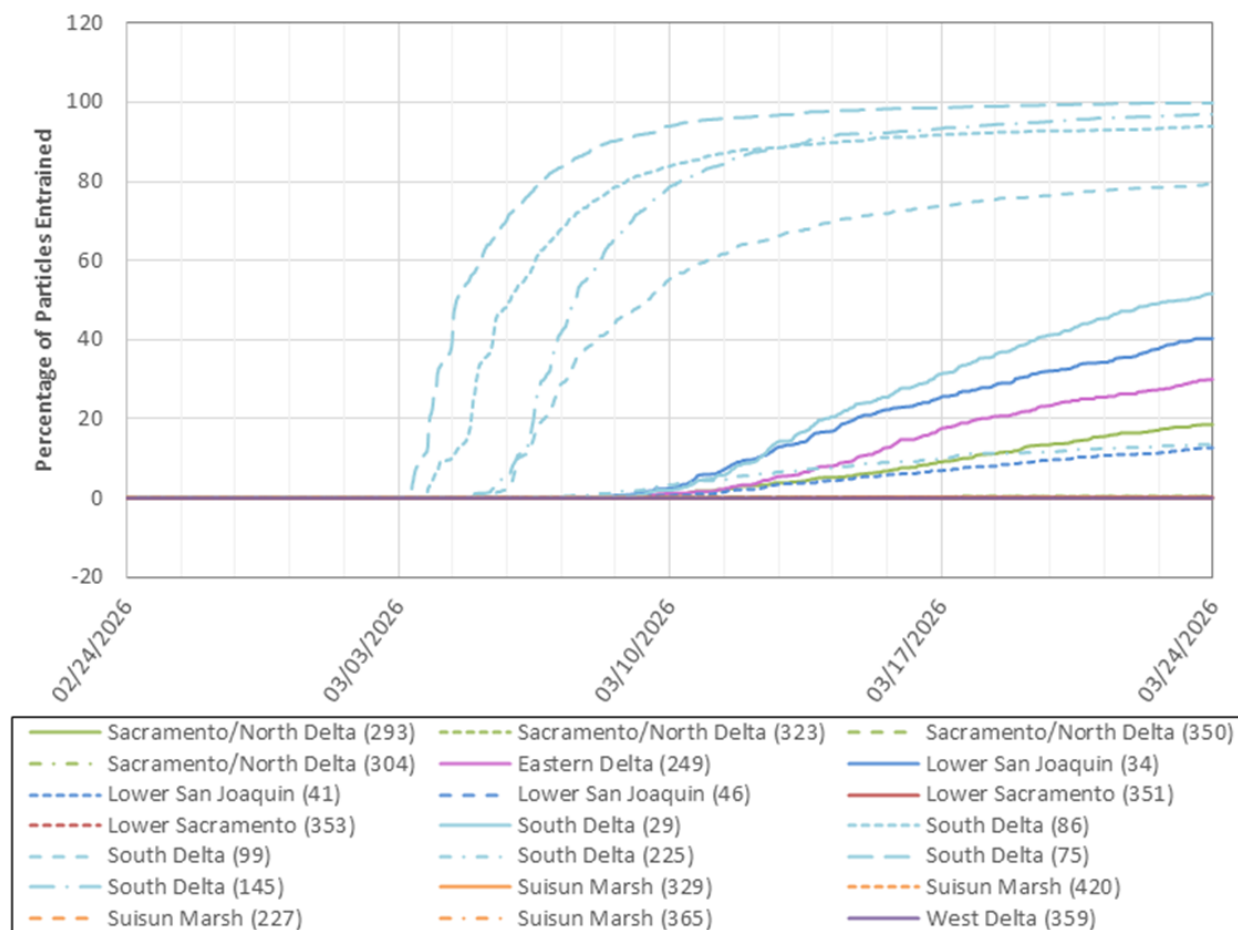
Note: Particles Injected 03/03/2026

Key: cfs = cubic feet per second; CVP = Central Valley Project; OMR = Old and Middle River; PTM = particle tracking model; SWP = State Water Project

Figure 43. Average PTM Results by Injection Region for Position Oriented Particles Entrained at CVP and SWP – OMR Scenario -6,500 cfs

Attachment A. Delta Real-Time Forecast Summary for 03/03/2026

**Average PTM Results by Injection Region for Position Oriented Particles
Entrained at CVP and SWP. OMR Scenario = -5,000. Particles Injected 3/3/2026.**



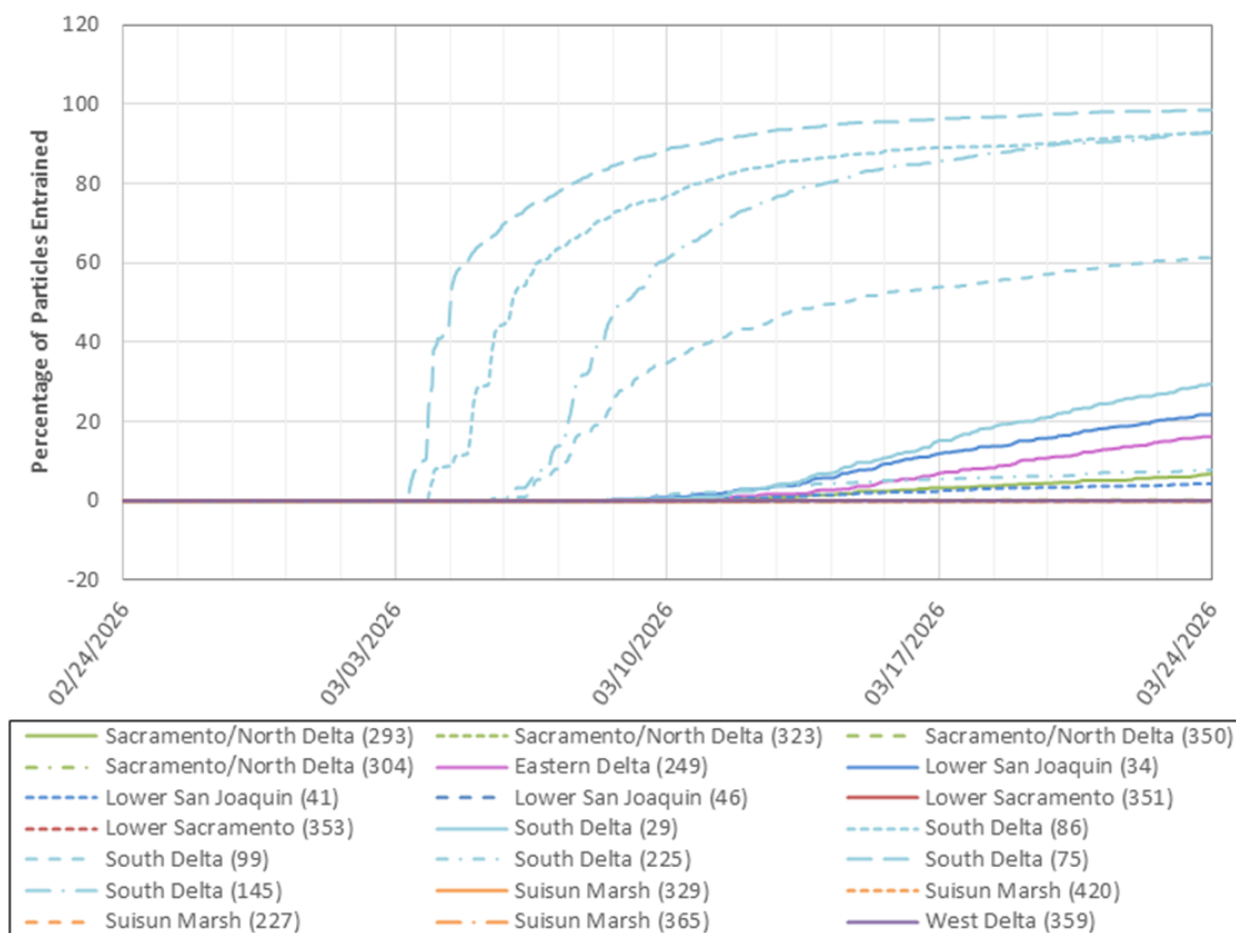
Note: OMR Scenario -5,000 cfs. Particles Injected 03/03/2026

Key: cfs = cubic feet per second; CVP = Central Valley Project; OMR = Old and Middle River; PTM = particle tracking model; SWP = State Water Project

Figure 44. Average PTM Results by Injection Region for Position Oriented Particles Entrained at CVP and SWP

Attachment A. Delta Real-Time Forecast Summary for 03/03/2026

**Average PTM Results by Injection Region for Position Oriented Particles
Entrained at CVP and SWP. OMR Scenario = -3,500. Particles Injected 3/3/2026.**



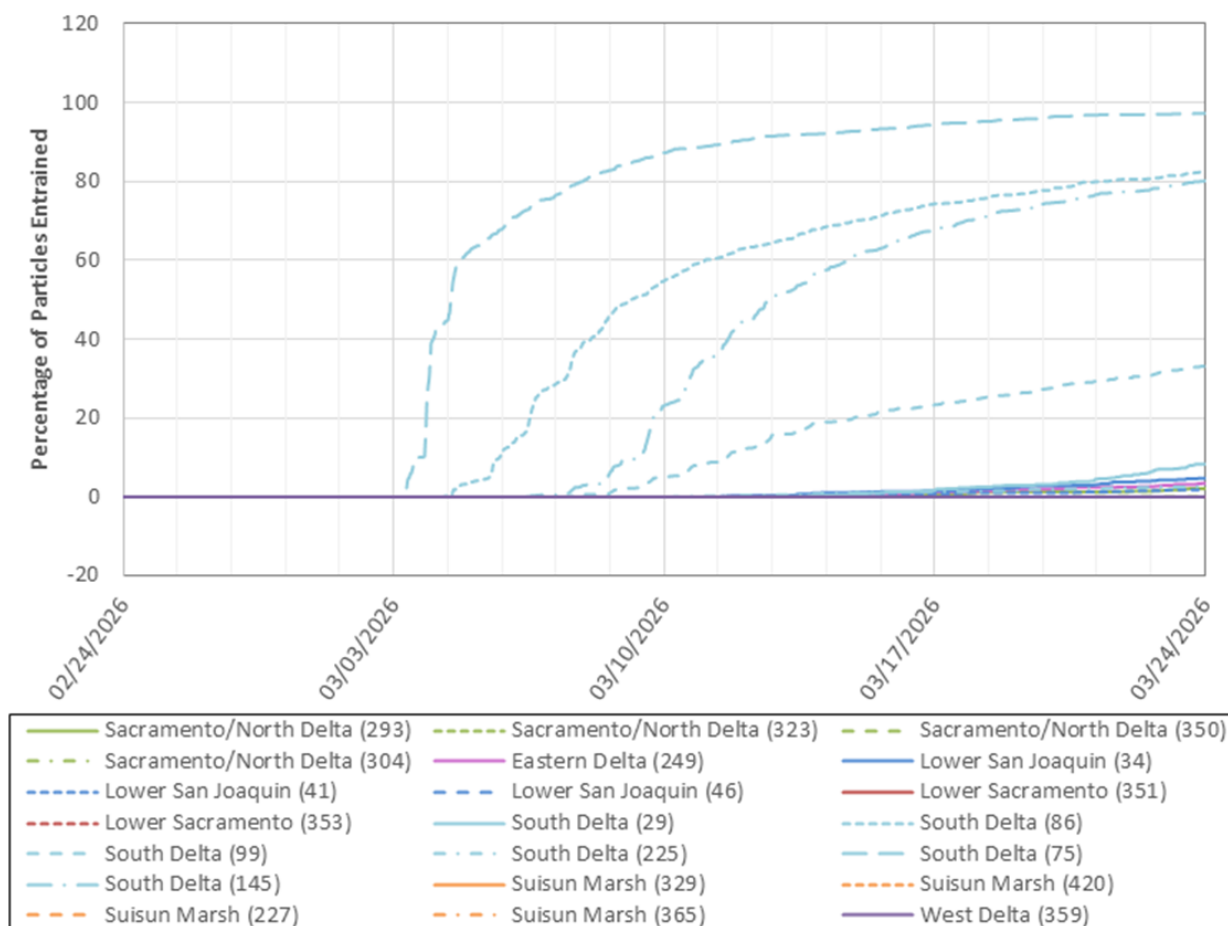
Note: OMR Scenario -3,500 cfs. Particles Injected 03/03/2026

Key: cfs = cubic feet per second; CVP = Central Valley Project; OMR = Old and Middle River; PTM = particle tracking model; SWP = State Water Project

Figure 45. Average PTM Results by Injection Region for Position Oriented Particles Entrained at CVP and SWP

Attachment A. Delta Real-Time Forecast Summary for 03/03/2026

**Average PTM Results by Injection Region for Position Oriented Particles
Entrained at CVP and SWP. OMR Scenario = -2,000. Particles Injected 3/3/2026.**



Note: OMR Scenario -2,000 cfs. Particles Injected 03/03/2026

Key: cfs = cubic feet per second; CVP = Central Valley Project; OMR = Old and Middle River; PTM = particle tracking model; SWP = State Water Project

Figure 46. Average PTM Results by Injection Region for Position Oriented Particles Entrained at CVP and SWP



Attachment B. Delta Real-Time Forecast Summary for 03/31/2026

Date Published: 04/06/2026

Forecast Period: 03/31/2026 – 04/20/2026

Forecast Week 1: 03/31/2026 – 04/06/2026

Forecast Week 2: 04/07/2026 – 04/13/2026

Forecast Week 3: 04/14/2026 – 04/20/2026

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- [Delta Export Zone of Influence](#)
- [PTM \(Particle Tracking Model\)](#)
 - [Neutrally Buoyant Particles \(NP\)](#)
 - [Surface Oriented Particles \(PP\)](#)
- [ECO-PTM \(Ecological Particle Tracking Model\)](#)
- [Longfin Smelt Larval Population and PTM Analysis](#)



Attachment B. Delta Real-Time Forecast Summary for 03/31/2026

B.1 Common Assumptions

The model run results cover the period March 31, 2026 through April 20, 2026 and are based on the following assumptions established by DWR:

1. Clifton Court Forebay (CCFB) Gates are operating to Priority 1.
2. The Delta Cross Channel gates are closed.
3. Suisun Marsh Salinity Control flashboards are in. All three gates are in open position from March 2.
4. San Joaquin River flow at Vernalis is at 1861 cfs at the beginning of the forecast period and is estimated to increase to 2100 cfs by the end of the forecast period.
5. San Joaquin River EC at Vernalis is at 632 $\mu\text{mhos}/\text{cm}$ at the beginning of the forecast period and is estimated to decrease to 582 $\mu\text{mhos}/\text{cm}$ at the end of the forecast period.
6. Sacramento River flow at Freeport is at 12424 cfs at the beginning of the forecast period and is expected to decrease to 8550 cfs by the end of the forecast period.
7. CCFB inflow is at 2386 cfs at the beginning of the forecast period and is expected to decrease to 600 cfs by the end of the forecast period.
8. Export at Jones Pumping Plant is at 3519 cfs at the beginning of the forecast period and is expected to decrease to 900 cfs to the end the forecast period.

As shown in the next section, assumptions 4 and 6 are updated based on Reclamation forecast data, and assumption 8 and exports at Banks Pumping Plant have been modified to include four different forecast scenarios at an Old and Middle River (OMR) index of -6,500 cfs, -5,000 cfs, -3,500

B.2 Reclamation Forecast Flow and Export Data

Table 1. Weekly Averaged Forecasted Flow Data and Flow Bins

Forecast Week	Sacramento River at Freeport (cfs)	Sac Flow Bin	San Joaquin River at Vernalis (cfs)	SJR Flow Bin	Delta Inflow Bin
Week 1: 03/31/2026 - 04/06/2026	12,428	lo	2,196	med	lomed
Week 2: 04/07/2026 - 04/13/2026	11,423	lo	2,200	med	lomed
Week 3: 04/14/2026 - 04/20/2026	10,500	lo	2,200	med	lomed

Key:

cfs = cubic feet per second

Sac = Sacramento River

SJR = San Joaquin River

Table 2. Weekly Averaged CVP and SWP Exports by OMR Bin

Forecast Week	OMR Bin ⁴ (cfs)	CVP Exports ^{1,3} (cfs)	SWP Exports ² (cfs)	Total Exports (cfs)	CVP Exports (% of total)	SWP Exports (% of total)
Week 1: 03/31/2026 - 04/06/2026	-6,500	4,107	1,102	5,209	79%	21%
	-5,000	3,506	873	4,379	80%	20%
	-3,500	2,819	630	3,449	82%	18%
	-2,000	2,046	601	2,647	77%	23%
Week 2: 04/07/2026 - 04/13/2026	-6,500	2,791	601	3,392	82%	18%
	-5,000	2,390	601	2,991	80%	20%
	-3,500	1,932	601	2,533	76%	24%
	-2,000	1,417	601	2,018	70%	30%
Week 3: 04/14/2026 - 04/20/2026	-6,500	902	601	1,503	60%	40%
	-5,000	902	601	1,503	60%	40%
	-3,500	902	601	1,503	60%	40%
	-2,000	902	601	1,503	60%	40%

Notes:

¹ One pumping unit is currently out of service at Jones Pumping Plant until August 2026. The current maximum pumping rate at Jones Pumping Plant (CVP Exports) is 4,200 cfs.

² Per the State Water Project (SWP) Incidental Take Permit (ITP) 8.12.1, the State is required to curtail exports April 1 through May 31. This change in exports is expected to persist for the two-month period unless Vernalis flows change. This is reflected in the forecast SWP exports starting on April 1.

³ From April 11 to mid-May CVP exports will be reduced to roughly 900 cfs due to D-1641.

⁴ The OMR bin for all three weeks reflects the OMR levels at the beginning of Week 1. However, OMR levels during and after Week 1 are reduced due to the various reductions in exports required by regulatory controls. The OMR bin naming convention is maintained for consistency with past reports.

Key:

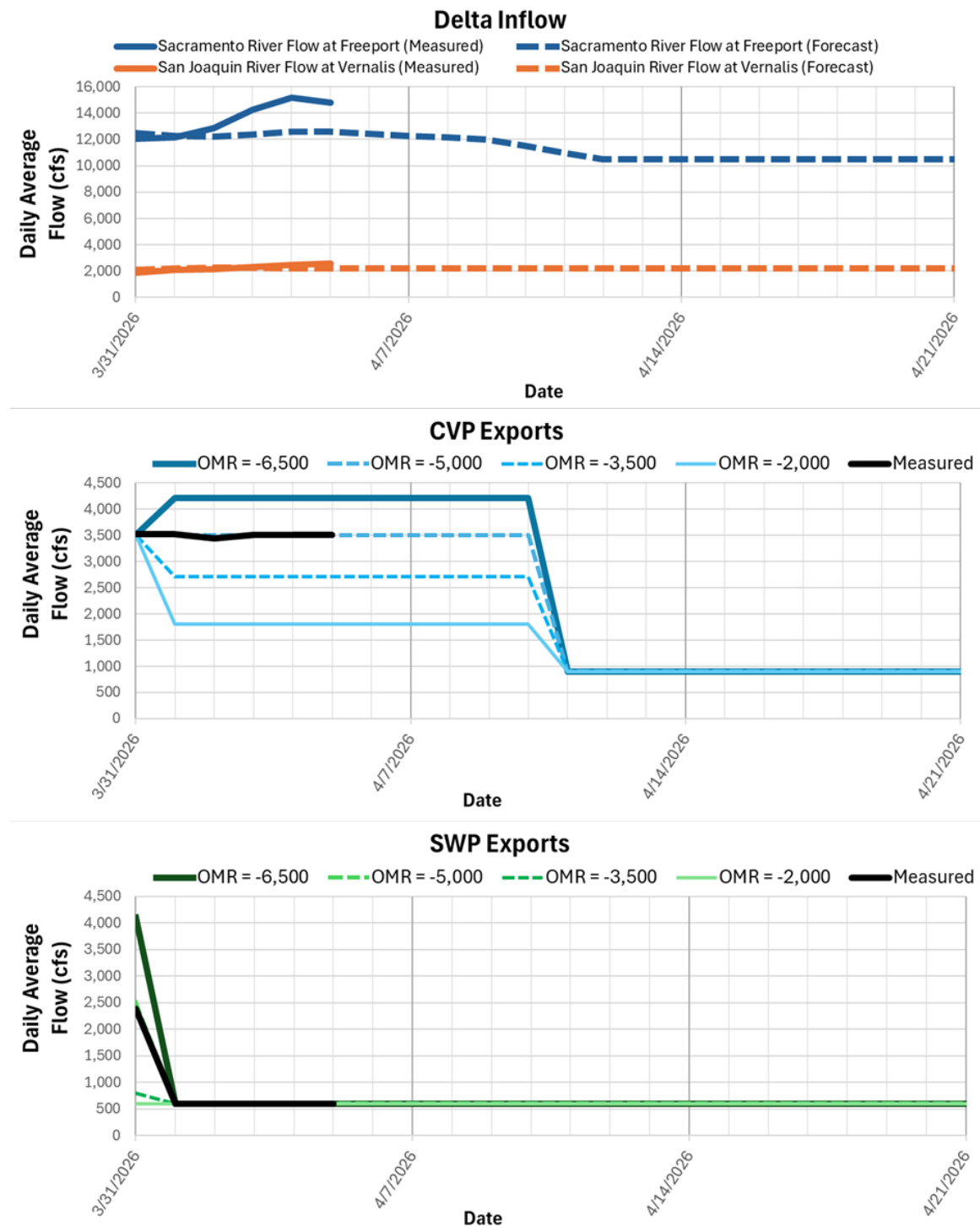
cfs = cubic feet per second

CVP = Central Valley Project

OMR = Old and Middle River



Attachment B. Delta Real-Time Forecast Summary for 03/31/2026

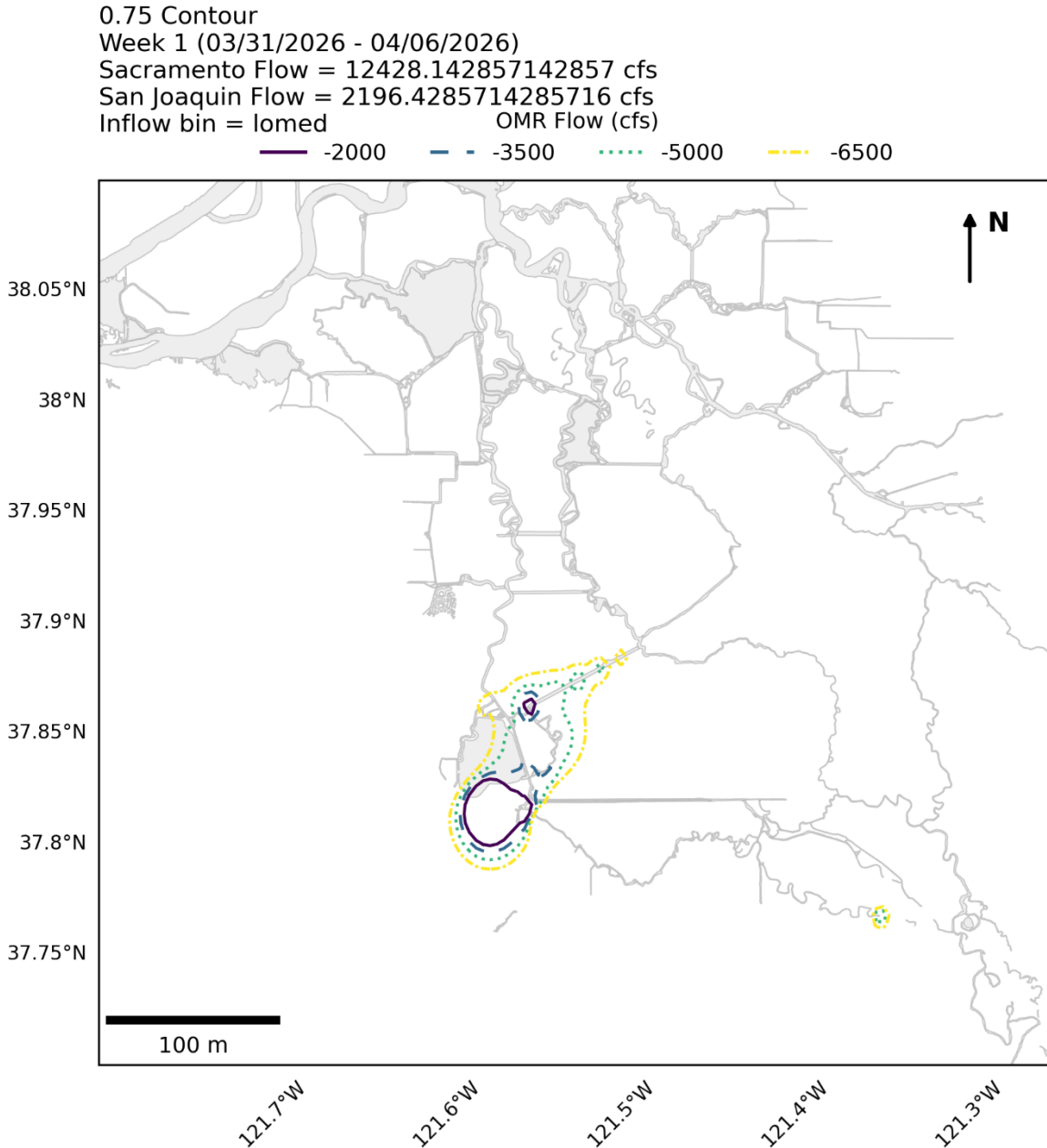


Key: CVP = Central Valley Project, OMR = Old and Middle River, SWP = State Water Project

Figure 1. Daily Average Flow for Measured and Forecasted Delta Inflow, CVP Exports, and SWP Exports



B.3 Delta Export Zone of Influence



Note: Contours indicate the proportional overlap of hourly average velocity Gaussian KDEs for a 1-week period from DSM2 hydro simulations with and without Delta exports active. DSM2 nodes that were sufficiently different from neighboring nodes to create isolated contours at several OMR flows were removed (nodes 146, 147, 148, 206, 242, 246, 432, 433, 434).

