

Possible Curtailment Method Based on a Water Right Term 91 Type Approach

1 Background and Introduction

California and the Sacramento-San Joaquin Delta (Delta) watershed have experienced extremely dry conditions over the last two years. Statewide, water years 2020 and 2021 were the driest two-year period on record resulting in very low runoff. These low runoff conditions resulted in very low inflows to reservoirs and associated limited reservoir storage supplies for various purposes. Currently, reservoir storage levels in the Delta watershed are significantly below average despite early season precipitation and will remain so until significant additional precipitation returns.

On May 10, 2021, as a result of the dry conditions, Governor Newsom issued a drought emergency proclamation covering 41 of California's 58 counties. On July 8, 2021, the Governor expanded the emergency declaration to 9 additional counties. On October 19, 2021, the Governor further expanded the emergency declaration to cover the entire state.

The May 10 proclamation ordered the State Water Resources Control Board (State Water Board or Board) and other agencies to consider a number of actions to protect water needed for health, safety, and the environment in the Delta watershed. The proclamation specifically directed the State Water Board to consider emergency regulations to curtail water diversions when water is not available at water right holders' priority of right or to protect releases of previously stored water.

On August 3, 2021, the State Water Board approved an [emergency curtailment and reporting regulation for the Delta Watershed](#) that authorizes the use of the [Water Unavailability Methodology for the Delta Watershed](#) to determine when curtailments of water rights should occur using available supply and water right demand data. The regulation was approved by the Office of Administrative Law on August 19, 2021, and curtailment and reporting orders were issued on August 20, 2021. The current regulation will be effective for up to one year from the effective date, and may be renewed (relying on the existing Water Unavailability Methodology), amended to authorize use of an alternate methodology for determining water unavailability, or repealed.

As part of the [August 3 State Water Board resolution](#) approving the regulation, the Board directed staff to engage with stakeholders prior to the end of 2021 to identify and explore possible approaches other than the current Water Unavailability Methodology and associated regulation that could be developed and implemented to address severe

water supply shortages and related concerns, including reservoir storage, minimum health and safety supplies, and maintaining salinity control in the Delta. The Board resolution specifically references evaluation of a curtailment methodology similar to the standard water right Term 91 (Term 91) curtailment methodology that is currently included in more junior appropriative water right permits and licenses in the Delta Watershed (with a priority date of approximately 1965 or later).

Pursuant to this direction, on November 18, 2021, State Water Board staff issued notice of a staff technical workshop on December 15, 2021. The notice identifies the following topics for discussion:

1. The possible development and implementation of Term 91 like curtailment methods to address water supply shortages in the Delta watershed during this drought.
2. Other near-term possible curtailment methods or other actions that should be considered if conditions remain dry.
3. Possible methods for determining shortages to riparian water right claimants in the event that natural supplies are inadequate to meet all riparian demands and correlative sharing of available supplies should occur.

This document provides additional technical information in order to inform discussion of a possible Term 91 type curtailment method. Information received during the staff workshop will inform what, if any, additional actions the State Water Board may want to consider to address water supply shortages in the future. Any such actions would be specifically identified and subject to additional public review and comment. No formal action or recommendation is under consideration at this time.

2 Existing Term 91

Currently, pursuant to State Water Board Decision 1641 (D-1641), the California Department of Water Resources' (DWR) water rights for the State Water Project (SWP) and the United States Bureau of Reclamation's (Reclamation) water rights for the Central Valley Project (CVP) (collectively Projects) are conditioned on meeting Delta flow-dependent water quality objectives included in the Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary (Bay-Delta Plan). In order to meet the flow and water quality objectives, DWR and Reclamation are required to bypass flows and release previously stored water at times. Diversions by other water users in the Delta Watershed when natural and abandoned flows are not adequate to meet Delta flow and water quality requirements and demands by other water users results in the need for the Projects to release previously stored water in order to meet water quality requirements. During drought conditions, these quantities of water can be very significant and deplete reservoir storage supplies needed for multiple purposes, including meeting water quality and temperature requirements later in the year and going into the next year.

To protect previously stored Project water and to prevent water users from diverting natural flows contributing to Delta flow and water quality requirements, the State Water Board has included provisions for curtailing the most junior water diverters in the Delta watershed by including Term 91 in these users' permits and licenses. Term 91 specifically allows for the Board to curtail water rights subject to this term in their rights when the Projects are required to release previously stored water to meet Delta flow and water quality requirements and other inbasin (within the Delta watershed) non-Project demands, referred to as supplemental Project water or SPW. The term effectively prevents Term 91 water right holders from diverting water that is released from storage by the Projects and also makes users who are subject to the term partially responsible for bypassing natural and abandoned flows needed to meet Delta flow dependent water quality objectives.

