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10			BEFORE	ГНЕ
11			CALIFORNIA STATE WATER RES	OURCES CONTROL BOARD
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13	In the	Matter	of the Petition of:	SWRCB/OCC File
14	Byron Recor	-Bethan	ny Irrigation District for on of Adoption of Resolution	PETITION FOR RECONSIDERATION OF RESOLUTION NO 2021-0028
15	No. 2 Curtai	021-002 ilment a	28 to Adopt an Emergency nd Reporting Regulation for the	TO ADOPT AN EMERGENCY CURTAILMENT AND REPORTING
16	Sacran and th	mento-S	San Joaquin Delta (Delta) Watershed Board's Order Imposing Water Right	REGULATION FOR THE
17	Curtai	ilment a	nd Reporting Requirements in the	DELTA (DELTA) WATERSHED AND THE STATE BOARD'S ORDER
18			an Joaquin Dena Watershed	IMPOSING CURTAILMENT
19			I. <u>PETITION FOR RI</u>	ECONSIDERATION
20	(1)	Petitio	oner:	
21		Byron	-Bethany Irrigation District	
22		Byron	, CA 94514	
23	(2)	The s _l	pecific Board actions of which Petition	her requests reconsideration:
24		a.	The State Water Resources Control I	Board's (State Board) Resolution
25			the Sacramento-San Joaquin Delta (I	Delta) Watershed (Resolution); and
26		b.	The State Board's Order Imposing W	Vater Right Curtailment and Reporting
27			Water Right ID S021256 of Byron-B	Bethany Irrigation District (Pre-1914
28			Curtamment Order); and	
	PETITIC REPOR	ON FOR R TING REC	ECONSIDERATION OF RESOLUTION NO. 2021-(GULATION FOR SACRAMENTO-SAN JOAQUIN I	0028 TO ADOPT AN EMERGENCY CURTAILMENT & DELTA (DELTA) WATERSHED 1

	c.	The State Board's Order Imposing Water Right Curtailment and Reporting Requirements in the Sacramento-San Joaquin Delta Watershed in the Matter of Water Right ID A000301 of West Side Irrigation District (Post-1914 Curtailment Order).	
(3)	The da	The dates on which the orders or decisions were made by the State Board:	
	Augus	st 3, 2021, and August 20, 2021.	
(4)	The re	easons the actions were inappropriate or improper:	
	a.	The Water Unavailability Methodology for the Delta Watershed (Methodology), the primary basis for the Resolution, Emergency Curtailment and Reporting Regulation for the Sacramento-San Joaquin Delta Watershed (Emergency Regulation), and Curtailment Orders, is insufficient to support a finding of water unavailability	
		 The Methodology relies upon inaccurate and unanalyzed assumptions for residence time of water in the Delta. 	
		ii. The Methodology relies upon inaccurate demand data, even after revisions were made in response to stakeholder comments.	
		iii. Technical Appendix D: Assessment of the Water Availability Issues Within the Delta, dated August 20, 2021, was provided to the parties after the State Board's action to adopt the Besolution and Emergency	
		Regulation, and contains incorrect assumptions that make it inadequate as a basis for the Curtailment Orders.	
		iv. Other technical assumptions in the Methodology are incorrect.	
	b.	The State Board lacks jurisdiction to issue curtailment orders authorized by the Emergency Regulation to holders of pre-1914 appropriative water rights and riparian rights.	
	C.	The Emergency Regulation and the Curtailment Orders violate the Due Process clause of the California Constitution.	
	d.	The Emergency Regulation and the Curtailment Order improperly rely upon a waste and unreasonable use theory for enforcement of violations.	
	e.	The Emergency Regulation and the Curtailment Orders are unnecessary to protect salinity due to the pending completion of the 2021 Emergency Drought Salinity Barrier.	
(5)	The sp	pecific action which Petitioner requests:	
	Rescission of the Resolution and the Curtailment Orders.		
(6)	A state all inte	ement that copies of the petition and any accompanying materials have been sent to erested parties:	
	Copie the De	s of this Petition and accompanying materials have been sent to the State Board and elta Water Master.	

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MEMORANDUM OF POINTS AND AUTHORITIES IN SUPPORT OF PETITION FOR RECONSIDERATION

Introduction A.

II.

In accordance with Water Code section 1120 et seq., Byron-Bethany Irrigation District 4 (BBID) files this Petition for Reconsideration of the State Board's Resolution adopting the Emergency Regulation and Curtailment Order to BBID (dated August 20, 2021). BBID 6 recognizes the critical drought conditions facing California during the 2021 water year, and the associated serious implications and responsibilities of all water users, along with the State Board, 8 to craft equitable shortage sharing strategies. However, the State Board's actions must be 9 constrained to the limits of established science, its jurisdiction, the Constitution, and California 10 law.

BBID holds a pre-1914 appropriative water right to divert and beneficially use water 12 from watercourses in the Delta. The priority date for BBID's pre-1914 right is May 18, 1914. 13 BBID and The West Side Irrigation District (WSID) consolidated effective as of September 2, 14 2020, upon the San Joaquin County Local Agency Formation Commission's recordation of a 15 Certificate of Completion, and BBID is the successor agency. Through this consolidation, BBID 16 now holds License 1381 to divert water from a point of diversion referred to as Wicklund Cut, 17 located on the Old River, for irrigation, domestic, and municipal and industrial uses, with a 18 19 priority date of April 17, 1916.

On May 10, 2021, Governor Gavin Newsom issued a Proclamation of a State of 20 Emergency due to drought conditions for 41 counties, including the Delta, expanding on his 21 previous proclamation and authorizing the use of emergency regulations to address drought 22 conditions. At about the same time, the State Board issued its Methodology, including a 23 Summary Report, Appendices A-B, and spreadsheet.¹ On June 15, 2021, Erik Ekdahl, the State 24 Board's Deputy Director, Division of Water Rights (Deputy Director), issued a Notice to BBID 25

¹ The State Board subsequently updated the Summary Report on June 15, 2021, July 23, 2021, and August 2021, 27 updated Appendix A on June 15, 2021 and July 23, 2021, updated Appendix B on June 15, 2021, added Appendix C on June 15, 2021, and updated the spreadsheet on June 16, 2021 and July 23, 2021. 28

1	curtailing diversion of water under its and others' post-1914 appropriative water rights with 1915
2	and later priority dates within the Sacramento-San Joaquin River Delta watersheds. A copy of
3	the Notice is attached as Exhibit A. BBID submitted a Petition for Reconsideration challenging
4	the Notice on July 16, 2021 (Petition for Reconsideration of Notice). A copy of the Petition for
5	Reconsideration of Notice is attached as Exhibit B. On July 20, 2021, the State Board issued a
6	Notice of Staff Workshop on Proposed Emergency Curtailment and Reporting Regulation for the
7	Sacramento-San Joaquin Delta Watershed. Subsequently, on July 23, 2021, the State Board
8	issued a Notice of Availability of Draft Emergency Curtailment and Reporting Regulation for
9	the Delta Watershed (Notice of Availability) and a Notice of Water Unavailability for Senior
10	Water Right Claims in the Delta Watershed (Senior Rights Notice). Copies of the Notice of
11	Availability and Senior Rights Notice are attached as Exhibits C and D, respectively. The Draft
12	Emergency Regulation was simultaneously posted on the State Board's website. A copy of the
13	Draft Emergency Regulation is attached as Exhibit E. BBID submitted comments regarding the
14	Draft Emergency Regulation on July 29, 2021 (Comments on Draft Emergency Regulation), a
15	copy of which is attached as Exhibit F. The State Board held a Board Meeting on August 3,
16	2021, during which it adopted the Resolution adopting the Emergency Regulation. A copy of
17	the Emergency Regulation, as adopted, is attached as Exhibit G. A copy of the Resolution, as
18	adopted, is attached as Exhibit H. BBID's expert consultants provided oral testimony during a
19	Staff Workshop on Proposed Emergency Regulation, held on July 27, 2021, and during the
20	August 3, 2021 board meeting. The most recently published iterations of the Methodology
21	Summary Report, Technical Appendix A: Methodology Spreadsheet Description, Technical
22	Appendix B: Demand Data Development Process, and Appendix C: Summary of Public
23	Comments, are attached as Exhibits I through L. The State Board added Appendix D to the
24	Methodology on August 20, 2021, attached as Exhibit M.
25	On August 20, 2021, the State Board issued the Pre-1914 Curtailment Order directing
26	BBID to cease diversion under S021256. A copy of the Pre-1914 Curtailment Order is attached
27	as Exhibit N. On the same date, the State Board issued the Post-1914 Curtailment Order
28	directing West Side Irrigation District, which was consolidated with BBID in 2020, resulting in a

single successor district of BBID, to cease diversion under A000301. A copy of the Post-1914
 Curtailment Order is attached as Exhibit O.

B. Standard of Review

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4 The State Board may reconsider all or part of a water rights decision or order upon 5 petition filed not later than 30 days from the date the State Board adopts the decision or order. 6 (Wat. Code, § 1122.) Water Code section 1122 applies to any decision or order issued under 7 certain sections of the Water Code, including Water Code section 1058.5. (Wat. Code, §§ 1120, 8 1058.5.) The Resolution adopted the Emergency Regulation pursuant to authority granted by 9 Water Code section 1058.5. Section 1058.5 authorizes the State Board to adopt an emergency 10 regulation upon a finding that the regulation is "adopted to prevent the waste, unreasonable use, 11 unreasonable method of use, or unreasonable method of diversion, of water" or "to require 12 curtailment of diversions when water is not available under the diverter's priority of right" 13 (Wat. Code, § 1058.5, subd. (a).)

Whenever – by the express or implied terms of any statute – "a state agency has authority
to adopt regulations to implement, interpret, make specific, or otherwise carry out the provisions
of the statute, no regulation adopted is valid or effective unless consistent and not in conflict
with the statute and reasonably necessary to effectuate the purpose of the statute." (Gov. Code,
§ 11342.2.)

Any person interested in any application, permit, or license affected by the decision or
order may petition the State Board for reconsideration of the matter upon any of the following
causes:

(a) Irregularity in the proceedings, or any ruling, or abuse of discretion, by which the person was prevented from having a fair hearing;

(b) The decision or order is not supported by substantial evidence;

(c) There is relevant evidence which, in the exercise of reasonable diligence, could not have been produced; or

(d) Error in law.

27 (Cal. Code Regs, tit. 23, § 768.)

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PETITION FOR RECONSIDERATION OF RESOLUTION NO. 2021-0028 TO ADOPT AN EMERGENCY CURTAILMENT & REPORTING REGULATION FOR SACRAMENTO-SAN JOAQUIN DELTA (DELTA) WATERSHED

C. Analysis

1.

The Resolution and the Curtailment Orders are unlawful for the reasons summarized below.

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The Resolution, Emergency Regulation, and Curtailment Orders Rely Upon a Deficient Methodology for the Delta Watershed

The Emergency Regulation purports to rely upon seven methods that will be used to 6 7 determine whether water is unavailable to a water right holder, including: (1) priority date, 8 statement of diversion and use data, judicial orders, and State Board orders; (2) water demand 9 projections based on use from 2018-2020; (3) monthly reporting information submitted in 10 response to an informational order issued under section 879 of the Proposed Regulation; 11 (4) water supply projections from certain sources; (5) relevant available information regarding 12 stream system disconnection where curtailing diversions would not make water available to 13 serve senior downstream water rights; (6) other pertinent, reliable, and publicly available 14 information; and (7) the Water Unavailability Methodology for the Delta Watershed described 15 by report dated July 23, 2021, or comparable tools. BBID understands that items (1), (2), and (4) 16 are elements of item (7) – the Methodology. Absent clarification of alternative methods which 17 will be used to determine water availability, the Emergency Regulation is primarily dependent 18 on the Methodology. As discussed in BBID's Petition for Reconsideration of Notice, and in its 19 Comments dated July 29, 2021, the Methodology is insufficient to support a finding of water 20 unavailability in the Delta Watershed because it is substantially similar to the deficient Water 21 Availability Analysis from 2014 and 2015. (Exhibit B at pp. 4-5.) 22 In addition to the arguments discussed in detail in the Petition for Reconsideration of 23 Notice and its exhibits, BBID's Comments on the Draft Emergency Regulation detail further 24 deficiencies in the Methodology which were inadequately addressed by the State Board in its 25 August 3, 2021 Board Meeting, indicating that the Methodology is arbitrary, capricious, and 26 entirely lacking in evidentiary support. (Exhibit F at pp. 3-13.)

Specifically, the Methodology relies upon inaccurate and unanalyzed assumptions
 for residence time of water in the Delta by assuming that residence time is one month or less,

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	18	detail on how de

2 time calculation. (Exhibit F at pp. 3-5.) Volumetric source fingerprinting analysis has been BID's consultants and is attached as Attachment 1. BBID's preliminary the Delta Simulation Model II (DSM2)² confirms that during the current water nce times are significantly longer than one month and closer to two to three it F at Attachment A, Figure 2.) Source fingerprints shown in Attachment 1 te that about 20 percent of the water in Clifton Court Forebay as of mid-August vater that entered the Delta from the Sacramento and San Joaquin Rivers. The hly 80 percent of water at Clifton Court Forebay should be available for diversion ogy were updated to evaluate the distribution of stored water within the Delta and flect Delta residence time. The Methodology relies upon inaccurate demand data ons were made in response to stakeholder comments. Demand is overstated eadsheet in the Methodology relies upon data that: (a) are representative of 2018 021 demands, (b) include duplicative demands for water rights in the Delta, and ischaracterize Exchange Contractor demands. For example, large users routinely demand to their maximum permitted amount at more than one point of der to preserve the option to take the maximum amount at each diversion. More emands are overstated is outlined in BBID's July 29, 2021 comments which were 19 submitted after the July 27, 2021 Workshop. (Exhibit F.) 2. 20 Additionally, the Methodology incorrectly rejects the use of brackish water as a possible supply, contrary to evidence submitted by BBID (Exhibit F at pp. 5-6); considers direct 21 22 diversions below sea level to be non-consumptive uses without adequately reflecting the 23 increased supply generated by non-consumptive uses (Exhibit F at pp. 7-8); makes return flows 24 2 Contrary to assertions in Appendix D, the DSM2 model is the best available tool for simulating hydrodynamics in the Delta. The DSM2 model was developed and is maintained by the California Department of Water Resources 25 (DWR) to simulate Delta flows and water quality, and it is routinely used by DWR to simulate Delta

rather than two to three months, and inappropriately considering source of water in its residence

- hydrodynamics, operations, and management scenarios. The DSM2 model incorporates current bathymetry, tidal 26 fluctuations as measured at the downstream model boundary, measured Delta inflows, internal barrier and gate operations, and Delta exports, diversions, and return flows. The residence time methodology in Appendix D does 27 not route flows through the Delta, does not consider measured tidal fluctuations or inflows, and does not allow
- consideration of the flow rates, tidal elevations, or water quality within the Delta as a function of time. 28

4 Central Valley Pro 5 which curtailment 6 p. 15). Due to the 7 inadequate to supp 8 3. App 9 Board's adoption of 10 a. 11 Emergency 12 Office of A As such, it

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attributable to Delta demand available as supply to upstream diverters outside the Delta, even though Delta return flows are not available at those locations (Exhibit F at pp. 8-10); does not account for return flows associated with the delivery of previously stored State Water Project or Central Valley Project water (Exhibit F at pp. 12-13); and does not provide a clear process by which curtailment orders will be suspended, whether completely or temporarily (Exhibit F at p. 15). Due to the independent and cumulative effects of these deficiencies, the Methodology is inadequate to support a water unavailability determination in the Delta.

3. Appendix D to the Methodology was added to the Methodology after the State Board's adoption of the Emergency Regulation. There are several concerns with Appendix D.

a. First, this rebuttal information was provided on August 20, 2021, after the Emergency Regulation was adopted by the State Board on August 3, 2021, and after the Office of Administrative Law approved the Emergency Regulation on August 19, 2021. As such, it should not be considered substantial evidence supporting the State Board's decision to adopt the Resolution.

b. Appendix D breaks the legal Delta into four regions and incorrectly
represents the interconnections between regions. For example, the Methodology appears
to assume a direct connection between the South Delta and Suisun Bay, which does not
exist in the physical Delta, and appears to assume that only San Joaquin River water
would be available to meet consumptive use in the South Delta. These assumptions are
incorrect.

c. Appendix D defines an "exchange rate" by dividing the volume of water in each of the four Delta regions by the volume of water that sloshes into and out of that region with the tides, and then conflates this quantity with the residence time of water in the Delta, which is misleading and inaccurate. Appendix D appears to assume the entire volume of water between high tide and low tide is "new water" that enters the Delta from the Bay,³ failing to recognize the fact that the water within the Delta sloshes back and

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³ Appendix D at page 5, for example, states that "... an amount of water equal to the entire volume of [the Delta region defined in the methodology as] Suisun Bay is exchanged by the tides over less than three days." (Note that the original sentence in Appendix D is incomplete.)

forth with the tides and is not "exchanged" with new water. Only a small fraction of the water that sloshes within the Delta is "new" Bay water that enters the Delta at the western boundary of the Delta with San Francisco Bay.

d. Appendix D also presents Gross Channel Depletions (GCD) as equivalent to Delta consumptive use. However, DWR has developed refined calculations of "Delta Channel Depletion" (DCD) that consider physical processes such as crop evapotranspiration, leaching, seepage, irrigation, drainage, and local groundwater. The refined computations of DCD are used in the most recent version of DSM2 and improve model computations of diversions, return flows, and salinity within the Delta. BBID's preliminary analysis found that GCD not only generally overestimates Delta consumptive use but also fails to account for the agricultural return flows. Because Appendix D uses GCD rather than DCD, Appendix D overestimates consumptive use.

e. Appendix D inaccurately assumes that if consumptive use in the South Delta exceeds San Joaquin River flows, water will flow through the Central Delta directly from Suisun Bay absent the release of stored water. This assumption ignores both the travel time and flow path for water entering the Delta, and the distribution of flows from all inflow sources (including the Sacramento River) within the Delta. BBID's preliminary estimate developed using the DSM2 model indicates only about 20 percent of the water in Clifton Court Forebay in mid-August of 2021 consists of stored water. The Emergency Regulation is inconsistent with Water Code section 1058.5 because it relies upon the Methodology, which does not provide a reasonable basis to determine whether water is unavailable under a diverter's priority of right. In this respect, the Emergency Regulation is invalid. (Gov. Code, § 11342.2.) The State Board committed an error in law and should reconsider and rescind the Emergency Regulation accordingly. (Cal. Code Regs., tit. 23, § 768.)

Based on the foregoing infirmities in the Methodology, it does not provide substantial
evidence supporting the Curtailment Orders, and the State Board should reconsider and rescind
the Curtailment Orders.

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The State Board Violated the Administrative Procedure Act Because the Methodology is an Underground Regulation

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3	The State Board is not permitted to issue, utilize, enforce, or attempt to enforce any
4	guideline, criterion, bulletin, manual, instruction, order, standard of general application, or other
5	rule, which is a regulation as defined in Government Code section 11342.600, unless it has been
6	adopted as a regulation and filed with the Secretary of State. (Gov. Code, § 11340.5, subd. (a).)
7	A regulation is defined to include a "standard of general application." (Gov. Code,
8	§ 11342.600.) The Methodology provides a standard by which the State Board will and has
9	generally applied to all water rights holders in the Delta and Delta watershed to determine
10	whether to issue curtailment orders, including the Pre-1914 Curtailment Order and Post-1914
11	Curtailment Order. While the Methodology purports to include six alternative methods by which
12	the State Board will determine whether water is available, as discussed herein, three of the
13	described methods are merely elements of the Methodology. The Regulation and Methodology
14	fail to provide sufficient specificity for individual water rights holders to anticipate whether the
15	Methodology will be used to curtail their water right, instead leaving such determinations to
16	State Board staff without additional public review.
17	As such, the Methology is a standard of general application that must be adopted in compliance
18	with the Administrative Procedure Act. (See, e.g., Malaga County Water District v. Central
19	Valley Regional Water Quality Control Bd. (2020) 58 Cal.App.5th 418, 434.) BBID requests
20	that the State Board rescind the Resolution and Curtailment Orders because they are based on an
21	improper underground regulation.
22	3. <u>The State Board Exceeded Its Jurisdiction by Adopting the Resolution and</u>
23	Issuing the Pre-1914 Curtailment Order
24	The State Board lacks jurisdiction to issue curtailments under the Emergency Regulation
25	on two grounds. First, Water Code section 1058.5 was not intended to authorize the State Board
26	to curtail pre-1914 appropriative water rights and riparian water rights. Second, Water Code
27	section 12200 prohibits the application of general law to the Delta due to its unique characteristics.
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	PETITION FOR RECONSIDERATION OF RESOLUTION NO. 2021-0028 TO ADOPT AN EMERGENCY CURTAILMENT & REPORTING REGULATION FOR SACRAMENTO-SAN JOAQUIN DELTA (DELTA) WATERSHED 10

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a. <u>Water Code Section 1058.5's Curtailment Authorization is Ambiguous</u> with Respect to Riparian and Pre-1914 Right Holders and the Legislature Did Not Intend to Authorize Curtailment of Such Right Holders

The State Board is statutorily charged with the orderly administration of water rights issued pursuant to the California Water Code. The State Board does not have statutory authority to regulate pre-1914 water rights and riparian rights. (*Young v. State Water Resources Control Bd.* (2013) 219 Cal.App.4th 397, 404.) Instead, the State Board's adoption of the Resolution and Emergency Regulation is based, in part, on section 1058.5 of the Water Code. Water Code section 1058.5 allows the adoption of emergency regulations to require "curtailment of diversions when water is not available under the diverter's priority of right. . . ." (Wat. Code, § 1058.5, subd. (a)(1).) This language simply refers to a "diverter's priority of right." In light of the general rule that the State Board does not have authority to regulate pre-1914 water rights and riparian rights, this language is ambiguous with respect to the Board's authority to curtail these right holders.

Section 1058.5 was amended to allow the adoption of emergency regulations authorizing 14 curtailment of water diversions by Senate Bill 104 (SB 104) in 2014. (SB 104 Assembly Floor 15 Analysis, attached hereto as Exhibit P.) Prior to SB 104, section 1058.5 allowed the 16 development of emergency regulations solely to promote wastewater reclamation or water 17 conservation. (2014 Cal. ALS 3 (Mar. 1, 2014) 2014 Cal. Stats. ch. 3, SB 104, Digest at 18 subd. (6) (Digest).) The legislative history for SB 104 calls out three major expansions to 19 section 1058.5 effectuated by the bill: (1) permitting emergency regulations to allow 20 curtailments when water is unavailable under priority of right; (2) expanding the drought 21 conditions under which emergency regulations can be adopted; and (3) imposing a \$500 per day 22 fine for violations thereof. (Exhibit P at p. 2.) It does not, however, specifically call out an 23 intent to allow the State Board to curtail diversions pursuant to pre-1914 appropriative water 24 rights or riparian water rights. (See, e.g., Exhibit P; see also Digest at subd. (6).) 25

On the contrary, the Assembly Floor Analysis states that "Any curtailment regulations
would follow California water right laws concerning priority," and that "[a] key aspect of
drought response is ensuring the existing water rights laws are followed." (Exhibit P at pp. 2-3,

1	emphasis added.) The amendments to section 1058.5 were intended to include "prudent changes
2	to the Water Code designed to enhance [the State Board's] ability to respond to drought,"
3	through "streamlined authority to enforce water rights laws" (Exhibit P at p. 3, emphasis
4	added.) As noted, California water law has historically not included the ability for the State
5	Board to curtail pre-1914 appropriative water rights or riparian water rights. There is no support
6	in the legislative history or plain text of section 1058.5 to allow curtailment of these historically
7	protected rights as "streamlined authority" of the State Board. Adoption of the Emergency
8	Regulation thus exceeds the State Board's authority.
9 10	b. <u>The State Board's Resolution Improperly Applies a General Law to the</u> <u>Delta</u>
11	Furthermore, section 12200 of the Water Code, titled "Necessity of special legislation for
12	protection, etc. of waters of the Delta," provides the following:
13	The Legislature hereby finds that the water problems of the Sacramento-San
14	Joaquin Delta are unique within the State; the Sacramento and San Joaquin Rivers join at the Sacramento-San Joaquin Delta to discharge their fresh water flows into
15	Suisun, San Pablo and San Francisco Bays and thence into the Pacific Ocean; the merging of fresh water with saline bay waters as drainage waters and the
16	withdrawal of fresh water for beneficial uses creates an acute problem of salinity intrusion into the vast network of channels and sloughs of the Delta; the State
17	Water Resources Development System has as one of its objectives the transfer of waters from water-surplus areas in the Sacramento Valley and the north coastal
18	Delta via the Delta; water surplus to the needs of the areas in which it originates is
19	supply for water-deficient areas. It is, therefore, hereby declared that a general
20	necessary for the protection, conservation, development, control and use of the
21	waters in the Dena for the public good.
22	(Wat. Code, § 12200.)
23	The Resolution and Emergency Regulation contain no reference to Water Code
24	section 12200, nor do they adequately reflect the unique nature of the Delta. Instead, the
25	Resolution simply adopts amendments to the emergency regulations initially adopted to allow
26	curtailments of diversions in the Russian River watershed – thereby applying a general law to the
27	Delta. (See, e.g., Exhibit G.) The Emergency Regulation therefore exceeds the State Board's
28	authority to regulate the Delta by adopting regulations that do not reflect the fact that "the water
	PETITION FOR RECONSIDERATION OF RESOLUTION NO. 2021-0028 TO ADOPT AN EMERGENCY CURTAILMENT & REPORTING REGULATION FOR SACRAMENTO-SAN JOAQUIN DELTA (DELTA) WATERSHED 12

SOMACH SIMMONS & DUNN A Professional Corporation

problems of the Sacramento-San Joaquin Delta are unique within the State" (See Wat. Code, § 12200.)

3 By exceeding its jurisdiction in adopting the Resolution, the State Board committed an 4 error in law and must grant BBID's petition for reconsideration and rescind the Resolution. Further, by issuing the Pre-1914 Curtailment Order premised upon an illegal Resolution and Emergency Regulation, the State Board committed a further error in law, and the State Board must reconsider and rescind the Pre-1914 Curtailment Order.

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4. The Resolution and the Pre-1914 Curtailment Order Violate BBID's Due Process Rights

10 While a water right is usufructuary in nature, once it is perfected it becomes a vested 11 property right. Thus, the right to beneficially use water pursuant to a valid pre-1914 12 appropriative water right is a real property right. As such, BBID's pre-1914 water right is a 13 property right subject to substantive due process protection. (Cal. Const., art. I, § 7, subd. (a).) 14 The Resolution, Emergency Regulation, and Pre-1914 Curtailment Order violate BBID's due 15 process rights because they fail to provide objective criteria by which the regulated community may ascertain whether water is available for diversion under their property rights. 16

17 In 2014 and 2015, the State Board adopted emergency regulations pursuant to 18 section 1058.5 to authorize curtailment of diversions of water on the basis of waste and 19 unreasonable use, similar to the grounds cited by the Resolution and Emergency Regulation. 20 (Stanford Vina Ranch Irrigation Co. v. State of California (2020) 50 Cal.App.5th 976 (Stanford 21 *Vina*).) In *Stanford Vina*, the court discussed the State Board's regulatory authority as follows: 22 "the [State] Board's grant of authority to 'exercise the ... regulatory functions of the state' 23 necessarily includes the power to enact regulations governing the reasonable use of water." (Id. 24 at p. 1002, citing Light v. State Water Resources Control Bd. (2014) 226 Cal.App.4th 1463, 25 1484-1485.) The emergency regulations at issue contained a section which "provided for issuance of a curtailment order . . . where 'diversions . . . would cause or threaten to cause flows 26 27 to fall beneath the drought emergency minimum flows listed in subdivision (c)." (Stanford 28 Vina, supra, at p. 1006.) Stanford Vina went on to discuss the objective criteria of minimum PETITION FOR RECONSIDERATION OF RESOLUTION NO. 2021-0028 TO ADOPT AN EMERGENCY CURTAILMENT & REPORTING REGULATION FOR SACRAMENTO-SAN JOAQUIN DELTA (DELTA) WATERSHED

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1 stream flow requirements that were specifically set by the regulations, allowing that when 2 diversions "threatened to drop the flow of water below minimum flow requirements," those 3 diversions could be "declared per se unreasonable and subject to curtailment by the [State] 4 Board." (*Id.* at p. 1002.)

5 Here, neither the Resolution nor the Emergency Regulation contain similar objective 6 criteria by which BBID or other users may determine whether the objectives underpinning the curtailments have been satisfied. The Resolution instead states that the Emergency Regulation is required to "meet human health and safety needs, preserve stored water needed to prevent 9 salinity from the ocean from intruding into the Legal Delta and making water unusable for 10 municipal, industrial, and agricultural purposes, and to minimize impacts to fish and wildlife." (Exhibit H at p. 2, recital 5.) BBID is left to assume that the curtailment orders issued pursuant 12 to the Emergency Regulation will advance the vague goals set forth in the Resolution.

13 In the facts before the State Board today, the limit against which to assess reasonableness 14 cannot be expressed. To do so, there would need to be some minimum threshold expressed, so 15 that continued diversions could be considered unreasonable because the minimum was unmet. Instead, Emergency Regulation section 876.1(b), states that "when flows are determined to be 16 17 insufficient to support all diversions, the Deputy Director . . . may issue curtailment orders" 18 (See Exhibit G.) However, there is no way for any water user to see an objective threshold level 19 of insufficient water by a gage, measurement, or other basis. Instead, section 876.1(d), outlines 20 seven very broad criteria upon which to subjectively declare unavailability. (Ibid.) These are 21 not criteria against which the reasonableness of water use can be assessed.

- 22
- 23

5. The Emergency Regulation and the Pre-1914 Curtailment Order Improperly Rely upon a Waste and Unreasonable Use Theory for Enforcement of Violations

24 Not only did the State Board fail to provide objective criteria to assess the reasonableness of water use, it did not undertake any sort of reasonableness analysis. As discussed in the 25 Resolution, the California Supreme Court has stated: "'What may be a reasonable beneficial 26 27 use, where water is present in excess of all needs, would not be a reasonable beneficial use in an 28 area of great scarcity and great need." (Exhibit H at p. 4, recital 14, citing Tulare Irrigation PETITION FOR RECONSIDERATION OF RESOLUTION NO. 2021-0028 TO ADOPT AN EMERGENCY CURTAILMENT &

REPORTING REGULATION FOR SACRAMENTO-SAN JOAQUIN DELTA (DELTA) WATERSHED

1 Dist. v. Lindsay-Strathmore Irrigation Dist. (1953) 3 Cal.2d 489, 567 (Tulare Irrigation 2 *District*).) In practice, the required waste and unreasonable use determination involves the State 3 Board or a court evaluating whether a specific use is unreasonable in light of its impacts on 4 another specific use. (See, e.g., Stanford Vina, supra, 50 Cal.App.5th at pp. 999-1004.) Here, 5 the State Board has not analyzed the reasonableness of competing uses by applying the rule cited 6 from Tulare Irrigation District. As such, unless and until the State Board has analyzed specific 7 competing uses, it may not rely upon the waste and unreasonable use theory for enforcement of 8 violations of the Emergency Regulation. Furthermore, section 876.1(b)'s simple statement that 9 diversion in violation of the Regulation constitutes an unreasonable use is no substitute for this 10 analysis.

11 Furthermore, lacking a per se rule of unreasonableness, the State Board must conduct a 12 hearing prior to issuing a curtailment order to determine which uses are unreasonable in light of 13 the circumstances. *Stanford Vina* provides that the State Board does not have to provide a 14 hearing if it has articulated a per se rule of unreasonable use. (Stanford Vina, supra, 15 50 Cal.App.5th at p. 1004.) As noted above, the State Board has not articulated objective criteria 16 to assess water availability and the reasonableness of water use. Instead, the Emergency 17 Regulation simply states that failure to comply with the Emergency Regulation is a waste and 18 unreasonable use of water. (Cal. Code Regs, tit. 23, § 879.2, subd. (b).) This is inadequate 19 because the State Board did not undertake the same type of analysis for the Resolution in 20 articulating waste and unreasonable use as it did in Stanford Vina or in California Trout, Inc. v. 21 State Water Resources Control Bd. (1989) 207 Cal.App.3d 585 (California Trout), balancing 22 irrigation and municipal beneficial uses against specific instream requirements for fish survival. 23 (See *Stanford Vina*, *supra*, 50 Cal.App.5th at pp. 999-1004; see also *California Trout*, *supra*.) 24 The State Board may not deny BBID a hearing by simply including section 879.2(b) in the 25 Emergency Regulation. By failing to identify unreasonable uses, and authorizing curtailments 26 without a hearing, the Pre-1914 Curtailment Order, issued pursuant to the Emergency 27 Regulation, is illegal.

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1 By exceeding its jurisdiction in adopting the Resolution and Emergency Regulation, the 2 State Board committed an error in law and must grant BBID's petition for reconsideration and 3 rescind the Resolution and Emergency Regulation. Further, by issuing the Pre-1914 Curtailment 4 Order premised upon an illegal Resolution and Emergency Regulation, the State Board 5 committed a further error in law, and the State Board must reconsider and rescind the Pre-1914 6 Curtailment Order.

6. The Emergency Regulation is Not Needed to Prevent Salinity Intrusion in the Delta

9 The State Board adopted the Resolution, in part, to "preserve stored water needed to 10 prevent salinity from the ocean from intruding into the Legal Delta and making water unusable 11 for municipal, industrial, and agricultural purposes, and minimize impacts to fish and wildlife." 12 (Exhibit H at p. 2.) The State Board contends that there is an "urgent need" to prevent salinity 13 intrusion, and that curtailments of diversions are necessary to meet that need. (Exhibit H at 14 pp. 2-4, 6.) The Resolution and Emergency Regulation do not, however, address the existence of 15 the Emergency Drought Salinity Barrier (Salinity Barrier) by DWR.

16 The Salinity Barrier comprises an approximately 800-foot-long rock barrier constructed 17 between Jersey and Bradford Islands in the Delta. (State Board Water Quality Certification for 18 the 2021 Emergency Drought Salinity Barrier Project, attached hereto as Exhibit Q at p. 2.) The 19 Salinity Barrier was similarly authorized by the Governor's Emergency Proclamation in 20 response to drought conditions, citing the need to "conserve water for use later in the year . . ., 21 preserve to the extent possible water quality in the Delta, and retain water supply for human 22 health and safety purposes." (Id. at p. 1.) Construction of the Salinity Barrier was planned to be 23 completed no later than July 1, 2021. (*Ibid.*) This occurred prior to the State Board's issuance 24 of the Draft Emergency Regulation on July 23, 2021.

25 The Emergency Regulation and accompanying Resolution do not acknowledge the 26 existence of the Salinity Barrier and its significant effect of reducing salinity intrusion in the 27 Delta, nor do they provide a basis for the necessity of the Emergency Regulation in light of the 28 Salinity Barrier's effects. Thus, in light of the Resolution's failure to recognize the existence of PETITION FOR RECONSIDERATION OF RESOLUTION NO. 2021-0028 TO ADOPT AN EMERGENCY CURTAILMENT & 16

REPORTING REGULATION FOR SACRAMENTO-SAN JOAQUIN DELTA (DELTA) WATERSHED

1	the Salinity Barrier, it is unclear whether the Emergency Regulation was reasonably necessary to			
2	prevent salinity intrusion. The State Board should therefore grant BBID's petition and			
3	3 reconsider the necessity of the Emergency Regulation in light of t	reconsider the necessity of the Emergency Regulation in light of the existence of the Salinity		
4	4 Barrier.			
5	5 III. CONCLUSION			
6	6 For the foregoing reasons, the Resolution is unlawful and	unsupported. Petitioner		
7	7 requests that the State Board rescind the Resolution and the Curta	ilment Orders.		
8	8 SOMACH SIMMON	IS & DUNN		
9	9 A Professional Corpo	oration		
10	10 Mint C			
11	11 Dated: September 2, 2021 By:			
12	12 Michael E. V Attorneys for Petition	ergara ner/Plaintiff		
13	13 Byron-Bethany Irriga	ation District		
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28	28 PETITION FOR RECONSIDERATION OF RESOLUTION NO. 2021-0028 TO ADOPT A	N FMERGENCY CURTAILMENT &		
	REPORTING REGULATION FOR SACRAMENTO-SAN JOAQUIN DELTA (DELTA) W	VATERSHED 17		

1	PROOF OF SERVICE	
2 3	I am employed in the County of Sacramento; my business address is 500 Capitol Mall, Suite 1000, Sacramento, California; I am over the age of 18 years and not a party to the foregoing action.	
4	On September 2, 2021, I served the following document(s):	
5	PETITION FOR RECONSIDERATION OF RESOLUTION NO. 2021-0028 TO ADOPT AN	
6	EMERGENCY CURTAILMENT AND REPORTING REGULATION FOR THE SACRAMENTO-SAN JOAQUIN DELTA (DELTA) WATERSHED AND THE STATE BOARD'S ORDER IMPOSING CURTAILMENTS	
7	X (by mail) by placing a true convit thereof enclosed in a sealed envelope, with postage fully	
8	\underline{X} (by mail) by placing a fine copy increase in a scaled envelope, with postage fully paid thereon, in the designated area for outgoing mail, addressed as set forth below:	
9	\underline{X} (electronically) by electronically transmitting a true copy to the person(s) at the electronic mailing addresses as set forth below:	
10	Erik Ekdahl, Deputy Director Michael P. George, Delta Watermaster	
11	Division of Water RightsOffice of the Delta WatermasterState Water Resources Control BoardState Water Resources Control Board	
12	1001 I StreetP.O. Box 100Sacramento CA 95814Sacramento CA 95812 0100	
13	Sacramento, CA 95814Sacramento, CA 95812-0100Erik.Ekdahl@waterboards.ca.govdeltawatermaster@waterboards.ca.gov	
14		
15	I declare under penalty of perjury that the foregoing is true and correct. Executed on September 2, 2021, at Sacramento, California.	
16	Crysh Rin:	
17	Crystal Rivera	
18		
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28		
	PETITION FOR RECONSIDERATION OF RESOLUTION NO. 2021-0028 TO ADOPT AN EMERGENCY CURTAILMENT & REPORTING REGULATION FOR SACRAMENTO-SAN JOAQUIN DELTA (DELTA) WATERSHED	

SOMACH SIMMONS & DUNN A Professional Corporation

ATTACHMENT 1

Attachment 1

Methodology used to obtain preliminary DSM2 model results

The Delta Simulation Model II (DSM2) version 8.2.1 was used to model Delta hydrodynamics and source fingerprints for WY 2021. Key input data are provided in the table below.

Category	Input Data	Data Source	Station ID	Time Interval
Major export /	Contra Costa Water District (Rock Slough)	CDEC	INB	Daily
diversions ("Source Flow")	Contra Costa Water District (Old River)	CDEC	IDB	Daily
	Tracy Pumping Plant	CDEC	TRP	Daily
	Contra Costa Water District (Middle River)	CDEC	CCW	Daily
Reservoir Inflow	Clifton Court Inflow	CDEC	CLC	Daily
Delta inflows	Sacramento River Inflow	CDEC	FPT / SPE	Daily
	San Joaquin River Inflow	CDEC	VNS	Daily
	Cosumnes River Inflow	CDEC	MHB	Daily
	Mokelumne River Inflow	CDEC	CMN	Daily
	Calaveras River Inflow	CDEC	NHG	Daily
	Yolo Bypass Inflow	USGS	11453000	Daily
	North Bay	CDEC	BKS	Daily
Boundary Stage	Stage at Martinez	CDEC	MRZ	Hourly

Input data for gate and temporary barrier operations are provided in the table below.

Category	Input Data	Data Source
Cata Operations	Delta Cross Channel	USBR
Gate Operations	Clifton Court Forebay	DWR
Temporary Barrier Operations	West False River	DWR
	Middle River	DWR
	Old River at Tracy	DWR
	Grant Line Canal	DWR

Because Delta Channel Depletion (DCD) for WY2021 were not publicly available when the simulation was performed, data from WY 2015 were used for these model parameters.

The DSM2 QUAL module was used to simulate volumetric fingerprints. Inflows were "tagged" within the model and traced throughout the model domain to determine both the source of water at key locations in the domain and, for Sacramento River inflows, the month water entered the Delta. Results are shown in Figure 1.

Volumetric fingerprinting analysis was also used to simulate the distribution and concentration of project stored water at key locations. Inflows were assigned as either natural flow or stored water for the period of May to July 2021. Natural and stored water flows were "tagged" separately and traced thoughout the model domain. The flow rates of natural and stored water were obtained from a spreadsheet provided by the SWRCB; these data were presented by the SWRCB in Figure 7 of Appendix D of the Water Unavailability Methodology. Results are shown in Figure 2.

Results from the modeling should be considered preliminary, but are generally consistent with model results from WY2015, as presented in prior BBID comments.

Figure 1. Preliminary fingerprinting results for WY 2021, Clifton Court Forebay. Sacramento River water is shown to indicate the month the Sacramento River flow entered the Delta (i.e., flows that entered the Delta prior to February 2021, and flows that entered the Delta during each month from February to July 2021.







Figure 2. Preliminary fingerprinting results for WY 2021, Clifton Court Forebay. Information from Appendix D to the Water Unavailability Methodology and spreadsheets provided by the SWRCB were used to "tag" natural and stored water inflows from the Sacramento and San Joaquin Rivers for the months of May, June, and July.



Volumetric Fingerprinting Source | BBID Intake (Clifton Court) | WY 2021

Preliminary Result, Subject to Change

EXHIBIT A





State Water Resources Control Board

June 15, 2021

Water Right ID Login: «WR_ID» Password: «RMS»

«MAIL_RECEIVER_NAME» «MAIL_RECEIVER_ADDRESS» «CITY», «STATE» «ZIP»

In Regard to Water Right: «WR_ID» Primary Owner: «PRIMARY_OWNER»

NOTICE OF WATER UNAVAILABILITY FOR POST-1914 WATER RIGHT HOLDERS AND WARNING OF IMPENDING WATER UNAVAILABILITY FOR PRE-1914 AND RIPARIAN CLAIMANTS IN THE SACRAMENTO-SAN JOAQUIN DELTA WATERSHED¹

State Water Resources Control Board (State Water Board or Board) records show you hold a «WR_TYPE». Please note that you will be receiving a similar notice for each water right or claim for which you are listed as the mail receiver.

Current information indicates that, as of the date of this letter, water supply in the Sacramento-San Joaquin Delta (Delta) watershed is insufficient to support lawful diversion under any post-1914 appropriative water right. While water may be physically present at post-1914 appropriative water right holders' points of diversion, that water is expected to either be needed by more senior water right claimants downstream or to consist of storage releases necessary to meet other downstream purposes, such as salinity control in the Delta.

Information also indicates that water will become unavailable this summer for some **pre-1914 appropriative water right claimants and riparian claimants**. The State Water Board is currently in the process of evaluating the seniority at which water may be unavailable for pre-1914 appropriative and riparian claimants, and when, and plans

¹ For the purposes of this notice, all registrations and stockpond certificates in the Delta watershed are considered post-1914 appropriative water rights for which water is currently unavailable.

E. JOAQUIN ESQUIVEL, CHAIR | EILEEN SOBECK, EXECUTIVE DIRECTOR

^{1001 |} Street, Sacramento, CA 95814 | Mailing Address: P.O. Box 100, Sacramento, CA 95812-0100 | www.waterboards.ca.gov

to issue further notices of water unavailability (notices) via email and to post water unavailability information on the Board's website as described below.

As a water right holder, it is your responsibility to monitor current conditions and pay attention to the information provided by the State Water Board. Future notices of water unavailability and updated information regarding your water right will be sent by email through the State Water Board's Delta Drought list. To stay informed and ensure you receive future communications regarding water unavailability for your water right(s), you are strongly encouraged to subscribe to the Delta Drought list on the State Water Board's Email Lists webpage at:

https://www.waterboards.ca.gov/resources/email_subscriptions/swrcb_subscribe.html

Additionally, the State Water Board urges you to frequently visit the following webpage where updated information will also be posted: https://www.waterboards.ca.gov/drought/delta/

The State Water Board is using its Water Unavailability Methodology for the Delta Watershed (methodology) to identify which water rights in the Delta watershed face insufficient supplies for diversion. For more information about the methodology and for ongoing updates as the methodology is refined, please visit the following webpage: https://www.waterboards.ca.gov/waterrights/water_issues/programs/drought/drought_to ols_methods/delta_method.html

Request to Complete a Water Unavailability Certification Form

If you have a post-1914 appropriative water right, please submit the Water Unavailability Certification Form (Form) within **seven days** of the date of this letter. If you have a pre-1914 appropriative or riparian claim, you do not need to complete the Form now, but you may be asked to do so in the near future. Please subscribe to the above referenced Delta Drought email list to receive any such future notices. You should not expect to receive hard copy mail notices of future changes in water unavailability that may affect your water right or claim; hard copy mail may be sent for other related matters, but only as required by law or regulation.

The Form requests information about whether you will cease diversions, if you have alternative sources of water, and if you seek an exception due to a need to divert water for human health and safety. Your timely response helps the State Water Board better identify and protect senior water rights and assists all water users to better manage severely limited water supplies.

Please follow the steps below to submit the Form:

- 1. Visit: https://public.waterboards.ca.gov
- 2. Login using the unique Water Right ID and Password listed next to your address at the top of this letter
- 3. Complete the Form

If you have a pending application and you do not have a unique Water Right ID Login and Password, please download a Form from the State Water Board's website at: https://www.waterboards.ca.gov/drought/delta/. Additional instructions for completing and submitting the Form are provided on the website.

If you receive a notice of water unavailability for your water right, the State Water Board may be able to assist you with identifying alternative sources of water or provide an exception on a case-by-case basis. If you divert under any of the following circumstances, you should identify it on the Form and provide the information requested:

- Your diversion is your only source of water to meet human health and safety uses, you have no other water supply, **and** you already conserve as much as possible;
- Your diversion is for a non-consumptive use (e.g., hydroelectric generation) and you return all water you divert to the originating stream on a time step that does not affect availability for other users; or
- You have a contract or transfer order allowing you to divert stored water released from a reservoir.

Potential Emergency Regulations and Future Curtailments

In accordance with the Governor's May 10, 2021 Proclamation of a State of Emergency, the State Water Board is considering emergency regulations to curtail water diversions when water is not available at water right holders' priority of right or to protect releases of stored water. Therefore, emergency regulations may require water right holders, including those diverting under pre-1914 appropriative or riparian claims, to curtail their diversions. As noted above, all water right holders should subscribe to the Delta Drought email list to receive notice of and to participate in the public process for State Water Board consideration and possible adoption of emergency regulations.

Potential Enforcement

This notice is solely informational. It alerts water users that the State Water Board's best available information indicates that water is not available to post-1914 appropriative water rights, and warns pre-1914 appropriative and riparian claimants that water may be unavailable at their claimed priority of right in the near future. It also reminds water users of their obligations under California's water rights system. This notice is not an order or directive from the State Water Board to stop diverting.

California water law provides that you are not authorized to divert when water is unavailable under your priority of right or according to the nature of your right/claim. Diverting water that is not lawfully available for your water right may subject you to a cease and desist order, prosecution in court, or administrative fines as high as \$1,000 per day of violation and \$2,500 for each acre-foot of water you divert or use that is not lawfully available under your water right. (See Wat. Code, §§ 1052, 1055.) If you have any questions regarding this notice, you may send an email to Bay-Delta@waterboards.ca.gov, or call the Delta Drought phone line at (916) 319-0960. For additional information, visit the State Water Board's drought webpage at: http://www.waterboards.ca.gov/drought

Sincerely,

ORIGINAL SIGNED BY

Erik Ekdahl Deputy Director, Division of Water Rights State Water Resources Control Board

EXHIBIT B

& DUNN	ration
MONS &	al Corpo
CH SIM	ofession
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SOM A Pro	ACH SIMMONS & DUNN ofessional Corporation	
ALY	HAEL E. VERGARA (SBN 137689) SON E. ACKERMAN (SBN 315914)	
ELLI 500 (EN M. SIMMONS (SBN 329144) Capitol Mall, Suite 1000	
Sacra	amento, California 95814-2403 bhone: (916) 446-7979	
Facsi	gara@somachlaw.com	
esim	erman@somachlaw.com mons@somachlaw.com	
Attor BET	neys for Petitioner/Plaintiff BYRON- HANY IRRIGATION DISTRICT	EXEMPT FROM FILING FEES PURSUANT TO GOVERNMENT CODE SECTION 6103
	BEFORE	ETHE
	CALIFORNIA STATE WATER RE	ESOURCES CONTROL BOARD
	Sector Sector Sector	
In the	Matter of the Petition of:	SWRCB/OCC File
Byron Recon Post-1 Impen Ripari Joaqu	Bethany Irrigation District for sideration of Notice of Unavailability for 914 Water Right Holders and Warning of ading Water Unavailability for Pre-1914 and an Claimants in the Sacramento-San in Delta Watershed	PETITION FOR RECONSIDERATION OF NOTICE OF UNAVAILABILITY FOR POST-1914 APPROPRIATIVE WATER RIGHTS
	I. PETITION FOR RE	ECONSIDERATION
(1)	Petitioner:	
	Byron-Bethany Irrigation District 7995 Bruns Road Byron, CA 94514	
(2)	The specific Board action of which Petitio	ner requests reconsideration:
	The State Water Resources Control Board	's (SWRCB) Notice of Unavailability for
	Prost-1914 water Right Holders and Warm Pre-1914 and Riparian Claimants in the Sa (Notice).	acramento-San Joaquin Delta Watershed
(3)	The date on which the order or decision w	as made by the Board:
	June 15, 2021.	

1	(4) The reason the action was inappropriate or improper:		
2	The Water Unavailability Methodology for the Delta Watershed (Methodology), the basis for the Notice, is insufficient to support a finding of water unavailability; the Deputy		
3 4	Director lacks authority to issue the Notice to diverters in the Delta; the SWRCB violated due process; and the SWRCB failed to comply with the Governor's Proclamation of a State of Emergency and Order, issued on May 10, 2021.		
5	(5) The specific action which Petitioner requests:		
6	Rescind the Notice.		
7 8	(6) A statement that copies of the petition and any accompanying materials have been sent to all interested parties:		
9	Copies of this Petition and accompanying materials have been sent to the SWRCB.		
10	II. MEMORANDUM OF POINTS AND AUTHORITIES IN SUPPORT OF		
11	PETITION FOR RECONSIDERATION		
12	In accordance with Water Code section 1120 et seq., Byron-Bethany Irrigation District		
13	(BBID) files this Petition for Reconsideration of SWRCB's Notice curtailing BBID's post-1914		
14	appropriative water right. BBID and The West Side Irrigation District (WSID) consolidated		
15	effective as of September 2, 2020, upon the San Joaquin Local Area Formation Commission's		
16	recordation of a Certificate of Completion, and BBID is the successor agency. Through this		
17	consolidation, BBID now holds WSID's post-1914 appropriative water right to divert water from		
18	Old River (at a point of diversion referred to as Wicklund Cut) for irrigation, domestic, and		
19	municipal and industrial uses with a priority date of April 17, 1916.		
20	On June 15, 2021, Erik Ekdahl, SWRCB's Deputy Director, Division of Water Rights,		
21	(Deputy Director), issued a Notice to BBID curtailing diversion of water under its and others'		
22	post-1914 appropriative water rights with 1915 and later priority dates within the Sacramento-San		
23	Joaquin River Delta watersheds. A copy of the Notice is attached as Exhibit A. The Notice states		
24	that "water supply in the Sacramento-San Joaquin Delta (Delta) watershed is insufficient to		
25	support lawful diversion under any post-1914 appropriative water right" and requests BBID		
26	certify that it will immediately cease all diversions (unless the diversion qualifies for identified		
27	exemption) under its post-1914 right. (Exhibit A at p. 1, emphasis added.) The Notice is cast as		
28	"solely informational" (id. at p. 3), however, because it also unequivocally states the financial and		
	PETITION FOR RECONSIDERATION OF NOTICE OF UNAVAILABILITY FOR POST-1914 APPROPRIATIVE WATER RIGHTS 2		

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legal ramifications for continuing to divert water under a post-1914 appropriative water right after
 receiving the Notice, the only reasonable interpretation of the Notice is it is an order of
 curtailment. Specifically, the Notice states that after receipt of the Notice, any further diversion
 of water under a post-1914 appropriative water right "when water is unavailable under [BBID's]
 priority of right" subjects BBID to the following:

Diverting water that is not lawfully available for your water right may subject you to a cease and desist order, *prosecution in court*, or administrative fines as high as \$1,000 per day of violation and \$2,500 for each acre-foot of water you divert or use that is not lawfully available under your water right.

(Exhibit A at p. 3, citing Wat. Code, §§ 1052, 1055, emphasis added.) The Notice expressly states that "as of the date of this letter" water is unavailable under BBID's priority of right. (See Exhibit A at p. 1, bold in original.)

12 The Notice was not issued after any hearing or proceeding before the SWRCB. BBID 13 was not provided an opportunity to test any evidence or information relied upon by SWRCB or its 14 Deputy Director, nor was it provided an opportunity to present SWRCB with evidence regarding 15 the availability of water diverted pursuant to BBID's post-1914 appropriative water right. 16 SWRCB did solicit comments regarding the draft Methodology, which it purportedly considered 17 in developing the final Methodology relied on to determine water is unavailable in the Delta to 18 post-1914 water right holders. However, most of BBID's comments alerting SWRCB to 19 deficiencies in the draft Methodology were not addressed in the final Methodology, and prior to 20 issuing the Notice. Indeed, only 20 calendar days passed between the close of written public 21 comments on the draft Methodology and publication of the final Methodology and issuance of the 22 Notice.

SWRCB may reconsider all or part of a water rights decision. (Wat. Code, § 1122.)
Water Code section 1126, subdivision (b), requires any party aggrieved by a decision issued
under authority delegated to an officer or employee of the SWRCB to seek reconsideration before
filing a petition for writ of mandate in a court of law. An allegedly informational curtailment
notice containing unequivocal language regarding cessation of diversions is a final agency action
subject to a petition for reconsideration. (*Phelps v. State Water Resources Control Bd.* (2007)

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RIGHTS

157 Cal.App.4th 89, 105.) BBID contests that the Deputy Director was lawfully delegated
 authority to issue the Notice. Should SWRCB determine the Notice was issued under authority
 lawfully delegated to the Deputy Director, BBID submits this Petition for Reconsideration in
 accordance with Water Code section 1126, subdivision (b), to preserve its right to file a petition
 for a writ of mandate.

BBID submits this Petition for Reconsideration because it believes the Notice constitutes a "final action" of SWRCB subject to the provisions of Water Code section 1126. (Wat. Code, § 1126, subd. (b).)

BBID believes that the Notice is unlawful for the reasons summarized below.

A. The Notice Relies on a Deficient Methodology for the Delta Watershed

11 The Methodology (both draft and final versions) is insufficient to support a finding of 12 water unavailability in the Delta Watershed. The Methodology, which the Notice relies on as 13 authority for the determination of water unavailability in the Delta, is merely a rebranded version 14 of the deficient Water Availability Analysis from 2014 and 2015 (Water Availability Analysis). 15 (See Exhibit A at p. 2; see also SWRCB Meeting, Division of Water Rights Presentation Slide for 16 Agenda Item 7: Update on Water Unavailability Methodology for the Delta Watershed on draft 17 Methodology (Jun. 1, 2021) attached as Exhibit B.) In 2016, the Hearing Unit in the Division of 18 Water Rights of SWRCB found the Water Availability Analysis insufficient to support 19 enforcement actions based on allegedly illegal diversions under substantially identical curtailment 20 notices. (SWRCB Order WR 2016-0015 (Order WR 2016-0015), attached hereto as Exhibit C.) 21 Specifically, the Hearing Unit found that the Water Availability Analysis lacking for the 22 following reasons: (1) it relied on data that was not the most accurate, available water supply and 23 demand information in the Delta in May and June 2015; (2) it included demand in tributary 24 watersheds that could not have been met with supply available to that tributary; and (3) it 25 included the San Joaquin River Exchange Contractors' diversions as demand on the full natural 26 flow of the San Joaquin River, when those diversions were likely met with imported or stored 27 water. (Exhibit C at pp. 14-15.) In addition to these findings, the Hearing Unit determined that 28 the absence of testimony answering other questions raised by BBID collectively amounted to the PETITION FOR RECONSIDERATION OF NOTICE OF UNAVAILABILITY FOR POST-1914 APPROPRIATIVE WATER

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SWRCB failing to meet its burden of proof to pursue enforcement action against BBID.

Rather than using Order WR 2016-0015 as a template by which to methodically improve, over the past six years, the Water Availability Analysis to account for the complexities of the Delta as well as supply and demand data issues, SWRCB staff began developing the Methodology in February 2021 and, on May 12, 2021, issued the notice of public workshop and opportunity for public comment on the draft Methodology. (See Exhibit B; see also Notice of Public Workshop and Opportunity for Public Comment on the Water Unavailability Methodology for the Delta Watershed (May 12, 2021), attached hereto as Exhibit D.)

9 On May 25, 2021, BBID submitted numerous comments on the draft Methodology, 10 highlighting its concerns that the draft Methodology suffers from similar deficiencies noted in 11 Order WR 2016-0015 regarding the Water Availability Analysis. (Comments on SWRCB 12 May 2021 Draft Water Unavailability Methodology for the Delta Watershed, attached hereto as 13 Exhibit E.) However, many critical comments on the draft Methodology raised by BBID remain 14 unaddressed in the final Methodology. These include: (1) improper consideration of Delta return 15 flows as supply available to diverters upstream of the Delta; (2) failure to account for municipal 16 wastewater treatment plant discharges to rivers and Delta channels as additional sources of 17 supply; (3) failure to treat the Delta as its own supply and demand area; and (4) failure to account 18 for Delta hydrodynamics and residence time. (Water Unavailability Methodology for the Delta 19 Watershed (June 2021), attached hereto as Exhibit F, at pp. 10-11, 23-25, 37-38, 49-50.) In 20 addition, despite BBID's comments, SWRCB declines to include as available supply the stored 21 Project water released for instream flow that becomes abandoned after fulfilling the instream flow 22 requirement in the applicable stream reach. (Exhibit F at p. 2.) And, finally, despite the 23 availability of real-time information to inform anticipated 2021 water demands, SWRCB uses 24 historic data from 2018 and 2019 as proxy to evaluate the demand on various water rights to 25 determine available supply (Exhibit F at p. 27), which continues a practice identified as flawed in 26 Order WR 2016-0015 (Exhibit C at pp. 14-15).

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in the Delta, rendering the Notice legally unsupported.

PETITION FOR RECONSIDERATION OF NOTICE OF UNAVAILABILITY FOR POST-1914 APPROPRIATIVE WATER RIGHTS

Therefore, the Methodology is inadequate to support a water unavailability determination

1 B.

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<u>Executive Director Lacks Authority to Issue Notice</u>

The Deputy Director issued the Notice. The Notice effectively curtails BBID's post-1914 right to divert water. SWRCB has not delegated authority to the Deputy Director to issue notices of curtailments. (See SWRCB Res. No. 2012-0029.) Moreover, under Water Code section 85230, the Delta Watermaster has exclusive authority over diversions in the Delta and does not authorize delegation of his authority. Thus, the Deputy Director's attempt to curtail BBID's post-1914 water right through the Notice is beyond the scope of the Deputy Director's legal authority.

C. <u>Violation of Due Process</u>

10 While a water right is usufructuary in nature, once a post-1914 appropriative water right is 11 perfected it becomes a vested right. (See Wat. Code, § 1610 [SWRCB's issuance of license 12 confirms the right to appropriate water].) As such, BBID's post-1914 appropriative water right is 13 subject to procedural due process protection including proper notice and the opportunity to be 14 heard. While BBID's license provides the terms by which it may be modified and the amount of 15 water diverted reduced to prevent waste and unreasonable use, protect the public trust, or meet 16 water quality objectives, it also provides that notice and opportunity for hearing are required. 17 (Amended License for Diversion and Use of Water, Permit 270, License 1381 (Aug. 19, 2020) attached hereto as Exhibit G, at p. 2.) SWRCB attempts to circumvent BBID's due process rights 18 19 by declaring water unavailable and all diversions under a post-1914 appropriative water right per 20 se illegal, resulting in the same effect as modification of BBID's license under the 21 aforementioned terms without any of the requisite due process. SWRCB, in curtailing BBID's 22 post-1914 appropriative water right by issuing the Notice, failed to provide BBID a hearing or 23 other opportunity to challenge the Notice. SWRCB and/or its Executive Director made the 24 decision to curtail BBID's post-1914 appropriative water right outside of any public process and 25 did not provide a notice, hearing, or administrative proceeding to BBID. By failing to provide 26 BBID with proper notice and a meaningful opportunity to be heard regarding the factual and legal 27 basis for issuing the Notice, SWRCB and/or its Executive Director deprived BBID of due process 28 to which it is entitled, constituting a failure to proceed in a manner required by law. (Code of

1 Civ. Proc., § 1094.5, subds. (1	(b), ((f).)
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2 D. SWRCB Failed to Comply with the Governor's Order 3 On May 10, 2021, Governor Gavin Newsom issued a Proclamation of a State of Emergency, which provides, among other things, that SWRCB "shall consider emergency 4 5 regulations to curtail water diversions when water is not available at water right holders' priority 6 of right or to protect releases of stored water." Contrary to this direction, SWRCB did not adopt 7 emergency regulations authorizing the issuance of curtailments. Instead, it curtailed all post-1914 8 appropriative water right holders' diversions in the Delta unilaterally and outside of a rulemaking, 9 emergency or otherwise. Thus, SWRCB failed to comply with the Governor's May 10, 2021 10 Proclamation, resulting in unauthorized and unlawful curtailment of BBID's water rights. 11 **III. CONCLUSION** 12 For the foregoing reasons, the Notice is unlawful and unsupported. Petitioner requests 13 that SWRCB rescind the Notice. 14 SOMACH SIMMONS & DUNN 15 Professional Corporation A 16 17 Dated: July 15, 2021 By

By: Michael E. Vergara Attorneys for Petitioner/Plaintiff Byron-Bethany Irrigation District

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EXHIBIT C




******* NOTICE *******

<u>Please read the following information carefully.</u> The staff of the State Water Resources Control Board (State Water Board or Board) is proposing an emergency regulation that, if adopted and approved, may affect the ability of water right holders in the Sacramento-San Joaquin Delta (Delta) watershed to divert water. This notice includes information on how to participate in public discussion and provide comments regarding the proposed emergency regulation. The notice also includes an update on water availability for pre-1914 appropriative and certain riparian water right claimants. The emergency regulation will be presented for review and possible adoption at the State Water Board's August 3, 2021 public meeting. Information on how to participate in or view that meeting is also included in this notice.