Key: cfs = cubic feet per second, OMR = Old and Middle River

Figure 2. Delta Zone of Influence for Week 1



Attachment B. Delta Real-Time Forecast Summary for 03/31/2026

0.75 Contour

Week 2 (04/07/2026 - 04/13/2026)

Sacramento Flow = 11422.714285714286 cfs

San Joaquin Flow = 2200.0 cfs

Inflow bin = lomed

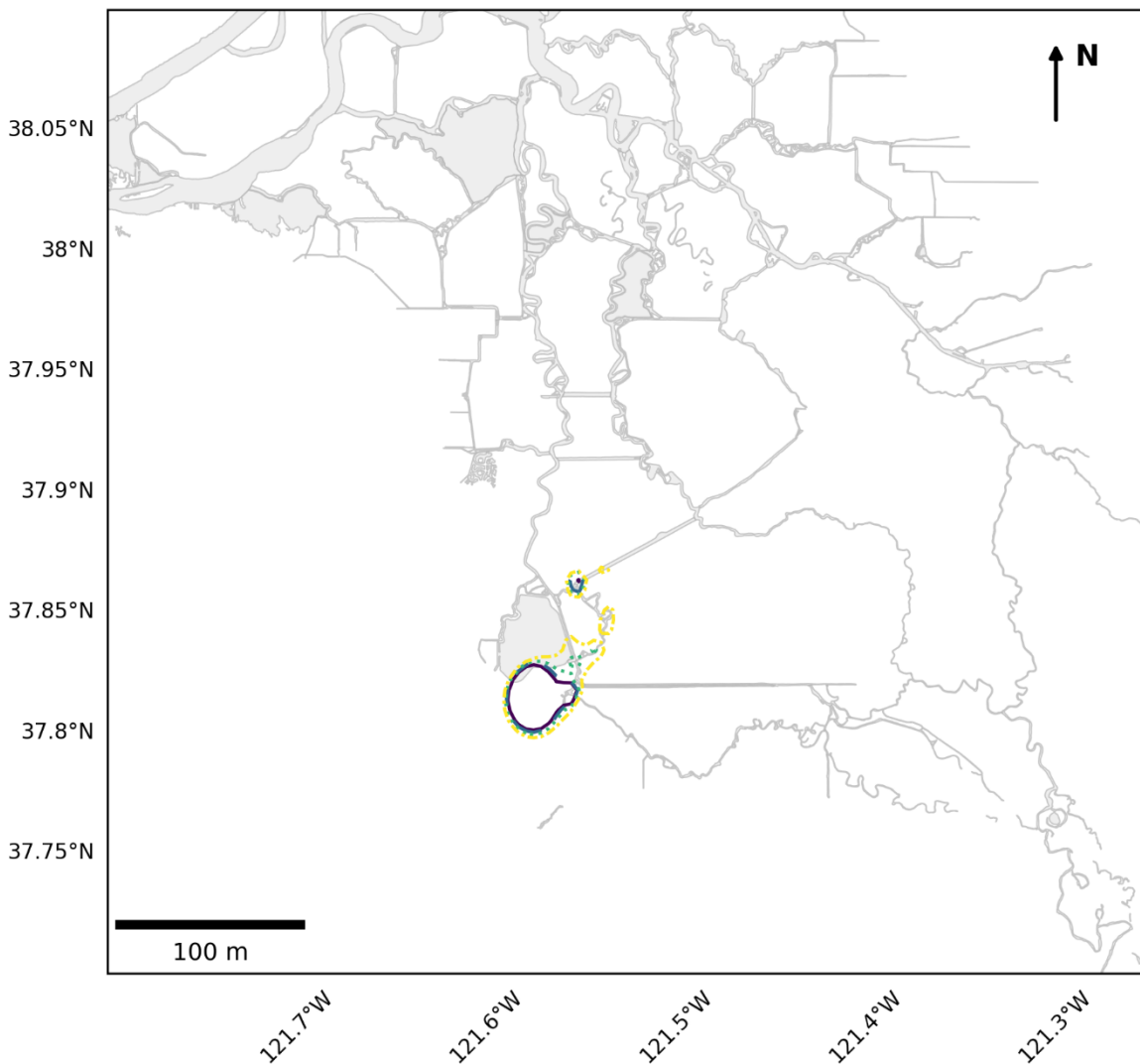
OMR Flow (cfs)

— -2000

- -3500

... -5000

- -6500



Note: Contours indicate the proportional overlap of hourly average velocity Gaussian KDEs for a 1-week period from DSM2 hydro simulations with and without Delta exports active. DSM2 nodes that were sufficiently different from neighboring nodes to create isolated contours at several OMR flows were removed (nodes 146, 147, 148, 206, 242, 246, 432, 433, 434).

Key: cfs = cubic feet per second, OMR = Old and Middle River

Figure 3. Delta Zone of Influence for Week 2



Attachment B. Delta Real-Time Forecast Summary for 03/31/2026

0.75 Contour

Week 3 (04/14/2026 - 04/20/2026)

Sacramento Flow = 10500.0 cfs

San Joaquin Flow = 2200.0 cfs

Inflow bin = lomed

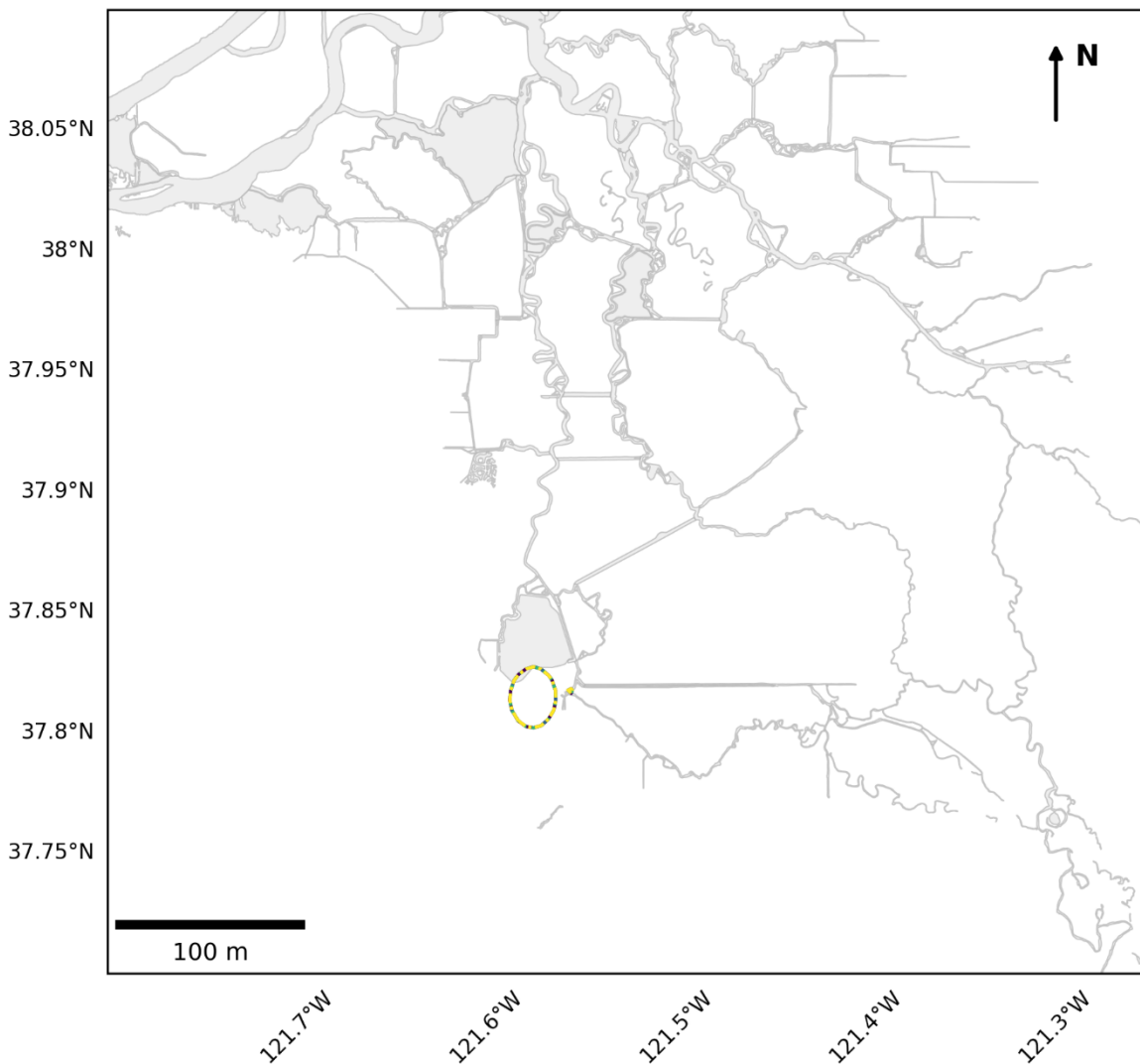
OMR Flow (cfs)

— -2000

- -3500

... -5000

- -6500



Note: Contours indicate the proportional overlap of hourly average velocity Gaussian KDEs for a 1-week period from DSM2 hydro simulations with and without Delta exports active. DSM2 nodes that were sufficiently different from neighboring nodes to create isolated contours at several OMR flows were removed (nodes 146, 147, 148, 206, 242, 246, 432, 433, 434).

Key: cfs = cubic feet per second, OMR = Old and Middle River

Figure 4. Delta Zone of Influence for Week 3



Attachment B. Delta Real-Time Forecast Summary for 03/31/2026

Table 3 Proportion of DSM2 Channel Length with Hydrologic Alteration from Pumping

Weekly Model Run	OMR Bin (cfs)	Sum Channel Length with Low HA (miles)	Channel Length with Low HA (%)	Sum Channel Length with Medium HA (miles)	Channel Length with Medium HA (%)	Sum Channel Length with High HA (miles)	Channel Length with High HA (%)
Week 1: 03/31/2026 - 04/06/2026	-6,500	655.17	97.3%	17.63	2.6%	0.85	0.1%
	-5,000	660.78	98.1%	12.02	1.8%	0.85	0.1%
	-3,500	665.56	98.8%	7.24	1.1%	0.85	0.1%
	-2,000	671.25	99.6%	1.55	0.2%	0.85	0.1%
Week 2: 04/07/2026 - 04/13/2026	-6,500	662.80	98.4%	10.00	1.5%	0.85	0.1%
	-5,000	669.23	99.3%	3.57	0.5%	0.85	0.1%
	-3,500	670.45	99.5%	2.35	0.3%	0.85	0.1%
	-2,000	671.25	99.6%	1.55	0.2%	0.85	0.1%
Week 3: 04/14/2026 - 04/20/2026	-6,500	672.07	99.8%	0.73	0.1%	0.85	0.1%
	-5,000	672.07	99.8%	0.73	0.1%	0.85	0.1%
	-3,500	672.07	99.8%	0.73	0.1%	0.85	0.1%
	-2,000	672.07	99.8%	0.73	0.1%	0.85	0.1%

Notes: Sum channel length includes the length of channels within the Delta that have a calculated hydrologic alteration level falling within each category

Key:

HA = hydrologic alteration

OMR = Old and Middle River



Attachment B. Delta Real-Time Forecast Summary for 03/31/2026

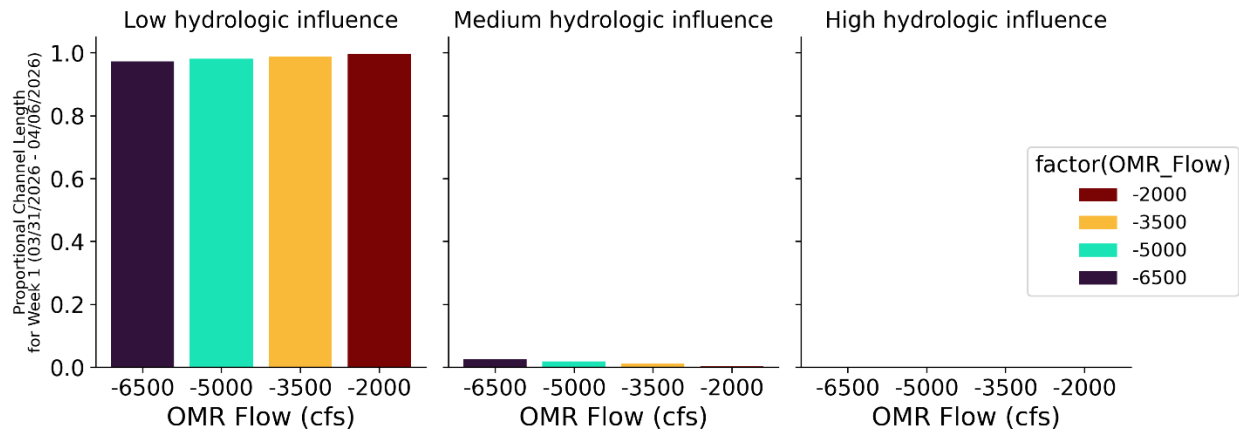


Figure 5. Proportional Channel Length for Week 1

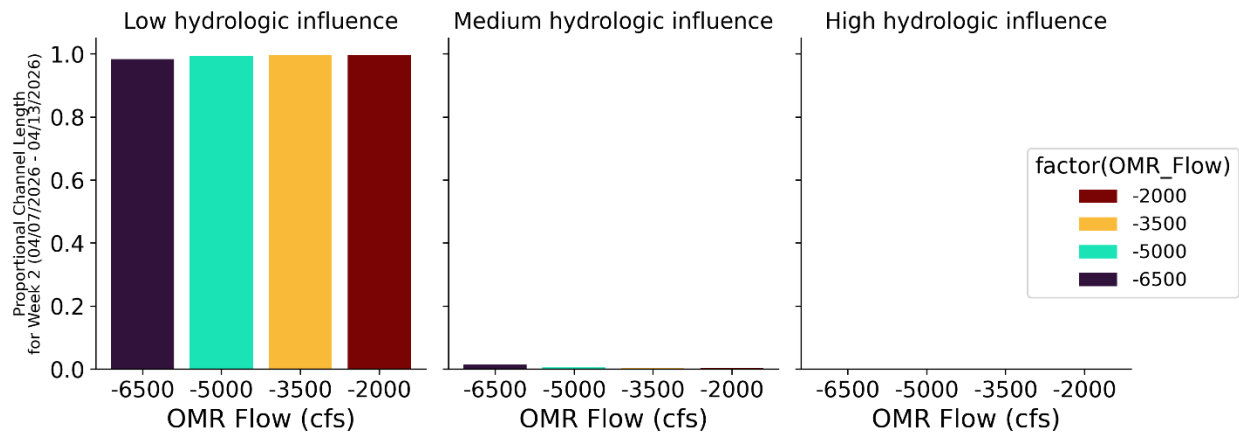
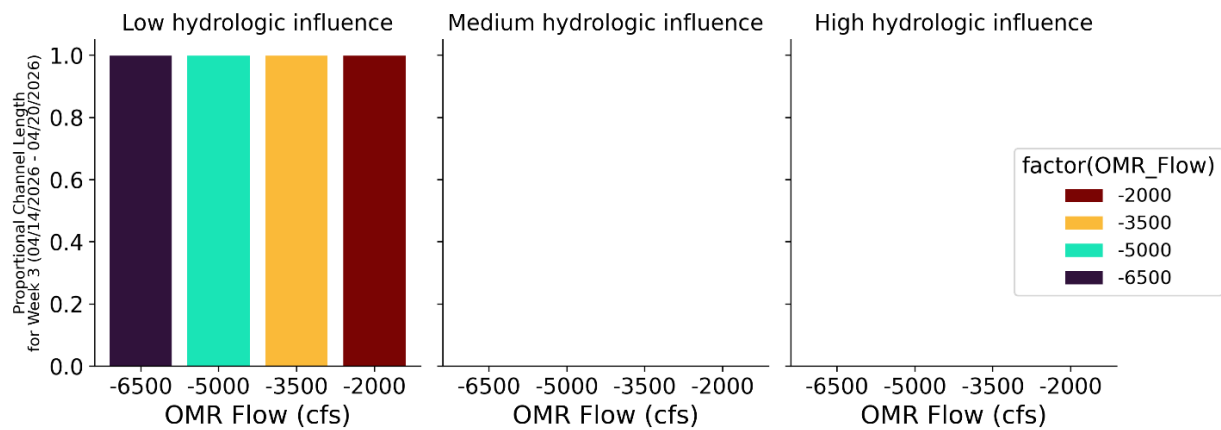


Figure 6. Proportional Channel Length for Week 2



Key: cfs = cubic feet per second, OMR = Old and Middle River

Figure 7. Proportional Channel Length for Week 3



B.4 PTM (Particle Tracking Model) Results

PTM Flux Evaluation Period: 03/31/2026 – 04/20/2026

Particles Injected: 03/31/2026

PTM Injection and Flux Locations

-  = Injection Point (DSM2 node)
-  = Flux Location
-  = Reference Flux Direction

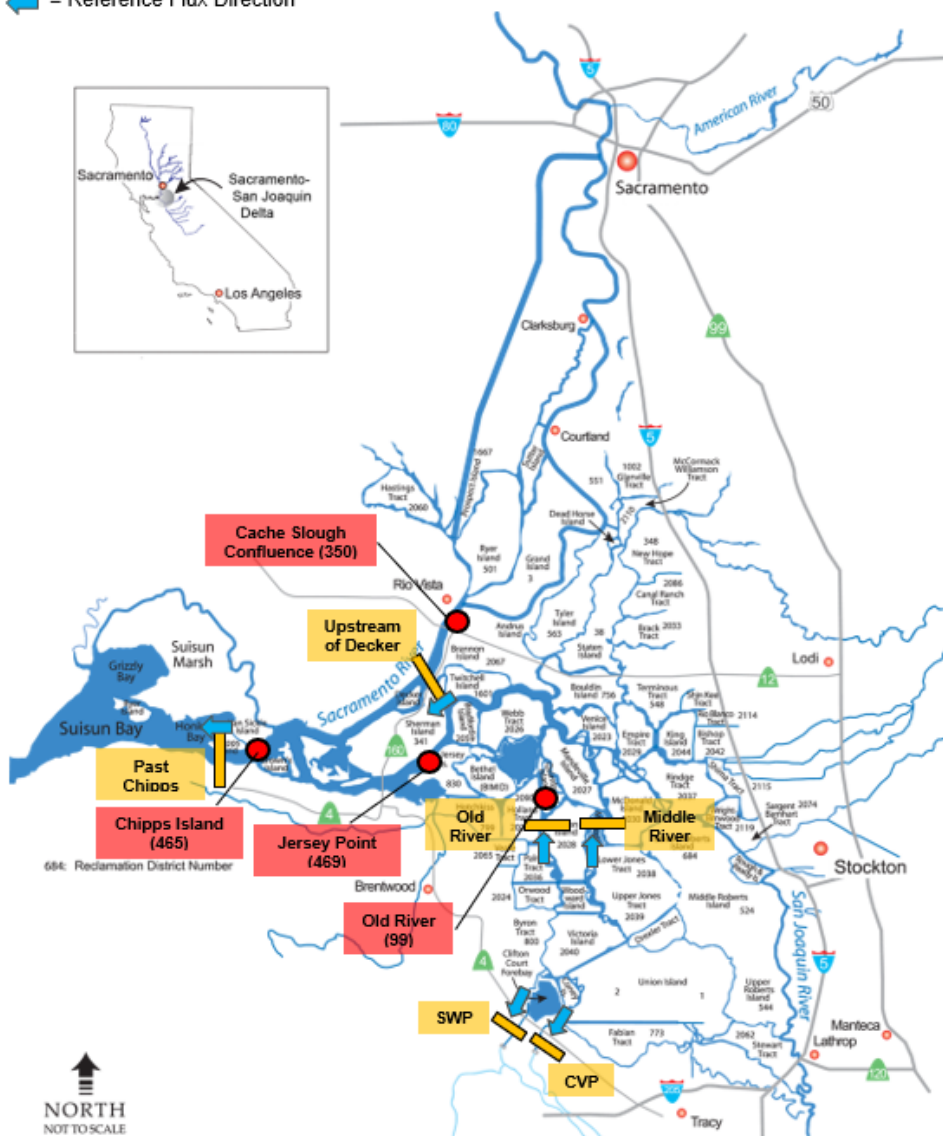


Figure 8. Map of Particle Tracking Model Injection and Flux Locations

Attachment B. Delta Real-Time Forecast Summary for 03/31/2026

B.4.1 Neutrally Buoyant Particles (NP)

Table 4. Neutral Particle Fate (percent flux across boundary) for Particles Injected at Chipps (DSM2 Node 465)

Forecast Week	OMR Flow Bin	Past Chipps	Upstream of Decker	Unresolved in Central Delta	Unresolved in OMR corridor	CVP Entrainment	SWP Entrainment
Week 1: 03/31/2026 - 04/06/2026	-6,500	78.4	0.0	21.6	0.0	0.0	0.0
	-5,000	82.4	0.0	17.6	0.0	0.0	0.0
	-3,500	82.8	0.0	17.3	0.0	0.0	0.0
	-2,000	85.3	0.0	14.7	0.0	0.0	0.0
Week 2: 04/07/2026 - 04/13/2026	-6,500	85.5	0.0	14.5	0.0	0.0	0.0
	-5,000	87.3	0.5	12.8	0.0	0.0	0.0
	-3,500	89.3	0.0	10.7	0.0	0.0	0.0
	-2,000	91.6	0.0	8.4	0.0	0.0	0.0
Week 3: 04/14/2026 - 04/20/2026	-6,500	93.8	0.1	6.3	0.0	0.0	0.0
	-5,000	94.3	0.6	5.7	0.0	0.0	0.0
	-3,500	94.7	0.2	5.3	0.0	0.0	0.0
	-2,000	95.4	0.0	4.6	0.0	0.0	0.0

Note: Values between 0.0 and 0.1 are indicated with <0.1.

Key: CVP = Central Valley Project, OMR = Old and Middle River, SWP = State Water Project

Table 5. Neutral Particle Fate (percent flux across boundary) for Particles Injected at Cache Slough (DSM2 Node 350)

Forecast Week	OMR Flow Bin	Past Chipps	Upstream of Decker	Unresolved in Central Delta	Unresolved in OMR corridor	CVP Entrainment	SWP Entrainment
Week 1: 03/31/2026 - 04/06/2026	-6,500	2.5	71.4	97.5	0.0	0.0	0.0
	-5,000	4.5	72.5	95.6	0.1	0.0	0.0
	-3,500	4.6	70.0	95.4	0.0	0.0	0.0
	-2,000	4.9	74.5	95.1	0.0	0.0	0.0
Week 2: 04/07/2026 - 04/13/2026	-6,500	38.3	77.1	62.2	0.5	0.0	0.0
	-5,000	41.3	77.4	59.2	0.4	0.0	0.1
	-3,500	42.2	76.3	58.2	0.4	0.0	0.0
	-2,000	50.3	79.0	49.9	0.2	0.0	0.0
Week 3: 04/14/2026 - 04/20/2026	-6,500	66.6	81.3	34.1	0.5	0.1	0.1
	-5,000	67.4	82.0	33.2	0.5	0.0	0.1
	-3,500	68.4	79.9	32.1	0.5	0.0	0.0
	-2,000	75.7	82.3	24.7	0.4	0.0	0.0

Note: Values between 0.0 and 0.1 are indicated with <0.1.

Key: CVP = Central Valley Project, OMR = Old and Middle River, SWP = State Water Project

Attachment B. Delta Real-Time Forecast Summary for 03/31/2026

Table 6. Neutral Particle Fate (percent flux across boundary) for Particles Injected at Jersey Point (DSM2 Node 469)

Forecast Week	OMR Flow Bin	Past Chipps	Upstream of Decker	Unresolved in Central Delta	Unresolved in OMR corridor	CVP Entrainment	SWP Entrainment
Week 1: 03/31/2026 - 04/06/2026	-6,500	1.2	18.0	99.1	0.3	0.0	0.0
	-5,000	2.6	18.6	97.5	0.1	0.0	0.0
	-3,500	3.5	14.2	96.7	0.2	0.0	0.0
	-2,000	3.5	16.1	96.9	0.4	0.0	0.0
Week 2: 04/07/2026 - 04/13/2026	-6,500	22.2	25.8	79.2	0.8	0.6	0.0
	-5,000	26.1	26.4	74.7	0.7	0.0	0.1
	-3,500	28.7	20.9	71.9	0.6	0.0	0.0
	-2,000	32.4	21.6	68.2	0.6	0.0	0.0
Week 3: 04/14/2026 - 04/20/2026	-6,500	52.0	29.5	49.8	1.1	0.6	0.1
	-5,000	59.4	30.3	41.6	0.9	0.0	0.1
	-3,500	63.1	25.6	37.6	0.7	0.0	0.0
	-2,000	65.9	24.9	34.9	0.8	0.0	0.0

Note: Values between 0.0 and 0.1 are indicated with <0.1.

Key: CVP = Central Valley Project, OMR = Old and Middle River, SWP = State Water Project

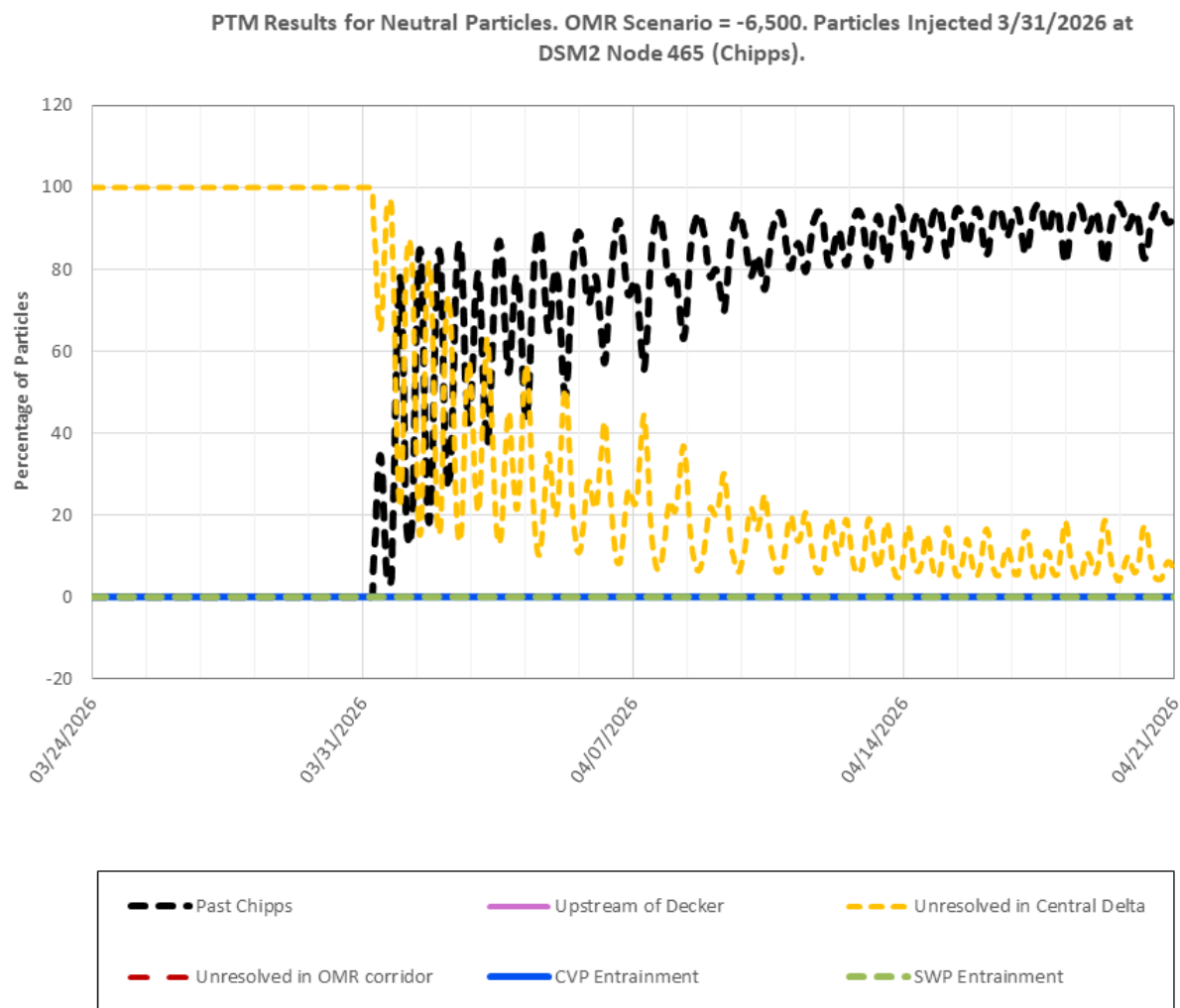
Table 7. Neutral Particle Fate (percent flux across boundary) for Particles Injected at Old River (DSM2 Node 99)

Forecast Week	OMR Flow Bin	Past Chipps	Upstream of Decker	Unresolved in Central Delta	Unresolved in OMR corridor	CVP Entrainment	SWP Entrainment
Week 1: 03/31/2026 - 04/06/2026	-6,500	0.0	0.4	19.1	45.2	35.4	0.4
	-5,000	0.0	0.9	28.9	58.1	12.9	0.1
	-3,500	0.0	0.7	44.0	54.7	1.3	0.0
	-2,000	0.1	1.2	58.1	41.8	0.0	0.0
Week 2: 04/07/2026 - 04/13/2026	-6,500	0.4	1.4	14.0	22.7	60.3	2.6
	-5,000	0.7	2.8	24.0	25.1	47.9	2.3
	-3,500	0.8	2.8	34.1	34.9	29.0	1.2
	-2,000	1.8	3.5	50.2	42.4	5.2	0.4
Week 3: 04/14/2026 - 04/20/2026	-6,500	1.8	2.8	12.1	19.4	61.2	5.4
	-5,000	3.7	5.6	20.5	21.6	49.1	5.1
	-3,500	5.1	6.2	29.3	30.6	31.2	3.9
	-2,000	8.3	7.9	42.3	39.2	8.5	1.6

Note: Values between 0.0 and 0.1 are indicated with <0.1.

