

## **Water Unavailability Methodology for the Delta Watershed: Possible Legal Delta Supply Adjustments**

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This document describes how the [Water Unavailability Methodology for the Sacramento-San Joaquin Delta \(Delta\) Watershed](#) (Methodology) currently evaluates water unavailability within the Legal Delta and identifies a conservative adjustment to address comments received on the Methodology that additional water supplies should be assumed to be available to Legal Delta users due to the unique characteristics of the Legal Delta. This document also discusses the implications of this adjustment for water right curtailments throughout the watershed.

### **Current Legal Delta Assumptions**

At present, the Methodology analyzes water unavailability in the Legal Delta by comparing the demands of water rights and claims located within it to natural and abandoned flow supplies from upstream tributaries. Legal Delta demands are only curtailed based on the watershed-scale analysis that includes all upstream tributaries, not individual headwater subwatershed-scale analyses. Water unavailability analyses require the selection of a timestep over which water supply is compared to anticipated demands, and the curtailment of any rights or claims in the Legal Delta is only based on unavailability analyses over periods of at least one month. However, periods less than a month may be considered for the purpose of suspending curtailments in the Legal Delta.

In the Methodology's water unavailability analyses, the supply needed to meet the demand of a given water right or claim in the Legal Delta is assumed to be distributed among any upstream tributaries which have available supply at its priority of right. Consistent with the analysis contained in State Water Board Order WR 89-8, claims of riparian-only rights are distributed only among upstream tributaries in the watershed where they are located (Sacramento River tributaries in the North Delta and San Joaquin River tributaries in the Central, Western, and South Delta). Claims of 'riparian or pre-1914' appropriative rights, as well as all post-1914 appropriative rights issued by the State Water Board, in the Legal Delta are assumed to have access to all upstream tributaries in both the Sacramento and San Joaquin River watersheds. A right or claim in the Legal Delta is curtailed when the unavailability analysis indicates that there is zero supply available at its priority of right from all tributaries that it has access to. Because the Methodology does not currently determine correlative curtailments, riparian claims of right in the Legal Delta would only be curtailed when there is zero total supply from all upstream tributaries (i.e., all are dry).

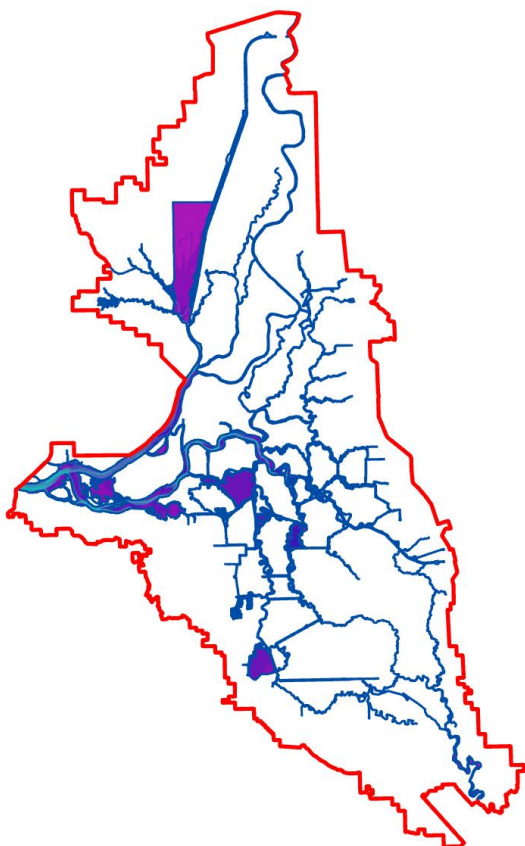
The Methodology's approach to evaluating water unavailability does not currently include specific assumptions related to the Legal Delta other than the use of a monthly timestep. The Methodology does not currently assume that there is an additional supply of water in Delta channels that may be available to Legal Delta diverters in addition to upstream tributary flows, or other assumptions specific to the Legal Delta.

### **Proposed Delta Supply Adjustments**

To address comments received that water contained in channels within the Legal Delta could provide prolonged water supply in the Legal Delta, State Water Board staff propose to modify the Methodology to include an additional supply source that represents the amount of fresh water "stored" in the channels of the Legal Delta at the beginning of the dry season. This

additional source of supply would only be available to users diverting within the Legal Delta and would be considered available to them when the Methodology indicates that water is otherwise unavailable to any rights or claims based on the watershed-scale unavailability analysis. The water stored in Delta channels would be considered a supply source alongside other upstream tributaries, and it would be depleted through the dry season if water continues to be unavailable at the watershed scale. Replenishment of the water stored in Delta channels would only be considered to occur when the Methodology determines that no curtailments are necessary in the Legal Delta. These proposed Delta supply modifications would not otherwise change the ways in which water unavailability is analyzed in the Delta watershed.