NOTICE OF AVAILABILITY OF DRAFT EMERGENCY CURTAILMENT AND REPORTING REGULATION FOR THE SACRAMENTO-SAN JOAQUIN DELTA (DELTA) WATERSHED FOR PUBLIC REVIEW AND COMMENT AND NOTICE OF WATER UNAVAILABILITY FOR SENIOR WATER RIGHT CLAIMS IN THE DELTA WATERSHED

NOTICE IS HEREBY GIVEN that due to extreme water shortage conditions in the Delta watershed, the State Water Board has developed and released for public review and comment the text of a draft emergency water right curtailment and reporting regulation which, if adopted, may directly affect the exercise of water rights in the Delta watershed.

NOTICE IS ADDITIONALLY HEREBY GIVEN that, as described further below, the State Water Board has determined, based on the best information available to the Board, that water supply is currently insufficient to support lawful diversion of any water under some pre-1914 appropriative water right claims and similarly insufficient to support full diversions by some riparian claims in the Delta watershed.

1001 | Street, Sacramento, CA 95814 | Mailing Address: P.O. Box 100, Sacramento, CA 95812-0100 | www.waterboards.ca.gov

BACKGROUND

On May 10, 2021, Governor Newsom issued a Proclamation of a State of Emergency due to drought in 41 counties, including those in the Delta watershed. On July 8, 2021, the Governor issued an expanded Proclamation of a State of Emergency for 9 additional counties and called upon Californians to voluntarily reduce their water use by 15 percent compared to the same period in 2020.

To ensure protection of water needed for health, safety, and the environment, the May 10, 2021 Proclamation directs the State Water Board to consider adoption of an emergency regulation to curtail water diversions in the Delta watershed when water is not available at water right holders' priority of right and to protect releases of previously stored water.

On June 15, 2021, the State Water Board sent Notices of Water Unavailability to all water right holders in the Delta watershed, alerting all post-1914 appropriative water right holders that the Board had determined, based on the best information available to the Board, that water was not available to serve their priorities. The June 15 notice also warned all pre-1914 appropriative and riparian water right claimants in the Delta watershed of impending water unavailability based on worsening drought conditions and the resulting likelihood of consideration of an emergency regulation to curtail water use throughout the Delta watershed.

The draft emergency regulation is scheduled to be considered by the State Water Board at its **August 3, 2021** meeting. If adopted by the State Water Board, the emergency regulation will be submitted to the Office of Administrative Law for a public comment period, review, and requested approval. If approved, the emergency regulation would become effective upon submittal to the Secretary of State as early as mid to late August 2021. The emergency regulation would remain in effect for up to one year but could be repealed if hydrologic conditions improve, or readopted if drought conditions continue through next year.

DRAFT EMERGENCY REGULATION TEXT AVAILABILITY, STAFF WORKSHOP, AND PUBLIC COMMENT

The draft text of the proposed emergency regulation is posted under the Emergency Curtailment Regulations section of the Delta Watershed Drought Information webpage at: https://www.waterboards.ca.gov/drought/delta/

The proposed emergency regulation would require water right holders in the Delta watershed to curtail their diversions when the State Water Board determines, based on the best information available to the Board, that water is not available to serve certain priorities of water rights. The emergency regulation would also allow the Board to require water right holders to provide additional information related to their diversion and use of water.

State Water Board staff will hold a public workshop on **July 27, 2021 from 1:00 p.m. to 5:00 p.m.** to provide information and to receive public input on the proposed emergency regulation. For more information and instructions to participate, please see the Notice of Staff Workshop available under the Announcements section on the Delta Watershed Drought Information webpage at: https://www.waterboards.ca.gov/drought/delta/

Written comments related to the draft emergency regulation text must be submitted to <u>commentletters@waterboards.ca.gov</u>, with a **copy** to <u>Bay-Delta@waterboards.ca.gov</u> by **12:00 noon on July 29, 2021,** to be considered before the August 3, 2021 Board Meeting.

Interested parties will have the opportunity to provide oral comment at the July 27, 2021 staff workshop and at the August 3, 2021 Board meeting. For instructions to participate in the August 3, 2021 Board Meeting, please see the Board's Remote Meeting webpage at: https://www.waterboards.ca.gov/board_info/remote_meeting/

WATER UNAVAILABILITY FOR SENIOR WATER RIGHT CLAIMS

The June 15, 2021 Notices of Water Unavailability applicable to all post-1914 appropriative water rights in the Delta watershed remain effective. In addition, updated information available to the Board, evaluated through the Water Unavailability Methodology (described below), indicates that water supply is currently insufficient to support lawful diversions under most senior claims of right (claims identified in Initial Statements of Water Diversion and Use). Specifically, as of the date of this notice, the best information available to the Board indicates that water is **not available** for:

- All post-1914 appropriative water rights in the Delta watershed (inclusive of the Sacramento River and San Joaquin River watersheds);
- All pre-1914 appropriative water right claims in the San Joaquin River watershed;
- All pre-1914 appropriative water right claims in the Sacramento River watershed with a priority date of 1883 or later; and
- Some pre-1914 appropriative water right claims in specific Sacramento River tributary sub-watersheds with a priority date earlier than 1883. These claims face water unavailability either due to limited local supplies or the need to bypass natural flows so that more senior rights downstream can be met.

All of the pre-1914 appropriative water right claims for which current information indicates that water is unavailable are identified on a **List of Noticed Pre-1914 Appropriative Water Right Claims**, which can be found under the Notices of Water Unavailability section on the Delta Watershed Drought Information webpage at: https://www.waterboards.ca.gov/drought/delta/

The best information available to the Board, evaluated using the Water Unavailability Methodology, indicates that, as of the date of this notice, water supply is insufficient to meet the demands of all riparian claims of right in the following watersheds and sub-watersheds:

 San Joaquin River watershed: In the months of July, August, and September 2021, demands under riparian water right claims will face a total deficit of approximately 197,000 acre-feet, 170,000 acre-feet, and 73,000 acrefeet, respectively. This amounts to a deficit of supply compared to riparian demand in the San Joaquin River watershed of approximately 82 percent in July, 91 percent in August, and 85 percent in September.

- Bear River sub-watershed: In the months of July and August 2021, demands under riparian water right claims will face a total deficit of approximately 79 acrefeet and 370 acre-feet, respectively. This amounts to a deficit of supply compared to riparian demand in the Bear River sub-watershed of approximately 9 percent in July and 42 percent in August.
- Upper American River sub-watershed: In the month of September 2021, demands under riparian water right claims will face a total deficit of approximately 687 acre-feet. This amounts to a deficit of supply compared to riparian demand in the Upper American River sub-watershed of approximately 100 percent in September.
- Putah Creek sub-watershed: In the month of July 2021, demands under riparian water right claims will face a total deficit of approximately 177 acre-feet. This amounts to a deficit of supply compared to riparian demand in the Putah Creek sub-watershed of approximately 7 percent in July.

In times of such supply shortage, riparian users are required to share the shortage on a correlative basis. Accordingly, riparian claims are not individually listed. These numbers include projections through September 2021 and may be updated as new information becomes available.

The State Water Board is using its updated Water Unavailability Methodology for the Delta Watershed (Methodology) to identify which water rights in the Delta watershed face insufficient supplies to support diversion. For further information regarding the Methodology, please visit the Methodology webpage at:

https://www.waterboards.ca.gov/waterrights/water_issues/programs/drought/drought_to ols_methods/delta_method.html

FUTURE COMMUNICATIONS REGARDING WATER SUPPLY CONDITIONS

If the State Water Board adopts and the Office of Administrative Law approves an emergency curtailment and reporting regulation, the emergency regulation will update the method of communicating with water right holders, including for when curtailments are imposed and lifted based on evolving water supply and demand conditions. Under the proposed emergency regulation, such communication will be exclusively by electronic means.

For further information regarding drought in the Delta watershed, you are strongly encouraged to subscribe to the Delta Drought list on the State Water Board's Email Lists webpage at:

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Additionally, the State Water Board urges you to frequently visit the Delta Watershed Drought Information webpage, where additional information will also be posted: https://www.waterboards.ca.gov/drought/delta/

Please note that, if adopted and approved, the draft emergency regulation will require water users to subscribe to the Delta Drought list or to frequently visit the Board's Delta Watershed Drought Information webpage for updates.

POTENTIAL ENFORCEMENT

This Notice of Water Unavailability is solely informational. It alerts water users that the best information available to the Board, evaluated through the Methodology, indicates that water is not available to serve the water right claims listed on the Delta Watershed Drought Information webpage at: https://www.waterboards.ca.gov/drought/delta/

This notice also reminds water users of their obligations under California's water rights system. However, this notice is not an order or directive from the State Water Board to stop diverting.

California water law provides that it is unlawful to divert when water is unavailable under a priority of right or according to the nature of a right/claim. Diverting water that is not lawfully available under your water right may subject you to an enforcement proceeding in which you will have the opportunity to present evidence but through which you could be ordered to cease such diversion and/or to pay administrative fines as high as \$1,000 per day of violation and \$2,500 for each acre-foot of water unlawfully diverted. You could also face prosecution in court. (See Wat. Code, §§ 1052, 1055.)

CONTACT AND RESOURCES

If you have any questions regarding this notice or related efforts, you may send an email to <u>Bay-Delta@waterboards.ca.gov</u>, or call the Delta Drought phone line at (916) 319-0960.

July 23, 2021

Date

anine Joursend

Jeanine Townsend Clerk to the Board

EXHIBIT D





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CONTACT AND RESOURCES

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July 23, 2021

Date

anine Joursend

Jeanine Townsend Clerk to the Board

EXHIBIT E

Enhanced Water Use Reporting and Curtailment of Diversions due to Lack of Water Availability in the Sacramento – San Joaquin Delta Watershed

In Title 23, Division 3, Chapter 2, Article 24, amend the title of Article 24, add Sections 876, 876.1, and 878.2, and amend Sections 877.1, 878, 878.1, 879, 879.1 and 879.2 to read:

Article 24. Curtailment of Diversions <u>due</u> to Protect Water Supplies and Threatened and Endangered Fish in the Russian River Watershed <u>Drought Emergency</u>

<u>§ 876 [Reserved]</u>

§ 876.1 Emergency Curtailments Due to Lack of Water Availability in the Sacramento-San Joaquin Delta Watershed

- (a) This section applies to direct diversions and diversions to storage, of natural and abandoned flows, in the Delta Watershed as defined in section 877.1.
- (b) After the effective date of this regulation, when flows are determined to be insufficient to support all diversions, the Deputy Director as defined in section 877.1 may issue curtailment orders as defined in section 877.1 to water right holders and claimants in the Delta Watershed in order of water right priority, requiring the curtailment of water diversion under designated water rights and claims, except as provided in sections 878, 878.1, and 878.2. Before issuing curtailment orders to water right holders and claimants in the Legal Delta, the Deputy Director will consult with and obtain the concurrence of the Delta Watermaster.
- (c) Initial orders requiring curtailment or reporting will be mailed to each water right holder, claimant, or the agent of record on file with the State Water Board, Division of Water Rights within the Delta watershed. The initial orders will require reporting in accordance with section 879, subdivision (d)(1) and will either require curtailment or will instruct water right holders or claimants regarding procedures for potential future curtailments. The water right holder, claimant, or agent of record is responsible for immediately providing notice of the orders to all diverters exercising the water right or claim covered by the orders. Communications regarding changes in water availability, including notification of

when curtailments of water diversions are required and when curtailments are temporarily suspended or reimposed, will be provided by email to the State Water Board's Delta Drought email distribution list and by posting on the State Water Board's drought webpage. Notice provided by email and by posting on the State Water Board's drought webpage shall be sufficient for all purposes related to required curtailments and reporting pursuant to this section and section 879.

- (d) In determining whether water is unavailable under a water right holder or claimant's priority of right and whether to order curtailment of water diversions under specific water rights, the Deputy Director will consider:
 - (1) Relevant available information regarding date of priority, including but not limited to claims of first use in statements of water diversion and use, judicial and State Water Board decisions and orders, and other information contained in the Division of Water Rights' files. Absent evidence to the contrary, riparian water rights are presumed senior to appropriative water rights for the purposes of curtailments pursuant to this section.
 - (2) Monthly water right demand projections based on reports of water use for permits and licenses, or statements of water diversion and use, from calendar years 2018, 2019, or 2020.
 - (3) Monthly water right demand projections based on information submitted in response to an informational order issued under section 879, subdivision (d).
 - (4) Water supply projections based on the following sources of forecasted supply data:
 - (A) Monthly full natural flow forecasts contained in the Department of Water Resources' California Cooperative Snow Surveys Bulletin 120 Water Supply Forecast, where available;
 - (B) Daily full natural flow forecasts from the California Nevada River Forecast Center, where data is not available in the Bulletin 120 Water Supply Forecasts; and
 - (C)Other available and reliable data on projected or actual precipitation and runoff events that may inform water availability at a monthly or sub-monthly scale.

- (5) Relevant available information regarding stream system disconnection where curtailing diversions would not make water available to serve senior downstream water rights or claims, including seasonal or temporary disconnections.
- (6) The Deputy Director may also consider any other pertinent, reliable, and publicly available information when determining water right priorities, water availability, water supply projections, and demand projections.
- (7) Evaluation of available water supplies against demands may be performed using the Water Unavailability Methodology for the Delta Watershed, or comparable tools. The Water Unavailability Methodology for the Delta Watershed is described in the Water Unavailability Methodology for the Delta Watershed report dated July 23, 2021, which is hereby incorporated by reference. Evaluation of available supplies against demands may be performed at the Hydrologic Unit Code level 4 Sacramento and Hydrologic Unit Code level 4 San Joaquin River watershed scale, or at the subwatershed scale. Subwatersheds within the Delta Watershed are defined in the July 23, 2021 Water Unavailability Methodology for the Delta Watershed summary report and were established based on Hydrologic Unit Code level 8 watersheds.
- (e) Upon receipt of an initial order pursuant to this section, a water right holder or claimant may submit information to the Deputy Director to: support a proposed correction to the water right priority date of the right for which the order was issued; or propose that curtailment may not be appropriate for a particular diverter or in a specific stream system as demonstrated by verifiable circumstances, such as a system that has been adjudicated or is disconnected and curtailment would not make water available to serve senior downstream water rights or claims. Any such proposals and all supporting information and analysis shall be submitted to the Deputy Director within 14 days of receipt of the initial order. Proposals, supporting information, and analyses submitted more than 14 days after receipt of an initial order may be considered to support corrections in advance of future curtailments. The Deputy Director will review timely-provided proposals and supporting information and analyses as soon as practicable, make a determination regarding the proposal, and inform the affected water right holder or claimant of any appropriate update for purposes of water diversion curtailment orders. Before making any determinations within the Legal Delta, the Deputy Director will consult with the Delta Watermaster.

- (f) Water right holders and claimants in the Delta Watershed must either subscribe to the Delta Drought email distribution list referenced in subdivision (c) or frequently check the State Water Board's drought webpage to receive updated information regarding water diversion curtailment and reporting orders and water unavailability.
- (g) The Deputy Director will temporarily suspend curtailments for some diverters, in order of water right priority, when water availability increases or is projected to increase due to precipitation and runoff events or due to reductions in demand, and the Deputy Director determines that such increased water availability warrants a suspension. The Deputy Director will consider the best available information, such as water supply forecasts from the California Department of Water Resources and other similarly reliable sources, to determine the geographic scope and duration of suspension. By no later than October 1, 2021, and by no more than every 30 days thereafter, the Deputy Director will promptly consider reliable and publicly available information that supports suspension, extension of suspension, or reimposition of curtailments of water diversions, and will publicly issue an update explaining any decisions resulting from the consideration of that information.
- (h) All curtailment orders issued under this section shall be subject to reconsideration under article 2 (commencing with section 1122) of chapter 4 of part 1 of division 2 of the California Water Code.

Reference: Cal. Const., Art. X, § 2; Sections 100, 100.5, 104, 105, 275, 1058.5, Water Code; El Dorado Irrigation Dist. v. State Water Resources Control Board (2006) 142 Cal.App.4th 937; Light v. State Water Resources Control Board (2014) 226 Cal.App.4th 1463; Stanford Vina Ranch Irrigation Co. v. State of California (2020) 50 Cal.App.5th 976.

§ 877.1 Definitions

- (a) "Curtailment Order" refers to an order from the Deputy Director of the Division of Water Rights ordering a water right holder to cease diversions.
- (b) "Deputy Director" refers to the Deputy Director of the Division of Water Rights, or duly authorized designee, at the State Water Resources Control Board.

- (c) "Flood Control District" refers to the Mendocino County Russian River Flood Control and Water Conservation Improvement District.
- (d) "Lower Russian River" refers to the surface waters, including underflow and subterranean streams, of the Russian River downstream of the confluence of Dry Creek and the Russian River.
- (e) "Lower Russian River Watershed" refers to the area in Sonoma County that drains towards Dry Creek and the area downstream of the confluence of the Russian River and Dry Creek that drains towards the outlet of the Russian River to the Pacific Ocean.
- (f) "Mainstem of the Upper Russian River" refers to the surface waters, including underflow and subterranean streams, of the Upper Russian River downstream of Lake Mendocino and upstream of the confluence of Dry Creek and the Russian River.
- (g) "Minimum human health and safety needs" refers to the amount of water necessary for prevention of adverse impacts to human health and safety, for which there is no feasible alternate supply. "Minimum human health and safety needs" include:
 - (1) Indoor domestic water uses including water for human consumption, cooking, or sanitation purposes. For the purposes of this article, water provided outdoors for human consumption, cooking, or sanitation purposes, including but not limited to facilities for unhoused persons or campgrounds, shall be regarded as indoor domestic water use. As necessary to provide for indoor domestic water use, water diverted for minimum human health and safety needs may include water hauling and bulk water deliveries, so long as the diverter maintains records of such deliveries and complies with the reporting requirements of Section 879, and so long as such provision is consistent with a valid water right.
 - (2) Water supplies necessary for energy sources that are critical to basic grid reliability, as identified by the California Independent System Operator, California Public Utilities Commission, California Energy Commission, or a similar energy grid reliability authority.
 - (3) Water supplies necessary to prevent tree die-off that would contribute to fire risk to residences, and for maintenance of ponds or other water sources for fire fighting, in addition to water supplies identified by the

California Department of Forestry and Fire Protection or another appropriate authority as regionally necessary for fire preparedness.

- (4) Water supplies identified by the California Air Resources Board, a local air quality management district, or other appropriate public agency with air quality expertise, as necessary to address critical air quality impacts to protect public health.
- (5) Water supplies necessary to address immediate public health or safety threats, as determined by a public agency with health or safety expertise.
- (6) Other water uses necessary for human health and safety which a state, local, tribal or federal health, environmental, or safety agency has determined are critical to public health and safety or to the basic infrastructure of the state. Diverters wishing to continue diversions for these uses must identify the health and safety need, include approval or similar relevant documentation from the appropriate public agency, describe why the amount requested is critical for the need and cannot be met through alternate supplies, state how long the diversion is expected to continue, certify that the supply will be used only for the stated need, and describe steps taken and planned to obtain alternative supplies.
- (h) "State Water Board" refers to the State Water Resources Control Board.
- (i) "Upper Russian River" refers to the surface waters, including underflow and subterranean streams, of the Russian River upstream of the confluence of the Russian River and Dry Creek and includes both the East and West Forks of the Russian River.
- (j) "Upper Russian River Watershed" refers to the area located in Mendocino and Sonoma Counties that drains towards the confluence of Dry Creek and the Russian River.
- (k) <u>"Delta Watershed" or "Sacramento-San Joaquin Delta Watershed" refers to the</u> <u>Hydrologic Unit Code level 4 Sacramento and the Hydrologic Unit Code level 4</u> <u>San Joaquin subregions, as defined using the U.S. Geological Survey Hydrologic</u> <u>Units Dataset.</u>
- (I) <u>"Legal Delta" has the same meaning as the Sacramento-San Joaquin Delta, as</u> defined in Water Code section 12220.

- (m) <u>"Informational Order" refers to an order issued by the Deputy Director which</u> orders reporting of water diversion and use information in the Delta Watershed to inform water unavailability determinations and to support the curtailment process described in section 876.1.
- (n) <u>"Delta Watermaster" has the same meaning as in Water Code section 85230.</u>

Reference: Cal. Const., Art., X § 2; Sections 100, 100.5, 104, 105, 106.3, 275, 1058.5, <u>12220, 85230,</u> Water Code; *Environmental Defense Fund v. East Bay Muni. Util. Dist.* (1980) 26 Cal.3d 183.

§ 878. Non-Consumptive Uses

Diversion and use described in this section under any valid basis of right may continue after issuance of a curtailment order without further approval from the Deputy Director, subject to the conditions set forth in this section. Diversions described in this section may not be required to curtail in response to a curtailment order under this article if their diversion and use of water does not decrease downstream flows. Any diverter wishing to continue diversion under this <u>section subdivision</u> must submit to the Deputy Director a certification, under penalty of perjury, which describes the non-consumptive use <u>of water</u> and explains, with supporting evidence, how the diversion and use do not decrease downstream flows in the applicable watershed. The Deputy Director may request additional information or disapprove any certification if the information provided is insufficient to support the statement or if more convincing evidence contradicts the claims. If a certification submitted pursuant to this section is disapproved, the diversions are subject to any curtailment order issued for that basis of right. This section applies to:

- (a) Direct diversions solely for hydropower if discharges are returned to the <u>source</u> <u>stream</u> Russian River or its tributaries and water is not held in storage.
- (b) Direct diversions dedicated to instream uses for the benefit of fish and wildlife pursuant to Water Code section 1707, including those that divert water to a different location for subsequent release, provided the location of release is hydraulically connected to the <u>source stream</u>Russian River.

- (c) For curtailment orders issued under sections 877.2 and 877.3, dDirect diversions where the Deputy Director, the California Department of Fish and Wildlife, and the Executive Officer of the North Coast Regional Board have approved a substitution of releases of either stored water or groundwater into the Russian River or a tributary thereof for the benefit of fish and wildlife such that there is not a net decrease in stream flow as a result of the diversion at the next downstream USGS gage. The rate of releases made pursuant to this subdivision must be measured daily using a device or measurement method approved by the Deputy Director and provided to the Deputy Director on a monthly basis. Proposals involving the release of groundwater shall provide sufficient data and information to reasonably quantify any depletions of surface water caused by the groundwater pumping, the potential time lags of those depletions, and if additional groundwater releases beyond the diversion amounts are able to offset those depletions. The release of water does not have to be conducted by the owner of the water right proposed for the continued diversions, provided an agreement between the water right holder and the entity releasing the water is included in the proposal.
- (d) Other direct diversions solely for non-consumptive uses, if those diverters file with the Deputy Director a certification under penalty of perjury demonstrating that the diversion and use are non-consumptive and do not decrease downstream flows in the watershed.
- (e) Direct diversions located within the Legal Delta used exclusively to irrigate lands entirely below sea level when comparison of diversion and drainage records provide substantial evidence that continued irrigation of those lands does not increase net channel depletions.

Reference: Cal. Const., Art. X, § 2; Sections 100, 187, 275, 348, <u>85003, subdivisions</u> (a) and (b), Water Code

§ 878.1 Minimum Human Health and Safety Needs

- (a) Diversions described in this section under any valid basis of right may be authorized to continue after issuance of a curtailment order, subject to the conditions set forth in this section. A diversion that would otherwise be subject to curtailment may be authorized if:
 - (1) The diversion is necessary for minimum human health and safety needs; and therefore,

- (2) The diversion is necessary to further the constitutional policy that the water resources of the state be put to beneficial use to the full extent they are capable, and that waste and unreasonable use be prevented, notwithstanding the effect of the diversions on more senior water rights or instream beneficial uses.
- (b) (1) Diversions for minimum human health and safety needs under any valid basis of right of not greater than 55 gallons per person per day may continue after issuance of a curtailment order without further approval from the Deputy Director, subject to the conditions set forth in this section. Any diverter wishing to continue diversion under this subdivision must submit to the Deputy Director certification, under penalty of perjury, of compliance with the requirements of subdivisions (b)(1)(A)-(E), below. The Deputy Director may request additional information or set additional requirements on continued diversion.
 - (A) Not more than 55 gallons per person per day will be diverted under all bases of right.
 - (B) The diversion is necessary to serve minimum human health and safety needs as defined in section 877.1, subdivision (g), after all other alternate sources of water have been used. To the extent other water sources are available, those sources will be used first and the total used will not exceed 55 gallons per person per day.
 - (C) The diverter and all end users of the diverted water are operating under the strictest existing conservation regime for that place of use, if such a plan exists for the area or service provider, or shall be operating under such regime within 30 days. If additional approvals are required before implementation of the conservation regime, the diverter must certify that all possible steps will be taken immediately to ensure prompt approval.
 - (D) If the diverter is a distributor of a public water supply under Water Code sections 350 et seq., that it has declared a water shortage emergency condition and either already has adopted regulations and restrictions on the delivery of water or will adopt conservation and water delivery restrictions and regulations within a timeframe specified by the Deputy Director as a condition of certification.

- (E) The diverter has either pursued steps to acquire other sources of water, but has not yet been completely successful, as described in an attached report, or the diverter will pursue the steps in an attached plan to identify and secure additional water.
- (2) To the extent that a diversion for minimum human health and safety needs requires more than 55 gallons per person per day, the continued diversion of water after issuance of a curtailment order for the diversion requires submission of a petition demonstrating compliance with the requirements of subdivisions (b)(2)(A)-(F), below, and approval by the Deputy Director. The Deputy Director may condition approval of the petition on implementation of additional conservation measures and reporting requirements. Any petition to continue diversion to meet minimum human health and safety needs of more than 55 gallons per person per day must:
 - (A) Describe the specific circumstances that make the requested diversion amount necessary to meet minimum human health and safety needs, if a larger amount is sought.
 - (B) Estimate the amount of water needed.
 - (C)Certify that the supply will be used only for the stated need.
 - (D) Describe any other additional steps the diverter will take to reduce diversions and consumption.
 - (E) Provide the timeframe in which the diverter expects to reduce usage to no more than 55 gallons per person per day, or why minimum human health and safety needs will continue to require more water.
 - (F) As necessary, provide documentation that the use meets the definition of minimum human health and safety needs provided in subdivision (g) of section 877.1.
- (c) For public water systems with 15 or greater connections and small water systems of 5 to 15 connections, gallons per person per day shall be calculated on a monthly basis and the calculation methodology shall be consistent with the State Water Board's "Guidance for Estimating Percentage Residential Use and Residential Gallons Per Capita Daily" dated September 22, 2020.

- (d) Diversions for minimum human health and safety needs that cannot be quantified on the basis of an amount per person per day require a petition and approval from the Deputy Director. The Deputy Director may approve a such a petition under this subdivision or subdivision (b)(2) upon a finding that the petition demonstrates that the requested diversion is in furtherance of the constitutional policy that the water resources of the state be put to beneficial use to the full extent they are capable, and that waste and unreasonable use be prevented, notwithstanding the effect of the diversion on senior water rights or instream beneficial uses, and may condition approval as appropriate to ensure that the diversion and use are reasonable and in the public interest.
- (e) To the extent necessary to resolve immediate public health or safety threats, a diversion subject to a curtailment order may continue while a petition under subdivision (b)(2) or (d) is being prepared and is pending. The Deputy Director may require additional information to support the initial petition, information on how long the diversion is expected to continue, and a description of other steps taken or planned to obtain alternative supplies.
- (f) Notice of certification, petitions, and decisions under this section and section 878 will be posted as soon as practicable on the State Water Board's drought webpage. The Deputy Director may issue a decision under this article prior to providing notice.
- (g) Diversion and use within the Russian River Watershed <u>or Delta Watershed</u> that deprives water for minimum human health and safety needs in 2021, or which creates unacceptable risk of depriving water for minimum human health and safety needs in 2022, is an unreasonable use of water. The Deputy Director shall prevent such unreasonable use of water by implementing the curtailment methodology described in section 877.2 for diversions in the Lower Russian River Watershed<u>and</u>, sections 877.3, 877.4, 877.5, and 877.6 for diversions in the Upper Russian River Watershed, and section 876.1 for <u>diversions in the Delta Watershed</u>.

Reference: Cal. Const., Art. X, § 2; Sections 100, 100.5, 104, 105, 106.3, 275, 1058.5, Water Code; *Environmental Defense Fund v. East Bay Muni. Util. Dist.* (1980) 26 Cal.3d 183; *Light v. State Water Resources Control Board* (2014) 226 Cal.App.4th 1463; *Stanford Vina Ranch Irrigation Co. v. State of California* (2020) 50 Cal.App.5th 976.

§ 878.2 Alternative Water Sharing Agreements

Water users may propose alternatives to water diversion curtailment that achieve the purposes of the curtailment process described under section 876.1 by submitting a proposal to the Deputy Director, Proposals must describe the setting, the parties, the actions, the provisions for monitoring, record keeping and reporting, and the purported benefits of the proposal in sufficient detail to demonstrate to the satisfaction of the Deputy Director that implementing the proposal will not injure non-party legal users of water or result in an unreasonable impact on fish and wildlife. In considering a proposal under this section, the Deputy Director may request additional information or consult with other entities that may have technical or legal information that should be considered in evaluating such proposals, including but not limited to the California Department of Water Resources (DWR) and United States Bureau of Reclamation (Reclamation). The Deputy Director will consult with the Delta Watermaster on any proposals among diverters within the Legal Delta. A proposal may be implemented pending review by the Deputy Director provided that potentially affected water right holders and claimants, including but not limited to DWR and Reclamation, concur with the proposal and no objections to the proposal are submitted to the Deputy Director. The Deputy Director may approve a proposal subject to conditions, including record keeping and reporting requirements, and provided that the Deputy Director finds implementing the proposal will not injure non-party legal users of water or result in an unreasonable impact on fish and wildlife. Diversions consistent with a proposal implemented or approved pursuant to this section are subject to this article, and violations of the terms of the proposal shall be subject to enforcement as a violation of this article or as an unauthorized diversion or use of water.

Notice of proposals and decisions under this section will be posted as soon as practicable on the State Water Board's Delta drought webpage. The Deputy Director may issue a decision under this section prior to providing such notice. Any interested person may file a comment or objection to the proposal or decision with the Deputy Director with simultaneous service to the parties who submitted the proposal. The Deputy Director will consider any comment or objection. The State Water Board may hold a hearing on any proposal to which parties have objected, after notice to all interested persons.

Authority: Sections 1058, 1058.5, Water Code

<u>Reference:</u> Cal. Const., Art. X, § 2; Sections 100, 109, 275, 1011, 1011.5, 1051.5, Water Code; City of Barstow v. Mojave Water Agency (2000) 23 Cal.4th 1224.

§ 879. Reporting

- (a) All water right holders issued a curtailment order under this article section <u>877.2 or 877.3</u> are required, within seven calendar days <u>of the date of the</u> <u>curtailment order</u>, to submit under penalty of perjury a certification of one or more of the following actions taken in response to the curtailment order, certifying, as applicable, that:
 - (1) Diversions under the water right(s) identified have ceased;
 - (2) Any continued use is under other water rights not subject to curtailment, specifically identifying those other rights, including the basis of right and quantity of diversion;
 - (3) Diversions under the water right(s) identified continue only to the extent that they are non-consumptive uses for which a certification for continued diversion has been submitted as specified in section 878;
 - (4) Diversions under the water right(s) identified continue only to the extent that they are to provide for minimum human health and safety needs, a certification has been filed as authorized under section 878.1, subdivision (b)(1), and the subject water right authorizes the diversion in the absence of a curtailment order; or
 - (5) Diversions under the water right(s) identified continue only to the extent that they are consistent with a petition filed under section 878.1, subdivision (b)(2) or (d), and diversion and use will comply with the conditions for approval of the petition.
- (b) All water users or water right holders whose continued diversion may be authorized under section 878.1 are required to submit, under penalty of perjury, information identified on a schedule established by the Deputy Director as a condition of certification or petition approval. The required information may include, but is not limited to, the following:
 - (1) The water right identification numbers under which diversions continue
 - (2) How the diverter complies with any conditions of continued diversion, including the conditions of certification under section 878.1, subdivision (b)(1);

- (3) Any failures to comply with conditions, including the conditions of certification under section 878.1, subdivision (b)(1), and steps taken to prevent further violations;
- (4) Conservation and efficiency efforts planned, in the process of implementation, and implemented, as well as any information on the effectiveness of implementation;
- (5) Efforts to obtain alternate water sources;
- (6) If the diversion is authorized under an approved petition filed pursuant to section 878.1, subdivision (b)(2), progress toward implementing the measures imposed as conditions of petition approval;
- (7) If the diversion is authorized under section 878.1, subdivision (d):(A) The rate of diversion if it is still ongoing;
 - (B) Whether the water has been used for any other purpose; and
 - (C) The date diversion ceased, if applicable.
- (8) The total water diversion for the reporting period and the total population served for minimum human health and safety needs. The total population must include actual or best available estimates of external populations not otherwise reported as being served by the water right holder, such as individuals receiving bulk or hauled water deliveries for indoor water use.
- (9) Diversion amounts for each day in acre-feet per day, maximum diversion rate in cubic feet per second, and anticipated future daily diversion amounts and diversion rates.
- (c) The Deputy Director, or delegee, may issue an order under this article requiring any person to provide additional information reasonably necessary to assess their compliance with this article. Any person receiving an order under this subdivision shall provide the requested information within the time specified by the Deputy Director, but not less than five (5) days.
- (d) This subdivision applies to Delta Watershed curtailment orders and enhanced reporting to inform water unavailability determinations and the curtailment process described under section 876.1.

- (1) All water right holders and claimants issued an initial order pursuant to section 876.1 are required, within the deadlines specified in the initial order but no sooner than seven calendar days following issuance of the order, to submit under penalty of perjury a certification that they have and will continue to take actions needed to comply with section 876.1, including the following actions:
 - (A) Regularly reviewing information posted on the State Water Board's drought webpage to determine when curtailments are required and when curtailments are suspended or reimposed, or subscribing to the State Water Board's Delta Drought email distribution list to receive updates directly; and
 - (B) Ceasing diversions of natural and abandoned flow when curtailments are ordered, except to the extent that continuing diversions are authorized in accordance with section 878, 878.1 or 878.2.
- (2) In addition to the requirements identified under subdivision (d)(1), the Deputy Director may require water right holders and claimants who have been issued an initial order under section 876.1 and whose water right or claim has a total authorized face value or recent annual reported diversion amount of one thousand acre-feet or greater to report the following information by the date specified by the Deputy Director, but no earlier than seven days after receipt of the reporting order and as specified thereafter:
 - (A) Prior diversions, including direct diversions and diversions to storage. Diversion volumes shall be provided in a daily, weekly, or monthly format, as identified in the order.
 - (B) Demand projections for subsequent months, including direct diversions and diversions to storage. Diversion volumes shall be provided in a daily, weekly, or monthly format, as identified in the order.
 - (C)Before issuing orders issued pursuant to subdivision (d)(2) to water right holders and claimants in the Legal Delta, the Deputy Director will consult with and obtain the concurrence of the Delta Watermaster.

- (3) In order to inform curtailment decisions, the Deputy Director, or the Delta Watermaster for rights in the Legal Delta, may issue informational orders under this subdivision requiring a water right holder, diverter, or user to provide additional information related to a diversion or use of water in the Delta Watershed, including but not limited to: additional reporting of water diversions and use; the basis of right with supporting documents or other evidence; property patent date for the place of use; the date of initial appropriation; anticipated or actual water transfer amounts; or any other information relevant to forecasting demands and supplies and determining compliance with curtailment orders in the current drought year or in contingency planning for continuation of the current drought emergency. Informational orders may require reporting of diversions made in prior months and diversions anticipated during subsequent months on a recurring, monthly basis.
- (4) Any water right holder or claimant receiving an order under this subdivision shall provide the requested information within the deadlines specified therein, including any recurring deadlines associated with ongoing reporting requirements as applicable. The Deputy Director, or the Delta Watermaster for rights in the Legal Delta, may grant additional time for submission of information upon substantial compliance with the specified deadline and a showing of good cause. Information provided pursuant to this subdivision shall be submitted in an online form maintained by the State Water Board and accessible through its website, or in an electronic format as specified by the Deputy Director or Delta Watermaster.
- (5) Failure to provide the information required under this subdivision within the deadlines specified in the order or any time extension granted by the Deputy Director, or the Delta Watermaster for rights in the Legal Delta, is a violation subject to civil liability of up to \$500 per day for each day the violation continues pursuant to Water Code section 1846.
- (6) In determining whether to impose reporting requirements under this subdivision, the Deputy Director and Delta Watermaster will consider the need for the information and the burden of producing it, and will take reasonable efforts to avoid requiring duplicative reporting of information that is already in the Board's possession.

Reference: Sections 100, 187, 275, 348, 1051, 1058.5, 1841, Water Code

§ 879.1. Conditions of permits, licenses and registrations

Compliance with this article, including any conditions of certification or approval of a petition under this article, shall constitute a condition of all water right permits, licenses, certificates, and registrations for diversions in the Russian River Watershed from any watershed identified in this article.

Authority: Sections 1058, 1058.5, Water Code

Reference: Cal. Const., Art. X, § 2; Sections 275, 1253, 1058.5, Water Code; *National Audubon Society v. Superior Court* (1983) 33 Cal.3d 419.

§ 879.2. Compliance and Enforcement

- (a) A diverter must comply with a curtailment order issued under this article, any conditions of certification or approval of a petition under this article, and any water right condition under this article, notwithstanding receipt of more than one curtailment order. To the extent of any conflict between applicable requirements, the diverter must comply with the requirements that are the most stringent.
- (b) Diversion or use of water in the Upper Russian River Watershed <u>or the Delta</u> <u>Watershed</u> in violation of this article constitutes an unreasonable use of water and is subject to any and all enforcement proceedings authorized by law.
- (c) Diversion or use of water in the Lower Russian River Watershed <u>or the Delta</u> <u>Watershed</u> in violation of this article is a trespass under Water Code section 1052 and shall constitute evidence of diversion or use in excess of a water user's rights.
- (d) All violations of this article shall be subject to any applicable penalties under Water Code section 1058.5. Nothing in this section shall be construed as limiting the enforceability of or penalties available under any other applicable provision of law.

Authority: Sections 1058, 1058.5, Water Code

Reference: Cal. Const., Art. X, § 2; Sections 275, 1052, 1055, 1058.5, 1825, 1831, Water Code; *National Audubon Society v. Superior Court* (1983) 33 Cal.3d 419.

EXHIBIT F



RUSSELL KAGEHIRO President Division IV

> TIM MAGGIORE Vice President Division III

LARRY ENOS, JR. Director Division I

MARK MAGGIORE Director Division II

CHARLES TUSO Director Division V

TOM PEREIRA Director Division VI

JACK ALVAREZ Director Division VII

RICK GILMORE General Manager Secretary July 29, 2021

<u>Via Electronic Mail</u> State Water Resources Control Board P.O. Box 100 Sacramento, CA 95812-0100 <u>commentletters@waterboards.ca.gov</u> <u>Bay-Delta@waterboards.ca.gov</u>

> Re: Comments on State Water Resources Control Board's July 27, 2021, Workshop for Proposed Emergency Curtailment and Reporting Regulation for the Sacramento-San Joaquin Delta Watershed and Overview of Recent Updates to the Water Unavailability Methodology for the Delta Watershed

Dear State Water Resources Control Board:

Byron-Bethany Irrigation District (BBID) appreciates the State Water Resources Control Board (State Board) providing an opportunity for stakeholders, like BBID, to learn about and comment on State Board staff's proposed Enhanced Water Use Reporting and Curtailment of Diversions due to Lack of Water Availability in the Sacramento-San Joaquin Delta Watershed (Proposed Regulation) and recent updates to the Water Unavailability Methodology for the Delta Watershed dated July 2021 (Revised Methodology). On July 20, 2021, the State Board provided a notice of staff workshop on the Proposed Regulation (Notice). The Notice states that the Revised Methodology is "planned to be used to inform curtailment decisions as described in the [Proposed] [R]egulation." (Notice, p. 1.) State Board staff released the Proposed Regulation in the late afternoon of July 23, 2021. Four calendar days later, on July 27, 2021, staff hosted the workshop on the Proposed Regulation. The deadline for written comments is noon on Thursday, July 29, 2021 – less than two days following the workshop. BBID understands that the State Board will consider adopting a resolution to approve the Proposed Regulation during its August 3, 2021, meeting, which will trigger a rapid approval process such that the Proposed Regulation may be effective as soon as August 16, 2021.

Re: Comments on Draft Emergency Curtailment and Reporting Regulation for the Sacramento-San Joaquin Delta Watershed

July 29, 2021 Page 2

BBID's consultants provided oral comments on its behalf during the workshop on the Proposed Regulation. BBID provides written comments on the Proposed Regulation and the Revised Methodology below.

General Comment:

As the State Board determined in its Order WR 2016-0015 (June 7, 2016), a water availability or unavailability analysis (e.g., the Revised Methodology) must (1) account for updates to forecasted supply and demand data, (2) document removal of unmet demand from the calculations, and (3) remove demands that were met by imported or stored water.

The Revised Methodology is one of the limited tools, and arguably the primary tool, in the Proposed Regulation to determine whether water is unavailable under a water right holder's priority of right and whether to order curtailment of water diversions. (Proposed Regulation, § 876.1, subd. (d)(6).) Given the critical nature of this essential resource, efforts to curtail its use must be based on precise and accurate information. Despite State Board staff's June 16 and July 23 modifications, the Revised Methodology still does not reflect the unique nature of the Delta as compared to other river runs, including and not limited to residence time and certain irrigation demands that may be deemed non-consumptive. BBID submits that because of assumptions in the Revised Methodology, rather than reliance on measured and modeled conditions, the use of the Revised Methodology will result in improper determinations that native water is unavailable for use and diversion in the Delta, cutting off Delta water users prematurely in favor of other water users.

In addition, BBID flags several issues that it can neither properly vet nor propose resolutions to in the truncated comment time frame.

Re: Comments on Draft Emergency Curtailment and Reporting Regulation for the Sacramento-San Joaquin Delta Watershed

July 29, 2021 Page 3

Specific Comments:

1. The Revised Methodology Relies on Inaccurate and Unanalyzed Assumptions for Residence Time of Water in the Delta

In response to the administrative civil liability complaint at issue in Order WR 2016-0015,¹ BBID provided a thorough analysis of the behavior and residence time of water within the Delta, making key points with respect to Delta hydrodynamics, which BBID incorporates herein and restates below as they remain relevant and unaddressed in the Revised Methodology.²

The Revised Methodology states, "given the extreme dry conditions that exist and have existed for a prolonged period, there is no basis to assume that any remaining storage of fresh water flows would exist in the Delta longer than the methodology's one-month time step." (Revised Methodology, § 1, p. 8.) Residence time of water in the Delta, however, is on the order of two to three months during critical years, such as 2021.

Residence time can be estimated as the volume of water in the Delta, divided by inflows to the Delta. Residence time is critical; only when residence time is considered appropriately can anyone (whether water users or the State Board and its staff) understand whether native water is available for use. If an assumed residence time is too short, that assumption may effectively cut off Delta water users, such as BBID, prematurely and favor storage users, such as the State Water Project (SWP) and/or Central Valley Project (CVP). In addition, the residence time assumption simply does not match measured and modeled conditions that are known at this time.

The bottoms of Delta channels are below sea level. So, too, is more than half of the land in the Delta. The Delta's low elevation and connection to the San Francisco Bay complex mean that water will always be present in both the Delta and Delta channels,

¹ BBID and the West Side Irrigation District (WSID) consolidated into one irrigation district, effective on September 2, 2020, and BBID is the successor district.

² Expert Report of Susan C. Paulsen, Ph.D., P.E., *Availability of Water in Old River, Sacramento-San Joaquin Delta, During Drought Conditions* (Jan. 2016) (Paulsen Expert Report).

Re: Comments on Draft Emergency Curtailment and Reporting Regulation for the Sacramento-San Joaquin Delta Watershed

July 29, 2021 Page 4

such that the volume of water in the Delta is essentially fixed. During dry conditions, when inflows are lower, the residence time is longer because there is less water flowing into and out of the Delta to "replace" water already present in the Delta. Conversely, in wet conditions when river inflows are high, water flows from the Delta to the San Francisco Bay much more quickly, and residence times are shorter.

Preliminary modeling using the Delta Simulation Model II (DSM2) confirms that during the current 2021 water year (i.e., October 1, 2020, through June 30, 2021), residence times are significantly longer than one month, and closer to two to three months. (The DSM2 modeling methodology is described in Attachment A, which also includes Figures 1 and 2 describing the source fingerprints for water at BBID's primary diversion locations for the period of January 1 through June 30, 2021.) Moreover, this preliminary modeling shows that a significant volume of water in the Delta entered months ago (i.e., prior to June) and from sources other than releases of stored water from the SWP and CVP (e.g., agricultural return flows and east side streams). Approximately 47 percent of the water that was present in Clifton Court Forebay at the end of June 2021 was Sacramento River water that flowed into the Delta in May 2021 or before, and roughly 24 percent of the water in Clifton Court Forebay consisted of agricultural return flows. Simply put, the Revised Methodology's assumption that residence time is less than one month is incorrect. Also, the inference that residence times are shorter in dry conditions than in wet conditions is incorrect. Therefore, the residence times assumptions in the Revised Methodology injure BBID and other similarly situated water users.

The Revised Methodology further states, "The methodology does not assume there is storage (residence time) longer than a month in the Legal Delta that would affect water availability given the extremely dry conditions that have persisted for an extended period *and the supplementation of flows in the Delta with previously stored water for many months.*" (Revised Methodology, § 2.3.3, p. 53, emphasis added.) This assumption is, again, incorrect. The supplementation of flows with previously stored water does not affect residence time. Residence time is a function of the total inflows to the Delta and the volume of water in the Delta, not the source of inflows. Whether Delta inflows are natural flows or previously stored water is not relevant to the calculation of residence time.

Re: Comments on Draft Emergency Curtailment and Reporting Regulation for the Sacramento-San Joaquin Delta Watershed

July 29, 2021 Page 5

To our knowledge, State Board staff have yet to analyze, either quantitatively or qualitatively, what fraction of water in the Delta is "stored water" or what fraction of Delta inflows consist of "stored water" — a necessary analysis to the support the abovequoted assumption. To properly rely on that assumption, State Board staff needs to develop a methodology for it and apply it, likely using modeling analyses similar to the analyses described above to determine the distribution and volume of stored water in the Delta.

Representing residence time in the Delta accurately is critical to assess the availability of native water. The Revised Methodology does not do so, and, therefore, cannot be considered the best available data. Accordingly, the Revised Methodology does not meet the State Board's criteria to determine the unavailability of water upon which to issue curtailment orders to water users within the Delta.

2. State Board Staff's Assertion that Tidal Inflows are of Insufficient Quality for Use Is Misplaced.

During the workshop, State Board staff presented a slide stating, "Tidal inflows [are] not sufficient quality for use." This assertion was listed as a response to the comments received on the previous version of the methodology regarding staff's need to consider the Delta's unique hydrology. BBID submitted both comments and data describing its historical diversions of brackish water, and those comments address this assertion.

In BBID's analysis submitted in 2016, BBID provided historical data and information confirming that water continued to be diverted at both the BBID and WSID diversion locations in the critically dry year of 1931, even when chloride concentrations exceeded 1,000 milligrams per liter (mg/L).³ Historical analyses also indicate that water was present in the channel, and BBID diverted water during July and August of 1977, when chloride concentrations may have approached 300 mg/L. In protracted litigation initiated by the State of California against BBID contesting BBID's diversion and use of water, BBID submitted testimony from a civil engineer regarding the quantity and quality of water available during July and August of 1977. The civil engineer opined:

³ Paulsen Expert Report at pages 62-63.

Re: Comments on Draft Emergency Curtailment and Reporting Regulation for the Sacramento-San Joaquin Delta Watershed

July 29, 2021 Page 6

State records indicate that the level of chlorides in the channel did not exceed 300 ppm [mg/L] during July and August of 1977. During that period, the District used that water, as available, just as it has every other year, *regardless of quality*. To my knowledge the District has never refrained from using [D]elta water because of its quality, and I believe it would have used water during that period regardless of drought conditions and regardless of the impact of the SWP.⁴

Water from San Francisco Bay enters the Delta with tidal action. This Bay water mixes with fresher water sources within the Delta as a result of tidal forcing and dispersion. The salinity of water in the interior Delta increases when water from the Bay is present in even small concentrations. As shown in Figures 1 and 2 in Attachment A, San Francisco Bay water constituted only a small fraction of the water present at the end of June 2021 in Clifton Court Forebay — the source of water diverted at BBID's primary intake. The majority of water at this location originates from the Sacramento River (including water that flowed into the Delta many months prior), the San Joaquin River, and agricultural return flows, collectively comprised of less than 1 percent Bay water. The presence of a small fraction of Bay water, combined with the clear history of BBID's diversion of water with chloride levels as high as 1,000 mg/L or more, should not affect the determination of availability of water for diversion by BBID.

The quality of water suitable for diversion is not universal, and yet the Revised Methodology unilaterally makes it so by refusing to consider tidal inflows as a possible supply for Delta users. Ignoring this data may, again, prematurely cut off BBID and similar Delta diverters where water is otherwise available for their diversion and use.

⁴ Statement of [CH2M Hill Civil Engineer] William T. O'Leary Regarding Byron-Bethany Irrigation District's Use of Water in July and August 1977 (Aug. 27, 2986), attached as Exhibit 1 to Settlement Conference Statement filed in *State of California v. Contra Costa Water Agency, et al.*, San Francisco Superior Court Case No. 765609, emphasis added.
Re: Comments on Draft Emergency Curtailment and Reporting Regulation for the Sacramento-San Joaquin Delta Watershed

July 29, 2021 Page 7

3. The Consideration of Direct Diversions Below Sea Level as Non-Consumptive Uses Demonstrates that Water Demand in the Delta Is Different than Other River Runs, and the Revised Methodology Should Be Updated to Reflect the Unique Nature of the Delta.

Section 878 of the Proposed Regulation (Section 878) provides certain categories of diversions and uses that may be deemed "non-consumptive uses" and, thus, may continue *after* issuance of a curtailment order upon the satisfaction of certain provisions. One category of possible non-consumptive diversion and use is "[d]irect diversions located within the Legal Delta used exclusively to irrigate lands entirely below sea level when comparison of diversion and drainage records provide substantial evidence that continued irrigation of those lands does not increase net channel depletions." (Proposed Regulation, § 878, subd. (e).)

As stated previously, more than half of the land in the Delta and nearly all Delta channels are situated below sea level. The inclusion of Section 878, subdivision (e), in the Proposed Regulation demonstrates that certain demands in the Delta should not be counted against the available supply in the Delta because they do not increase net depletions. To the extent that the data used in the Revised Methodology (and its previous iterations) accounts for the use of water to irrigate lands below sea level where such use does not increase net depletions, that demand data is overstated, potentially by a substantial magnitude. Thus, the Revised Methodology does not account for the unique characteristics of the Delta, nor does it present an accurate water demand therein. Just as in 2016, the Revised Methodology includes an assumption that overstates demand and negatively impacts BBID.

 The Process for Receiving Certification of Non-Consumptive Uses Under Section 878 is Inverted, Impacts Available Supply, and Should be Further Revised to Provide Recourse if the Deputy Director Disapproves Certification.

The process to obtain certification from the Deputy Director (or Delta Watermaster, as discussed elsewhere herein) under Section 878 is inverted. Section 878, subdivision (e), indicates that a diverter may continue diversions "without further approval from the Deputy Director" upon submittal of certification of non-consumptive use. (Proposed Regulation, § 878, p. 6.) Provided the Deputy Director does not

Re: Comments on Draft Emergency Curtailment and Reporting Regulation for the Sacramento-San Joaquin Delta Watershed

July 29, 2021 Page 8

"disapprove" a certification, demand in the Revised Methodology will be reduced, which presumably will increase supply available to other Delta diverters. However, this increase in supply will occur after the fact, perhaps long after the fact, and too late for diverters who needlessly stopped diverting under a curtailment order. Given the relatively large extent of below-sea-level lands in the Delta, this provision may significantly reduce Delta demand as quantified by the Revised Methodology. Diverters should be afforded with the opportunity to submit certification that their diversions and uses are non-consumptive *prior* to issuance of curtailment orders and the available supply be updated accordingly.

Furthermore, it is unclear whether submittal of a certification under Section 878 stays the period of time during which a diverter receiving a curtailment order must cease diversions. The process in Section 878 leaves open the possibility that the Deputy Director may, "if more convincing evidence contradicts the claims," (see Proposed Regulation, § 878, p. 7), deny the diverter's certification that its diversions do not decrease downstream flows, and the diverter has no recourse.

5. The Revised Methodology Continues to Make Return Flows Attributable to Delta Demand Available as Supply to Diverters Upstream of the Delta and Should Be Modified so that the Entirety of Delta Return Flow Supply is Available Only to Delta Diverters

The Revised Methodology does not address BBID's previous concerns regarding State Board staff's use of Delta return flows as supply available to diverters upstream of the Delta; an assumption that is physically impossible. Item 2 in BBID's May 25, 2021, letter to the State Board commenting on the Draft Water Unavailability Methodology for the Delta Watershed cited State Board staff's improper consideration of Delta return flows as supply available to diverters upstream of the Delta:

However, the Draft Methodology does not consider the Delta as a separate area, but rather one composed of the lower portions of the Sacramento Valley Floor, San Joaquin Valley Floor, and Mokelumne subwatersheds. The Draft Methodology appears to add the return flows assumed for Delta diverters to the subwatershed-wide supply, such that return flows in the Delta are counted as supply available to diverters

Re: Comments on Draft Emergency Curtailment and Reporting Regulation for the Sacramento-San Joaquin Delta Watershed

July 29, 2021 Page 9

> within portions of the subwatersheds upstream from the Delta. This is physically impossible and potentially overstates the amount of demand within these upstream subwatersheds that could be supplied from available supply, which results in an inaccurate reckoning of supply available to Delta diverters. BBID recommends that the State Board treat the Delta as its own supply and demand area, as much as possible, so that only demands that have physical access to the available supply are charged against the supply.

The State Board's Revised Methodology responds to this comment and issue by stating, "Commenters suggested that return flows from Legal Delta diversions should not be made available to diverters upstream. The methodology only makes return flows available within four downstream subwatersheds. As discussed above, data and tools for more granular analyses are not currently available at this time." (Revised Methodology, p. 8.)

This reply does not refute BBID's concern, but rather acknowledges that a more granular analysis is needed to properly account for supply and demand in the Delta. Notwithstanding the fact that the Revised Methodology makes return flows available to "only four downstream watersheds," substantial portions of three of these subwatersheds (i.e., Sacramento Valley Floor, San Joaquin Valley Floor, and Mokelumne) are outside of the Delta. The Revised Methodology, therefore, continues to make return flows attributable to Delta demand available as supply to diverters upstream of the Delta. This remains physically impossible. It also potentially overstates the amount of demand within the upstream portions of subwatersheds that can be supplied from available supply, which results in an inaccurate accounting of supply available to Delta diverters.

In addition, in State Board staff's July 27, 2021 workshop presentation on slide 13, staff essentially restated the response in the Revised Methodology adding, "Delta return flows are available to other Legal Delta diverters, avoids underestimating supply." While Delta return flows are available to other Delta diverters, the Revised Methodology also makes them available to diverters not in the Delta. Since the Revised Methodology evaluates supply and demand on a subwatershed basis, we expect that the assertion of conservatism is for the subject subwatersheds as a whole. It is unclear,

Re: Comments on Draft Emergency Curtailment and Reporting Regulation for the Sacramento-San Joaquin Delta Watershed

July 29, 2021 Page 10

absent a thorough review of the Revised Methodology spreadsheet (Spreadsheet) and consideration of spatial aspects and water right priorities within each subwatershed, whether the Revised Methodology is, in fact, conservative for Delta diverters. Either way, given the physical impossibility that supply generated in the Delta is available to diverters upstream of the Delta, the Revised Methodology should be modified such that the entirety of the Delta return flow supply is available only to diverters in the Delta.

6. <u>The Revised Methodology Spreadsheet Relies on Inaccurate Demand Data.</u>

Section 876.1, subdivision (d)(6), of the Proposed Regulation identifies the use of the Revised Methodology to determine water unavailability, as stated above. The Spreadsheet, however, relies on data that: (a) is not representative of current demands; (b) includes duplicative demands for water rights in the Delta; and (c) appears to mischaracterize Exchange Contractor water demands.

First, the Spreadsheet relies upon 2018 water rights reporting data to represent demand claiming, "2018 was a below normal water year in both the Sacramento and San Joaquin River watersheds and is assumed to more closely resemble demands during a critically dry year than 2019, which was a wet water year in both watersheds. The reliance on 2018 demand data may underestimate actual demand since demands are likely to be greater during a critically dry year due to drier soil conditions. There are also likely higher losses to evaporation and seepage in a critically dry year." (Revised Methodology, § at p. 34).

As can be readily determined through review of multiple years of reporting for particular water rights, demands vary year-to-year and even more so month-to-month across years based upon more than just whether soil was wetted by rainfall. During peak irrigation months, such as June through August, monthly demand in water rights reporting reflect crop types, acreage, agronomic activities, and wind and weather conditions – not just when effective rainfall was no longer available to a crop. Since the Spreadsheet uses a month-by-month evaluation of supply and demand, the assertion that demand in July of 2018 was more or less reflective of the hydrology of 2021 is misplaced. When inspecting a few water rights with large quantities of reported diversion across months and years, this becomes apparent. The Spreadsheet should

Re: Comments on Draft Emergency Curtailment and Reporting Regulation for the Sacramento-San Joaquin Delta Watershed

July 29, 2021 Page 11

utilize 2021 actual diversion and projected demand information prior to determining whether water supplies are unavailable.

Second, the Spreadsheet improperly includes duplicative demands for water rights in the Delta, an issue unaddressed by the State Board's water availability analysis used in 2015/2016 proceedings. As articulated in a civil engineer's testimony on behalf of BBID in response to the administrative civil liability complaint at issue in Order WR 2016-0015, the direct use of several reports for water rights holders in the Delta results in duplicative demands for the lands actually served by those rights, causing the total demand to include "phantom" demands that cannot (and do not) actually exist. (Written Testimony of Greg Young, P.E., In the Matter of Enforcement Action ENF01951, ¶¶ 28-33 (Testimony).) In his testimony, the expert described many instances in which multiple purportedly separate statements of demand had the same listed value for the same month, ultimately revealing that each identical statement had the same owner, and represented a duplicative statement covering the same parcel of land. (Testimony, ¶¶ 31-32.)

As presently noted in the Spreadsheet on the "Demand" tab, State Board staff marked certain representations of reported demand as "not reviewed," even though these demands were explicitly noted as duplicative in the 2015/2016 proceedings. These duplications result in an over-estimated demand of a minimum of 198 cubic feet per second (cfs) in July alone, which is approximately 12,000 acre-feet. Accurately representing these demands may result in the Spreadsheet showing water available to Delta diverters.

Third, the representation of demand for certain Exchange Contractors (e.g., Central California Irrigation District) appears to be inconsistent with the Revised Methodology's reported treatment of the Exchange Contractor demands. The Revised Methodology states: "Accordingly, all Exchange Contractor demands are assumed to be met with previously stored CVP supplies since the Exchange Contractors do not use water from the San Joaquin River under their underlying water right claims unless they are shorted supplies under their Exchange Contracts." (Revised Methodology, § 2.2.6.2, at p. 45). This suggests that the demand for the Exchange Contractors should not be included, especially during the summer irrigation months, as their demand is met with

Re: Comments on Draft Emergency Curtailment and Reporting Regulation for the Sacramento-San Joaquin Delta Watershed

July 29, 2021 Page 12

previously stored water, which is not included as a supply in the Spreadsheet's "Supply Forecast" tab.

Furthermore, Central California Irrigation District's water right, reported under S000477, is claimed as "riparian." This designation is treated by the Revised Methodology as "senior in priority to all other demands for the purposes of the methodology." (Revised Methodology, fn. 22, p. 52, emphasis added.) Water right S000477 represents over 100,000 AF in July 2018 and over 80,000 AF in August 2018. Thus, the inclusion of this very large demand as a senior right when it is being served by previously stored SWP or CVP water has significant impacts on the determination of water unavailability for other Delta diverters. To be consistent with the Revised Methodology's stated treatment of Exchange Contractor demands, this water right, and all others associated with the Exchange Contractors, should be removed from the Spreadsheet. Doing so will more accurately reflect demand.

7. The Revised Methodology Does Not Appear to Account for Return Flows Associated with the Delivery of Previously Stored SWP or CVP Water.

The Spreadsheet implements a unique approach to account for return flows associated with diverted surface water supplies. (Revised Methodology, § 2.2.8, pp. 46-47.) As explained in the Revised Methodology, the Spreadsheet discounts demands by a "Demand Factor," as noted in the "Demand Factor" tab. This discounting is explained to reflect modeling from other tools, such as CalSim3, as a method to reduce the portion of the demands within a "subwatershed" (as that term is used in the Spreadsheet) that will potentially use available supply.

While understanding this approach is a proxy for return flows associated with demands, it appears to not account for rediversion of previously stored SWP or CVP water by certain contractors that will also contribute to available return flows. Specifically, the demands included in the "Demand" tab of the Spreadsheet reflect only demands on a month-by-month basis, as reported by the water right holder in accordance with statutory and State Board requirements. This includes the diversion to storage under water rights held to provide SWP or CVP water that generally occur in the winter and early spring months. Subsequently, this stored water is released for rediversion by SWP or CVP water contractors, including contractors in the Sacramento

Re: Comments on Draft Emergency Curtailment and Reporting Regulation for the Sacramento-San Joaquin Delta Watershed

July 29, 2021 Page 13

Valley Floor and other subwatersheds. However, because some of these contractors, such as contractors with CVP water service contracts located north of the Delta, do not have demands reported to the State Board, there is no demand to discount. Thus, any return flow associated with the diversion and delivery of previously stored SWP or CVP water to such entities should represent a return flow potentially available to other water rights in the subwatershed.