Key: CVP = Central Valley Project, OMR = Old and Middle River, SWP = State Water Project

Attachment B. Delta Real-Time Forecast Summary for 03/31/2026

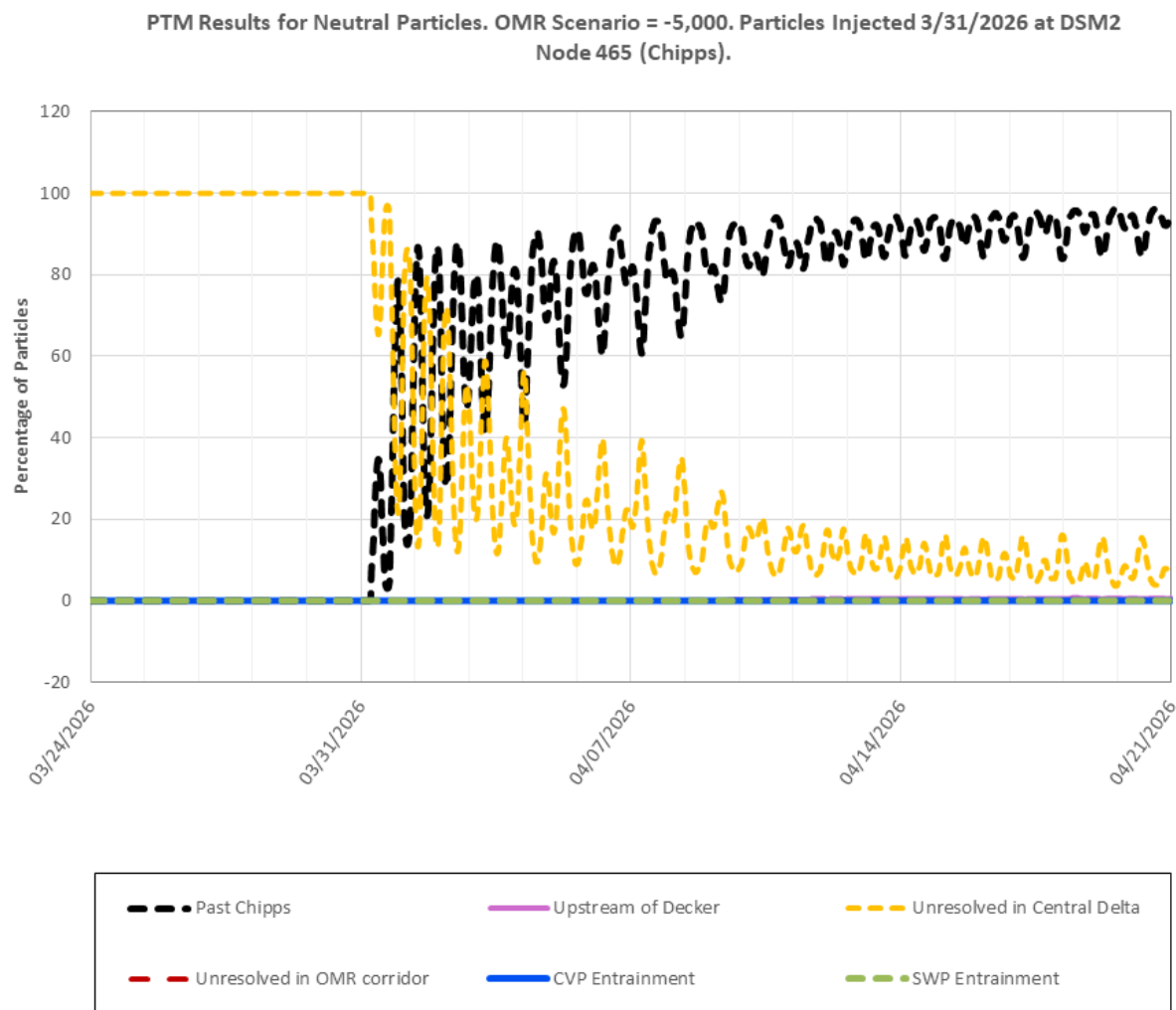


Note: Particles Injected 03/31/2026 at DSM2 Node 465 (Chippis)

Key: cfs = cubic feet per second, OMR = Old and Middle River; PTM = particle tracking model

Figure 9. PTM Results for Neutral Particles – OMR Scenario -6,500 cfs

Attachment B. Delta Real-Time Forecast Summary for 03/31/2026

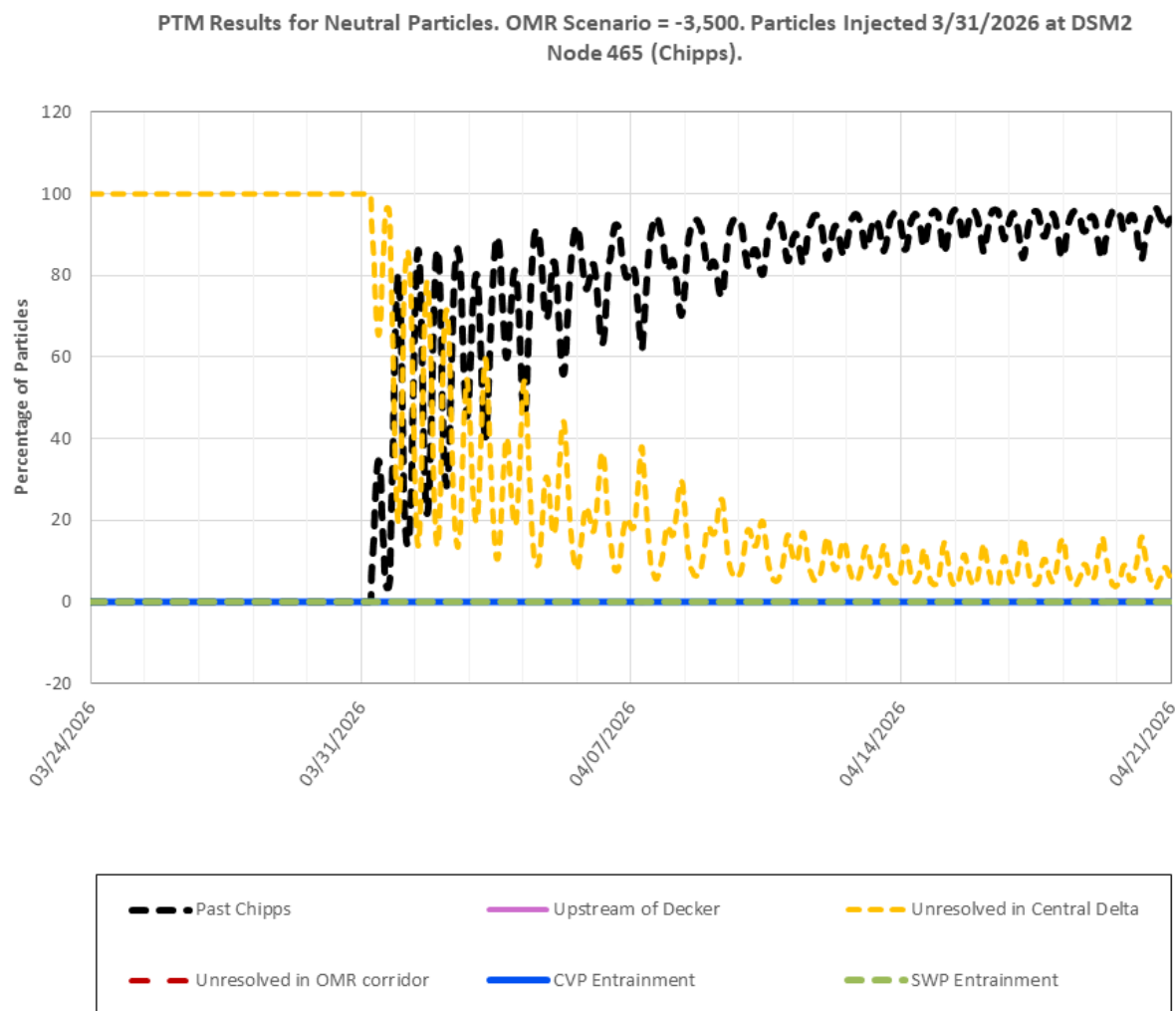


Note: Particles Injected 03/31/2026 at DSM2 Node 465 (Chippis)

Key: cfs = cubic feet per second, OMR = Old and Middle River; PTM = particle tracking model

Figure 10. PTM Results for Neutral Particles – OMR Scenario -5,000 cfs

Attachment B. Delta Real-Time Forecast Summary for 03/31/2026

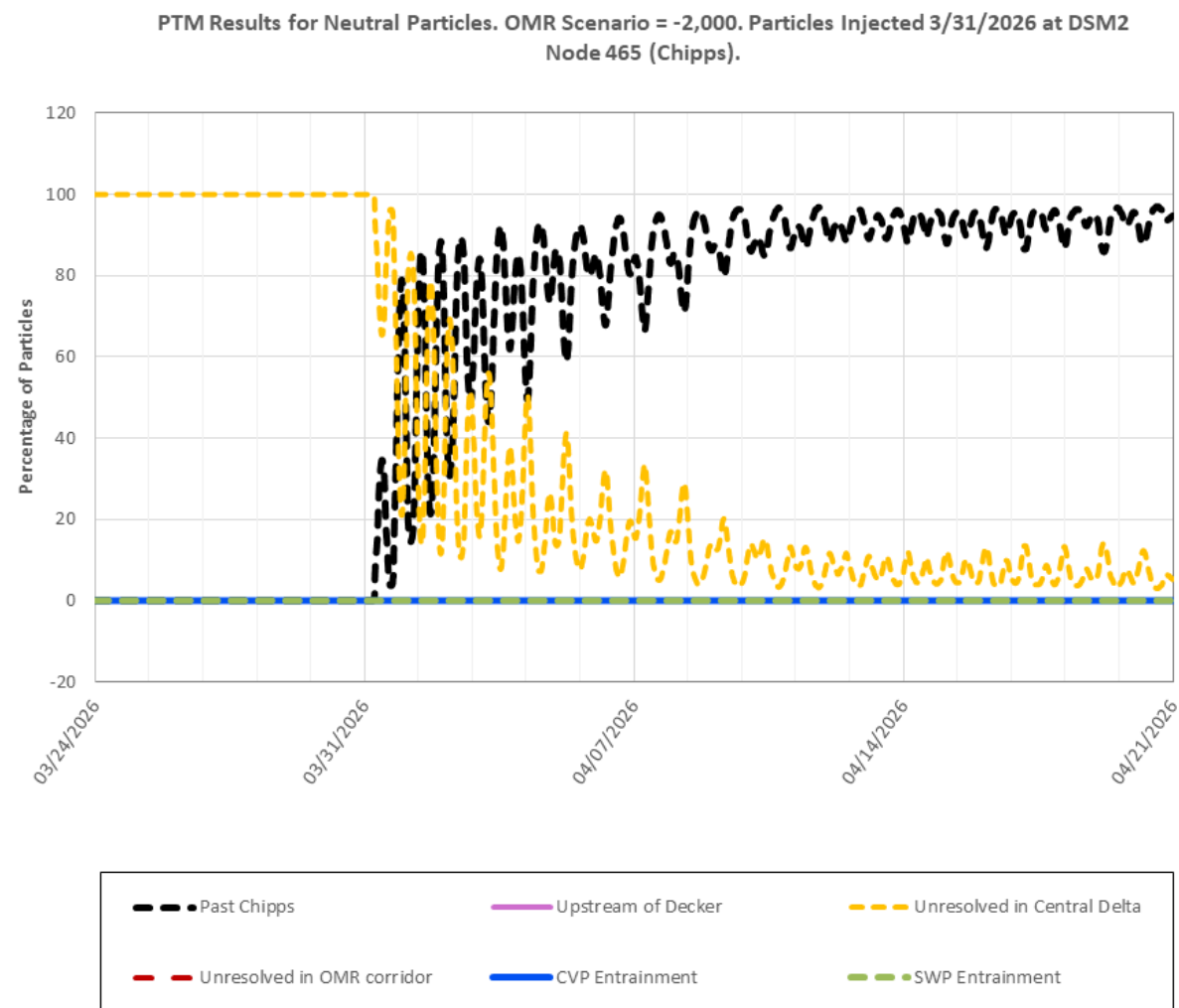


Note: Particles Injected 03/31/2026 at DSM2 Node 465 (Chippis)

Key: cfs = cubic feet per second, OMR = Old and Middle River; PTM = particle tracking model

Figure 11. PTM Results for Neutral Particles - OMR Scenario -3,500 cfs

Attachment B. Delta Real-Time Forecast Summary for 03/31/2026

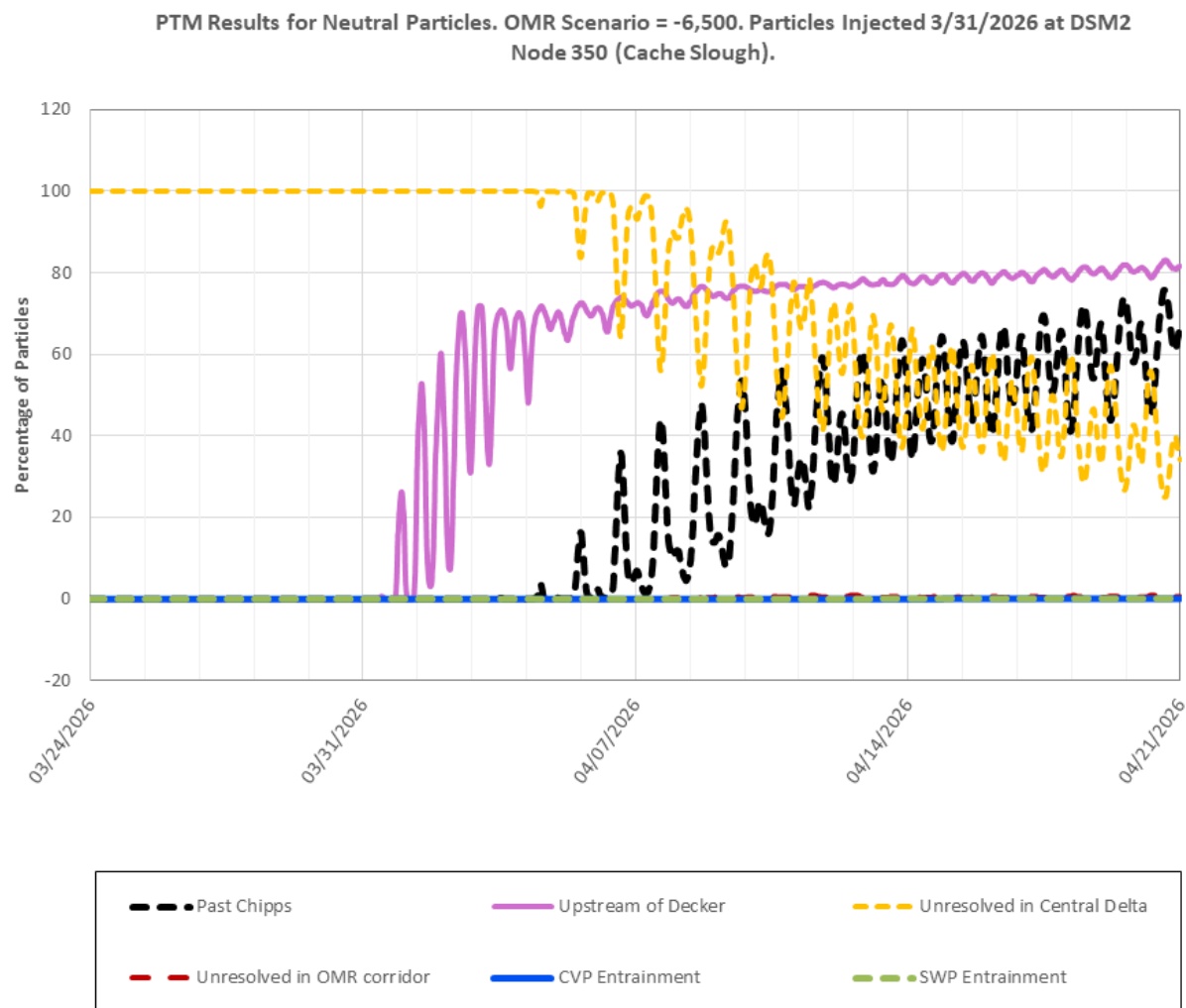


Note: Particles Injected 03/31/2026 at DSM2 Node 465 (Chippis)

Key: cfs = cubic feet per second, OMR = Old and Middle River; PTM = particle tracking model

Figure 12. PTM Results for Neutral Particles – OMR Scenario -2,000 cfs

Attachment B. Delta Real-Time Forecast Summary for 03/31/2026



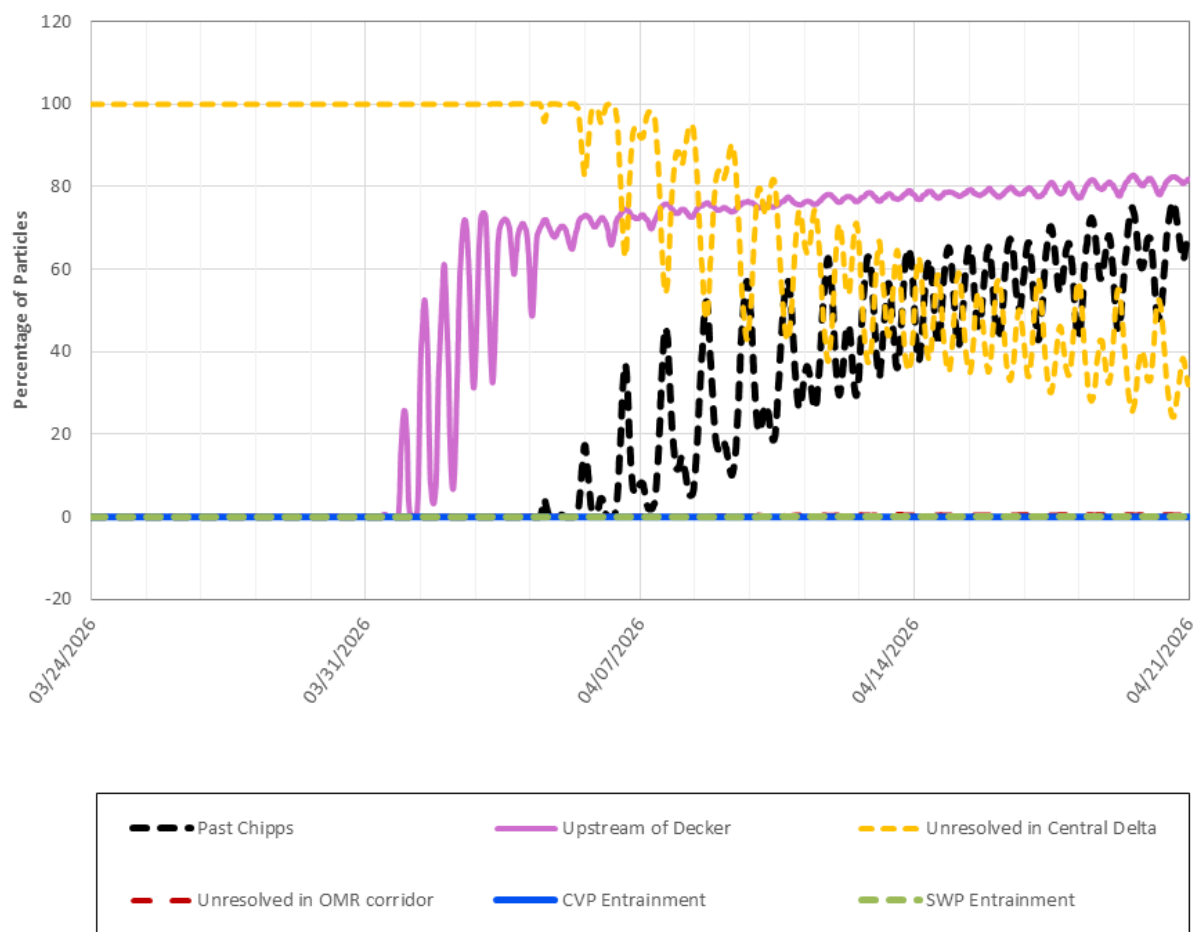
Note: Particles Injected 03/31/2026 at DSM2 Node 350 (Cache Slough)

Key: cfs = cubic feet per second, OMR = Old and Middle River; PTM = particle tracking model

Figure 13. PTM Results for Neutral Particles – OMR Scenario -6,500 cfs

Attachment B. Delta Real-Time Forecast Summary for 03/31/2026

PTM Results for Neutral Particles. OMR Scenario = -5,000. Particles Injected 3/31/2026 at DSM2 Node 350 (Cache Slough).

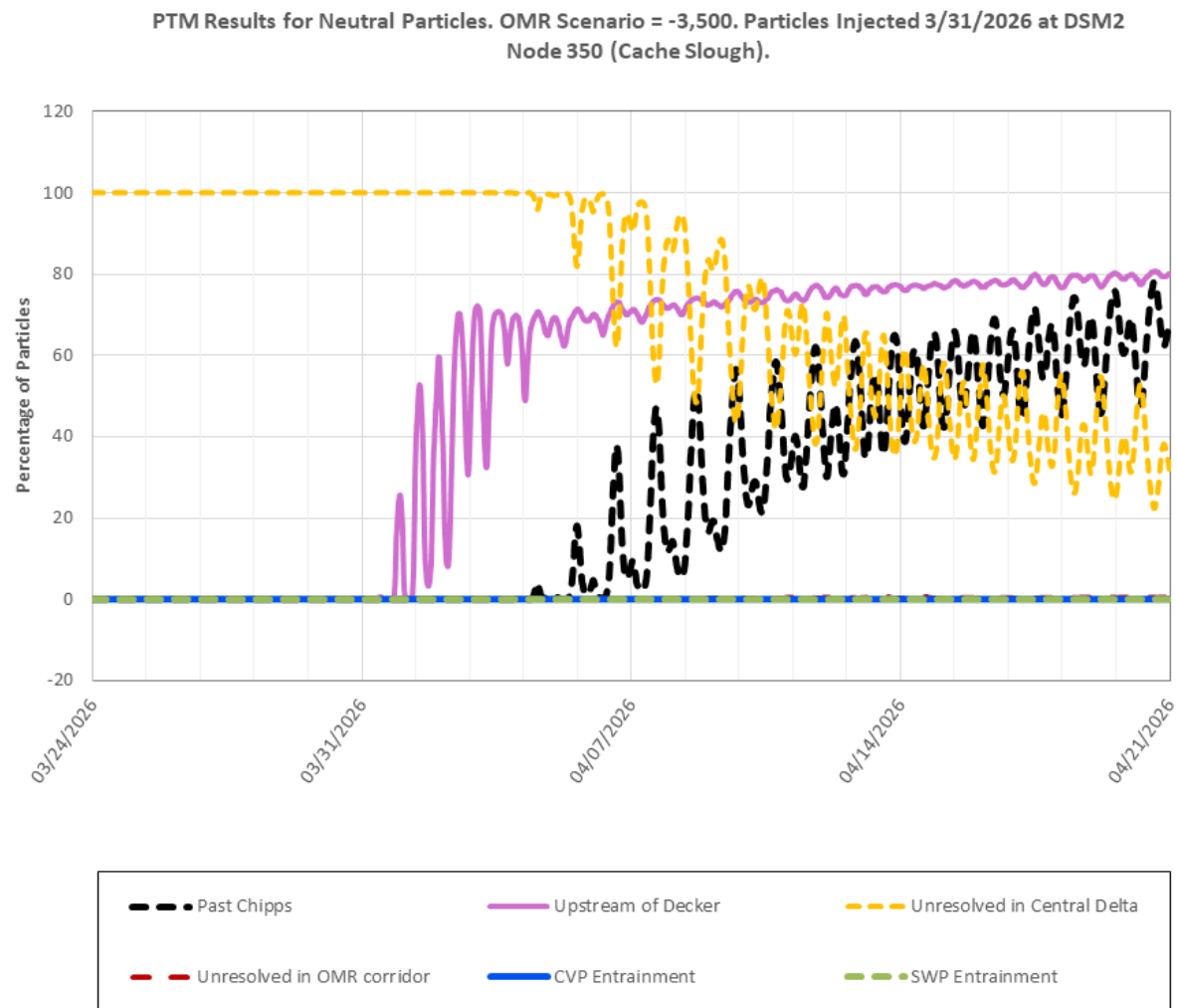


Note: Particles Injected 03/31/2026 at DSM2 Node 350 (Cache Slough)

Key: cfs = cubic feet per second, OMR = Old and Middle River; PTM = particle tracking model

Figure 14. PTM Results for Neutral Particles – OMR Scenario -5,000 cfs

Attachment B. Delta Real-Time Forecast Summary for 03/31/2026

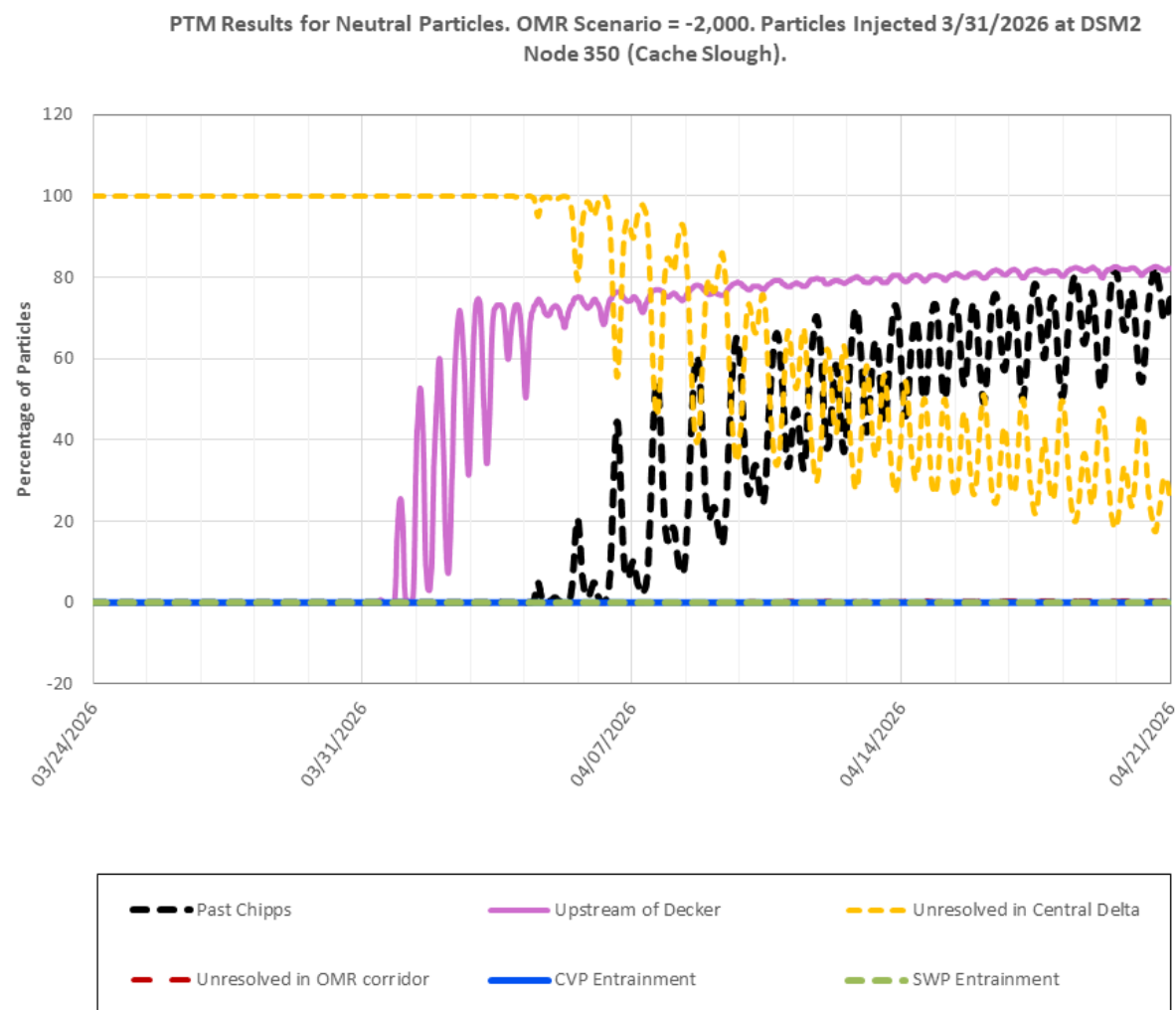


Note: Particles Injected 03/31/2026 at DSM2 Node 350 (Cache Slough)