Term 91 specifically states:

No diversion is authorized by this permit/license when satisfaction of inbasin entitlements requires release of supplemental Project water by the Central Valley Project or the State Water Project.

A. Inbasin entitlements are defined as all rights to divert water from streams tributary to the Sacramento-San Joaquin Delta or the Delta for use within the respective basins of origin or the Legal Delta, unavoidable natural requirements for riparian habitat and conveyance losses, and flows required by the State Water Board for maintenance of water quality and fish and wildlife. Export diversions and Project carriage water are specifically excluded from the definition of inbasin entitlements.

B. Supplemental Project water is defined as water imported to the basin by the projects, and water released from Project storage, which is in excess of export diversions, Project carriage water, and Project inbasin deliveries.

Currently, Term 91 is included in 115 water right permits and licenses issued since approximately 1965 that divert water at a rate greater than one cubic-foot per second and/or collect more than 100 acre-feet of water to storage within the Delta Watershed where hydraulic continuity with the Delta exists or is likely to exist.¹ Term 91 is generally invoked in all but the wettest years. In most water years that Term 91 has gone into effect, curtailments have begun in the late spring to early summer when natural flow from spring runoff is no longer sufficient to meet inbasin uses and Delta flow and water quality requirements, and Term 91 curtailments have been lifted in the late fall to early winter when demands for water are more limited and precipitation events return.

¹ Diversions from Cache Creek, Putah Creek, and Stony Creek are currently excluded from Term 91 due to this provision.

However, Term 91 curtailments may occur at any time of the year if the triggers for Term 91 curtailments occur.

2.1 Components of the Current Term 91 Calculation

The following sections describe the major components of the existing Term 91 calculation. The existing Term 91 calculation assumes that exports by the SWP and the CVP have a lower priority than other water rights for use within the Delta watershed regardless of priority date due to the watershed protection statutes that effectively convey a higher priority right to inbasin diversion of water over exports. (State Water Board Decision 1594, pp. 14, 40-46.) Exports are assumed to include both direct diversion exports from the Delta at the SWP and CVP pumping facilities and diversions to storage at the reservoirs that subsequently release water for diversion at the export pumps. Therefore, both direct diversions at the export pumps and diversions to storage in a reservoir that provides water to the export pumps are treated in the Term 91 calculations as having a priority junior to all other diversions in the basin. This lower priority extends only to the diversion of natural and abandoned flow in the system. This lower priority does not apply to SWP and CVP redirection of storage releases or imports into the basin that other water right holders do not have a right to. Consequently, the SWP and the CVP must bypass all of the inflow to their reservoirs before any other party is required to curtail diversion under Term 91.

As described above, the Projects must bypass water and release additional water from storage to the extent necessary to meet D-1641 flow and water quality requirements. The amount of water the Projects are importing or releasing from storage in excess of Project deliveries, including carriage water, is considered supplemental project water or SPW. When SPW is present, or positive, and the Delta is in balanced conditions (described below), Term 91 curtailments are triggered.

The following formula is currently used to calculate SPW:

$$\text{SPW} = \text{SR} - (\text{EX} + \text{CW}) \quad (\text{eq. 1})$$

Where: SPW => Supplemental water, which is the water imported to the basin by the projects and water released from project storage which is in excess of export diversions, project carriage water, and project Inbasin deliveries.

SR => Project storage releases from Shasta, Oroville and Folsom Reservoirs, plus imports from the Trinity River.

EX => Export diversions into the California Aqueduct, the Delta-Mendota Canal, the Contra Costa Canal, and the North Bay Aqueduct.

CW => Carriage water required to repel seawater due to operation

of the export pumps (defined on page 5 of Board [Order 81-15](#)).

This method of calculating SPW was approved by the State Water Board in [Order 81-15](#) and affirmed in [Water Right Decision 1594](#). SPW is calculated daily by Reclamation and posted on [Reclamation's CVP Operations website](#). The current SPW calculation that is applied to more junior appropriative water right holders does not contain a specific provision to account for Project deliveries to contractors within the Delta watershed, referred to as inbasin contractors. In order to extend the Term 91 methodology to more senior water right holders and claimants, an updated SPW calculation that accounts for inbasin Project contract deliveries would be appropriate.