8. The Proposed Regulation Misrepresents the Methods to Determine Water <u>Unavailability</u>.

Section 876.1, subdivision (d) of the Proposed Regulation discusses six methods that will be used to determine whether water is unavailable to a water right holder, including: (1) priority date, statement of diversion and use data, judicial orders, and State Board orders; (2) water demand projections based on use from 2018-2020; (3) monthly reporting information submitted in response to an informational order issued under section 879 of the Proposed Regulation; (4) water supply projections from certain sources; (5) other pertinent, reliable, and publicly available information; and (6) the Water Unavailability Methodology for the Delta Watershed or comparable tools, which BBID assumes will be the Revised Methodology.

It is our understanding that items (1), (2),⁵ and (4) are elements of item (6) – the Revised Methodology. Accordingly, these additional provisions serve only to distract and overstate information that is already taken into consideration by the Revised Methodology. These tools are also insufficient to independently determine availability, and do not provide a meaningful opportunity to examine unavailability determinations. Therefore, Section 876.1, subdivision (d) should be revised to make clear that certain items (i.e., 1, 2, and 4) are already, in whole or in part, accounted for in the Revised Methodology, retaining the two other provisions allowing consideration of subsequently available information.

⁵ Specifically, data from 2018.

Re: Comments on Draft Emergency Curtailment and Reporting Regulation for the Sacramento-San Joaquin Delta Watershed

July 29, 2021 Page 14

9. The Proposed Regulation Diminishes the Delta Watermaster's Authority Over the Delta.

As previously stated, the Delta is unique in its hydrology and nature. In recognition of the unique nature of the Delta, the Legislature enacted Water Code section 85230 (Section 85230) and created the Office of the Delta Watermaster. Under Section 85230, the Delta Watermaster is granted exclusive authority over matters involving decisions in the Delta, including "monitoring and enforcement of the [State] [B]oard's orders and license and permit terms and conditions that apply to conditions in the Delta." (Wat. Code, § 85230, subd. (b).) The Delta Watermaster is also granted exclusive authority to "issue notice of a proposed cease and desist order or administrative civil liability complaint" involving diversions in the Delta. (*Ibid.*) Moreover, Section 85230 does not provide for delegation of the Delta Watermaster's authority under any circumstances, and there is no support in the statute for diminishing the Delta Watermaster's authority during implementation of emergency regulations.

Disregarding Section 85230, the Proposed Regulation empowers the "Deputy Director" to enforce the regulation, diminishing the Delta Watermaster's role to mere consultation over proposed corrections to the priority date of a Delta diverter seeking a correction. (Proposed Regulation, § 876.1, subd. (e).) This is a violation of Section 85230, and the Proposed Regulation should be revised to substitute "Delta Watermaster" in place of "Deputy Director" wherever it appears in the Proposed Regulation.

Additional Issues:

- 1. The Revised Methodology suffers from cumulative discrepancies that are significant and need to be corrected before the State Board, Deputy Director, or Delta Watermaster rely on it to issue curtailment orders.
- 2. The Revised Methodology does not provide a clear process by which curtailment orders will be suspended, whether completely or temporarily.

Re: Comments on Draft Emergency Curtailment and Reporting Regulation for the Sacramento-San Joaquin Delta Watershed

July 29, 2021 Page 15

- 3. The Proposed Regulation does not contemplate a phased-in approach, like that which is customarily used in a "water right priority call" implemented in other western states. Using a phased-in approach based on priority of right allows for parties to better plan as the water supply drops over a season, rather than an assertion that an entire watershed must cease diversions all at one time.
- 4. BBID requests the State Board delete proposed Section 879.2(b) because the Proposed Regulation are most appropriately premised on a trespass theory, not an unreasonable use of water theory. A waste and unreasonable use determination involves the State Board or a Court evaluating whether a specific use is unreasonable in light of its impacts on another specific use. For example, in *Stanford Vina Ranch Irrigation Co. v. State of California* (2020) 50 Cal.App. 5th 976, where the State Board evaluated the reasonableness of irrigation in light of its potential impacts on fish. Here, assuming it's possible to do so, the State Board has not analyzed the reasonableness of competing uses by applying the rule cited from *Tulare Irr. Dist. v. Linday-Strathmore Irr. Dist.*, noted in Resolution Recital #14, to the present circumstances to support inclusion of Section 879.2(b). Therefore, the State Board should delete Section 879.2(b).

Very truly yours,

Win alum

BYRON BETHANY IRRIGATION DISTRICT Rick Gilmore General Manager

ATTACHMENT A

Methodology For Obtaining Preliminary Delta Simulation Model II Model Results

We used the Delta Simulation Model II (DSM2) version 8.2.0 to model Delta hydrodynamics and source fingerprints for water year 2021 (WY 2021). The key input data are provided in the table below.

Category	Input Data	Data Source	Station ID	Time Interval
Major export /	Contra Costa Water District	CDEC	INB	Daily
("Source	Contra Costa Water District	CDEC	IDB	Daily
FIOW)	Tracy Pumping Plant	CDEC	TRP	Daily
	Contra Costa Water District	CDEC	CCW	Daily
Reservoir Inflow	Clifton Court Inflow	CDEC	CLC	Daily
Delta inflows	Sacramento River Inflow	CDEC	FPT / SPE	Daily
	San Joaquin River Inflow	CDEC	VNS	Daily
	Cosumnes River Inflow	CDEC	MHB	Daily
	Mokelumne River Inflow	CDEC	CMN	Daily
	Calaveras River Inflow	CDEC	NHG	Daily
	Yolo Bypass Inflow	USGS	11453000	Daily
	North Bay	CDEC	BKS	Daily
Boundary Stage	Stage at Martinez	CDEC	MRZ	Hourly

Because Delta Channel Depletion (DCD) and gate operation records for WY 2021 were not publicly available when we performed the simulation, we used data from water 2015 (WY 2015) for these model parameters.

We used the DSM2 QUAL module to simulate volumetric fingerprints. Inflows were "tagged" within the model and traced throughout the model domain to determine both the source of water at key locations in the domain and, for Sacramento River inflows, the month water entered the Delta. Figures 1 and 2 (below) show these results.

Results from this modeling should be considered preliminary, but are generally consistent with model results from the WY 2015, as presented in prior BBID comments.



Figure 1. Preliminary Fingerprinting Results for WY 2021, Clifton Court Forebay.





EXHIBIT G

State of California Office of Administrative Law

In re:

State Water Resources Control Board

Regulatory Action:

Title 23, California Code of Regulations

Adopt sections: 876.1, 878.2 Amend sections: 877.1, 878, 878.1, 879, 879.1, 879.2 NOTICE OF APPROVAL OF EMERGENCY REGULATORY ACTION

Government Code Sections 11346.1 and 11349.6

OAL Matter Number: 2021-0809-01

OAL Matter Type: Emergency (E)

This action by the State Water Resources Control Board adopts emergency regulations to curtail water diversions in the Delta watershed when water is not available at water right holders' or claimants' priority of right or to protect releases of stored water.

OAL approves this emergency regulatory action pursuant to sections 11346.1 and 11349.6 of the Government Code.

This emergency regulatory action is effective on 8/19/2021 and, pursuant to Water Code section 1058.5(c), will expire on 8/19/2022. The Certificate of Compliance for this action is due no later than 8/18/2022.

Date: August 19, 2021

Thomas

Anna Thomas Attorney

For: Kenneth J. Pogue Director

Original: Eileen Sobeck, Executive Director Copy: Dana Heinrich

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Enhanced Water Use Reporting and Curtailment of Diversions due to Lack of Water Availability in the Sacramento – San Joaquin Delta Watershed

In Title 23, Division 3, Chapter 2, Article 24, amend the title of Article 24, add Sections 876, 876.1, and 878.2, and amend Sections 877.1, 878, 878.1, 879, 879.1 and 879.2 to read:

Article 24. Curtailment of Diversions <u>due</u> to Protect Water Supplies and Threatened and Endangered Fish in the Russian River Watershed <u>Drought Emergency</u>

§ 876.1 Emergency Curtailments Due to Lack of Water Availability in the Sacramento-San Joaquin Delta Watershed

- (a) This section applies to direct diversions and diversions to storage, of natural and abandoned flows, in the Delta Watershed as defined in section 877.1. This section also applies to the rediversion of water released from storage in the Delta Watershed, except to the extent authorized by a water right or contract.
- (b) After the effective date of this regulation, when flows are determined to be insufficient to support all diversions, the Deputy Director as defined in section 877.1 may issue curtailment orders as defined in section 877.1 to water right holders and claimants in the Delta Watershed in order of water right priority, requiring the curtailment of water diversion under designated water rights and claims, except as provided in sections 878, 878.1, and 878.2. Before issuing curtailment orders to water right holders and claimants in the Legal Delta, the Deputy Director will consult with and obtain the concurrence of the Delta Watermaster.
- (c) Initial orders requiring curtailment or reporting will be mailed to each water right holder, claimant, or the agent of record on file with the State Water Board, Division of Water Rights within the Delta Watershed. The initial orders will require reporting in accordance with section 879, subdivision (d)(1) and will either require curtailment or will instruct the water right holder, claimant, or agent of record regarding procedures for potential future curtailments. The water right holder, claimant, or agent of record is responsible for immediately providing notice of the orders to all diverters exercising the water right or claim covered by the orders. Communications regarding changes in water availability, including

notification of when curtailments of water diversions are required and when curtailments are temporarily suspended or reimposed, will be provided by email to the State Water Board's Delta Drought email distribution list and by posting on the State Water Board's drought webpage. Notice provided by email and by posting on the State Water Board's drought webpage shall be sufficient for all purposes related to required curtailments and reporting pursuant to this section and section 879.

- (d) In determining whether water is unavailable under a water right holder or claimant's priority of right and whether to order curtailment of water diversions under specific water rights, the Deputy Director will consider:
 - (1) Relevant available information regarding date of priority, including but not limited to claims of first use in statements of water diversion and use, judicial and State Water Board decisions and orders, and other information contained in the Division of Water Rights' files. Absent evidence to the contrary, riparian water rights are presumed senior to appropriative water rights for the purposes of curtailments pursuant to this section.
 - (2) Monthly water right demand projections based on reports of water use for permits and licenses, or statements of water diversion and use, from calendar years 2018, 2019, or 2020.
 - (3) <u>Monthly water right demand projections based on information submitted in</u> response to an informational order issued under section 879, subdivision (d).
 - (4) Water supply projections based on the following sources of forecasted supply data:
 - (A) Monthly full natural flow forecasts contained in the Department of Water Resources' California Cooperative Snow Surveys Bulletin 120 Water Supply Forecast, where available;
 - (B) Daily full natural flow forecasts from the California Nevada River Forecast Center, where data is not available in the Bulletin 120 Water Supply Forecasts; and

- (C) Other available and reliable data on projected or actual precipitation and runoff events that may inform water availability at a monthly or sub-monthly scale.
- (5) Relevant available information regarding stream system disconnection where curtailing diversions would not make water available to serve senior downstream water rights or claims, including seasonal or temporary disconnections.
- (6) The Deputy Director may also consider any other pertinent, reliable, and publicly available information when determining water right priorities, water availability, water supply projections, and demand projections.
- (7) Evaluation of available water supplies against demands may be performed using the Water Unavailability Methodology for the Delta Watershed, or comparable tools. The Water Unavailability Methodology for the Delta Watershed is described in the Water Unavailability Methodology for the Delta Watershed report dated July 23, 2021, which is hereby incorporated by reference. Evaluation of available supplies against demands may be performed at the Hydrologic Unit Code level 4 Sacramento and Hydrologic Unit Code level 4 San Joaquin River watershed scale, or at the subwatershed scale. Subwatersheds within the Delta Watershed are defined in the Water Unavailability Methodology for the Delta Watershed report dated July 23, 2021, and were established based on Hydrologic Unit Code level 8 watersheds.
- (e) Upon receipt of an initial order pursuant to this section, a water right holder or claimant may submit information to the Deputy Director to: support a proposed correction to the water right priority date of the right for which the order was issued; or propose that curtailment may not be appropriate for a particular diverter or in a specific stream system as demonstrated by verifiable circumstances, such as a system that has been adjudicated and is disconnected and curtailment would not make water available to serve senior downstream water rights or claims. Any such proposals and all supporting information and analysis shall be submitted to the Deputy Director within 14 days of receipt of the initial order. Proposals, supporting information, and analyses submitted more than 14 days after receipt of an initial order may be considered to support corrections in advance of future curtailments. The Deputy Director will review timely-provided proposals and supporting information and analyses as soon as practicable, make a determination regarding the proposal, and inform the affected water right holder or claimant of any appropriate update for purposes of

water diversion curtailment orders. Before making any determinations within the Legal Delta, the Deputy Director will consult with the Delta Watermaster.

- (f) Water right holders and claimants in the Delta Watershed must either subscribe to the Delta Drought email distribution list referenced in subdivision (c) or frequently check the State Water Board's drought webpage to receive updated information regarding water diversion curtailment and reporting orders and water unavailability.
- (g) The Deputy Director will temporarily suspend curtailments for some diverters, in order of water right priority, when water availability increases or is projected to increase due to precipitation and runoff events or due to reductions in demand, and the Deputy Director determines that such increased water availability warrants a suspension. The Deputy Director will consider the best available information, such as water supply forecasts from the California Department of Water Resources and other similarly reliable sources, to determine the geographic scope and duration of suspension. By no later than October 1, 2021, and by no more than every 30 days thereafter, the Deputy Director will consider reliable and publicly available information that supports suspension, extension of suspension, or reimposition of curtailments of water diversions, and will publicly issue an update explaining any decisions resulting from the consideration of that information.
- (h) <u>All curtailment orders issued under this section shall be subject to</u> reconsideration under article 2 (commencing with section 1122) of chapter 4 of part 1 of division 2 of the California Water Code.

Authority: Sections 1058, 1058.5, Water Code

Reference: Cal. Const., Art. X, § 2; Sections 100, 100.5, 104, 105, 275, 1058.5, Water Code; El Dorado Irrigation Dist. v. State Water Resources Control Board (2006) 142 Cal.App.4th 937; Light v. State Water Resources Control Board (2014) 226 Cal.App.4th 1463; Stanford Vina Ranch Irrigation Co. v. State of California (2020) 50 Cal.App.5th 976.

§ 877.1 Definitions

(a) "Curtailment Order" refers to an order from the Deputy Director of the Division of Water Rights ordering a water right holder to cease diversions.

- (b) "Deputy Director" refers to the Deputy Director of the Division of Water Rights, or duly authorized designee, at the State Water Resources Control Board.
- (c) "Flood Control District" refers to the Mendocino County Russian River Flood Control and Water Conservation Improvement District.
- (d) "Lower Russian River" refers to the surface waters, including underflow and subterranean streams, of the Russian River downstream of the confluence of Dry Creek and the Russian River.
- (e) "Lower Russian River Watershed" refers to the area in Sonoma County that drains towards Dry Creek and the area downstream of the confluence of the Russian River and Dry Creek that drains towards the outlet of the Russian River to the Pacific Ocean.
- (f) "Mainstem of the Upper Russian River" refers to the surface waters, including underflow and subterranean streams, of the Upper Russian River downstream of Lake Mendocino and upstream of the confluence of Dry Creek and the Russian River.
- (g) "Minimum human health and safety needs" refers to the amount of water necessary for prevention of adverse impacts to human health and safety, for which there is no feasible alternate supply. "Minimum human health and safety needs" include:
 - (1) Indoor domestic water uses including water for human consumption, cooking, or sanitation purposes. For the purposes of this article, water provided outdoors for human consumption, cooking, or sanitation purposes, including but not limited to facilities for unhoused persons or campgrounds, shall be regarded as indoor domestic water use. As necessary to provide for indoor domestic water use, water diverted for minimum human health and safety needs may include water hauling and bulk water deliveries, so long as the diverter maintains records of such deliveries and complies with the reporting requirements of Section 879, and so long as such provision is consistent with a valid water right.
 - (2) Water supplies necessary for energy sources that are critical to basic grid reliability, as identified by the California Independent System Operator, California Public Utilities Commission, California Energy Commission, or a similar energy grid reliability authority.

- (3) Water supplies necessary to prevent tree die-off that would contribute to fire risk to residences, and for maintenance of ponds or other water sources for fire fighting, in addition to water supplies identified by the California Department of Forestry and Fire Protection or another appropriate authority as regionally necessary for fire preparedness.
- (4) Water supplies identified by the California Air Resources Board, a local air quality management district, or other appropriate public agency with air quality expertise, as necessary to address critical air quality impacts to protect public health.
- (5) Water supplies necessary to address immediate public health or safety threats, as determined by a public agency with health or safety expertise.
- (6) Other water uses necessary for human health and safety which a state, local, tribal or federal health, environmental, or safety agency has determined are critical to public health and safety or to the basic infrastructure of the state. Diverters wishing to continue diversions for these uses must identify the health and safety need, include approval or similar relevant documentation from the appropriate public agency, describe why the amount requested is critical for the need and cannot be met through alternate supplies, state how long the diversion is expected to continue, certify that the supply will be used only for the stated need, and describe steps taken and planned to obtain alternative supplies.
- (h) "State Water Board" refers to the State Water Resources Control Board.
- (i) "Upper Russian River" refers to the surface waters, including underflow and subterranean streams, of the Russian River upstream of the confluence of the Russian River and Dry Creek and includes both the East and West Forks of the Russian River.
- (j) "Upper Russian River Watershed" refers to the area located in Mendocino and Sonoma Counties that drains towards the confluence of Dry Creek and the Russian River.
- (k) <u>"Delta Watershed" or "Sacramento-San Joaquin Delta Watershed" refers to the Hydrologic Unit Code level 4 Sacramento and the Hydrologic Unit Code level 4 San Joaquin subregions, as defined using the U.S. Geological Survey Hydrologic Units Dataset.</u>

- (I) <u>"Legal Delta" has the same meaning as the Sacramento-San Joaquin Delta, as</u> <u>defined in Water Code section 12220.</u>
- (m) <u>"Informational Order" refers to an order issued by the Deputy Director which</u> orders reporting of water diversion and use information in the Delta Watershed to inform water unavailability determinations and to support the curtailment process described in section 876.1.
- (n) "Delta Watermaster" has the same meaning as in Water Code section 85230.

Authority: Sections 1058, 1058.5, Water Code

Reference: Cal. Const., Art., X § 2; Sections 100, 100.5, 104, 105, 106.3, 275, 1058.5, <u>12220, 85230</u>, Water Code; *Environmental Defense Fund v. East Bay Muni. Util. Dist.* (1980) 26 Cal.3d 183.

§ 878. Non-Consumptive Uses

Diversion and use described in this section under any valid basis of right may continue after issuance of a curtailment order without further approval from the Deputy Director, subject to the conditions set forth in this section. Diversions described in this section may not be required to curtail in response to a curtailment order under this article if their diversion and use of water does not decrease downstream flows. Any diverter wishing to continue diversion under this <u>section subdivision</u> must submit to the Deputy Director a certification, under penalty of perjury, which describes the non-consumptive use <u>of water</u> and explains, with supporting evidence, how the diversion and use do not decrease downstream flows in the applicable watershed. The Deputy Director may request additional information or disapprove any certification if the information provided is insufficient to support the statement or if more convincing evidence contradicts the claims. If a certification submitted pursuant to this section is disapproved, the diversions are subject to any curtailment order issued for that basis of right. This section applies to:

- (a) Direct diversions solely for hydropower if discharges are returned to the <u>source</u> <u>stream Russian River</u> or its tributaries and water is not held in storage.
- (b) Direct diversions dedicated to instream uses for the benefit of fish and wildlife pursuant to Water Code section 1707, including those that divert water to a different location for subsequent release, provided the location of release is hydraulically connected to the <u>source stream</u>Russian River.

- (c) For curtailment orders issued under sections 877.2 and 877.3, dDirect diversions where the Deputy Director, the California Department of Fish and Wildlife, and the Executive Officer of the North Coast Regional Board have approved a substitution of releases of either stored water or groundwater into the Russian River or a tributary thereof for the benefit of fish and wildlife such that there is not a net decrease in stream flow as a result of the diversion at the next downstream USGS gage. The rate of releases made pursuant to this subdivision must be measured daily using a device or measurement method approved by the Deputy Director and provided to the Deputy Director on a monthly basis. Proposals involving the release of groundwater shall provide sufficient data and information to reasonably quantify any depletions of surface water caused by the groundwater pumping, the potential time lags of those depletions, and if additional groundwater releases beyond the diversion amounts are able to offset those depletions. The release of water does not have to be conducted by the owner of the water right proposed for the continued diversions, provided an agreement between the water right holder and the entity releasing the water is included in the proposal.
- (d) Other direct diversions solely for non-consumptive uses, if those diverters file with the Deputy Director a certification under penalty of perjury demonstrating that the diversion and use are non-consumptive and do not decrease downstream flows in the watershed.
- (e) Direct diversions located within the Legal Delta used exclusively to irrigate lands entirely below sea level when comparison of diversion and drainage records provide substantial evidence that continued irrigation of those lands does not increase net channel depletions.

Authority: Sections 1058, 1058.5, Water Code

Reference: Cal. Const., Art. X, § 2; Sections 100, 187, 275, 348, 85003, Water Code

§ 878.1 Minimum Human Health and Safety Needs

- (a) Diversions described in this section under any valid basis of right may be authorized to continue after issuance of a curtailment order, subject to the conditions set forth in this section. A diversion that would otherwise be subject to curtailment may be authorized if:
 - (1) The diversion is necessary for minimum human health and safety needs; and therefore,
 - (2) The diversion is necessary to further the constitutional policy that the water

resources of the state be put to beneficial use to the full extent they are capable, and that waste and unreasonable use be prevented, notwithstanding the effect of the diversions on more senior water rights or instream beneficial uses.

- (b) (1) Diversions for minimum human health and safety needs under any valid basis of right of not greater than 55 gallons per person per day may continue after issuance of a curtailment order without further approval from the Deputy Director, subject to the conditions set forth in this section. Any diverter wishing to continue diversion under this subdivision must submit to the Deputy Director certification, under penalty of perjury, of compliance with the requirements of subdivisions (b)(1)(A)-(E), below. The Deputy Director may request additional information or set additional requirements on continued diversion.
 - (A) Not more than 55 gallons per person per day will be diverted under all bases of right.
 - (B) The diversion is necessary to serve minimum human health and safety needs as defined in section 877.1, subdivision (g), after all other alternate sources of water have been used. To the extent other water sources are available, those sources will be used first and the total used will not exceed 55 gallons per person per day.
 - (C) The diverter and all end users of the diverted water are operating under the strictest existing conservation regime for that place of use, if such a plan exists for the area or service provider, or shall be operating under such regime within 30 days. If additional approvals are required before implementation of the conservation regime, the diverter must certify that all possible steps will be taken immediately to ensure prompt approval.
 - (D) If the diverter is a distributor of a public water supply under Water Code sections 350 et seq., that it has declared a water shortage emergency condition and either already has adopted regulations and restrictions on the delivery of water or will adopt conservation and water delivery restrictions and regulations within a timeframe specified by the Deputy Director as a condition of certification.

- (E) The diverter has either pursued steps to acquire other sources of water, but has not yet been completely successful, as described in an attached report, or the diverter will pursue the steps in an attached plan to identify and secure additional water.
- (2) To the extent that a diversion for minimum human health and safety needs requires more than 55 gallons per person per day, the continued diversion of water after issuance of a curtailment order for the diversion requires submission of a petition demonstrating compliance with the requirements of subdivisions (b)(2)(A)-(F), below, and approval by the Deputy Director. The Deputy Director may condition approval of the petition on implementation of additional conservation measures and reporting requirements. Any petition to continue diversion to meet minimum human health and safety needs of more than 55 gallons per person per day must:
 - (A) Describe the specific circumstances that make the requested diversion amount necessary to meet minimum human health and safety needs, if a larger amount is sought.
 - (B) Estimate the amount of water needed.
 - (C) Certify that the supply will be used only for the stated need.
 - (D) Describe any other additional steps the diverter will take to reduce diversions and consumption.
 - (E) Provide the timeframe in which the diverter expects to reduce usage to no more than 55 gallons per person per day, or why minimum human health and safety needs will continue to require more water.
 - (F) As necessary, provide documentation that the use meets the definition of minimum human health and safety needs provided in subdivision (g) of section 877.1.
- (c) For public water systems with 15 or greater connections and small water systems of 5 to 15 connections, gallons per person per day shall be calculated on a monthly basis and the calculation methodology shall be consistent with the State Water Board's "Guidance for Estimating Percentage Residential Use and Residential Gallons Per Capita Daily" dated September 22, 2020.

- (d) Diversions for minimum human health and safety needs that cannot be quantified on the basis of an amount per person per day require a petition and approval from the Deputy Director. The Deputy Director may approve a such a petition under this subdivision or subdivision (b)(2) upon a finding that the petition demonstrates that the requested diversion is in furtherance of the constitutional policy that the water resources of the state be put to beneficial use to the full extent they are capable, and that waste and unreasonable use be prevented, notwithstanding the effect of the diversion on senior water rights or instream beneficial uses, and may condition approval as appropriate to ensure that the diversion and use are reasonable and in the public interest.
- (e) To the extent necessary to resolve immediate public health or safety threats, a diversion subject to a curtailment order may continue while a petition under subdivision (b)(2) or (d) is being prepared and is pending. The Deputy Director may require additional information to support the initial petition, information on how long the diversion is expected to continue, and a description of other steps taken or planned to obtain alternative supplies.
- (f) Notice of certification, petitions, and decisions under this section and section 878 will be posted as soon as practicable on the State Water Board's drought webpage. The Deputy Director may issue a decision under this article prior to providing notice.
- (g) Diversion and use within the Russian River Watershed <u>or Delta Watershed</u> that deprives water for minimum human health and safety needs in 2021, or which creates unacceptable risk of depriving water for minimum human health and safety needs in 2022, is an unreasonable use of water. The Deputy Director shall prevent such unreasonable use of water by implementing the curtailment methodology described in section 877.2 for diversions in the Lower Russian River Watershed-and, sections 877.3, 877.4, 877.5, and 877.6 for diversions in the Upper Russian River Watershed, and section 876.1 for diversions in the Delta Watershed.

Authority: Sections 1058, 1058.5, Water Code

Reference: Cal. Const., Art. X, § 2; Sections 100, 100.5, 104, 105, 106.3, 275, 1058.5, Water Code; *Environmental Defense Fund v. East Bay Muni. Util. Dist.* (1980) 26 Cal.3d 183; Light v. State Water Resources Control Board (2014) 226 Cal.App.4th 1463; *Stanford Vina Ranch Irrigation Co. v. State of California* (2020) 50 Cal.App.5th 976.

§ 878.2 Alternative Water Sharing Agreements

Water users may propose alternatives to water diversion curtailment that achieve the purposes of the curtailment process described under section 876.1 by submitting a proposal to the Deputy Director. Proposals must describe the setting, the parties, the actions, the provisions for monitoring, record keeping and reporting, and the purported benefits of the proposal in sufficient detail to demonstrate to the satisfaction of the Deputy Director that implementing the proposal will not injure non-party legal users of water or result in an unreasonable impact on fish and wildlife. In considering a proposal under this section, the Deputy Director may request additional information or consult with other entities that may have technical or legal information that should be considered in evaluating such proposals, including but not limited to the California Department of Water Resources (DWR) and United States Bureau of Reclamation (Reclamation). The Deputy Director will consult with the Delta Watermaster on any proposals among diverters within the Legal Delta. A proposal may be implemented pending review by the Deputy Director provided that potentially affected water right holders and claimants, including but not limited to DWR and Reclamation, concur with the proposal and no objections to the proposal are submitted to the Deputy Director. The Deputy Director may approve a proposal subject to conditions, including record keeping and reporting requirements, and provided that the Deputy Director finds implementing the proposal will not injure non-party legal users of water or result in an unreasonable impact on fish and wildlife. Diversions consistent with a proposal implemented or approved pursuant to this section are subject to this article, and violations of the terms of the proposal shall be subject to enforcement as a violation of this article or as an unauthorized diversion or use of water.

Notice of proposals and decisions under this section will be posted as soon as practicable on the State Water Board's Delta drought webpage. The Deputy Director may issue a decision under this section prior to providing such notice. Any interested person may file a comment or objection to the proposal or decision with the Deputy Director with simultaneous service to the parties who submitted the proposal. The Deputy Director will consider any comment or objection. The State Water Board may hold a hearing on any proposal to which parties have objected, after notice to all interested persons.

Authority: Sections 1058, 1058.5, Water Code

Reference: Cal. Const., Art. X, § 2; Sections 100, 109, 275, 1011, 1011.5, 1051.5, Water Code; City of Barstow v. Mojave Water Agency (2000) 23 Cal.4th 1224.

§ 879. Reporting

- (a) All water right holders issued a curtailment order under this article section 877.2 or 877.3 are required, within seven calendar days of the date of the curtailment order, to submit under penalty of perjury a certification of one or more of the following actions taken in response to the curtailment order, certifying, as applicable, that:
 - (1) Diversions under the water right(s) identified have ceased;
 - (2) Any continued use is under other water rights not subject to curtailment, specifically identifying those other rights, including the basis of right and quantity of diversion;
 - (3) Diversions under the water right(s) identified continue only to the extent that they are non-consumptive uses for which a certification for continued diversion has been submitted as specified in section 878;
 - (4) Diversions under the water right(s) identified continue only to the extent that they are to provide for minimum human health and safety needs, a certification has been filed as authorized under section 878.1, subdivision (b)(1), and the subject water right authorizes the diversion in the absence of a curtailment order; or
 - (5) Diversions under the water right(s) identified continue only to the extent that they are consistent with a petition filed under section 878.1, subdivision (b)(2) or (d), and diversion and use will comply with the conditions for approval of the petition.
- (b) All water users or water right holders whose continued diversion may be authorized under section 878.1 are required to submit, under penalty of perjury, information identified on a schedule established by the Deputy Director as a condition of certification or petition approval. The required information may include, but is not limited to, the following:
 - (1) The water right identification numbers under which diversions continue
 - (2) How the diverter complies with any conditions of continued diversion, including the conditions of certification under section 878.1, subdivision (b)(1);

- (3) Any failures to comply with conditions, including the conditions of certification under section 878.1, subdivision (b)(1), and steps taken to prevent further violations;
- (4) Conservation and efficiency efforts planned, in the process of implementation, and implemented, as well as any information on the effectiveness of implementation;
- (5) Efforts to obtain alternate water sources;
- (6) If the diversion is authorized under an approved petition filed pursuant to section 878.1, subdivision (b)(2), progress toward implementing the measures imposed as conditions of petition approval;
- (7) If the diversion is authorized under section 878.1, subdivision (d):(A) The rate of diversion if it is still ongoing;
 - (B) Whether the water has been used for any other purpose; and
 - (C) The date diversion ceased, if applicable.
- (8) The total water diversion for the reporting period and the total population served for minimum human health and safety needs. The total population must include actual or best available estimates of external populations not otherwise reported as being served by the water right holder, such as individuals receiving bulk or hauled water deliveries for indoor water use.
- (9) Diversion amounts for each day in acre-feet per day, maximum diversion rate in cubic feet per second, and anticipated future daily diversion amounts and diversion rates.
- (c) The Deputy Director, or delegee, may issue an order under this article requiring any person to provide additional information reasonably necessary to assess their compliance with this article. Any person receiving an order under this subdivision shall provide the requested information within the time specified by the Deputy Director, but not less than five (5) days.
- (d) This subdivision applies to Delta Watershed curtailment orders and enhanced reporting to inform water unavailability determinations and the curtailment process described under section 876.1.

- (1) All water right holders and claimants issued an initial order pursuant to section 876.1 are required, within the deadlines specified in the initial order but no sooner than seven calendar days following issuance of the order, to submit under penalty of perjury a certification that they have and will continue to take actions needed to comply with section 876.1, including the following actions:
 - (A) Regularly reviewing information posted on the State Water Board's drought webpage to determine when curtailments are required and when curtailments are suspended or reimposed, or subscribing to the State Water Board's Delta Drought email distribution list to receive updates directly; and
 - (B) Ceasing diversions of natural and abandoned flow when curtailments are ordered, except to the extent that continuing diversions are authorized in accordance with section 878, 878.1 or 878.2, and ceasing rediversions of water released from storage, except to the extent authorized by a water right or contract.
- (2) In addition to the requirements identified under subdivision (d)(1), the Deputy Director may require water right holders and claimants who have been issued an initial order under section 876.1 and whose water right or claim has a total authorized face value or recent annual reported diversion amount of one thousand acre-feet or greater to report the following information by the date specified by the Deputy Director, but no earlier than seven days after receipt of the reporting order and as specified thereafter:
 - (A) Prior diversions, unless otherwise reported in annual reports of water diversion and use, including direct diversions and diversions to storage. Diversion volumes shall be provided in a daily, weekly, or monthly format, as identified in the order.
 - (B) Demand projections for subsequent months through October 1, 2022, including direct diversions and diversions to storage. Diversion volumes shall be provided in a daily, weekly, or monthly format, as identified in the order.
 - (C)Before issuing orders issued pursuant to subdivision (d)(2) to water right holders and claimants in the Legal Delta, the Deputy Director will consult with and obtain the concurrence of the Delta Watermaster.

- (3) In order to inform curtailment decisions, the Deputy Director, or the Delta Watermaster for rights in the Legal Delta, may issue informational orders under subdivision (d) of this section requiring a water right holder, diverter, or user to provide additional information related to a diversion or use of water in the Delta Watershed, including but not limited to: additional reporting of water diversions and use; the basis of right with supporting documents or other evidence; property patent date for the place of use; the date of initial appropriation; anticipated or actual water transfer amounts; or any other information relevant to forecasting demands and supplies and determining compliance with curtailment orders in the current drought year or in contingency planning for continuation of the current drought emergency. Informational orders may require reporting of diversions made in prior months and diversions anticipated during subsequent months on a recurring, monthly basis.
- (4) Any water right holder or claimant receiving an order under subdivision (d) of this section shall provide the requested information within the deadlines specified therein, including any recurring deadlines associated with ongoing reporting requirements as applicable. The Deputy Director, or the Delta Watermaster for rights in the Legal Delta, may grant additional time for submission of information upon substantial compliance with the specified deadline and a showing of good cause. Information provided pursuant to subdivision (d) of this section shall be submitted in an online form maintained by the State Water Board and accessible through its website, or in an electronic format as specified by the Deputy Director or Delta Watermaster.
- (5) Failure to provide the information required under subdivision (d) of this section within the deadlines specified in the order or any time extension granted by the Deputy Director, or the Delta Watermaster for rights in the Legal Delta, is a violation subject to civil liability of up to \$500 per day for each day the violation continues pursuant to Water Code section 1846.
- (6) In determining whether to impose reporting requirements under subdivision (d) of this section, the Deputy Director and Delta Watermaster will consider the need for the information for purposes of informing curtailment decisions and the burden of producing it, and will make reasonable efforts to avoid requiring duplicative reporting of information that is already in the Board's possession.
- (7) All orders issued under subdivisions (d)(2) and (d)(3) shall be subject to reconsideration under article 2 (commencing with section 1122) of chapter 4

of part 1 of division 2 of the California Water Code.

Authority: Sections 1058, 1058.5, Water Code

Reference: Sections 100, 187, 275, 348, 1051, 1058.5, 1841, Water Code

§ 879.1. Conditions of permits, licenses and registrations

Compliance with this article, including any conditions of certification or approval of a petition under this article, shall constitute a condition of all water right permits, licenses, certificates, and registrations for diversions in the Russian River Watershed from any watershed identified in this article.

Authority: Sections 1058, 1058.5, Water Code

Reference: Cal. Const., Art. X, § 2; Sections 275, 1253, 1058.5, Water Code; National Audubon Society v. Superior Court (1983) 33 Cal.3d 419.

§ 879.2. Compliance and Enforcement

- (a) A diverter must comply with a curtailment order issued under this article, any conditions of certification or approval of a petition under this article, and any water right condition under this article, notwithstanding receipt of more than one curtailment order. To the extent of any conflict between applicable requirements, the diverter must comply with the requirements that are the most stringent.
- (b) Diversion or use of water in the Upper Russian River Watershed <u>or the Delta</u> <u>Watershed</u> in violation of this article constitutes an unreasonable use of water and is subject to any and all enforcement proceedings authorized by law.
- (c) Diversion or use of water in the Lower Russian River Watershed <u>or the Delta</u> <u>Watershed</u> in violation of this article is a trespass under Water Code section 1052 and shall constitute evidence of diversion or use in excess of a water user's rights.
- (d) All violations of this article shall be subject to any applicable penalties under Water Code section 1058.5. Nothing in this section shall be construed as limiting the enforceability of or penalties available under any other applicable provision of law.

Authority: Sections 1058, 1058.5, Water Code

Reference: Cal. Const., Art. X, § 2; Sections 275, 1052, 1055, 1058.5, 1825, 1831, Water Code; National Audubon Society v. Superior Court (1983) 33 Cal.3d 419.

ADOPT

Water Unavailability Methodology for the Delta Watershed

Prepared By:

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Table of Contents

1	Intr	oduct	ion1	
	1.1	Back	ground	;
	1.2	Curre	ent Conditions	ļ
2	Wa	iter Ur	availability Methodology10	ļ
	2.1	Supp	ły12	
	2.1	.1	Supply Analysis	,
	2.1	.2	Types of Water	1
	2.1	.3	Subwatershed Delineation	
	2. 1.	.4	Supply Data Sources	
	2.1.	.5	Filling Supply Data Gaps	
	2	.1 . 5.1	Extrapolation	
	2	.1.5.2	Augmentation	
	2.1.	.6	Abandoned Instream Flows	
	2.2	Dema	and	
	2.2.	.1	Initial Selection of Water Right Records	
	2.2.	2	Initial Quality Control	
	2.2.	3	Additional Quality Control	
	2.2.	4	Disaggregation of Statements of Diversion and Use	
	2.2.	5	Demand Aggregation by Subwatershed	
	2.2.	6	Project Demands	
	2.	2.6.1	Trinity River Imports	
	2.	2.6.2	Settlement Contractor Demands44	
	2.2.	7	Interbasin Diversions (Yuba-Bear and Drum-Spaulding)45	
	2.2.8	8	Accretions and Return Flow Estimates	
2	2.3	Adjus	tments to the Supply and Demand Datasets	
	2.3.1	1	Elimination of Unmet Demand	
	2.3.2 in Di	2 isconr	Treatment of Riparian Demands and Elimination of Supply and Demand nected Headwater Subwatersheds	
	2.3.3	3	Proration of Legal Delta Demands	
2	2.4	Water	Unavailability Visualizations	

•

3 Imp	plementation	
3.1	Issuance of Notices of Water Unavailability	
3.1	.1 Exceedance Forecast Selection	
3.2	Water Quality and Public Trust Resources	
3.3	Communication and Public Engagement Strategy	
4 Are	eas of Potential Refinement	
4.1	Near-Term Opportunities	
4.1	.1 Supply	
4,1,	.2 Demand	60
4.2	Longer-Term Opportunities	60
5 Ref	ferences Cited	
Technic	cal Appendix A	A-1
Technic	cal Appendix B	B-1
Append	lix C	C-1
1 Introduction

The Sacramento-San Joaquin Delta (Delta) watershed is currently experiencing extremely dry conditions following dry conditions in 2020. Currently, the 2021 and 2020 period is projected to be one of the driest two-year periods on record for runoff. These low runoff conditions have resulted in very low inflows to reservoirs and associated limited storage supplies for various purposes this summer and into the fall. To help address these conditions, the State Water Resources Control Board (State Water Board or Board) developed a methodology to assess water unavailability in the Delta watershed. This report describes that methodology identifying when available data indicates that natural and abandoned water supplies are unavailable for diversion by water right holders and claimants in the Delta watershed under their priority of right (Delta Water Unavailability Methodology or Water Unavailability Methodology for short).

Based on the output of a prior version of the Water Unavailability Methodology, on June 15, 2021, the State Water Board issued notices to all post-1914 appropriative water right holders in the Delta watershed indicating that water supplies are not available for their use based on the best available information (notices of water unavailability). Based on the current version of the Water Unavailability Methodology, additional notices were issued to more senior water right claimants on July 23, 2021.¹ In addition, on July 23, 2021, the State Water Board released draft emergency curtailment regulations for the Delta watershed. If adopted, the regulations would authorize curtailments based upon the Water Unavailability Methodology or other comparable tools, including any appropriate updates to the methodology that may be made in the future through the Board's processes. Additional information related to Delta curtailment regulations can be found on the Board's <u>Delta drought webpage</u>.

The Delta watershed includes supplies from both the Sacramento and San Joaquin river systems. As shown in Figure 1 below, these river systems, including their tributaries, drain water from about 40 percent of California's land area, supporting a variety of beneficial uses of water. The San Francisco Bay-Delta (Bay-Delta) is one of the most important ecosystems in California, as well as the hub of California's water supply system. As the largest tidal estuary on the western coast of the Americas, it provides essential habitat to a vast array of aquatic, terrestrial, and avian wildlife in the Delta,

¹ On July 23, 2021, notices were issued to all post-1883 appropriative water right claimants within the Sacramento River watershed and all pre-1914 appropriative water right claimants within the San Joaquin River watershed. In addition, notices were issued to pre-1883 appropriative water right claimants in specific Sacramento River tributary subwatersheds due to limited local supplies. Riparian claimants in the San Joaquin River watershed and the Bear River, Upper American River, and Putah Creek subwatersheds within the Sacramento River watershed were notified that water supplies were insufficient to meet the demands of all riparian claimants.

Figure 1. Delta Watershed Location



San Francisco Bay, and near-shore ocean, as well as a diverse assemblage of species upstream of the Delta. Water from the Delta provides a portion of the supplies to more than two-thirds of Californians, supports industry, and is used to irrigate millions of acres of farmland.

Given the importance of the water supplies in the Delta watershed for multiple purposes and the extreme limitations in water supplies this year, action is needed to determine when water supplies are not available under water right holders' or claimants' priorities of right. The Department of Water Resources' (DWR) State Water Project (SWP) and the U.S. Bureau of Reclamation's (Reclamation) Central Valley Project (CVP) (collectively Projects) are responsible for providing salinity control and meeting environmental flows in the Delta, as well as specific requirements for flows and temperature management on Project tributaries. Currently, many Project reservoir storage levels are at or near historical lows, creating significant concerns for salinity control, municipal water supplies (particularly from Folsom Reservoir), and temperature management and other environmental needs this year and going into next year. As a result of these concerns, the Projects have submitted, and were granted subject to terms and conditions, a temporary urgency change petition to reduce their obligations to release water from storage to meet flow and water quality requirements in the Delta.²

Concerns for reservoir storage levels are compounded when diversions occur by users when supplies do not exist at their priority of right, resulting in the need for additional releases of stored water from Project reservoirs in order to repel salinity intrusion from the ocean and meet other minimal needs.

Determining when water supplies are unavailable to users will be important to ensure that supplies are available to meet current water quality and flow requirements and the demands of senior water right holders. However, it may be unclear to water users when supplies are unavailable for their use because supplies are needed by downstream senior water right holders or because streamflows are comprised of releases of previously stored water that is released to serve contractors or to meet water quality or flow requirements.

The State Water Board has developed the Water Unavailability Methodology for identifying when available data indicates that natural and abandoned water supplies are unavailable for direct diversion or diversion to storage for consumptive use by water right holders and claimants in the Delta watershed under their priorities of right. The methodology is not intended to address other supplies of water like rediversion of previously stored water for use by Project contractors. The methodology also does not address water unavailability for non-consumptive uses of water like direct diversion for hydropower production when these supplies are returned back to the source stream.

² The Board order conditionally approving the petition is available at:

https://www.waterboards.ca.gov/waterrights/water_issues/programs/drought/tucp/docs/ 2021/20210601_swb_tuco.pdf

However, since wet season diversions to storage for later production of hydropower may change the timing of flows and affect the availability of water for other users, the methodology will consider water unavailability for such diversions if applied during the wet season.

The methodology evaluates water supplies and demands on a monthly scale at the subwatershed and watershed scale for both the Sacramento River and San Joaquin River watersheds with currently available data, reporting, and tools. Results from the methodology are available through September 2021. The methodology is also planned to be used beyond September 2021, utilizing updated data on supplies and demands, including additional demand data that may be required by possible emergency regulations. The Water Unavailability Methodology improves upon methods used for determining water unavailability in prior droughts, most recently in 2014 and 2015. Major improvements are described below and are focused on ensuring that demands are not overinflated in ways that would overestimate water unavailability, causing more water users to receive notices of water unavailability or resulting in those notices applying for a longer time period. Other improvements include better supply estimates. With more time, better data, and improved tools, additional improvements will be possible.

This report and associated technical appendices describe the current approach and major assumptions for the Water Unavailability Methodology. Technical Appendix A describes the Water Unavailability Methodology spreadsheet, including the input data sources, computational steps, and outputs used to develop the water unavailability visualizations. Technical Appendix B describes the process used to collect and quality control the demand datasets. Appendix C summarizes the substantive technical, factual, or legal comments that have been received to date on the Water Unavailability Methodology, as well as any relevant sections of the report where those comments have been addressed. The technical appendices and spreadsheet are available on the State Water Board's <u>Delta Water Unavailability Methodology webpage</u>.

This report will continue to be updated, as appropriate, as the methodology is updated. All revisions will be made available on the Board's Delta Water Unavailability Methodology webpage.

The draft Water Unavailability Methodology was released for public comment on May 12, 2021. The Water Unavailability Methodology was updated based on comments received, and further review and an update of the methodology was released on June 15, 2021, along with notice of water unavailability to all post-1914 water right holders in the Delta watershed. At that time, the State Water Board indicated that additional modifications were planned to address water unavailability for more senior water right claimants, including pre-1914 appropriative and riparian claimants. This version of the methodology includes those updates, as well as additional updates to address comments received on the methodology and other updates based on further review. Those changes include the following:

- Inclusion of methods to evaluate water unavailability for pre-1914 and riparian claimants, including disaggregation of these demands by water right priority. In this disaggregation, riparian rights are generally assumed to be senior to pre-1914 appropriative rights. While this may not be the case in every instance, on the scale of these analyses, exceptions are not generally expected to have a meaningful effect. To the extent that a pre-1914 appropriative claimant believes they have a senior right to riparian water rights, the Board will consider that information and make appropriate adjustments to any curtailment orders issued pursuant to the proposed emergency regulation.
- Changes to assumptions regarding available supplies for riparian diversions in the Legal Delta to exclude water from outside of the watershed where the diversion occurs. Specifically, riparian water right claimants in the Sacramento River portion of the Delta are only assumed to have supplies available from the Sacramento River and likewise riparian water right claimants located in the San Joaquin River portion of the Legal Delta are only assumed to have supplies available from the San Joaquin River. The proration methodology described in the June 15, 2021 version of the methodology continues to be used for any appropriative demands in the Legal Delta since those rights do not include the same source limitations and may draw water from an adjacent watershed.
- Changes to reflect that headwater subwatersheds are only "disconnected" from the larger Delta watershed if all post-1914 appropriative and all pre-1914 appropriative demands cannot be met. The June 15 version of the methodology only evaluated water unavailability for post-1914 water rights and, therefore, assumed disconnection when all post-1914 appropriative demands could not be met because the methodology was not evaluating relative water unavailability for more senior claims. In order to evaluate water unavailability for more senior claims, the relative priority of pre-1914 appropriators must be considered at the subwatershed as well as the watershed-wide scales. Because riparian water right holders are generally senior in priority to pre-1914 appropriators, those demands are assumed to be met prior to any pre-1914 appropriative demands. Where there are shortages in supplies for riparian claimants, shortages would be shared correlatively amongst them. Such shortages cannot currently be fully reflected in the methodology given the complexity of reflecting correlative shortages.
- The addition of an online visualization comparing monthly supply forecasts to daily cumulative supplies. This tool will be used to help ensure that curtailment decisions are tracking the correct hydrologic exceedance level. To address short term precipitation events, additional information regarding actual and forecasted precipitation and runoff will be considered to ensure that curtailments are

suspended in a timely manner when additional supplies become available, particularly for the purposes of refilling depleted reservoirs.

- Refinements to Bear River supply estimates to better reflect actual supplies in this sub-watershed.
- Other minor refinements.

The State Water Board has received and reviewed numerous public comments on the methodology, including comments received during a May 21, 2021 staff-led workshop and in writing by the May 25, 2021 comment deadline. Many commenters supported the methodology and acknowledged the substantial improvements compared to that used during the prior drought. Other commenters requested use of data and tools that do not currently exist and will not be possible to use for many years at the earliest. Given the dire water supply concerns that exist this year, assumptions were made using the best available data as discussed further in the report.

With over 17,000 water rights or claims on record in the watershed with even more points of diversion, numerous real-time and dynamic supply and demand issues that are not all well understood, and numerous other complexities, reasonable simplifying assumptions are necessary based on current best available information. These assumptions, as well as the implementation of the methodology itself, are intended to be conservative for the purpose of avoiding unwarranted curtailments.

Some commenters suggested the methodology should use real-time, verified, demand and return flow data. Currently demand data is self-reported annually by diverters on a monthly timestep, only received in arears, and not subject to systematic verification upon receipt. In addition, compliance with Senate Bill 88, which would improve reporting accuracy and frequency, is low, even among large diverters. The Board has made efforts to improve the demand data currently available for use in the methodology via a quality control process, described in sections 2.2.2 and 2.2.3. This qualitycontrolled dataset represents the most accurate demand dataset for the watershed available to the Board at this time. The proposed emergency regulation seeks to further improve the demand dataset by requesting monthly projected water demand from the watershed's largest users. Developing processes and tools that can accommodate daily or sub-daily demand data would take significant additional time and significant improvements in data and tools, which would not be available in time to respond to the present emergency. Reported diversion and use information for 2020 was not initially used for the methodology because it had not been received or quality controlled in time: however, it may be incorporated in the future. Further, there is currently no wide-scale system in place for measuring return flows or system losses from seepage, riparian vegetation, evaporation, and other sources, but reasonable assumptions are made in the methodology to account for these factors.

Similar to the comments received suggesting the use of more real-time demand data, some commenters suggested use of daily or sub daily, real-time, verified supply and

abandoned flow data. As with demand, developing real-time verified supply data is not possible in time to address this emergency, but will be explored further in the future.

Commenters also suggested that increased spatial resolution and dynamic supply/demand analyses are needed to reflect the specific issues of water availability at each point of diversion. This level of complexity would require significant, sustained, and widespread improvements in real-time measurement, reporting, quality control, and tools to develop. Improvement to the spatial and temporal resolution of water unavailability analyses will be further investigated in the future. For the current methodology, where sub-monthly time steps for consideration of precipitation and runoff are warranted, that information will also be considered in curtailment and water unavailability determinations to ensure that curtailments are suspended when supplies become available.

Some commenters suggested that adjudicative-like proceedings are needed prior to addressing issues of water unavailability. Given the number of right holders and the complexity of the related issues, such a process would likely take decades and require significant resources and would not permit the Board to adequately address the water supply shortages that exist this year. In the Stanislaus River, an adjudication was completed and a decree issued in 1929. One commenter suggested that, as a result, water from this subwatershed should not be included as available downstream supply. The Stanislaus River adjudication only determined the validity and parameters of appropriative rights within the Stanislaus River. The adjudication did not determine riparian rights or rights in the larger Sacramento or San Joaquin River watersheds. The commenter has not cited any legal authority for the proposition that the Stanislaus River adjudication had preclusive effect on water right holders outside the Stanislaus River watershed who may be entitled to natural flows originating in the Stanislaus River watershed. (See Wat. Code, §§ 2500, 2774 [preclusive effect of statutory stream adjudication only extends to rights acquired upon "the stream system embraced in the proceedings"].)

A commenter suggested that the methodology should consider prescriptive rights. The State Water Board does not have adequate information regarding the nature and validity of any prescriptive rights to factor those into the analysis. In addition, in the context of the drought emergency, the State Water Board does not have the time or resources to investigate and determine whether any of the thousands of water rights in the Delta watershed have been invalidated or rendered subordinate to junior water rights through prescription. (See *City of Pasadena v. City of Alhambra* (1949) 33 Cal.2d 908, 926-927 [setting forth common law elements of prescription].) To the extent that prescriptive rights may exist and are not accounted for, the emergency regulations would allow for that information to be considered, as well as other claims that changes to water right information should be made in the methodology.

Commenters asserted that stored water released from New Melones Reservoir should be treated as abandoned flow below Vernalis on the San Joaquin River. The

methodology does not treat stored water releases from New Melones as abandoned because the releases are being made to meet Delta outflow and other water quality requirements below Vernalis this year.

A number of commenters raised topics regarding issues in the Legal Delta. Commenters suggested that return flows from Legal Delta diversions should not be made available to diverters upstream. The methodology only makes return flows available within four downstream subwatersheds. As discussed above, data and tools for more granular analyses are not currently available at this time. Commenters suggested that provisions for in-Delta storage or fresh water supplies should be made. However, no specific sources for assumptions that should be made during the current hydrologic conditions were provided. As described further in section 2.3.3, given the extreme dry conditions that exist and have existed for a prolonged period, there is no basis to assume that any remaining storage of fresh water flows would exist in the Delta longer than the methodology's one-month time step.

To the extent that users can develop voluntary solutions, those voluntary solutions may address some of the long-standing legal and technical issues, at least in the short term for purposes of addressing current water unavailability. The Board intends to update the methodology as needed in order to administer the water rights priority system using the best available information. Due to the uncertainties that exist in determining water unavailability in the Delta watershed, conservative assumptions were used within the methodology itself and will also be used in the methodology's implementation.

1.1 Background

The mission of the State Water Board is: "To preserve, enhance, and restore the quality of California's water resources and drinking water for the protection of the environment, public health, and all beneficial uses, and to ensure proper water resource allocation and efficient use, for the benefit of present and future generations." The Board's critical goals of providing safe drinking water to all Californians and maintaining the quality of our waterways, in keeping with both state and federal requirements, rely on the Board's successful administration of the water rights system. California's water rights system is one of the most complex in the nation, incorporating both riparian³ and appropriative

³ Generally, a riparian water right is a right to use the natural flow of water on land contiguous to a natural water course. Riparian water rights are unquantified, allowing the diverter to take water from the natural flow of the water course for any immediate reasonable and beneficial use on the subject land. In times of shortage, all riparian rights share the shortage on a correlative basis; that is, each riparian is required to reduce its use proportionally so that the reduced supply is divided among all riparian rights.

water rights, including appropriative rights issued under the Board's authority and those in existence prior to the inception of its predecessor-in-interest.⁴

The water right priority system, based on the "priority date" of each water right, forms the basis for determining which users may divert, and how much, when there is insufficient water in the stream for all users. Older, more senior appropriative water rights have priority over more junior appropriative water rights. Senior water right holders are more likely to receive water at times of shortage than more junior water right holders. However, once water is stored or imported, the entity that stored or imported the water has the only right to it, though others may acquire contingent junior rights to any return flows.

When the amount of water available in a surface water source is not sufficient to support the needs of existing water right holders and in-stream uses, junior appropriators must cease diversion in favor of higher-priority rights. However, it is not always clear to a junior diverter whether there is sufficient natural flow in the system to support their diversion and senior water uses and instream needs downstream. As part of administrating water rights, the State Water Board may issue notices of curtailment to water rights holders based on California's water rights priority system.

1.2 Current Conditions

After two years of low precipitation, the U.S. Drought Monitor now reports that the entirety of California is experiencing moderate to exceptional drought, of which 86 percent is experiencing extreme to exceptional drought (USDM 2021). The U.S. Seasonal Drought Outlook, released by the Climate Prediction Center on July 15, 2021 and valid through October 31, 2021, shows drought persisting throughout California (NOAA 2021). Within the Delta watershed, conditions have been extraordinarily dry, with Water Year (WY) 2020 ranking as the ninth driest on record and WY 2021 ranking as the fourth driest on record (DWR & Reclamation 2021). These dry conditions have resulted in reservoir storage levels that are significantly below average (DWR 2021a; DWR 2021c). As of July 21, 2021, storage volumes in major reservoirs, including Lake Shasta, Lake Oroville, and Folsom Lake are lower than 35 percent of capacity and below 50 percent of average storage conditions (*Ibid*).

As a result of the current dry conditions, on May 10, 2021, Governor Newson 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 and called on Californians to reduce their water use by 15 percent. The May 10

⁴ Use of water on non-riparian land or seasonal storage of water for later beneficial use requires an appropriative water right. An appropriative water right that was initiated before the Water Commission Act went into effect on December 19, 1914, and subsequently perfected is called a pre-1914 appropriative water right. Appropriative rights initiated and acquired after this date are called post-1914 appropriative water rights, and they are administered and regulated by the State Water Board.

proclamation orders the State Water 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 indicates that the State Water Board shall consider emergency regulations to curtail water diversions when water is not available at water right holders' priority of right or to protect previously stored releases of water (Exec 2021). Upon finalization, this methodology may serve as the technical basis for future emergency curtailment regulations pursuant to the directives in the emergency drought proclamation.

2 Water Unavailability Methodology

The Water Unavailability Methodology incorporates the best available supply data for the Delta watershed with the best available estimates of demand for the same area. The methodology compares this data for multiple areas within the Delta watershed: the Sacramento River watershed, San Joaquin River watershed, and headwater subwatersheds (see definition in section 2.3.1 below), to determine if supply may be insufficient to meet certain priorities of right. These comparisons are presented visually using interactive graphs and in spreadsheet format. The following sections describe the sources of the supply and demand data, adjustments made to the data as needed, and the resultant outputs of the comparisons. Figure 2 below shows an overview of the Water Unavailability Methodology that is covered in greater detail in the following sections.



Figure 2. Water Unavailability Methodology Flowchart

2.1 Supply

The purpose of this analysis is to account for the availability of natural and abandoned flows within the Delta watershed for diversion by water right holders under their priority of right. This analysis is not intended to account for the availability of imported supplies from other watersheds that do not contribute to available supplies for general use in the Delta watershed. Specifically, imported supplies from the Trinity River system are imported for use by Reclamation and their contractors and are not available to other users under their own water rights. The analysis is also not intended to account for releases of previously stored water for downstream delivery, use, or rediversion since those supplies are also not available to other users under their own water rights. In the case where previously stored water is released to meet instream flow requirements that apply in an upstream subwatershed, but not downstream watersheds, and the water is not released for delivery to a downstream user, these flows are considered to be abandoned and part of available supplies.

The methodology incorporates the use of past and projected future full natural flow (FNF) (or unimpaired flow) estimates (see section 2.1.4 below). FNF represents the natural water production of a river basin unaltered by upstream water diversion, storage, or import from or export to other watersheds (DWR 2015). FNF is a theoretical water supply estimate rather than a reconstruction of pre-development streamflows (DWR 2016). Though FNF values are not directly measured, the locations where they are estimated are referred to herein as "gages."

Past FNF estimates are calculated from measured streamflows, adjusted for upstream operations by subtracting imported water and adding upstream diversions, changes in storage, and evaporative losses. The past FNF values serve two purposes in the methodology: (1) to provide historical context to current water supply conditions and (2) to show water supply conditions for the current year, from January 2021 to the present. Water years in the Sacramento and San Joaquin River watersheds are categorized as Wet, Above Normal, Below Normal, Dry, and Critically Dry based on equations defined in State Water Board Decision 1641 that account for the unimpaired runoff of each water year and its preceding water year (DWR 2021b). For both the Sacramento and San Joaquin River watersheds.

Forecasted FNF values are calculated from snowpack measurements, estimates of water content, expected weather, rates of evaporation, ground absorption, and other factors. Because future water supply cannot be predicted with absolute certainty, a forecast provides a range of expected water supply volumes. These potential volumes are assigned probabilities that they will occur based on current conditions. Probabilities are expressed in exceedances, or the percent chance that the future FNF will exceed a given amount. For example, the 10 percent exceedance indicates wetter than average conditions where there is a 10 percent chance that the FNF volume will exceed the forecast value, and a 90 percent chance that the FNF volume will be less than this forecast value. Similarly, a 90 percent exceedance indicates drier conditions where

there is a 90 percent chance that the FNF volume will exceed the forecast value and a 10 percent chance that the FNF volume will be less than this forecast value. A 50 percent exceedance indicates a 50 percent chance that the FNF volume will exceed the forecast value and a 50 percent chance that the FNF volume will be less than this forecast value. Generally, this forecast is the middle of the range of possible FNF volumes that can be produced given current conditions (50 percent exceedance is equivalent to the median). As the dry season approaches, forecasts become progressively more precise as actual events replace the variable range of potential conditions. Currently, conditions in the Delta watershed are extremely dry, tracking drier than the 99 percent exceedance.

2.1.1 Supply Analysis

The range of data available within the supply dataset described below allows for the comparison of historical FNF to current year estimates and forecasts. As described above, the current hydrology is tracking drier than the 99 percent exceedance forecast. For reference, both the 90 percent and 99 percent exceedances, provided in the official supply forecasts released in June 2021, are shown in Figure 3 and Figure 4 below. As indicated below, the current year supply within the Delta watershed is drier than the median critically dry year over the period of 1922 through 2019.







Figure 4. 2021 Supply Conditions Within the San Joaquin River Watershed

2.1.2 Types of Water

The water rights system is complex. In many cases during droughts, the observable water in a stream may not be available for diversion because the water: is needed to meet senior downstream demand; has been transferred for use or rediversion downstream; or is previously stored water that has been released to meet downstream demands, water quality and flow requirements, and contractual demands. This section discusses the additional complexities in determining whether water is available for diversion.