Key: cfs = cubic feet per second, OMR = Old and Middle River; PTM = particle tracking model

Figure 15. PTM Results for Neutral Particles – OMR Scenario -3,500 cfs

Attachment B. Delta Real-Time Forecast Summary for 03/31/2026

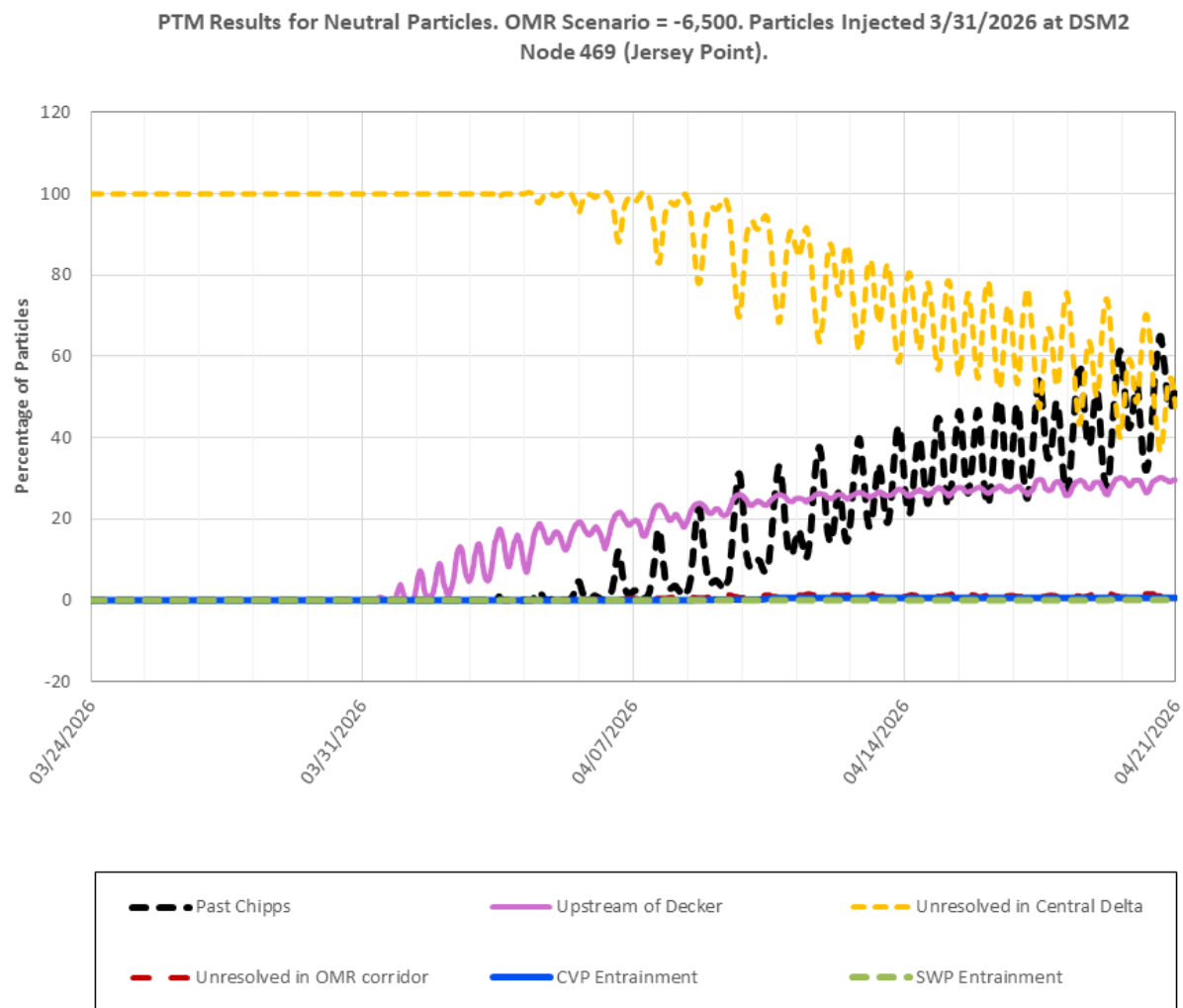


Note: Particles Injected 03/31/2026 at DSM2 Node 350 (Cache Slough)

Key: cfs = cubic feet per second, OMR = Old and Middle River; PTM = particle tracking model

Figure 16. PTM Results for Neutral Particles – OMR Scenario -2,000 cfs

Attachment B. Delta Real-Time Forecast Summary for 03/31/2026

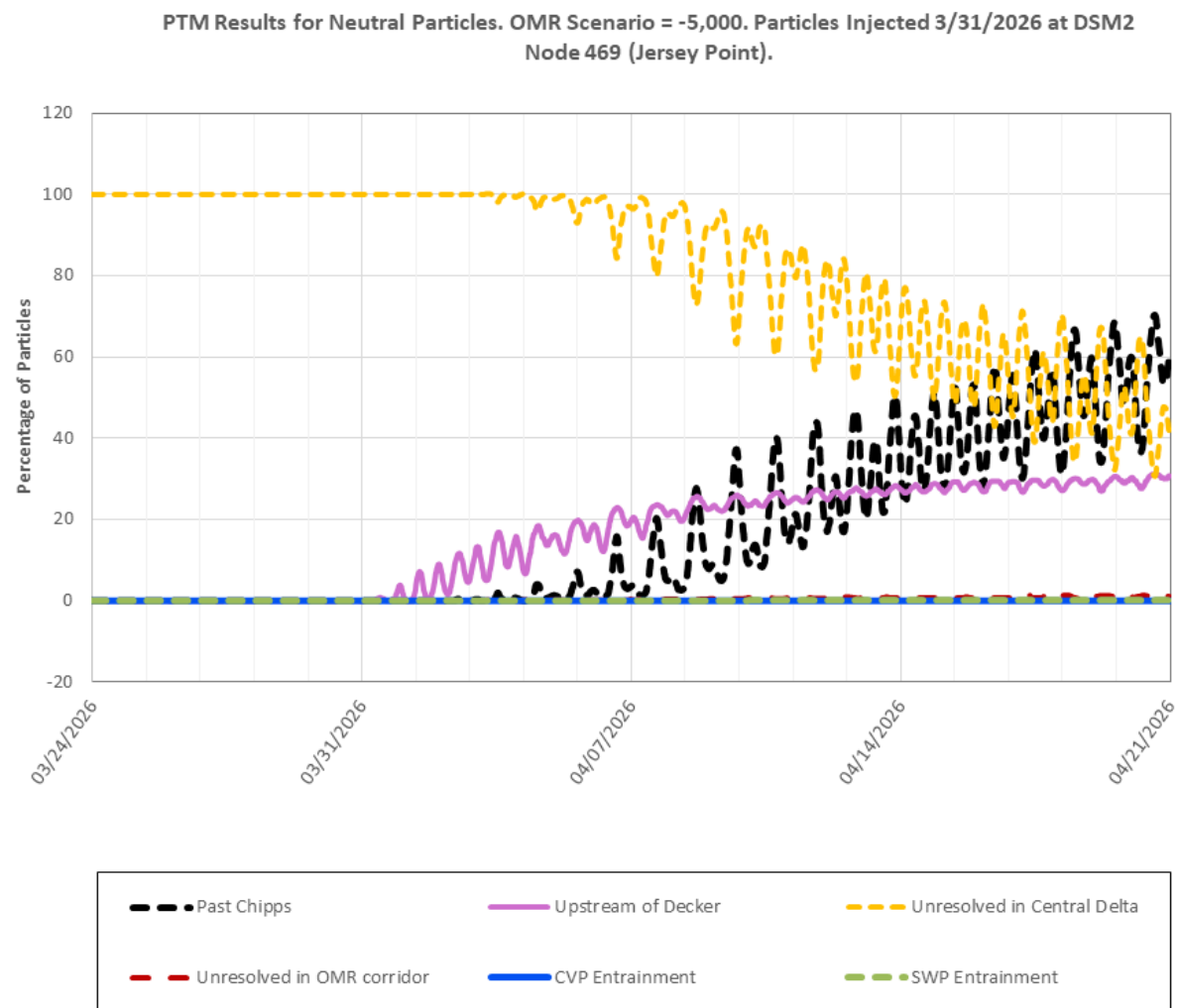


Note: Particles Injected 03/31/2026 at DSM2 Node 469 (Jersey Point)

Key: cfs = cubic feet per second, OMR = Old and Middle River; PTM = particle tracking model

Figure 17. PTM Results for Neutral Particles – OMR Scenario -6,500 cfs

Attachment B. Delta Real-Time Forecast Summary for 03/31/2026

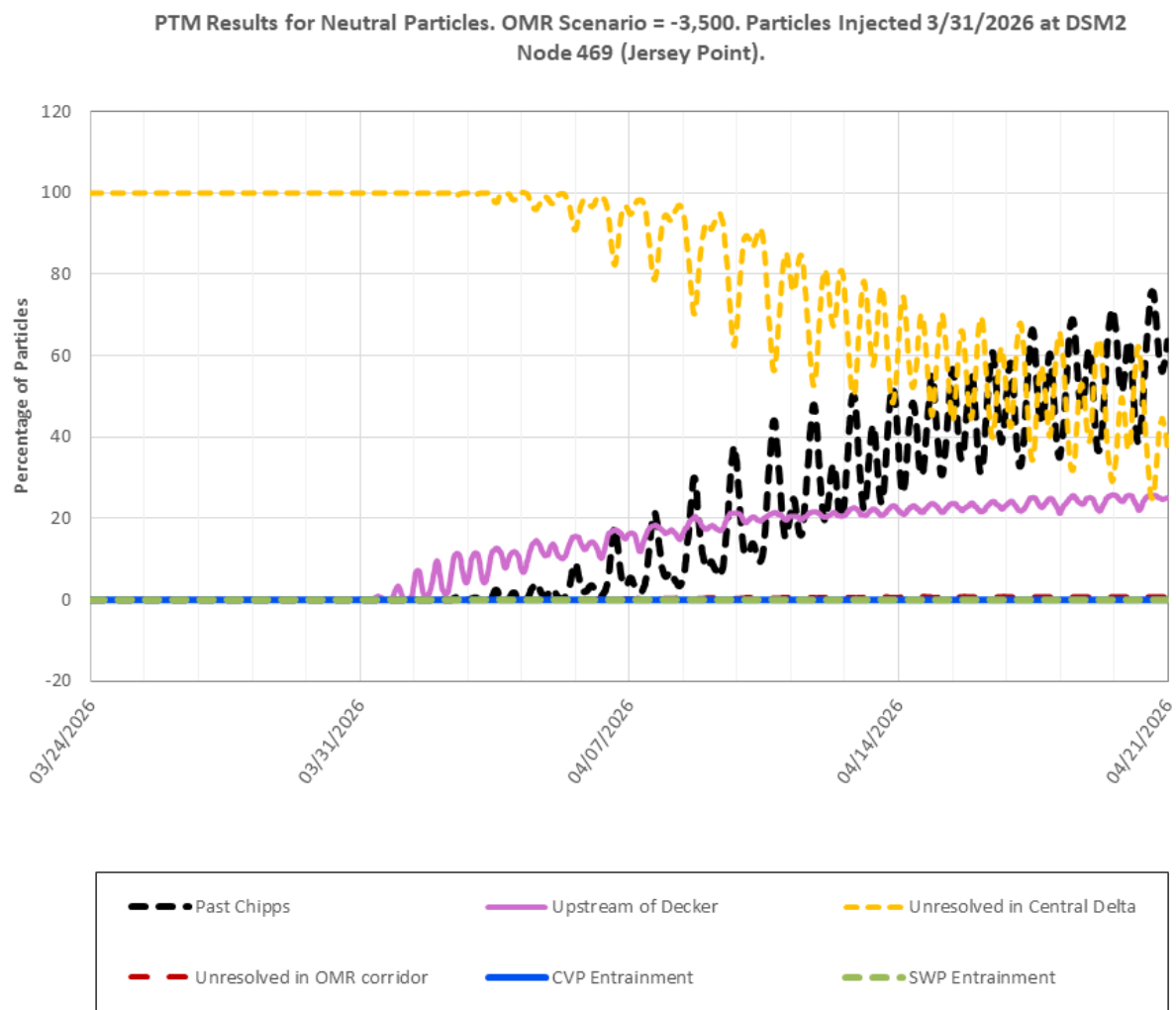


Note: Particles Injected 03/31/2026 at DSM2 Node 469 (Jersey Point)

Key: cfs = cubic feet per second, OMR = Old and Middle River; PTM = particle tracking model

Figure 18. PTM Results for Neutral Particles – OMR Scenario -5,000 cfs

Attachment B. Delta Real-Time Forecast Summary for 03/31/2026

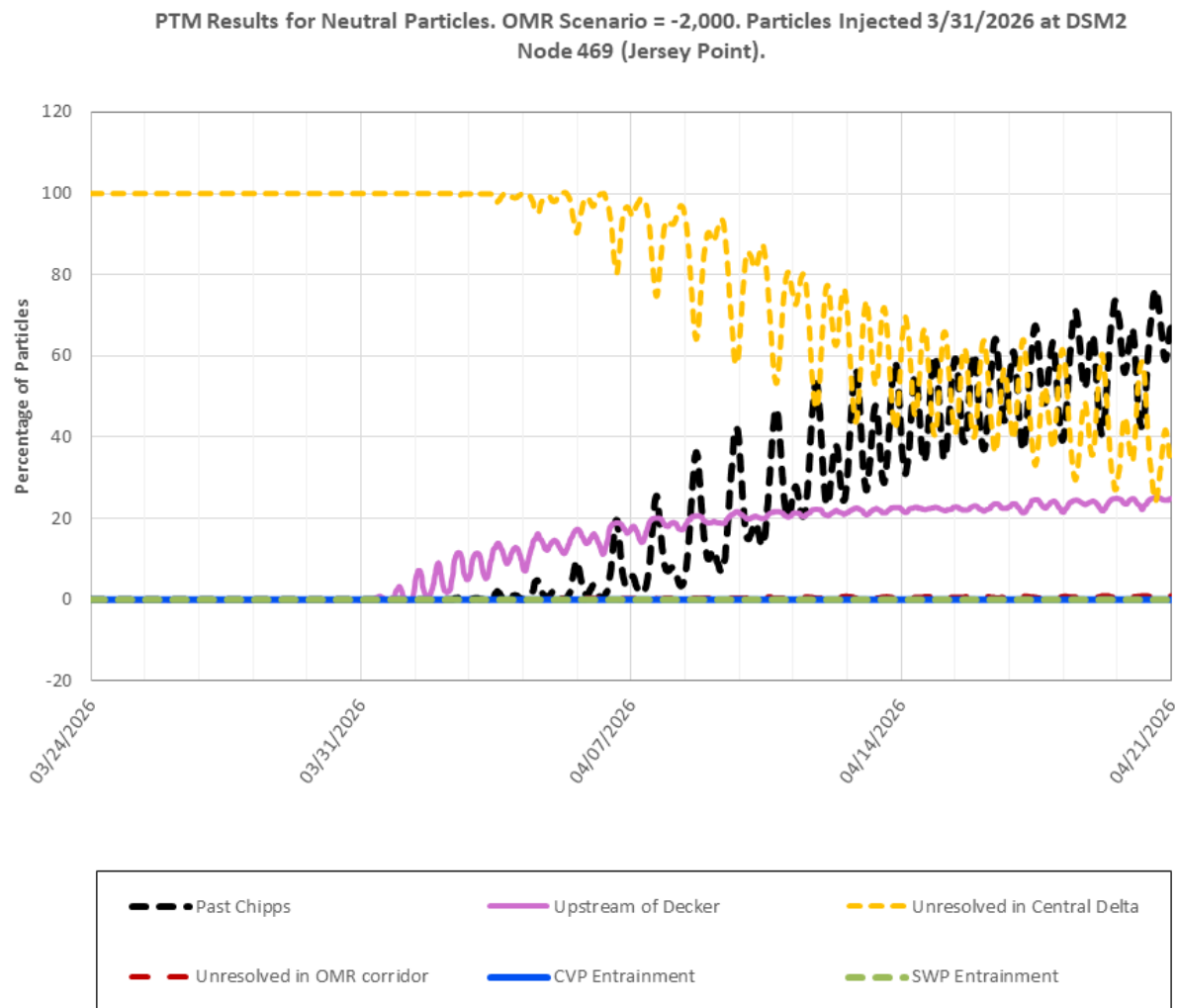


Note: Particles Injected 03/31/2026 at DSM2 Node 469 (Jersey Point)

Key: cfs = cubic feet per second, OMR = Old and Middle River; PTM = particle tracking model

Figure 19. PTM Results for Neutral Particles – OMR Scenario -3,500 cfs

Attachment B. Delta Real-Time Forecast Summary for 03/31/2026

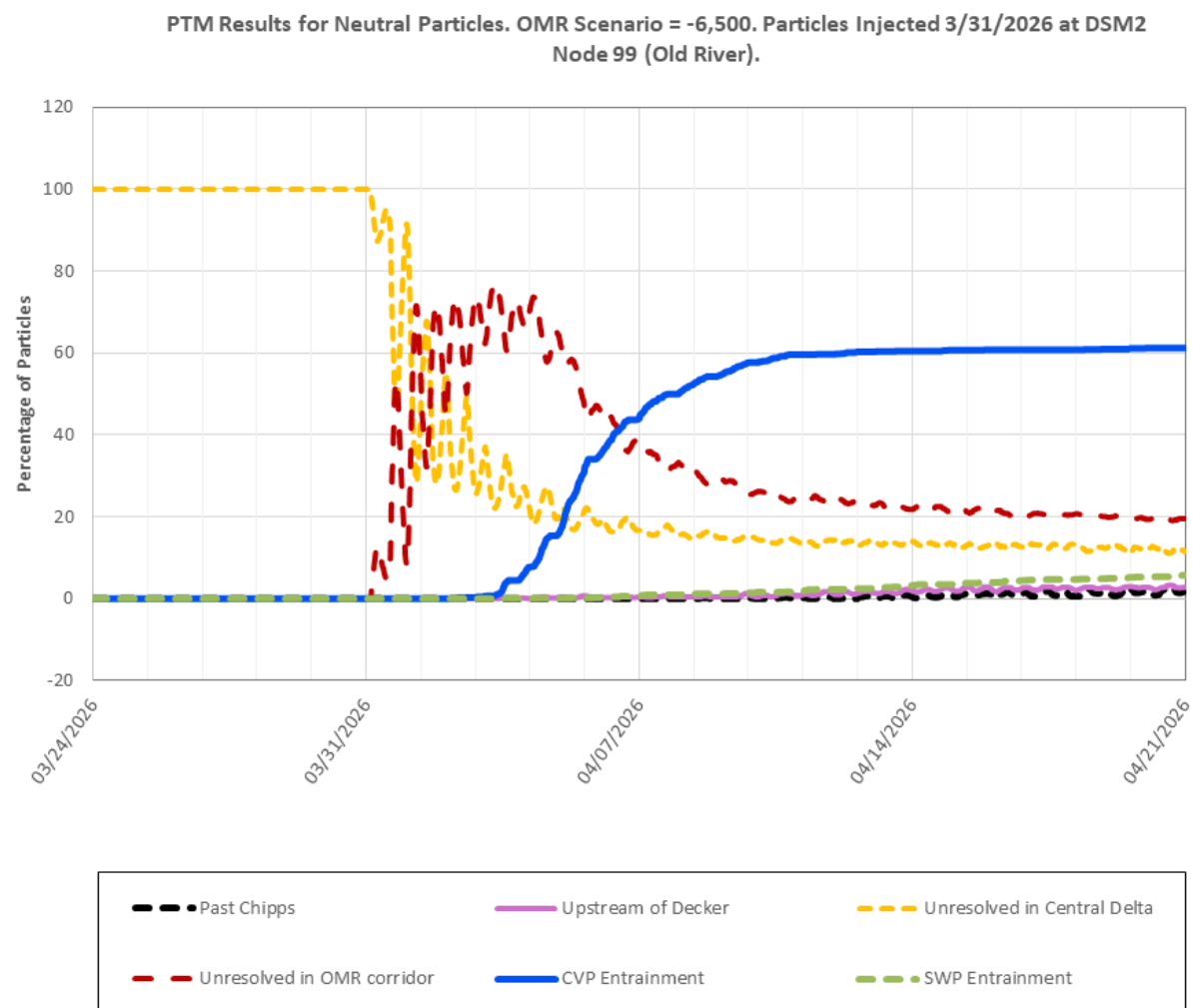


Note: Particles Injected 03/31/2026 at DSM2 Node 469 (Jersey Point)

Key: cfs = cubic feet per second, OMR = Old and Middle River; PTM = particle tracking model

Figure 20. PTM Results for Neutral Particles – OMR Scenario -2,000 cfs

Attachment B. Delta Real-Time Forecast Summary for 03/31/2026

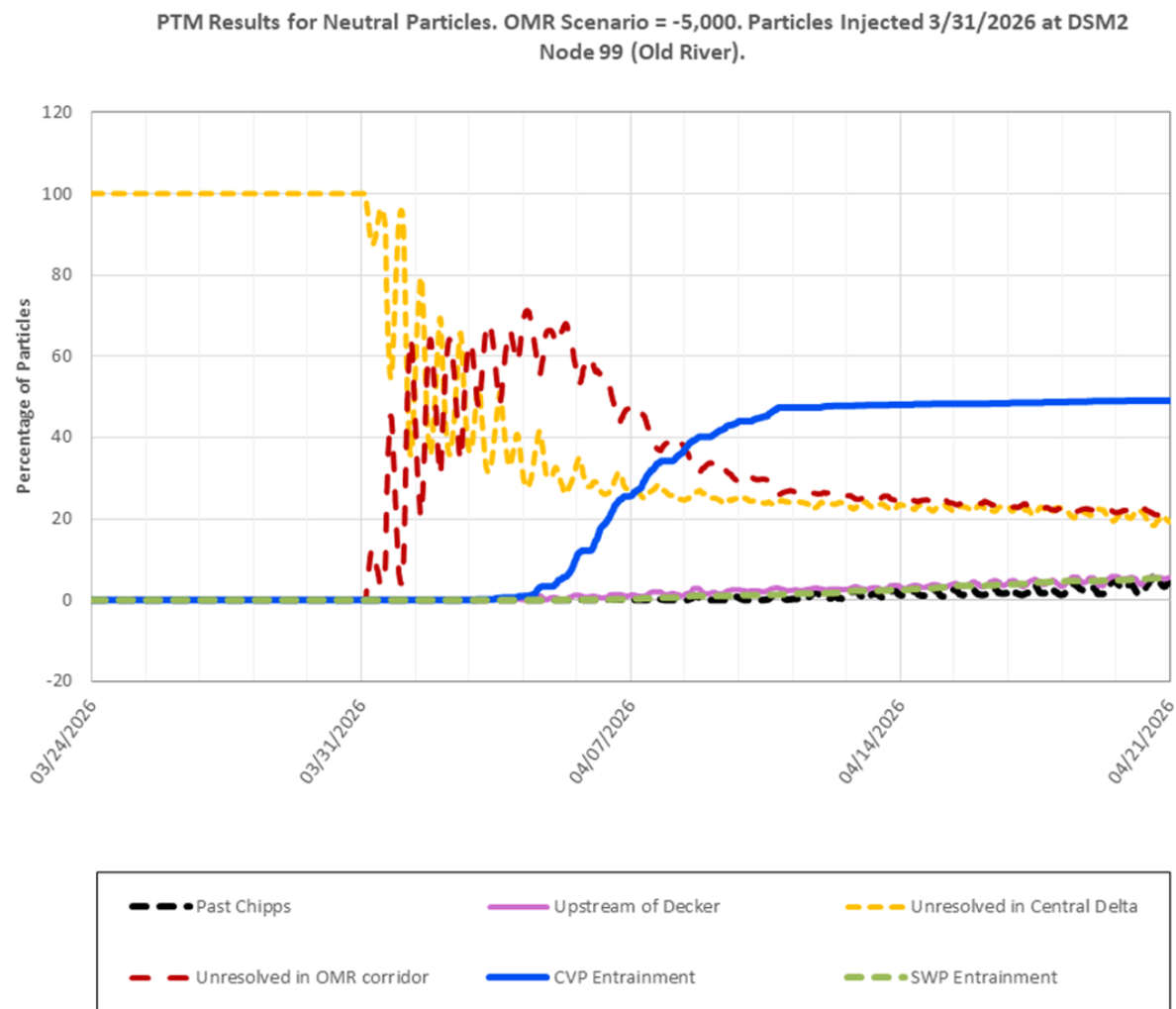


Note: Particles Injected 03/31/2026 at DSM2 Node 99 (Old River)

Key: cfs = cubic feet per second, OMR = Old and Middle River; PTM = particle tracking model

Figure 21. PTM Results for Neutral Particles – OMR Scenario -6,500 cfs

Attachment B. Delta Real-Time Forecast Summary for 03/31/2026

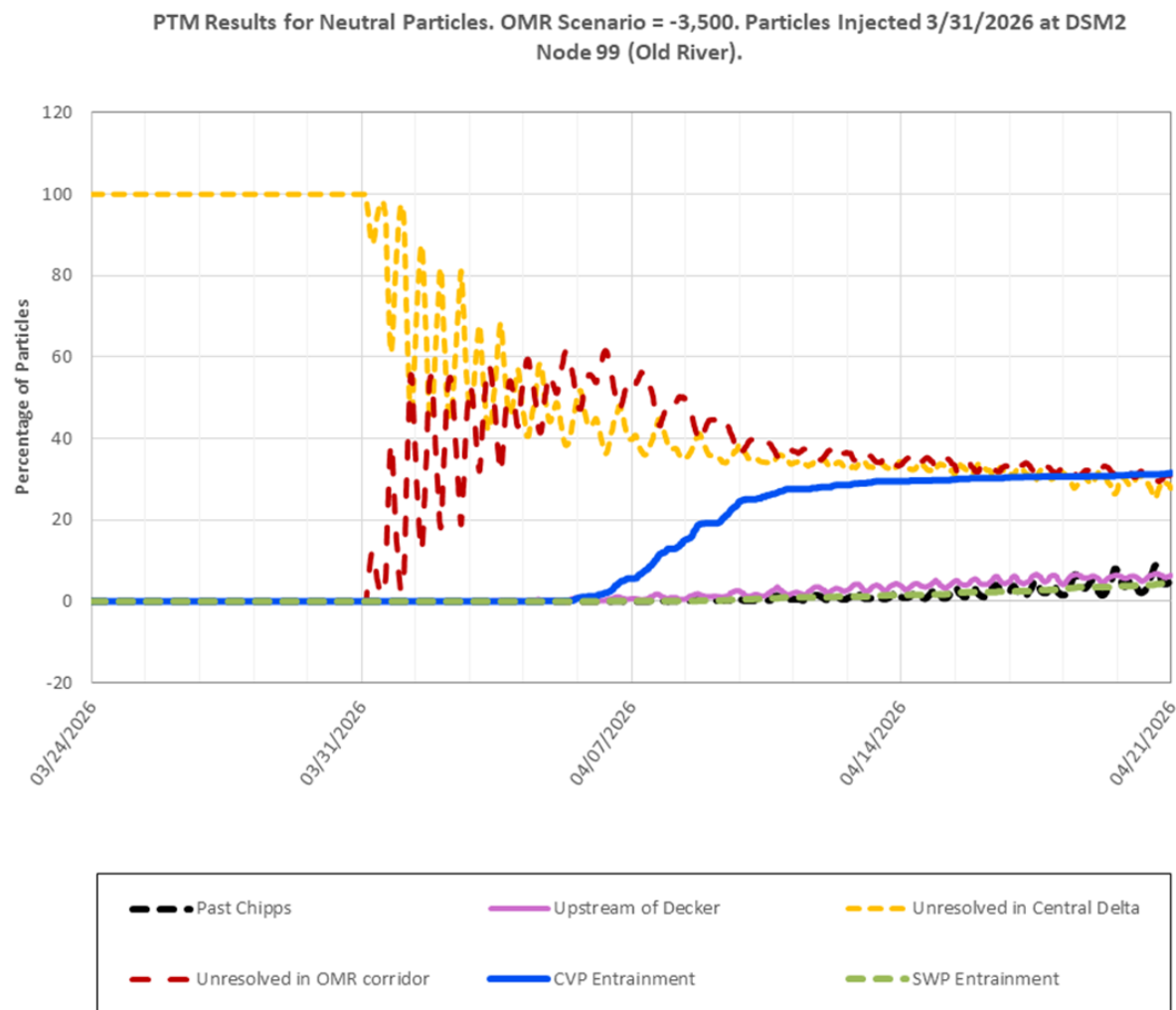


Note: Particles Injected 03/31/2026 at DSM2 Node 99 (Old River)