In addition to the presence of SPW, an additional criterion for the imposition of Term 91 curtailments is for the Delta to be in "balanced" conditions. When the Delta watershed is in balanced conditions, upstream releases and natural flows equal the water needed to meet inbasin uses of water, regulatory flow requirements, and Project exports. Term 91 curtailments cannot be triggered when the Delta watershed is in "excess" conditions, defined as times when upstream releases and natural flows exceed the water needed to meet inbasin uses, Delta flow and water quality requirements, and Project exports. This provision effectively prevents Term 91 curtailments when flood control releases are being made, which can yield a positive SPW under the calculation method described above.

3 Extension of a Term 91 Type Curtailment Method

Term 91 is a relatively robust and efficient method for identifying water unavailability in the Delta watershed that has been in use for over 40 years. However, currently Term 91 only applies to a very small number (115) of the roughly 17,000 water rights and claims of right in the Delta watershed, which significantly limits the effectiveness of these curtailments. In order to address water supply shortages during the current drought for other users, a Term 91 type approach could be developed in the short term that is expanded to other more senior water right holders and claimants. The existing Term 91 curtailment methodology would remain in place for users that currently have this term.

Expansion of a Term 91 type approach has been previously evaluated by the State Water Board in the past, including in the [November 1999 Environmental Impact Report \(EIR\) for the implementation of the 1995 Bay-Delta Plan](#) (1999 EIR) and a [2012 report from the Delta Watermaster](#). To address water unavailability during the current drought, this approach could replace the Water Unavailability Methodology that is currently being used to inform curtailment decisions, or could be used in combination with that approach. A Term 91 type approach could also be part of a longer-term

planning and implementation process to address water unavailability. Significant attributes of a Term 91 type approach include the following:

- Term 91 is focused on overall water unavailability at the Delta watershed scale and does not address water unavailability at the sub-watershed scale, which the current Water Unavailability Methodology does.
- In addition to previously stored Project water releases, Term 91 is designed to protect natural flow and abandoned flows from diversions that are needed to meet water quality and flow requirements in order to limit the amount of Project storage needed for this purpose. For curtailment purposes, the current Water Unavailability Methodology effectively assumes that all supplies needed to meet Delta flow and water quality requirements are met by storage releases and not natural and abandoned flows. However, adjustments could be made to the Water Unavailability Methodology to account differently for flows needed to meet water quality and flow objectives.
- SPW calculations for Term 91 are based on real time calculations based largely on measured data, and are not reliant on reported water user demand data, projections of natural flows, or estimates of abandoned and return flows to inform water unavailability. However, reported demand data or some other source of diversion data would still be needed to determine which water rights and claims should be curtailed in accordance with the water right priority system based on the amount of SPW. Effectively, under a Term 91 type curtailment methodology, curtailments would occur incrementally based on water right priority to reduce SPW releases. Table II-5 of the 1999 EIR includes a possible method for grouping post-1914 appropriative water rights by priority for Term 91 type curtailment purposes. This method could be extended to address pre-1914 appropriative and riparian claims and could otherwise be modified as appropriate.

The following sections describe possible methods to develop a Term 91 type curtailment method that could be extended to other more senior water right holders and claimants. Potential approaches have been identified that could utilize a range of possible data inputs. These options center on adding a term to the SPW calculation that would account for deliveries to inbasin Project contractors (referred to as inbasin obligations). To account for the Projects' obligation to serve their inbasin contracts with stored water, another term needs to be added to Equation 1 above to deduct inbasin obligations (IO) from the SPW calculation. The IO term represents total inbasin contract deliveries of stored water to contractors ranging in water right priority from no underlying right (SWP Table A or CVP Service contractors) up to the most senior settlement contractor curtailed at a given time. The subscript, n, denotes that this total varies with the relative seniority of curtailed diverters. Following is an equation that can be used to expand the Term 91 type approach to other more senior water right holders and claimants with a priority date prior to 1965:

$$SPW = SR - (EX + CW + IO_n) \quad (\text{eq. 2})$$

Where (in addition to the terms defined by equation 1 above):

IO_n => Inbasin obligations: Project inbasin contract deliveries of stored water.