Water in a stream system may consist of a combination of "natural flows," imported supplies, storage releases, abandoned flows, and return flows:

- 1. **Natural flow** Natural flows are the natural runoff of a river basin unaltered by upstream water diversion, storage, or import from or export to other watersheds. Natural flows, quantified as FNF, are the basis of this methodology.
- Imported Supplies Imported supplies include supplies that are brought from one water supply source to another for consumptive uses or non-consumptive uses. In the Delta watershed, imported supplies are brought in from outside of the watershed from the Trinity River. Other projects may import water to one subwatershed from another, entirely within the Delta watershed (e.g., the Yuba-

Bear and Drum-Spaulding projects, see section 2.2.7 below). These additional water supplies are not accounted for in this analysis because these supplies do not constitute natural or abandoned flows.

- Previously Stored Water Seasonally stored water, including releases of previously stored water for downstream use, is not available for diversion or use by diverters other than the entity that stored the water, their contractors, or recipients of a transfer. Accordingly, the methodology does not account for these storage supplies.
- 4. Abandoned water Abandoned water is water that has been used or dedicated for a specific purpose for which it is no longer needed. If it was previously diverted, the diverter lays no further claim to the water, such as is commonly the case with return flow from agricultural uses. If the water was dedicated for instream use, it becomes abandoned once it flows out of the reach for which it was dedicated. Abandoned flows are available for downstream diversion.
 - a. Abandoned instream flows Water for instream use may be comprised of previously stored water releases that are foreign in time or imported from another watershed or bypassed natural flow that is provided for the purposes of preserving or enhancing wetlands, protecting fish and wildlife, and/or recreation. Some instream flows that only apply to a certain reach of a stream can be considered abandoned past that reach. Instream flows that are required to meet Delta instream flow, outflows, and salinity requirements are not considered abandoned. Section 2.1.6 below describes adjustments to the supply analysis to account for certain abandoned instream flows.
 - b. Abandoned return flows Return flows from other uses such as irrigated agriculture or municipal water treatment plants may be discharged back to the stream system with no residual claim of control, dominion, or right of further use. In such a case, this water would be available to appropriative diverters and may be available to riparian diverters if not foreign in time or source. Section 2.2.8 below describes adjustments made to the demand dataset to account for return flows from use within the Delta watershed.

The Water Unavailability Methodology assumes all FNF is available for diversion. The methodology also includes assumptions for return flows and abandoned instream flows that are available for diversion. Incorporation of return flows reduces demand calculated purely on reported diversions because a component of that diversion is introduced back into the system. As a simplifying assumption, the methodology does not distinguish between the types of water available within a stream system. Additional analysis will be needed to distinguish supplies that are foreign in time or watershed and not available to riparian diverters.

2.1.3 Subwatershed Delineation

The supply-demand analysis begins at a "subwatershed" level. Subwatershed boundaries were defined using the U.S. Geological Survey (USGS) Watershed Boundary Dataset (WBD) and National Hydrography Dataset (NHD), which delineate land areas draining to streams. Subwatersheds in the Delta watershed were established based on Hydrologic Unit Code level 8 watersheds (HUC8s), which represent areas of sufficient size to capture as much of the available flow as possible within the watershed given the existing network of FNF gages.

Some subwatershed boundaries were defined as a combination of multiple HUC8s due to the presence of multiple HUC8s upstream of a single FNF gage location. These subwatersheds include the Sacramento River above Bend, the Upper American River, and the Upper Feather River. Some HUC8s containing small tributaries on the valley floor were also combined into a single subwatershed due to the locations of supply estimates produced by DWR,⁵ including the Upper Sacramento River Valley, Sacramento River Valley Floor, and San Joaquin Valley Floor subwatersheds. A total of 20 Delta subwatersheds were used in the Water Unavailability Methodology: 10 each in the Sacramento and San Joaquin River watersheds (see Figure 5).

An inventory of available FNF gages from multiple sources (see section 2.1.4 below) was compared to the subwatershed boundaries, NHD stream maps, and water right points of diversion (PODs) to identify target FNF gages that are representative of water supplies and demands met by them within each subwatershed. These target FNF gages were considered during the prioritization of available supply data sources discussed in more detail in section 2.1.4 below.

The Water Unavailability Methodology assumes that water supply data at each FNF gage shown in Figure 5 below is representative of the total FNF for the subwatershed as a whole, not only the portion of the subwatershed upstream of the location. This assumption may result in minimal underestimation of supply within certain upstream subwatersheds and minimal overestimation of supply in corresponding downstream subwatersheds. Given the broad spatial coverage of the methodology and the use of generally conservative estimates regarding supply, this assumption is not anticipated to significantly impact watershed-wide determinations of water unavailability.

Supplies and demands from the Tulare Lake watershed (including the Kings, Kern, Kaweah, and Tule Rivers) and the Panoche Creek subwatershed are not included in the Water Unavailability Methodology. Natural flows from the Tulare Lake watershed, despite not being a part of the Delta watershed, at times enter the watershed, largely from the Kings River via Fresno Slough. However, surface water contributions of the Tulare Lake region have historically been minimal and may have been significant only in wet years (DWR 2016). Natural flow would not reach the Delta watershed from the

⁵ See DWR's March 2016 Report on Unimpaired Flows in the Bay-Delta Watershed, described in section 2.1.4 below.

Tulare Lake watershed during the dry season of a critically dry year. Similarly, during the upcoming wet season, it is unlikely that natural flow from the Tulare Lake watershed would reach the Delta watershed as long as shortage conditions persist in the Delta watershed. Therefore, supplies and demands from the Tulare Lake watershed have been excluded from the methodology. In addition, the methodology excludes supply and demand from the Panoche Creek subwatershed, a relatively small tributary in the southwest corner of the San Joaquin River watershed. There is no available FNF supply data for Panoche Creek, and aerial photographs indicate that it terminates in agricultural fields west of Mendota. Therefore, it is assumed not to significantly contribute to available water supplies within the Delta watershed.



Figure 5. Delta Subwatershed and FNF Gage Map

2.1.4 Supply Data Sources

Because there is no single data source that provides both past and forecasted FNF estimates for the entire Delta watershed, supply data is derived from multiple sources which vary by location, timescale (i.e., historical data, including prior months of the current water year, and future forecasted data), and temporal resolution (i.e., daily or monthly). These data sources were considered hierarchically; that is, if data for a particular subwatershed was not available from the preferred data source, the next source was checked. If the data was available there, that data was incorporated into the dataset, and so on down the list.

The sources of past supply data, in order of priority of use, are:

- 1. The <u>California Data Exchange Center (CDEC)</u>, which contains published FNF estimates made by water system operators within each watershed. These are primarily available for larger rivers and contain monthly data as far back as WY 1901 in some subwatersheds.
- 2. <u>DWR's March 2016 Report on Unimpaired Flows in the Bay-Delta Watershed</u>, which contains monthly FNF estimates for water years 1922 through 2014.
- 3. The National Oceanic and Atmospheric Administration (NOAA) National Weather Service <u>California Nevada River Forecast Center (CNRFC)</u> estimates of daily FNF.⁶ These estimates are available for many streams beginning with WY 2013. This source was used only for streams where no other data was available.

The sources of forecasted supply data, in order of priority of use, are:

- DWR's California Cooperative Snow Surveys <u>Bulletin 120</u> Water Supply Forecast (B-120),⁷ which contains monthly FNF forecasts for the current water year for only larger rivers. B-120 Water Supply Index (WSI) products include forecasts with 10, 25, 50, 75, 90, and 99 percent exceedance probabilities.
- 2. CNRFC daily FNF forecasts⁸ were used only for minor tributaries. Exceedance probabilities were calculated from the available forecast data to match the B-120

⁶ CNRFC data is published on a daily scale, which is summed to generate monthly values for the purpose of this analysis. Any negative daily FNF values were replaced with zero values.

⁷ Bulletin 120 (B-120) provides FNF forecasts for the state's major watersheds. It is updated monthly, around the fifth business day of each month, from February to May of each year. The FNF calculation is made using DWR's own database of diversions upstream of unimpaired flow stations. The methodology relies upon DWR's unimpaired flow calculations and did not cross-check DWR's diversion database against the Board's records of reported diversions.

⁸ CNRFC forecasts are presented in the form of 39 different daily FNF "traces." These daily values were summed, and exceedances were calculated from the resulting monthly forecasts.

format. During the October through January time period when B-120 forecasts are not available, CNRFC daily FNF forecasts will be used for locations that have relied upon B-120 forecasts to date.

If data was available from multiple sources for the same subwatershed (e.g., past data from both CDEC and DWR or forecasted data from both B-120 and CNRFC), both datasets were compared for an overlapping time period to validate that there we no substantial inconsistencies between them. These comparisons did not result in any changes to the assumed hierarchy of data sources described above.

The final water supply dataset used in the Water Unavailability Methodology's supplydemand comparison consists of monthly FNF data. The use of monthly supply forecasts and demand estimates (see section 2.2 below) is assumed to negate the need to consider the water's transit time within the Delta watershed (i.e., it takes less than a month for water to flow from its headwaters to a downstream diverter). Monthly data is also used because there is insufficient real-time data available to evaluate supplies for all streams in the Delta watershed on a daily timestep. Furthermore, daily supply data from sources such as CDEC are less accurate than published monthly values. However, for the purposes of sub-monthly short-term considerations of curtailment suspensions due to precipitation and runoff events, sub-monthly data will be considered to ensure that curtailments are suspended on a time step commensurate with available supplies.

CDEC provides both monthly and daily FNF estimates for many rivers in California. Daily FNF estimates are less accurate than monthly estimates because they are based on less data than is available at the completion of each month (DWR 2015). Therefore, daily CDEC FNF values are not used in the water unavailability graphs described in section 2.4 below. However, daily FNF estimates may be used to determine the most appropriate supply forecast (e.g., 10, 50, 90, or 99 percent exceedance probability) to use when issuing notices of water unavailability, as described in section 3.1.1 below.

Table 1 and Table 2 below summarize the sources of both past and forecasted supply data for each subwatershed included in the supply dataset for the Sacramento River watershed and the San Joaquin River watershed, respectively. The source information includes the agency from which the data was obtained and the unique identifier for each FNF gage site. Past source data is broken down into the sources of monthly and daily estimates; daily sources with date ranges in Table 1 and Table 2 were summed to generate monthly past data, while those shown without date ranges were used only for periodic forecast monitoring (see section 3.1.1). The monthly past source data also includes the years for which data is available, such as WY 1906 to present. For forecasted supply data, information is provided on the resolution, frequency, and format of forecast updates. Subwatersheds where gap-filling procedures were applied (see section 2.1.5 below) are denoted with asterisks, and all gap-filled values are specifically identified as such in the supply dataset.

	Past Supply	Forecasted			
Subwatershed	Monthly (Agency, Gage, Date Range)	Monthly (Agency, Gage, Date Range) applicable)			
Sacramento River at Bend	CDEC SBB: Sacramento River above Bend Bridge, sensor 65 (WY 1906-Present)	CDEC BND: Sacramento River at Bend Bridge, sensor 8	DWR B-120 SRWSI: Sacramento River above Bend Bridge (monthly TAF for current WY in 6 exceedances); when DWR B-120 unavailable, CNRFC BDBC1: Sacramento River- Bend Bridge (daily TCFS for next year in 39 traces)		
Stony Creek	DWR UF4: Stony Creek at Black Butte (WY 1922- 2014)	CNRFC EPRC1: Little Stony Creek- East Park Reservoir (WY 2015-Present)*	CNRFC EPRC1: Little Stony Creek- East Park Reservoir (daily TCFS for next year in 39 traces)*		
Cache Creek	DWR UF3: Cache Creek above Rumsey (WY 1922- 2014)	*	*		
Upper Feather River	CDEC FTO: Feather River at Oroville, sensor 65 (WY 1906-Present)	CDEC ORO: Oroville Dam, sensor 8	DWR B-120 SRWSI: Feather River at Oroville (monthly TAF for current WY in 6 exceedances); when DWR B-120 unavailable, CNRFC ORDC1: Feather River- Lake Oroville (daily TCFS for next year in 39 traces)		

Table 1. Sacramento River Watershed Supply Data Sources

	Past Supply	Forecasted	
Subwatershed	Monthly (Agency, Gage, Date Range) Date Range) Date Range)		Monthly Supply Data Sources (Agency, Gage, Forecast Resolution)
Yuba River	CDEC YRS: Yuba River near Smartville, sensor 65 (WY 1901- Present)	CDEC YRS: Yuba River near Smartville, sensor 8	DWR B-120 SRSWI: Yuba River near Smartville plus Deer Creek (monthly TAF for current WY in 6 exceedances); when DWR B-120 unavailable, CNRFC HLEC1: Yuba River- Englebright Reservoir (daily TCFS for next year in 39 traces)
Bear River	DWR UF10: Bear River near Wheatland (WY 1922-2014)	*	*
Upper American River	CDEC AMF: American River at Folsom, sensor 65 (WY 1901-Present)	CDEC NAT: Lake Natoma (Nimbus Dam), sensor 8	DWR B-120 SRWSI: American River below Folsom Lake (monthly TAF for current WY in 6 exceedances); when DWR B-120 unavailable, CNRFC FOLC1: American River- Folsom Lake (daily TCFS for next year in 39 traces)
Putah Creek	DWR UF2: Putah Creek near Winters (WY 1922-2014)	*	*

	Past Supply	Forecasted	
Subwatershed	Monthly (Agency, Gage, Date Range)	Daily (Agency, Gage, Date Range if applicable)	Monthly Supply Data Sources (Agency, Gage, Forecast Resolution)
Upper	DWR UF5: Sacramento Valley West Side Minor Streams (WY 1922- 2014)	CNRFC EDCC1: Elder Creek- Paskenta + TCRC1: Thomes Creek-Paskenta (WY 2015- Present)*	CNRFC EDCC1: Elder Creek- Paskenta + TCRC1: Thomes Creek-Paskenta (daily TCFS for next year in 39 traces)*
River Valley	DWR UF7: Sacramento Valley East Side Minor Streams (WY 1922- 2014)	CNRFC MLMC1: Mill Creek-Los Molinos + DCVC1: Deer Creek-Vina + BKCC1: Butte Creek-Chico (WY 2015-Present)*	CNRFC MLMC1: Mill Creek-Los Molinos + DCVC1: Deer Creek-Vina + BKCC1: Butte Creek-Chico (daily TCFS for next year in 39 traces)*
Sacramento River Valley Floor	DWR UF1: Sacramento Valley Floor (WY 1922- 2014)	*	*

*Gap filling procedure used to adjust existing data or fill-in missing data (see section 2.1.5).

Table	2. San	Joaquin	River	Watershed	Supply	Data	Sources

	Past Supply	Forecasted	
Subwatershed	Monthly (Agency, Gage, Date Range)	Daily (Agency, Gage)	Monthly Supply Data Sources (Agency, Gage, Forecast Resolution)
Chowchilla River	DWR UF20: Chowchilla River at Buchanan Reservoir (WY 1922-2014)	CNRFC BHNC1: Chowchilla River- Buchanan Reservoir (WY 2015-Present)	CNRFC BHNC1: Chowchilla River- Buchanan Reservoir (daily TCFS for next year in 39 traces)

	Past Supply	Forecasted	
Subwatershed	Monthly (Agency, Gage, Date Range)	Daily (Agency, Gage)	Monthly Supply Data Sources (Agency, Gage, Forecast Resolution)
Upper San Joaquin River	CDEC SJF: San Joaquin River below Friant, sensor 65 (WY 1901-Present)	CDEC SJF: San Joaquin River below Friant, sensor 8	B-120 SJWSI: San Joaquin River inflow to Millerton Lake (monthly TAF for current WY in 6 exceedances); when DWR B-120 unavailable, CNRFC FRAC1: San Joaquin River- Millerton Reservoir (daily TCFS for next year in 39 traces)
Fresno River	DWR UF21: Fresno River near Daulton (WY 1922-2014)	CNRFC HIDC1: Fresno River- Hensley Lake (WY 2015-Present)	CNRFC HIDC1: Fresno River- Hensley Lake (daily TCFS for next year in 39 traces)
Merced River	CDEC MRC: Merced River near Merced Falls, sensor 65 (WY 1901-Present)	CDEC EXC: New Exchequer-Lake McClure, sensor 8	B-120 SJWSI: Merced River below Merced Falls (monthly TAF for current WY in 6 exceedances); when DWR B-120 unavailable, CNRFC EXQC1: Merced River- Exchequer Reservoir (daily TCFS for next year in 39 traces)

	Past Supply	Forecasted		
Subwatershed	Monthly (Agency, Gage, Date Range)	Daily (Agency, Gage)	Monthly Supply Data Sources (Agency, Gage, Forecast Resolution)	
Tuolumne River	CDEC TLG: Tuolumne River-La Grange Dam, sensor 65 (WY 1901-Present)	CDEC TLG: Tuolumne River-La Grange Dam, sensor 8	B-120 SJWSI: Tuolumne River below La Grange Reservoir (monthly TAF for current WY in 6 exceedances); when DWR B-120 unavailable, CNRFC NDPC1: Tuolumne River- New Don Pedro Reservoir (daily TCFS for next year in 39 traces)	
Stanislaus River	CDEC SNS: Stanislaus River- Goodwin, sensor 65 (VVY 1901- Present)	CDEC GDW: Goodwin Dam, sensor 8	B-120 SJWSI: Stanislaus River below Goodwin Reservoir (monthly TAF for current WY in 6 exceedances); when DWR B-120 unavailable, CNRFC NMSC1: Stanislaus River- New Melones Reservoir (daily TCFS for next year in 39 traces)	
Calaveras River	DWR UF15: Calaveras River at Jenny Lind (WY 1922-2014)	CNRFC NHGC1: Calaveras River- New Hogan Reservoir (WY 2015-Present) CDEC NHG: New Hogan Lake, sensor 8 (WY 2015-Present)	CNRFC NHGC1 (daily TCFS for next year in 39 traces)	

	Past Supply	Forecasted		
Subwatershed	Monthly (Agency, Gage, Date Range)	Daily (Agency, Gage)	Monthly Supply Data Sources (Agency, Gage, Forecast Resolution)	
Mokelumne River	CDEC MKM: Mokelumne River- Mokelumne Hill, sensor 65 (WY 1901-Present)	CDEC MKM: Mokelumne River- Mokelumne Hill, sensor 8	CNRFC CMPC1: Mokelumne River- Mokelumne Hill (daily TCFS for next year in 39 traces)	
Cosumnes River	CDEC CSN: Cosumnes River at Michigan Bar, sensor 65 (WY 1908-Present)	CDEC MHB: Cosumnes River at Michigan Bar, sensor 8	CNRFC MHBC1: Cosumnes River- Michigan Bar (daily TCFS for next year in 39 traces)	
San Joaquin River Valley Floor	DWR UF12: San Joaquin Valley East Side Minor Streams + UF17: San Joaquin Valley Floor + UF24: San Joaquin Valley West Side Minor Streams (WY 1922- 2014)	CNRFC MPAC1: Mariposa Creek- Mariposa Reservoir + OWCC1: Owens Creek-Owens Reservoir + MEEC1: Bear Creek-McKee Road*	CNRFC MPAC1: Mariposa Creek- Mariposa Reservoir + OWCC1: Owens Creek-Owens Reservoir + MEEC1: Bear Creek-McKee Road (daily TCFS for next year in 39 traces)*	

*Gap filling procedure used to adjust existing data or fill-in missing data (see section 2.1.5).

2.1.5 Filling Supply Data Gaps

After the compilation of supply data from the sources listed in section 2.1.4 above, data "gaps" remain for some subwatersheds in the Delta watershed. These gaps include periods of missing past or forecasted data and past or forecasted data that cover only a portion of a subwatershed, as defined for this analysis (see section 2.1.3 above). These gaps were filled using extrapolation and augmentation processes, respectively, to create a complete supply dataset for use in the Water Unavailability Methodology. Technical Appendix A contains descriptions of specific gap-filling processes for each subwatershed where they were applied.

2.1.5.1 Extrapolation

To fill missing past or forecasted supply data gaps, overlapping historical data between the subwatershed with missing data ("Stream") and a nearby watershed with similar hydrology but more robust data ("River") were analyzed. The Stream:River ratio was calculated⁹ for each month over this period, and outliers were removed. Then, the River FNF estimates were multiplied by the average monthly Stream:River ratio to extrapolate reasonable FNF estimates to fill the gaps in the subwatershed's dataset.

For example, February 2021 supply data for the Bear River subwatershed was not available from any of the sources listed in section 2.1.4 above. Therefore, prior February FNF estimates for the Bear River subwatershed were compared to the neighboring Yuba River and a ratio of 1:5 was calculated (Bear:Yuba). Missing February data for the Bear River subwatershed was estimated by multiplying the Yuba River subwatershed's February 2021 FNF estimate by this ratio. Figure 6 below illustrates the Bear:Yuba extrapolation for the period of WY 2014 to present.





2.1.5.2 Augmentation

In other areas, past or forecasted data may exist but not represent the entire FNF supply of a watershed that would be expected to be available for diversion. This was the case for watersheds consisting of multiple small tributary streams, in which only some streams have available supply forecasts through CNRFC. DWR's 2016 Bay-Delta Unimpaired Flow Report includes past FNF estimates that cover all tributaries in these subwatersheds. To increase the "CNRFC" forecasts to approximate a forecast for the entire subwatershed (as the past supply estimates from "DWR" do), overlapping historical data between the two sources were analyzed. The ratio DWR:CNRFC was

⁹ The Stream:River ratio calculation is analogous to a linear interpolation each month, with the y-intercept always set to zero.

calculated on a monthly basis over this period, and outliers were removed.¹⁰ Then, the past and forecasted CNRFC values were augmented by multiplying them by the monthly average DWR:CNRFC ratio to produce a reasonable FNF forecast estimate for the subwatershed.

For example, DWR's past (WY 1922–2014) unimpaired flow estimates for the Sacramento Valley East Side Minor Streams (UF7 in DWR's Report), part of the Upper Sacramento Valley subwatershed, include Antelope Creek, Mill Creek, Deer Creek, Big Chico Creek, Butte Creek, and other minor tributaries from Big Chico Creek to the Feather River (DWR 2016). CNRFC only has past (WYs 2013–present) and forecasted FNF data available for Mill, Deer, and Butte Creeks (MDB, in total). By comparing historical FNF values for a period with overlapping data (WYs 2013 and 2014), a monthly relationship ratio can be calculated. In this example, for February, the total Sacramento Valley East Side Minor Streams unimpaired flow was about 1.5 times the MDB supply. Therefore, missing February data in the Upper Sacramento Valley subwatershed also includes supplies from West Side Minor Streams, which were estimated using a similar method with different DWR and CNRFC gages. Figure 7 below illustrates the DWR:CNRFC augmentation to estimate FNF for the Sacramento Valley East Side Minor Streams.

¹⁰ Because the DWR FNF values include data for all of the CNRFC streams and additional tributaries, the value of the DWR:CNRFC ratio is always greater than one. This ratio calculation is analogous to a linear interpolation each month, with the y-intercept always set to zero.

Figure 7. Augmentation Example: Adjusting CNRFC Data for Mill, Deer, and Butte Creeks (MDB) to Estimate FNF Within Sacramento Valley East Side Minor Streams (SVESMS), a Portion of the Upper Sacramento Valley Subwatershed, Based on DWR's FNF Estimate for SVESMS



2.1.6 Abandoned Instream Flows

Specific reaches of streams within the Delta watershed may be subject to minimum instream flow requirements due to water right permit/license conditions, Board orders/decisions/regulations, Federal Energy Regulatory Commission (FERC) hydropower license conditions, biological opinion requirements, or private agreements. If these instream flow requirements are met by diverters bypassing flow, these flows are already included in FNF values. If these instream flow requirements are met via releases of stored water, these flows are not captured by FNF calculations. Beyond the reach for which they are intended for instream use, these storage releases are available for diversion, and, therefore, may theoretically be considered alongside FNF values to more accurately represent the amount of water available for downstream diversion unless there are provisions making these flows unavailable for use.

Current data limitations prevent a precise accounting of when instream flow requirements that will be abandoned have been met by stored water. Therefore, to incorporate abandoned instream flows into the supply dataset without artificially inflating estimates of available supply by assuming all abandoned instream flows have been met by releases of stored water, the methodology uses the greater of the FNF value and the abandoned instream flow value to represent the amount of supply contribution of the subwatershed to the respective watershed-wide supply. In other words, it was assumed that if the FNF is greater than the instream flow then instream flow requirement is being met by FNF; conversely, if the instream flow is greater than the FNF then it was assumed that the instream flow is met at least in part by storage releases which can be considered abandoned below their intended reach.

For the purpose of this analysis, all abandoned instream flows whose intended reach ends near the bottom of a subwatershed were considered. If two instream flow requirements exist in series in a watershed, it is possible that the same water could be used to meet both requirements. To avoid double counting of additional supplies, the methodology does not include instream flows that end higher up in the subwatershed. Using data from the State Water Board's Sacramento Valley Water Allocation Model (SacWAM)¹¹ and Water Supply Effects (WSE) model,¹² a total of seven instream flow requirements that would produce abandoned flows were identified. These flow requirements, locations, and amounts are summarized in Table 3 and Table 4 below for the Sacramento and San Joaquin River watersheds, respectively. Water released by the Projects to meet water quality and flow requirements included in State Water Board Decision 1641 is not considered abandoned because those flows are intended to remain instream through the Delta and as outflow from the Delta.

¹¹ SacWAM is a hydrologic and system operations model developed by the Stockholm Environment Institute (SEI) and State Water Board using the Water Evaluation and Planning (WEAP) platform to represent the Sacramento River watershed, Delta, and eastside tributaries to the Delta (the Calaveras, Cosumnes, and Mokelumne Rivers). Information on SacWAM is available at:

https://www.waterboards.ca.gov/waterrights/water_issues/programs/bay_delta/sacwam/ ¹² WSE is a hydrologic and system operations model developed by the State Water Board to represent the lower San Joaquin River and its lower tributaries (the Merced, Tuolumne, and Stanislaus Rivers). Information on WSE is available at:

https://www.waterboards.ca.gov/waterrights/water_issues/programs/bay_delta/bay_delt a_plan/water_quality_control_planning/2018_sed/

Sub-	Abandoned Instream Flow (cfs)					
watershed	May	June	July	Aug.	Sept.	Notes
Upper North Fork Feather River	300	300	300	300	250	FERC P-2107 license (below Poe Dam)
Yuba River	500	500	250	250	250	Board Decision 1644 (at Marysville, assumes Extreme Critical year, does not include flows transferred to DWR)
Bear River	25	25	10	10	10	FERC P-2997 license (below Camp Far West Diversion Dam, does not include flows transferred to DWR)
Upper American River	425	475	425	425	350	FERC 20140820 license (South Fork below Chili Bar, assumes Dry year, includes Conditions 1 and 3) and P-2079 license (North Fork below American River Pump Station)
Putah Creek	5	5	5	5	5	2000 Putah Creek Accord (outflow to Toe Drain)
Total	1,255	1,305	990	990	865	

 Table 3. Sacramento River Watershed Flows Considered to Contribute

 Abandoned Supplies¹³

¹³ Abandoned flows from Stony Creek were included in the May 12, 2021 version of the methodology but have been excluded from this updated version because, given current hydrology, any abandoned instream flow from Stony Creek is expected to seep into the underlying groundwater basin prior to reaching the Sacramento River and contributing to available downstream supplies.

Sub-	ib- Abandoned Instream Flows (cfs)				(cfs)	
watershed	May	June	July	Aug.	Sept.	Notes
Merced River	60	15	15	15	15	FERC P-2179 license (below Crocker Huffman Diversion Dam, assumes Dry year)
Tuolumne River	311	50	50	50	50	FERC P-2299 license (below La Grange Diversion Dam, assumes SJR 60-20-20 index is between 1.5 and 2.0 MAF)
Total	371	65	65	65	65	

 Table 4. San Joaquin River Watershed Flows Considered to Contribute

 Abandoned Supplies

For simplicity of analysis, the Water Unavailability Methodology does not currently account for whether the abandoned flows included in the supply dataset are foreign in either time or source and not available for use by riparian diverters. On a watershed-wide scale, these additional flows are not significant and would not significantly affect the analysis.

2.2 Demand

The Water Unavailability Methodology evaluates demands for natural and abandoned flows by basis of water right. It is not intended to account for demands for previously stored water, imported supplies, and contractual demands. The analysis to date has relied on reported demand data from the State Water Board's Electronic Water Rights Information Management System (eWRIMS) computer database.¹⁴ The State Water Board may also rely upon updated reporting of projected demands for larger users that is provided pursuant to emergency regulations. Projections of demands during the wet season are expected to be more accurate than historical diversion data for purposes of estimating demands, particularly for storage which historically occurred when flows were present, which does not necessarily reflect demands that would exist this year The eWRIMS data system contains information regarding water rights, including but not limited to:

- Water right ownership information
- Water right type (e.g., "Appropriative" or "Statement of Diversion and Use")

¹⁴ A public version of the eWRIMS database is available at: <u>https://ciwqs.waterboards.ca.gov/ciwqs/ewrims/EWPublicTerms.jsp</u>

- Water right claim type for Statements of Diversion and Use (e.g., "Riparian," "Pre-1914," etc.) as reported in the diverter's Initial Statement of Water Diversion and Use or annual Supplemental Statements of Diversion and Use.
- Water right status (e.g., active, inactive, revoked, etc.)
- Authorized diversion seasons and volumes
- Authorized beneficial uses, including both consumptive (e.g., irrigation) and nonconsumptive (e.g., hydropower generation) beneficial uses
- Spatial location of PODs,¹⁵ including HUC8 watershed(s)
- Electronically reported water diversion and use information, available on a monthly basis

The eWRIMS database system contains information for various water right types, including both riparian and appropriative water rights. Within the eWRIMS database system, post-1914 appropriative water rights are categorized as "Appropriative," and other claims of right, which mainly consist of pre-1914 appropriative and riparian claims, are categorized as "Statements of Diversion and Use." The eWRIMS database system also includes information for other minor water right types, such as water right registrations.

Currently, all diverters are required to submit annual reports of water diversion and use (annual reports) to the State Water Board electronically through the eWRIMS Report Management System (RMS). The annual reports are mandatory filings that document water diversions and uses made during each month of the previous calendar year, including monthly direct diversion volumes, monthly diversion to storage volumes, and monthly water use volumes. A separate annual report of water diversion and use is required for each water right each year; therefore, a diverter may be required to submit more than one annual report if they hold or claim more than one right. Reports for the prior calendar year are due by April 1 for appropriative water rights, stockpond certificates, ¹⁶ and registrations¹⁷ and by July 1 for groundwater recordations and statements of water diversion and use. Diversion data contained within the annual reports forms the basis for estimates of water demand used in the Water Unavailability Methodology. Water right holders and claimants that divert water under Statements of Diversion and Use also provide information about the water right claim type (e.g., riparian, pre-1914 appropriative, etc.) in annual reports.

¹⁵ The eWRIMS database contains a mapping application to view the spatial location of PODs.

¹⁶ Stockpond certificates are appropriative water rights issued by the State Water Board through 1997 and are limited to diversion of 10 acre-feet (AF) or less per year.

¹⁷ Water right registrations are appropriative water rights issued by the State Water Board through an expedited acquisition process for certain small projects first available in 1989. Water right registrations are available for small domestic use, livestock stockpond use, small irrigation use, and cannabis small irrigation use.

For this analysis, water demand is based on the total monthly diversion amount reported for each water right record, including monthly direct diversions and monthly diversions to storage. The demand dataset used in the Water Unavailability Methodology is specifically derived from the reported annual diversion data for calendar years 2018 and 2019, the most current years available. 2020 diversion data has not yet been used for this analysis because the full dataset is not yet available, though 2020 data may be used in the future.¹⁸ Demand data were not analyzed on a daily scale because annual reports contain only monthly reported diversion data. The transformation of monthly data to a finer timescale (e.g., daily) would not meaningfully impact the analysis because, without more detailed knowledge of operations by individual water users, monthly demand values would be divided equally between all days of each month. Furthermore, as described below, current compliance with new diversion measurement and reporting regulations have not made substantial daily and/or real-time diversion information available for even the largest water users in the Delta watershed.

The methodology primarily relies on 2018 demand data, with additional data from 2019 also available for comparison purposes. 2018 was a below normal water year in both the Sacramento and San Joaquin River watersheds and is assumed to more closely resemble demands during a critically dry year than 2019, which was a wet water year in both watersheds. The reliance on 2018 demand data may underestimate actual demand since demands are likely to be greater during a critically dry year due to drier soil conditions. There are also likely higher losses to evaporation and seepage in a critically dry year. Conservation activities that may be pursued this year may offset higher critical year demands to some degree, but it is assumed that using below normal year demand estimates in a critically dry year is a conservative assumption for the purposes of avoiding issuance of notices of water unavailability when they may not be warranted.

In addition, 2018 diversion data was used because it is the only drier year for which diversion data is available since updated water right measurement and reporting requirements went into effect with Senate Bill 88 (SB88). Pursuant to regulations implementing SB88, all water right diverters authorized to divert more than 10 AF annually from rivers, creeks, springs, or subterranean streams must comply with measurement requirements. There are three ways to achieve measurement compliance: (1) install, use, and maintain a device capable of measuring the rate of direct diversion; (2) propose an alternative compliance plan; or (3) utilize a measurement method for multiple diverters. SB88 set expectations for both the accuracy of measurement devices as well as the monitoring frequency of the device and included measurement device installation deadlines of January 1, 2018 or earlier.

¹⁸ Because reporting of 2020 diversion and use information was not due for Statements of Diversion and Use until July 1, 2021, sufficient data were not available in time to complete this analysis but may be used in the future.

Although the implementation of SB88 has increased the frequency of required reporting for many diverters and may help to improve the quality of reported diversion and use data submitted to the State Water Board, many diverters have not yet achieved full compliance with the water right measurement requirements even though the measuring device installation deadlines have now passed. For example, among the 244 largest consumptive water right records in the Delta watershed located outside of the Legal Delta, diverters installed a measuring device and submitted a measurement data file for 2018 or 2019 in accordance with SB88 for only 57 percent (140) of the records. Diverters submitted proposed Alternative Compliance Plans pursuant to SB88 for an additional 2 percent (4) of the records. Diverters installed a measuring device, submit a measurement data file for 2018 or 2019 for 27 percent (65) of the records, and did not install a measuring device, submit a measurement data file for 2018 or 2019, or submit a proposed Alternative Compliance Plan for 14 percent (35) of the records. Compliance with the measurement requirements may be even lower for smaller diverters.

Figure 8 below shows the locations of the PODs associated with the largest (those with a 5,000 AF or larger face value or 5,000 AF or larger of reported diversions) consumptive water right records in the Delta watershed and displays their SB88 compliance status.




As discussed in more detail below, diversion data contained within annual reports is self-reported and is not systematically verified for accuracy upon submittal. As a result, an internal review and quality control effort was conducted.

2.2.1 Initial Selection of Water Right Records

A subset of the water right records in the eWRIMS database for the Delta watershed were selected for use in the Water Unavailability Methodology based on several criteria:

- Spatial Location: POD(s) located within the Delta watershed¹⁹
- Water Right Status: Active status types only, thereby excluding inactive-type statuses (e.g., inactive, revoked, cancelled, etc.)
- Water Right Type: "Appropriative" (i.e., post-1914 appropriative, excluding registrations and stockpond certificates) and "Statement of Diversion and Use" (i.e., pre-1914 appropriative and riparian), thereby excluding minor water right types
- Beneficial Uses: All beneficial uses except exclusively non-consumptive beneficial uses

Water right records with active-type statuses were selected to best approximate current year water demand since it is unlikely that inactive-type statuses (e.g., inactive, revoked, cancelled, etc.) would be reactivated during the current year. Only water right records with "Appropriative" and "Statement of Diversion and Use" water right types were included because minor water right types, such as registrations and stockponds, were assumed to constitute a negligible amount of the water diversion and use within the Delta watershed.

Water right records identified as non-consumptive based on their beneficial use type (e.g., hydropower generation, fish and wildlife preservation and enhancement, etc.) were also excluded. Non-consumptive uses, such as for hydropower generation, may change the timing of flows but do not reduce the amount of supply available unless they result in an interbasin diversion (see section 2.2.7 below). Given the temporal resolution of the supply and demand dataset (i.e., monthly) and the lesser amount of hydropower-related storage occurring during the dry season than the wet season, the potential impact of these non-consumptive diversions on the timing of flows is not assumed to be significant during the dry season. During the wet season, adjustments will be made to account for diversions to storage under hydropower rights to accurately reflect where these diversions make water unavailable for a period of time.

¹⁹ All PODs within the Delta watershed were selected except for those within the Panoche Creek subwatershed. As described in section 2.1.3 above, supply data is not available for this subwatershed; therefore, neither supply nor demand for this area were included in this analysis.

This initial selection of water right records resulted in a demand dataset consisting of approximately 12,000 total records. Of these, approximately 5,000 were post-1914 appropriative water rights and 7,000 were statements of diversion and use.

2.2.2 Initial Quality Control

Water diversion data contained within the eWRIMS database originates from annual reports of water diversion and use electronically submitted by diverters. This self-reported data is not systematically verified for accuracy upon receipt and contains inaccuracies, inconsistencies, and other errors. Staff conducted a quality control effort following the initial selection of water right records for the demand dataset.

The approximately 12,000 total records existing within the demand dataset after initial selection were too numerous to feasibly review in their entirety at this time. Therefore, the scope of the review was narrowed to appropriative water rights with a face value (maximum diversion amount) of 5,000 AF or greater and statements of diversion and use with reported diversions of 5,000 AF or greater in either calendar year 2018 or 2019. This produced a manageable subset of water right records to review within a limited timeframe of approximately 580 records, including approximately 360 post-1914 appropriative rights and approximately 220 Statements of Diversion and Use. These records account for approximately 90 percent of the water diverted in the Delta watershed in 2018 and 2019 but less than 10 percent of the users.

For this narrower set of records, the 2018 and 2019 annual reports of water diversion and use associated with each record were reviewed to identify potential inaccuracies in the diversion data. During the review process, several types of data errors were identified and corrected, if the appropriate correction was discernable.²⁰ These corrections included:

- Correction of diversion data entry and reporting issues, such as incorrect units of measurement and decimal placement errors
- Removal of duplicate diversion values, such as the same diversions reported under multiple water right records
- · Removal of non-consumptive diversions improperly appearing as consumptive
- Correction of diversion values as necessary where reported diversion exceeds the water right's face value

During the quality control process, if the appropriate correction was unclear, the affected records were flagged for potential further investigation beyond the information readily available in eWRIMS.

²⁰ Comments provided within the annual reports of water diversion and use often contained critical information to inform these corrections. For example, some diverters stated that their purpose of use is entirely non-consumptive. Others indicated that a particular diversion was fully reported under two or more separate rights (i.e., duplicated).

In addition to the records review described above, approximately 100 post-1914 appropriative rights were identified that reported diversions less than 5,000 AF but in excess of the face value of the water right. Most of these diversions are very small. Due to time constraints, these records were not investigated individually. Instead, for these rights, the reported diversion amounts within the demand dataset were updated to equal the face value of the right.

Except for the correction to reported diversions in excess of the face value of post-1914 rights, all water right records with a face value or reported use under 5,000 AF were included in the demand analysis without a quality control review. As mentioned above, these records constitute only about 10 percent of the total demand within the Delta watershed.

2.2.3 Additional Quality Control

After conducting the initial quality control review of 2018 and 2019 annual reports for the largest diversions as discussed above, and after applying corrections to rectify errors, some diversion values remained flagged as potentially including incorrect demand information with outstanding issues that could not be resolved without further information. Examples of these issues include:

- Possible duplicate reporting of diversion volumes under multiple water right records where it was not possible to quantify the duplicate reporting amount.
- Possible overreporting of diversion volumes that could not be corrected to reflect a best estimate of the actual diversion volume based on the available information. For example, some annual reports contained information that appeared to indicate that the diversion volume was not measured and, as a result, the maximum diversion amount authorized under the permit or license had been reported.
- Apparent inclusion of both consumptive and non-consumptive uses in the
- reported diversion amount where it was not possible to quantify the volume of water diverted only for consumptive uses.
- Other potential data reporting issues where an error was detected, but the appropriate correction was unclear.

In these cases, additional information may be needed to determine the appropriate correction or resolve other reporting-related issues. State Water Board staff has contacted numerous water right holders, claimants, or their agents to gather this information. Diversion volumes within the demand dataset were updated according to the responses provided. However, it was not feasible to contact all water right holders, claimants, or agents in all cases where a potential reporting related error was identified or a correction applied to a diversion value. Efforts were prioritized to contact water right holders or agents based on several factors, including reported diversion size and relative level of uncertainty regarding potential reporting-related inaccuracies. In addition, some water right holders, claimants, and agents did not provide responses to

inquiries regarding potential reporting related errors. In the absence of additional information provided by the water right holder, claimant, or agent, best estimates of the actual diversion values were used based on information contained within the annual report of water diversion and use and supplemental information available within the eWRIMS database.

Further refinements to the demand dataset used in the Water Unavailability Methodology may occur. Diverters who are aware of reporting issues, including, but not limited to, the items discussed above, should contact the State Water Board at Bay-Delta@waterboards.ca.gov.in addition, the quality-controlled 2018 and 2019 demand datasets were compared to FNF for each of these years, respectively, at the subwatershed scale (see section 2.1.3 above), and at the Sacramento and San Joaquin River watershed scales to assess the reasonableness of the demand datasets. The demand datasets used in the Water Unavailability Methodology represent the State Water Board's current best estimate of demand for these years based on the available information.

Water right records included in the demand dataset at this time are shown in Figure 9 below.

Figure 9. Active Consumptive Appropriative Water Rights and Statements of Diversion and Use in the Delta Watershed



2.2.4 Disaggregation of Statements of Diversion and Use

The May 12, 2021 draft and June 15, 2021 version of the methodology were developed to identify when available data indicates that natural and abandoned water supplies are unavailable for post-1914 appropriative water users in the Delta watershed. These prior versions were not intended to identify when water supplies are unavailable for pre-1914 appropriative and riparian claims, and prior versions of the demand dataset did not separate Statements of Diversion and Use into categories. Instead, these earlier versions grouped water demand for all Statements of Diversion and Use under a single demand category with the same assumed senior priority rank.

The Statements of Diversion and Use have now been disaggregated into several assigned categories and have been assigned priority dates. This refinement provides for the forecasting of water unavailability for pre-1914 appropriative and riparian claims. Statements of Diversion and Use were assigned a category based on the water right claim types reported by diverters in Initial Statements of Water Diversion and Use and in 2018 and 2019 annual reports. This user-submitted information was not reviewed for accuracy as part of this analysis but represents the best information currently available. This information may be updated based on additional information, including information submitted by water right claimants through the emergency regulation process.

The following Statement of Diversion and Use categories are currently included in the demand dataset: Riparian, Pre-1914, Riparian/Pre-1914, Reserved, Other, and Unclassified. The vast majority (over 95 percent) of the Statements of Diversion and Use included in the demand dataset were categorized as Riparian, Pre-1914, or Riparian/Pre-1914. Water right records assigned to the Riparian, Pre-1914, and Riparian/Pre-1914 categories also constitute the vast majority (over 95 percent) of the Statement of Diversion and Use demand.

Technical Appendix B further describes the process used to categorize and assign priority dates to Statements of Diversion and Use.

2.2.5 Demand Aggregation by Subwatershed

The Water Unavailability Methodology requires that both the supply and demand data be aggregated to a common spatial resolution for comparison purposes. The supply data is generally only available at the HUC8 watershed scale or larger, while the demand data includes both the HUC8 watershed and the precise spatial location (latitude and longitude) of each POD. For the purpose of this analysis, demand values within the demand dataset were aggregated at the same subwatershed scale as supply values within the supply dataset (see section 2.1.3 above). The subwatershed assignments of specific PODs, such as those located near Folsom, Oroville, and Friant Dams, were reassigned on a case-by-case basis within the demand dataset to better fit the demand to the subwatershed from which it draws supply.

All of the PODs of most water right records are geographically located within a single subwatershed. In these instances, all of the demand associated with these rights is attributed to that subwatershed. Sixty-five water right records in the Delta watershed have PODs that span multiple subwatersheds. Of these, 11 are Project water rights, which frequently have PODs upstream at the major storage reservoirs, downstream on major tributaries, and within the Legal Delta. As described in section 2.2.6 below, the Water Unavailability Methodology treats these demands differently because of the unique circumstances of the Projects' diversions. For the 54 remaining non-Project rights that have PODs within multiple subwatersheds, the total reported diversion for each water right record was split among the applicable subwatersheds based on the proportion of the total active direct diversion PODs located within each subwatershed. For example, if a water right record had 3 associated PODs, one of which was located within the Sacramento Bend subwatershed and 2 within the Upper Sacramento Valley subwatershed, one-third of the total demand for the water right would be attributed to the Sacramento Bend subwatershed and two-thirds to the Upper Sacramento Valley subwatershed. An apportionment of demand based on the amount diverted at each POD is not possible at this time because water diversion and use information is typically reported by water right and not for individual PODs.

2.2.6 Project Demands

The Projects divert and store water for use by contractors both within and outside of the Delta watershed. These contractors include contractors that do not have their own basis of right and contractors that have their own bases of water right that may also receive supplemental contract supplies (referred to as settlement contractors). Settlement contractors entered into contracts with the Projects to resolve water right disputes related to construction of the Projects. These contracts are not synonymous with the underlying rights but are instead negotiated agreements. Project contractors that do not have their own water rights include CVP service contractors and SWP Table A contractors. CVP service contracts and SWP Table A contracts include contracts for use within the Delta watershed and use outside of the Delta watershed. Diversions by the Projects for uses outside of the Delta watershed are subject to area of origin protection pursuant to the Water Code.²¹ This protection prohibits the Projects from diverting for purposes of exporting natural and abandoned flows needed for uses within the Delta watershed.

In recognition of area of origin protection, Project demands were assumed to have the lowest priority date among Delta watershed rights. While some of the Projects' diversions serve inbasin purposes that are not subject to area of origin protection, this summer all of these uses are expected to be met with previously stored water due to the lack of significant inflow and other Project obligations. Adjustments will be considered for the wet season to account for the priority of inbasin uses. However, any changes to the priority dates are not expected to have a significant effect on the analysis given the

²¹ Wat. Code, §§ 11128, 11460.

Projects' relatively junior water right priority and the likelihood that curtailment will not be in place when Project direct diversions are occurring for inbasin uses. In addition to recognizing area of origin protection, identifying Project demands as junior to all others ensures that any duplicate reporting between the Projects and their various settlement contractors that have their own underlying water rights or claims of right does not inflate demands in a manner that materially affects the analysis. The exception to this approach is for New Melones Project water rights (A014858A and A014858B). Since New Melones water is not authorized for export out of the Delta watershed, these demands are assumed to be met in accordance with the original priority date of the rights.

Generally, the Projects will not be diverting natural and abandoned flow and will be releasing previously stored water under conditions when notices of water unavailability would be issued. The responsibility to meet water quality and flow requirements effectively results in curtailment of Project water rights without any further action. Accordingly, while notices of water unavailability may still be issued to the Projects, such notices are unlikely to have a material effect.

2.2.6.1 Trinity River Imports

Several consumptive water rights associated with the CVP Trinity River Division (A005628, A015374, A015375, A016767, and A017374) have PODs within the Delta watershed, but the water they divert originates from the Trinity River watershed. These water rights and correlating diversion data were removed from the Delta watershed demand dataset for analysis because the water associated with these diversions is imported to the Delta watershed and does not impact supply forecasting for the watershed.

2.2.6.2 Settlement Contractor Demands

As discussed above, there are various water users in the Delta watershed that have settlement contracts with DWR and Reclamation that provide a contractual entitlement of a certain supply to these users. These contracts are intended to satisfy these users' underlying rights and to provide supplemental supplies. Because these users have both their own water rights or claims of right for which they likely report use and contractual supplies for which DWR and Reclamation report use, there may be overlapping reporting of demands.

For the purpose of this analysis, it is assumed that most settlement contractors, with the exception of the Exchange Contractors on the San Joaquin River (see below discussion), have demands for natural and abandoned flows in accordance with their water use reports and that these users will take water pursuant to their senior water rights first if it is available. The fact that the supply may not be available at the senior priority of right or claim of right is not assumed to diminish the demand. Accordingly, settlement contractors may receive notices of water unavailability under their own water

rights and would then need to rely upon contractual supplies to the extent those supplies are available.

Sacramento River and Feather River Settlement Contractor Demands

As a result of the very dry hydrologic conditions this year, allocations to Sacramento River and Feather River settlement contractors under their contracts during the contract period have been reduced to approximately 75 and 50 percent, respectively. However, these reductions are not assumed under this analysis because the contracts are not synonymous with the underlying right or claim. For example, Sacramento River settlement contract amounts total 2.1 million acre-feet (MAF) but reported use under these contractors' underlying water right claims is closer to 1.4 to 1.6 MAF (which is close to 75 percent of the contract amount). Also, these groups of users have different priorities of rights and include a combination of pre-1914 and post-1914 rights (e.g., over 600 thousand acre-feet of Sacramento River settlement contractors' reported use in 2018 occurred under post-1914 claims of right). Accordingly, it is not clear which rights demands should be reduced.

Exchange Contractors

The Exchange Contractors receive replacement supplies exported from the Delta in exchange for use of water from the San Joaquin River under the Exchange Contractors' underlying rights as part of settlement contracts related to the development of the Friant Project by Reclamation. Accordingly, all Exchange Contractor demands are assumed to be met with previously stored CVP supplies since the Exchange Contractors do not use water from the San Joaquin River under their underlying water right claims unless they are shorted supplies under their Exchange Contracts. If shortages occur the assumptions in the methodology will be adjusted to account for those shortages and the resulting demand for San Joaquin River water under the Exchange Contractors' claimed water rights.

2.2.7 Interbasin Diversions (Yuba-Bear and Drum-Spaulding)

Non-consumptive uses are generally not included in demand estimates under the methodology at this time. However, the May 12, 2021 draft methodology identified that adjustments were planned to be made to account for the interbasin diversions that occur from the Yuba River watershed to the Bear and American Rivers as part of highly complex hydroelectric project operations under Pacific Gas and Electric Company's (PG&E) Upper Drum-Spaulding Hydroelectric Project and Lower Drum Hydroelectric Project and Nevada Irrigation District's (NID) Yuba-Bear Hydroelectric Project. Under Upper Drum-Spaulding and Yuba-Bear hydroelectric project operations, water is exported from the Yuba River watershed to the Bear River via the South Yuba Canal and the Drum Canal.

Since May 12, 2021, adjustments to the demand dataset to account for interbasin diversions between the Yuba River watershed and Bear River watershed were considered. However, a review of information contained within the applicable PG&E

and NID water right records indicated that diversions through the South Yuba Canal and Drum Canal are already reported under water right records located in the Yuba River subwatershed. In addition, it appears that previously stored water accounts for a large portion of the water transferred from the Yuba River to the Bear River during the summer months. Therefore, adjustments were not applied to account for the interbasin diversions at this time. Adjustments will be considered for the wet season and based on updated demand data that may be submitted pursuant to an emergency regulation.

2.2.8 Accretions and Return Flow Estimates

Accretions in the valley floor during the dry season are primarily due to return flows. In recognition that only a portion of diversions are actually consumptively used due to return flows from irrigation and, to a lesser extent, municipal uses, a return flow factor was applied to diversion values within the Delta watershed demand dataset. Return flows are water that is diverted and returned to the river as part of agricultural and urban uses. Agricultural return flows include operational spills from canals, flow through and draining of rice paddies, and drainage from other agricultural fields. The volume of return flows from agriculture varies based on type of use, crop type, location, soils, and season. Urban return flows are primarily comprised of treated effluent from wastewater treatment plants. Natural depletions due to stream-groundwater interaction and demand by riparian vegetation are difficult to estimate and not accounted for in the methodology, which represents a conservative assumption that may overestimate water availability and reduce curtailments.

Out of the hundreds of return flow sources in the Delta watershed, the rates and volumes of most are unknown and only a handful have measurement gages. Rates of return flow can be estimated using models developed to simulate surface and groundwater hydrology. Models that have been developed for the Delta watershed include SacWAM, CalSim, C2VSIM, and regional water budgets developed by DWR. Of these models, CalSim 3 is the most complete hydrologic simulation model of the Sacramento and San Joaquin River watersheds. SacWAM provides detailed representations of the hydrologic processes including return flows in the Sacramento River watershed. CalSim 3 return flow rates show similar trends to SacWAM results for the Sacramento River watershed. DWR's surface-groundwater model, C2VSIM fine grid, may provide useful information on return flows with future calibration efforts, but at this time the surface hydrology does not correspond well with observed data during dry periods. DWR's regional water budgets may also provide useful estimates of return flows in the future, but at this time they are not available.

CalSim 3 includes simulations for the 1922–2015 period. For the purpose of estimating return flows for the methodology, results for water year 2014 were analyzed because it is a recent year out of the period of simulation that has hydrology that most closely matches current and forecasted conditions for 2021. The CalSim 3 results, summarized in Table 5 and Table 6 below, show an increasing return flow as a percent of diversion

after May continuing throughout the remainder of the irrigation season in the Sacramento River watershed and generally lower and more constant return flows in the San Joaquin River watershed. The increasing proportion of return flow in the Sacramento River watershed is primarily due to decreased diversions in August and September and draining of rice fields in September. Given the extreme dry conditions this year and changes in rice acreage this year, return flow assumptions in the September and to some extent August may be high representing a conservative assumptive that would reduce curtailments. Urban return flows remain relatively constant throughout the irrigation season. In the San Joaquin River watershed, agricultural and urban return flows remain relatively constant throughout the summer.

Month	Diversions (TAF)	Return (TAF)	Percent Return
Мау	829	320	39%
June	845	161	19%
July	875	184	21%
August	660	187	28%
September	339	324	96%
Annual Average	4,990	2,093	42%

 Table 5. CalSim 3 Results of Monthly Diversions and Return Flows for

 Sacramento River Watershed, May-September 2014

Table 6. CalSim 3 Results of Monthly Diversions and Return Flows for SanJoaquin River Watershed, May-September 2014

Month	Diversions (TAF)	Return (TAF)	Percent Return
Мау	313	75	24%
June	362	76	21%
July	403	85	21%
August	331	68	21%
September	216	54	25%
Annual Average	2,566	605	24%

Spatially, most diversions and return flows occur in the Sacramento and San Joaquin Valley regions. Accordingly, return flow factors were only applied to demands in the Sacramento Bend, Upper Sacramento Valley, Sacramento River Valley Floor, and San Joaquin River Valley Floor subwatersheds.

2.3 Adjustments to the Supply and Demand Datasets

2.3.1 Elimination of Unmet Demand

A significant improvement over the water unavailability methodology used in the previous drought is the implementation of a more granular analysis, evaluating supply and demand on both a subwatershed level (e.g., a single tributary like the Feather River) and watershed-wide level (the Sacramento and San Joaquin River watersheds). The watershed-wide analysis also includes water rights that divert from within the Legal Delta (see section 2.3.3 below). This allows for water unavailability to be determined based on physical supplies within a headwater stream and for the accounting of senior demands that may have priority to divert that supply further downstream. Supply and demand are compared at a subwatershed level for those subwatersheds that are not downstream of any other subwatershed. Demands within the subwatershed itself. Figure 10 below is a schematic showing how this analysis was performed using the supply and demand data previously described.





As shown in Figure 10, supply and demand are first compared within headwater subwatersheds. While supplies from headwater subwatersheds are considered available to meet downstream demands in the larger Sacramento or San Joaquin River watershed analyses, only headwater subwatershed demand that is able to be met by available supply in the headwater subwatershed is considered in the watershed analysis.

The headwater subwatersheds in the Sacramento River watershed include the Sacramento River and tributaries above Bend, Stony Creek, Cache Creek, Putah Creek, the Upper Feather River above Oroville Dam, Yuba River, Bear River, and the Upper American River above Folsom Dam (see Figure 5). The headwater subwatersheds in the San Joaquin River watershed are the Upper San Joaquin River above Friant Dam, Merced River, Tuolumne River, Stanislaus River, Calaveras River, and the Cosumnes River. Figure 11 below shows a schematic of the subwatersheds previously mapped in Figure 5. A small number of rights in the headwater Putah Creek, Stanislaus River, Calaveras River, and Cosumnes River subwatersheds which lie within the Legal Delta were excluded from the headwater subwatershed analysis and included only in the Sacramento and San Joaquin watershed-wide analyses, as they have access to water from both the Sacramento and San Joaquin Rivers (see section 2.3.3 below).

Lower subwatersheds are defined as such because they contain demands that can be met by supplies from outside tributaries (the headwater subwatersheds). The Upper Sacramento River Valley and Sacramento River Valley floor subwatersheds are considered lower watersheds because demands within them may be met from the mainstem of the Sacramento River flowing in from the Sacramento River at Bend. Similarly, the San Joaquin River Valley Floor includes demands on the mainstem of the San Joaquin River that can be met by inflow from the Stanislaus, Tuolumne, Merced, and Upper San Joaquin River subwatersheds.

Additional subwatersheds in the San Joaquin River watershed were classified as lower subwatersheds because their boundaries, based on HUC8 watersheds mapped in the USGS NHD (see section 2.1.3 above), contain demands that are not met from supplies within the subwatershed. These consist of the Chowchilla River (which includes minor east side tributaries and the mainstem of the San Joaquin River from Friant Dam to the confluence with the Merced River), Fresno River (which includes diversion points on the Eastside Bypass that are supplied by San Joaquin River flood flows), and the Mokelumne River (which includes demands on the mainstem of the San Joaquin River within the Legal Delta) subwatersheds. The Legal Delta is not a distinct subwatershed; it is a category of rights within several subwatersheds which have access to water from both the Sacramento and San Joaquin Rivers (see section 2.3.3 below).

Figure 11. Subwatersheds Schematic



Diverters within headwater subwatersheds whose demand cannot be physically met by the supply available within those subwatersheds may receive notices of water unavailability based on the headwater subwatershed-level analysis. In addition, if demand in a headwater subwatershed exceeds the available supply, the excess demand is eliminated from the larger watershed-wide analysis. As a result, demand that cannot be met by physically available supplies is not "charged against" supplies from elsewhere in the Delta watershed.

The evaluation of water availability at the headwater subwatershed scale is only part of the evaluation of water availability. Though water may be physically available within a headwater subwatershed, it may be needed to meet the demand of senior users downstream that may have the right to some of the water originating in the headwater subwatershed. This broader availability is shown in the watershed-wide analysis for the Sacramento and San Joaquin River watersheds.

2.3.2 Treatment of Riparian Demands and Elimination of Supply and Demand in Disconnected Headwater Subwatersheds

The Water Unavailability Methodology does not currently specifically evaluate water unavailability for individual riparian claimants unless there is no flow available.²² In times of shortage, riparian rights provide for sharing of those shortages. Given the scale and complexity of the Delta watershed, the methodology does not yet fully evaluate how that sharing should occur. However, the methodology can be used to evaluate general quantities of water that may be unavailable for riparian claimants and when riparian claimants should implement measures to address those shortages. In the future, refinements to the methodology may be made to further address water unavailability for riparian claimants.

If the headwater subwatershed analysis indicates that the total demands of riparian claimants exceed the available supply in a particular headwater subwatershed, the headwater subwatershed's supplies and demands are removed from the watershed-wide analysis for that month. In other words, the methodology assumes that the given stream would not have continuity with the larger Delta watershed and would be considered "disconnected" due to fulfillment of the local senior water right demands.

The Water Unavailability Methodology Spreadsheet, available on the State Water Board's Delta Water Unavailability Methodology webpage, contains a table in the 'Analysis Headwaters' tab which summarizes which headwater subwatersheds were assumed to be disconnected from the Delta watershed in specific months as a result of this analysis.

2.3.3 Proration of Legal Delta Demands

Diverters with appropriative water rights with points of diversion within the Legal Delta (as defined in Water Code section 12220) may have access to water supplies entering the Delta from both the Sacramento and San Joaquin River watersheds. To account for this, appropriative demands within the Legal Delta were prorated between the two watersheds based on the monthly proportion of connected supply available (see section 2.3.2 above) from each watershed. For example, if the Sacramento River watershed contributes 80 percent of the water supply reaching the Legal Delta in a given month, 80 percent of Legal Delta appropriative demand is allocated against Sacramento River watershed supply for that month and 20 percent is charged against San Joaquin River watershed supply. The proration of Legal Delta appropriative demands is only applicable to the assessment of water unavailability at the headwater subwatershed scale.

²² These demands are assumed to be senior in priority to all other demands for the purposes of the methodology. As discussed above, there may be instances where a pre-1914 appropriative right is senior to a riparian. In those cases, adjustments can be made.

Consistent with the analysis contained in State Water Board Order WR 89-8, the methodology assumes that riparian claims do not have access to supply outside the watershed where they are located (i.e., a riparian claim along the San Joaquin River in the Legal Delta does not have a right to divert natural or abandoned flow of water originating from the Sacramento River). Therefore, Statements of Diversion and Use with points of diversion within the Legal Delta that claim only riparian rights (see section 2.2.4 above) are excluded from the Legal Delta proration process described in the previous paragraph and are only charged against supply in the watershed where they are located. Statements of Diversion and Use with points of diversion in the Legal Delta claiming both riparian rights and pre-1914 or other non-riparian categories of right were assumed for the purposes of the methodology to be riparian claims and were therefore accorded senior priority over all appropriative water rights.²³ Statements of Diversion and Use with points of diversion for the purposes of the methodology to be riparian claims and were therefore accorded senior priority over all appropriative water rights.²³ Statements of Diversion and Use with points of diversion in the Legal Delta that claim only pre-1914 or other non-riparian categories of priority over all appropriative water rights.²⁴ Statements of Diversion and Use with points of diversion in the Legal Delta that claim only pre-1914 or other non-riparian categories of right are prorated as described in the previous paragraph.

Monthly supply ratios for the Sacramento and San Joaquin River watersheds were calculated based on data for 2021; for past months of 2021, these months' FNF values were used. For current or future months, the exceedance forecast selected for use in determining water unavailability for each watershed (see section 3.1.1 below) was used for the proration. These supplies include abandoned instream flows in excess of FNF (see section 2.1.6 above) and do not include flows from headwater subwatersheds assumed to be disconnected from the Delta watershed (see section 2.3.2 above).