Key: cfs = cubic feet per second, OMR = Old and Middle River; PTM = particle tracking model

Figure 22. PTM Results for Neutral Particles – OMR Scenario -5,000 cfs

Attachment B. Delta Real-Time Forecast Summary for 03/31/2026

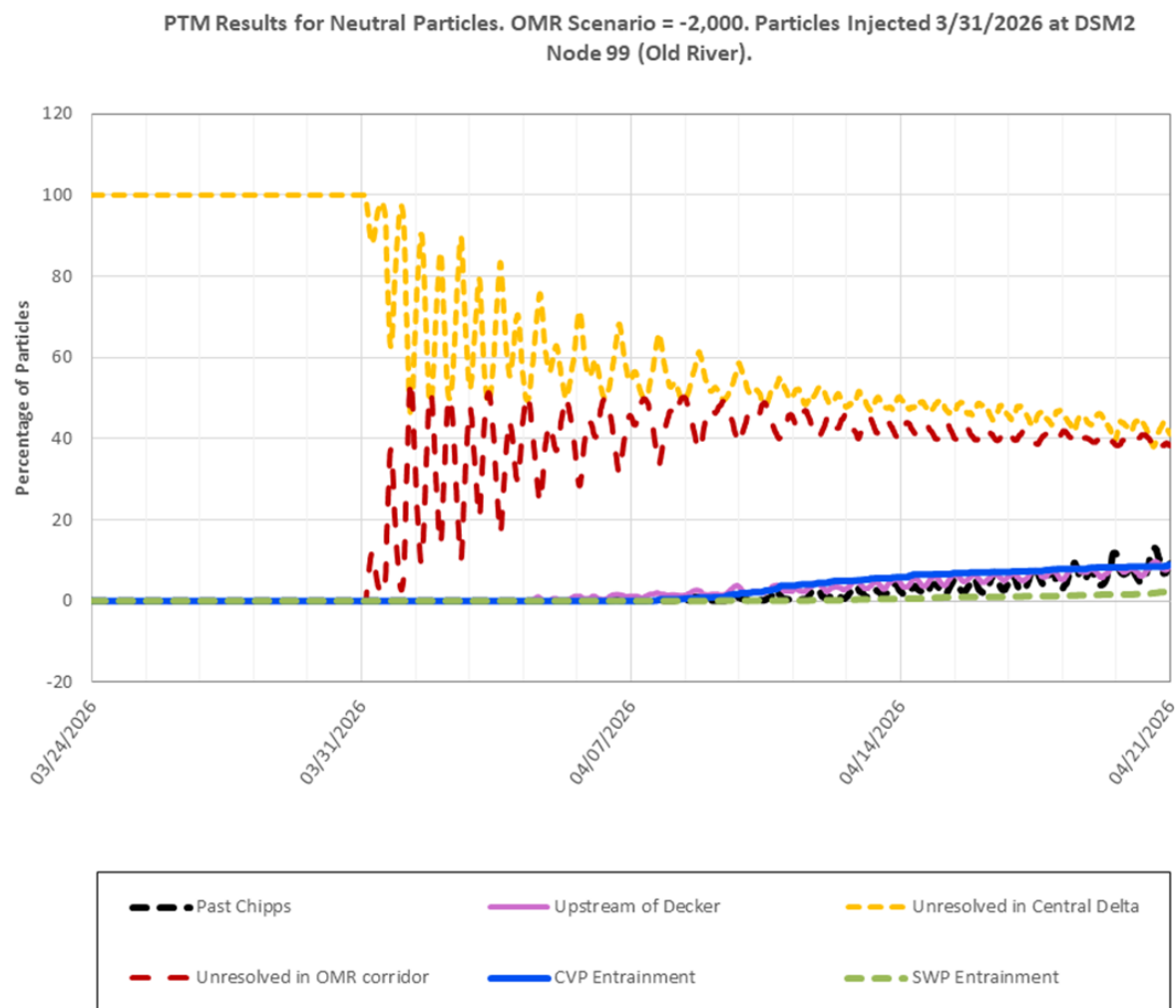


Note: Particles Injected 03/31/2026 at DSM2 Node 99 (Old River)

Key: cfs = cubic feet per second, OMR = Old and Middle River; PTM = particle tracking model

Figure 23. PTM Results for Neutral Particles – OMR Scenario -3,500 cfs

Attachment B. Delta Real-Time Forecast Summary for 03/31/2026



Note: Particles Injected 03/31/2026 at DSM2 Node 99 (Old River)

Key: cfs = cubic feet per second, OMR = Old and Middle River; PTM = particle tracking model

Figure 24. PTM Results for Neutral Particles – OMR Scenario -2,000 cfs

B.4.2 Surface Oriented Particles (PP)

Table 8. Surface Oriented Particle Fate (percent flux across boundary) for Particles Injected at Chipps (DSM2 Node 465)

Forecast Week	OMR Flow Bin	Past Chipps	Upstream of Decker	Unresolved in Central Delta	Unresolved in OMR corridor	CVP Entrainment	SWP Entrainment
Week 1: 03/31/2026 - 04/06/2026	-6,500	87.5	0.0	12.5	0.0	0.0	0.0
	-5,000	88.1	0.0	11.9	0.0	0.0	0.0
	-3,500	89.2	0.0	10.8	0.0	0.0	0.0
	-2,000	91.4	0.0	8.6	0.0	0.0	0.0
Week 2: 04/07/2026 - 04/13/2026	-6,500	94.4	0.1	5.6	0.0	0.0	0.0
	-5,000	94.7	0.0	5.3	0.0	0.0	0.0
	-3,500	95.5	0.1	4.5	0.0	0.0	0.0
	-2,000	96.8	0.0	3.2	0.0	0.0	0.0
Week 3: 04/14/2026 - 04/20/2026	-6,500	95.9	0.0	4.2	0.1	0.0	0.0
	-5,000	97.0	0.1	3.0	0.0	0.0	0.0
	-3,500	97.1	0.1	2.9	0.0	0.0	0.0
	-2,000	97.7	0.1	2.3	0.0	0.0	0.0

Note: Values between 0.0 and 0.1 are indicated with <0.1.

Key: CVP = Central Valley Project, OMR = Old and Middle River, SWP = State Water Project

Table 9. Surface Oriented Particle Fate (percent flux across boundary) for Particles Injected at Cache Slough (DSM2 Node 350)

Forecast Week	OMR Flow Bin	Past Chipps	Upstream of Decker	Unresolved in Central Delta	Unresolved in OMR corridor	CVP Entrainment	SWP Entrainment
Week 1: 03/31/2026 - 04/06/2026	-6,500	16.1	65.9	84.1	0.3	0.0	0.0
	-5,000	17.6	69.4	82.5	0.1	0.0	0.0
	-3,500	18.1	67.8	81.9	0.0	0.0	0.0
	-2,000	20.4	69.5	79.6	0.0	0.0	0.0
Week 2: 04/07/2026 - 04/13/2026	-6,500	57.1	72.3	44.0	0.8	0.2	0.1
	-5,000	60.8	75.1	40.0	0.7	0.0	0.0
	-3,500	61.6	73.5	38.9	0.5	0.0	0.0
	-2,000	66.4	75.1	33.6	0.0	0.0	0.0
Week 3: 04/14/2026 - 04/20/2026	-6,500	76.8	77.1	24.4	0.7	0.4	0.1
	-5,000	79.4	78.7	21.3	0.5	0.2	0.0
	-3,500	80.3	77.6	20.3	0.6	0.0	0.0
	-2,000	82.1	78.2	18.0	0.1	0.0	0.0

Note: Values between 0.0 and 0.1 are indicated with <0.1.

Key: CVP = Central Valley Project, OMR = Old and Middle River, SWP = State Water Project

Attachment B. Delta Real-Time Forecast Summary for 03/31/2026

Table 10. Surface Oriented Particle Fate (percent flux across boundary) for Particles Injected at Jersey Point (DSM2 Node 469)

Forecast Week	OMR Flow Bin	Past Chipps	Upstream of Decker	Unresolved in Central Delta	Unresolved in OMR corridor	CVP Entrainment	SWP Entrainment
Week 1: 03/31/2026 - 04/06/2026	-6,500	5.9	19.3	94.9	0.8	0.0	0.0
	-5,000	8.9	17.3	91.9	0.8	0.0	0.0
	-3,500	10.6	19.1	89.5	0.1	0.0	0.0
	-2,000	13.0	17.3	87.0	0.0	0.0	0.0
Week 2: 04/07/2026 - 04/13/2026	-6,500	44.8	25.2	57.5	1.1	1.1	0.0
	-5,000	49.0	22.3	52.4	0.9	0.4	0.1
	-3,500	56.9	23.2	43.8	0.6	0.0	0.1
	-2,000	60.3	21.2	40.0	0.3	0.0	0.0
Week 3: 04/14/2026 - 04/20/2026	-6,500	73.1	28.3	29.8	1.8	1.1	0.0
	-5,000	77.0	24.7	24.4	0.9	0.4	0.1
	-3,500	80.0	25.6	20.8	0.7	0.0	0.1
	-2,000	82.1	22.8	18.3	0.4	0.0	0.0

Note: Values between 0.0 and 0.1 are indicated with <0.1.

Key: CVP = Central Valley Project, OMR = Old and Middle River, SWP = State Water Project

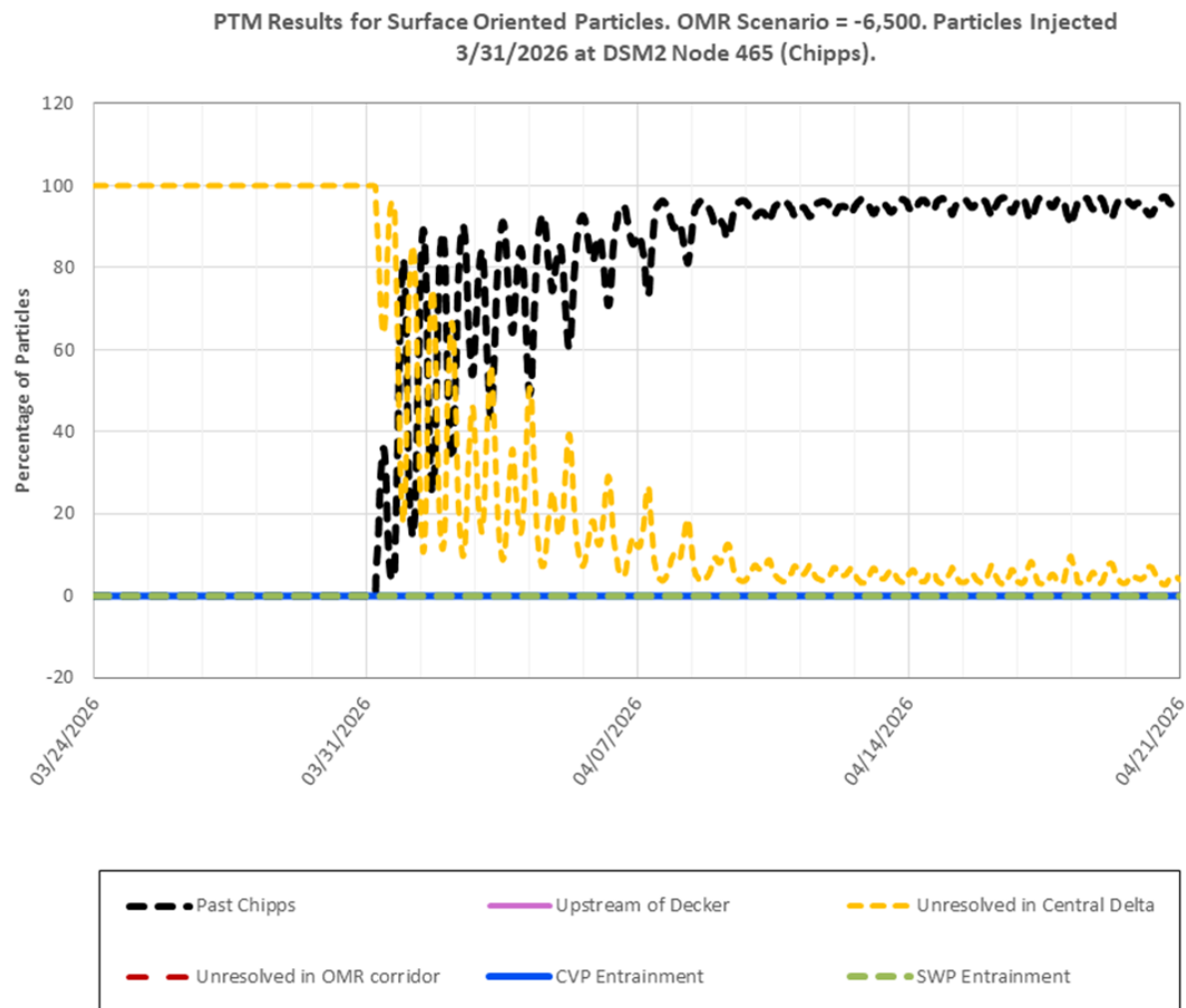
Table 11. Surface Oriented Particle Fate (percent flux across boundary) for Particles Injected at Old River (DSM2 Node 99)

Forecast Week	OMR Flow Bin	Past Chipps	Upstream of Decker	Unresolved in Central Delta	Unresolved in OMR corridor	CVP Entrainment	SWP Entrainment
Week 1: 03/31/2026 - 04/06/2026	-6,500	0.0	0.6	17.1	39.5	42.9	0.5
	-5,000	0.0	0.7	26.8	49.4	23.6	0.2
	-3,500	0.0	1.3	40.4	54.0	5.6	0.1
	-2,000	0.1	1.2	56.0	43.8	0.1	0.0
Week 2: 04/07/2026 - 04/13/2026	-6,500	1.4	1.6	12.7	23.0	60.5	2.4
	-5,000	1.5	2.4	20.9	25.7	49.5	2.4
	-3,500	3.0	4.5	32.3	31.9	30.7	2.0
	-2,000	4.6	4.9	47.5	36.2	10.8	0.9
Week 3: 04/14/2026 - 04/20/2026	-6,500	4.4	2.9	9.4	20.2	61.2	4.8
	-5,000	8.1	4.2	13.6	22.1	51.0	5.2
	-3,500	11.5	7.9	23.3	27.7	32.2	5.3
	-2,000	15.3	8.9	35.4	33.7	13.3	2.3

Note: Values between 0.0 and 0.1 are indicated with <0.1.

Key: CVP = Central Valley Project, OMR = Old and Middle River, SWP = State Water Project

Attachment B. Delta Real-Time Forecast Summary for 03/31/2026

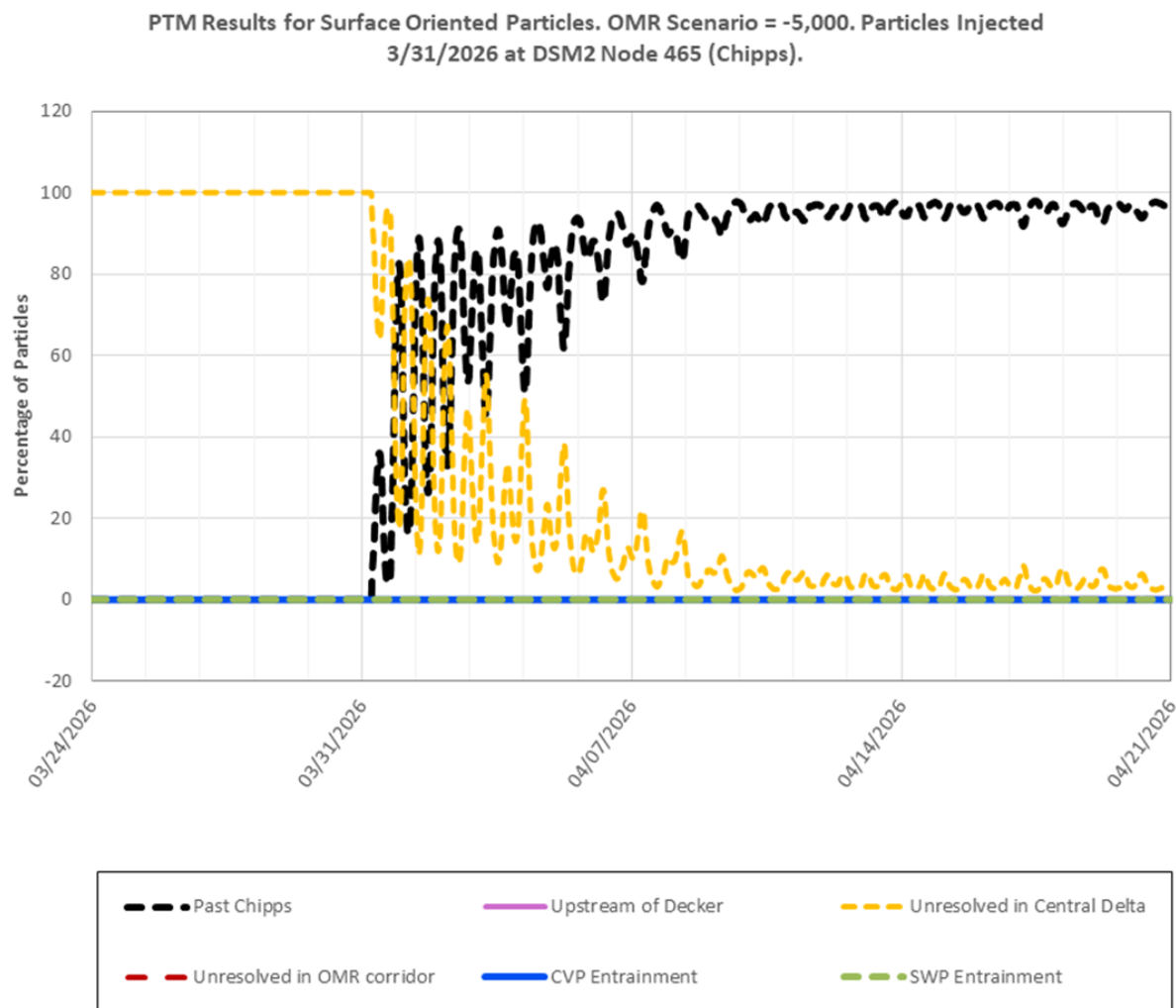


Note: Particles Injected 03/31/2026 at DSM2 Node 465 (Chippis)

Key: cfs = cubic feet per second, OMR = Old and Middle River; PTM = particle tracking model

Figure 25. PTM Results for Surface Oriented Particles – OMR Scenario -6,500 cfs

Attachment B. Delta Real-Time Forecast Summary for 03/31/2026

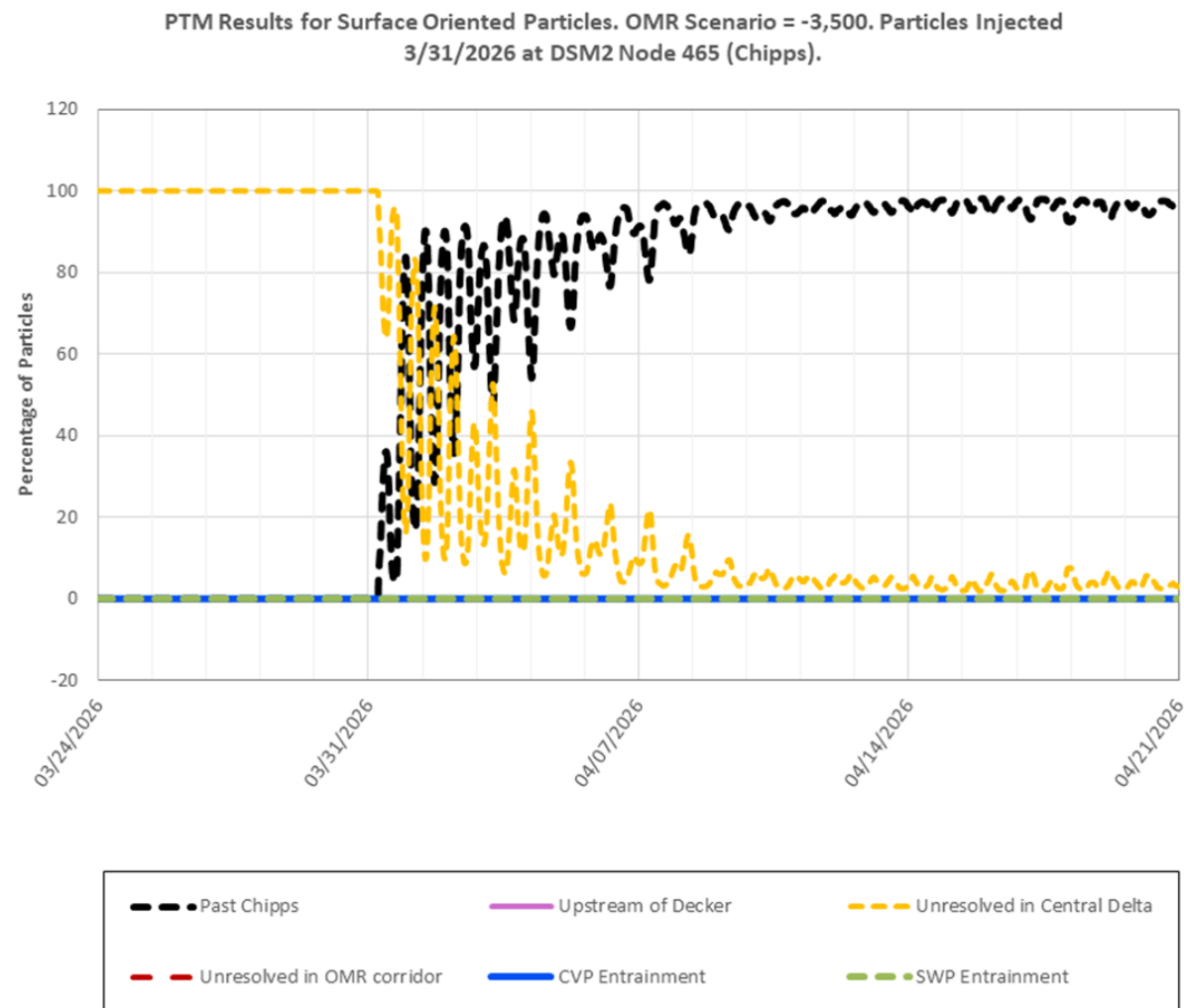


Note: Particles Injected 03/31/2026 at DSM2 Node 465 (Chippis)

Key: cfs = cubic feet per second, OMR = Old and Middle River; PTM = particle tracking model

Figure 26. PTM Results for Surface Oriented Particles – OMR Scenario -5,000 cfs

Attachment B. Delta Real-Time Forecast Summary for 03/31/2026

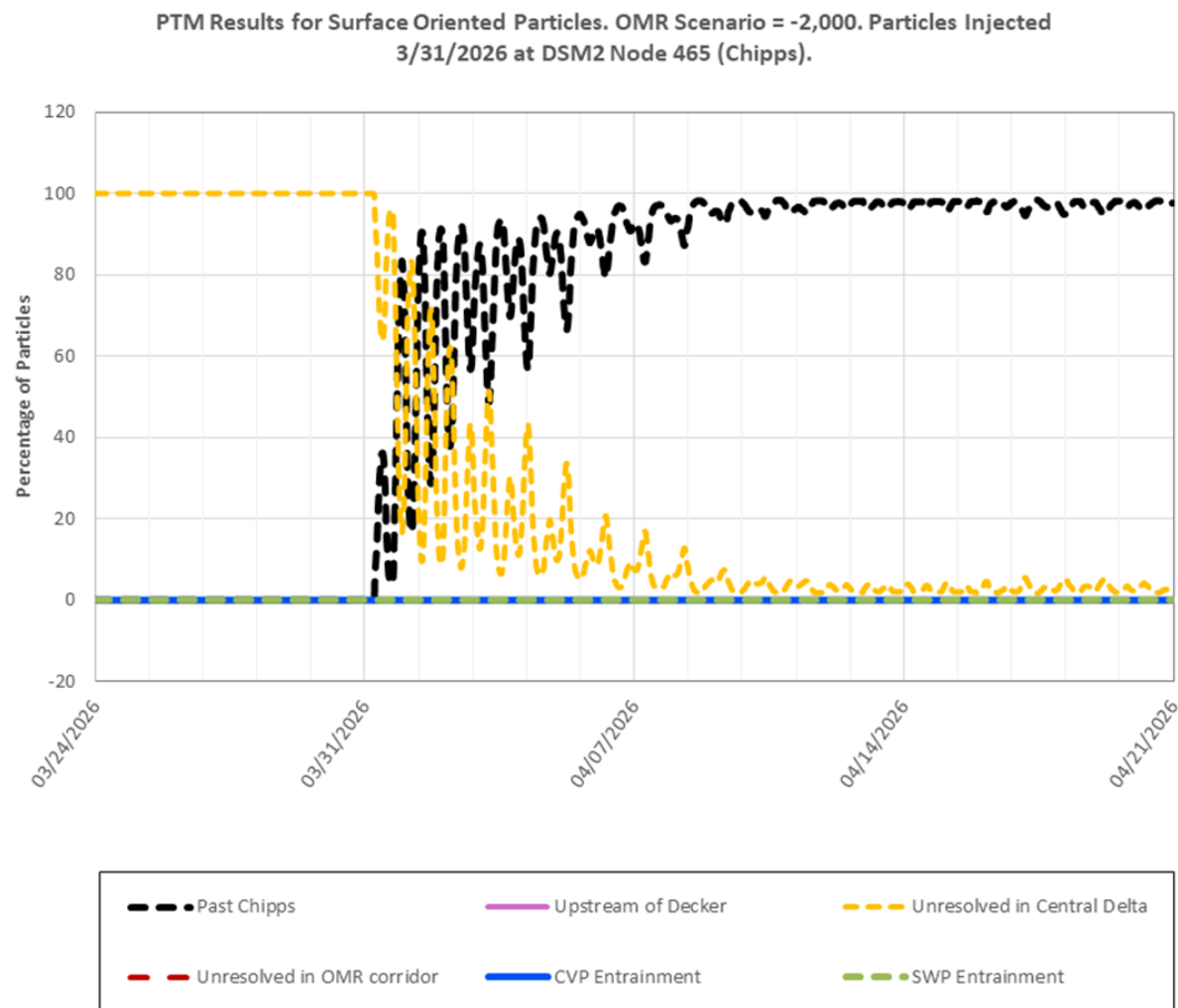


Note: Particles Injected 03/31/2026 at DSM2 Node 465 (Chippis)