The Projects have two general types of inbasin contractors. Service contractors are contractors that do not have their own water rights and settlement type contractors are contractors that hold their own water rights and claims of right that also receive supplemental supplies from the Projects. For contractors with no independent water rights, all deliveries would be part of the inbasin obligation amount. For contractors with their own water rights or claims of right, only deliveries of water under the Projects' water rights (e.g., water released from storage in Project reservoirs) would be part of the inbasin obligation amount. The new term tracks the inbasin obligation (IO) that requires the release of stored water. When direct diversions under the Projects' inbasin rights are curtailed, and as direct diversions of contractors with rights senior to the projects are curtailed, the storage release obligations of the Projects increase to serve these contractors. The increased storage release obligations are Project obligations, not the responsibility of other inbasin users, and therefore should be subtracted from the Projects' storage releases when SPW is calculated.

When SPW as calculated in equation 2 is zero or negative, any Project storage releases are only being used for exports, carriage water associated with exports, and inbasin obligations. When SPW is positive, that means that other diverters in the system are diverting previously stored Project water, or natural and abandoned flows needed to meet Delta water quality requirements and senior inbasin entitlements, indicating a possible need for other water users to be curtailed to a level that eliminates SPW. Below are possible methods for identifying an inbasin obligation factor for a possible expansion of a Term 91 type approach.

3.1 Potential Approaches to Estimate Inbasin Obligation Term

In order to calculate the IO term, daily values are needed for inbasin Project water deliveries to their contractors. CVP Water Service Contractors and SWP Table A contractors do not have an underlying water right associated with their contracts. Therefore, all diversions to these users would be assumed to be an inbasin obligation. For settlement contractors, in order to determine the inbasin obligation that exists associated with these diversions, a method for distinguishing between water diverted under their own rights and claims of right and water diverted under the Projects' rights is needed. The portion diverted under Project rights would be considered part of the Project's inbasin obligations, and the portion diverted under the settlement contractors' own water rights and claims would not be part of the Projects' inbasin obligation. Four possible methods to determine inbasin obligations are listed below. One or a combination of these methods could be used in a Term 91 type approach that applies to water right holders and claimants senior to 1965:

1. Real time data on deliveries of inbasin Project water, including identification of inbasin deliveries of Project water to CVP Service and SWP Table A contractors who do not have their own water rights and deliveries of Project water to settlement contractors with their own rights and claims of right. Currently, this data is not available on a real-time basis for all settlement contractors so one of the methods described below would likely be needed in the short term.
2. Estimations of Project water deliveries based on historical information or other estimation methods. DWR and Reclamation both develop accounting of settlement contractor diversions of Project water after each contract year is complete. Thus, historical data exists that may be used to develop statistical relationships between historical deliveries and flow conditions that may be applied to determine the source of water diverted by certain users. Different estimates could be developed to account for different hydrologic conditions, times of year, and transfer scenarios. In addition, depletions between existing streamflow gages may be used to get a rough estimate of Project deliveries by assigning the total depletions for certain reaches as inbasin obligations. For example, many CVP municipal and industrial deliveries from the American River Watershed occur at Folsom Reservoir or from the Folsom South Canal, these deliveries are available on Reclamation's website.
3. Determination of inbasin obligations to settlement contractors based on curtailment status. As settlement contractors' underlying water rights are curtailed, continued diversions by those users would be considered a Project water delivery and added to the inbasin obligation term. This method would require real-time diversion information from the settlement contractors as well as CVP Service and SWP Table A contractors. The Projects receive projected demand schedules from contractors to inform forecasted operations. These schedules are typically received monthly during the diversion and irrigation season. Actual diversion data from contractors is not reported to the Projects immediately, and is accounted for with some time lag after the delivery. However, the majority of diverters have systems that can report more frequently.
4. Delta outflow could be used as a proxy for inbasin obligations. IO could be estimated as the required Delta outflow based on DWR and Reclamation's existing responsibility for meeting these requirements, along with real-time or estimated deliveries to inbasin SWP Table A and CVP Service contractors. This method could be implemented the most readily, but would over and underestimate inbasin obligations at different times.

4 Conclusion and Next Steps

State Water Board staff will deliver a presentation on this information at the upcoming staff workshop on December 15, 2021, and elicit technical input from public agencies and the interested public to inform possible future development of a Term 91 type curtailment method or other approaches to address water supply shortages in the Delta watershed. Any specific actions that may be considered in the future by the State Water Board will be subject to public notice and additional opportunity for public input prior to consideration by the State Water Board.