Water rights and claims with points of diversion within the Legal Delta that claim only non-riparian rights will only receive notices of water unavailability if both the Sacramento River watershed analysis and the San Joaquin River watershed analysis show that water will be unavailable at their priority of right. The hydrology of the Legal Delta is complex, and this proration method offers a simplified and generous assessment of water availability to appropriators in the Legal Delta during this critically dry period.

The methodology does not assume there is storage (residence time) longer than a month in the Legal Delta that would affect water availability given the extremely dry conditions that have persisted for an extended period and the supplementation of flows in the Delta with previously stored water for many months. The methodology also only accounts for freshwater natural flows from the Sacramento and San Joaquin Rivers as part of the available supplies and does not include any water supplies from tidal inflows to the Legal Delta. Saline water entering the Legal Delta from the San Francisco Bay

²³ This categorization of colorable riparian claims within the Legal Delta is consistent with the legal principles described in a memorandum dated December 15, 2017, regarding Issues Related to Overlap between Pre-1914 and Riparian Water Right Claims in the Delta and available on the website of the Office of the Delta Watermaster (<u>Overlap Memo</u>).

via tidal action is assumed to be of insufficient quality to be usable for agricultural or municipal purposes.

2.4 Water Unavailability Visualizations

The Water Unavailability Methodology includes two major types of water unavailability visualizations: the headwater subwatershed visualizations (14 in total) and the watershed-wide visualizations,²⁴ consisting of one for the Sacramento River watershed and one for the San Joaquin River watershed. Samples of these graphs are provided below in Figures 12, 13, and 14. Each graph can display demand data from either the 2018 or 2019 demand datasets. The demands are sorted by water right priority, with riparian demand at the bottom of the graphs, followed by pre-1914 appropriative demand and post-1914 appropriative demand, which are grouped by priority decade. Project demands are stacked at the top (see section 2.2.6 above).

The subwatershed visualization displays four water supply scenarios: the 10 percent, 50 percent, 90 percent, and 99 percent FNF exceedance forecasts, representing optimistic, neutral, pessimistic, and extremely pessimistic forecasts, respectively. Because conditions in the Delta watershed are currently extremely dry, the adjustments to the supply and demand datasets described in section 2.3 above were done using the 90 percent FNF exceedance forecast.²⁵ As a result, the watershed-wide visualizations display a single supply scenario, the adjusted 90 percent exceedance forecast.

²⁴ Supply and demand within the watershed-wide analyses is adjusted as described in section 2.3 above.

²⁵ Section 3.1.1 below describes how daily FNF may be used to determine which monthly FNF exceedance forecast most closely represents actual conditions.



Figure 12. Sample Headwater Subwatershed Water Unavailability Visualization (Yuba River)

Figure 13. Sample Sacramento River Watershed Water Unavailability Visualization





Figure 14. Sample San Joaquin River Watershed Water Unavailability Visualization

The visualizations have been made available on the Board's Delta Water Unavailability Methodology webpage using the Tableau interactive platform and will be updated monthly to reflect current supply conditions and forecasts. As discussed above, the 2018 demand dataset is planned to be used to assess if insufficient supply is available to meet demands (i.e., the demands positioned above the applicable supply line(s) in the visualizations). In cases where riparian demand exceeds supply (i.e., in disconnected headwater subwatersheds or for riparian demands above the applicable supply line(s) in the visualization) there may be water unavailable to meet all riparian demands. Section 3.1 below describes the proposed process for issuing notices of water unavailability to diverters.

3 Implementation

3.1 Issuance of Notices of Water Unavailability

The Water Unavailability Methodology is being used to determine when there is insufficient supply to meet diverters' priorities of right within the Delta watershed based on the best available information, either at the scale of a headwater subwatershed or the wider Sacramento or San Joaquin River watersheds. Based on the prior output of the methodology, on June 15, 2021, the State Water Board issued notices of water unavailability (also referred to simply as "notices") to all post-1914 appropriative water right holders in the Delta watershed indicating that water supplies are not available for

their use. On July 23, 2021, the State Water Board issued further notices of water unavailability to certain pre-1914 users, including all pre-1914 claimants in the San Joaquin River watershed and pre-1914 appropriative claimants in the Sacramento River watershed down to an 1883 priority date. The July 23 notices also notified riparian claimants in the San Joaquin River watershed of correlative supply deficits through September 2021.

Notices are not directives to stop diverting and are different from curtailment orders. Rather, they inform affected diverters that water is expected to be unavailable for their diversion in a future time frame. These notices also play an important policy and public relations role by offering the opportunity for voluntary compliance prior to formal enforcement action by the Board. Diverting unavailable water can result in penalties for injuring more senior water right holders and public trust resources. As discussed above, this methodology may serve as the technical basis for future emergency regulations and associated curtailment orders.

As discussed above, appropriative diverters in the Legal Delta will only receive notices of water unavailability if supply is unavailable to them from both the Sacramento and the San Joaquin Rivers, the issuance of which will be coordinated with the Office of the Delta Watermaster. In addition, implementation of this methodology will operate separately from issuance of curtailment notices pursuant to standard water right Term 91, which has been in effect since April 29, 2021, and is likely to be in effect until significant precipitation occurs.

3.1.1 Exceedance Forecast Selection

The methodology requires the selection of an appropriate future supply forecast (e.g., 10 percent, 50 percent, 90 percent, or 99 percent exceedance forecasts) for use in determining which diverters should receive notices of water unavailability or curtailments. To account for the potential variability of daily water supply and the degree of uncertainty inherent in monthly forecasts, cumulative daily FNF estimates²⁶ for the current month, sourced from CDEC and CNRFC²⁷ (see Table 1 and Table 2 above) will be compared to the most recent monthly supply forecasts. Interactive visualizations of these comparisons for total supplies in the Sacramento and San Joaquin River watersheds have been made available on the Board's Delta Water Unavailability Methodology webpage using the Tableau interactive platform. These plots will be updated periodically throughout each month to reflect current supply conditions.

²⁶ As described in section 2.1.4 above, daily FNF data are valuable for the purpose of this check but are not suitable to replace past or forecasted monthly FNF values because they are based on fewer data points than are available at the end of each month and due to the lag time between upstream operations and their effect on downstream flow measurements.

²⁷ Occasionally, CDEC or CNRFC may report negative daily FNFs. These values are replaced with zero values before any further calculations are performed.

The comparison of monthly forecasts to cumulative daily supplies over the month will provide an indication of which forecast is likely to be the most accurate predictor of actual conditions. These evaluations are planned to error in favor of reducing curtailments. For example, if the cumulative daily FNF tracks close to the 90 percent monthly supply forecast, the 90 percent supply forecast would be used to determine the priority at which notices should be issued. If the daily cumulative FNF exceeds the 90 percent supply forecast only part way through the month, the 50 percent supply forecast may be used. In addition, the State Water Board will continually evaluate the need to discontinue notices of water unavailability based on forecasted or actual precipitation and runoff that does, or is expected to, result in a measurable increase to available supplies. Additional available datasets that may be used to monitor and forecast precipitation and runoff include Quantitative Precipitation Forecasts (QPF) from CNRFC, Atmospheric River (AR) Activity sub-seasonal outlooks from the Center for Western Weather and Water Extremes, use of the USGS Basin Characterization Model, and other tools.

Different exceedance forecasts may be used between the Sacramento River watershed and the San Joaquin River watershed, if appropriate. The exceedance forecast selected for the watershed-wide analyses will also be used for that watershed's headwater subwatershed analyses. For example, if the 90 percent exceedance forecast is determined to be the most likely to accurately predict conditions in the Sacramento River watershed, it will be used for the Sacramento River watershed-wide analysis as well as each of the headwater subwatershed analyses for that watershed.

3.2 Water Quality and Public Trust Resources

The Water Unavailability Methodology does not account for any of the following: (a) water needs for public trust resources; (b) natural instream losses and evaporation; or (c) non-agricultural consumptive uses in the Delta (e.g., open water evaporation, riparian vegetation, etc.).²⁸ Currently, notices of water unavailability are not proposed to be issued to make water available for the environment, only to make water available for senior water right holders and claimants and to prevent the unlawful diversion of storage releases which are intended to meet water quality and flow requirements or contract demands. The methodology does not affect other obligations that water users may have for meeting flow and other requirements.

3.3 Communication and Public Engagement Strategy

State Water Board staff has engaged with a number of water users on issues related to the development of the Water Unavailability Methodology. In addition, a public workshop regarding the May 12, 2021 draft version of the methodology was held on

²⁸ For context, the State Water Board's 1977 Drought Report Appendix, Table 14 estimated that non-agricultural consumptive water use in the Delta was as high as 74,560 AF in June 1977.

May 21, 2021, during which numerous parties provided oral comment. Numerous written comments on the draft methodology were also timely received by the May 25, 2021 deadline. Since that time, modifications have been made to the methodology to support the determination of water unavailability for water right holders and claimants in the Delta watershed. These changes are described throughout this document, as well as its technical appendices.

The State Water Board will continue to regularly update the information used to determine water unavailability in the methodology as new data becomes available and as needed to address wet season information needs as described above. Regular updates regarding issues related to water unavailability will be provided to the public during Board meetings. At least monthly updates will also be provided on the Board's Delta Water Unavailability Methodology webpage, including updated water availability visualizations. If daily cumulative FNF significantly exceeds the forecasted monthly supply used in the methodology, the webpage will be updated more frequently to communicate any changed conditions to diverters.

This methodology does not represent a static assessment of how the State Water Board will determine water unavailability within the Delta watershed. The methodology may change as the season progresses and based on new information and refined analyses, as appropriate. This methodology is a first step toward refining the Board's process for issuing notices of water unavailability, which includes refinements upon the 2014 and 2015 methodology that were feasible given existing time and data constraints. Additional refinements to the methodology beyond those discussed above may be needed if the methodology is applied during the upcoming wet season.

4 Areas of Potential Refinement

4.1 Near-Term Opportunities

4.1.1 Supply

California water supply data is generated by agencies other than the State Water Board and is, therefore, subject to the data quality assurance programs and improvements of those agencies. In the near-term, the State Water Board will continue to focus refinement efforts on improvements to the preparation of supply data for use in water unavailability analyses. These improvements relate to analysis repeatability, automation of the data preparation process, and data documentation. Within the next few years, the Board may further improve the preparation of supply data via the implementation of additional data validation methods, refinement of the process to identify and fill data gaps, and incorporation of new supply data as it becomes available. The Board may also alter the assumptions of the analysis to reflect increased understanding of groundwater interactions, riparian evapotranspiration, and evaporative losses.

4.1.2 Demand

The State Water Board will continue to refine the demand dataset used in the Water Unavailability Methodology as appropriate by streamlining existing processes and improving demand estimates and accounting. This includes the identification of additional data entry errors, estimation of demand values where necessary and feasible, and additional data quality control methods. In addition, as discussed above, emergency regulations may be adopted that require the submittal of demand projections that can be used in the methodology as appropriate. Refinement of the representation of non-consumptive uses will also be evaluated. The Board will also continue ongoing work with diverters to improve water accounting by minimizing instances of duplicate reporting, identifying incorrectly reported re-diversions, refining estimates of return flows from larger scale diverters such as those diverting more than 100,000 AF per year, and increasing compliance with the regulations that resulted from SB88. The Board may also consider specific demand issues within the Legal Delta for lands below sea level as described in the proposed emergency regulations.

Over the next few years, the State Water Board plans to develop cross-validation methods using other datasets such as aerial imagery, OpenET, and land use datasets to assess the validity of reported demand values. The Board may also refine the subwatershed demand aggregation method (see section 2.2.5 above) by developing more accurate estimates of proportional demand for water rights that have PODs located in more than one subwatershed. In addition, the Board may use the historical demand record to develop statistical and predictive approaches to identify outliers in the demand dataset and, in conjunction with outside datasets, develop higher temporal resolution for demand estimates.

4.2 Longer-Term Opportunities

In the next several years as part of larger efforts, the State Water Board will work toward developing a data management plan for the demand dataset. The plan's primary functions will be to formalize quality assurance measures, improve data intake processes, and publish the dataset in accordance with Assembly Bill 1755 and the State Water Board's Open Data Resolution to the extent feasible. During the plan development, the Board will expand upon existing data validation efforts using land usebased demand estimates and collaborate with other agencies or organizations to identify where the installation of telemetered diversion gages is needed to enable the validation of demand data to an acceptable level of accuracy. The Board may also look to refine internal and external accounting methods for contracted water, water transfers, and other issues.

Ultimately, the demand data is most limited by the number of required or available telemetered diversion measurement gages and the relatively infrequent manual reporting requirements. These spatial and temporal limitations prevent the State Water Board from conducting a finer scale analysis and responding in real time to limited water

availability. New requirements for reporting diversions and transitioning to land usebased demand estimates could improve the spatial and temporal coverage of water demand data in California and improve the Board's ability to effectively monitor and manage water supplies.

In the long-term, the Board is also planning to evaluate the use of more sophisticated dynamic evaluation tools capable of addressing the complexities of water unavailability issues in the Delta watershed and other areas of the state with greater spatial and temporal resolution. To be effective, however, these tools are dependent on data of adequate quality.

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Technical Appendix A

Technical Appendix A: Methodology Spreadsheet Description is available on the Delta Water Unavailability Methodology webpage at

https://www.waterboards.ca.gov/drought/drought_tools_methods/delta_method.html

Technical Appendix B

Technical Appendix B: Demand Dataset Description and Preparation is available on the Delta Water Unavailability Methodology webpage at

https://www.waterboards.ca.gov/drought/drought_tools_methods/delta_method.html

Appendix C

Appendix C: Summary of Public Comments is available on the Delta Water Unavailability Methodology webpage at https://www.waterboards.ca.gov/drought/drought_tools_methods/delta_method.html

Technical Appendix A: Methodology Spreadsheet Description

This appendix outlines the process used to assess water supply and demand in the Sacramento-San Joaquin Delta (Delta) watershed and describes each input used for the analysis and output produced by the analysis. Each section of this document describes a separate tab in the Delta Water Unavailability Methodology Excel workbook ("spreadsheet"), the significance of each column, and data sources.

Subwatersheds

This tab shows how Hydrologic Unit Code Level 8 (HUC8) watersheds from the U.S. Geological Survey (USGS) Watershed Boundary Database (WBD) are categorized into "subwatersheds" for the purpose of this analysis. It also indicates the primary watershed that each subwatershed is tributary to, as well as the subwatershed "type" (headwater or lower) assigned to each. These relationships underpin much of the analysis. A map of Delta subwatersheds can be found in Figure 5 of the main report.

Field Name(s)	Definition & Methodology	Data Source(s)
Watershed	The two primary river systems in the Delta watershed: Sacramento and San Joaquin.	USGS WBD
Subwatershed	An area encompassing one or more HUC8 watersheds, determined based on geospatial mapping of stream and diversion locations and the availability of full natural flow (FNF) supply locations ("gages"). Subwatershed is the smallest area over which water availability is determined.	Staff- determined

Field Name(s)	Definition & Methodology	Data Source(s)
Subwatershed Type	Subwatersheds are categorized as either 'headwater' or 'lower' for the purpose of this analysis: - A headwater subwatershed contains water demands which can only be met by water supplies within the subwatershed (i.e., there are no tributaries flowing into the subwatershed).	Staff- determined
	 A lower subwatershed can receive water supplies from outside its boundaries (i.e., it is located downstream of the headwaters). 	
HUC8	The boundaries of watersheds which contain land that all drains to the outlet, as delineated and classified by the USGS. This delineation provides a consistent boundary for classifying water supplies and demands for the analysis.	USGS WBD

To the right of the data table is a key for the various colors used for each tab of the spreadsheet. Green tabs contain data fields that can be updated or revised to change the analysis; cells with modifiable data are highlighted green throughout the spreadsheet. Orange tabs contain only a limited number of data fields that accept updates. Red tabs contain only data outputs and should not be modified.

Supply Past Monthly

This tab contains historical monthly supply data for each of the 20 subwatersheds in the analysis, dating back as far as water year (WY) 1901 for some subwatersheds (NOTE: a water year runs from October of the previous year through September; e.g., WY 2021 is October 2020 through September 2021). Supply data consists of full natural flow (FNF, also known as "unimpaired flow") data compiled from the California Data Exchange Center (CDEC), a March 2016 report from the Department of Water Resources (DWR) on unimpaired flows in the Central Valley from WY 1922-2014, and the California Nevada River Forecast Center (CNRFC). Direct links to individual gage datasets are provided in the spreadsheet. Supply volumes are provided in units of acrefeet (AF), converted from thousand acre-feet (TAF) for some data sources. Certain fields are estimated or adjusted using gap-filling (GF) procedures, which are explained in the next section.

Field Name(s)	Definition & Methodology	Data Source(s)
Year, WY, Month	The calendar year, water year, and calendar year month of the respective water supply volume. The dataset begins with water year 1901 (starting in October 1900) and continues through the end of water year 2021 (September 2021); data fields for current and future months are blank.	
Sacramento Bend	Monthly FNF data for the Sacramento River at Bend subwatershed (including the Sacramento, McCloud, and Pit Rivers above Shasta Reservoir and Cow, Cottonwood, Battle, Clear, and Paynes Creeks): - CDEC station SBB, sensor 65 for WY 1906-Present.	CDEC
Stony	Monthly FNF data for the Stony Creek subwatershed (at Black Butte Reservoir): - DWR subbasin UF4 for WY 1922-2014. - CNRFC station EPRC1 (daily TAF summed to monthly AF) with GF augmentation for WY 2015-Present.	DWR, CNRFC w/ staff adjustments
Cache	Monthly FNF data for the Cache Creek subwatershed (above Rumsey): - DWR subbasin UF3 for WY 1922-2014. - GF extrapolation based on Stony Creek for WY 2015-Present.	DWR, staff estimates
Upper Feather	Monthly FNF data for the Upper Feather River subwatershed (at Oroville Dam): - CDEC station FTO, sensor 65 for WY 1906-Present.	CDEC
Yuba	Monthly FNF data for the Yuba River subwatershed (near Smartville): - CDEC station YRS, sensor 65 for WY 1901-Present.	CDEC
Bear	Monthly FNF data for the Bear River subwatershed (near Wheatland): - DWR subbasin UF10 for WY 1922-2014. - GF extrapolation based on Yuba River for WY 2015-Present.	DWR, staff estimates

Water Unavailability Methodology for the Delta Watershed Technical Appendix A July 23, 2021

Field Name(s)	Definition & Methodology	Data Source(s)
Upper American	Monthly FNF data for the Upper American River subwatershed (at Folsom Dam): - CDEC station AMF, sensor 65 for WY 1901-Present.	CDEC
Putah	Monthly FNF data for the Putah Creek subwatershed (near Winters): - DWR subbasin UF2 for WY 1922-2014. - GF extrapolation based on Stony Creek for WY 2015-Present.	DWR, staff estimates
Upper Sacramento Valley	Monthly FNF data for the Upper Sacramento River Valley subwatershed (tributaries between Bend and Butte Slough, including Redbank, Elder, Thomes, Antelope, Mill, Deer, Big Chico, and Butte Creeks): - DWR subbasins UF5+UF7 for WY 1922- 2014. - CNRFC stations EDCC1+TCRC1+MLMC1+DCVC1+BKCC1 (daily TAF summed to monthly AF) with GF augmentation for WY 2015-Present.	DWR, CNRFC w/ staff adjustments
Sacramento Valley Floor	Monthly FNF data for the Sacramento Valley Floor subwatershed (minor east and west side tributaries between Stony Creek and the Delta, including tributaries to the Lower Feather and American Rivers): - DWR subbasin UF1 for WY 1922-2014. - GF extrapolation based on Sacramento, Feather, and American Rivers for WY 2015-Present.	DWR, staff estimates
Sac Total	The sum of all subwatershed supplies in the Sacramento River watershed for the given month.	Calculated
Sac Complete Dataset?	Indicates if supply data values are present for all 10 subwatersheds in the Sacramento River watershed for the given month (TRUE/FALSE).	Calculated
Sac Water Year Type	Reconstructed water year hydrologic classification index for the Sacramento Valley, as published by DWR.	DWR

Field Name(s)	Definition & Methodology	Data Source(s)
Chowchilla	Monthly FNF data for the Chowchilla River subwatershed (at Buchanan Reservoir): - DWR subbasin UF20 for WY 1922-2014. - CNRFC station BHNC1 (daily TAF summed to monthly AF) for WY 2015- Present.	DWR, CNRFC
Upper San Joaquin	Monthly FNF data for the Upper San Joaquin River subwatershed (at Friant Dam): - CDEC station SJF, sensor 65 for WY 1901-Present.	CDEC
Fresno	Monthly FNF data for the Fresno River subwatershed (near Daulton or at Hidden Dam): - DWR subbasin UF21 for WY 1922-2014. - CNRFC station HIDC1 (daily TAF summed to monthly AF) for WY 2015- Present.	DWR, CNRFC
Merced	Monthly FNF data for the Merced River subwatershed (near Merced Falls): - CDEC station MRC, sensor 65 for WY 1901-Present.	CDEC
Tuolumne	Monthly FNF data for the Tuolumne River subwatershed (at La Grange Dam): - CDEC station TLG, sensor 65 for WY 1901-Present.	CDEC
Stanislaus	Monthly FNF data for the Stanislaus River subwatershed (below Goodwin Reservoir): - CDEC station SNS, sensor 65 for WY 1901-Present.	CDEC
Calaveras	Monthly FNF data for the Calaveras River subwatershed (at Jenny Lind or New Hogan Reservoir): - DWR subbasin UF15 for WY 1922-2014. - CNRFC station NHGC1 (daily TAF summed to monthly AF) for WY 2015- Present.	DWR, CNRFC

Field Name(s)	Definition & Methodology	Data Source(s)
Mokelumne	Monthly FNF data for the Mokelumne River subwatershed (near Mokelumne Hill): - CDEC station MKM, sensor 65 for WY 1901-Present.	CDEC
Cosumnes	Monthly FNF data for the Cosumnes River subwatershed (at Michigan Bar): - CDEC station CSN, sensor 65 for WY 1908-Present.	CDEC
San Joaquin Valley Floor	Monthly FNF data for the San Joaquin River Valley Floor subwatershed (including minor east and west side tributaries between the Chowchilla and American Rivers): - DWR subbasins UF12+UF17+UF24 for WY 1922-2014. - CNRFC stations MPAC1+OWCC1+MEEC1 (daily TAF summed to monthly AF) + GF extrapolation based on Mokelumne, Cosumnes, San Joaquin, Merced, Tuolumne, and Stanislaus Rivers for WY 2015-Present.	DWR, CNRFC, staff estimates
SJ Total	The sum of all subwatershed supplies in the San Joaquin River watershed for the given month.	Calculated
SJ Complete Dataset?	Indicates if supply data values are present for all 10 subwatersheds in the San Joaquin River watershed for the given month (TRUE/FALSE).	Calculated
SJ Water Year Type	Reconstructed water year hydrologic classification index for the San Joaquin Valley, as published by DWR.	DWR
Total Supply	The sum of all water supplies in the Delta (Sacramento and San Joaquin River watersheds) for the given month.	Calculated
% Sacramento	The percent of the given month's total Delta watershed supply which came from the Sacramento River watershed.	Calculated
% San Joaquin	The percent of the given month's total Delta watershed supply which came from the San Joaquin River watershed.	Calculated

Field Name(s)	Definition & Methodology	Data Source(s)
Delta Complete Dataset?	Indicates if supply data values are present for all 20 subwatersheds in the Delta watershed for the given month (TRUE/FALSE).	Calculated

Supply Gap Filling (GF)

This tab contains monthly factors which are used to fill gaps in supply data for select subwatersheds, either to estimate missing past/forecasted data (extrapolation) or to adjust existing supply data (augmentation). These monthly average factors are computed based on supply data described in the previous section, and detailed methods for each subwatershed are described in the table below.

Field Name(s)	Definition & Methodology	Data Source(s)
Month	Month of the calendar year for which the gap-filling factor applies.	
Cache-Stony Ratio (CSR)	Monthly factor used to extrapolate the FNF supply for the Cache Creek subwatershed based on data for the Stony Creek subwatershed: - CSR = DWR subbasin UF3 / DWR subbasin UF4 for WY -1922-2014, removed outlying values >20 and averaged by month. - GF Cache = CSR*(EPRC1*SIF) for WY 2015-Present and Forecasts.	Calculated
Stony Increase Factor (SIF)	Monthly factor used to augment recent FNF supply values for the Stony Creek subwatershed to approximate the entire subwatershed's supply based on past DWR data (CNRFC station EPRC1 is located upstream of several tributaries): - SIF = DWR subbasin UF4 / CNRFC station EPRC1 for WYs 2013-2014, removed outlying values >6 and averaged by month. - GF Stony = SIF*EPRC1 for WY 2015- Present and Forecasts.	Calculated
Field Name(s)	Definition & Methodology	Data Source(s)
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Bear-Yuba Ratio (BYR)	Monthly factor used to extrapolate the FNF supply for the Bear River subwatershed based on data for the Yuba River subwatershed: - BYR = DWR subbasin UF10 / CDEC station YRS for WY -1922-2014, removed outlying value >1 and averaged by month. - GF Bear = BYR*YRS for WY 2015- Present and Forecasts.	Calculated
Elder-Thomes Increase Factor (ETIF)	Monthly factor used to augment recent FNF supply values for west side tributaries in the Upper Sacramento River Valley subwatershed to approximate the supply of all west side tributaries based on past DWR data (CNRFC stations EDCC1 and TCRC1 do not include all west side tributaries): - ETIF = DWR subbasin UF5 / (CNRFC stations EDCC1+TCRC1) for WYs 2013- 2014, removed outlying values >8 and averaged by month. - GF Upper Sacramento Valley West = ETIF*(EDCC1+TCRC1) for WY 2015- Present and Forecasts.	Calculated
Mill-Deer-Butte Increase Factor (MDBIF)	Monthly factor used to augment recent FNF supply values for east side tributaries in the Upper Sacramento River Valley subwatershed to approximate the supply of all east side tributaries based on past DWR data (CNRFC stations MLMC1, DCVC1, and BKCC1 do not include all east side tributaries): - MDBIF = DWR subbasin UF7 / (CNRFC stations MLMC1+DCVC1+BKCC1) for WYs 2013-2014, averaged by month. - GF Upper Sacramento Valley East = MDBIF*(MLMC1+DCVC1+BKCC1) for WY 2015-Present and Forecasts.	Calculated

Field Name(s)	Definition & Methodology	Data Source(s)
Putah-Stony Ratio (PSR)	Monthly factor used to extrapolate the FNF supply for the Putah Creek subwatershed based on data for the Stony Creek subwatershed: - PSR = DWR subbasin UF2 / DWR subbasin UF4 for WY 1922-2014, removed outlying values of zero and averaged by month. - GF Putah = PSR*(EPRC1*SIF) for WY 2015-Present and Forecasts.	Calculated
Sacramento Valley Ratio (SRVR)	Monthly factor used to extrapolate the FNF supply for the Sacramento River Valley Floor subwatershed based on data for the Sacramento, Feather, and American Rivers (no recent or projected supply data exists for the Valley Floor): - SRVR = DWR subbasin UF1 / CDEC stations SBB+FTO+AMF for WY 1922- 2014, removed outlying values >0.3 and averaged by month. - GF Sacramento Valley Floor = SRVR*(SBB+FTO+AMF) for WY 2015- Present and Forecasted.	Calculated
San Joaquin- Mokelumne- Cosumnes Ratio (SJMCR)	Monthly factor used to extrapolate the FNF supply for east side tributaries in the San Joaquin River Valley Floor subwatershed based on data for the Mokelumne and Cosumnes Rivers (no recent or projected supply data exists for the Valley Floor): - SJMCR = DWR subbasin UF12 / CDEC stations MKM+CSN for WY -1922-2014, removed outlying values >5 and averaged by month. - GF San Joaquin Valley Floor East = SJMCR*(MKM+CSN) for WY 2015- Present and Forecasted.	Calculated

Field Name(s)	Definition & Methodology	Data Source(s)
San Joaquin- Merced- Tuolumne- Stanislaus Ratio (SJMTSR)	Monthly factor used to estimate the FNF supply for west side tributaries in the San Joaquin River Valley Floor subwatershed based on data for the San Joaquin, Merced, Tuolumne, and Stanislaus Rivers (no recent or projected supply data exists for the Valley Floor): - SJMTSR = DWR subbasin UF24 / CDEC stations SJF+MRC+TLG+SNS for WY - 1922-2014, removed outlying values >0.06 and averaged by month. - GF San Joaquin Valley Floor West = SJMTSR*(SJF+MRC+TLG+SNS) for WY 2015-Present and Forecasted.	Caiculated

Supply Adjust (SA)

This tab contains monthly instream flow requirements for each subwatershed, which are used to increase available supplies to account for the abandonment of these dedicated flows below their intended reach. Flow requirements are sourced from the Division's Sacramento Valley Water Allocation Model (SacWAM) and Water Supply Effects (WSE) model. Only requirements which crossed subwatershed boundaries or ended near the bottom of a subwatershed (less than 30 river miles from its mouth) are included. If the instream flow reach ends higher up in the subwatershed, such that it may meet demand within that subwatershed itself, the abandoned instream flow is not considered in the analysis. The origin of each instream flow requirement is detailed in the Note column.

All flow values in the Supply Adjust (SA) table are given in average cubic feet per second (CFS) by month, which are converted to acre-feet (AF) per month later in the analysis (see Headwater Reductions and Analysis Watersheds sections below). The supply contribution of each subwatershed to the watershed-wide analysis is represented by the greater of either the past or forecasted full natural flow (FNF, see next section) or the abandoned instream flow in this table for the respective subwatershed and month. In other words, during very dry conditions instream flows were assumed to consist of supplemental reservoir releases which would replace available natural flows when abandoned below their intended reach. During wet conditions instream flows were assumed to consist of bypassed natural flows, which would not contribute abandoned water in excess of FNF below their intended reach.

Supply Forecast

This tab contains forecasted monthly supply data for each of the 20 subwatersheds in the analysis. Like past supply data, forecasted values consist of full natural flow (FNF, also known as "unimpaired flow") estimates published by other agencies. Sources include DWR's Bulletin 120 Water Supply Forecast (B-120) Sacramento Water Supply Index (SRWSI) and San Joaquin Water Supply Index (SJWSI), the California Nevada River Forecast Center (CNRFC), and gap-filled (GF) data for certain watersheds without published forecasts. Direct links to individual forecast datasets are provided in the spreadsheet. Supplies volumes are provided in units of thousand acre-feet (TAF) and converted in the spreadsheet to acre-feet (AF).

This tab is grouped vertically into six tables, separated by black rows. Each table contains forecasted FNF values with a given exceedance probability: 10%, 25%, 50%, 75%, 90%, and 99%. Data fields for past months of the year reference the Past Supply Monthly tab, while forecast values for future months are updated at the beginning of each month. CNRFC forecasts are downloaded on the first of each month, while new B-120 SRWSI/SJWSI forecasts are published on the fifth business day of each month from December-May. CNRFC forecasts require additional intermediate data processing to convert from their default format of 39 daily forecast traces in thousands of cubic feet per second (TCFS) to monthly exceedance probabilities in TAF, which is done outside of the spreadsheet.

Field Name(s)	Definition & Methodology	Data Source(s)
Year, Month, Date	The calendar year, calendar year month, and date of the respective water supply forecast.	
Sacramento Bend	Monthly FNF forecasts for the Sacramento River at Bend subwatershed: - B-120 SRWSI. - When B-120 unavailable, CNRFC station BDBC1 (daily TCFS converted to monthly TAF).	B-120
Stony	Monthly FNF forecasts for the Stony Creek subwatershed (at Black Butte Reservoir): - CNRFC station EPRC1 (daily TCFS converted to monthly TAF) with GF augmentation.	CNRFC w/ staff adjustments
Cache	Monthly FNF forecasts for the Cache Creek subwatershed (above Rumsey): - GF extrapolation based on Stony Creek.	Staff estimates

Field Name(s)	Definition & Methodology	Data Source(s)
Upper Feather	Monthly FNF forecasts for the Upper Feather River subwatershed (at Oroville): - B-120 SRWSI.	B-120
	 When B-120 unavailable, CNRFC station ORDC1 (daily TCFS converted to monthly TAF). 	
Yuba	Monthly FNF forecasts for the Yuba River subwatershed (near Smartville plus Deer Creek or Englebright Reservoir): - B-120 SRWSI.	B-120
	 When B-120 unavailable, CNRFC station HLEC1 (daily TCFS converted to monthly TAF). 	
Bear	Monthly FNF forecasts for the Bear River subwatershed (near Wheatland): - GF extrapolation based on Yuba River.	Staff estimates
Upper American	Monthly FNF forecasts for the Upper American River subwatershed (below Folsom Lake): - B-120 SRWSI.	B-120
	FOLC1 (daily TCFS converted to monthly TAF).	
Putah	Monthly FNF forecast for the Putah Creek subwatershed (near Winters): - GF extrapolation based on Stony Creek.	Staff estimates
Upper Sacramento Valley	Monthly FNF forecasts for the Upper Sacramento River Valley subwatershed (tributaries between Bend and Butte Slough, including Redbank, Elder, Thomes, Antelope, Mill, Deer, Big Chico, and Butte Creeks): - CNRFC stations EDCC1+TCRC1+MLMC1+DCVC1+BKCC1 (daily TCFS converted to monthly TAF) with GF augmentation.	CNRFC w/ staff adjustments

Field Name(s)	Definition & Methodology	Data Source(s)
Sacramento Valley Floor	Monthly FNF forecasts for the Sacramento Valley Floor subwatershed (minor east and west side tributaries between Stony Creek and the Delta, including tributaries to the Lower Feather and American Rivers): - GF extrapolation based on Sacramento, Feather, and American Rivers.	Staff estimates
Sac Total	The sum of all subwatershed supplies in the Sacramento River watershed for the given month and forecast exceedance.	Calculated
Supply forecasts	for all Sacramento subwatersheds are converted	to AF.
Chowchilla	Monthly FNF forecasts for the Chowchilla River subwatershed (at Buchanan Reservoir): - CNRFC station BHNC1 (daily TCFS converted to monthly TAF).	CNRFC
Upper San Joaquin	Monthly FNF forecasts for the Upper San Joaquin River subwatershed (inflow to Millerton Lake): - B-120 SJWSI. - When B-120 unavailable, CNRFC station FRAC1 (daily TCFS converted to monthly TAF).	B-120
Fresno	Monthly FNF forecasts for the Fresno River subwatershed (at Hidden Dam): - CNRFC station HIDC1 (daily TCFS converted to monthly TAF).	CNRFC
Merced	Monthly FNF forecasts for the Merced River subwatershed (below Merced Falls or Exchequer Reservoir): - B-120 SJWSI. - When B-120 unavailable, CNRFC station EXQC1 (daily TCFS converted to monthly TAF).	B-120

Field Name(s)	Definition & Methodology	Data Source(s)
Tuolumne	Monthly FNF forecasts for the Tuolumne River subwatershed (below La Grange Reservoir or New Don Pedro Reservoir): - B-120 SJWSI. - When B-120 unavailable, CNRFC station	B-120
	TAF).	
Stanislaus	Monthly FNF forecasts for the Stanislaus River subwatershed (below Goodwin Reservoir or New Melones Reservoir): - B-120 SJWSI.	B-120
	 When B-120 unavailable, CNRFC station NMSC1 (daily TCFS converted to monthly TAF). 	
Calaveras	Monthly FNF forecasts for the Calaveras River subwatershed (New Hogan Reservoir): - CNRFC station NHGC1 (daily TCFS converted to monthly TAF).	CNRFC
Mokelumne	Monthly FNF forecasts for the Mokelumne River subwatershed (near Mokelumne Hill): - CNRFC station MHBC1 (daily TCFS converted to monthly TAF).	CNRFC
Cosumnes	Monthly FNF forecasts for the Cosumnes River subwatershed (at Michigan Bar): - CNRFC station MHBC1 (daily TCFS converted to monthly TAF).	CNRFC
San Joaquin Valley Floor	Monthly FNF forecasts for the San Joaquin River Valley Floor subwatershed (including minor east and west side tributaries between the Chowchilla and American Rivers): - CNRFC stations MPAC1+OWCC1+MEEC1 (daily TCFS converted to monthly TAF) + GF extrapolation based on Mokelumne, Cosumnes, San Joaquin, Merced, Tuolumne, and Stanislaus Rivers.	CNRFC, staff estimates
SJ Total	The sum of all subwatershed supplies in the San Joaquin River watershed for the given month and forecast exceedance.	Calculated

Field Name(s)	Definition & Methodology	Data Source(s)
Supply forecasts	for all San Joaquin subwatersheds are converted	d to AF.
% Sacramento	The percent of total Delta watershed supply for the given month and forecast exceedance which came from the Sacramento River watershed.	Calculated
% San Joaquin	The percent of total Delta watershed supply for the given month and forecast exceedance which came from the San Joaquin River watershed.	Calculated
Stony	Original monthly FNF forecasts (pre-GF augmentation) for the Stony Creek subwatershed (at Black Butte Reservoir): - CNRFC station EPRC1 (daily TCFS converted to monthly TAF).	CNRFC
Sacramento Minor Streams West	Original monthly FNF forecasts (pre- GF augmentation) for two west side streams in the Upper Sacramento River Valley subwatershed (Elder and Thomes Creeks at Paskenta): - CNRFC stations EDCC1+TCRC1 (daily TCFS converted to monthly TAF).	CNRFC
Sacramento Minor Streams East	Original monthly FNF forecasts (pre- GF augmentation) for three east side streams in the Upper Sacramento River Valley subwatershed (Mill Creek at Los Molinos, Deer Creek at Vina, and Butte Creek at Chico): - CNRFC stations MLMC1+DCVC1+BKCC1 (daily TCFS converted to monthly TAF).	CNRFC
San Joaquin Valley Floor	Original daily FNF data (before being added to other GF extrapolated datasets) for three east side streams in the San Joaquin River Valley Floor subwatershed (Mariposa Creek at Mariposa Reservoir, Owens Creek at Owens Reservoir, and Bear Creek at McKee Road): - CNRFC stations MPAC1+OWCC1+MEEC1 (daily TCFS converted to monthly TAF).	CNRFC

Supply Daily Monitoring

This tab contains daily cumulative supply data (full natural flow, FNF) for a single month, which are compared to the monthly water supply forecasts described in the previous section for the purpose of selecting the most appropriate supply forecast to use when issuing notices of water unavailability. Additional methods to assess water availability based on precipitation events or other forecasts may be used during the wet season.

There are inherent uncertainties in the forecasting of water supply, and daily water supplies may vary depending on changing conditions (e.g., precipitation, temperatures, or snowpack). Since supply forecasts are only updated at the beginning of each month, this daily cumulative data monitoring helps provide an indication of which forecast is likely to be the most accurate predictor of actual conditions as the month continues. If the daily cumulative FNF exceeds a given forecast only partway through the month, the next highest forecast may be used to adjust the timing or scope of notices of water unavailability.

This tab is grouped vertically into three tables, separated by black rows:

- 1. The top table shows monthly forecasted FNF values for each subwatershed by exceedance, all in acre-feet (referencing the Supply Forecast tab). The cells in this table have conditional formatting to highlight red if the cumulative daily supply for that subwatershed (middle table) has exceeded the given monthly forecast.
- 2. The middle table shows the calculated total cumulative daily FNF for each subwatershed, all converted to acre-feet (AF).
- 3. The bottom table contains the daily FNF supply values, which are updated from the data sources linked in the middle table (NOTE: any negative reported values are changed to zero). These values are in the default units of each source: AF, thousand acre-feet (TAF), or cubic feet per second (CFS).

Unless otherwise noted, the below table defines fields from the bottom table in the spreadsheet. Values in the top table reference the previous Supply Forecast tab, while values in the middle table are computed from data in the bottom table.

Field Name(s)	Definition & Methodology	Data Source(s)
Forecast	The exceedance probability of the given forecasted supply value (top table only).	
Date	Days of the (calendar year) month over which water supply is being tracked. This tab can only track one month's supply at a time.	

Field Name(s)	Definition & Methodology	Data Source(s)
Sacramento Bend	Daily FNF data for the Sacramento River at Bend subwatershed: - CDEC station BND, sensor 8	CDEC
Stony	Daily FNF data for the Stony Creek subwatershed (at Black Butte Reservoir): - CNRFC station EPRC1 with GF augmentation (original data to right of the main table).	CNRFC w/ staff adjustments
Cache	Daily FNF data for the Cache Creek subwatershed (above Rumsey): - GF extrapolation based on Stony Creek (with GF augmentation).	Staff estimates
Upper Feather	Daily FNF data for the Upper Feather River subwatershed (at Oroville Dam): - CDEC station ORO, sensor 8.	CDEC
Yuba	Daily FNF data for the Yuba River subwatershed (near Smartville): - CDEC station YRS, sensor 8.	CDEC
Bear	Daily FNF data for the Bear River subwatershed (near Wheatland): - GF extrapolation based on Yuba River.	Staff estimates
Upper American	Daily FNF data for the Upper American River subwatershed (at Lake Natoma): - CDEC station NAT, sensor 8.	CDEC
Putah	Daily FNF data for the Putah Creek subwatershed (near Winters): - GF extrapolation based on Stony Creek.	Staff estimates
Upper Sacramento Valley	Daily FNF data for the Upper Sacramento River Valley subwatershed (tributaries between Bend and Butte Slough, including Redbank, Elder, Thomes, Antelope, Mill, Deer, Big Chico, and Butte Creeks): - CNRFC stations EDCC1+TCRC1+MLMC1+DCVC1+BKCC1 with GF augmentation (original data to right of main table).	CNRFC w/ staff adjustments

Field Name(s)	Definition & Methodology	Data Source(s)
Sacramento Valley Floor	Daily FNF for the Sacramento Valley Floor subwatershed (minor east and west side tributaries between Stony Creek and the Delta, including tributaries to the Lower Feather and American Rivers): - GF extrapolation based on Sacramento, Feather, and American Rivers.	Staff estimates
Sac Total	The sum of all subwatershed supplies in the Sacramento River watershed for the given day (all converted to AF).	Calculated
Chowchilla	Daily FNF data for the Chowchilla River subwatershed (at Buchanan Reservoir): - CNRFC station BHNC1.	CNRFC
Upper San Joaquín	Daily FNF data for the Upper San Joaquin River subwatershed (at Friant Dam): - CDEC station SJF, sensor 8.	CDEC
Fresno	Daily FNF for the Fresno River subwatershed (at Hidden Dam): - CNRFC station HIDC1.	CNRFC
Merced	Daily FNF for the Merced River subwatershed (at New Exchequer Dam/Lake McClure): - CDEC station EXC, sensor 8.	CDEC
Tuolumne	Daily FNF data for the Tuolumne River subwatershed (at La Grange Dam): - CDEC station TLG, sensor 8.	CDEC
Stanislaus	Daily FNF data for the Stanislaus River subwatershed (at Goodwin Dam): - CDEC station GDW, sensor 8.	CDEC
Calaveras	Daily FNF data for the Calaveras River subwatershed (at New Hogan Reservoir): - CNRFC station NHGC1.	CDEC
Mokelumne	Daily FNF data for the Mokelumne River subwatershed (near Mokelumne Hill): - CDEC station MKM, sensor 8.	CDEC
Cosumnes	Daily FNF data for the Cosumnes River subwatershed (at Michigan Bar): - CDEC station MHB, sensor 8.	CDEC

Field Name(s)	Definition & Methodology	Data Source(s)
San Joaquin Valley Floor	Daily FNF data for the San Joaquin River Valley Floor subwatershed (including minor east and west side tributaries between the Chowchilla and American Rivers): - CNRFC stations MPAC1+OWCC1+MEEC1 (original data to right of main table) + GF extrapolation based on Mokelumne, Cosumnes, San Joaquin, Merced, Tuolumne, and Stanislaus Rivers.	CNRFC, staff estimates
SJ Total	The sum of all subwatershed supplies in the Sacramento River watershed for the given day (all converted to AF).	Calculated
Total Supply	The sum of all water supplies in the Delta (Sacramento and San Joaquin River watersheds) for the given day (all converted to AF).	Calculated
% Sacramento	The percent of the given month's total Delta supply which came from the Sacramento River watershed.	Calculated
% San Joaquin	The percent of the given month's total Delta supply which came from the San Joaquin River watershed.	Calculated
Stony	Original daily FNF data (pre-GF augmentation) for the Stony Creek subwatershed (at Black Butte Reservoir): - CNRFC station EPRC1.	CNRFC
Sacramento Minor Streams West	Original daily FNF data (pre-GF augmentation) for two west side streams in the Upper Sacramento River Valley subwatershed (Elder and Thomes Creeks at Paskenta): - CNRFC stations EDCC1 and TCRC1.	CNRFC
Sacramento Minor Streams East	Original daily FNF data (pre-GF augmentation) for three east side streams in the Upper Sacramento River Valley subwatershed (Mill Creek at Los Molinos, Deer Creek at Vina, and Butte Creek at Chico): - CNRFC stations MLMC1, DCVC1, and BKCC1.	CNRFC

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Field Name(s)	Definition & Methodology	Data Source(s)
San Joaquin Valley Floor	Original daily FNF data (before being added to other GF extrapolated datasets) for three east side streams in the San Joaquin River Valley Floor subwatershed (Mariposa Creek at Mariposa Reservoir, Owens Creek at Owens Reservoir, and Bear Creek at McKee Road): - CNRFC stations MPAC1, OWCC1, and MEEC1.	CNRFC

Demand

This tab contains monthly water diversion (demand) data for active, consumptive water right records in the Delta watershed. This data originated from the State Water Board's Electronic Water Rights Information Management System (eWRIMS) database. Technical Appendix B describes the process used to select these water right records and quality-control reported data to produce this dataset. In this tab each row quantifies water diversions (demand) for a single water right or claim in each month of the 2018 and 2019 calendar years, which are used as proxies for 2021 water demand in this analysis. Demand data are further adjusted in the Demand Separated tab (see next section) to account for water rights with diversion points in multiple subwatersheds and return flows.

Field Name(s)	Definition & Methodology	Data Source(s)
Application ID	Water Right Application ID Number; each water right record on file with the State Water Board is assigned a unique Application ID Number.	eWRIMS database

Field Name(s)	Definition & Methodology	Data Source(s)
Water Right Type	 Water right type (see Appendix B for additional information on the different Statement assigned categories): Appropriative: A post-1914 appropriative water right pursuant to a permit or license from the Board. Statement of Div[ersion] and Use (Riparian): A riparian water right claim. Statement of Div[ersion] and Use (Riparian/Pre-1914): A riparian and pre-1914 appropriative water right claim. Statement of Div[ersion] and Use (Pre-1914): A pre-1914 appropriative water right claim. Statement of Div[ersion] and Use (Pre-1914): A pre-1914 appropriative water right claim. Statement of Div[ersion] and Use (Pre-1914): A pre-1914 appropriative water right claim. Statement of Div[ersion] and Use (Reserved): A federal reserved water right claim. Statement of Div[ersion] and Use (Other): Any other category of water right claim (e.g. court decreed/adjudicated or contract/agreement). Statement of Div[ersion] and Use (Unclassified): A water right claim with an unspecified category. 	eWRIMS database w/ staff adjustments
Water Right Status	Status of the water right or claim, according to the Board's records: - Licensed: A post-1914 appropriative water right for which the Board has issued a license. - Permitted: A post-1914 appropriative water right for which the Board has issued a permit. - Claimed: A water right claimed by the owner (i.e., Statements of Diversion and Use) which the Board has not verified.	eWRIMS database
Primary Owner	Name of the primary owner of the water right record.	eWRIMS database

Field Name(s)	Definition & Methodology	Data Source(s)
Beneficial Use(s)	Concatenated list of the beneficial use(s) of water associated with the water right record, as defined by Water Code §§ 660-669.	eWRIMS database
Priority Date	The priority date of the water right records (YYYY/MM/DD): - Appropriative: Assumed to be the earlier of the Application Acceptance Date and Application Received Date attributes. - Statement of Div[ersion] and Use (Riparian): 'Riparian' and assumed to be senior to all non-Riparian demands. - Statement of Div[ersion] and Use (Riparian/Pre-1914, Pre-1914, Reserved, or Other): Assumed to be January 1 st of the earliest claimed Year Diversion Commenced attribute, which is present in the Initial Statement of Diversion and Use and annual Supplemental Statements of Diversion and Use. Further adjusted in the Demand Separated tab for Riparian/Pre-1914 and Other Statements and Appropriative Project rights.	eWRIMS database
Face Value (AFA)	The maximum annual amount of water authorized for diversion under an appropriative water right. Statements, including Riparian and Pre-1914 Appropriative claims, do not have an assigned face value; for the purposes of this analysis, their face value is assumed to be zero.	eWRIMS database

Field Name(s)	Definition & Methodology	Data Source(s)
2018/2019 Annual Diversion	The total reported diversion of the water right record in calendar year 2018 or 2019. These values include user-reported direct diversions and diversions to storage from annual reports. Values for select water right records were manually reviewed by staff and corrected as necessary.	eWRIMS database w/ staff adjustments
2018/2019 Review	Indicates whether and how the 2018 or 2019 reported diversion was reviewed or corrected by staff: - Estimated Downward: Staff reviewed and corrected the user- reported diversion value to be higher than reported. - Estimated Upward: Staff reviewed and corrected the user-reported diversion value to be lower than reported. - Reviewed Not Changed: Staff reviewed the reported diversion value but did not apply a correction. - Not Reviewed: Staff did not manually review this annual report.	Staff-determined
Jan-Dec 2018/2019 Diversion	The total reported diversion of the water right record in each month of calendar year 2018 or 2019. These values include user-reported direct diversions and diversions to storage from annual reports. Values for select water right records were manually reviewed by staff and corrected as necessary.	eWRIMS database w/ staff adjustments

Demand Factors

This tab contains monthly factors which are used to adjust demand data to account for return flows within each subwatershed on a monthly basis. Demand factors are calculated for each month in the Sacramento and San Joaquin River watersheds as the percent of diversion which returned as flow within the same month (Factor = Total Diversions / Total Return Flows) from May through September. Data used to determine

the factors, which include return flows from both agricultural and municipal water uses, were sourced from CalSim 3 results published by DWR. Results from WY 2014 are used, as its hydrology most closely matches forecasts for the remainder of WY 2021.

All values in the Demand Factor table are given as multipliers (i.e., a demand factor of 0.6 means that the analysis will reduce demands within the given subwatershed in the given month by 40%). Demand values in the analysis are adjusted by multiplying monthly demand for a given water right by the monthly factor for the appropriate subwatershed where it diverts. The 2021 Methodology currently only applies demand factors to reduce demands within lower valley portions of the Delta watershed (the Sacramento Bend, Upper Sacramento Valley, Sacramento Valley Floor, and San Joaquin Valley Floor subwatersheds) because return flows from diversions within headwater subwatersheds are not expected to be available within the same subwatershed (i.e., they return further downstream on the valley floor). Demand adjustments are done in the Demand Separated tab of the spreadsheet (see next section).

Demand Separated

This tab contains monthly demand data for water rights in the Delta watershed, which are modified from the Demand tab (see previous section) to account for return flows and water rights with points of diversion (PODs) in multiple subwatersheds. This demand separation is necessary because annual water right reports, and thus the data in the Demand tab of the spreadsheet, are provided for each water right rather than each POD. While the data necessary to separate demands originated from the Division's eWRIMS database, staff judgement is required to develop the Demand Weights listed in this tab based on the nature of PODs associated with each right. Demand adjustments to account for return flows are sourced from the Demand Factors tab of the spreadsheet. Each row quantifies monthly demands from a single water right's POD(s) within a single HUC8.

Field Name(s)	Definition & Methodology	Data Source(s)
Application ID	Application ID of the water right, sourced from the Demand tab. Water rights with PODs in multiple HUC8s are split into multiple rows, one for each HUC8.	eWRIMS database

Field Name(s)	Definition & Methodology	Data Source(s)
Water Right Type	 Water right type, sourced from the Demand tab: Appropriative: A post-1914 appropriative water right pursuant to a permit or license from the Board. Statement of Div[ersion] and Use (Riparian): A riparian water right claim. Statement of Div[ersion] and Use (Riparian/Pre-1914): A riparian and pre- 1914 appropriative water right claim. Statement of Div[ersion] and Use (Pre- 1914): A pre-1914 appropriative water right claim. Statement of Div[ersion] and Use (Reserved): A federal reserved water right claim. Statement of Div[ersion] and Use (Other): Any other category of water right claim (e.g. court decreed/adjudicated or contract/agreement). Statement of Div[ersion] and Use (Unclassified): A water right claim with an unspecified category. 	eWRIMS database w/ staff adjustments
HUC8	The name of the Hydrologic Unit Code Level 8 where demand in the row is located. Water right PODs are automatically assigned a HUC8 value in eWRIMS based on their location. This tab contains additional detail not found in the Demand tab, splitting rights that have PODs in multiple HUC8s into multiple rows (one for each HUC8).	eWRIMS database USGS WBD
Subwatershed	Subwatershed where demand in the row is located. Sourced from the Subwatersheds tab based on the HUC8 value.	Staff- determined
Watershed	The watershed in which the demand occurs: the Sacramento River watershed or the San Joaquin River watershed. Sourced from the Subwatersheds tab based on the HUC8 value.	eWRIMS database, USGS WBD

Field Name(s)	Definition & Methodology	Data Source(s)
Legal Delta?	Indicates if demand for that row occurs within the Legal Delta (TRUE/FALSE). Assigned in the eWRIMS database based on the location of water right POD(s) and validated to ensure only rows which account for Legal Delta demands are flagged as TRUE. Statements claiming only Riparian rights which are located in the Legal Delta are marked as FALSE (with a note in the Demand Comment column) because these demands are not prorated between watersheds per Board Order WR 89-8 (see Watershed Viz and Watershed Analysis sections).	eWRIMS database w/ staff adjustments
Priority Date	The priority date of a water right or claim, sourced from the Demand tab (YYYY/MM/DD), with some exceptions: - The priorities of Statements categorized as "Riparian", "Riparian/Pre-1914" or "Other" are marked as 'Riparian' because the water right record does not contain sufficient information to further disaggregate their demands. They are conservatively assumed to have a more senior priority date than all appropriative water rights. ¹ - Project rights listed in Board Decision 1641 (excepting 2 New Melones Project rights, per Board Decision 1422) are marked as 'Project' and assumed to be junior to all other water rights.	eWRIMS database w/ staff adjustments
Priority Year	The year of the priority date, sourced from the previous column. Riparian or Project priorities are shown as blank.	eWRIMS database w/ staff adjustments

¹ For claims within the Legal Delta, this categorization of colorable riparian claims is consistent with recent judicial decisions (see e.g., *Modesto Irrigation District v. Heather Robinson Tanaka*, 48 Cal.App.5th 898 (2020)) and with the legal principles described in a memorandum dated December 15, 2017 regarding issues Related to Overlap between Pre-1914 and Riparian Water Right Claims in the Delta and available on the website of the Office of the Delta Watermaster (Overlap Memo).

Field Name(s)	Definition & Methodology	Data Source(s)
Demand Weight	The percent of the specified water right's demand which occurs within the specified HUC8:	Staff- determined
	 Demand Weight = (number of PODs within the respective HUC8) / (total number of PODs). Only active PODs that are not Points of Rediversion or Points of Offstream Storage are considered in this calculation. The sum of Demand Weights for most water rights is equal to one (see exception in next column). 	
Demand Comment	 Additional detail about the Demand Weight or other aspects of the demand: Has POD(s) outside Delta watershed: The water right has one or more associated PODs which divert from streams outside the Delta watershed (sum of Demands Weights is less than one). In Legal Delta but not prorated between watersheds: The POD in the specified HUC8 is located within the Legal Delta but is associated with a Statement claiming only riparian rights. Per Board Order WR 89-8, the riparian demand is not prorated between watersheds. Inactive: The POD in the specified HUC8 is not actively used (Demand Weight is zero). Point of Rediversion/Offstream Storage: The POD does not divert natural flow (Demand Weight is zero). Project: The water right is listed in Board Decision 1641, so its Priority Date is set to 'Project.' Also indicates actual water right Priority Date, sourced from Demand tab 	Staff- determined

Field Name(s)	Definition & Methodology	Data Source(s)
January- December 2018/2019	Monthly demands of the specified water right within the specified HUC8, calculated as follows: (Application ID Demand for month of 2018 or 2019, sourced from Demand tab) * (Demand Factor for subwatershed and month, sourced from Supply Adjust tab) * (Demand Weight)	Calculated

Headwater Reductions

This tab compiles supply and demand data from each subwatershed in the Delta watershed and: 1) reduces any demands that cannot be met in headwater subwatersheds so that they are not reflected in the watershed-wide analysis, and 2) removes both supply and demand for any headwater subwatersheds considered to be disconnected from the Delta watershed because local supplies are insufficient to meet all riparian demands. Supply data is sourced from the Supply Forecast tab of the spreadsheet, while demand data is sourced from the Demand Separated tab of the spreadsheet.