Key: cfs = cubic feet per second, OMR = Old and Middle River; PTM = particle tracking model

Figure 27. PTM Results for Surface Oriented Particles – OMR Scenario -3,500 cfs

Attachment B. Delta Real-Time Forecast Summary for 03/31/2026

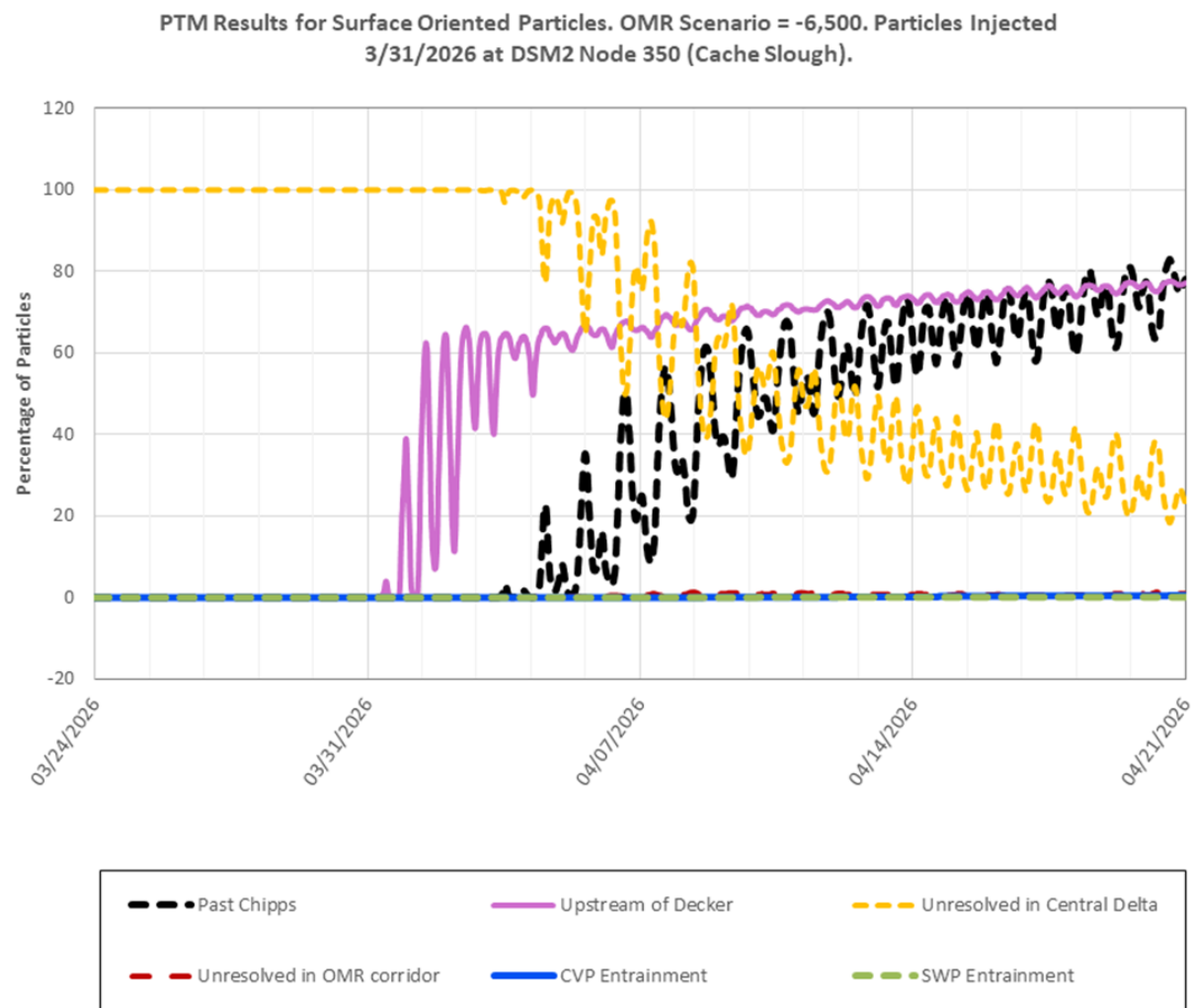


Note: Particles Injected 03/31/2026 at DSM2 Node 465 (Chippis)

Key: cfs = cubic feet per second, OMR = Old and Middle River; PTM = particle tracking model

Figure 28. PTM Results for Surface Oriented Particles – OMR Scenario -2,000 cfs

Attachment B. Delta Real-Time Forecast Summary for 03/31/2026

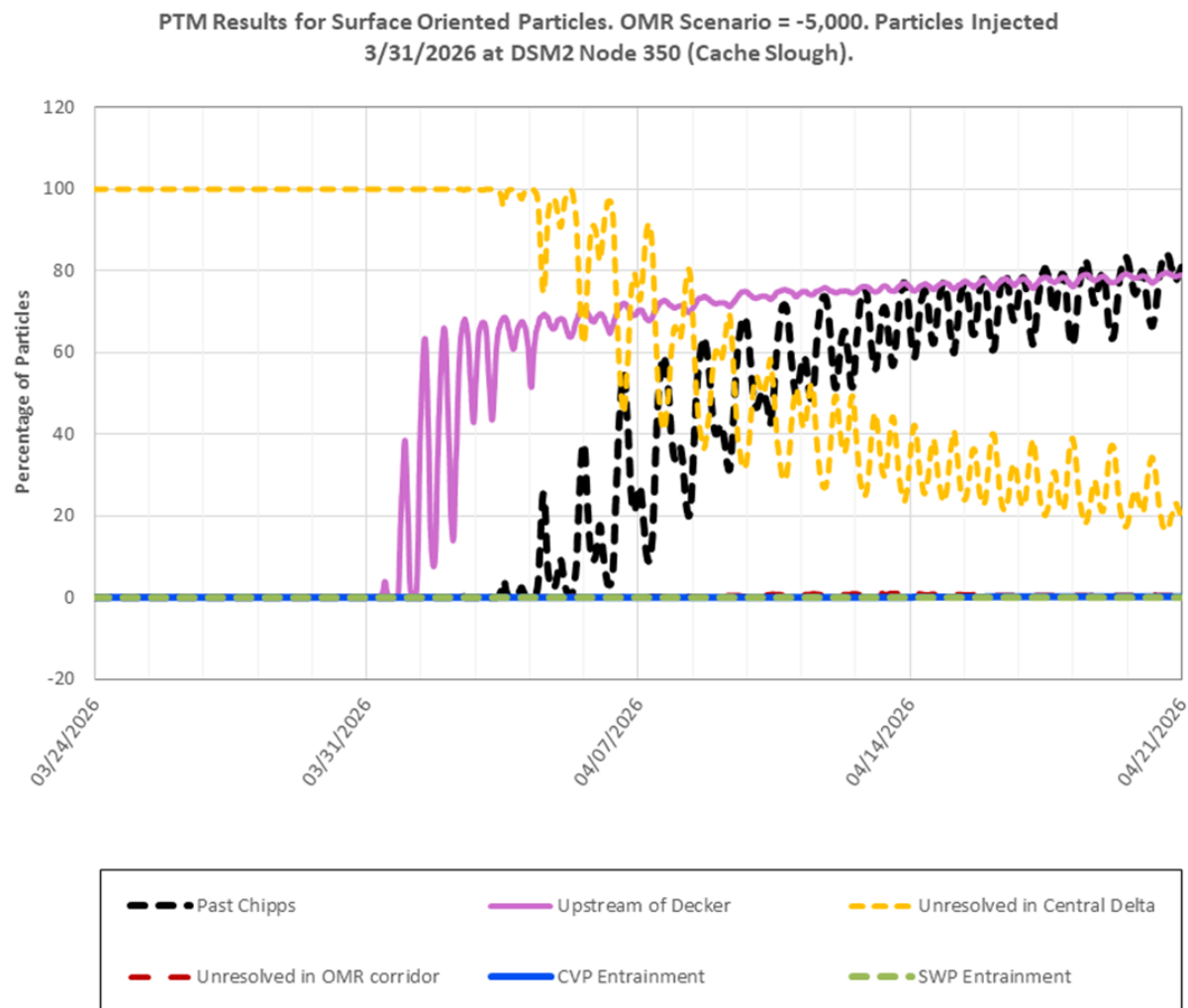


Note: Particles Injected 03/31/2026 at DSM2 Node 350 (Cache Slough)

Key: cfs = cubic feet per second, OMR = Old and Middle River; PTM = particle tracking model

Figure 29. PTM Results for Surface Oriented Particles – OMR Scenario -6,500 cfs

Attachment B. Delta Real-Time Forecast Summary for 03/31/2026

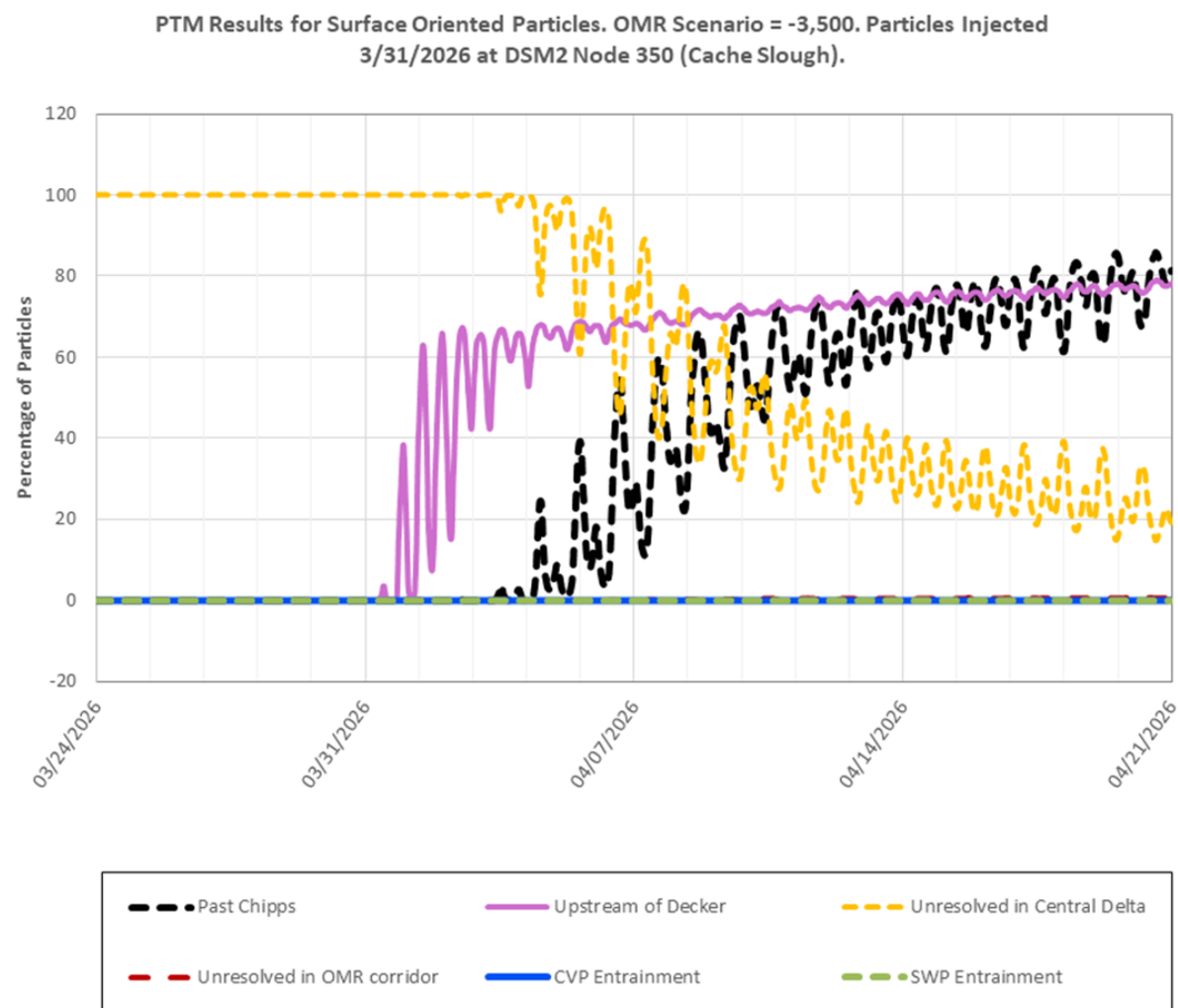


Note: Particles Injected 03/31/2026 at DSM2 Node 350 (Cache Slough)

Key: cfs = cubic feet per second, OMR = Old and Middle River; PTM = particle tracking model

Figure 30. PTM Results for Surface Oriented Particles – OMR Scenario -5,000 cfs

Attachment B. Delta Real-Time Forecast Summary for 03/31/2026

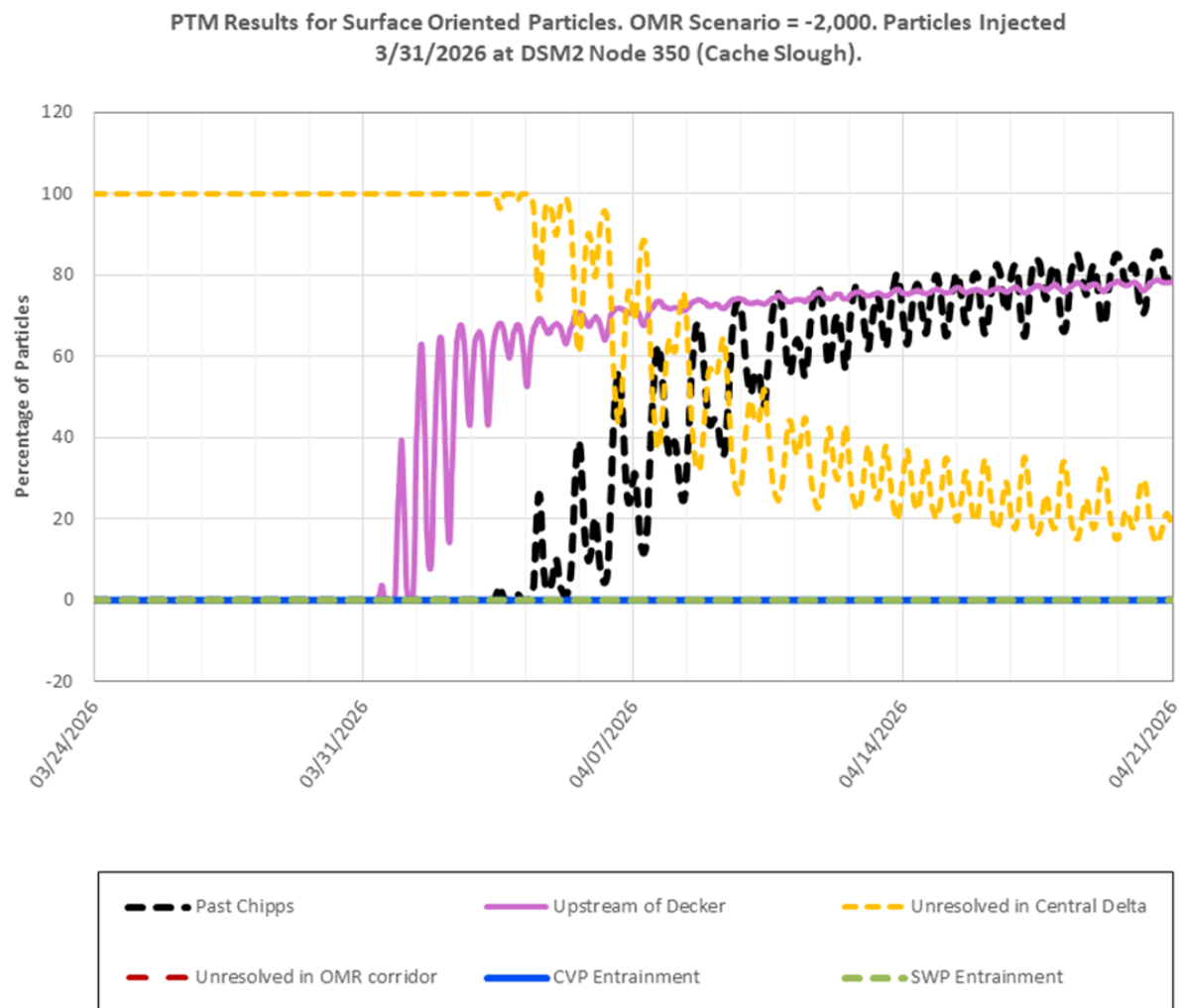


Note: Particles Injected 03/31/2026 at DSM2 Node 350 (Cache Slough)

Key: cfs = cubic feet per second, OMR = Old and Middle River; PTM = particle tracking model

Figure 31. PTM Results for Surface Oriented Particles – OMR Scenario -3,500 cfs

Attachment B. Delta Real-Time Forecast Summary for 03/31/2026

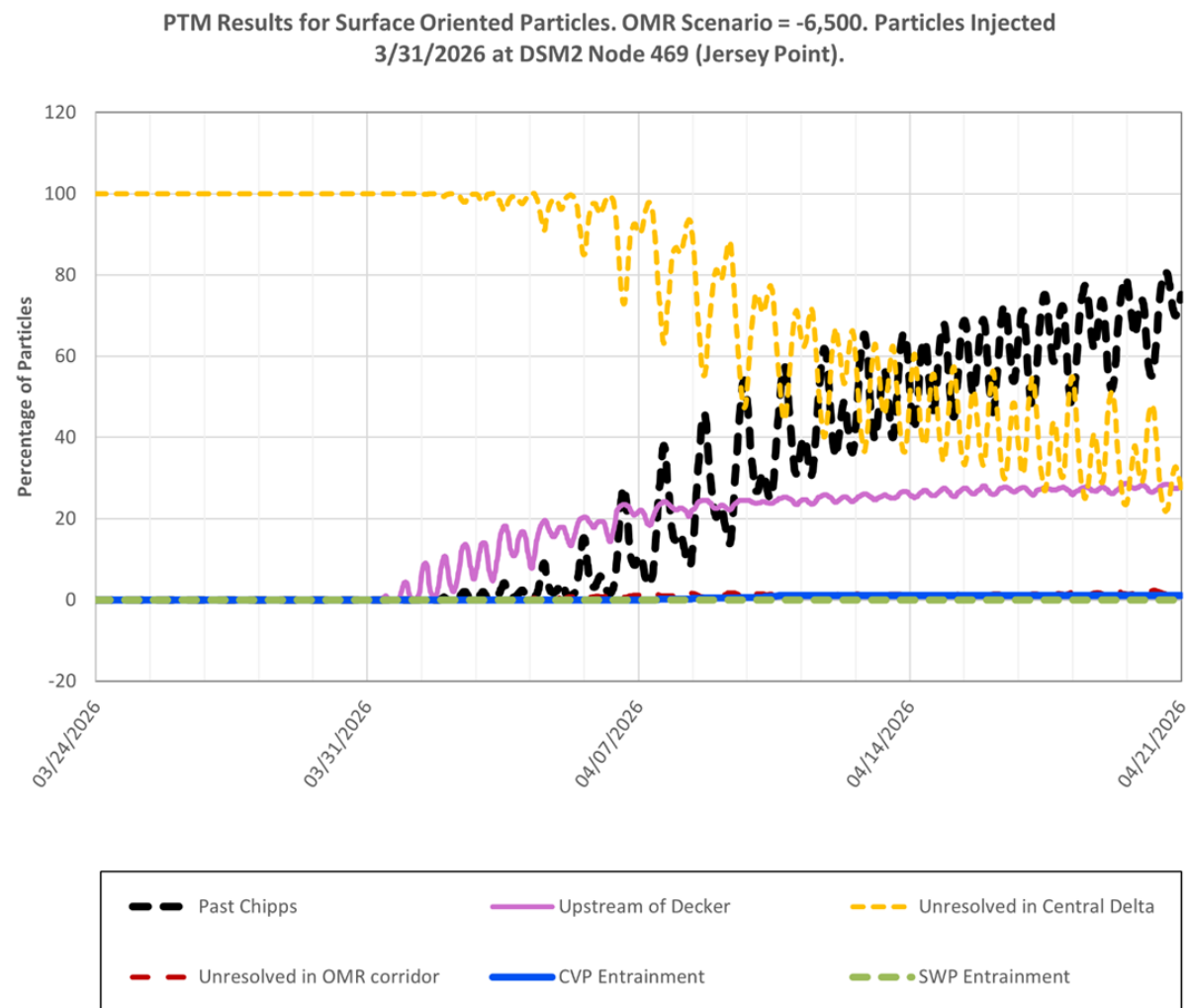


Note: Particles Injected 03/31/2026 at DSM2 Node 350 (Cache Slough)

Key: cfs = cubic feet per second, OMR = Old and Middle River; PTM = particle tracking model

Figure 32. PTM Results for Surface Oriented Particles – O MR Scenario -2,000 cfs

Attachment B. Delta Real-Time Forecast Summary for 03/31/2026

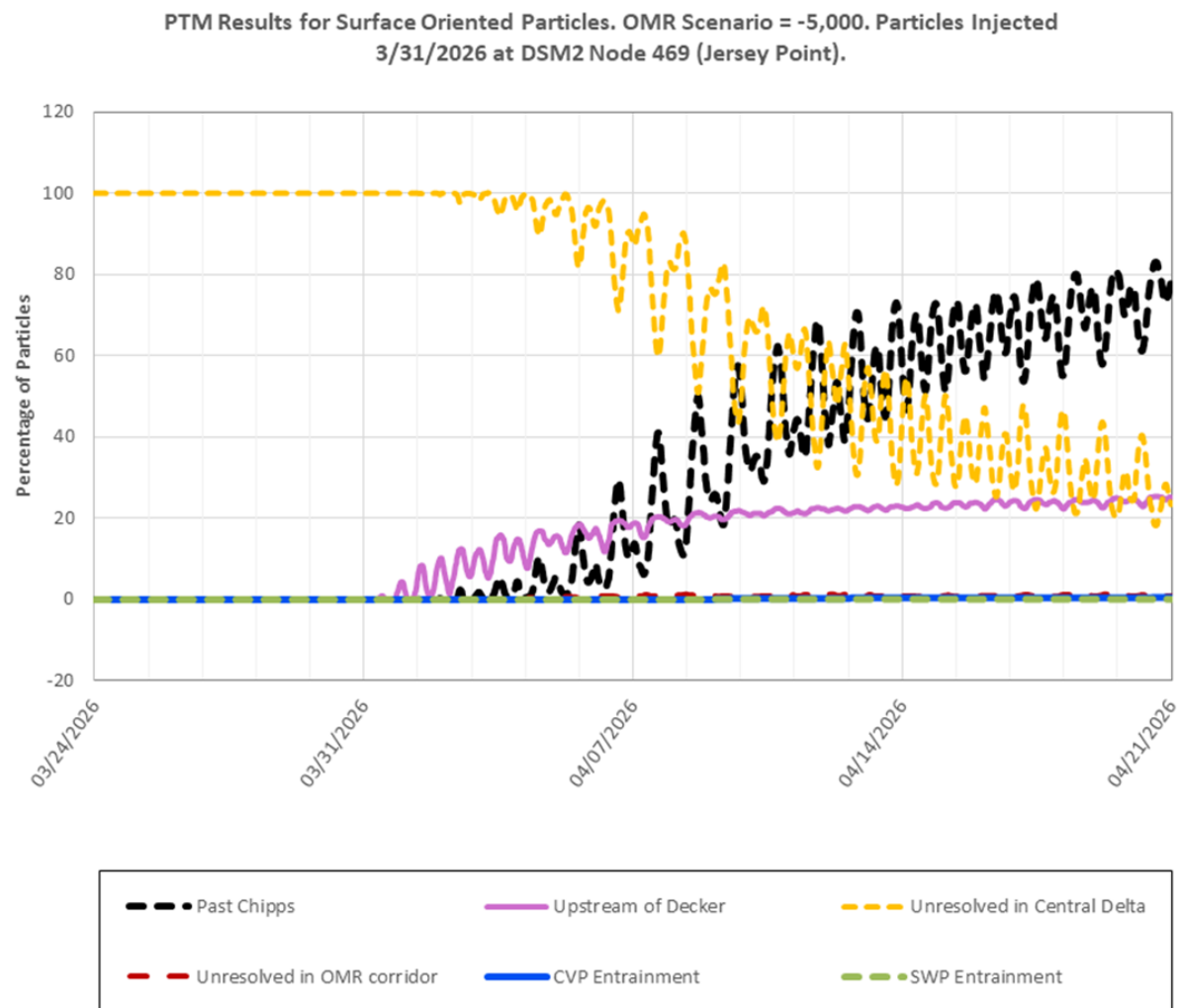


Note: Particles Injected 03/31/2026 at DSM2 Node 469 (Jersey Point)

Key: cfs = cubic feet per second, OMR = Old and Middle River; PTM = particle tracking model

Figure 33. PTM Results for Surface Oriented Particles – OMR Scenario -6,500 cfs

Attachment B. Delta Real-Time Forecast Summary for 03/31/2026

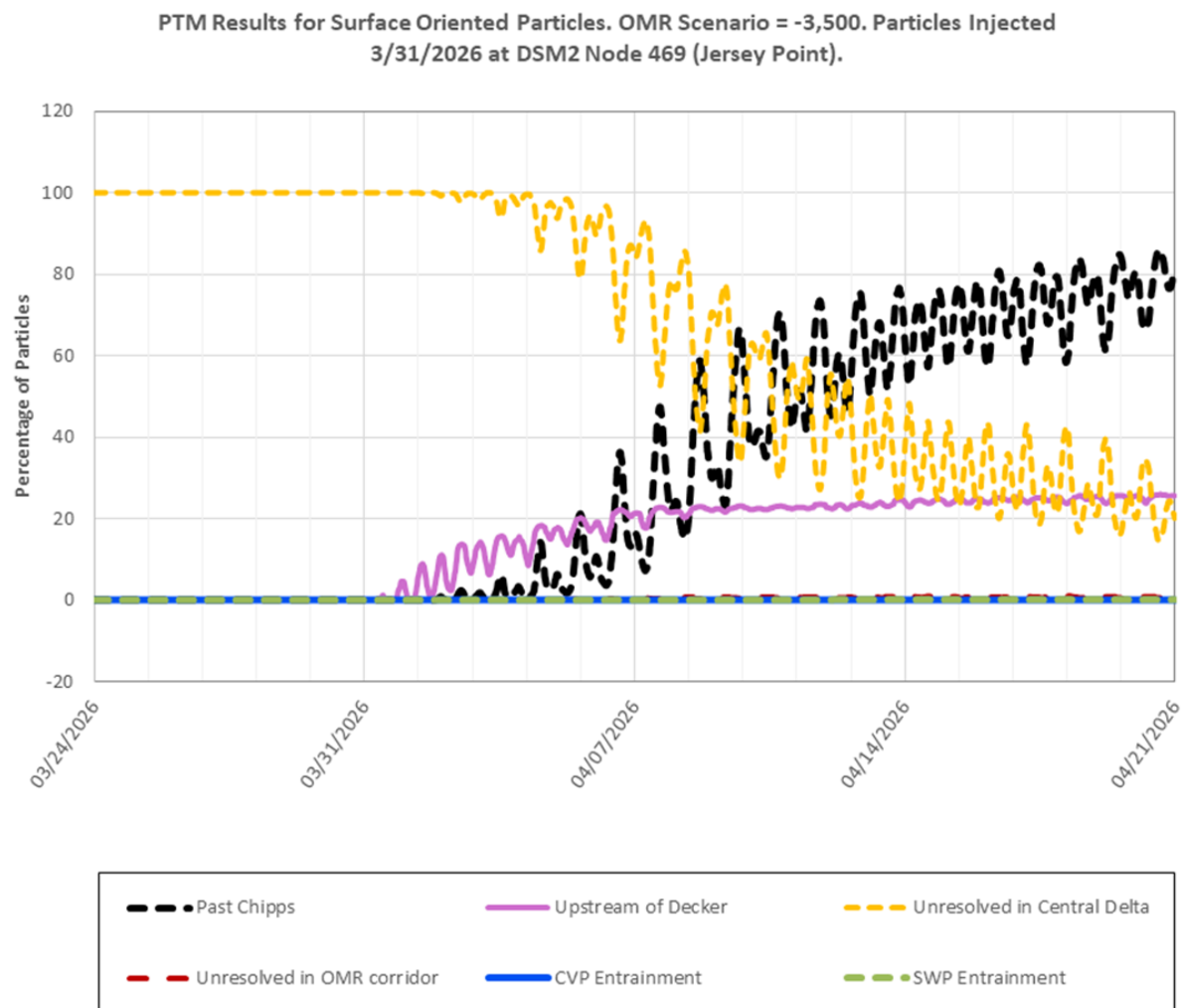


Note: Particles Injected 03/31/2026 at DSM2 Node 469 (Jersey Point)