The volume of water considered to be stored in Delta channels would be 893,919 acre-feet (AF), which represents the total volume of water in Legal Delta channels below the mean sea level at San Francisco (0.97 meters). This volume is analogous to the amount of water which would remain in channels and other currently flooded areas below mean tidal levels within the boundaries of the Legal Delta if all upstream inflows ceased and conditions stabilized. Estimates of this volume were provided by the California Department of Water Resources' Delta Modeling Section, computed using the [Bay-Delta SCHISM model](#) and analysis grid consisting of [processed bathymetry data](#) defining the geometry of Delta channels. Figure 1 shows the Legal Delta boundary and the Delta channels that are part of the SCHISM grid; all wetted areas of the grid are shown, so Figure 1 may include some channels which would be dry with a water surface elevation of 0.97 meters.



*Figure 1. Legal Delta boundary (orange) and channels within it in the Bay-Delta SCHISM grid (shaded blue and purple based on depth).*

The water stored in Delta channels would be made available beginning with the first analysis timestep in the water year when the Methodology indicates that water is unavailable to any rights or claims in the watershed-scale analysis (i.e., not including unavailability in the headwater-scale analyses) without the water in the channels. Even if the water right or claim facing unavailability is not located in the Legal Delta, it is appropriate to initiate the additional source of supply at this time because unavailability to any right or claim in the watershed is caused in part by the demands of senior riparian claims in the Legal Delta. As described above, the starting volume of the additional supply would be the volume of Delta channels below an elevation of 0.97 meters: 893,919 AF.

Though unavailability analyses are run on a weekly or more frequent basis in order to consider up-to-date observations and forecasts of water supply, the same starting volume would be used as long as these analyses have the same analysis period (typically a single discrete month, e.g., March 2023). The demands of each Legal Delta claim or right will be distributed to the water stored in Delta channels as a source of supply. The additional supply volume may be depleted down to a volume of zero by these demands. If the additional supply is not depleted within the first analysis timestep, its remaining balance after analyzing water unavailability to the most junior Legal Delta right would be carried over as the starting volume for the next timestep (typically the next discrete month, e.g., April 2023). Credits to the volume of additional supply would only be considered when all curtailments in the Legal Delta have been suspended. Because freshwater added to the Delta supply balance must originate from the Sacramento or San Joaquin River watersheds, it would be inappropriate to credit the balance of water in these channels if curtailments are in-place based on a lack of water supply from these sources.

The water stored in Delta channels would be considered as a supply source alongside all other upstream tributaries, with demands of each right or claim in the Legal Delta distributed among each upstream tributary and the Delta channels in proportion to the supply available at its priority from each. This reflects the physical reality that Delta users are unable to determine the origin of the water they divert from Delta channels. The assumption that the water stored in Delta channels would not be the first source from which any Legal Delta demand would be met would decrease the likelihood that the additional source of supply would be depleted within the first analysis timestep. Conversely, the additional source of supply is not proposed to be the last source used by Legal Delta diversions only when no water is available from upstream tributaries, as this could cause curtailment of upstream water rights even when senior Legal Delta users may have access to the additional supply.

### **Comparison of Approaches**

The addition of the freshwater present in Delta channels at the outset of the dry season specifically addresses comments received on the Methodology, namely that it does not account for freshwater supplies present in the channels of the Legal Delta. The proposed adjustment to the Methodology would provide an additional source of water that decreases the likelihood that senior rights and claims in the Legal Delta will face water unavailability, leaving additional supply available to junior users both upstream and in the Legal Delta.

Because the proposed adjustment would add to the water supply assumed to be available, its implementation would result in fewer curtailments across the watershed compared to the Methodology's current analysis. This is particularly true in the spring and summer, when natural and abandoned flow supplies decrease but direct diversion demands remain high.

Nevertheless, it is possible that the additional source of supply would be depleted during the water year, and the curtailment of rights and claims in the Legal Delta would be warranted when remaining fresh water supplies are insufficient to meet all demands in the watershed. Dry fall and early winter conditions may make this situation more likely, as initial drawdown of the additional source of supply earlier in the water year could result in depletion of that supply through the winter and spring. Conversely, a wetter winter may cause initial drawdown of the additional source of supply to begin later in the year and prolong the availability of this supply into the summer.

### **Conclusion**

The addition of water present in Delta channels is a conservative adjustment in favor of fewer curtailments since it would assume that the water present within the channels at the beginning of the dry season will remain of adequate quality for beneficial uses throughout the course of the dry season without freshwater supplementation from other sources. In reality, as this supply is withdrawn, and in the absence of natural inflows, abandoned flows, or State Water Project and Central Valley Project storage releases, Delta channels would be refilled with brackish water from Suisun Bay that would eventually degrade water quality. This could result in the quality of water in the Delta channels degrading below levels required for beneficial uses even before the volume of freshwater present at the beginning of the dry period is fully depleted. The proposed adjustment to the Methodology would serve to delay curtailments in the Legal Delta, but once the additional supply is depleted after an extended dry period, curtailments would be unaffected compared to the Methodology's current approach.