Field Name(s)	Definition & Methodology	Data Source(s)
Subwatershed	Smallest area over which water availability is determined, based on one or more HUC8s. Sourced from the Demand Separated tab.	Staff- determined
Subwatershed Type	Subwatersheds are categorized as either - 'headwater' or 'lower' for the purpose of this analysis: - A headwater subwatershed contains water demands which can only be met by water supplies within the subwatershed (i.e., there are no tributaries flowing into the subwatershed). - A lower subwatershed can receive water supplies from outside its boundaries (i.e., it is located downstream of the headwaters).	Staff- determined
Watershed	The two primary river systems in the Delta: Sacramento and San Joaquin.	USGS WBD

Field Name(s)	Definition & Methodology	Data Source(s)
MonthNum and Month	The calendar year month (either number or three-letter abbreviation) of the respective water supply and demand.	
Riparian Demand 2018	The sum of calendar year 2018 demand for all Riparian water right claims (Water Right Type = Riparian, Riparian/Pre-1914, or Other Statements) for the respective subwatershed and month, excluding demands in the Legal Delta. Sourced from the Demand Separated tab.	eWRIMS database w/ staff adjustments
Pre-1914 Demand 2018	The sum of calendar year 2018 demand for all pre-1914 appropriative water right claims (Water Right Type = Pre-1914 or Unclassified Statements) for the respective subwatershed, month, and demand year, excluding demands in the Legal Delta. Sourced from the Demand Separated tab.	eWRIMS database w/ staff adjustments
1914-1919, 1920s, 1930s, 1940s, 1950s, 1960s, 1970s, 1980s, 1990s, 2000s, and 2010s Demand 2018	The sum of calendar year 2018 demand for all Post-1914 Appropriative rights (Water Right Type = Reserved Statement or Appropriative) with a priority date within the specified decade for the respective subwatershed and month, excluding demands in the Legal Delta. Sourced from the Demand Separated tab.	eWRIMS database w/ staff adjustments
Project Demand 2018	The sum of calendar year 2018 demand for all Project water rights which export water outside the Delta watershed for the respective subwatershed and month, excluding demands in the Legal Delta. Sourced from the Demand Separated tab.	eWRIMS database w/ staff adjustments
2019 demand data	is disaggregated in the same manner as 2018	demand data.
Supply Forecast 10%, 50%, 90% or 99% Exceedance	Supply for the respective subwatershed and month. For past months, the actual value from the Supply Past Monthly tab is shown. For future months, the forecasted supply with the respective exceedance probability from the Supply Forecast tab is shown.	CDEC, B-120, CNRFC, staff estimates

Field Name(s)	Definition & Methodology	Data Source(s)
Discontinuity? (2018 Demand, 90% Exceedance Supply)	Whether a given headwater subwatershed is considered disconnected from the Delta watershed in a given month (Yes/No). A headwater subwatershed is considered disconnected when the supply (using the 90% exceedance forecast for future months) is insufficient to meet the 2018 demands of all riparian claims of right in the subwatershed.	Staff- determined
2018 Total Demand	The sum of 2018 all demand values for the respective subwatershed and month.	Calculated
2018 Reduced Demand for Discontinuity & Unmet Demand (90% Exceedance Supply)	 2018 demands for the respective subwatershed and month, eliminating any demand which cannot physically be met by available supply: In headwater subwatersheds, the lesser of 2018 Total Demand or 90% Supply Forecast 90% Exceedance. In disconnected headwater subwatersheds, equal to zero. In lower subwatersheds, the 2018 Total Demand (no reduction due to supply). 	Calculated
2019 demand data as 2018 demand d	a is summed and analyzed for discontinuity in th lata.	e same manner
Supply Forecast 90% Exceedance with Headwater Abandoned Flow Replacement	Supply for the respective subwatershed and month which contributes to the Delta watershed. The greater of either the Supply Forecast 90% Exceedance value or the abandoned flow for the respective subwatershed and month (sourced from the Supply Adjust tab, converted to acre- feet per month).	B-120, CNRFC, staff estimates

Field Name(s)	Definition & Methodology	Data Source(s)
2018/2019 Reduced Supply for Discontinuity (90% Exceedance with Abandoned Flow Replacement)	When discontinuity is found for the respective subwatershed and month based on demand data from the respective year (i.e., Discontinuity? = Yes), both supply and demand are removed from the watershed-wide analysis. This column sets supplies for disconnected headwater subwatersheds to zero.	Calculated

Subwatershed Viz

This tab compiles supply and demand data from each subwatershed in the Delta watershed to generate the interactive Headwater Subwatershed Analysis visualization at:

 $https://www.waterboards.ca.gov/waterrights/water_issues/programs/drought/drought_tools_methods/delta_method.html$

Field Name(s)	Definition & Methodology	Data Source(s)
Subwatershed	Smallest area over which water availability is determined, based on one or more HUC8s. Sourced from the Demand Separated tab.	Staff-determined
Subwatershed Type	Subwatersheds are categorized as either 'headwater' or 'lower' for the purpose of this analysis: - A headwater subwatershed contains water demands which can only be met by water supplies within the subwatershed (i.e., there are no tributaries flowing into the subwatershed). - A lower subwatershed can receive water supplies from outside its boundaries (i.e., it is located downstream of the headwaters).	Staff-determined
Watershed	The two primary river systems in the Delta: Sacramento and San Joaquin.	USGS WBD

Field Name(s)	Definition & Methodology	Data Source(s)
MonthNum and Month	The calendar year month (either number or three-letter abbreviation) of the respective water supply and demand.	
Discontinuity?	Whether a given headwater subwatershed is considered disconnected from the Delta watershed in a given month based on a given year of demand data (Yes/No). Sourced from the Discontinuity? column in the Headwater Reductions tab.	Staff-determined
Demand Type	Demand category, based on water right priority. Post-1914 appropriative demands are largely separated by priority decade, except for demand by the Central Valley Project and the State Water Project (Project Demand).	eWRIMS w/ staff adjustments
Demand Year	Calendar year of demand data (2018 or 2019).	eWRIMS database
Demand	Monthly total demand for the respective subwatershed, month, demand year, and demand type, prior to the elimination of unmet headwater demand and demand in disconnected subwatersheds. Sourced from the Demand columns in the Headwater Reductions tab.	eWRIMS database w/ staff adjustments
Demand After Reduction (90% Exceedance Supply)	Monthly demand for the respective subwatershed, month, and demand year, after unmet headwater demand and demand in disconnected subwatersheds are removed. If Cumulative Demand exceeds the available supply, the remaining supply is credited towards the last added (senior) demand type and later (junior) demands are zero.	Calculated

Field Name(s)	Definition & Methodology	Data Source(s)
2021 Supply 10%, 50% 90%, and 99% Exceedance	Supply for the respective subwatershed and month. For past months, the actual value from the Supply Past Monthly tab is shown. For future months, the forecasted supply with the respective exceedance probability from the Supply Forecast tab is shown (NOTE: supply is available to all demand types by priority; values are shown only in the Riparian Demand rows due to Tableau plotting limitations).	CDEC, B-120, CNRFC, staff estimates
Supply After Reduction (90% Exceedance Supply)	Monthly supply for the respective subwatershed and month (past months from the Supply Past Monthly tab, future months from the Supply Forecast tab). Set to zero if Discontinuity? = Yes.	Calculated
Cumulative Demand for Subwatershed & Month	Total cumulative demand for the respective subwatershed, month, and demand year (used as an intermediate calculation to inform the Demand After Reduction value). Added from most senior to most junior rights.	Calculated
Watershed Supply Summary Table (Watershed, MonthNum, Month, Supply Type, Supply)	Monthly supply statistics for the Sacramento River and San Joaquin River watersheds. Sourced from the Supply Past Monthly and Supply Forecast tabs to compare median hydrologic conditions of past wet years and critically dry years to 90% exceedance forecasts for 2021.	CDEC, B-120, CNRFC, staff estimates

Watershed Viz

This tab compiles supply and demand data used to assess water unavailability at the watershed level. Formulas in this tab: 1) remove any demands that cannot be met in headwater subwatersheds, 2) remove both supply and demand for any disconnected headwater subwatersheds, and 3) distribute demand within the Legal Delta between the Sacramento River and the San Joaquin River watersheds before producing final supply and demand values that populate the interactive Watershed Analysis visualization at:

Field Name(s)	Definition & Methodology	Data Source(s)
Watershed	The two primary river systems in the Delta: Sacramento and San Joaquin.	USGS WBD
MonthNum and Month	The calendar year month of the respective water supply and demand.	
Delta Watershed Supply Ratio	The percent of supply that the respective watershed (Sacramento River or San Joaquin River) contributes to the Delta watershed in the respective month. Based on 90% exceedance supply forecasts, including the greater of FNF or subwatershed abandoned flow, and calculated after supplies from disconnected subwatersheds are removed based on demands for the respective year. Sourced from the 2018 and 2019 Reduced Supply for Discontinuity columns in the Headwater Reduction tab.	Calculated
Demand Type	Demand category, based on water right priority. Post-1914 appropriative demands are largely separated by priority decade, except for demand by the Central Valley Project and the State Water Project (Project Demand).	eWRIMS w/ staff adjustments
Demand Year	Calendar year of demand data (2018 or 2019).	eWRIMS database
Headwater Demand Reduction	The amount of demand removed from the watershed-wide analysis due to reduction of demands that cannot be met by supplies in headwater subwatersheds. Sourced from the Subwatershed Viz tab: Headwater Demand Reduction = Demand column – Demand after Reduction	Calculated

https://www.waterboards.ca.gov/waterrights/water_issues/programs/drought/drought_to ols_methods/delta_method.html

Field Name(s)	Definition & Methodology	Data Source(s)
Demand w/o Legal Deita (Headwater Reduced)	Total demand for the respective watershed, month, and demand year, excluding demand in the Legal Delta. Sourced from the Demand Separated tab: Demand w/o Legal Delta (Headwater Reduced) = total watershed demand – demand from PODs in the Legal Delta (Legal Delta? = TRUE) – Headwater Demand Reduction	Calculated
Legal Delta Demand	Demand for PODs within the Legal Delta (Legal Delta? = TRUE) for the respective month and demand type. Sourced from the Demand Separated tab.	eWRIMS w/ staff adjustments
Legal Delta Demand Prorated by Watershed	Demand for PODs within the Legal Delta (Legal Delta? = TRUE) for the respective watershed, month, and demand type. Legal Delta demands are prorated between the Sacramento River and San Joaquin River watersheds based on the percent of supply that each contributes in a given month (based on the 90% exceedance supply forecast, accounting for supply reductions due to disconnection and the replacement of abandoned instream flows in excess of subwatershed FNF): Prorated Legal Delta Demand by Watershed = Delta Watershed Supply Ratio * Legal Delta Demand In other words, if the Sacramento River watershed constitutes 80% of Delta watershed supply in a given month, then 80% of Legal Delta demand is charged against the Sacramento River watershed supply for that month and 20% is charged against the San Joaquin River watershed	Calculated

Field Name(s)	Definition & Methodology	Data Source(s)
Total Watershed Demand	Total demand for the respective watershed, month, and demand year after Legal Delta demand has been prorated between the two watersheds: Total Watershed Demand = Demand w/o Legal Delta (Headwater Reduced) + Legal Delta Demand Prorated by Watershed	Calculated
Total Watershed Supply	Total supply for the respective watershed and month after excluding supply from disconnected subwatersheds. Sourced from the 2018 and 2019 Reduced Supply for Discontinuity columns in the Headwater Reduction tab (NOTE: supply is available to all demand types by priority; values are shown only in the Riparian Demand rows due to Tableau plotting limitations).	Calculated

Daily Supply Viz

This tab compiles monthly supply data from the Supply Forecast tab and daily supply data from the Supply Daily Monitoring tab to produce a comparison between monthly forecasts and cumulative daily supply, which may be used to adjust the timing or scope of notices of water unavailability. This data populates the interactive Watershed Analysis Weekly Supply Updates visualization at:

https://www.waterboards.ca.gov/waterrights/water_issues/programs/drought/drought_to ois_methods/delta_method.html

Field Name(s)	Definition & Methodology	Data Source(s)
Date	Individual days of the current month.	<u></u>
Watershed	The two primary river systems in the Delta: Sacramento and San Joaquin.	USGS WBD

Field Name(s)	Definition & Methodology	Data Source(s)
Daily Cumulative	The cumulative total supply (sum of respective date and all previous days of the month) for the respective watershed, in acre-feet. Equal to '#N/A' if supply data are not available for all subwatersheds in the respective watershed (i.e., dates in the future). Sourced from the Supply Daily Monitoring tab.	CDEC, CNRFC, staff estimates
Fcast 99%, 90%, 75%, 50%, 25%, and 10% exc	Monthly forecasted supply for the respective watershed and exceedance probability, in acre-feet, Equal to the same value for all days of the month in order to plot as a horizontal line. Sourced from the Supply Forecast tab.	B-120, CNRFC, staff estimates

Analysis Headwaters

This tab contains a tabular version of the water supply and demand visualizations for 14 headwater subwatersheds in the Delta watershed. In each, past and forecasted supplies are used to determine water availability for each water right in order of priority date. Rights which are not expected to have water available to meet their demands due to limited local supplies are flagged for the receipt of a notice of water unavailability, and these unmet demands are excluded from the Watershed Analysis (see next section). If the Headwaters Analysis indicates that any Riparian claims of right (senior demands) would face water unavailability, all supplies and demands from that subwatershed are excluded from its respective Watershed Analysis. In other words, these streams are assumed to not have connectivity to the Delta watershed due to senior demands exceeding all available water supplies.

This analysis is set-up for each headwater subwatershed as follows:

- 1. The water rights listed in the Demand Separated tab of the spreadsheet are grouped by subwatershed.
- 2. Any rights located in the Legal Delta (Legal Delta? = TRUE) are excluded; this only occurs in the furthest downstream reaches of the Putah Creek, Stanislaus River, Calaveras River, and Cosumnes River headwater subwatersheds. Water availability for these rights is only analyzed in the Watershed Analysis, as they are assumed to have access to water from both the Sacramento and San Joaquin Rivers and not be limited by local supplies.
- 3. Any duplicate rights within each subwatershed are merged; this only occurs in the Sacramento River above Bend and Upper American River headwater

subwatersheds, where there are rights that divert from multiple HUC8s within the same subwatershed.

- 4. Rights within each subwatershed are sorted by priority date, with the most senior rights first: Riparian, Pre-1914 Appropriative, Appropriative, Project (see the explanations of Statement assigned categories and priority assumptions in the Demand and Demand Separated sections). All Riparian claims of right are assumed to have senior priority over all pre-1914 appropriative claims, which are in turn assumed to have priority over all post-1914 appropriative rights.
- 5. On a monthly basis for each right within a subwatershed, each of the following parameters is calculated or determined: demand, cumulative supply available, water availability (i.e., will this right receive a notice of water unavailability?), demand met, and demand unmet.

This tab is grouped into sixteen tables. The fourteen tables on the left, separated by black rows, contain the analysis for each headwater subwatershed: Sacramento River above Bend, Stony Creek, Cache Creek, Upper Feather River, Yuba River, Bear River, Upper American River, Putah Creek, Upper San Joaquin River, Merced River, Tuolumne River, Stanislaus River, Calaveras River, and Cosumnes River.

The upper table on the right side of this tab indicates the supply forecast exceedance and monthly supply volumes used for each individual subwatershed, sourced from the Supply Forecast tab. The lower table on the right side of this tab indicates if any Riparian claims within each subwatershed faced water unavailability in each month (i.e., if the subwatershed's supplies and demands should be excluded from the Watershed Analysis due to lack of connectivity with the Delta watershed). These cells have conditional formatting to highlight red if the subwatershed lacks connectivity.

NOTE: To save computation time, this tab contains largely static values. The first row of the top table (or the first two rows of the 2021 Supply Cumulative column), highlighted in blue, contain sample formulas described in detail in the table below.

Field Name(s)	Definition & Methodology	Data Source(s)
Subwatershed	Smallest area over which water availability is determined, based on one or more HUC8s. This tab contains data for only headwater subwatersheds (see Subwatersheds section), sourced from the Demand Separated tab.	Staff- determined
Application ID	Application ID of each water right, sourced from the Demand Separated tab. Any duplicate Application IDs within a single subwatershed are merged.	eWRIMS database

Field Name(s)	Definition & Methodology	Data Source(s)
Primary Owner	Name of the primary owner of the water right or water right claim, sourced from the Demand tab.	eWRIMS database
Water Right Type	Water right type, sourced from the Demand tab: Appropriative or Statement of Div[ersion] and Use (Riparian, Riparian/Pre-1914, Pre-1914, Reserved, Other, or Unclassified).	eWRIMS database w/ staff adjustments
Priority Date	The priority date of a water right or claim, sourced from the Demand tab (YYYY/MM/DD). Riparian, Riparian/Pre- 1914, and Other Statements are denoted as 'Riparian' priority and are assumed to be senior to all other demands, while Project rights listed in Board Decision 1641 are denoted as 'Project' priority and are assumed to be junior to all other demands.	eWRIMS database w/ staff adjustments
2018 Demand, Jan-Sep	Monthly demands by each water right in the respective subwatershed, summed from the Demand Separated tab. Excludes any demands in the Legal Delta.	eWRIMS database w/ staff adjustments
2021 Supply Cumulative, Jan-Sep	Available water supply to meet each water right's Demand, calculated as follows: - For the first water right in each subwatershed, equal to the subwatershed's monthly supply from the upper-right table in the spreadsheet. - For the next water right, the Supply Cumulative available to the previous right minus the previous rights' Demand Potentially Met in Subwatershed (see below). - Continued for each next junior water right, until all Demands are accounted for or there is no remaining water supply available.	CDEC, B-120, CNRFC, staff estimates, staff- determined

Field Name(s)	Definition & Methodology	Data Source(s)
Water Unavailable? Jan-Sep	If water is anticipated to be unavailable to the respective water right in the respective month. Determined if Demand exceeds Supply Cumulative (TRUE/FALSE). These cells have conditional formatting to highlight red if water is unavailable for a given right and month.	Staff- determined
Demand Potentially Met in Subwatershed, Jan-Sep	 Amount of each right's Demand which can be met by available supply within a given month, calculated as follows: If Supply Cumulative > Demand, equal to Demand. If 0 < Supply Cumulative < Demand, equal to Supply Cumulative (i.e., Water Unavailable, but a portion of Demand can be met). If Supply Cumulative = 0, equal to zero (i.e., Water Unavailable). 	Calculated
Demand Unmet in Subwatershed, Jan-Sep	Amount of each right's Demand which cannot be met by available water supply within a given month, calculated as follows: - If Demand Potentially Met = Demand, equal to zero. - If Demand Potentially Met < Demand, equal to Demand – Demand Potentially Met. - If Demand Potentially Met = 0, equal to Demand.	Calculated

Analysis Watersheds

This tab contains a tabular version of the Sacramento and San Joaquin Watershed-wide water supply and demand visualizations. In each watershed, total forecasted supplies are used to determine water availability for each right in order of priority date. Demands compared in this analysis include those in headwater subwatersheds which may be met by local supplies (see previous section), as well as all demands located in lower subwatersheds and within the Legal Delta. Rights which are not expected to have water available to meet their demands are flagged for the receipt of a notice of water unavailability. This is in addition to notices identified in the Headwater Subwatershed Analysis; while there may be enough water present locally to meet a given demand,

those supplies may not actually be available if they are needed to supply more senior rights further downstream in the watershed. Headwater subwatersheds where senior demands (Priority Date = Riparian) may receive notices have their supplies and demands removed from the Watershed Analysis.

This analysis is set-up for each watershed as follows:

- The water rights listed in the Demand Separated tab of the spreadsheet are grouped by watershed. Rights within the Legal Delta (Legal Delta? = TRUE) are present in both watersheds so that they can be prorated to each based on available supplies.
- 2. Any duplicate rights within each subwatershed are merged; this occurs only in the Sacramento River above Bend, Upper American River, Upper Sacramento Valley, Sacramento Valley Floor, and San Joaquin Valley Floor subwatersheds, where some rights divert from multiple HUC8s within the same subwatershed.
- 3. Rights within each subwatershed are sorted by priority date, with the most senior rights first: Riparian, Pre-1914 Appropriative, Appropriative, Project (see the explanations of Statement assigned categories and priority assumptions in the Demand and Demand Separated sections). All Riparian claims of right are assumed to have senior priority over all pre-1914 appropriative claims, which are in turn assumed to have priority over all post-1914 appropriative rights.
- 4. On a monthly basis for each right within a watershed, each of the following parameters is calculated or determined: demand (both total and headwater subwatershed demand which can potentially be met by local supplies), cumulative supply available, water availability (i.e., will this right receive a notice of water unavailability?), demand met, and demand unmet.

This tab is grouped into four tables. The two tables on the left, separated by black rows, contain the analysis for the Sacramento and San Joaquin River watersheds. The upper table on the right side of this tab indicates the supply forecast exceedance and monthly supply volumes used for each individual subwatershed, which are summed to a total for each watershed. Monthly supply ratios for the Delta watershed are calculated for each watershed for the purpose of Legal Delta demand proration. The lower table on the right side of this tab indicates any headwater subwatersheds whose supplies and demands were excluded if any Riparian claims were flagged for receipt of a notice of water unavailability (sourced from the Analysis Headwaters tab). These cells have conditional formatting to highlight red if the subwatershed was excluded.

NOTE: To save computation time, this tab contains largely static values. The first row of the top table (or the first two rows of the 2021 Supply Cumulative column), highlighted in blue, contain sample formulas described in detail in the table below.

Field Name(s)	Definition & Methodology	Data Source(s)
Watershed	The watershed in which the demand occurs, Sacramento River or San Joaquin River. Sourced from the Demand Separated tab. Legal Delta demands (Legal Delta? = TRUE) are present in both watersheds, with their demands prorated between them.	USGS WBD
Subwatershed	Smallest area over which water availability is determined, based on one or more HUC8s. Sourced from the Demand Separated tab.	Staff- determined
Application ID	Application ID of each water right, sourced from the Demand Separated tab. Any duplicate Application IDs within a single subwatershed are merged.	eWRIMS database
Water Right Type	Water right type, sourced from the Demand tab: Appropriative or Statement of Div[ersion] and Use (Riparian, Riparian/Pre-1914, Pre-1914, Reserved, Other, or Unclassified).	eWRIMS database w/ staff adjustments
Primary Owner	Name of the primary owner of the water right or water right claim, sourced from the Demand tab.	eWRIMS database
Priority Date	The priority date of a water right or claim, sourced from the Demand tab (YYYY/MM/DD). Riparian, Riparian/Pre- 1914, and Other Statements are denoted as 'Riparian' priority and assumed to be senior to all other demands, while Project rights listed in Board Decision 1641 are denoted as 'Project' priority and are assumed to be junior to all other demands.	eWRIMS database w/ staff adjustments
Legal Delta?	If demand for that row occurs within the Legal Delta (TRUE/FALSE), sourced from the Demand Separated tab. Each water right located in the Legal Delta is present in both the Sacramento and San Joaquin Watershed Analyses.	eWRIMS database w/ staff adjustments

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Field Name(s)	Definition & Methodology	Data Source(s)
Headwater Subwatershed?	If demand for that row occurs within a headwater subwatershed (TRUE/FALSE), sourced from the Subwatersheds tab.	Staff- determined
2018 Demand, Jan-Sep	Monthly demands by each water right in the respective subwatershed, summed from the Demand Separated tab. If the right is located in the Legal Delta (Legal Delta? = TRUE), the demand is multiplied by the respective watershed's supply ratio for the respective month (from the upper- right table in the spreadsheet) in order to prorate these demands between both watersheds.	eWRIMS database w/ staff adjustments
Water Unavailable in Subwatershed? Jan-Sep	If water is anticipated to be unavailable in a headwater subwatershed (TRUE/FALSE): - If located in a headwater subwatershed, equal to the Water Unavailable? value in the Analysis Headwaters tab for the respective right and month. - FALSE if located in a lower subwatershed. These cells have conditional formatting to highlight red if water is unavailable for a given right and month.	Staff- determined
Demand Potentially Met in Subwatershed, Jan-Sep	Monthly demands by each water right which can physically be met within the respective subwatershed: - If any Riparian Statements received notices in the given headwater subwatershed and month, equal to zero (see lower table to right in spreadsheet). - if located in a headwater subwatershed and nonzero, equal to the Demand Potentially Met in Subwatershed value in the Analysis Headwaters tab for the respective right and month. - If located in a lower subwatershed, equal to 2018 Demand.	Caiculated
Field Name(s)	Definition & Methodology	Data Source(s)
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2021 Supply Cumulative, Jan-Sep	 Available water supply to meet each water right's Demand Potentially Met, calculated as follows: For the first water right in each watershed, equal to the total watershed monthly supply from the upper-right table in the spreadsheet. For the next water right, the Supply Cumulative available to the previous right minus the previous right's Demand Met in Watershed (see below). Continued for each next junior water right, until all Demands are accounted for or there is no remaining water supply 	CDEC, B-120, CNRFC, staff estimates
Water Unavailable in Watershed? Jan-Sep	available. If water is anticipated to be unavailable to the respective water right in the respective month. Determined if Demand Potentially Met exceeds Supply Cumulative (TRUE/FALSE). These cells have conditional formatting to highlight red if water is unavailable for a given right and month.	Staff- determined
Demand Met in Watershed, Jan-Sep	Amount of each right's Demand Potentially Met which can be met by available supply within a given month, calculated as follows: - If Supply Cumulative > Demand Potentially Met, equal to Demand Potentially Met. - If 0 < Supply Cumulative < Demand Potentially Met, equal to Supply Cumulative (i.e., Water Unavailable, but a portion of Demand can be met). - If Supply Cumulative = 0, equal to zero (i.e., Water Unavailable).	Calculated

Field Name(s)	Definition & Methodology	Data Source(s)
Demand Unmet in Watershed, Jan-Sep	Amount of each right's Demand which can be physically met in the watershed that will be unmet by available water supply within a given month, calculated as follows: - If Demand Met = Demand Potentially Met, equal to zero. - If Demand Met < Demand Potentially Met, equal to Demand Potentially Met – Demand Met. - If Demand Met = 0, equal to Demand Potentially Met.	Calculated
Water Unavailable? Jan-Sep	If the water right is anticipated to receive a notice of water unavailability in the given month, either from the Headwaters Analysis (Water Unavailable in Subwatershed?) or Watershed Analysis (Water Unavailable in Watershed?). These cells have conditional formatting to highlight red if water is unavailable for a given right and month.	Staff- determined
Demand Deficit, Jan- Sep	Amount of each right's total Demand which will be unmet, either by unavailable headwater subwatershed supply or by overall watershed supply, within a given month. Calculated as follows: - If Subwatershed is disconnected, equal to Demand Unmet in Subwatershed from the Headwater Analysis tab. - If Subwatershed is not disconnected, equal to Demand Unmet in Watershed.	Calculated

Analysis Legal Delta

This tab contains information on water rights located in the Legal Delta. Because these rights are assumed to have access to supplies from both the Sacramento and San Joaquin Rivers to meet their demands (see 2018 Demand column in Analysis Watersheds tab), this tab quantifies total demands and demands met from each watershed to identify which rights may receive notices of water unavailability. Per State Water Board Order WR 89-8, this analysis assumes that demands by Statements of Diversion and Use claiming only Riparian water rights can only be met by supply from

the watershed in which they are located; therefore, they are excluded from all demand proration between watersheds and are not listed in this tab.

Water rights in the Legal Delta will only receive a notice if water is anticipated to be unavailable from both watersheds. This tab does not contain any new analysis, it only compiles values from the Analysis Watersheds tab for rights located in the Legal Delta (Legal Delta? = TRUE in the Demand Separated tab). Duplicate rights were merged in this tab, so each row represents a single water right's total demand.

NOTE: To save computation time, this tab contains largely static values. The first row of the table, highlighted in blue, contain sample formulas described in detail in the table below.

Field Name(s)	Definition & Methodology	Data Source(s)
Application ID	Application ID of each water right, sourced from the Demand Separated tab.	eWRIMS database
Primary Owner	Name of the primary owner of the water right or water right claim, sourced from the Demand tab.	eWRIMS database
Priority Date	The priority date of a water right or claim, sourced from the Demand tab (YYYY/MM/DD). Riparian/Pre-1914 and Other Statements are denoted as 'Riparian' priority and assumed to be senior to all other demands, while Project rights listed in Board Decision 1641 are denoted as 'Project' priority and are assumed to be junior to all other demands.	eWRIMS database w/ staff adjustments
2018 Sacramento Demand, Jan- Sep	Monthly demands by each water right from the Sacramento River watershed, sourced from the 2018 Demand column of the Analysis Watersheds tab.	eWRIMS database w/ staff adiustments
2018 San Joaquin Demand, Jan- Sep	Monthly demands by each water right from the San Joaquin River watershed, sourced from the 2018 Demand column of the Analysis Watersheds tab.	eWRIMS database w/ staff adjustments

Water Unavailability Methodology for the Delta Watershed Technical Appendix A July 23, 2021

Field Name(s)	Definition & Methodology	Data Source(s)
Water Unavailable from Sacramento? Jan-Sep	If the water right is anticipated to face water unavailability from the Sacramento River watershed in a given month, sourced from the Water Unavailable? column of the Analysis Watersheds tab. These cells have conditional formatting to highlight red if water is unavailable for a given right and month.	Staff- determined
Water Unavailable from San Joaquin? Jan- Sep	If the water right is anticipated to face water unavailability from the San Joaquin River watershed in a given month, sourced from the Water Unavailable? column of the Analysis Watersheds tab. These cells have conditional formatting to highlight red if water is unavailable for a given right and month.	Staff- determined
Sacramento Demand Met, Jan-Sep	Amount of each right's Demand in the Sacramento River watershed which can be met by available supplies, sourced from the Analysis Watersheds tab.	Staff- determined
San Joaquin Demand Met, Jan-Sep	Amount of each right's Demand in the San Joaquin River watershed which can be met by available supplies, sourced from the Analysis Watersheds tab.	Staff- determined
Water Unavailable? Jan-Sep	If the water right is anticipated to face water unavailability from both the Sacramento and San Joaquin River watersheds in a given month, meaning it would receive a notice of water unavailability. These cells have conditional formatting to highlight red if water is unavailable for a given right and month.	Staff- determined

Technical Appendix B: Delta Watershed Demand Dataset

This appendix documents the process used to prepare the Sacramento-San Joaquin Delta (Delta) watershed demand dataset for the Water Unavailability Methodology for the Delta Watershed (methodology). Specifically, this appendix summarizes: (1) the process used to select water right records in the Delta watershed, (2) the quality control process used to review diversion data submitted by water right holders and claimants and address diversion data reporting inaccuracies, and (3) demand dataset updates and formatting. In the future, the State Water Board may also rely upon updated reporting of projected demands for larger users that is provided pursuant to emergency regulations.

Initial Selection of Water Right Records in the Delta Watershed

This section describes the process and computer code logic used to select water right records in the Delta watershed for inclusion in the demand dataset. These water right records were selected from the full list of all of California's water right records using information contained within the State Water Resources Control Board's (State Water Board) Electronic Water Rights Information Management System (eWRIMS) database. The eWRIMS database contains information on water right permits and licenses issued by the State Water Board and other claimed water rights, including reported diversion and use data submitted by water right holders and claimants through the Report Management System (RMS). The eWRIMS database system can be accessed at: https://www.waterboards.ca.gov/waterrights/water_issues/programs/ewrims/

Selection of All Water Right Records in California

Using information from the eWRIMS database, a dataset of all water right records in California was created. The dataset of all water right records included other associated information, such as the water right type, status, and reported diversions for calendar years 2018 and 2019.

To compile this dataset, the full record of California's water rights and claims and annually reported water diversion information was obtained from the eWRIMS database. The eWRIMS database is continuously updated by modifications to water right records, such as the addition of new water right records or changes in water right status. Water diversion and use information contained within the eWRIMS database is also updated when annual reports of water diversion and use (annual reports) are submitted or modified by diverters. The initial selection of water right records in the Delta watershed and quality control review described below required a static copy of the eWRIMS datasets, which were downloaded on January 15, 2021.

Several plain text comma-separated values (.csv) files, known as eWRIMS flat files, contain the data fields used to create the dataset. Data was compiled from the eWRIMS flat files by the water right Application ID Number. The eWRIMS flat files that contain the data fields used to create the dataset are titled:

- Water Rights Master Flat File: This file contains general information associated with each water right record on file with the State Water Board. Several fields within this flat file were selected, such as: primary owner name, water source name, water right face value, water right status (e.g., active, etc.), and water right type (e.g., Appropriative, Statement of Diversion and Use, etc.).
- Water Rights Annual Water Use Report: This file contains the monthly water diversion and use data submitted by water right holders and claimants in annual reports. Reported total diversions, which included the amounts directly diverted and the amounts diverted or collected to storage, were selected for each month during calendar years 2018 and 2019. For Statements of Diversion and Use, this file contains information about the water right type (e.g., pre-1914, riparian, etc.) submitted by water right claimants as well as information about the year diversion first commenced, as discussed under *Disaggregation of Statements of Diversion and Use*.
- Water Rights Uses and Seasons: This file contains additional information regarding authorized diversion and storage seasons and beneficial uses¹ for each water right record. Beneficial use information was selected and compiled for each water right record. Some water right records have multiple beneficial uses, and each of the beneficial uses for each of the water right records was aggregated by Application ID Number.
- Water Rights Point of Diversion Flat File: This file contains general information associated with each water right record on file with the State Water Board, including several fields that are also available in the Water Rights Master Flat File. This file contains additional fields that were incorporated into the demand dataset, including: point of diversion location (latitude/longitude), application received date, and application acceptance date. The application acceptance date and application

¹ The beneficial uses of water pertaining to water rights are defined in the California Code of Regulations (CCR) §§ 659-672 to include: domestic, irrigation, power, municipal, mining, industrial, fish and wildlife preservation and enhancement, aquaculture, recreational, stockwatering, water quality, frost protection, and heat control.

received date fields were used to identify a water right priority date for the post-1914 appropriative water right records, as discussed under *Update and Format Demand Dataset*.

Information from the eWRIMS flat files was used to create one dataset of water rights and claims for all of California on record with the State Water Board.

Selection of Active Water Right Records in California

The dataset of all water right records was limited to those with an active-type water right status, which includes the following water right statuses:

- Claimed
- Licensed
- Permitted
- Registered
- Certified

By only including active-type statuses, water rights with inactive-type statuses, such as inactive, rejected, and cancelled, were excluded from the demand dataset.

Selection of Active Water Right Records in the Delta Watershed

The dataset of active water right records in California was then limited to diversions located in the Delta watershed. Using geographic information system (GIS) software, water right records located in the Delta watershed were selected based on the spatial location of each water right Point of Diversion (POD).

The Division of Water Rights has created an eWRIMS Web Mapping Application that provides the spatial location of all of the water right PODs in California. A public version of the eWRIMS GIS System is available at:

https://waterrightsmaps.waterboards.ca.gov/viewer/index.html?viewer=eWRIMS.eWRIM S_gvh#

The Delta watershed boundaries used for the spatial selection include the following Hydrologic Unit Code level 4 (HUC4) watersheds, as defined by the U.S. Geological Survey (USGS) Watershed Boundary Dataset (WBD):

HUC4 Subregion Number	HUC4 Subregion Name
1802	Sacramento
1804	San Joaquin

The GIS attributes of water right PODs within the Delta watershed were then exported as a plain text .csv file.

Selection of Consumptive Water Right Records in the Delta Watershed

The Delta watershed demand dataset was then further subdivided to include only water right records with consumptive beneficial uses. Water right records that contain only non-consumptive beneficial uses were excluded from the Delta watershed demand dataset. These beneficial use types and combinations include:

- Power
- Power and Recreational
- Power and Industrial
- Power and Domestic
- Power and Fish and Wildlife Preservation and Enhancement
- Fish and Wildlife Preservation and Enhancement

The above beneficial use types and combinations were assumed to be associated primarily with non-consumptive uses of water, including hydropower generation and instream flows. Water right records with the Power and Industrial and Power and Domestic beneficial use combinations were assumed to be primarily associated with hydropower generation, with a negligible amount of incidental industrial or domestic uses of water as a conservative assumption for purposes of avoiding overestimation of demands. Accounting for instream flows is described in the main report.

A small number of water right records did not contain beneficial use information in the eWRIMS flat files. These water right records were initially included in the demand dataset. However, many of these were eventually found to be non-consumptive during the review process described below.

Selection of Appropriative Water Rights and Statements of Diversion and Use in the Delta Watershed

The Delta watershed demand dataset was again subdivided to include only the following water right types:

- Appropriative
- Statement of Diversion and Use

Appropriative water rights include post-1914 appropriative water rights (e.g., water right permits and licenses). Statements of Diversion and Use include pre-1914 appropriative and riparian claims.

By limiting the demand dataset to Appropriative water rights and Statements of Diversion and Use, minor water right types such as Stockponds and Registrations were excluded from the dataset. Similarly, other types of water right records such as Temporary Permits were also excluded. These other water right types were assumed to constitute a negligible amount of the water diversion and use within the Delta watershed. Excluding these uses represents a conservative assumption for the purposes of avoiding overestimation of demands.

Quality Control Review

Diversion data contained within annual reports is self-reported and is not systematically verified for accuracy upon submittal to the State Water Board. As a result, an internal review and quality control effort was conducted. The quality control review process was focused on the review of the total diversion amounts for 2018 and 2019 reported by water right holders or their agents in annual reports. The total diversion amount includes the amount directly diverted and the amount diverted or collected to storage.

The water right records in the Delta watershed demand dataset after initial selection were too numerous to feasibly review in their entirety at this time. Therefore, the scope of the review was narrowed to a subset of water right records, with a focus on the largest diversions in the Delta watershed.

Selection of Largest Diversions in Delta Watershed for Quality Control Review

The approximately 12,000 total water right records in the demand dataset after initial selection were subdivided to approximately 580 water right records that include the largest diversions in the Delta watershed. Criteria used to identify this selection of water right records includes:

- Statements of Diversion and Use with total reported diversion of 5,000 acre-feet (AF) or greater for either 2018 or 2019
- Appropriative water rights with a face value of 5,000 AF or greater, or a total reported diversion of 5,000 AF or greater for either 2018 or 2019

These water right records were the focus of the quality control review process described below, and together represent over 90% of demands in the Delta watershed.

Quality Control Review

The quality control process focused on review of diversion data obtained from annual reports submitted by water right holders and their agents for calendar years 2018 and 2019. For each of the approximately 580 water right records included in the quality control review, the 2018 and 2019 annual reports were accessed through the eWRIMS

database system. The contents of the annual reports were reviewed, including but not limited to the following information:

- Purpose of Use
- Amount of Water Diverted and Used, including monthly amounts directly diverted, monthly amounts diverted or collected to storage, and monthly amounts used
- Maximum Rate of Diversion, including maximum monthly diversion rates
- Comments and Additional Remarks

The specific issues that were investigated during the quality control review, and corrected when possible, included:

- Non-consumptive diversions improperly appearing as consumptive
- Duplicate diversion values, such as the same diversions reported under multiple water right records
- Diversion data entry and reporting errors, such as incorrect units of measurement and decimal placement errors
- Reported diversions in excess of the water right's face value (applies to post-1914 appropriative water rights only)

In general, the issues that were investigated relate to the correction of over-reporting of diversion amounts. An overview of the commonly identified issues and corrections that were applied to the demand dataset is provided below.

In some cases, it was not possible to resolve outstanding issues without further information. State Water Board staff has contacted numerous water right holders or their agents to gather this information. However, it was not feasible to contact all water right holders or agents in all cases where a potential reporting related error was identified or a correction applied to a diversion value. Efforts were prioritized to contact water right holders or agents based on several factors, including reported diversion size and relative level of uncertainty regarding potential reporting-related inaccuracies. Some water right holders and agents did not provide timely responses to inquiries regarding potential reporting related errors. In the absence of additional information provided by the water right holder or agent, estimates of the actual diversion amounts were used based on information contained within the annual report and supplemental information available within the eWRIMS database.

Non-Consumptive Diversions and Uses

Annual reports reviewed for some water right records appeared to indicate that water was diverted only for non-consumptive use. Water right records were generally identified as non-consumptive based on the reported purposes of use contained within the 2018 and 2019 annual reports. Some non-consumptive purposes of use identified during the quality control review include instream flow uses (e.g., "maintain a live

stream"), power generation, or non-consumptive aquaculture uses. These records were removed from the demand dataset.

In some cases, annual reports included both consumptive and non-consumptive purposes of use, such as both power generation and irrigation. It was generally assumed that all water diverted under these records was used consumptively. However, for some water right records, comments or additional remarks included in the annual report appeared to indicate that only a portion of the water diverted was used consumptively, but information was not provided within the annual report to quantify the volume of water diverted for consumptive uses. If it was not possible to quantify the volume of water diverted for consumptive uses, the water right record was identified for outreach to the water right holder to resolve the issue.

Duplication of Reported Diversion Amounts

Some 2018 and 2019 annual reports contain comments, additional remarks, or other information that clearly indicated that a particular diversion was fully reported under two or more separate rights (i.e., duplicated). In these cases, reported diversions were retained for only one record and were changed to zero for the other record(s) in the demand dataset.

Some water right holders have multiple water rights or claims. In some cases, identical monthly diversion amounts were reported under multiple records associated with a particular water right holder, but the annual reports did not clearly indicate if the same diversion volumes were reported under multiple water right records. If it was not possible to determine if the water right holder had reported duplicative diversion volumes under multiple records, the water right records were identified for outreach to the water right holder to resolve the issue.

Some 2018 and 2019 annual reports contain information that appeared to identify some duplicate reporting of the same diversion volumes under multiple water right records, including water right records held by different water right holders. If it was not possible to quantify the volume of water reported under multiple water right records, the water right records were identified for outreach to the water right holders to resolve the issue.

Diversion Data Entry and Reporting Issues

Numerous diversion data entry and reporting issues were identified during the quality control review, including data entry, unit reporting, and other related issues. Commonly encountered diversion data entry and reporting issues are summarized below.

Diversion data entry issues encountered during the quality control review include misplaced decimal points, apparent reporting of monthly diversion volumes in the wrong data field within the annual report, and other similar issues. When the data entry issue was identifiable, the diversion data was corrected accordingly. Unit reporting issues encountered during the quality control review include apparent reporting of monthly diversion amounts using incorrect units of measurement, such as reporting of diversion volumes in units of acre-feet instead of gallons. These unit reporting errors generally resulted in unreasonably large diversion amounts, particularly when compared with the reported purpose of use. Other information contained within the annual report, such as the reported purpose of use, crop acreage, maximum rate of diversion, amount beneficially used, and comments and additional remarks, was generally used to identify and correct the reported diversion amounts. In some cases, a comparison of 2018 and 2019 reported diversions with reported diversions in prior annual reports provided information that informed a correction to the diversion amount.

In some cases, a diversion data entry or unit reporting error was detected, but it was unclear how the reported diversion amounts should be corrected. If it was not possible to correct the diversion amount without supplemental information provided by the water right holder, the water right record was identified for outreach to the water right holder to resolve the issue.

Some additional data reporting errors were also identified during the quality control review, such as annual reports that contain reported monthly diversion volumes in excess of the reported maximum monthly rate of diversion. In some cases, it was determined that the water right holder or their agent likely reported the maximum monthly rate of diversion using incorrect units, such as gallons per day (GPD) instead of gallons per minute (GPM). In many cases, this specific issue did not require a correction to the reported monthly diversion amounts. However, some other miscellaneous reporting-related issues were identified during the quality control review that required additional information to resolve. These water right records were generally identified and prioritized for outreach to the water right holder.

Reported Diversions in Excess of Water Right Face Value

Annual reports submitted for some post-1914 appropriative water rights included reported diversions in excess of the water right face value. In most instances, the reported diversion amount was changed to the face value amount or other updated value based on information contained within the annual report or supplemental information available in other documentation accessed through the eWRIMS database, such as the water right permit or license.

In addition to the records review described above, approximately 100 post-1914 appropriative rights were identified that reported diversions less than 5,000 AF but in excess of the face value of the water right. Most of these diversions are very small. Due to time constraints, no investigation of the approximately 100 post-1914 appropriative water right records with 2018 or 2019 reported diversions in excess of the water right face value was conducted. In these cases, the reported diversion amounts within the demand dataset were updated to equal the face value of the water right.

Update and Format Demand Dataset

Following completion of the quality control review process described above, several additional steps were completed to update, format, and export the demand dataset for use in the Water Unavailability Methodology Excel workbook (spreadsheet). The contents of the spreadsheet are described in Appendix A.

Select water right records (Application ID Numbers) were removed from the initial demand dataset as a result of the quality control review discussed above, including water right records that appeared to divert water only for non-consumptive use. As discussed in the main report, several consumptive water right records were also removed from the dataset, including consumptive water rights associated with the Central Valley Project (CVP) Trinity River Division (A005628, A015374, A015375, A016767, and A017374). A small number (less than 10) of additional water right records were determined to be located outside of the Delta watershed based on their Hydrologic Unit Code level 8 (HUC8) watershed and were also removed from the demand dataset. These records all contain PODs located near the boundary of the Delta watershed that were improperly included in the spatial selection of water right records in the Delta watershed.

The quality control process described above focused on the review of the annual total diversion amounts for calendar years 2018 and 2019. If an annual diversion amount was adjusted as a result of a correction applied during the quality control process, the monthly diversion values were adjusted in a proportional manner.

Some water right holders did not submit annual reports in 2018 or 2019. When an annual report is not submitted, there is no diversion data value recorded in the eWRIMS flat files. In instances where a water right holder did not submit an annual report, the diversion amount was recorded as zero in the demand dataset. This provides a conservative assumption for the purposes of avoiding the overestimation of demands.

Upon completion of the quality control review process, diversion values were merged with a March 16, 2021 copy of the eWRIMS datasets to produce a demand dataset that reflects updates to eWRIMS database information that occurred between January 15 and March 16, 2021. For example, a small number of diverters submitted new or revised 2018 or 2019 annual reports between January 15 and March 16, 2021. These new or revised diversion values were incorporated into the demand dataset. In addition, seven water right records were removed from the demand dataset due to changes in water right status from an active-type status to an inactive-type status between January 15 and March 16, 2021.

Appendix A contains more information about the field names and content included in the demand dataset used in the spreadsheet. Many of the demand dataset fields were obtained directly from the eWRIMS flat files. Several other fields, including the Watershed and Legal Delta (True/False) fields, were determined based on a GIS

analysis. One field, Priority Date, was determined for post-1914 appropriative rights and select Statements of Diversion and Use using multiple data fields contained within the eWRIMS flat files. The Priority Date for post-1914 appropriative water right types was based on the 'Application Acceptance Date' and 'Application Received Date' fields in the eWRIMS database and was determined to be the earlier date among the two fields. The Priority Date for Statements of Diversion and Use was based on the year diversion first commenced or was assigned a Priority date of "Riparian," depending on the Statement of Diversion and Use assigned category. These Statement of Diversion and Use assigned categories and priority dates are described in greater detail in the next section.

The demand data diversion values are structured in a wide format, such that each water right record (Application ID Number) exists on a single row with total annual and monthly diversion amounts for both 2018 and 2019. Some water right records divert from multiple subwatersheds or divert within the Legal Delta, with access to water from both the Sacramento and the San Joaquin River watersheds. The demands of these water right records are modified and expanded upon in the Demand Separated tab of the methodology spreadsheet. Appendix A provides additional details on these modifications.

Disaggregation of Statements of Diversion and Use

Water right holders and claimants that divert water under Statements of Diversion and Use provide information about the water right claim type to the State Water Board in Initial Statements of Water Diversion and Use and in annual reports (Supplement Statements of Diversion and Use). This user-submitted information was obtained from the Initial Statements of Diversion and Use and the 2018 and 2019 annual reports, and was used to disaggregate Statements of Diversion and Use into several categories.

Statement of Diversion and Use water right claim type information provided in the Initial Statement of Diversion and Use is stored in the 'Sub-Type' field in the Water Rights Point of Diversion Flat File. Statement of Diversion and Use water right claim type information provided in the 2018 and 2019 annual reports is stored in the 'Diverted and Used Under' field in the Water Rights Annual Water Use Report Flat File. Water right claim type information were concatenated, capitalized for uniformity, and reduced to a minimum set of unique and ordered values for each Statement of Diversion and Use.

The Statement of Diversion and Use water right claim type information was then searched for keywords and a category (Riparian, Riparian/Pre-1914, Pre-1914, Reserved, Other, or Unclassified) was assigned based on matches as summarized below. The search was conducted in sequence and stopped when the first match was found, following the sequence below with the assigned category in bold:

- 1. Riparian/Pre-1914 -- Keywords: RIPARIAN, or RIPERIAN and PRE-1914, PRE-14, PRE1914, or PRE14
- 2. Riparian Keywords: RIPARIAN, or RIPERIAN
- 3. Pre-1914 Keywords: PRE-1914, PRE-14, PRE1914, or PRE14
- 4. Reserved Keywords: RESERVE, or RESERVATION
- 5. Other Keywords: COURTADJ, COURTDECREE, COURT DECREE, HOLDING CONTRACT, COWELL AGREEMENT, or CONTRACT WITH YOLO COUNTY
- 6. Removal from demand dataset Keywords: STOCKPOND, STOCK POND, PENDING, or PENDINGAPPROPRIATE
- 7. Unclassified did not contain any of the above keywords.

Statements of Diversion and Use assigned to the Riparian category contain the keyword RIPARIAN or RIPERIAN, but do not contain the keywords PRE-1914, PRE-14, PRE1914, or PRE14. Statements of Diversion and Use assigned to the Pre-1914 category contain the keyword PRE-1914, PRE-14, PRE1914, or PRE14, but do not contain the keywords RIPARIAN or RIPERIAN. Statements of Diversion and Use assigned to the Riparian/Pre-1914 category contain keywords for both the Riparian and Pre-1914 categories.

Priority dates were assigned to each record in the Riparian/Pre-1914, Pre-1914, Reserved, and Unclassified categories based upon the earliest 'Year Diversion Commenced' value reported in the Initial Statements of Diversion and Use, the 2018 annual report, or the 2019 annual report. These values can be found in the 'Year Diversion Commenced' column of both the Water Rights Point of Diversion Flat File and the Water Rights Annual Water Use Report Flat File. Though priority dates were assigned to Statements of Diversion and Use in the Riparian/Pre-1914 category, for the purposes of evaluating water unavailability these claims are assigned a non-priority date value of "Riparian" and are assumed to have senior priority over all appropriative water rights. ² Statements in the Riparian and Other categories are similarly assigned a "Riparian" priority and assumed to all have equal senior priority.

² For claims within the Legal Delta, this categorization of colorable riparian claims is consistent with recent judicial decisions (see e.g., *Modesto Irrigation District v. Heather Robinson Tanaka*, 48 Cal.App.5th 898 (2020)) and with the legal principles described in a memorandum dated December 15, 2017 regarding Issues Related to Overlap between Pre-1914 and Riparian Water Right Claims in the Delta and available on the website of the Office of the Delta Watermaster (Overlap Memo).

Delta Watershed	Appendix C	July 23, 2021
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Appendix C: Summary of Public Comments

regarding the Water Unavailability Methodology as well as the section of the Water Unavailability Methodology summary The table below summarizes the substantive technical, factual, or legal comments that have been received to date report that is responsive to each comment.

Response	IDIDAD	-	See <u>June 15.</u> 2021 Notices	1, 2.1.3, 2.2.8, 2.3.3
Summary of Comments		Notices of Water Unavailability (Notices) should be issued earlier to manage post-1914 priorities of right. If conditions are very dry, Notices should be issued to partially curtail all riparians as well.	Notices should be very clear that they are not curtailment orders.	Methodology cannot support any curtailments. Some of the flaws from Order WR 2016-0015 still exist. Distinguish supply gages in Figure 5. Add Hydrologic Unit Code level 8 watersheds map. Do not make Delta return flows available to rights upstream. Treat Delta as its own supply and demand area with water always present. Legal Delta's return flows stay available locally. Add municipal return flows as additional supply. Do not omit mainstem reservoir releases in excess of full natural flow (FNF). Acknowledge residence time of water in the Delta (about 3 months). Use hydrodynamic models for Delta water availability instead of upstream FNF. Consider Delta water quality. Include return flows from rediversion of stored Project water. Attached 2016 Expert Report of Susan Paulsen
Commenter	Written Comments	Valley Aglands, Inc.	Association of California Water Agencies	Byron-Bethany Irrigation District

	Water Unavailability Methodology for	the Delta Watershed Appendix C July 23, 2021
Commenter	Summary of Comments	Response
California Farm Bureau Federation	Better describe actual curtailment process. How will the recent Temporary Urgency Change Petition from the Department of Water Resources' (DWR) State Water Project (SWP) and the U.S. Bureau of Reclamation's (Reclamation) Central Valley Project (CVP) (collectively Projects) affect this effort? Focus on improved functional data instead of poor reporting/measurement. Encourage voluntary agreements instead of curtailments.	3 Section
Central Delta Water Agency	Tidal flow should be available natural flow supply (about 330,000 cubic feet per second or about 19.6 million acre-feet per month). Identify any rights within tidal influence zone. Natural tidal flows are of sufficient quality for beneficial use; the Projects are required to ensure this. Historically the Delta was less salty but development (deepening ship channels) have made it saltier. Acknowledge that Delta lowland diversions help the Projects by improving Delta water quality. Curtailing Delta lowland rights would not save any water due to weed growth and shallow groundwater. Account for water transfers (e.g., groundwater substitution or land fallowing) and channel accretions/depletions. Do not curtail any water users in the Delta. Attached 1993 Delta Attas Tidal Flows figure, 2014 testimony of Christopher Neudeck, 2014 South Delta sounding elevations map, 2010 Contra Costa Water District memo on historical Western Delta Atlas elevation map, 2014 GEI memo on buttorical Western Delta Atlas elevation map, 2014 GEI memo on historical Western Delta Atlas elevation map, 2014 GEI memo on Delta Wetlands curtailment, and 1993 Delta Atlas Lowland water quality, 1956 DWR Report on Delta Lowland water quality, 1993 Delta Atlas elevation map, 2014 GEI memo on Delta	1, 2.1.2, 2.2.8, 2.3.3
Cold Springs Water Company	Inadequate justification for curtailing any water rights in San Joaquin Watershed. Support users with no alternative water sources.	See <u>June 15.</u> 2021 Notices

		July 23, 2021
Commenter	Summary of Comments	Response
California Water Research	Consider diversions by Sacramento River Settlement Contractors under Reclamation's CVP permits (Reclamation's reports are unclear on relationship). Cross-check diversions greater than face value. Document assumptions on Settlement Contractor demand met by stored water versus natural flow. Ensure Reclamation is complying with reporting requirements for CVP. Attached data table estimating diversions by contractors with post-14 rinhts.	2.2.2, 2.2.6
East Bay Municipal Utility District	Methodology not real-time or appropriate for individual curtailments (i.e., demands based on 2018 which may not represent current conditions). More technical documentation of process needed. Better describe actual curtailment process. Why is the Mokelumne River subwatershed considered a lower subwatershed? Were adjustments made to include the entire watershed in FNF gages? Better explain treatment of riparian and pre-1914 users. Better explain calculations of pasted values	2.1.3, 2.2, 2.2.4, 2.3.1, Technical Appendix A
Jennifer Spaletta (Delta and tributary water users)	Acknowledge that Delta channels below sea level always have water; the issue is quality not quantity. Use 2020 Demand data for permits and licenses and real-time data for largest diverters with telemetry (e.g., Projects). Support voluntary agreements (e.g., fallowing/forbearance). Attached 2016 Expert Report of Susan Paulsen.	1, 2.2, 2.3.3
Merced Irrigation District	Disagrees with treatment of Projects as most junior. Methodology too generous to SB88 violators. Make sure that abandoned flows are actually abandoned and not being delivered downstream. Do not enact emergency regulations and risk litigation. More information coming on proposed San Joaquin voluntary agreement.	2.2.6, 2.2.8

Water Unavailability Methodology for the Delta Watershed Appendix C

	Summary of Comments	July 23, 2021 Response
1.4		Section
	Curtai/ments based on waste and unreasonable use are not effective. Better align water availability with actual and projected water supplies (see MBK comments at workshop). Real-time system like Term 91 works well. Sacramento water rights should not be curtailed for users south of North Delta Water Agency, reconsider Legal Delta proration (see Order WR 89-8). The State Water Resources Control Board's (State Water Board or Board) January 1978 Report has good recommendations. Fully utilize complaint process. Use online alert system to lift curtailments. Support voluntary agreements (flow agreements exist on nearly all Sacramento tributaries).	2.1, 2.3.3
	Do not include Stanislaus River water as available downstream (adjudicated). Include New Melones releases as abandoned downstream of Vernalis. Reclamation's planned New Melones releases for Delta outflow are illegal. Most of Reclamation's Project diversions are San Joaquin River water. Decide if the Delta is a "poof" or not. Curtailing diversions in the Delta does not save water. Are flows to meet X-2 protected? Is tidal flow available for appropriation? Do Central and South Delta have a right to stored water? See comment letter for additional questions.	1, 2.2.6, 2.3.3
<u> </u>	Consider impacts on transfers and exchanges. Enforce SB88 requirements. Balance human water needs with environment.	2.1.2

July 23, 2021	Response Section	liments, and 1, 2.1.4, 2.1.6, 1. Evaluate 2.2, 2.2.4, used in forecasts. 2.2.6, 2.2.8, aquin River return 2.3.2, 4.1.2 ot included. 2.3.2, 4.1.2 Account for 2.3.2, 4.1.2 Account for 2.3.2, 4.1.2 he counted. Do adwater bo is and be he Board's ivity may be	ata using land use 2.1.4, 2.2, 4.1.2 voluntary	cient to curtail 1, 2.2, 2.2.6, his year. 2.2.8, 2.3.2 tse finer time ation data high. Include e abandoned in River. The
	Summary of Comments	Supply forecasts of FNF are insufficient to support curt: DWR's Bulletin 120 (B-120) has been inaccurate in 202 supply on a daily basis. Better explain how past data is Disclose all CalSim 3 results and better validate San Jo flows. Abandoned flows in headwater subwatersheds r Demand estimates based on past data are inaccurate. statement demand into riparian and pre-1914 demands. reductions in demand due to drought. Better explain he subwatershed disconnection. Contractor demands dou not include rediversions of rim dam releases. Regulatio curtailments of riparian and pre-1914 users are outside jurisdiction without adjudication. Assuming flow connect incorrect. Only enforce priority system throuch comotain	Use smaller timestep than monthly. Validate demand d information. Rely on real-time water use data. Support agreements. Critiques arguments of Delta water users.	Methodology has not improved since 2015 and is insuffi individual users. Use updated (lower) demand data for Remove riparian demands if no natural flow available. I scale than monthly. California Data Exchange Center st inaccurate. Summer San Joaquin Project demand is too San Joaquin River accretions. New Melones releases a after Vernalis. Curtailments not necessary on San Joaq State Water Board has no duty to protect the Projects.
	Commenter	San Joaquin Tributaries Authority	State Water Contractors	Jeanne Zolezzi (Banta-Carbona Irrigation District, Patterson Irrigation District, West Stanislaus Irrigation District)

Water Unavailability Methodology for the Delta Watershed Appendix C

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Apper July 23	Response	Section	2.1.4, 2.3.3		2.2.4, 3.2
	Summary of Comments		Appreciates the inclusion of abandoned water at a subwatershed scale. Appreciates the approach of erring on the side of conservative demand estimates and liberal supply estimates so curtailments are not premature. Compare B-120 and California Nevada River Forecast Center forecasts for Sacramento River watershed locations. Reconsider the apportionment of Delta demands between watershed		Consider public trust needs before making allocation decisions. Revise demand estimates to include demands for instream flow. Create a separate public trust process to ensure that there are sufficient flows for fish survival during the drought. Apply methodology to all users including pre-1914 users.
	Commenter	Verbal Comment	Mark Van Camp (MBK Engineers)	Late Comment	Environmental Law Foundation

Water Unavailability Methodology for the Delta Watershed Appendix C

EXHIBIT H

STATE WATER RESOURCES CONTROL BOARD RESOLUTION NO. 2021-0028

TO ADOPT AN EMERGENCY CURTAILMENT AND REPORTING REGULATION FOR THE SACRAMENTO-SAN JOAQUIN DELTA (DELTA) WATERSHED

WHEREAS:

- California and the entire western United States are facing a significant drought in the wake of one of the driest periods on record, driven by climate change and unprecedented hydrologic conditions. Water supply in many parts of California, including the Delta watershed, is insufficient to meet demands and requires urgent action to ensure the protection of health, safety, and the environment;
- 2. On April 21, 2021, Governor Gavin Newsom issued a Proclamation of a State of Emergency for Mendocino and Sonoma counties, in response to drought conditions in the Russian River watershed. On May 10, 2021, Governor Newsom issued an expanded Proclamation of a State of Emergency for 41 counties, including those within the Sacramento-San Joaquin Delta (Delta) watershed (May 2021 Proclamation), in response to drought conditions. The May 2021 Proclamation finds that it is necessary to act expeditiously to mitigate the effects of drought conditions in the Delta watershed, both to ensure the protection of health, safety, and the environment and to prepare for potential sustained drought conditions. On July 8, 2021, the Governor expanded the emergency declaration to 9 additional counties and called upon Californians to voluntarily reduce their water use by 15 percent;
- 3. The May 2021 Proclamation directs the State Water Resources Control Board (State Water Board or Board) to consider adopting an emergency regulation to curtail water diversions when water is not available at water right holders' priority of right or to protect releases of stored water in the Delta watershed. For purposes of approving an emergency regulation pursuant to this directive, the May 2021 Proclamation also suspends the California Environmental Quality Act (CEQA) in Public Resources Code, Division 13 (commencing with section 21000) and regulations adopted pursuant to that Division;
- 4. The Delta watershed has experienced two consecutive extremely dry years. Together, Water Years¹ 2020 and 2021 are expected to be the second driest two-year period on record, behind only 1976-77. As of July 20, 2021, cumulative precipitation for Water Year 2021 was approximately 47 percent of average across the Delta watershed, with precipitation in the Sacramento River watershed being 23.2 inches and precipitation in the San Joaquin River

¹ A water year is a 12-month period from October 1 to September 30 of the following year. For example, Water Year 2020 was from October 1, 2019 through September 30, 2020.

watershed being 18.3 inches. Earlier this year, the state also experienced unprecedented loss of snowmelt runoff, which was absorbed by dry soils or evaporated amid unusually warm temperatures before reaching streams and reservoirs. These conditions have resulted in reservoir storage levels that are significantly below average: as of July 20, 2021, storage levels in major reservoirs, specifically Shasta, Oroville, and Folsom reservoirs, are around 30 percent of capacity and below 50 percent of historical average storage conditions for that date;

- 5. There is an urgent need to address severe water shortages in the Delta watershed to protect water supplies necessary to meet human health and safety needs, preserve stored water needed to prevent salinity from the ocean from intruding into the Legal Delta and making water unusable for municipal, industrial, and agricultural purposes, and to minimize impacts to fish and wildlife. The Delta watershed is the state's largest surface water source, supplying two-thirds of Californians with at least some portion of their drinking water. It is also home to numerous fish, wildlife, and plant species listed as threatened, endangered, or special status under the state and federal Endangered Species Acts, as well as species that hold significant cultural importance to California tribes and are vital to the commercial and recreational fishing economy. Water quality within the Legal Delta relies on an intricate balance between freshwater flows and tidal actions. Leaving freshwater storage unprotected could result in severe salinity intrusion in the Legal Delta, rendering this critical water source unusable for humans and ecosystems alike;
- 6. Further, there is a need to ensure continued minimum human health and safety needs are met, notwithstanding the shortage conditions. The California Water Code declares water supplies for consumption, sanitation, and cooking as a human right (Wat. Code, § 106.3); identifies domestic use as the highest water use (Wat. Code, § 106); and provides water suppliers with authority to declare a water shortage emergency to allow sufficient water for human consumption, sanitation, and fire protection (Wat. Code, § 350). Additional efforts are needed in the Delta watershed this year to ensure that water right holders and claimants without other means to access basic health and safety supplies are able to continue to access water for these uses under critical drought conditions;
- 7. Water agencies across California have taken actions in response to the dry conditions, including reducing or eliminating contract water deliveries and implementing mandatory and voluntary conservation efforts. The Central Valley Project (CVP) and the State Water Project (SWP), the state's two major water supply projects operating reservoirs throughout the Delta watershed, have announced severe reductions in contract deliveries. In 2021, the U.S. Bureau of Reclamation (Reclamation), which operates the CVP, has made no allocation to agricultural service contractors and a 25 percent allocation, or the amount needed for minimum health and safety, to municipal and industrial contractors. The Department of Water Resources (DWR), which operates the SWP, has made a five percent allocation for both municipal and agricultural contractors. In addition to water supply reductions and conservation efforts, water users have

requested and received approvals for temporary changes to regulatory requirements to extend limited supplies. Many water users have also pursued water transfers and purchases from willing sellers to make up for reduced supplies;

- 8. On March 22, 2021, the State Water Board sent <u>letters regarding ongoing dry conditions in most California watersheds</u> to all water right holders and claimants in the state regarding ongoing dry conditions in most California watersheds. These letters encouraged water right holders and claimants to plan and prepare for potential water shortages later this year. The letters also notified water right holders and claimants that accurate and timely reporting of water use data will help to provide critical information needed to manage the state's water resources;
- 9. On June 15, 2021, the State Water Board sent <u>Notices of Water Unavailability</u> to all 4,300 post-1914 appropriative water right holders in the Delta watershed and warned approximately 2,300 water users with more senior water right claims that continued drought later this summer could also impact their ability to divert. These notices were based on the output of the Water Unavailability Methodology for the Delta Watershed (<u>Water Unavailability Methodology</u> or Methodology), developed by compiling water rights demand data and comparing those demands against available supplies. The comparison of available and forecasted supplies against water rights demands allows for a determination of the water rights that face insufficient supplies during times of shortage;
- 10. Prior to sending the June 15 Notices of Water Unavailability, the Methodology upon which the notices were based was subject to a 14-day public review and comment period, including a <u>public workshop</u> on May 21, 2021, to explain the Methodology and receive public comments. Board staff also presented the Methodology at the June 1, 2021 Board Meeting as part of an Informational Item. The State Water Board has updated the Methodology twice, in response to public comments, in addition to updates made in response to feedback from the prior drought. On July 23, 2021, the State Water Board sent additional Notices of Water Unavailability to some senior water right claimants in the Delta watershed based on the Methodology showing insufficient supply to meet all demands;
- As appropriate, State Water Board staff may further update the July 23, 2021 Methodology to reflect best available information. Notice of any such updates will be provided through the Board's Delta Drought email distribution list and posting on the Board's drought website;
- 12. During the dire drought conditions currently being experienced in the Delta watershed, it is imperative that water right holders and claimants who do not have water available at their priority of right and do not have a need or obligation to provide water for minimum human health and safety uses cease diversions of water that is needed for more senior rights and to prevent unauthorized diversion of previously stored water needed for salinity control, human health and safety supplies, and minimal ecosystem protections;

- 13. Water Code section 1058.5 provides the State Water Board the authority to adopt emergency regulations in certain drought years or when the Governor proclaims a drought state of emergency in order to "prevent the waste, unreasonable use, unreasonable method of use, or unreasonable method of diversion, of water, to promote water recycling or water conservation, to require curtailment of diversions when water is not available under the diverter's priority of right, or in furtherance of any of the foregoing, to require reporting of diversion or use or the preparation of monitoring reports";
- 14. Article X, section 2 of the California Constitution declares that the water resources of the state must be put to beneficial use to the fullest extent possible and the unreasonable use of water be prevented. Relevant to the current drought conditions, the California Supreme Court has clarified that "[w]hat may be a reasonable beneficial use, where water is present in excess of all needs, would not be a reasonable beneficial use in an area of great scarcity and great need. What is a beneficial use at one time may, because of changed conditions, become a waste of water at a later time." (*Tulare Irr. Dist. v. Lindsay-Strathmore Irr. Dist.* (1935) 3 Cal.2d 489, 567.) The reasonable use doctrine applies to the diversion and use of both surface water and groundwater, and it applies irrespective of the type of water right held by the diverter or user. (*Peabody v. City of Vallejo* (1935) 2 Cal.2d 351, 367.) This regulation is in furtherance of article X, section 2 during this drought emergency;
- 15. Adoption of an emergency regulation is necessary to address the immediate and dire water shortages in the Delta watershed. An emergency regulation will enable the State Water Board to act in a timely manner to enforce the water right priority system with respect to all water right holders and claimants and to protect critical water storage needed for minimum health and safety, salinity control in the Legal Delta, and some ecosystem protection;
- 16. The State Water Board is adopting the emergency regulation due to severe emergency drought conditions and the need for prompt action;
- 17. The regulation will rely upon the current Methodology, including any updates to that Methodology, for curtailment decisions, as well as more real-time publicly available and reliable information to support sub-monthly and sub-watershed suspension and re-imposition of curtailments due to precipitation and runoff events as appropriate. State Water Board staff will identify the specific sources used to support sub-monthly and sub-watershed curtailment decisions as part of its email and website updates on curtailments;
- 18. The regulation supports cooperative agreements among water right holders and claimants in the Delta watershed to share or forebear the use of available water and avoid curtailment. Such agreements must not result in injury to other water right holders and claimants or cause unreasonable harm to fish and wildlife. Such agreements are expected to achieve the overall objectives that would otherwise be served by curtailment;

- 19. Emergency regulations adopted under Water Code section 1058.5 may remain in effect for up to one year; and
- 20. Pursuant to Water Code section 7, the State Water Board is authorized to delegate authority to staff.