Key: cfs = cubic feet per second, OMR = Old and Middle River; PTM = particle tracking model

Figure 34. PTM Results for Surface Oriented Particles – OMR Scenario -5,000 cfs

Attachment B. Delta Real-Time Forecast Summary for 03/31/2026

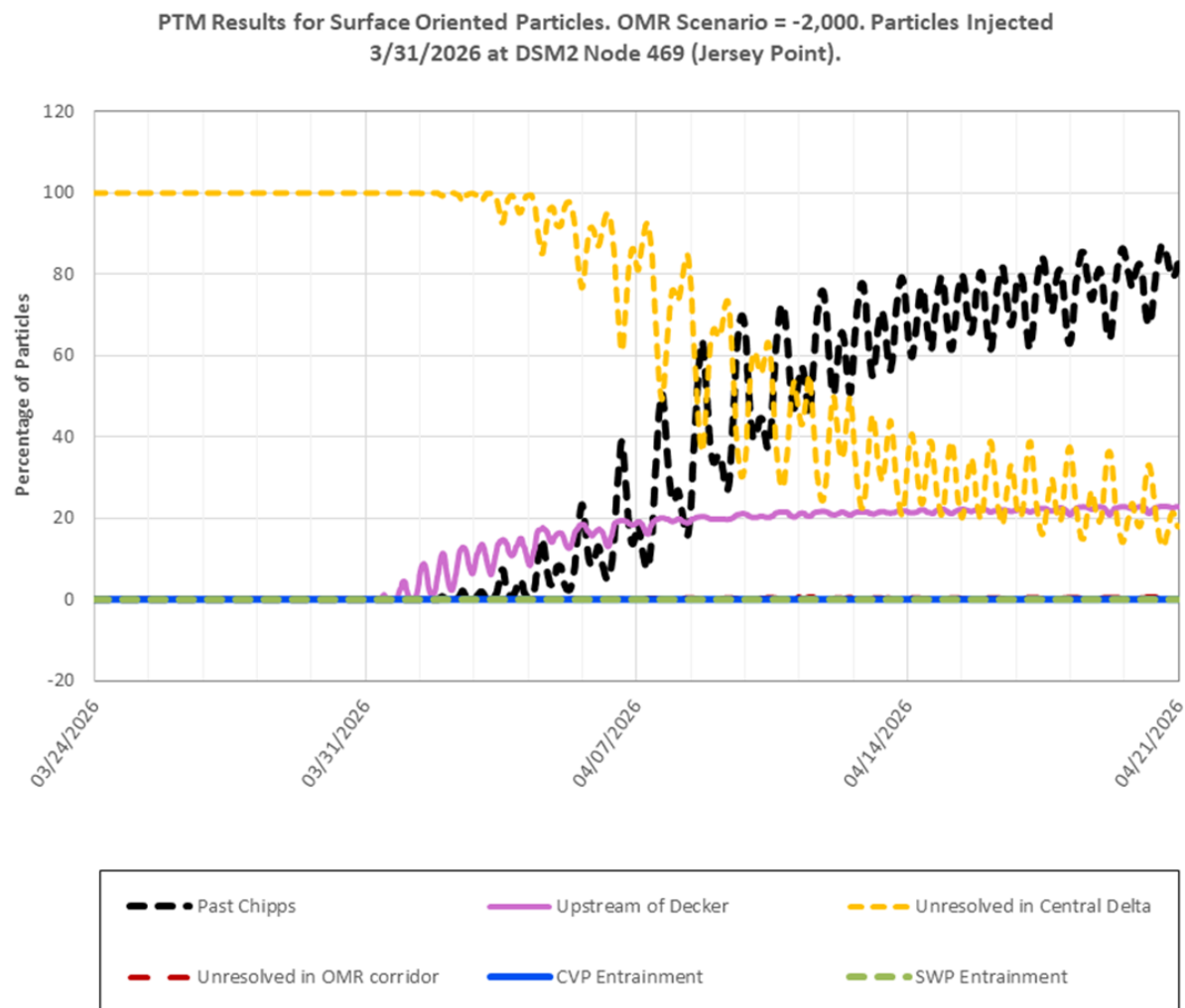


Note: Particles Injected 03/31/2026 at DSM2 Node 469 (Jersey Point)

Key: cfs = cubic feet per second, OMR = Old and Middle River; PTM = particle tracking model

Figure 35. PTM Results for Surface Oriented Particles – OMR Scenario -3,500 cfs

Attachment B. Delta Real-Time Forecast Summary for 03/31/2026

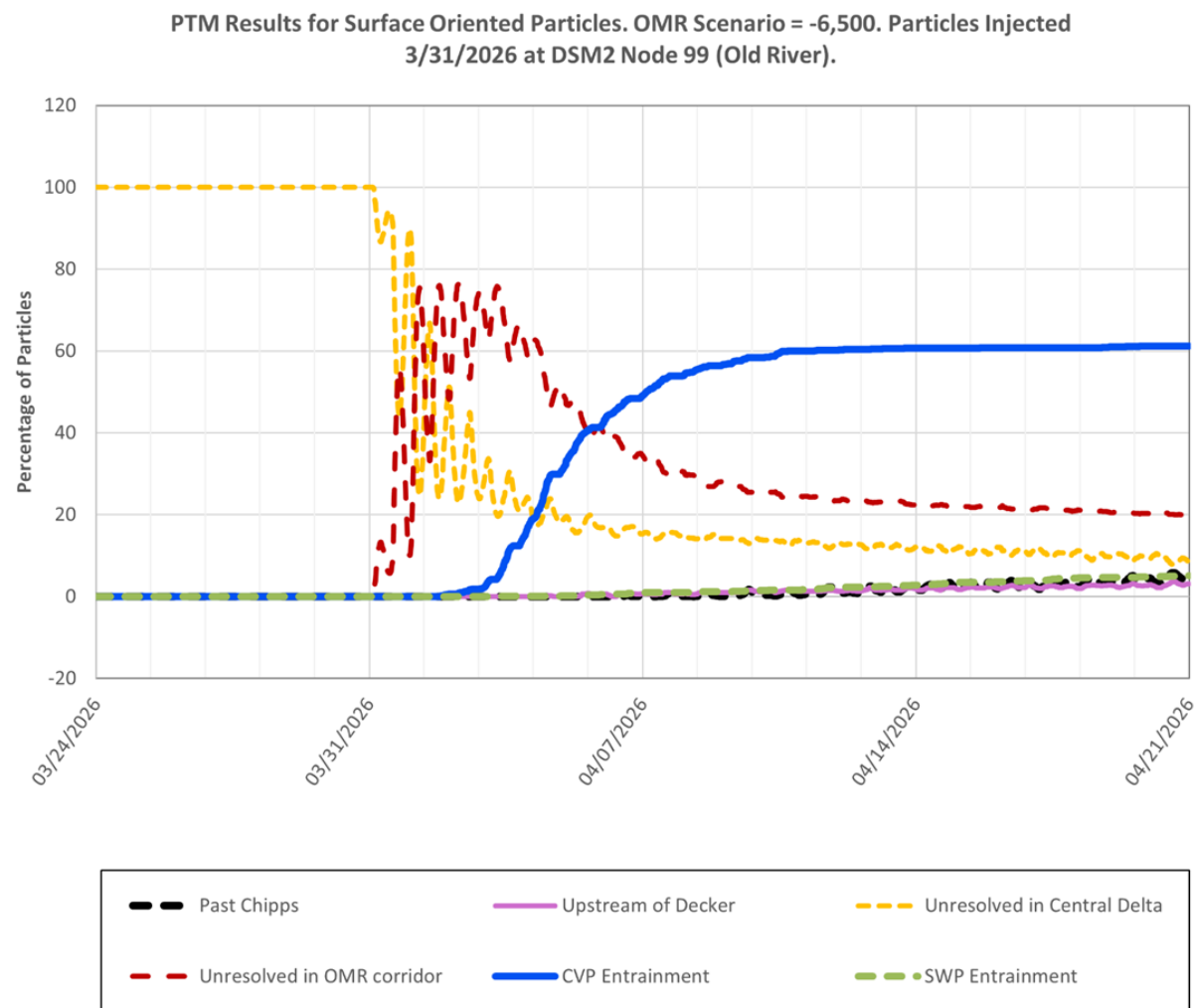


Note: Particles Injected 03/31/2026 at DSM2 Node 469 (Jersey Point)

Key: cfs = cubic feet per second, OMR = Old and Middle River; PTM = particle tracking model

Figure 36. PTM Results for Surface Oriented Particles – OMR Scenario -2,000 cfs

Attachment B. Delta Real-Time Forecast Summary for 03/31/2026

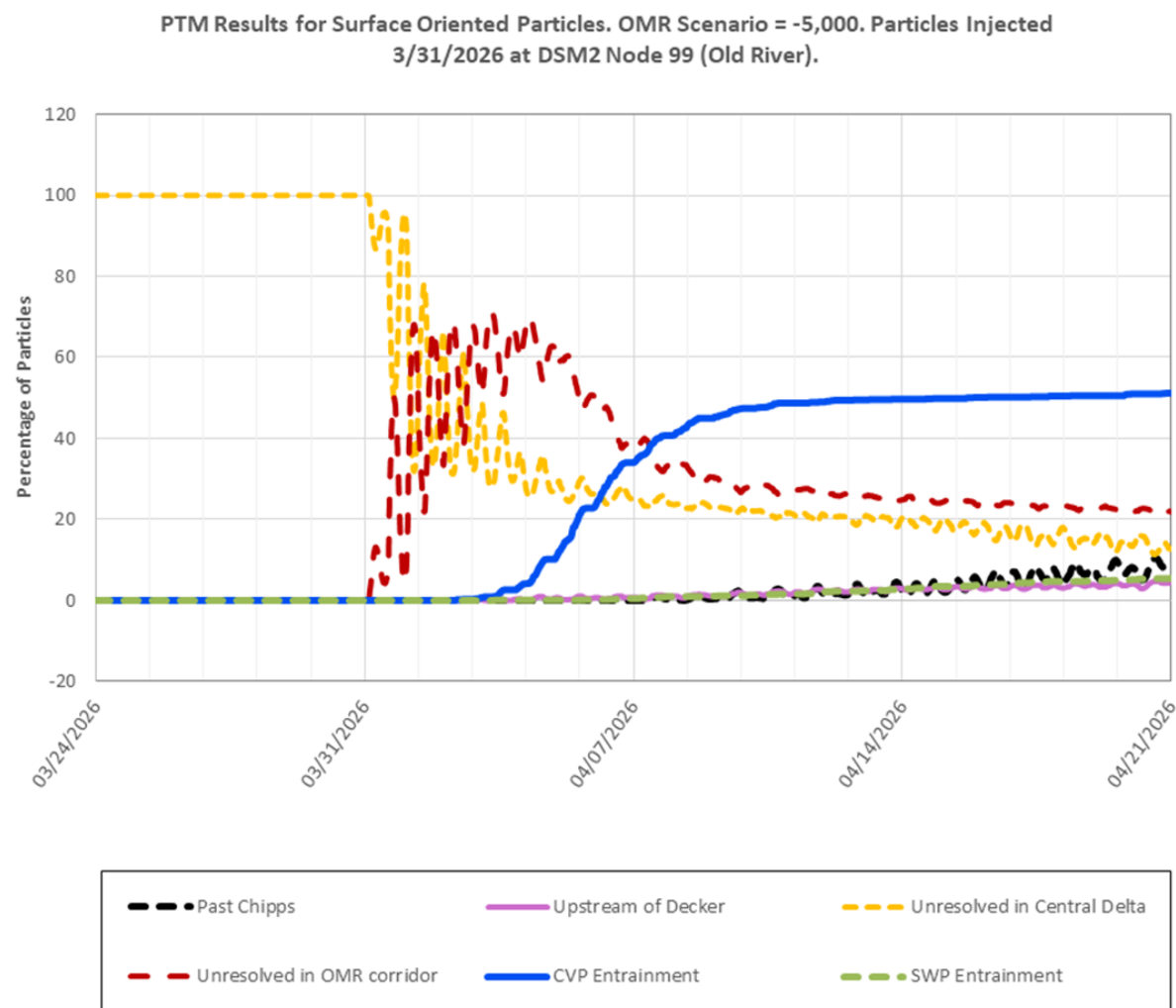


Note: Particles Injected 03/31/2026 at DSM2 Node 99 (Old River)

Key: cfs = cubic feet per second, OMR = Old and Middle River; PTM = particle tracking model

Figure 37. PTM Results for Surface Oriented Particles – OMR Scenario -6,500 cfs

Attachment B. Delta Real-Time Forecast Summary for 03/31/2026

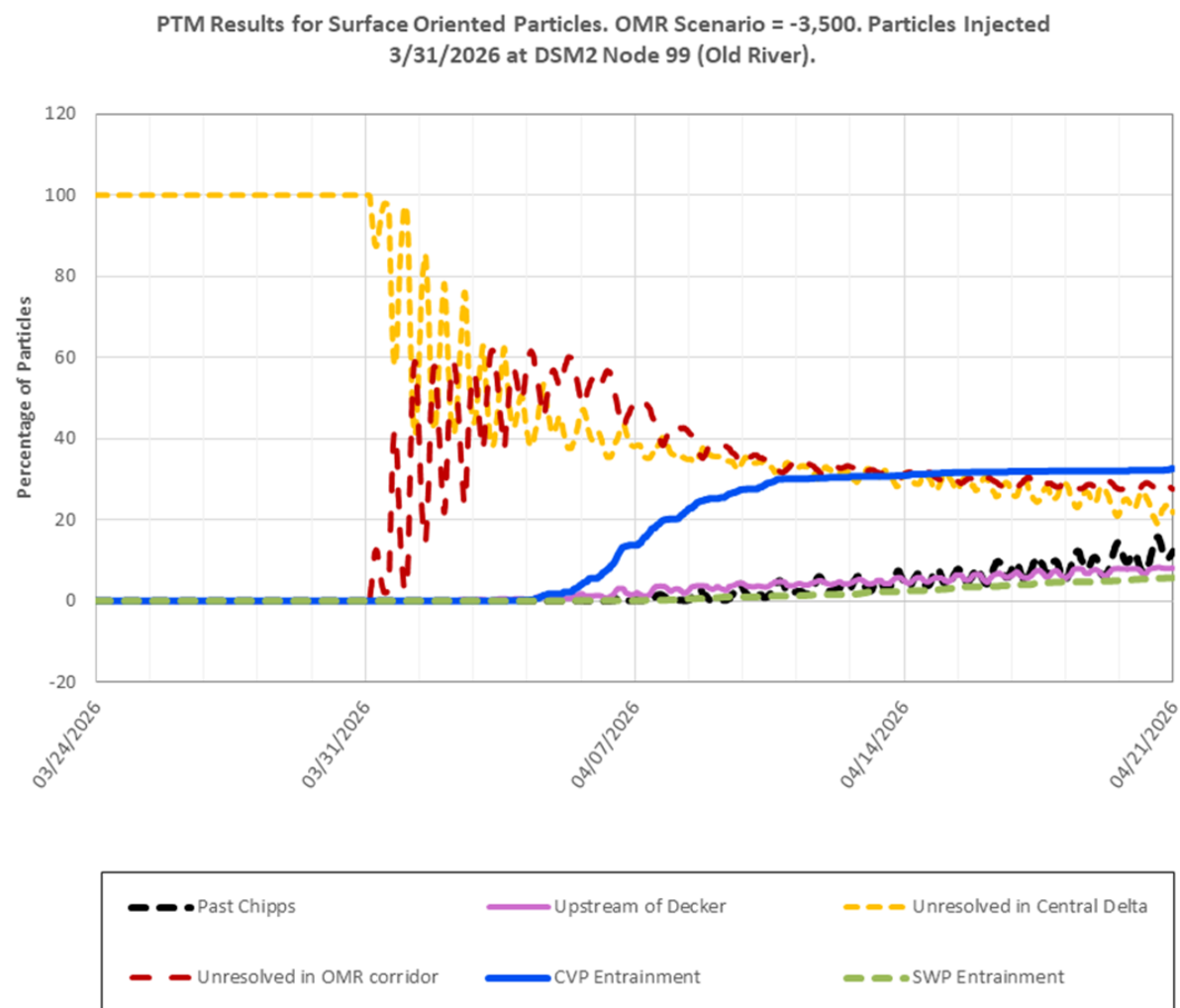


Note: Particles Injected 03/31/2026 at DSM2 Node 99 (Old River)

Key: cfs = cubic feet per second, OMR = Old and Middle River; PTM = particle tracking model

Figure 38. PTM Results for Surface Oriented Particles – OMR Scenario -5,000 cfs

Attachment B. Delta Real-Time Forecast Summary for 03/31/2026

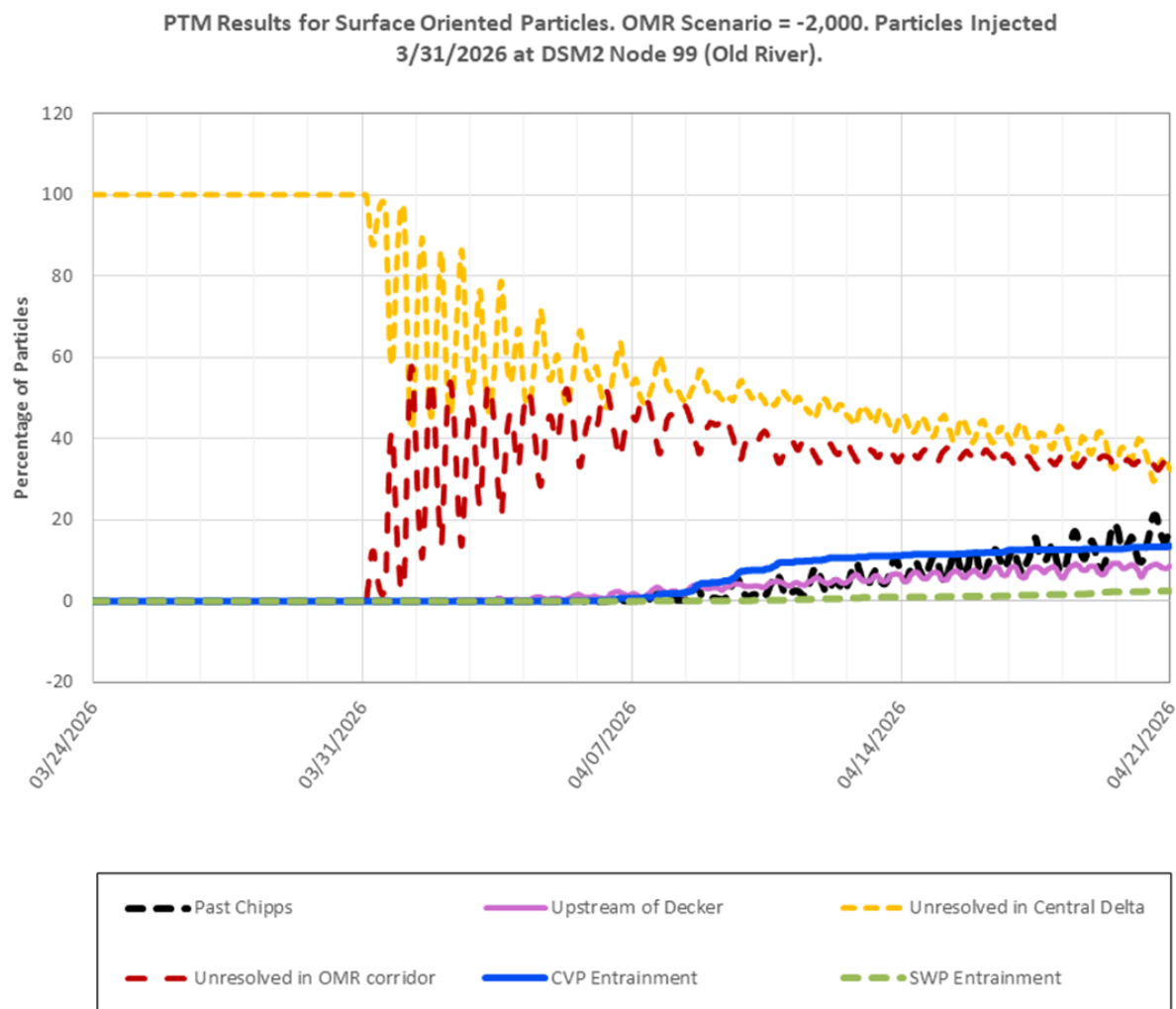


Note: Particles Injected 03/31/2026 at DSM2 Node 99 (Old River)

Key: cfs = cubic feet per second, OMR = Old and Middle River; PTM = particle tracking model

Figure 39. PTM Results for Surface Oriented Particles – OMR Scenario -3,500 cfs

Attachment B. Delta Real-Time Forecast Summary for 03/31/2026



Note: Particles Injected 03/31/2026 at DSM2 Node 99 (Old River)

Key: cfs = cubic feet per second, OMR = Old and Middle River; PTM = particle tracking model

Figure 40. PTM Results for Surface Oriented Particles – OMR Scenario -2,000 cfs

B.5 ECO-PTM (Ecological Particle Tracking Model)

ECO-PTM Results Evaluation Period: 03/31/2026 – 04/20/2026

Particles Injected: 03/31/2026

Injection Location: Sacramento River at Freeport

Table 12. Salmon Particle Route Ratio After 3 Weeks Ending 04/20/2026

OMR Flow Bin (cfs)	Sutter Slough Route	Steamboat Slough Route	Sacramento River (SS) Route	Sacramento River (GEO) Route	Georgiana Slough Route
-6,500	0.10	0.08	0.81	0.75	0.25
-5,000	0.11	0.09	0.81	0.74	0.26
-3,500	0.11	0.08	0.81	0.74	0.26
-2,000	0.10	0.09	0.81	0.75	0.25

Note: Salmon particle route ratio for the Sacramento River (SS) Route reflects particles inserted at Freeport that are not routed through either Sutter Slough or Steamboat Slough. Salmon particle route ratio for the Sacramento River (GEO) Route reflects particles inserted at Freeport that are not routed through either Sutter Slough, Steamboat Slough, Georgiana Slough, or the Delta Cross Channel (when operational).

Key: cfs = cubic feet per second, OMR = Old and Middle River

Table 13. Salmon Particle Route-Specific Survival After 3 Weeks Ending 04/20/2026

OMR Flow Bin (cfs)	Sutter Slough Route	Steamboat Slough Route	Sacramento River Route	Georgiana Slough Route	All Routes Combined
-6,500	32%	45%	36%	16%	32%
-5,000	37%	49%	40%	18%	36%
-3,500	34%	48%	38%	24%	35%
-2,000	36%	48%	40%	20%	36%

Key: cfs = cubic feet per second, OMR = Old and Middle River

B.6 Longfin Smelt Larval Population and PTM Analysis

PTM Results Evaluation Period: 03/31/2026 – 04/20/2026

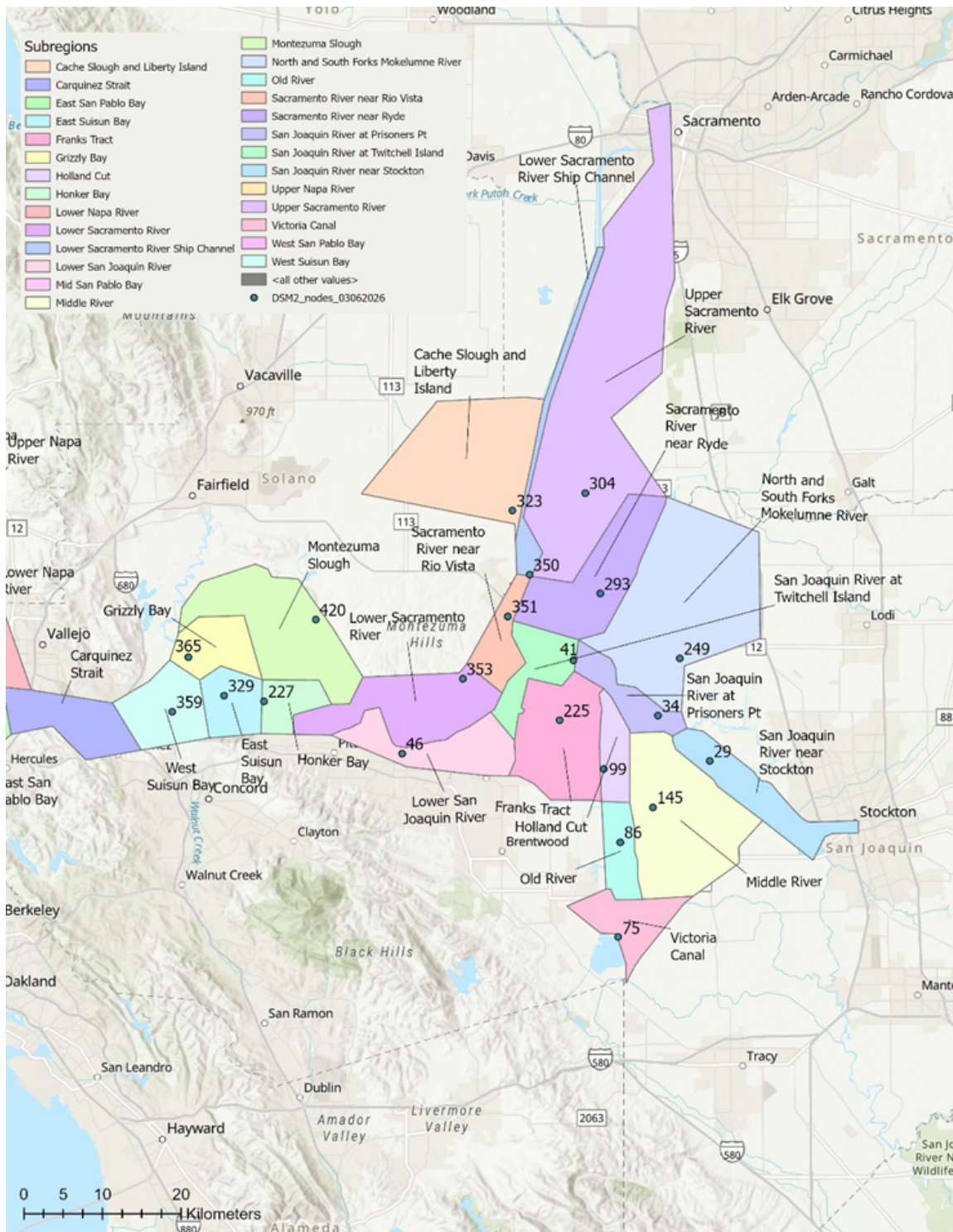
Particles Injected: 03/31/2026

PTM Injection Location: node(s) within each Delta Region identified in map below

PTM Analysis Method: LFS larva abundance is estimated in each Enhanced Delta Smelt Monitoring (EDSM) program subregion. Cumulative particle flux into CVP and SWP facilities is represented in PTM by one injection location per subregion ([Figure 41](#)). LFS larva entrainment is estimated by multiplying the LFS subregion abundance by cumulative particle flux into CVP and SWP facilities from the corresponding subregion injection point. LFS entrainment from each subregion is added together and reported at the LFS Region scale ([Figure 42](#)).