THEREFORE BE IT RESOLVED THAT:

- 1. The State Water Board adopts California Code of Regulations, Title 23, Division 3, Chapter 2, Article 24, Sections 876, 876.1, and 878.2, and amendments to Sections 877.1, 878, 878.1, 879, 879.1 and 879.2, as appended to this resolution as an emergency regulation;
- 2. State Water Board staff will submit the regulation to the Office of Administrative Law (OAL) for final approval;
- If, during the approval process, State Water Board staff, the State Water Board, or OAL determines that minor corrections to the language of the regulation or supporting documentation are needed for clarity or consistency, the State Water Board Executive Director, the Deputy Director for the Division of Water Rights, or their designee, may make such changes;
- 4. This regulation shall remain in effect for one year after filing with the Secretary of State unless: (i) the State Water Board determines that it is no longer necessary due to changed conditions, (ii) the conditions specified in Water Code section 1058.5 subdivision (a)(2) are no longer in effect, in which case this regulation is deemed repealed, or (iii) the State Water Board renews the regulation due to continued drought conditions as described in Water Code section 1058.5;
- The State Water Board directs staff to process as expeditiously as possible any proposals for cooperative agreements which may be offered as alternatives to curtailments;
- 6. The State Water Board directs staff to publicly notice through the Board's email distribution list and posting on the drought website any changes to the Water Unavailability Methodology at least 24 hours prior to implementation. If those changes are substantial, State Water Board staff shall hold a workshop as soon as practical, which may be subsequent to implementation. Staff shall provide updates on the changes to the Water Unavailability Methodology at least 24 hours prior to implementation.
- The State Water Board directs staff to closely monitor evolving hydrology and weather conditions and suspend curtailments, as circumstances warrant, as quickly as possible. In suspending curtailments staff shall consider opportunities and needs to replenish stored water supplies;

- 8. The State Water Board directs staff to engage with stakeholders by December 31, 2021, or as soon as practical to identify and explore other possible approaches 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 Legal Delta. Examples include, but are not limited to, a curtailment methodology similar to standard water right Term 91 that is currently included in more junior water right licenses and permits; and
- 9. Except for purposes of enforcement of a curtailment order issued pursuant to this regulation, this regulation and any curtailment order issued hereunder shall not be cited as authority for, or evidence of, the validity or priority of any water right or claim affected or protected by this regulation. Given this, it would be inappropriate to consider compliance with the regulation to be an admission or waiver of any rights or claims of affected parties.

CERTIFICATION

The undersigned Clerk to the Board does hereby certify that the foregoing is a full, true, and correct copy of a resolution duly and regularly adopted at a meeting of the State Water Resources Control Board held on August 3, 2021.

- AYE: Chair E. Joaquin Esquivel Vice Chair Dorene D'Adamo Board Member Sean Maguire Board Member Laurel Firestone Board Member Nichole Morgan
- NAY: None ABSENT: None
- ABSTAIN: None

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Jeanine Townsend Clerk to the Board

Enhanced Water Use Reporting and Curtailment of Diversions due to Lack of Water Availability in the Sacramento – San Joaquin Delta Watershed

In Title 23, Division 3, Chapter 2, Article 24, amend the title of Article 24, add Sections 876, 876.1, and 878.2, and amend Sections 877.1, 878, 878.1, 879, 879.1 and 879.2 to read:

Article 24. Curtailment of Diversions <u>due</u> to Protect Water Supplies and Threatened and Endangered Fish in the Russian River Watershed <u>Drought Emergency</u>

§ 876 [Reserved]

§ 876.1 Emergency Curtailments Due to Lack of Water Availability in the Sacramento-San Joaquin Delta Watershed

- (a) This section applies to direct diversions and diversions to storage, of natural and abandoned flows, in the Delta Watershed as defined in section 877.1. This section also applies to the rediversion of water released from storage in the Delta Watershed, except to the extent authorized by a water right or contract.
- (b) After the effective date of this regulation, when flows are determined to be insufficient to support all diversions, the Deputy Director as defined in section 877.1 may issue curtailment orders as defined in section 877.1 to water right holders and claimants in the Delta Watershed in order of water right priority, requiring the curtailment of water diversion under designated water rights and claims, except as provided in sections 878, 878.1, and 878.2. Before issuing curtailment orders to water right holders and claimants in the Legal Delta, the Deputy Director will consult with and obtain the concurrence of the Delta Watermaster.
- (c) Initial orders requiring curtailment or reporting will be mailed to each water right holder, claimant, or the agent of record on file with the State Water Board, Division of Water Rights within the Delta watershed. The initial orders will require reporting in accordance with section 879, subdivision (d)(1) and will either require curtailment or will instruct water right holders or claimants regarding procedures for potential future curtailments. The water right holder, claimant, or agent of record is responsible for immediately providing notice of the orders to

all diverters exercising the water right or claim covered by the orders. Communications regarding changes in water availability, including notification of when curtailments of water diversions are required and when curtailments are temporarily suspended or reimposed, will be provided by email to the State Water Board's Delta Drought email distribution list and by posting on the State Water Board's drought webpage. Notice provided by email and by posting on the State Water Board's drought webpage shall be sufficient for all purposes related to required curtailments and reporting pursuant to this section and section 879.

- (d) In determining whether water is unavailable under a water right holder or claimant's priority of right and whether to order curtailment of water diversions under specific water rights, the Deputy Director will consider:
 - (1) Relevant available information regarding date of priority, including but not limited to claims of first use in statements of water diversion and use, judicial and State Water Board decisions and orders, and other information contained in the Division of Water Rights' files. Absent evidence to the contrary, riparian water rights are presumed senior to appropriative water rights for the purposes of curtailments pursuant to this section.
 - (2) Monthly water right demand projections based on reports of water use for permits and licenses, or statements of water diversion and use, from calendar years 2018, 2019, or 2020.
 - (3) Monthly water right demand projections based on information submitted in response to an informational order issued under section 879, subdivision (d).
 - (4) Water supply projections based on the following sources of forecasted supply data:
 - (A) Monthly full natural flow forecasts contained in the Department of Water Resources' California Cooperative Snow Surveys Bulletin 120 Water Supply Forecast, where available;
 - (B) Daily full natural flow forecasts from the California Nevada River Forecast Center, where data is not available in the Bulletin 120 Water Supply Forecasts; and

- (C) Other available and reliable data on projected or actual precipitation and runoff events that may inform water availability at a monthly or sub-monthly scale.
- (5) Relevant available information regarding stream system disconnection where curtailing diversions would not make water available to serve senior downstream water rights or claims, including seasonal or temporary disconnections.
- (6) The Deputy Director may also consider any other pertinent, reliable, and publicly available information when determining water right priorities, water availability, water supply projections, and demand projections.
- (7) Evaluation of available water supplies against demands may be performed using the Water Unavailability Methodology for the Delta Watershed, or comparable tools. The Water Unavailability Methodology for the Delta Watershed is described in the Water Unavailability Methodology for the Delta Watershed report dated July 23, 2021, which is hereby incorporated by reference. Evaluation of available supplies against demands may be performed at the Hydrologic Unit Code level 4 Sacramento and Hydrologic Unit Code level 4 San Joaquin River watershed scale, or at the subwatershed scale. Subwatersheds within the Delta Watershed are defined in the July 23, 2021 Water Unavailability Methodology for the Delta Watershed summary report and were established based on Hydrologic Unit Code level 8 watersheds.
- (e) Upon receipt of an initial order pursuant to this section, a water right holder or claimant may submit information to the Deputy Director to: support a proposed correction to the water right priority date of the right for which the order was issued; or propose that curtailment may not be appropriate for a particular diverter or in a specific stream system as demonstrated by verifiable circumstances, such as a system that has been adjudicated and is disconnected and curtailment would not make water available to serve senior downstream water rights or claims. Any such proposals and all supporting information and analysis shall be submitted to the Deputy Director within 14 days of receipt of the initial order. Proposals, supporting information, and analyses submitted more than 14 days after receipt of an initial order may be considered to support corrections in advance of future curtailments. The Deputy Director will review timely-provided proposals and supporting information and analyses as soon as practicable, make a determination regarding the proposal, and inform the affected water right holder or claimant of any appropriate update for purposes of

water diversion curtailment orders. Before making any determinations within the Legal Delta, the Deputy Director will consult with the Delta Watermaster.

- (f) Water right holders and claimants in the Delta Watershed must either subscribe to the Delta Drought email distribution list referenced in subdivision (c) or frequently check the State Water Board's drought webpage to receive updated information regarding water diversion curtailment and reporting orders and water unavailability.
- (g) The Deputy Director will temporarily suspend curtailments for some diverters, in order of water right priority, when water availability increases or is projected to increase due to precipitation and runoff events or due to reductions in demand, and the Deputy Director determines that such increased water availability warrants a suspension. The Deputy Director will consider the best available information, such as water supply forecasts from the California Department of Water Resources and other similarly reliable sources, to determine the geographic scope and duration of suspension. By no later than October 1, 2021, and by no more than every 30 days thereafter, the Deputy Director will consider reliable and publicly available information that supports suspension, extension of suspension, or reimposition of curtailments of water diversions, and will publicly issue an update explaining any decisions resulting from the consideration of that information.
- (h) All curtailment orders issued under this section shall be subject to reconsideration under article 2 (commencing with section 1122) of chapter 4 of part 1 of division 2 of the California Water Code.

Authority: Sections 1058, 1058.5, Water Code

Reference: Cal. Const., Art. X, § 2; Sections 100, 100.5, 104, 105, 275, 1058.5, Water Code; El Dorado Irrigation Dist. v. State Water Resources Control Board (2006) 142 Cal.App.4th 937; Light v. State Water Resources Control Board (2014) 226 Cal.App.4th 1463; Stanford Vina Ranch Irrigation Co. v. State of California (2020) 50 Cal.App.5th 976.

§ 877.1 Definitions

(a) "Curtailment Order" refers to an order from the Deputy Director of the Division of Water Rights ordering a water right holder to cease diversions.

- (b) "Deputy Director" refers to the Deputy Director of the Division of Water Rights, or duly authorized designee, at the State Water Resources Control Board.
- (c) "Flood Control District" refers to the Mendocino County Russian River Flood Control and Water Conservation Improvement District.
- (d) "Lower Russian River" refers to the surface waters, including underflow and subterranean streams, of the Russian River downstream of the confluence of Dry Creek and the Russian River.
- (e) "Lower Russian River Watershed" refers to the area in Sonoma County that drains towards Dry Creek and the area downstream of the confluence of the Russian River and Dry Creek that drains towards the outlet of the Russian River to the Pacific Ocean.
- (f) "Mainstem of the Upper Russian River" refers to the surface waters, including underflow and subterranean streams, of the Upper Russian River downstream of Lake Mendocino and upstream of the confluence of Dry Creek and the Russian River.
- (g) "Minimum human health and safety needs" refers to the amount of water necessary for prevention of adverse impacts to human health and safety, for which there is no feasible alternate supply. "Minimum human health and safety needs" include:
 - (1) Indoor domestic water uses including water for human consumption, cooking, or sanitation purposes. For the purposes of this article, water provided outdoors for human consumption, cooking, or sanitation purposes, including but not limited to facilities for unhoused persons or campgrounds, shall be regarded as indoor domestic water use. As necessary to provide for indoor domestic water use, water diverted for minimum human health and safety needs may include water hauling and bulk water deliveries, so long as the diverter maintains records of such deliveries and complies with the reporting requirements of Section 879, and so long as such provision is consistent with a valid water right.
 - (2) Water supplies necessary for energy sources that are critical to basic grid reliability, as identified by the California Independent System Operator, California Public Utilities Commission, California Energy Commission, or a similar energy grid reliability authority.

- (3) Water supplies necessary to prevent tree die-off that would contribute to fire risk to residences, and for maintenance of ponds or other water sources for fire fighting, in addition to water supplies identified by the California Department of Forestry and Fire Protection or another appropriate authority as regionally necessary for fire preparedness.
- (4) Water supplies identified by the California Air Resources Board, a local air quality management district, or other appropriate public agency with air quality expertise, as necessary to address critical air quality impacts to protect public health.
- (5) Water supplies necessary to address immediate public health or safety threats, as determined by a public agency with health or safety expertise.
- (6) Other water uses necessary for human health and safety which a state, local, tribal or federal health, environmental, or safety agency has determined are critical to public health and safety or to the basic infrastructure of the state. Diverters wishing to continue diversions for these uses must identify the health and safety need, include approval or similar relevant documentation from the appropriate public agency, describe why the amount requested is critical for the need and cannot be met through alternate supplies, state how long the diversion is expected to continue, certify that the supply will be used only for the stated need, and describe steps taken and planned to obtain alternative supplies.
- (h) "State Water Board" refers to the State Water Resources Control Board.
- (i) "Upper Russian River" refers to the surface waters, including underflow and subterranean streams, of the Russian River upstream of the confluence of the Russian River and Dry Creek and includes both the East and West Forks of the Russian River.
- (j) "Upper Russian River Watershed" refers to the area located in Mendocino and Sonoma Counties that drains towards the confluence of Dry Creek and the Russian River.
- (k) <u>"Delta Watershed" or "Sacramento-San Joaquin Delta Watershed" refers to the</u> <u>Hydrologic Unit Code level 4 Sacramento and the Hydrologic Unit Code level 4</u> <u>San Joaquin subregions, as defined using the U.S. Geological Survey Hydrologic</u> <u>Units Dataset.</u>

- (I) <u>"Legal Delta" has the same meaning as the Sacramento-San Joaquin Delta, as</u> defined in Water Code section 12220.
- (m) <u>"Informational Order" refers to an order issued by the Deputy Director which</u> orders reporting of water diversion and use information in the Delta Watershed to inform water unavailability determinations and to support the curtailment process described in section 876.1.
- (n) <u>"Delta Watermaster" has the same meaning as in Water Code section 85230.</u>

Authority: Sections 1058, 1058.5, Water Code

Reference: Cal. Const., Art., X § 2; Sections 100, 100.5, 104, 105, 106.3, 275, 1058.5, <u>12220, 85230,</u> Water Code; *Environmental Defense Fund v. East Bay Muni. Util. Dist.* (1980) 26 Cal.3d 183.

§ 878. Non-Consumptive Uses

Diversion and use described in this section under any valid basis of right may continue after issuance of a curtailment order without further approval from the Deputy Director, subject to the conditions set forth in this section. Diversions described in this section may not be required to curtail in response to a curtailment order under this article if their diversion and use of water does not decrease downstream flows. Any diverter wishing to continue diversion under this <u>section subdivision</u> must submit to the Deputy Director a certification, under penalty of perjury, which describes the non-consumptive use <u>of water</u> and explains, with supporting evidence, how the diversion and use do not decrease downstream flows in the applicable watershed. The Deputy Director may request additional information or disapprove any certification if the information provided is insufficient to support the statement or if more convincing evidence contradicts the claims. If a certification submitted pursuant to this section is disapproved, the diversions are subject to any curtailment order issued for that basis of right. This section applies to:

- (a) Direct diversions solely for hydropower if discharges are returned to the <u>source</u> <u>stream</u> Russian River or its tributaries and water is not held in storage.
- (b) Direct diversions dedicated to instream uses for the benefit of fish and wildlife pursuant to Water Code section 1707, including those that divert water to a different location for subsequent release, provided the location of release is hydraulically connected to the <u>source stream</u>Russian River.

- (c) For curtailment orders issued under sections 877.2 and 877.3, dDirect diversions where the Deputy Director, the California Department of Fish and Wildlife, and the Executive Officer of the North Coast Regional Board have approved a substitution of releases of either stored water or groundwater into the Russian River or a tributary thereof for the benefit of fish and wildlife such that there is not a net decrease in stream flow as a result of the diversion at the next downstream USGS gage. The rate of releases made pursuant to this subdivision must be measured daily using a device or measurement method approved by the Deputy Director and provided to the Deputy Director on a monthly basis. Proposals involving the release of groundwater shall provide sufficient data and information to reasonably quantify any depletions of surface water caused by the groundwater pumping, the potential time lags of those depletions, and if additional groundwater releases beyond the diversion amounts are able to offset those depletions. The release of water does not have to be conducted by the owner of the water right proposed for the continued diversions, provided an agreement between the water right holder and the entity releasing the water is included in the proposal.
- (d) Other direct diversions solely for non-consumptive uses, if those diverters file with the Deputy Director a certification under penalty of perjury demonstrating that the diversion and use are non-consumptive and do not decrease downstream flows in the watershed.
- (e) Direct diversions located within the Legal Delta used exclusively to irrigate lands entirely below sea level when comparison of diversion and drainage records provide substantial evidence that continued irrigation of those lands does not increase net channel depletions.

Authority: Sections 1058, 1058.5, Water Code

Reference: Cal. Const., Art. X, § 2; Sections 100, 187, 275, 348, <u>85003, subdivisions</u> (a) and (b), Water Code

§ 878.1 Minimum Human Health and Safety Needs

- (a) Diversions described in this section under any valid basis of right may be authorized to continue after issuance of a curtailment order, subject to the conditions set forth in this section. A diversion that would otherwise be subject to curtailment may be authorized if:
 - (1) The diversion is necessary for minimum human health and safety needs; and therefore,
- (2) The diversion is necessary to further the constitutional policy that the water resources of the state be put to beneficial use to the full extent they are capable, and that waste and unreasonable use be prevented, notwithstanding the effect of the diversions on more senior water rights or instream beneficial uses.
- (b) (1) Diversions for minimum human health and safety needs under any valid basis of right of not greater than 55 gallons per person per day may continue after issuance of a curtailment order without further approval from the Deputy Director, subject to the conditions set forth in this section. Any diverter wishing to continue diversion under this subdivision must submit to the Deputy Director certification, under penalty of perjury, of compliance with the requirements of subdivisions (b)(1)(A)-(E), below. The Deputy Director may request additional information or set additional requirements on continued diversion.
 - (A) Not more than 55 gallons per person per day will be diverted under all bases of right.
 - (B) The diversion is necessary to serve minimum human health and safety needs as defined in section 877.1, subdivision (g), after all other alternate sources of water have been used. To the extent other water sources are available, those sources will be used first and the total used will not exceed 55 gallons per person per day.
 - (C) The diverter and all end users of the diverted water are operating under the strictest existing conservation regime for that place of use, if such a plan exists for the area or service provider, or shall be operating under such regime within 30 days. If additional approvals are required before implementation of the conservation regime, the diverter must certify that all possible steps will be taken immediately to ensure prompt approval.
 - (D) If the diverter is a distributor of a public water supply under Water Code sections 350 et seq., that it has declared a water shortage emergency condition and either already has adopted regulations and restrictions on the delivery of water or will adopt conservation and water delivery restrictions and regulations within a timeframe specified by the Deputy Director as a condition of certification.

- (E) The diverter has either pursued steps to acquire other sources of water, but has not yet been completely successful, as described in an attached report, or the diverter will pursue the steps in an attached plan to identify and secure additional water.
- (2) To the extent that a diversion for minimum human health and safety needs requires more than 55 gallons per person per day, the continued diversion of water after issuance of a curtailment order for the diversion requires submission of a petition demonstrating compliance with the requirements of subdivisions (b)(2)(A)-(F), below, and approval by the Deputy Director. The Deputy Director may condition approval of the petition on implementation of additional conservation measures and reporting requirements. Any petition to continue diversion to meet minimum human health and safety needs of more than 55 gallons per person per day must:
 - (A) Describe the specific circumstances that make the requested diversion amount necessary to meet minimum human health and safety needs, if a larger amount is sought.
 - (B) Estimate the amount of water needed.
 - (C) Certify that the supply will be used only for the stated need.
 - (D) Describe any other additional steps the diverter will take to reduce diversions and consumption.
 - (E) Provide the timeframe in which the diverter expects to reduce usage to no more than 55 gallons per person per day, or why minimum human health and safety needs will continue to require more water.
 - (F) As necessary, provide documentation that the use meets the definition of minimum human health and safety needs provided in subdivision (g) of section 877.1.
- (c) For public water systems with 15 or greater connections and small water systems of 5 to 15 connections, gallons per person per day shall be calculated on a monthly basis and the calculation methodology shall be consistent with the State Water Board's "Guidance for Estimating Percentage Residential Use and Residential Gallons Per Capita Daily" dated September 22, 2020.

- (d) Diversions for minimum human health and safety needs that cannot be quantified on the basis of an amount per person per day require a petition and approval from the Deputy Director. The Deputy Director may approve a such a petition under this subdivision or subdivision (b)(2) upon a finding that the petition demonstrates that the requested diversion is in furtherance of the constitutional policy that the water resources of the state be put to beneficial use to the full extent they are capable, and that waste and unreasonable use be prevented, notwithstanding the effect of the diversion on senior water rights or instream beneficial uses, and may condition approval as appropriate to ensure that the diversion and use are reasonable and in the public interest.
- (e) To the extent necessary to resolve immediate public health or safety threats, a diversion subject to a curtailment order may continue while a petition under subdivision (b)(2) or (d) is being prepared and is pending. The Deputy Director may require additional information to support the initial petition, information on how long the diversion is expected to continue, and a description of other steps taken or planned to obtain alternative supplies.
- (f) Notice of certification, petitions, and decisions under this section and section 878 will be posted as soon as practicable on the State Water Board's drought webpage. The Deputy Director may issue a decision under this article prior to providing notice.
- (g) Diversion and use within the Russian River Watershed <u>or Delta Watershed</u> that deprives water for minimum human health and safety needs in 2021, or which creates unacceptable risk of depriving water for minimum human health and safety needs in 2022, is an unreasonable use of water. The Deputy Director shall prevent such unreasonable use of water by implementing the curtailment methodology described in section 877.2 for diversions in the Lower Russian River Watershed<u>and</u>, sections 877.3, 877.4, 877.5, and 877.6 for diversions in the Upper Russian River Watershed, and section 876.1 for <u>diversions in the Delta Watershed</u>.

Authority: Sections 1058, 1058.5, Water Code

Reference: Cal. Const., Art. X, § 2; Sections 100, 100.5, 104, 105, 106.3, 275, 1058.5, Water Code; *Environmental Defense Fund v. East Bay Muni. Util. Dist.* (1980) 26 Cal.3d 183; *Light v. State Water Resources Control Board* (2014) 226 Cal.App.4th 1463; *Stanford Vina Ranch Irrigation Co. v. State of California* (2020) 50 Cal.App.5th 976.

§ 878.2 Alternative Water Sharing Agreements

Water users may propose alternatives to water diversion curtailment that achieve the purposes of the curtailment process described under section 876.1 by submitting a proposal to the Deputy Director. Proposals must describe the setting, the parties, the actions, the provisions for monitoring, record keeping and reporting, and the purported benefits of the proposal in sufficient detail to demonstrate to the satisfaction of the Deputy Director that implementing the proposal will not injure non-party legal users of water or result in an unreasonable impact on fish and wildlife. In considering a proposal under this section, the Deputy Director may request additional information or consult with other entities that may have technical or legal information that should be considered in evaluating such proposals, including but not limited to the California Department of Water Resources (DWR) and United States Bureau of Reclamation (Reclamation). The Deputy Director will consult with the Delta Watermaster on any proposals among diverters within the Legal Delta. A proposal may be implemented pending review by the Deputy Director provided that potentially affected water right holders and claimants, including but not limited to DWR and Reclamation, concur with the proposal and no objections to the proposal are submitted to the Deputy Director. The Deputy Director may approve a proposal subject to conditions, including record keeping and reporting requirements, and provided that the Deputy Director finds implementing the proposal will not injure non-party legal users of water or result in an unreasonable impact on fish and wildlife. Diversions consistent with a proposal implemented or approved pursuant to this section are subject to this article, and violations of the terms of the proposal shall be subject to enforcement as a violation of this article or as an unauthorized diversion or use of water.

Notice of proposals and decisions under this section will be posted as soon as practicable on the State Water Board's Delta drought webpage. The Deputy Director may issue a decision under this section prior to providing such notice. Any interested person may file a comment or objection to the proposal or decision with the Deputy Director with simultaneous service to the parties who submitted the proposal. The Deputy Director will consider any comment or objection. The State Water Board may hold a hearing on any proposal to which parties have objected, after notice to all interested persons.

Authority: Sections 1058, 1058.5, Water Code

<u>Reference:</u> Cal. Const., Art. X, § 2; Sections 100, 109, 275, 1011, 1011.5, 1051.5, Water Code; *City of Barstow v. Mojave Water Agency* (2000) 23 Cal.4th 1224.

§ 879. Reporting

- (a) All water right holders issued a curtailment order under this article section <u>877.2 or 877.3</u> are required, within seven calendar days <u>of the date of the</u> <u>curtailment order</u>, to submit under penalty of perjury a certification of one or more of the following actions taken in response to the curtailment order, certifying, as applicable, that:
 - (1) Diversions under the water right(s) identified have ceased;
 - (2) Any continued use is under other water rights not subject to curtailment, specifically identifying those other rights, including the basis of right and quantity of diversion;
 - (3) Diversions under the water right(s) identified continue only to the extent that they are non-consumptive uses for which a certification for continued diversion has been submitted as specified in section 878;
 - (4) Diversions under the water right(s) identified continue only to the extent that they are to provide for minimum human health and safety needs, a certification has been filed as authorized under section 878.1, subdivision (b)(1), and the subject water right authorizes the diversion in the absence of a curtailment order; or
 - (5) Diversions under the water right(s) identified continue only to the extent that they are consistent with a petition filed under section 878.1, subdivision (b)(2) or (d), and diversion and use will comply with the conditions for approval of the petition.
- (b) All water users or water right holders whose continued diversion may be authorized under section 878.1 are required to submit, under penalty of perjury, information identified on a schedule established by the Deputy Director as a condition of certification or petition approval. The required information may include, but is not limited to, the following:
 - (1) The water right identification numbers under which diversions continue
 - (2) How the diverter complies with any conditions of continued diversion, including the conditions of certification under section 878.1, subdivision (b)(1);

- (3) Any failures to comply with conditions, including the conditions of certification under section 878.1, subdivision (b)(1), and steps taken to prevent further violations;
- (4) Conservation and efficiency efforts planned, in the process of implementation, and implemented, as well as any information on the effectiveness of implementation;
- (5) Efforts to obtain alternate water sources;
- (6) If the diversion is authorized under an approved petition filed pursuant to section 878.1, subdivision (b)(2), progress toward implementing the measures imposed as conditions of petition approval;
- (7) If the diversion is authorized under section 878.1, subdivision (d):
 - (A) The rate of diversion if it is still ongoing;
 - (B) Whether the water has been used for any other purpose; and
 - (C) The date diversion ceased, if applicable.
- (8) The total water diversion for the reporting period and the total population served for minimum human health and safety needs. The total population must include actual or best available estimates of external populations not otherwise reported as being served by the water right holder, such as individuals receiving bulk or hauled water deliveries for indoor water use.
- (9) Diversion amounts for each day in acre-feet per day, maximum diversion rate in cubic feet per second, and anticipated future daily diversion amounts and diversion rates.
- (c) The Deputy Director, or delegee, may issue an order under this article requiring any person to provide additional information reasonably necessary to assess their compliance with this article. Any person receiving an order under this subdivision shall provide the requested information within the time specified by the Deputy Director, but not less than five (5) days.
- (d) This subdivision applies to Delta Watershed curtailment orders and enhanced reporting to inform water unavailability determinations and the curtailment process described under section 876.1.

- (1) All water right holders and claimants issued an initial order pursuant to section 876.1 are required, within the deadlines specified in the initial order but no sooner than seven calendar days following issuance of the order, to submit under penalty of perjury a certification that they have and will continue to take actions needed to comply with section 876.1, including the following actions:
 - (A) Regularly reviewing information posted on the State Water Board's drought webpage to determine when curtailments are required and when curtailments are suspended or reimposed, or subscribing to the State Water Board's Delta Drought email distribution list to receive updates directly; and
 - (B) Ceasing diversions of natural and abandoned flow when curtailments are ordered, except to the extent that continuing diversions are authorized in accordance with section 878, 878.1 or 878.2, and ceasing rediversions of water released from storage, except to the extent authorized by a water right or contract.
- (2) In addition to the requirements identified under subdivision (d)(1), the Deputy Director may require water right holders and claimants who have been issued an initial order under section 876.1 and whose water right or claim has a total authorized face value or recent annual reported diversion amount of one thousand acre-feet or greater to report the following information by the date specified by the Deputy Director, but no earlier than seven days after receipt of the reporting order and as specified thereafter:
 - (A) Prior diversions, unless otherwise reported in annual reports of water diversion and use, including direct diversions and diversions to storage. Diversion volumes shall be provided in a daily, weekly, or monthly format, as identified in the order.
 - (B) Demand projections for subsequent months through October 1, 2022, including direct diversions and diversions to storage. Diversion volumes shall be provided in a daily, weekly, or monthly format, as identified in the order.
 - (C) Before issuing orders issued pursuant to subdivision (d)(2) to water right holders and claimants in the Legal Delta, the Deputy Director will consult with and obtain the concurrence of the Delta Watermaster.

- (3) In order to inform curtailment decisions, the Deputy Director, or the Delta Watermaster for rights in the Legal Delta, may issue informational orders under this subdivision requiring a water right holder, diverter, or user to provide additional information related to a diversion or use of water in the Delta Watershed, including but not limited to: additional reporting of water diversions and use; the basis of right with supporting documents or other evidence; property patent date for the place of use; the date of initial appropriation; anticipated or actual water transfer amounts; or any other information relevant to forecasting demands and supplies and determining compliance with curtailment orders in the current drought year or in contingency planning for continuation of the current drought emergency. Informational orders may require reporting of diversions made in prior months and diversions anticipated during subsequent months on a recurring, monthly basis.
- (4) Any water right holder or claimant receiving an order under this subdivision shall provide the requested information within the deadlines specified therein, including any recurring deadlines associated with ongoing reporting requirements as applicable. The Deputy Director, or the Delta Watermaster for rights in the Legal Delta, may grant additional time for submission of information upon substantial compliance with the specified deadline and a showing of good cause. Information provided pursuant to this subdivision shall be submitted in an online form maintained by the State Water Board and accessible through its website, or in an electronic format as specified by the Deputy Director or Delta Watermaster.
- (5) Failure to provide the information required under this subdivision within the deadlines specified in the order or any time extension granted by the Deputy Director, or the Delta Watermaster for rights in the Legal Delta, is a violation subject to civil liability of up to \$500 per day for each day the violation continues pursuant to Water Code section 1846.
- (6) In determining whether to impose reporting requirements under this subdivision, the Deputy Director and Delta Watermaster will consider the need for the information for purposes of informing curtailment decisions and the burden of producing it, and will make reasonable efforts to avoid requiring duplicative reporting of information that is already in the Board's possession.
- (7) All orders issued under subdivisions (d)(2) and (d)(3) shall be subject to reconsideration under article 2 (commencing with section 1122) of chapter 4 of part 1 of division 2 of the California Water Code.

Authority: Sections 1058, 1058.5, Water Code

Reference: Sections 100, 187, 275, 348, 1051, 1058.5, 1841, Water Code

§ 879.1. Conditions of permits, licenses and registrations

Compliance with this article, including any conditions of certification or approval of a petition under this article, shall constitute a condition of all water right permits, licenses, certificates, and registrations for diversions in the Russian River Watershed from any watershed identified in this article.

Authority: Sections 1058, 1058.5, Water Code

Reference: Cal. Const., Art. X, § 2; Sections 275, 1253, 1058.5, Water Code; *National Audubon Society v. Superior Court* (1983) 33 Cal.3d 419.

§ 879.2. Compliance and Enforcement

- (a) A diverter must comply with a curtailment order issued under this article, any conditions of certification or approval of a petition under this article, and any water right condition under this article, notwithstanding receipt of more than one curtailment order. To the extent of any conflict between applicable requirements, the diverter must comply with the requirements that are the most stringent.
- (b) Diversion or use of water in the Upper Russian River Watershed <u>or the Delta</u> <u>Watershed</u> in violation of this article constitutes an unreasonable use of water and is subject to any and all enforcement proceedings authorized by law.
- (c) Diversion or use of water in the Lower Russian River Watershed <u>or the Delta</u> <u>Watershed</u> in violation of this article is a trespass under Water Code section 1052 and shall constitute evidence of diversion or use in excess of a water user's rights.
- (d) All violations of this article shall be subject to any applicable penalties under Water Code section 1058.5. Nothing in this section shall be construed as limiting the enforceability of or penalties available under any other applicable provision of law.

Authority: Sections 1058, 1058.5, Water Code

Reference: Cal. Const., Art. X, § 2; Sections 275, 1052, 1055, 1058.5, 1825, 1831, Water Code; *National Audubon Society v. Superior Court* (1983) 33 Cal.3d 419.



Water Unavailability Methodology for the Delta Watershed

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Table of Contents

1 Introduction				1
	1.1	Back	ground	9
	1.2	Curre	nt Conditions	10
2	Wa	ter Un	availability Methodology	11
2.1 Supp		Supp	ly	13
	2.1	.1	Supply Analysis	14
	2.1	.2	Types of Water	15
	2.1	.3	Subwatershed Delineation	17
	2.1	.4	Supply Data Sources	20
	2.1	.5	Filling Supply Data Gaps	27
	2	.1.5.1	Extrapolation	27
	2	.1.5.2	Augmentation	28
	2.1	.6	Abandoned Instream Flows	30
2.2		Dema	and	33
	2.2	.1	Initial Selection of Water Right Records	38
	2.2	.2	Initial Quality Control	39
	2.2	.3	Additional Quality Control	40
	2.2	.4	Disaggregation of Statements of Diversion and Use	43
	2.2	.5	Demand Aggregation by Subwatershed	44
	2.2	.6	Project Demands	44
	2	.2.6.1	Trinity River Imports	45
	2	.2.6.2	Settlement Contractor Demands	45
2.2.7		.7	Interbasin Diversions (Yuba-Bear and Drum-Spaulding)	46
	2.2	.8	Accretions and Return Flow Estimates	47
	2.3	Adjus	tments to the Supply and Demand Datasets	49
	2.3	.1	Elimination of Unmet Demand	49
	2.3 in [.2 Disconi	Treatment of Riparian Demands and Elimination of Supply and Deman nected Headwater Subwatersheds	d 53
	2.3	.3	Proration of Legal Delta Demands	53
	2.4	Wate	r Unavailability Visualizations	55

3	Implementation					
3	3.1 Issuance of Notices of Water Unavailability and Curtailment Order		nce of Notices of Water Unavailability and Curtailment Orders	57		
	3.1	.1	Exceedance Forecast Selection	58		
3	.2	Wate	Quality and Public Trust Resources	59		
3	.3	Comr	nunication and Public Engagement Strategy	59		
4	Are	eas of F	Potential Refinement	60		
4	.1	Near-	Term Opportunities	60		
	4.1	.1	Supply	60		
	4.1	.2	Demand	60		
4	.2	Longe	er-Term Opportunities	61		
5	Ref	ference	es Cited	62		
Те	Technical Appendix AA-1					
Те	Technical Appendix BB-1					
Ар	Appendix C C-1					
Те	Technical Appendix D D-1					

1 Introduction

The Sacramento-San Joaquin Delta (Delta) watershed is currently experiencing extremely dry conditions following dry conditions in 2020. Currently, the 2021 and 2020 period is projected to be one of the driest two-year periods on record for runoff. These low runoff conditions have resulted in very low inflows to reservoirs and associated limited storage supplies for various purposes this summer and into the fall. To help address these conditions, the State Water Resources Control Board (State Water Board or Board) developed a methodology to assess water unavailability in the Delta watershed. This report describes that methodology identifying when available data indicates that natural and abandoned water supplies are unavailable for diversion by water right holders and claimants in the Delta watershed under their priority of right (Delta Water Unavailability Methodology or Water Unavailability Methodology for short).

Based on the output of prior versions of the Water Unavailability Methodology, the State Water Board issued notices of water unavailability to certain water right holders and/or claimants in the Delta watershed on June 15, 2021, and July 23, 2021, indicating that water supplies were not available for their use based on the best available information. The June 15 notices applied to all post-1914 water right holders in the Delta watershed, while the July 23 notices also included more senior water right claimants, including many pre-1914 appropriative water right claimants in the Sacramento River watershed and all pre-1914 appropriative claimants in the San Joaquin River watershed.¹ On July 23, 2021, the State Water Board also released a draft emergency curtailment and reporting regulation for the Delta watershed that authorizes curtailments based upon the Water Unavailability Methodology or other comparable tools, including any appropriate updates to the methodology that may be made in the future through the Board's processes. The regulation also authorizes reporting to confirm compliance with the curtailment orders and reporting of water diversion and demand data from larger water right holders and claimants for possible use in the Methodology. Along with minor clarifying revisions, the Board adopted the emergency regulation on August 3, 2021, and on August 19, 2021, the Office of Administrative Law approved the regulation, which became effective upon filing with the Secretary of State on the same day. Under the authority granted by the emergency regulation, on August 20, 2021, the Board issued curtailment and reporting orders to water right holders and claimants throughout

¹ On July 23, 2021, notices were issued to all post-1883 appropriative water right claimants within the Sacramento River watershed and all pre-1914 appropriative water right claimants within the San Joaquin River watershed. In addition, notices were issued to pre-1883 appropriative water right claimants in specific Sacramento River tributary subwatersheds due to limited local supplies. Riparian claimants in the San Joaquin River, Upper American River, and Putah Creek subwatersheds within the Sacramento River watershed were notified that water supplies were insufficient to meet the demands of all riparian claimants.

the Delta watershed. The orders identified that all post-1914 appropriative water rights in the Delta watershed, many pre-1914 appropriative claims, as well as some riparian claims are curtailed in August, with a subset of these water rights and claims curtailed in September (as well as others not curtailed in August).² Additional information related to Delta curtailment regulation and curtailment and reporting orders can be found on the Board's <u>Delta drought webpage</u>.

The San Francisco Bay-Delta (Bay-Delta) watershed includes supplies from both the Sacramento and San Joaquin river systems and their tributaries. As shown in Figure 1 below, water from about 40 percent of California's land area drains to the Bay-Delta, supporting a variety of beneficial uses of water. The Bay-Delta is one of the most important ecosystems in California, as well as the hub of California's water supply system. As the largest tidal estuary on the western coast of the Americas, it provides essential habitat to a vast array of aquatic, terrestrial, and avian wildlife in the Delta, San Francisco Bay, and near-shore ocean, as well as a diverse assemblage of species upstream of the Delta. Water from the Delta provides a portion of the supplies to more than two-thirds of Californians, supports industry, and is used to irrigate millions of acres of farmland.

² On August 20, 2021, the Board mailed initial orders imposing reporting requirements on all water right holders and claimants in the Delta watershed and imposing water right curtailments on many right holders and claimants. The initial orders identify the priorities of water rights and claims of right that are curtailed for the remainder of August and the month of September, and directs diverters to subscribe to the Board's Delta Drought email distribution list or visit the <u>Delta Drought webpage</u> to view Delta Watershed Curtailment Status List (Curtailment Status List) for updates regarding these and future curtailment orders.



Figure 1. Delta Watershed Location

Given the importance of the water supplies in the Delta watershed for multiple purposes and the extreme limitations in water supplies this year, action is needed to determine when water supplies are not available under water right holders' or claimants' priorities of right. The Department of Water Resources' (DWR) State Water Project (SWP) and the U.S. Bureau of Reclamation's (Reclamation) Central Valley Project (CVP) (collectively Projects) are responsible for providing salinity control and meeting environmental flows in the Delta, as well as specific requirements for flows and temperature management on Project tributaries. Currently, many Project reservoir storage levels are at or near historical lows, creating significant concerns for salinity control, municipal water supplies (particularly from Folsom Reservoir), and temperature management and other environmental needs this year and going into next year. As a result of these concerns, the Projects have submitted, and were granted subject to terms and conditions, a temporary urgency change petition to reduce their obligations to release water from storage to meet flow and water quality requirements in the Delta.³

Concerns for reservoir storage levels are compounded when diversions occur by users when supplies do not exist at their priority of right, resulting in the need for additional releases of stored water from Project reservoirs in order to repel salinity intrusion from the ocean and meet other minimal needs.

Determining when water supplies are unavailable to users will be important to ensure that supplies are available to meet current water quality and flow requirements and the demands of senior water right holders. However, it may be unclear to water users when supplies are unavailable for their use because supplies are needed by downstream senior water right holders or because streamflows are comprised of releases of previously stored water that is released to serve contractors or to meet water quality or flow requirements.

The State Water Board has developed the Water Unavailability Methodology for identifying when available data indicates that natural and abandoned water supplies are unavailable for direct diversion or diversion to storage for consumptive use by water right holders and claimants in the Delta watershed under their priorities of right. The methodology is not intended to address other supplies of water like rediversion of previously stored water for use by Project contractors. The methodology also does not address water unavailability for non-consumptive uses of water like direct diversion for hydropower production when these supplies are returned back to the source stream. However, since wet season diversions to storage for later production of hydropower may change the timing of flows and affect the availability of water for other users, the methodology will consider water unavailability for such diversions if applied during the wet season.

³ The Board order conditionally approving the petition is available at: https://www.waterboards.ca.gov/waterrights/water_issues/programs/drought/tucp/docs/ 2021/20210601_swb_tuco.pdf

The methodology evaluates water supplies and demands on a monthly scale at the subwatershed and watershed scale for both the Sacramento River and San Joaquin River watersheds with currently available data, reporting, and tools. Results from the methodology are available through September 2021. The methodology is also planned to be used beyond September 2021, utilizing updated data on supplies and demands, including additional demand data that may be required by possible emergency regulations. The Water Unavailability Methodology improves upon methods used for determining water unavailability in prior droughts, most recently in 2014 and 2015. Major improvements are described below and are focused on ensuring that demands are not overinflated in ways that would overestimate water unavailability, causing more water users to receive notices of water unavailability or curtailment orders or resulting in those notices or orders applying for a longer time period. Other improvements include better supply estimates. With more time, better data, and improved tools, additional improvements will be possible.

This report and associated technical appendices describe the current approach and major assumptions for the Water Unavailability Methodology. Technical Appendix A describes the Water Unavailability Methodology spreadsheet, including the input data sources, computational steps, and outputs used to develop the water unavailability visualizations. Technical Appendix B describes the process used to collect and quality control the demand datasets. Appendix C summarizes the substantive technical, factual, or legal comments that have been received to date on the Water Unavailability Methodology, as well as any relevant sections of the report where those comments have been addressed. Technical Appendix D was included to respond to comments received regarding the hydrologic complexities of the Legal Delta and to provide additional explanation regarding the assumptions used in the Methodology with regard to freshwater residence time in the Legal Delta and the exclusion of tidal inflows as a source of supply. The technical appendices and spreadsheet are available on the State Water Board's <u>Delta Water Unavailability Methodology webpage</u>.

This report will continue to be updated, as appropriate, as the methodology is updated. All revisions will be made available on the Board's Delta Water Unavailability Methodology webpage.

The draft Water Unavailability Methodology was released for public comment on May 12, 2021. The Water Unavailability Methodology was updated based on comments received, and further review and an update of the methodology was released on June 15, 2021, along with notice of water unavailability to all post-1914 water right holders in the Delta watershed. At that time, the State Water Board indicated that additional modifications were planned to address water unavailability for more senior water right claimants, including pre-1914 appropriative and riparian claimants. This version of the methodology includes those updates, as well as additional updates to address comments received on the methodology and other updates based on further review.

Those changes include the following:

- Inclusion of methods to evaluate water unavailability for pre-1914 and riparian claimants, including disaggregation of these demands by water right priority. In this disaggregation, riparian rights are generally assumed to be senior to pre-1914 appropriative rights. While this may not be the case in every instance, on the scale of these analyses, exceptions are not generally expected to have a meaningful effect. To the extent that a pre-1914 appropriative claimant believes they have a senior right to riparian water rights, the Board will consider that information and make appropriate adjustments to any curtailment orders issued pursuant to the proposed emergency regulation.
- Changes to assumptions regarding available supplies for riparian diversions in the Legal Delta to exclude water from outside of the watershed where the diversion occurs. Specifically, riparian water right claimants in the Sacramento River portion of the Delta are only assumed to have supplies available from the Sacramento River and likewise riparian water right claimants located in the San Joaquin River portion of the Legal Delta are only assumed to have supplies available from the San Joaquin River. The proration methodology described in the June 15, 2021 version of the methodology continues to be used for any appropriative demands in the Legal Delta since those rights do not include the same source limitations and may draw water from an adjacent watershed.
- Changes to reflect that headwater subwatersheds are only "disconnected" from the larger Delta watershed if all post-1914 appropriative and all pre-1914 appropriative demands cannot be met. The June 15 version of the methodology only evaluated water unavailability for post-1914 water rights and, therefore, assumed disconnection when all post-1914 appropriative demands could not be met because the methodology was not evaluating relative water unavailability for more senior claims. In order to evaluate water unavailability for more senior claims, the relative priority of pre-1914 appropriators must be considered at the subwatershed as well as the watershed-wide scales. Because riparian water right holders are generally senior in priority to pre-1914 appropriators, those demands are assumed to be met prior to any pre-1914 appropriative demands. Where there are shortages in supplies for riparian claimants, shortages would be shared correlatively amongst them. Such shortages cannot currently be fully reflected in the methodology given the complexity of reflecting correlative shortages.
- The addition of an online visualization comparing monthly supply forecasts to daily cumulative supplies. This tool will be used to help ensure that curtailment decisions are tracking the correct hydrologic exceedance level. To address short term precipitation events, additional information regarding actual and forecasted precipitation and runoff will be considered to ensure that curtailments are

suspended in a timely manner when additional supplies become available, particularly for the purposes of refilling depleted reservoirs.

- Refinements to Bear River and Putah Creek supply estimates to better reflect actual supplies in these subwatersheds.
- Removal of demands within the Goose Lake subwatershed to reflect its disconnection from the Delta watershed during dry conditions.
- Other minor refinements.

The State Water Board has received and reviewed numerous public comments on the methodology, including comments received during a May 21, 2021 staff-led workshop and in writing by the May 25, 2021 comment deadline. Many commenters supported the methodology and acknowledged the substantial improvements compared to that used during the prior drought. Other commenters requested use of data and tools that do not currently exist and will not be possible to use for many years at the earliest. Given the dire water supply concerns that exist this year, assumptions were made using the best available data as discussed further in the report.

With over 17,000 water rights or claims on record in the watershed with even more points of diversion, numerous real-time and dynamic supply and demand issues that are not all well understood, and numerous other complexities, reasonable simplifying assumptions are necessary based on current best available information. These assumptions, as well as the implementation of the methodology itself, are intended to be conservative for the purpose of avoiding unwarranted curtailments.

Some commenters suggested the methodology should use real-time, verified, demand and return flow data. Currently demand data is self-reported annually by diverters on a monthly timestep, only received in arears, and not subject to systematic verification upon receipt. In addition, compliance with Senate Bill 88, which would improve reporting accuracy and frequency, is low, even among large diverters. The Board has made efforts to improve the demand data currently available for use in the methodology via a quality control process, described in sections 2.2.2 and 2.2.3. This qualitycontrolled dataset represents the most accurate demand dataset for the watershed available to the Board at this time. The proposed emergency regulation seeks to further improve the demand dataset by requesting monthly projected water demand from the watershed's largest users. Developing processes and tools that can accommodate daily or sub-daily demand data would take significant additional time and significant improvements in data and tools, which would not be available in time to respond to the present emergency. Reported diversion and use information for 2020 was not initially used for the methodology because it had not been received or quality controlled in time; however, it may be incorporated in the future. Further, there is currently no wide-scale system in place for measuring return flows or system losses from seepage, riparian vegetation, evaporation, and other sources, but reasonable assumptions are made in the methodology to account for these factors.

Similar to the comments received suggesting the use of more real-time demand data, some commenters suggested use of daily or sub daily, real-time, verified supply and abandoned flow data. As with demand, developing real-time verified supply data is not possible in time to address this emergency, but will be explored further in the future.

Commenters also suggested that increased spatial resolution and dynamic supply/demand analyses are needed to reflect the specific issues of water unavailability at each point of diversion. This level of complexity would require significant, sustained, and widespread improvements in real-time measurement, reporting, quality control, and tools to develop. Improvement to the spatial and temporal resolution of water unavailability analyses will be further investigated in the future. For the current methodology, where sub-monthly time steps for consideration of precipitation and runoff are warranted, that information will also be considered in curtailment and water unavailability determinations to ensure that curtailments are suspended when supplies become available.

Some commenters suggested that adjudicative-like proceedings are needed prior to addressing issues of water unavailability. Given the number of right holders and the complexity of the related issues, such a process would likely take decades and require significant resources and would not permit the Board to adequately address the water supply shortages that exist this year. In the Stanislaus River, an adjudication was completed and a decree issued in 1929. One commenter suggested that, as a result, water from this subwatershed should not be included as available downstream supply. The Stanislaus River adjudication only determined the validity and parameters of appropriative rights within the Stanislaus River. The adjudication did not determine riparian rights or rights in the larger Sacramento or San Joaquin River watersheds. The commenter has not cited any legal authority for the proposition that the Stanislaus River adjudication had preclusive effect on water right holders outside the Stanislaus River watershed who may be entitled to natural flows originating in the Stanislaus River watershed. (See Wat. Code, §§ 2500, 2774 [preclusive effect of statutory stream adjudication only extends to rights acquired upon "the stream system embraced in the proceedings"].)

A commenter suggested that the methodology should consider prescriptive rights. The State Water Board does not have adequate information regarding the nature and validity of any prescriptive rights to factor those into the analysis. In addition, in the context of the drought emergency, the State Water Board does not have the time or resources to investigate and determine whether any of the thousands of water rights in the Delta watershed have been invalidated or rendered subordinate to junior water rights through prescription. (See *City of Pasadena v. City of Alhambra* (1949) 33 Cal.2d 908, 926-927 [setting forth common law elements of prescription].) To the extent that prescriptive rights may exist and are not accounted for, the emergency regulations would allow for that information to be considered, as well as other claims that changes to water right information should be made in the methodology.

Commenters asserted that stored water released from New Melones Reservoir should be treated as abandoned flow below Vernalis on the San Joaquin River. The methodology does not treat stored water releases from New Melones as abandoned because the releases are being made to meet Delta outflow and other water quality requirements below Vernalis this year.

A number of commenters raised topics regarding issues in the Legal Delta. Commenters suggested that return flows from Legal Delta diversions should not be made available to diverters upstream. The methodology only makes return flows available within four downstream subwatersheds. As discussed above, data and tools for more granular analyses are not currently available at this time. Commenters suggested that provisions for in-Delta storage or fresh water supplies should be made. However, no specific sources for assumptions that should be made during the current hydrologic conditions were provided. As described further in section 2.3.3, given the extreme dry conditions that exist and have existed for a prolonged period, there is no basis to assume that any remaining storage of fresh water flows would exist in the Delta longer than the methodology's one-month time step. Appendix D was added with further information and analysis to support this conclusion.

To the extent that users can develop voluntary solutions, those voluntary solutions may address some of the long-standing legal and technical issues, at least in the short term for purposes of addressing current water unavailability. The Board intends to update the methodology as needed in order to administer the water rights priority system using the best available information. Due to the uncertainties that exist in determining water unavailability in the Delta watershed, conservative assumptions were used within the methodology itself and will also be used in the methodology's implementation.

1.1 Background

The mission of the State Water Board is: "To preserve, enhance, and restore the quality of California's water resources and drinking water for the protection of the environment, public health, and all beneficial uses, and to ensure proper water resource allocation and efficient use, for the benefit of present and future generations." The Board's critical goals of providing safe drinking water to all Californians and maintaining the quality of our waterways, in keeping with both state and federal requirements, rely on the Board's successful administration of the water rights system. California's water rights system is one of the most complex in the nation, incorporating both riparian⁴ and appropriative

⁴ Generally, a riparian water right is a right to use the natural flow of water on land contiguous to a natural water course. Riparian water rights are unquantified, allowing the diverter to take water from the natural flow of the water course for any immediate reasonable and beneficial use on the subject land. In times of shortage, all riparian rights share the shortage on a correlative basis; that is, each riparian is required to reduce its use proportionally so that the reduced supply is divided among all riparian rights.

water rights, including appropriative rights issued under the Board's authority and those in existence prior to the inception of its predecessor-in-interest.⁵

The water right priority system, based on the "priority date" of each water right, forms the basis for determining which users may divert, and how much, when there is insufficient water in the stream for all users. Older, more senior appropriative water rights have priority over more junior appropriative water rights. Senior water right holders are more likely to receive water at times of shortage than more junior water right holders. However, once water is stored or imported, the entity that stored or imported the water has the only right to it, though others may acquire contingent junior rights to any return flows.

When the amount of water available in a surface water source is not sufficient to support the needs of existing water right holders and in-stream uses, junior appropriators must cease diversion in favor of higher-priority rights. However, it is not always clear to a junior diverter whether there is sufficient natural flow in the system to support their diversion and senior water uses and instream needs downstream. As part of administrating water rights, the State Water Board may issue notices of curtailment to water rights holders based on California's water rights priority system.

1.2 Current Conditions

After two years of low precipitation, the U.S. Drought Monitor now reports that the entirety of California is experiencing moderate to exceptional drought, of which 88 percent is experiencing extreme to exceptional drought (USDM 2021). The U.S. Seasonal Drought Outlook, released by the Climate Prediction Center on July 15, 2021 and valid through October 31, 2021, shows drought persisting throughout California (NOAA 2021). Within the Delta watershed, conditions have been extraordinarily dry, with Water Year (WY) 2020 ranking as the ninth driest on record and WY 2021 ranking as the fourth driest on record (DWR & Reclamation 2021). These dry conditions have resulted in reservoir storage levels that are significantly below average (DWR 2021a; DWR 2021c). As of August 16, 2021, storage volumes in major reservoirs, including Lake Shasta, Lake Oroville, and Folsom Lake are lower than 30 percent of capacity and below 50 percent of average storage conditions (*Ibid*).

As a result of the current dry conditions, on May 10, 2021, Governor Newson 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 and called on Californians to reduce their water use by 15 percent. The May 10

⁵ Use of water on non-riparian land or seasonal storage of water for later beneficial use requires an appropriative water right. An appropriative water right that was initiated before the Water Commission Act went into effect on December 19, 1914, and subsequently perfected is called a pre-1914 appropriative water right. Appropriative rights initiated and acquired after this date are called post-1914 appropriative water rights, and they are administered and regulated by the State Water Board.

proclamation orders the State Water 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 indicates that the State Water Board shall consider emergency regulations to curtail water diversions when water is not available at water right holders' priority of right or to protect previously stored releases of water (Exec 2021). Upon finalization, this methodology may serve as the technical basis for future emergency curtailment regulations pursuant to the directives in the emergency drought proclamation.

2 Water Unavailability Methodology

The Water Unavailability Methodology incorporates the best available supply data for the Delta watershed with the best available estimates of demand for the same area. The methodology compares this data for multiple areas within the Delta watershed: the Sacramento River watershed, San Joaquin River watershed, and headwater subwatersheds (see definition in section 2.3.1 below), to determine if supply may be insufficient to meet certain priorities of right. These comparisons are presented visually using interactive graphs and in spreadsheet format. The following sections describe the sources of the supply and demand data, adjustments made to the data as needed, and the resultant outputs of the comparisons. Figure 2 below shows an overview of the Water Unavailability Methodology that is covered in greater detail in the following sections.



Figure 2. Water Unavailability Methodology Flowchart

2.1 Supply

The purpose of this analysis is to account for the availability of natural and abandoned flows within the Delta watershed for diversion by water right holders under their priority of right. This analysis is not intended to account for the availability of imported supplies from other watersheds that do not contribute to available supplies for general use in the Delta watershed. Specifically, imported supplies from the Trinity River system are imported for use by Reclamation and their contractors and are not available to other users under their own water rights. The analysis is also not intended to account for releases of previously stored water for downstream delivery, use, or rediversion since those supplies are also not available to other users under their own water rights. In the case where previously stored water is released to meet instream flow requirements that apply in an upstream subwatershed, but not downstream watersheds, and the water is not released for delivery to a downstream user, these flows are considered to be abandoned and part of available supplies.

The methodology incorporates the use of past and projected future full natural flow (FNF) (or unimpaired flow) estimates (see section 2.1.4 below). FNF represents the natural water production of a river basin unaltered by upstream water diversion, storage, or import from or export to other watersheds (DWR 2015). FNF is a theoretical water supply estimate rather than a reconstruction of pre-development streamflows (DWR 2016). Though FNF values are not directly measured, the locations where they are estimated are referred to herein as "gages."

Past FNF estimates are calculated from measured streamflows, adjusted for upstream operations by subtracting imported water and adding upstream diversions, changes in storage, and evaporative losses. The past FNF values serve two purposes in the methodology: (1) to provide historical context to current water supply conditions and (2) to show water supply conditions for the current year, from January 2021 to the present. Water years in the Sacramento and San Joaquin River watersheds are categorized as Wet, Above Normal, Below Normal, Dry, and Critically Dry based on equations defined in State Water Board Decision 1641 that account for the unimpaired runoff of each water year and its preceding water year (DWR 2021b). For both the Sacramento and San Joaquin River watersheds.

Forecasted FNF values are calculated from snowpack measurements, estimates of water content, expected weather, rates of evaporation, ground absorption, and other factors. Because future water supply cannot be predicted with absolute certainty, a forecast provides a range of expected water supply volumes. These potential volumes are assigned probabilities that they will occur based on current conditions. Probabilities are expressed in exceedances, or the percent chance that the future FNF will exceed a given amount. For example, the 10 percent exceedance indicates wetter than average conditions where there is a 10 percent chance that the FNF volume will exceed the forecast value, and a 90 percent chance that the FNF volume will be less than this forecast value. Similarly, a 90 percent exceedance indicates drier conditions where

there is a 90 percent chance that the FNF volume will exceed the forecast value and a 10 percent chance that the FNF volume will be less than this forecast value. A 50 percent exceedance indicates a 50 percent chance that the FNF volume will exceed the forecast value and a 50 percent chance that the FNF volume will be less than this forecast value. Generally, this forecast is the middle of the range of possible FNF volumes that can be produced given current conditions (50 percent exceedance is equivalent to the median). As the dry season approaches, forecasts become progressively more precise as actual events replace the variable range of potential conditions. Currently, conditions in the Delta watershed are extremely dry, tracking drier than the 99 percent exceedance.

2.1.1 Supply Analysis

The range of data available within the supply dataset described below allows for the comparison of historical FNF to current year estimates and forecasts. As described above, the current hydrology is tracking drier than the 99 percent exceedance forecast. For reference, both the 90 percent and 99 percent exceedances, provided in the latest supply forecasts, are shown in Figure 3 and Figure 4 below. As indicated below, the current year supply within the Delta watershed is drier than the median critically dry year over the period of 1922 through 2019.



Figure 3. 2021 Supply Conditions Within the Sacramento River Watershed



Figure 4. 2021 Supply Conditions Within the San Joaquin River Watershed

2.1.2 Types of Water

The water rights system is complex. In many cases during droughts, the observable water in a stream may not be available for diversion because the water: is needed to meet senior downstream demand; has been transferred for use or rediversion downstream; or is previously stored water that has been released to meet downstream demands, water quality and flow requirements, and contractual demands. This section discusses the additional complexities in determining whether water is unavailable for diversion.

Water in a stream system may consist of a combination of "natural flows," imported supplies, storage releases, abandoned flows, and return flows:

- Natural flow Natural flows are the natural runoff of a river basin unaltered by upstream water diversion, storage, or import from or export to other watersheds. Natural flows, quantified as FNF, are the basis of this methodology.
- Imported Supplies Imported supplies include supplies that are brought from one water supply source to another for consumptive uses or non-consumptive uses. In the Delta watershed, imported supplies are brought in from outside of the watershed from the Trinity River. Other projects may import water to one subwatershed from another, entirely within the Delta watershed (e.g., the Yuba-

Bear and Drum-Spaulding projects, see section 2.2.7 below). These additional water supplies are not accounted for in this analysis because these supplies do not constitute natural or abandoned flows.