Attachment B. Delta Real-Time Forecast Summary for 03/31/2026



Note: No DSM2 nodes are west of the West Suisun Bay subregion, so the furthest west node in the DSM2 domain is used to represent particle entrainment for all subregions west of West Suisun Bay.

Figure 41. Map of Delta Showing Longfin Smelt Subregions and DSM2 Nodes



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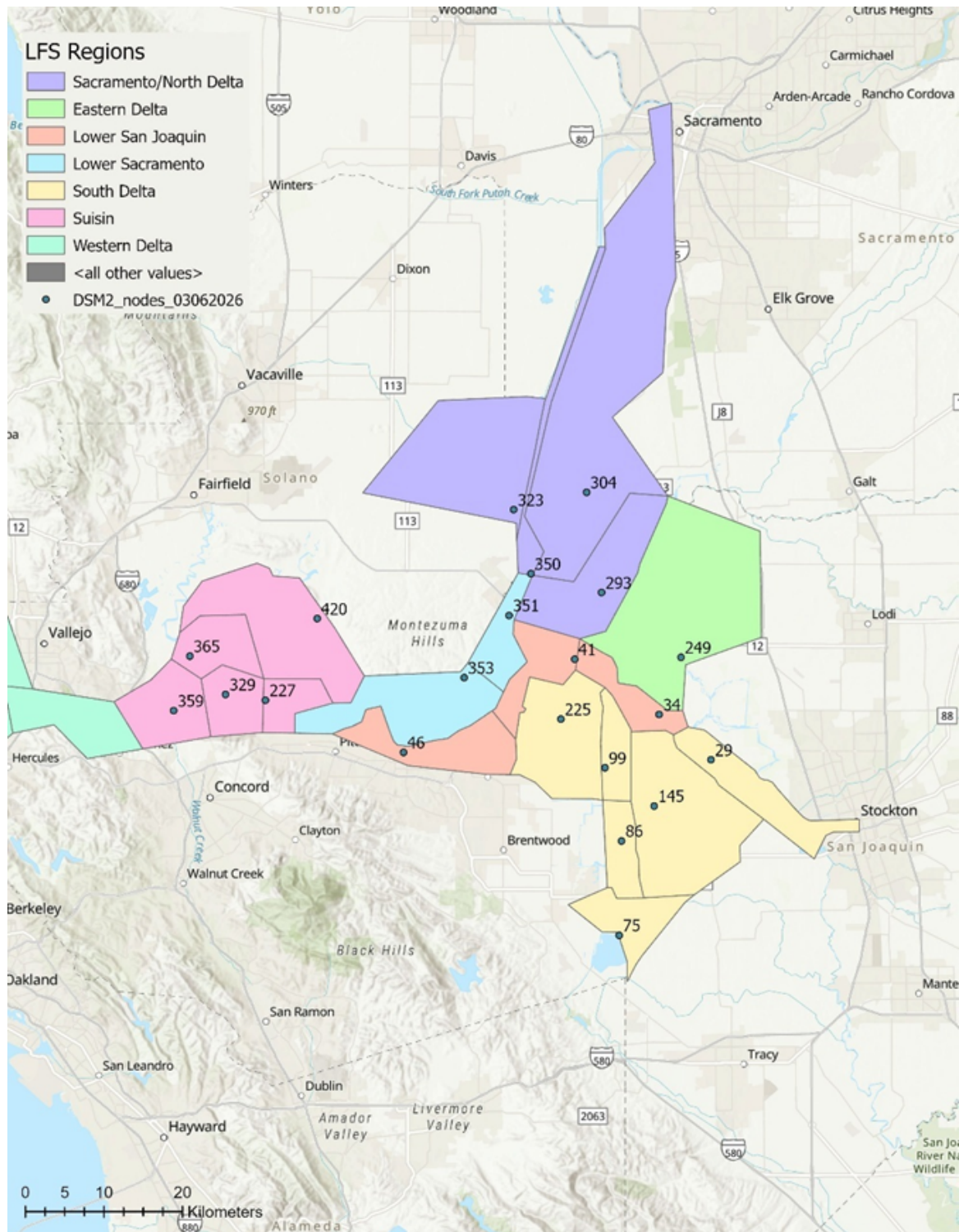


Figure 42. Map of Delta Showing Longfin Smelt Regions and DSM2 Nodes

Attachment B. Delta Real-Time Forecast Summary for 03/31/2026

Regional and Delta-wide longfin smelt (LFS) larval population is estimated using SLS survey data from Survey 6 (3/9/2026 – 3/11/2026) and volumetric expansion methods developed by the Six-Agency Monitoring Survey Design Team. The percent of samples processed as of 3/27/2026 for each survey is shown in [Table 14](#). Results from Survey 6 are used because it has been more than one month since Survey 5 and Survey 6 results are partially processed in Suisun and Western Delta. However, since only partial results are available for Suisun and Western Delta and these regions typically contain a high count of LFS larva, the entrainment analysis may overestimate Delta-wide proportional entrainment.

Table 14. Percent of Smelt Larva Survey Sample Results Processed as of 03/27/2026

SLS Survey Number	Survey Date	Eastern Delta	Lower Sacramento	Lower San Joaquin	Sacramento/ North Delta	South Delta	Suisun	Western Delta
1	12/29/2025	100%	100%	100%	100%	100%	100%	100%
2	1/12/2026	100%	100%	100%	100%	100%	100%	100%
3	1/26/2026	100%	100%	100%	100%	100%	100%	100%
4	2/9/2026	100%	100%	100%	100%	100%	100%	100%
5	2/23/2026	100%	100%	100%	100%	100%	100%	92%
6	3/9/2026	100%	71%	86%	67%	100%	78%	28%

Key: SLS = Smelt Larva Survey

The DSM2 node used as an injection point, EDSM subregion, and LFS Region for reporting are shown in [Table 15](#).

Table 15. DSM2 Injection Node, EDSM Subregion, and LFS Region

DSM2 Injection Node	EDSM Subregion	LFS Region
329	East Suisun Bay	Suisun
365	Grizzly Bay	Suisun
227	Honker Bay	Suisun
420	Montezuma Slough	Suisun
359	West Suisun Bay	Suisun
359	Carquinez Strait	Western Delta
359	Upper Napa River	Western Delta
359	Lower Napa River	Western Delta
359	East San Pablo Bay	Western Delta
359	West San Pablo Bay	Western Delta
359	Mid San Pablo Bay	Western Delta
353	Lower Sacramento River	Lower Sacramento
351	Sacramento River near Rio Vista	Lower Sacramento
350	Lower Sacramento River Ship Channel	Sacramento/ North Delta
293	Sacramento River near Ryde	Sacramento/ North Delta
323	Cache Slough and Liberty Island	Sacramento/ North Delta
304	Upper Sacramento River	Sacramento/ North Delta
249	North and South Forks Mokelumne River	East
46	Lower San Joaquin River	Lower San Joaquin
41	San Joaquin River at Twitchell Island	Lower San Joaquin
34	San Joaquin River at Prisoners Point	Lower San Joaquin

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DSM2 Injection Node	EDSM Subregion	LFS Region
225	Franks Tract	South Delta
99	Holland Cut	South Delta
86	Old River	South Delta
29	San Joaquin River near Stockton	South Delta
145	Middle River	South Delta
75	Victoria Canal	South Delta

Key:

EDSM = Enhanced Delta Smelt Monitoring

LFS = longfin smelt

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Table 16. LFS Entrainment Estimate Using PTM with Surface Oriented Particles: Week 1 Ending 04/06/2026

OMR (cfs)	Combined Exports (cfs)	Region	West	Suisun	Sacra- mento/ North Delta	Lower San Joaquin	Lower Sacra- mento	South Delta	East	Delta-wide Total (#)	Delta- wide Total (%)
		Metric									
		LFS Larva Abundance (Survey 5: 2/23/2026)	2,568,108	14,411,532	304,865	3,100,001	1,410,811	0	0	21,795,317	-
-6,500	5,209	PTM Entrained (%)	0.0	0.0	0.0	<0.1	0.0	0.0	0.0	-	-
-5,000	4,379	PTM Entrained (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	-
-3,500	3,449	PTM Entrained (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	-
-2,000	2,647	PTM Entrained (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	-
-6,500	5,209	LFS Larva Entrained (#)	0	0	0	434	0	0	0	434	<0.1%
-5,000	4,379	LFS Larva Entrained (#)	0	0	0	0	0	0	0	0	0.0%
-3,500	3,449	LFS Larva Entrained (#)	0	0	0	0	0	0	0	0	0.0%
-2,000	2,647	LFS Larva Entrained (#)	0	0	0	0	0	0	0	0	0.0%

Notes:

Values between 0.0 and 0.1 are indicated with <0.1

The PTM entrained (%) value reflects the total entrained particles from all subregions within an LFS Region divided by the estimated LFS Region abundance.

Key:

cfs = cubic feet per second

LFS = longfin Smelt

OMR = Old and Middle River

Attachment B. Delta Real-Time Forecast Summary for 03/31/2026

Table 17. LFS Entrainment Estimate Using PTM with Surface Oriented Particles: Week 2 Ending 03/15/2026

OMR (cfs)	Combined Exports (cfs)	Region	West	Suisun	Sacramento/ North Delta	Lower San Joaquin	Lower Sacramento	South Delta	East	Delta-wide Total (#)	Delta-wide Total (%)
		Metric									
		LFS Larva Abundance (Survey 5: 2/23/2026)	2,568,108	14,411,532	304,865	3,100,001	1,410,811	0	0	21,795,317	-
-6,500	3,392	PTM Entrained (%)	0.0	0.0	0.4	0.9	0.1	0.0	0.0	-	-
-5,000	2,991	PTM Entrained (%)	0.0	0.0	0.1	0.3	0.0	0.0	0.0	-	-
-3,500	2,533	PTM Entrained (%)	0.0	0.0	0.0	0.2	0.0	0.0	0.0	-	-
-2,000	2,018	PTM Entrained (%)	0.0	0.0	0.0	<0.1	0.0	0.0	0.0	-	-
-6,500	3,392	LFS Larva Entrained (#)	0	0	1,219	26,593	1,411	0	0	29,223	0.1%
-5,000	2,991	LFS Larva Entrained (#)	0	0	305	9,096	0	0	0	9,401	<0.1%
-3,500	2,533	LFS Larva Entrained (#)	0	0	0	6,983	0	0	0	6,983	<0.1%
-2,000	2,018	LFS Larva Entrained (#)	0	0	0	217	0	0	0	217	<0.1%

Notes:

Values between 0.0 and 0.1 are indicated with <0.1

The PTM entrained (%) value reflects the total entrained particles from all subregions within an LFS Region divided by the estimated LFS Region abundance.

Key:

cfs = cubic feet per second

LFS = longfin Smelt

OMR = Old and Middle River

Attachment B. Delta Real-Time Forecast Summary for 03/31/2026

Table 18. LFS Entrainment Estimate Using PTM with Surface Oriented Particles: Week 3 Ending 03/22/2026

OMR (cfs)	Combined Exports (cfs)	Region	West	Suisun	Sacra- mento/ North Delta	Lower San Joaquin	Lower Sacra- mento	South Delta	East	Delta-wide Total (#)	Delta- wide Total (%)
		Metric									
		LFS Larva Abundance (Survey 5: 2/23/2026)	2,568,108	14,411,532	304,865	3,100,001	1,410,811	0	0	21,795,317	-
-6,500	1,503	PTM Entrained (%)	0.0	0.0	0.4	1.1	0.1	0.0	0.0	-	-
-5,000	1,503	PTM Entrained (%)	0.0	0.0	0.2	0.5	0.0	0.0	0.0	-	-
-3,500	1,503	PTM Entrained (%)	0.0	0.0	0.0	0.3	0.0	0.0	0.0	-	-
-2,000	1,503	PTM Entrained (%)	0.0	0.0	0.0	<0.1	0.0	0.0	0.0	-	-
-6,500	1,503	LFS Larva Entrained (#)	0	0	1,219	35,031	1,411	0	0	37,662	0.2%
-5,000	1,503	LFS Larva Entrained (#)	0	0	610	15,162	0	0	0	15,771	<0.1%
-3,500	1,503	LFS Larva Entrained (#)	0	0	0	10,223	0	0	0	10,223	<0.1%
-2,000	1,503	LFS Larva Entrained (#)	0	0	0	867	0	0	0	867	<0.1%

Notes:

Values between 0.0 and 0.1 are indicated with <0.1

The PTM entrained (%) value reflects the total entrained particles from all subregions within an LFS Region divided by the estimated LFS Region abundance.

Key:

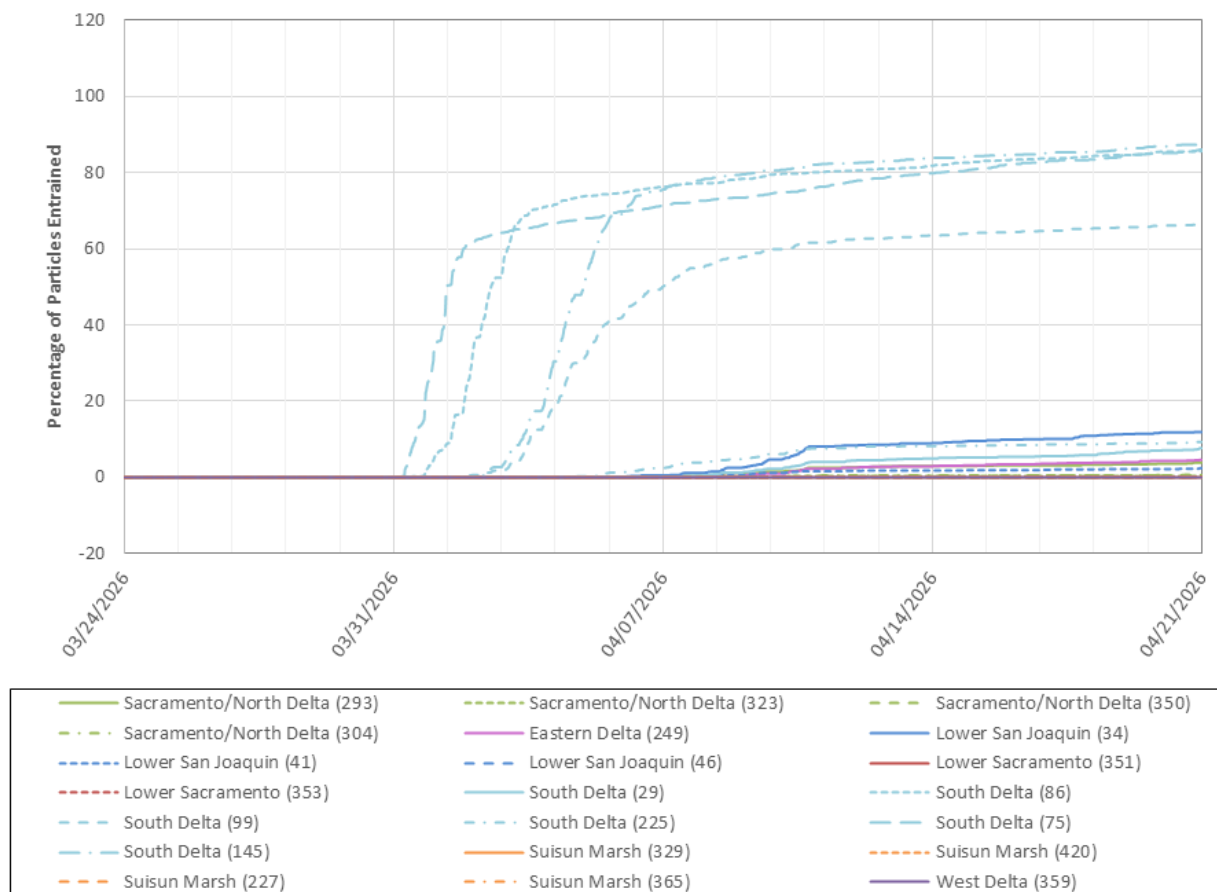
cfs = cubic feet per second

LFS = longfin Smelt

OMR = Old and Middle River

Attachment B. Delta Real-Time Forecast Summary for 03/31/2026

Average PTM Results by Injection Region for Position Oriented Particles Entrained at CVP and SWP. OMR Scenario = -6,500. Particles Injected 3/31/2026.



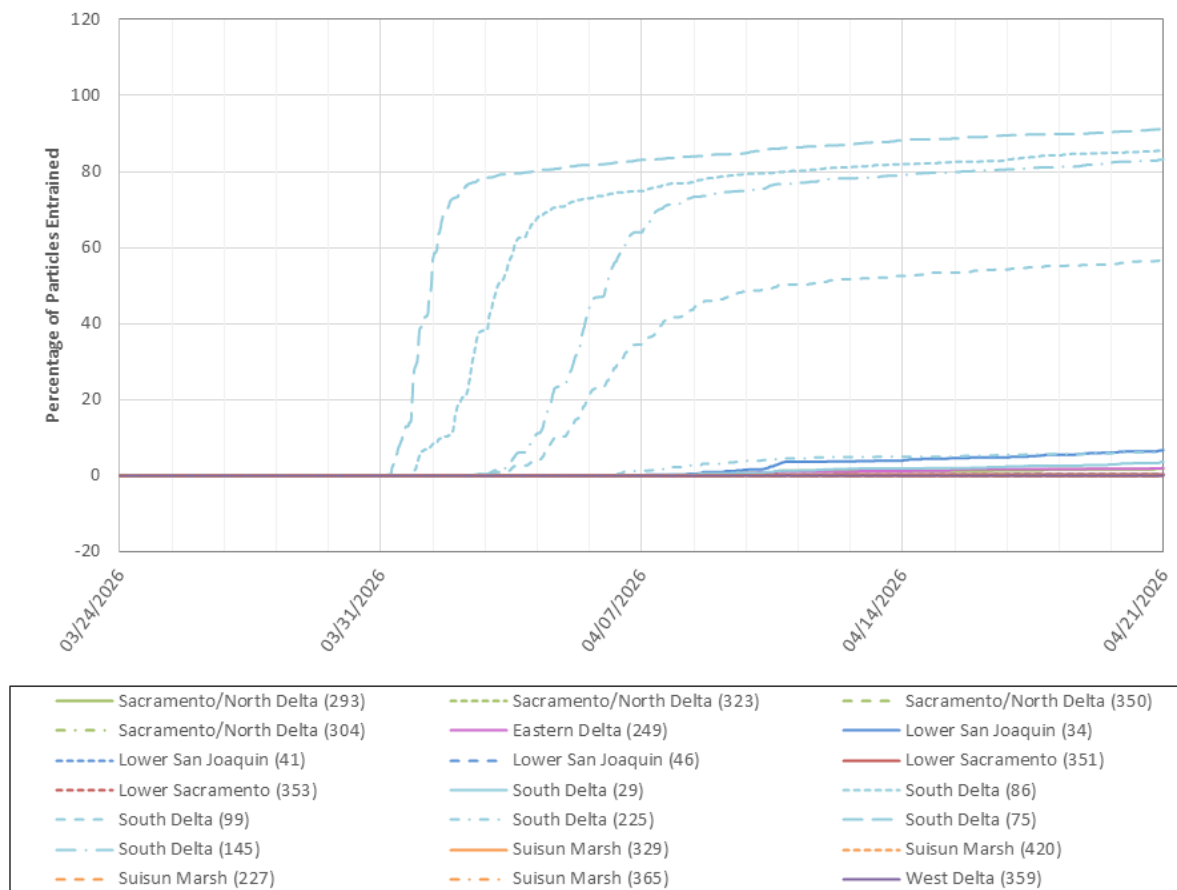
Note: Particles Injected 03/31/2026

Key: cfs = cubic feet per second, OMR = Old and Middle River; PTM = particle tracking model

Figure 43. Average PTM Results by Injection Region for Position Oriented Particles Entrained at CVP and SWP – OMR Scenario -6,500 cfs

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Average PTM Results by Injection Region for Position Oriented Particles Entrained at CVP and SWP. OMR Scenario = -5,000. Particles Injected 3/31/2026.



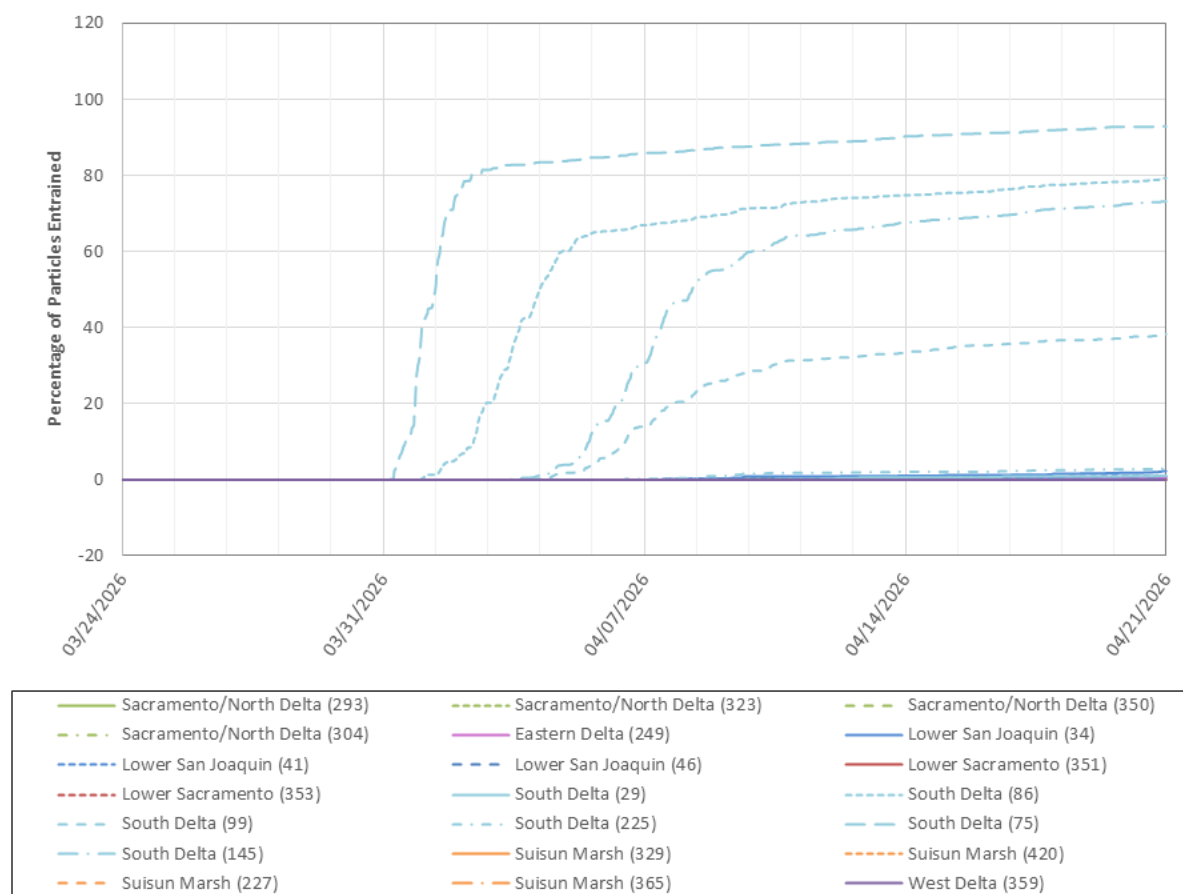
Note: Particles Injected 03/31/2026

Key: cfs = cubic feet per second, OMR = Old and Middle River; PTM = particle tracking model

Figure 44. Average PTM Results by Injection Region for Position Oriented Particles Entrained at CVP and SWP – OMR Scenario -5,000 cfs

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Average PTM Results by Injection Region for Position Oriented Particles Entrained at CVP and SWP. OMR Scenario = -3,500. Particles Injected 3/31/2026.

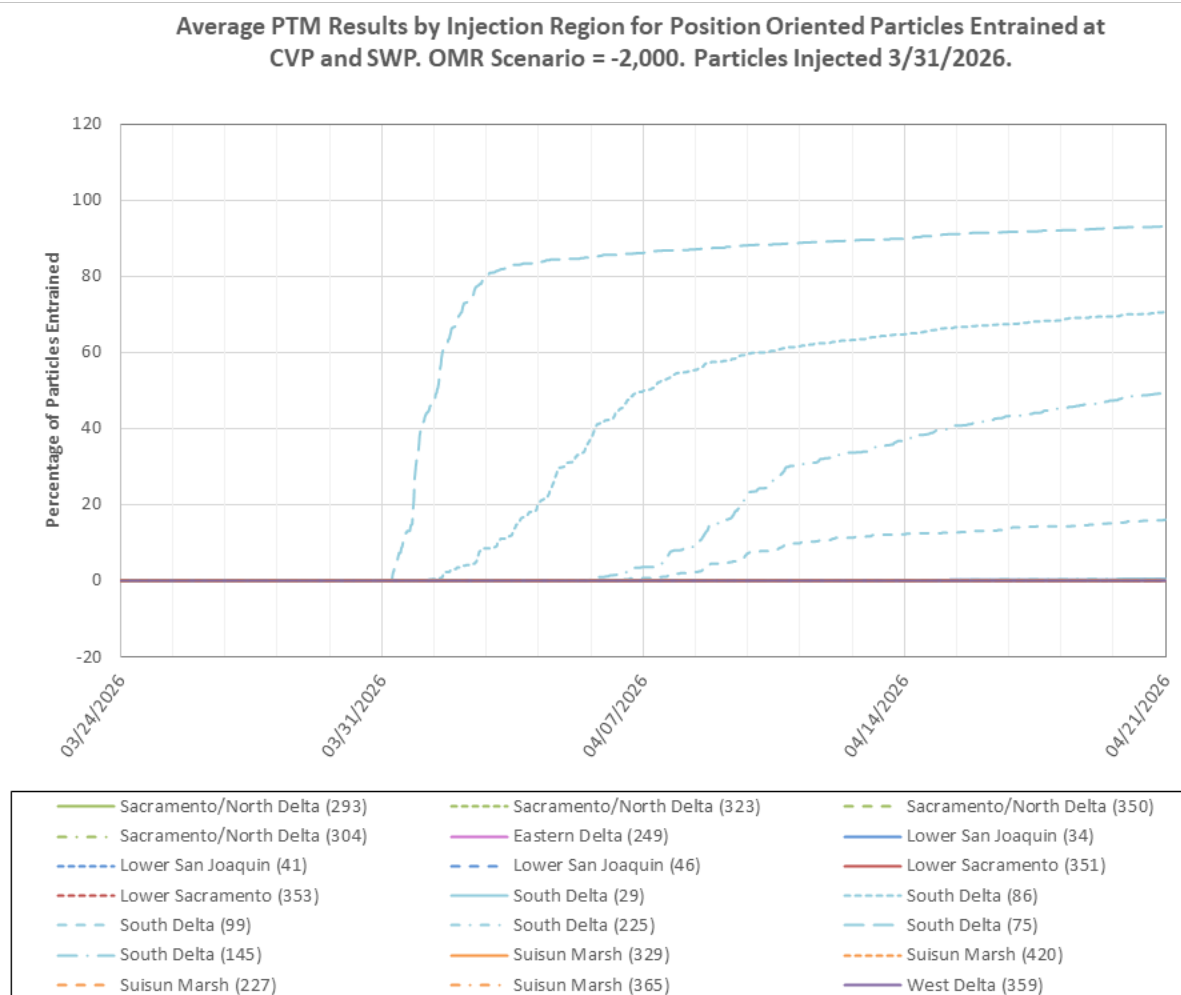


Note: Particles Injected 03/31/2026

Key: cfs = cubic feet per second, OMR = Old and Middle River; PTM = particle tracking model

Figure 45. Average PTM Results by Injection Region for Position Oriented Particles Entrained at CVP and SWP – OMR Scenario -3,500 cfs

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Note: Particles Injected 03/31/2026

Key: cfs = cubic feet per second, OMR = Old and Middle River; PTM = particle tracking model

Figure 46. Average PTM Results by Injection Region for Position Oriented Particles Entrained at CVP and SWP – OMR Scenario -2,000 cfs