- Previously Stored Water Seasonally stored water, including releases of previously stored water for downstream use, is not available for diversion or use by diverters other than the entity that stored the water, their contractors, or recipients of a transfer. Accordingly, the methodology does not account for these storage supplies.
- 4. Abandoned water Abandoned water is water that has been used or dedicated for a specific purpose for which it is no longer needed. If it was previously diverted, the diverter lays no further claim to the water, such as is commonly the case with return flow from agricultural uses. If the water was dedicated for instream use, it becomes abandoned once it flows out of the reach for which it was dedicated. Abandoned flows are available for downstream diversion.
 - a. **Abandoned instream flows** Water for instream use may be comprised of previously stored water releases that are foreign in time or imported from another watershed or bypassed natural flow that is provided for the purposes of preserving or enhancing wetlands, protecting fish and wildlife, and/or recreation. Some instream flows that only apply to a certain reach of a stream can be considered abandoned past that reach. Instream flows that are required to meet Delta instream flow, outflows, and salinity requirements are not considered abandoned. Section 2.1.6 below describes adjustments to the supply analysis to account for certain abandoned instream flows.
 - b. Abandoned return flows Return flows from other uses such as irrigated agriculture or municipal water treatment plants may be discharged back to the stream system with no residual claim of control, dominion, or right of further use. In such a case, this water would be available to appropriative diverters and may be available to riparian diverters if not foreign in time or source. Section 2.2.8 below describes adjustments made to the demand dataset to account for return flows from use within the Delta watershed.

The Water Unavailability Methodology assumes all FNF is available for diversion. The methodology also includes assumptions for return flows and abandoned instream flows that are available for diversion. Incorporation of return flows reduces demand calculated purely on reported diversions because a component of that diversion is introduced back into the system. As a simplifying assumption, the methodology does not distinguish between the types of water available within a stream system. Additional analysis will be needed to distinguish supplies that are foreign in time or watershed and not available to riparian diverters.

2.1.3 Subwatershed Delineation

The supply-demand analysis begins at a "subwatershed" level. Subwatershed boundaries were defined using the U.S. Geological Survey (USGS) Watershed Boundary Dataset (WBD) and National Hydrography Dataset (NHD), which delineate land areas draining to streams. Subwatersheds in the Delta watershed were established based on Hydrologic Unit Code level 8 watersheds (HUC8s), which represent areas of sufficient size to capture as much of the available flow as possible within the watershed given the existing network of FNF gages.

Some subwatershed boundaries were defined as a combination of multiple HUC8s due to the presence of multiple HUC8s upstream of a single FNF gage location. These subwatersheds include the Sacramento River above Bend, the Upper American River, and the Upper Feather River. Some HUC8s containing small tributaries on the valley floor were also combined into a single subwatershed due to the locations of supply estimates produced by DWR,⁶ including the Upper Sacramento River Valley, Sacramento River Valley Floor, and San Joaquin Valley Floor subwatersheds. A total of 20 Delta subwatersheds were used in the Water Unavailability Methodology: 10 each in the Sacramento and San Joaquin River watersheds (see Figure 5).

An inventory of available FNF gages from multiple sources (see section 2.1.4 below) was compared to the subwatershed boundaries, NHD stream maps, and water right points of diversion (PODs) to identify target FNF gages that are representative of water supplies and demands met by them within each subwatershed. These target FNF gages were considered during the prioritization of available supply data sources discussed in more detail in section 2.1.4 below.

The Water Unavailability Methodology assumes that water supply data at each FNF gage shown in Figure 5 below is representative of the total FNF for the subwatershed as a whole, not only the portion of the subwatershed upstream of the location. This assumption may result in minimal underestimation of supply within certain upstream subwatersheds and minimal overestimation of supply in corresponding downstream subwatersheds. Given the broad spatial coverage of the methodology and the use of generally conservative estimates regarding supply, this assumption is not anticipated to significantly impact watershed-wide determinations of water unavailability.

Supplies and demands from the Goose Lake subwatershed, the Panoche Creek subwatershed, and Tulare Lake watershed (including the Kings, Kern, Kaweah, and Tule Rivers) are not included in the Water Unavailability Methodology. Goose Lake, located on the border of California and Oregon, is expected to only overflow into the North Fork of the Pit River during very wet conditions. Therefore, the methodology excludes supply and demand that occurs within the boundaries of the Goose Lake HUC8. The methodology also excludes supply and demand within the Panoche Creek

⁶ See DWR's March 2016 Report on Unimpaired Flows in the Bay-Delta Watershed, described in section 2.1.4 below.

HUC8, a relatively small tributary in the southwest corner of the San Joaquin River watershed. There is no available FNF supply data for Panoche Creek, and aerial photographs indicate that it terminates in agricultural fields west of Mendota, so it is assumed not to significantly contribute to available water supplies within the Delta watershed.

Natural flows from the Tulare Lake watershed, despite not being a part of the Delta watershed, at times enter the watershed, largely from the Kings River via Fresno Slough. However, surface water contributions of the Tulare Lake region have historically been minimal and may have been significant only in wet years (DWR 2016). Natural flow would not reach the Delta watershed from the Tulare Lake watershed during the dry season of a critically dry year. Similarly, during the upcoming wet season, it is unlikely that natural flow from the Tulare Lake watershed would reach the Delta watershed as long as shortage conditions persist in the Delta watershed. Therefore, supplies and demands from the Tulare Lake watershed have been excluded from the methodology.



Figure 5. Delta Subwatershed and FNF Gage Map

2.1.4 Supply Data Sources

Because there is no single data source that provides both past and forecasted FNF estimates for the entire Delta watershed, supply data is derived from multiple sources which vary by location, timescale (i.e., historical data, including prior months of the current water year, and future forecasted data), and temporal resolution (i.e., daily or monthly). These data sources were considered hierarchically; that is, if data for a particular subwatershed was not available from the preferred data source, the next source was checked. If the data was available there, that data was incorporated into the dataset, and so on down the list.

The sources of past supply data, in order of priority of use, are:

- 1. The <u>California Data Exchange Center (CDEC)</u>, which contains published FNF estimates made by water system operators within each watershed. These are primarily available for larger rivers and contain monthly data as far back as WY 1901 in some subwatersheds.
- 2. <u>DWR's March 2016 Report on Unimpaired Flows in the Bay-Delta Watershed</u>, which contains monthly FNF estimates for water years 1922 through 2014.
- 3. The National Oceanic and Atmospheric Administration (NOAA) National Weather Service <u>California Nevada River Forecast Center (CNRFC)</u> estimates of daily FNF.⁷ These estimates are available for many streams beginning with WY 2013. This source was used only for streams where no other data was available.

The sources of forecasted supply data, in order of priority of use, are:

- DWR's California Cooperative Snow Surveys <u>Bulletin 120</u> Water Supply Forecast (B-120),⁸ which contains monthly FNF forecasts for the current water year for only larger rivers. B-120 Water Supply Index (WSI) products include forecasts with 10, 25, 50, 75, 90, and 99 percent exceedance probabilities.
- 2. CNRFC daily FNF forecasts⁹ were used only for minor tributaries. Exceedance probabilities were calculated from the available forecast data to match the B-120

⁷ CNRFC data is published on a daily scale, which is summed to generate monthly values for the purpose of this analysis. Any negative daily FNF values were replaced with zero values.

⁸ Bulletin 120 (B-120) provides FNF forecasts for the state's major watersheds. It is updated monthly, around the fifth business day of each month, from February to May of each year. The FNF calculation is made using DWR's own database of diversions upstream of unimpaired flow stations. The methodology relies upon DWR's unimpaired flow calculations and did not cross-check DWR's diversion database against the Board's records of reported diversions.

⁹ CNRFC forecasts are presented in the form of 39 different daily FNF "traces." These daily values were summed, and exceedances were calculated from the resulting monthly forecasts.

format. During the October through January time period when B-120 forecasts are not available, CNRFC daily FNF forecasts will be used for locations that have relied upon B-120 forecasts to date.

If data was available from multiple sources for the same subwatershed (e.g., past data from both CDEC and DWR or forecasted data from both B-120 and CNRFC), both datasets were compared for an overlapping time period to validate that there we no substantial inconsistencies between them. These comparisons did not result in any changes to the assumed hierarchy of data sources described above.

The final water supply dataset used in the Water Unavailability Methodology's supplydemand comparison consists of monthly FNF data. The use of monthly supply forecasts and demand estimates (see section 2.2 below) is assumed to negate the need to consider the water's transit time within the Delta watershed (i.e., it takes less than a month for water to flow from its headwaters to a downstream diverter). Monthly data is also used because there is insufficient real-time data available to evaluate supplies for all streams in the Delta watershed on a daily timestep. Furthermore, daily supply data from sources such as CDEC are less accurate than published monthly values. However, for the purposes of sub-monthly short-term considerations of curtailment suspensions due to precipitation and runoff events, sub-monthly data will be considered to ensure that curtailments are suspended on a time step commensurate with available supplies.

CDEC provides both monthly and daily FNF estimates for many rivers in California. Daily FNF estimates are less accurate than monthly estimates because they are based on less data than is available at the completion of each month (DWR 2015). Therefore, daily CDEC FNF values are not used in the water unavailability graphs described in section 2.4 below. However, daily FNF estimates may be used to determine the most appropriate supply forecast (e.g., 10, 50, 90, or 99 percent exceedance probability) to use when issuing notices of water unavailability or curtailment orders, as described in section 3.1.1 below.

Table 1 and Table 2 below summarize the sources of both past and forecasted supply data for each subwatershed included in the supply dataset for the Sacramento River watershed and the San Joaquin River watershed, respectively. The source information includes the agency from which the data was obtained and the unique identifier for each FNF gage site. Past source data is broken down into the sources of monthly and daily estimates; daily sources with date ranges in Table 1 and Table 2 were summed to generate monthly past data, while those shown without date ranges were used only for periodic forecast monitoring (see section 3.1.1). The monthly past source data also includes the years for which data is available, such as WY 1906 to present. For forecasted supply data, information is provided on the resolution, frequency, and format of forecast updates. Subwatersheds where gap-filling procedures were applied (see section 2.1.5 below) are denoted with asterisks, and all gap-filled values are specifically identified as such in the supply dataset.

	Past Supply	Forecasted		
Subwatershed	Monthly (Agency, Gage, Date Range)	Daily (Agency, Gage, Date Range if applicable)	Monthly Supply Data Sources (Agency, Gage, Forecast Resolution)	
Sacramento River at Bend	CDEC SBB: Sacramento River above Bend Bridge, sensor 65 (WY 1906-Present)	CDEC BND: Sacramento River at Bend Bridge, sensor 8	DWR B-120 SRWSI: Sacramento River above Bend Bridge (monthly TAF for current WY in 6 exceedances); when DWR B-120 unavailable, CNRFC BDBC1: Sacramento River- Bend Bridge (daily TCFS for next year in 39 traces)	
Stony Creek	DWR UF4: Stony Creek at Black Butte (WY 1922- 2014)	CNRFC EPRC1: Little Stony Creek- East Park Reservoir (WY 2015-Present)*	CNRFC EPRC1: Little Stony Creek- East Park Reservoir (daily TCFS for next year in 39 traces)*	
Cache Creek	DWR UF3: Cache Creek above Rumsey (WY 1922- 2014)	*	*	
Upper Feather River	CDEC FTO: Feather River at Oroville, sensor 65 (WY 1906-Present)	CDEC ORO: Oroville Dam, sensor 8	DWR B-120 SRWSI: Feather River at Oroville (monthly TAF for current WY in 6 exceedances); when DWR B-120 unavailable, CNRFC ORDC1: Feather River- Lake Oroville (daily TCFS for next year in 39 traces)	

 Table 1. Sacramento River Watershed Supply Data Sources

	Past Supply	Forecasted		
Subwatershed	Monthly (Agency, Gage, Date Range)	Daily (Agency, Gage, Date Range if applicable)	Monthly Supply Data Sources (Agency, Gage, Forecast Resolution)	
Yuba River	CDEC YRS: Yuba River near Smartville, sensor 65 (WY 1901- Present)	CDEC YRS: Yuba River near Smartville, sensor 8	DWR B-120 SRSWI: Yuba River near Smartville plus Deer Creek (monthly TAF for current WY in 6 exceedances); when DWR B-120 unavailable, CNRFC HLEC1: Yuba River- Englebright Reservoir (daily TCFS for next year in 39 traces)	
Bear River	DWR UF10: Bear River near Wheatland (WY 1922-2014)	*	*	
Upper American River	CDEC AMF: American River at Folsom, sensor 65 (WY 1901-Present)	CDEC NAT: Lake Natoma (Nimbus Dam), sensor 8	DWR B-120 SRWSI: American River below Folsom Lake (monthly TAF for current WY in 6 exceedances); when DWR B-120 unavailable, CNRFC FOLC1: American River- Folsom Lake (daily TCFS for next year in 39 traces)	
Putah Creek	DWR UF2: Putah Creek near Winters (WY 1922-2014)	*	*	
	Past Supply	Forecasted		
-------------------------------------	--------------------------------------------------------------------------------	------------------------------------------------------------------------------------------------------------------------------	-------------------------------------------------------------------------------------------------------------------------------------------------------	--
Subwatershed	Monthly (Agency, Gage, Date Range)	Daily (Agency, Gage, Date Range if applicable)	Monthly Supply Data Sources (Agency, Gage, Forecast Resolution)	
Upper Sacramento River Valley	DWR UF5: Sacramento Valley West Side Minor Streams (WY 1922- 2014)	CNRFC EDCC1: Elder Creek- Paskenta + TCRC1: Thomes Creek-Paskenta (WY 2015- Present)*	CNRFC EDCC1: Elder Creek- Paskenta + TCRC1: Thomes Creek-Paskenta (daily TCFS for next year in 39 traces)*	
	DWR UF7: Sacramento Valley East Side Minor Streams (WY 1922- 2014)	CNRFC MLMC1: Mill Creek-Los Molinos + DCVC1: Deer Creek-Vina + BKCC1: Butte Creek-Chico (WY 2015-Present)*	CNRFC MLMC1: Mill Creek-Los Molinos + DCVC1: Deer Creek-Vina + BKCC1: Butte Creek-Chico (daily TCFS for next year in 39 traces)*	
Sacramento River Valley Floor	DWR UF1: Sacramento Valley Floor (WY 1922- 2014)	*	*	

*Gap filling procedure used to adjust existing data or fill-in missing data (see section 2.1.5).

Table 2. San Joaquir	River Watershed	Supply Data	Sources
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	Past Supply	Forecasted	
Subwatershed	Monthly (Agency, Gage, Date Range)	Daily (Agency, Gage)	Monthly Supply Data Sources (Agency, Gage, Forecast Resolution)
Chowchilla River	DWR UF20: Chowchilla River at Buchanan Reservoir (WY 1922-2014)	CNRFC BHNC1: Chowchilla River- Buchanan Reservoir (WY 2015-Present)	CNRFC BHNC1: Chowchilla River- Buchanan Reservoir (daily TCFS for next year in 39 traces)

	Past Supply	Forecasted		
Subwatershed	Monthly (Agency, Gage, Date Range) Date Range)		Monthly Supply Data Sources (Agency, Gage, Forecast Resolution)	
Upper San Joaquin River	CDEC SJF: San Joaquin River below Friant, sensor 65 (WY 1901-Present)	CDEC SJF: San Joaquin River below Friant, sensor 8	B-120 SJWSI: San Joaquin River inflow to Millerton Lake (monthly TAF for current WY in 6 exceedances); when DWR B-120 unavailable, CNRFC FRAC1: San Joaquin River- Millerton Reservoir (daily TCFS for next year in 39 traces)	
Fresno River	DWR UF21: Fresno River near Daulton (WY 1922-2014)	CNRFC HIDC1: Fresno River- Hensley Lake (WY 2015-Present)	CNRFC HIDC1: Fresno River- Hensley Lake (daily TCFS for next year in 39 traces)	
Merced River	CDEC MRC: Merced River near Merced Falls, sensor 65 (WY 1901-Present)	CDEC EXC: New Exchequer-Lake McClure, sensor 8	B-120 SJWSI: Merced River below Merced Falls (monthly TAF for current WY in 6 exceedances); when DWR B-120 unavailable, CNRFC EXQC1: Merced River- Exchequer Reservoir (daily TCFS for next year in 39 traces)	

	Past Supply	Forecasted		
Subwatershed	Monthly (Agency, Gage, Date Range)	Daily (Agency, Gage)	Monthly Supply Data Sources (Agency, Gage, Forecast Resolution)	
Tuolumne River	CDEC TLG: Tuolumne River-La Grange Dam, sensor 65 (WY 1901-Present)	CDEC TLG: Tuolumne River-La Grange Dam, sensor 8	B-120 SJWSI: Tuolumne River below La Grange Reservoir (monthly TAF for current WY in 6 exceedances); when DWR B-120 unavailable, CNRFC NDPC1: Tuolumne River- New Don Pedro Reservoir (daily TCFS for next year in 39 traces)	
Stanislaus River	CDEC SNS: Stanislaus River- Goodwin, sensor 65 (WY 1901- Present)	CDEC GDW: Goodwin Dam, sensor 8	B-120 SJWSI: Stanislaus River below Goodwin Reservoir (monthly TAF for current WY in 6 exceedances); when DWR B-120 unavailable, CNRFC NMSC1: Stanislaus River- New Melones Reservoir (daily TCFS for next year in 39 traces)	
Calaveras River	DWR UF15: Calaveras River at Jenny Lind (WY 1922-2014)	CNRFC NHGC1: Calaveras River- New Hogan Reservoir (WY 2015-Present) CDEC NHG: New Hogan Lake, sensor 8 (WY 2015-Present)	CNRFC NHGC1 (daily TCFS for next year in 39 traces)	

	Past Supply	Forecasted		
Subwatershed	Monthly (Agency, Gage, Date Range)	Daily (Agency, Gage)	Monthly Supply Data Sources (Agency, Gage, Forecast Resolution)	
Mokelumne River	CDEC MKM: Mokelumne River- Mokelumne Hill, sensor 65 (WY 1901-Present)	CDEC MKM: Mokelumne River- Mokelumne Hill, sensor 8	CNRFC CMPC1: Mokelumne River- Mokelumne Hill (daily TCFS for next year in 39 traces)	
Cosumnes River	CDEC CSN: Cosumnes River at Michigan Bar, sensor 65 (WY 1908-Present)	CDEC MHB: Cosumnes River at Michigan Bar, sensor 8	CNRFC MHBC1: Cosumnes River- Michigan Bar (daily TCFS for next year in 39 traces)	
San Joaquin River Valley Floor	DWR UF12: San Joaquin Valley East Side Minor Streams + UF17: San Joaquin Valley Floor + UF24: San Joaquin Valley West Side Minor Streams (WY 1922- 2014)	CNRFC MPAC1: Mariposa Creek- Mariposa Reservoir + OWCC1: Owens Creek-Owens Reservoir + MEEC1: Bear Creek-McKee Road*	CNRFC MPAC1: Mariposa Creek- Mariposa Reservoir + OWCC1: Owens Creek-Owens Reservoir + MEEC1: Bear Creek-McKee Road (daily TCFS for next year in 39 traces)*	

*Gap filling procedure used to adjust existing data or fill-in missing data (see section 2.1.5).

2.1.5 Filling Supply Data Gaps

After the compilation of supply data from the sources listed in section 2.1.4 above, data "gaps" remain for some subwatersheds in the Delta watershed. These gaps include periods of missing past or forecasted data and past or forecasted data that cover only a portion of a subwatershed, as defined for this analysis (see section 2.1.3 above). These gaps were filled using extrapolation and augmentation processes, respectively, to create a complete supply dataset for use in the Water Unavailability Methodology. Technical Appendix A contains descriptions of specific gap-filling processes for each subwatershed where they were applied.

2.1.5.1 *Extrapolation*

To fill missing past or forecasted supply data gaps, overlapping historical data between the subwatershed with missing data ("Stream") and a nearby watershed with similar hydrology but more robust data ("River") were analyzed. The Stream:River ratio was calculated¹⁰ for each month over this period, and outliers were removed. Then, the River FNF estimates were multiplied by the average monthly Stream:River ratio to extrapolate reasonable FNF estimates to fill the gaps in the subwatershed's dataset.

For example, February 2021 supply data for the Bear River subwatershed was not available from any of the sources listed in section 2.1.4 above. Therefore, prior February FNF estimates for the Bear River subwatershed were compared to the neighboring Yuba River and a ratio of 1:5 was calculated (Bear:Yuba). Missing February data for the Bear River subwatershed was estimated by multiplying the Yuba River subwatershed's February 2021 FNF estimate by this ratio. Figure 6 below illustrates the Bear:Yuba extrapolation for the period of WY 2014 to present.





2.1.5.2 Augmentation

In other areas, past or forecasted data may exist but not represent the entire FNF supply of a watershed that would be expected to be available for diversion. This was the case for watersheds consisting of multiple small tributary streams, in which only some streams have available supply forecasts through CNRFC. DWR's 2016 Bay-Delta Unimpaired Flow Report includes past FNF estimates that cover all tributaries in these subwatersheds. To increase the "CNRFC" forecasts to approximate a forecast for the entire subwatershed (as the past supply estimates from "DWR" do), overlapping historical data between the two sources were analyzed. The ratio DWR:CNRFC was

¹⁰ The Stream:River ratio calculation is analogous to a linear interpolation each month, with the y-intercept always set to zero.

calculated on a monthly basis over this period, and outliers were removed.¹¹ Then, the past and forecasted CNRFC values were augmented by multiplying them by the monthly average DWR:CNRFC ratio to produce a reasonable FNF forecast estimate for the subwatershed.

For example, DWR's past (WY 1922–2014) unimpaired flow estimates for the Sacramento Valley East Side Minor Streams (UF7 in DWR's Report), part of the Upper Sacramento Valley subwatershed, include Antelope Creek, Mill Creek, Deer Creek, Big Chico Creek, Butte Creek, and other minor tributaries from Big Chico Creek to the Feather River (DWR 2016). CNRFC only has past (WYs 2013–present) and forecasted FNF data available for Mill, Deer, and Butte Creeks (MDB, in total). By comparing historical FNF values for a period with overlapping data (WYs 2013 and 2014), a monthly relationship ratio can be calculated. In this example, for February, the total Sacramento Valley East Side Minor Streams unimpaired flow was about 1.5 times the MDB supply. Therefore, missing February data in the Upper Sacramento Valley subwatershed would be estimated by multiplying the MDB supply by 1.5. The Upper Sacramento Valley subwatershed also includes supplies from West Side Minor Streams, which were estimated using a similar method with different DWR and CNRFC gages. Figure 7 below illustrates the DWR:CNRFC augmentation to estimate FNF for the Sacramento Valley East Side Minor Streams.

¹¹ Because the DWR FNF values include data for all of the CNRFC streams and additional tributaries, the value of the DWR:CNRFC ratio is always greater than one. This ratio calculation is analogous to a linear interpolation each month, with the y-intercept always set to zero.

Figure 7. Augmentation Example: Adjusting CNRFC Data for Mill, Deer, and Butte Creeks (MDB) to Estimate FNF Within Sacramento Valley East Side Minor Streams (SVESMS), a Portion of the Upper Sacramento Valley Subwatershed, Based on DWR's FNF Estimate for SVESMS



2.1.6 Abandoned Instream Flows

Specific reaches of streams within the Delta watershed may be subject to minimum instream flow requirements due to water right permit/license conditions, Board orders/decisions/regulations, Federal Energy Regulatory Commission (FERC) hydropower license conditions, biological opinion requirements, or private agreements. If these instream flow requirements are met by diverters bypassing flow, these flows are already included in FNF values. If these instream flow requirements are met via releases of stored water, these flows are not captured by FNF calculations. Beyond the reach for which they are intended for instream use, these storage releases are available for diversion, and, therefore, may theoretically be considered alongside FNF values to more accurately represent the amount of water available for downstream diversion unless there are provisions making these flows unavailable for use.

Current data limitations prevent a precise accounting of when instream flow requirements that will be abandoned have been met by stored water. Therefore, to incorporate abandoned instream flows into the supply dataset without artificially inflating estimates of available supply by assuming all abandoned instream flows have been met by releases of stored water, the methodology uses the greater of the FNF value and the abandoned instream flow value to represent the amount of supply contribution of the subwatershed to the respective watershed-wide supply. In other words, it was assumed that if the FNF is greater than the instream flow then instream flow requirement is being met by FNF; conversely, if the instream flow is greater than the FNF then it was assumed that the instream flow is met at least in part by storage releases which can be considered abandoned below their intended reach.

For the purpose of this analysis, all abandoned instream flows whose intended reach ends near the bottom of a subwatershed were considered. If two instream flow requirements exist in series in a watershed, it is possible that the same water could be used to meet both requirements. To avoid double counting of additional supplies, the methodology does not include instream flows that end higher up in the subwatershed. Using data from the State Water Board's Sacramento Valley Water Allocation Model (SacWAM)¹² and Water Supply Effects (WSE) model,¹³ a total of seven instream flow requirements that would produce abandoned flows were identified. These flow requirements, locations, and amounts are summarized in Table 3 and Table 4 below for the Sacramento and San Joaquin River watersheds, respectively. Water released by the Projects to meet water quality and flow requirements included in State Water Board Decision 1641 is not considered abandoned because those flows are intended to remain instream through the Delta and as outflow from the Delta.

¹² SacWAM is a hydrologic and system operations model developed by the Stockholm Environment Institute (SEI) and State Water Board using the Water Evaluation and Planning (WEAP) platform to represent the Sacramento River watershed, Delta, and eastside tributaries to the Delta (the Calaveras, Cosumnes, and Mokelumne Rivers). Information on SacWAM is available at:

https://www.waterboards.ca.gov/waterrights/water_issues/programs/bay_delta/sacwam/ ¹³ WSE is a hydrologic and system operations model developed by the State Water Board to represent the lower San Joaquin River and its lower tributaries (the Merced, Tuolumne, and Stanislaus Rivers). Information on WSE is available at: https://www.waterboards.ca.gov/waterrights/water_issues/programs/bay_delta/bay_delt a_plan/water_quality_control_planning/2018_sed/

Table 3. Sacramento River	Watershed Flows Considered to Contribute
Abandoned Supplies ¹⁴	

Subwatershed Abandoned Instream Flow (cfs)					Notos	
	Мау	June	July	Aug.	Sept.	Notes
Upper North Fork Feather River	300	300	300	300	250	FERC P-2107 license (below Poe Dam)
Yuba River	500	500	250	250	250	Board Decision 1644 (at Marysville, assumes Extreme Critical year, does not include flows transferred to DWR)
Bear River	25	25	10	10	10	FERC P-2997 license (below Camp Far West Diversion Dam, does not include flows transferred to DWR)
Upper American River	425	475	425	425	350	FERC 20140820 license (South Fork below Chili Bar, assumes Dry year, includes Conditions 1 and 3) and P-2079 license (North Fork below American River Pump Station)
Putah Creek	5	5	5	5	5	2000 Putah Creek Accord (outflow to Toe Drain)
Total	1,255	1,305	990	990	865	

¹⁴ Abandoned flows from Stony Creek were included in the May 12, 2021 version of the methodology but have been excluded from this updated version because, given current hydrology, any abandoned instream flow from Stony Creek is expected to seep into the underlying groundwater basin prior to reaching the Sacramento River and contributing to available downstream supplies.

Subwatarabad	Abandoned Instream Flows (cfs)					Notos
Subwatersneu	Мау	June	July	Aug.	Sept.	NOLES
Merced River	60	15	15	15	15	FERC P-2179 license (below Crocker Huffman Diversion Dam, assumes Dry year)
Tuolumne River	311	50	50	50	50	FERC P-2299 license (below La Grange Diversion Dam, assumes SJR 60-20- 20 index is between 1.5 and 2.0 MAF)
Total	371	65	65	65	65	

Table 4. San Joaquin River Watershed Flows Considered to ContributeAbandoned Supplies

For simplicity of analysis, the Water Unavailability Methodology does not currently account for whether the abandoned flows included in the supply dataset are foreign in either time or source and not available for use by riparian diverters. On a watershedwide scale, these additional flows are not significant and would not significantly affect the analysis.

2.2 Demand

The Water Unavailability Methodology evaluates demands for natural and abandoned flows by basis of water right. It is not intended to account for demands for previously stored water, imported supplies, and contractual demands. The analysis to date has relied on reported demand data from the State Water Board's Electronic Water Rights Information Management System (eWRIMS) computer database.¹⁵ The State Water Board may also rely upon updated reporting of projected demands for larger users that is provided pursuant to emergency regulations. Projections of demands during the wet season are expected to be more accurate than historical diversion data for purposes of estimating demands, particularly for storage which historically occurred when flows were present, which does not necessarily reflect demands that would exist this year The eWRIMS data system contains information regarding water rights, including but not limited to:

- Water right ownership information
- Water right type (e.g., "Appropriative" or "Statement of Diversion and Use")

¹⁵ A public version of the eWRIMS database is available at: <u>https://ciwqs.waterboards.ca.gov/ciwqs/ewrims/EWPublicTerms.jsp</u>

- Water right claim type for Statements of Diversion and Use (e.g., "Riparian," "Pre-1914," etc.) as reported in the diverter's Initial Statement of Water Diversion and Use or annual Supplemental Statements of Diversion and Use.
- Water right status (e.g., active, inactive, revoked, etc.)
- Authorized diversion seasons and volumes
- Authorized beneficial uses, including both consumptive (e.g., irrigation) and nonconsumptive (e.g., hydropower generation) beneficial uses
- Spatial location of PODs,¹⁶ including HUC8 watershed(s)
- Electronically reported water diversion and use information, available on a monthly basis

The eWRIMS database system contains information for various water right types, including both riparian and appropriative water rights. Within the eWRIMS database system, post-1914 appropriative water rights are categorized as "Appropriative," and other claims of right, which mainly consist of pre-1914 appropriative and riparian claims, are categorized as "Statements of Diversion and Use." The eWRIMS database system also includes information for other minor water right types, such as water right registrations.

Currently, all diverters are required to submit annual reports of water diversion and use (annual reports) to the State Water Board electronically through the eWRIMS Report Management System (RMS). The annual reports are mandatory filings that document water diversions and uses made during each month of the previous calendar year, including monthly direct diversion volumes, monthly diversion to storage volumes, and monthly water use volumes. A separate annual report of water diversion and use is required for each water right each year; therefore, a diverter may be required to submit more than one annual report if they hold or claim more than one right. Reports for the prior calendar year are due by April 1 for appropriative water rights, stockpond certificates,¹⁷ and registrations¹⁸ and by July 1 for groundwater recordations and statements of water diversion and use. Diversion data contained within the annual reports forms the basis for estimates of water demand used in the Water Unavailability Methodology. Water right holders and claimants that divert water under Statements of Diversion and Use also provide information about the water right claim type (e.g., riparian, pre-1914 appropriative, etc.) in annual reports.

¹⁶ The eWRIMS database contains a mapping application to view the spatial location of PODs.

¹⁷ Stockpond certificates are appropriative water rights issued by the State Water Board through 1997 and are limited to diversion of 10 acre-feet (AF) or less per year.
¹⁸ Water right registrations are appropriative water rights issued by the State Water Board through an expedited acquisition process for certain small projects first available in 1989. Water right registrations are available for small domestic use, livestock stockpond use, small irrigation use, and cannabis small irrigation use.

For this analysis, water demand is based on the total monthly diversion amount reported for each water right record, including monthly direct diversions and monthly diversions to storage. The demand dataset used in the Water Unavailability Methodology is specifically derived from the reported annual diversion data for calendar years 2018 and 2019, the most current years available. 2020 diversion data has not yet been used for this analysis because the full dataset is not yet available, though 2020 data may be used in the future.¹⁹ Demand data were not analyzed on a daily scale because annual reports contain only monthly reported diversion data. The transformation of monthly data to a finer timescale (e.g., daily) would not meaningfully impact the analysis because, without more detailed knowledge of operations by individual water users, monthly demand values would be divided equally between all days of each month. Furthermore, as described below, current compliance with new diversion measurement and reporting regulations have not made substantial daily and/or real-time diversion information available for even the largest water users in the Delta watershed.

The methodology primarily relies on 2018 demand data, with additional data from 2019 also available for comparison purposes. 2018 was a below normal water year in both the Sacramento and San Joaquin River watersheds and is assumed to more closely resemble demands during a critically dry year than 2019, which was a wet water year in both watersheds. The reliance on 2018 demand data may underestimate actual demand since demands are likely to be greater during a critically dry year due to drier soil conditions. There are also likely higher losses to evaporation and seepage in a critically dry year. Conservation activities that may be pursued this year may offset higher critical year demands to some degree, but it is assumed that using below normal year demand estimates in a critically dry year is a conservative assumption for the purposes of avoiding issuance of notices of water unavailability or curtailment orders when they may not be warranted.

In addition, 2018 diversion data was used because it is the only drier year for which diversion data is available since updated water right measurement and reporting requirements went into effect with Senate Bill 88 (SB88). Pursuant to regulations implementing SB88, all water right diverters authorized to divert more than 10 AF annually from rivers, creeks, springs, or subterranean streams must comply with measurement requirements. There are three ways to achieve measurement compliance: (1) install, use, and maintain a device capable of measuring the rate of direct diversion; (2) propose an alternative compliance plan; or (3) utilize a measurement method for multiple diverters. SB88 set expectations for both the accuracy of measurement devices as well as the monitoring frequency of the device and included measurement device installation deadlines of January 1, 2018 or earlier.

¹⁹ Because reporting of 2020 diversion and use information was not due for Statements of Diversion and Use until July 1, 2021, sufficient data were not available in time to complete this analysis but may be used in the future.

Although the implementation of SB88 has increased the frequency of required reporting for many diverters and may help to improve the quality of reported diversion and use data submitted to the State Water Board, many diverters have not yet achieved full compliance with the water right measurement requirements even though the measuring device installation deadlines have now passed. For example, among the 244 largest consumptive water right records in the Delta watershed located outside of the Legal Delta, diverters installed a measuring device and submitted a measurement data file for 2018 or 2019 in accordance with SB88 for only 57 percent (140) of the records. Diverters submitted proposed Alternative Compliance Plans pursuant to SB88 for an additional 2 percent (4) of the records. Diverters installed a measuring device, submit a measuring device but failed to submit a measurement data file for 2018 or 2019 for 27 percent (65) of the records, and did not install a measuring device, submit a measurement data file for 2018 or 2019, or submit a proposed Alternative Compliance Plan for 14 percent (35) of the records. Compliance with the measurement requirements may be even lower for smaller diverters.

Figure 8 below shows the locations of the PODs associated with the largest (those with a 5,000 AF or larger face value or 5,000 AF or larger of reported diversions) consumptive water right records in the Delta watershed and displays their SB88 compliance status.



Figure 8. Delta Watershed: Surface Water Measurement (SB88) Compliance Status

As discussed in more detail below, diversion data contained within annual reports is self-reported and is not systematically verified for accuracy upon submittal. As a result, an internal review and quality control effort was conducted.

2.2.1 Initial Selection of Water Right Records

A subset of the water right records in the eWRIMS database for the Delta watershed were selected for use in the Water Unavailability Methodology based on several criteria:

- Spatial Location: POD(s) located within the Delta watershed²⁰
- Water Right Status: Active status types only, thereby excluding inactive-type statuses (e.g., inactive, revoked, cancelled, etc.)
- Water Right Type: "Appropriative" (i.e., post-1914 appropriative, excluding registrations and stockpond certificates) and "Statement of Diversion and Use" (i.e., pre-1914 appropriative and riparian), thereby excluding minor water right types
- Beneficial Uses: All beneficial uses except exclusively non-consumptive beneficial uses

Water right records with active-type statuses were selected to best approximate current year water demand since it is unlikely that inactive-type statuses (e.g., inactive, revoked, cancelled, etc.) would be reactivated during the current year. Only water right records with "Appropriative" and "Statement of Diversion and Use" water right types were included because minor water right types, such as registrations and stockponds, were assumed to constitute a negligible amount of the water diversion and use within the Delta watershed.²¹

Water right records identified as non-consumptive based on their beneficial use type (e.g., hydropower generation, fish and wildlife preservation and enhancement, etc.) were also excluded. Non-consumptive uses, such as for hydropower generation, may change the timing of flows but do not reduce the amount of supply available unless they result in an interbasin diversion (see section 2.2.7 below). Given the temporal resolution of the supply and demand dataset (i.e., monthly) and the lesser amount of hydropower-related storage occurring during the dry season than the wet season, the potential impact of these non-consumptive diversions on the timing of flows is not assumed to be significant during the dry season. During the wet season, adjustments

²⁰ All PODs within the Delta watershed were selected except for those within the Panoche Creek subwatershed. As described in section 2.1.3 above, supply data is not available for this subwatershed; therefore, neither supply nor demand for this area were included in this analysis.

²¹ Exclusion of these minor right types from the methodology represents a conservative assumption because it underestimates overall demand. These diverters are included in the issuance of notices of water unavailability and curtailment orders in keeping with the principles of the water rights priority system.

will be made to account for diversions to storage under hydropower rights to accurately reflect where these diversions make water unavailable for a period of time.

This initial selection of water right records resulted in a demand dataset consisting of approximately 12,000 total records. Of these, approximately 5,000 were post-1914 appropriative water rights and 7,000 were statements of diversion and use.

2.2.2 Initial Quality Control

Water diversion data contained within the eWRIMS database originates from annual reports of water diversion and use electronically submitted by diverters. This self-reported data is not systematically verified for accuracy upon receipt and contains inaccuracies, inconsistencies, and other errors. Staff conducted a quality control effort following the initial selection of water right records for the demand dataset.

The approximately 12,000 total records existing within the demand dataset after initial selection were too numerous to feasibly review in their entirety at this time. Therefore, the scope of the review was narrowed to appropriative water rights with a face value (maximum diversion amount) of 5,000 AF or greater and statements of diversion and use with reported diversions of 5,000 AF or greater in either calendar year 2018 or 2019. This produced a manageable subset of water right records to review within a limited timeframe of approximately 580 records, including approximately 360 post-1914 appropriative rights and approximately 220 Statements of Diversion and Use. These records account for approximately 90 percent of the water diverted in the Delta watershed in 2018 and 2019 but less than 10 percent of the users.

For this narrower set of records, the 2018 and 2019 annual reports of water diversion and use associated with each record were reviewed to identify potential inaccuracies in the diversion data. During the review process, several types of data errors were identified and corrected, if the appropriate correction was discernable.²² These corrections included:

- Correction of diversion data entry and reporting issues, such as incorrect units of measurement and decimal placement errors
- Removal of duplicate diversion values, such as the same diversions reported under multiple water right records
- Removal of non-consumptive diversions improperly appearing as consumptive
- Correction of diversion values as necessary where reported diversion exceeds the water right's face value

²² Comments provided within the annual reports of water diversion and use often contained critical information to inform these corrections. For example, some diverters stated that their purpose of use is entirely non-consumptive. Others indicated that a particular diversion was fully reported under two or more separate rights (i.e., duplicated).

During the quality control process, if the appropriate correction was unclear, the affected records were flagged for potential further investigation beyond the information readily available in eWRIMS.

In addition to the records review described above, approximately 100 post-1914 appropriative rights were identified that reported diversions less than 5,000 AF but in excess of the face value of the water right. Most of these diversions are very small. Due to time constraints, these records were not investigated individually. Instead, for these rights, the reported diversion amounts within the demand dataset were updated to equal the face value of the right.

Except for the correction to reported diversions in excess of the face value of post-1914 rights, all water right records with a face value or reported use under 5,000 AF were included in the demand analysis without a quality control review. As mentioned above, these records constitute only about 10 percent of the total demand within the Delta watershed.

2.2.3 Additional Quality Control

After conducting the initial quality control review of 2018 and 2019 annual reports for the largest diversions as discussed above, and after applying corrections to rectify errors, some diversion values remained flagged as potentially including incorrect demand information with outstanding issues that could not be resolved without further information. Examples of these issues include:

- Possible duplicate reporting of diversion volumes under multiple water right records where it was not possible to quantify the duplicate reporting amount.
- Possible overreporting of diversion volumes that could not be corrected to reflect a best estimate of the actual diversion volume based on the available information. For example, some annual reports contained information that appeared to indicate that the diversion volume was not measured and, as a result, the maximum diversion amount authorized under the permit or license had been reported.
- Apparent inclusion of both consumptive and non-consumptive uses in the reported diversion amount where it was not possible to quantify the volume of water diverted only for consumptive uses.
- Other potential data reporting issues where an error was detected, but the appropriate correction was unclear.

In these cases, additional information may be needed to determine the appropriate correction or resolve other reporting-related issues. State Water Board staff has contacted numerous water right holders, claimants, or their agents to gather this information. Diversion volumes within the demand dataset were updated according to the responses provided. However, it was not feasible to contact all water right holders, claimants, or agents in all cases where a potential reporting related error was identified

or a correction applied to a diversion value. Efforts were prioritized to contact water right holders or agents based on several factors, including reported diversion size and relative level of uncertainty regarding potential reporting-related inaccuracies. In addition, some water right holders, claimants, and agents did not provide responses to inquiries regarding potential reporting related errors. In the absence of additional information provided by the water right holder, claimant, or agent, best estimates of the actual diversion values were used based on information contained within the annual report of water diversion and use and supplemental information available within the eWRIMS database.

Further refinements to the demand dataset used in the Water Unavailability Methodology may occur. Diverters who are aware of reporting issues, including, but not limited to, the items discussed above, should contact the State Water Board at Bay-Delta@waterboards.ca.gov.In addition, the quality-controlled 2018 and 2019 demand datasets were compared to FNF for each of these years, respectively, at the subwatershed scale (see section 2.1.3 above), and at the Sacramento and San Joaquin River watershed scales to assess the reasonableness of the demand datasets. The demand datasets used in the Water Unavailability Methodology represent the State Water Board's current best estimate of demand for these years based on the available information.

Water right records included in the demand dataset at this time are shown in Figure 9 below.

Figure 9. Active Consumptive Appropriative Water Rights and Statements of Diversion and Use in the Delta Watershed



2.2.4 Disaggregation of Statements of Diversion and Use

The May 12, 2021 draft and June 15, 2021 version of the methodology were developed to identify when available data indicates that natural and abandoned water supplies are unavailable for post-1914 appropriative water users in the Delta watershed. These prior versions were not intended to identify when water supplies are unavailable for pre-1914 appropriative and riparian claims, and prior versions of the demand dataset did not separate Statements of Diversion and Use into categories. Instead, these earlier versions grouped water demand for all Statements of Diversion and Use under a single demand category with the same assumed senior priority rank.

The Statements of Diversion and Use have now been disaggregated into several assigned categories and have been assigned priority dates. This refinement provides for the forecasting of water unavailability for pre-1914 appropriative and riparian claims. Statements of Diversion and Use were assigned a category based on the water right claim types reported by diverters in Initial Statements of Water Diversion and Use and in 2018 and 2019 annual reports. This user-submitted information was not reviewed for accuracy as part of this analysis but represents the best information currently available. This information may be updated based on additional information, including information submitted by water right claimants through the emergency regulation process.

The following Statement of Diversion and Use categories are currently included in the demand dataset: Riparian, Pre-1914, Riparian/Pre-1914, Reserved, Other, and Unclassified. The vast majority (over 95 percent) of the Statements of Diversion and Use included in the demand dataset were categorized as Riparian, Pre-1914, or Riparian/Pre-1914. For the purposes of assigning priority within the Methodology, those water right records categorized as Riparian/Pre-1914 or Other were assumed to have the more senior priority of right, i.e., Riparian.²³

Technical Appendix B further describes the process used to categorize and assign priority dates to Statements of Diversion and Use.

²³ For the purpose of curtailment, diverters who claim both a riparian and a pre-1914 appropriative water right to serve the same place of use (or have reported diversion pursuant to a combination of such unadjudicated claims among their Initial Statement of Water Diversion and Use and their 2018 and 2019 annual reports) are treated solely as riparian claimants. Assuming, solely for curtailment determinations, that the diverter has a valid riparian right, they may continue to divert under that right, subject to its restrictions, unless and until the riparian right is curtailed. In nearly all scenarios, this represents a conservative simplifying approach within the Methodology, because riparian rights are assumed to be senior to all appropriative rights, absent specific evidence to the contrary.

2.2.5 Demand Aggregation by Subwatershed

The Water Unavailability Methodology requires that both the supply and demand data be aggregated to a common spatial resolution for comparison purposes. The supply data is generally only available at the HUC8 watershed scale or larger, while the demand data includes both the HUC8 watershed and the precise spatial location (latitude and longitude) of each POD. For the purpose of this analysis, demand values within the demand dataset were aggregated at the same subwatershed scale as supply values within the supply dataset (see section 2.1.3 above). The subwatershed assignments of specific PODs, such as those located near Folsom, Oroville, and Friant Dams, were reassigned on a case-by-case basis within the demand dataset to better fit the demand to the subwatershed from which it draws supply.

All of the PODs of most water right records are geographically located within a single subwatershed. In these instances, all of the demand associated with these rights is attributed to that subwatershed. Sixty-five water right records in the Delta watershed have PODs that span multiple subwatersheds. Of these, 11 are Project water rights, which frequently have PODs upstream at the major storage reservoirs, downstream on major tributaries, and within the Legal Delta. As described in section 2.2.6 below, the Water Unavailability Methodology treats these demands differently because of the unique circumstances of the Projects' diversions. For the 54 remaining non-Project rights that have PODs within multiple subwatersheds, the total reported diversion for each water right record was split among the applicable subwatersheds based on the proportion of the total active direct diversion PODs located within each subwatershed. For example, if a water right record had 3 associated PODs, one of which was located within the Sacramento Bend subwatershed and 2 within the Upper Sacramento Valley subwatershed, one-third of the total demand for the water right would be attributed to the Sacramento Bend subwatershed and two-thirds to the Upper Sacramento Valley subwatershed. An apportionment of demand based on the amount diverted at each POD is not possible at this time because water diversion and use information is typically reported by water right and not for individual PODs.

2.2.6 Project Demands

The Projects divert and store water for use by contractors both within and outside of the Delta watershed. These contractors include contractors that do not have their own basis of right and contractors that have their own bases of water right that may also receive supplemental contract supplies (referred to as settlement contractors). Settlement contractors entered into contracts with the Projects to resolve water right disputes related to construction of the Projects. These contracts are not synonymous with the underlying rights but are instead negotiated agreements. Project contractors that do not have their own water rights include CVP service contractors and SWP Table A contractors. CVP service contracts and SWP Table A contracts include contracts for use within the Delta watershed and use outside of the Delta watershed. Diversions by the Projects for uses outside of the Delta watershed are subject to area of origin

protection pursuant to the Water Code.²⁴ This protection prohibits the Projects from diverting for purposes of exporting natural and abandoned flows needed for uses within the Delta watershed.

In recognition of area of origin protection, Project demands were assumed to have the lowest priority date among Delta watershed rights. While some of the Projects' diversions serve inbasin purposes that are not subject to area of origin protection, this summer all of these uses are expected to be met with previously stored water due to the lack of significant inflow and other Project obligations. Adjustments will be considered for the wet season to account for the priority of inbasin uses. However, any changes to the priority dates are not expected to have a significant effect on the analysis given the Projects' relatively junior water right priority and the likelihood that curtailment will not be in place when Project direct diversions are occurring for inbasin uses. In addition to recognizing area of origin protection, identifying Project demands as junior to all others ensures that any duplicate reporting between the Projects and their various settlement contractors that have their own underlying water rights or claims of right does not inflate demands in a manner that materially affects the analysis. The exception to this approach is for New Melones Project water rights (A014858A and A014858B). Since New Melones water is not authorized for export out of the Delta watershed, these demands are assumed to be met in accordance with the original priority date of the rights.

Generally, the Projects will not be diverting natural and abandoned flow and will be releasing previously stored water under conditions when notices of water unavailability or curtailment orders would be issued. The responsibility to meet water quality and flow requirements effectively results in curtailment of Project water rights without any further action. Accordingly, while notices of water unavailability or curtailment orders may still be issued to the Projects, such notices or orders are unlikely to have a material effect.

2.2.6.1 *Trinity River Imports*

Several consumptive water rights associated with the CVP Trinity River Division (A005628, A015374, A015375, A016767, and A017374) have PODs within the Delta watershed, but the water they divert originates from the Trinity River watershed. These water rights and correlating diversion data were removed from the Delta watershed demand dataset for analysis because the water associated with these diversions is imported to the Delta watershed and does not impact supply forecasting for the watershed.

2.2.6.2 Settlement Contractor Demands

As discussed above, there are various water users in the Delta watershed that have settlement contracts with DWR and Reclamation that provide a contractual entitlement of a certain supply to these users. These contracts are intended to satisfy these users'

²⁴ Wat. Code, §§ 11128, 11460.

underlying rights and to provide supplemental supplies. Because these users have both their own water rights or claims of right for which they likely report use and contractual supplies for which DWR and Reclamation report use, there may be overlapping reporting of demands.

For the purpose of this analysis, it is assumed that most settlement contractors, with the exception of the Exchange Contractors on the San Joaquin River (see below discussion), have demands for natural and abandoned flows in accordance with their water use reports and that these users will take water pursuant to their senior water rights first if it is available. The fact that the supply may not be available at the senior priority of right or claim of right is not assumed to diminish the demand. Accordingly, settlement contractors may receive notices of water unavailability or curtailment orders under their own water rights and would then need to rely upon contractual supplies to the extent those supplies are available.

Sacramento River and Feather River Settlement Contractor Demands

As a result of the very dry hydrologic conditions this year, allocations to Sacramento River and Feather River settlement contractors under their contracts during the contract period have been reduced to approximately 75 and 50 percent, respectively . However, these reductions are not assumed under this analysis because the contracts are not synonymous with the underlying right or claim. For example, Sacramento River settlement contract amounts total 2.1 million acre-feet (MAF) but reported use under these contractors' underlying water right claims is closer to 1.4 to 1.6 MAF (which is close to 75 percent of the contract amount). Also, these groups of users have different priorities of rights and include a combination of pre-1914 and post-1914 rights (e.g., over 600 thousand acre-feet of Sacramento River settlement contractors' reported use in 2018 occurred under post-1914 claims of right). Accordingly, it is not clear which rights demands should be reduced.

Exchange Contractors

The Exchange Contractors receive replacement supplies exported from the Delta in exchange for use of water from the San Joaquin River under the Exchange Contractors' underlying rights as part of settlement contracts related to the development of the Friant Project by Reclamation. Accordingly, all Exchange Contractor demands are assumed to be met with previously stored CVP supplies since the Exchange Contractors do not use water from the San Joaquin River under their underlying water right claims unless they are shorted supplies under their Exchange Contracts. If shortages occur the assumptions in the methodology will be adjusted to account for those shortages and the resulting demand for San Joaquin River water under the Exchange Contractors' claimed water rights.

2.2.7 Interbasin Diversions (Yuba-Bear and Drum-Spaulding)

Non-consumptive uses are generally not included in demand estimates under the methodology at this time. However, the May 12, 2021 draft methodology identified that

adjustments were planned to be made to account for the interbasin diversions that occur from the Yuba River watershed to the Bear and American Rivers as part of highly complex hydroelectric project operations under Pacific Gas and Electric Company's (PG&E) Upper Drum-Spaulding Hydroelectric Project and Lower Drum Hydroelectric Project and Nevada Irrigation District's (NID) Yuba-Bear Hydroelectric Project. Under Upper Drum-Spaulding and Yuba-Bear hydroelectric project operations, water is exported from the Yuba River watershed to the Bear River via the South Yuba Canal and the Drum Canal.

Since May 12, 2021, adjustments to the demand dataset to account for interbasin diversions between the Yuba River watershed and Bear River watershed were considered. However, a review of information contained within the applicable PG&E and NID water right records indicated that diversions through the South Yuba Canal and Drum Canal are already reported under water right records located in the Yuba River subwatershed. In addition, it appears that previously stored water accounts for a large portion of the water transferred from the Yuba River to the Bear River during the summer months. Therefore, adjustments were not applied to account for the interbasin diversions at this time. Adjustments will be considered for the wet season and based on updated demand data that may be submitted pursuant to an emergency regulation.

2.2.8 Accretions and Return Flow Estimates

Accretions in the valley floor during the dry season are primarily due to return flows. In recognition that only a portion of diversions are actually consumptively used due to return flows from irrigation and, to a lesser extent, municipal uses, a return flow factor was applied to diversion values within the Delta watershed demand dataset. Return flows are water that is diverted and returned to the river as part of agricultural and urban uses. Agricultural return flows include operational spills from canals, flow through and draining of rice paddies, and drainage from other agricultural fields. The volume of return flows from agriculture varies based on type of use, crop type, location, soils, and season. Urban return flows are primarily comprised of treated effluent from wastewater treatment plants. Natural depletions due to stream-groundwater interaction and demand by riparian vegetation are difficult to estimate and not accounted for in the methodology, which represents a conservative assumption that may overestimate water availability and reduce curtailments.

Out of the hundreds of return flow sources in the Delta watershed, the rates and volumes of most are unknown and only a handful have measurement gages. Rates of return flow can be estimated using models developed to simulate surface and groundwater hydrology. Models that have been developed for the Delta watershed include SacWAM, CalSim, C2VSIM, and regional water budgets developed by DWR. Of these models, CalSim 3 is the most complete hydrologic simulation model of the Sacramento and San Joaquin River watersheds. SacWAM provides detailed representations of the hydrologic processes including return flows in the Sacramento River watershed but does not include a representation of the San Joaquin River

watershed. CalSim 3 return flow rates show similar trends to SacWAM results for the Sacramento River watershed. DWR's surface-groundwater model, C2VSIM fine grid, may provide useful information on return flows with future calibration efforts, but at this time the surface hydrology does not correspond well with observed data during dry periods. DWR's regional water budgets may also provide useful estimates of return flows in the future, but at this time they are not available.

CalSim 3 includes simulations for the 1922–2015 period. For the purpose of estimating return flows for the methodology, results for water year 2014 were analyzed because it is a recent year out of the period of simulation that has hydrology that most closely matches current and forecasted conditions for 2021. A review of CDEC data from 2014 and this year at locations dominated by return flows indicates that these return flow estimates are likely much higher than is actually occurring this year. As such, use of the CalSim 3 data is considered a conservative assumption. This assumption is planned to be further evaluated to determine if changes should be made in the future.

The CalSim 3 results, summarized in Table 5 and Table 6 below, show an increasing return flow as a percent of diversion after May continuing throughout the remainder of the irrigation season in the Sacramento River watershed and generally lower and more constant return flows in the San Joaquin River watershed. The increasing proportion of return flow in the Sacramento River watershed is primarily due to decreased diversions in August and September and draining of rice fields in September. Given the extreme dry conditions this year and changes in rice acreage this year, return flow assumptions in September and to some extent August may be high representing a conservative assumptive that would reduce curtailments. Urban return flows remain relatively constant throughout the irrigation season. In the San Joaquin River watershed, agricultural and urban return flows remain relatively constant throughout the summer.

Month	Diversions (TAF)	Return (TAF)	Percent Return
Мау	829	320	39%
June	845	161	19%
July	875	184	21%
August	660	187	28%
September	339	324	96%
Annual Average	4,990	2,093	42%

Table 5. CalSim 3 Results of Monthly Diversions and Return Flows for Sacramento River Watershed, May–September 2014

Month	Diversions (TAF)	Return (TAF)	Percent Return
Мау	313	75	24%
June	362	76	21%
July	403	85	21%
August	331	68	21%
September	216	54	25%
Annual Average	2,566	605	24%

Table 6. CalSim 3 Results of Monthly Diversions and Return Flows for San Joaquin River Watershed, May–September 2014

Spatially, most diversions and return flows occur in the Sacramento and San Joaquin Valley regions. Accordingly, return flow factors were only applied to demands in the Sacramento Bend, Upper Sacramento Valley, Sacramento River Valley Floor, and San Joaquin River Valley Floor subwatersheds.

2.3 Adjustments to the Supply and Demand Datasets

2.3.1 Elimination of Unmet Demand

A significant improvement over the water unavailability methodology used in the previous drought is the implementation of a more granular analysis, evaluating supply and demand on both a subwatershed level (e.g., a single tributary like the Feather River) and watershed-wide level (the Sacramento and San Joaquin River watersheds). The watershed-wide analysis also includes water rights that divert from within the Legal Delta (see section 2.3.3 below). This allows for water unavailability to be determined based on physical supplies within a headwater stream and for the accounting of senior demands that may have priority to divert that supply further downstream. Supply and demand are compared at a subwatershed level for those subwatersheds that are not downstream of any other subwatershed. Demands within these "headwater" subwatersheds can only be met by supply originating within the subwatershed itself. Figure 10 below is a schematic showing how this analysis was performed using the supply and demand data previously described.

Figure 10. Schematic of Supply and Demand Analysis at the Subwatershed and Watershed Levels



As shown in Figure 10, supply and demand are first compared within headwater subwatersheds. While supplies from headwater subwatersheds are considered available to meet downstream demands in the larger Sacramento or San Joaquin River watershed analyses, only headwater subwatershed demand that is able to be met by available supply in the headwater subwatershed is considered in the watershed analysis.

The headwater subwatersheds in the Sacramento River watershed include the Sacramento River and tributaries above Bend, Stony Creek, Cache Creek, Putah Creek, the Upper Feather River above Oroville Dam, Yuba River, Bear River, and the Upper American River above Folsom Dam (see Figure 5). The headwater subwatersheds in the San Joaquin River watershed are the Upper San Joaquin River above Friant Dam, Merced River, Tuolumne River, Stanislaus River, Calaveras River, and the Cosumnes River. Figure 11 below shows a schematic of the subwatersheds previously mapped in Figure 5. A small number of rights in the headwater Putah Creek, Stanislaus River, Calaveras River, and Cosumnes River subwatersheds which lie within the Legal Delta were excluded from the headwater subwatershed analysis and included only in the Sacramento and San Joaquin watershed-wide analyses, as they have access to water from both the Sacramento and San Joaquin Rivers (see section 2.3.3 below).

Lower subwatersheds are defined as such because they contain demands that can be met by supplies from outside tributaries (the headwater subwatersheds). The Upper Sacramento River Valley and Sacramento River Valley floor subwatersheds are considered lower watersheds because demands within them may be met from the mainstem of the Sacramento River flowing in from the Sacramento River at Bend. Similarly, the San Joaquin River Valley Floor includes demands on the mainstem of the San Joaquin River that can be met by inflow from the Stanislaus, Tuolumne, Merced, and Upper San Joaquin River subwatersheds.

Additional subwatersheds in the San Joaquin River watershed were classified as lower subwatersheds because their boundaries, based on HUC8 watersheds mapped in the USGS NHD (see section 2.1.3 above), contain demands that are not met from supplies within the subwatershed. These consist of the Chowchilla River (which includes minor east side tributaries and the mainstem of the San Joaquin River from Friant Dam to the confluence with the Merced River), Fresno River (which includes diversion points on the Eastside Bypass that are supplied by San Joaquin River flood flows), and the Mokelumne River (which includes demands on the mainstem of the San Joaquin River within the Legal Delta) subwatersheds. The Legal Delta is not a distinct subwatershed; it is a category of rights within several subwatersheds which have access to water from both the Sacramento and San Joaquin Rivers (see section 2.3.3 below).

Figure 11. Subwatersheds Schematic



Diverters within headwater subwatersheds whose demand cannot be physically met by the supply available within those subwatersheds may receive notices of water unavailability or curtailment orders based on the headwater subwatershed-level analysis. In addition, if demand in a headwater subwatershed exceeds the available supply, the excess demand is eliminated from the larger watershed-wide analysis. As a result, demand that cannot be met by physically available supplies is not "charged against" supplies from elsewhere in the Delta watershed.

The evaluation of water unavailability at the headwater subwatershed scale is only part of the evaluation of water unavailability. Though water may be physically available within a headwater subwatershed, it may be needed to meet the demand of senior users downstream that may have the right to some of the water originating in the headwater subwatershed. This broader unavailability is shown in the watershed-wide analysis for the Sacramento and San Joaquin River watersheds.

2.3.2 Treatment of Riparian Demands and Elimination of Supply and Demand in Disconnected Headwater Subwatersheds

The Water Unavailability Methodology does not currently specifically evaluate water unavailability for individual riparian claimants unless there is no flow available.²⁵ In times of shortage, riparian rights provide for sharing of those shortages. Given the scale and complexity of the Delta watershed, the methodology does not yet fully evaluate how that sharing should occur. However, the methodology can be used to evaluate general quantities of water that may be unavailable for riparian claimants and when riparian claimants should implement measures to address those shortages. In the future, refinements to the methodology may be made to further address water unavailability for riparian claimants.

If the headwater subwatershed analysis indicates that the total demands of riparian claimants exceed the available supply in a particular headwater subwatershed, the headwater subwatershed's supplies and demands are removed from the watershed-wide analysis for that month. In other words, the methodology assumes that the given stream would not have continuity with the larger Delta watershed and would be considered "disconnected" due to fulfillment of the local senior water right demands.

The Water Unavailability Methodology Spreadsheet, available on the State Water Board's Delta Water Unavailability Methodology webpage, contains a table in the 'Analysis Headwaters' tab which summarizes which headwater subwatersheds were assumed to be disconnected from the Delta watershed in specific months as a result of this analysis.

2.3.3 Proration of Legal Delta Demands

Diverters with appropriative water rights with points of diversion within the Legal Delta (as defined in Water Code section 12220) may have access to water supplies entering the Delta from both the Sacramento and San Joaquin River watersheds. To account for this, appropriative demands within the Legal Delta were prorated between the two watersheds based on the monthly proportion of connected supply available (see section 2.3.2 above) from each watershed. For example, if the Sacramento River watershed contributes 80 percent of the water supply reaching the Legal Delta in a given month, 80 percent of Legal Delta appropriative demand is charged against Sacramento River watershed supply for that month and 20 percent is charged against San Joaquin River watershed supply. The proration of Legal Delta appropriative demands is only applicable to the assessment of water unavailability at a watershed-wide scale and does not impact the assessment of water unavailability at the headwater subwatershed scale. Water rights and claims with points of diversion within the Legal Delta that claim only

²⁵ These demands are assumed to be senior in priority to all other demands for the purposes of the methodology. As discussed above, there may be instances where a pre-1914 appropriative right is senior to a riparian. In those cases, adjustments can be made.

appropriative water rights will only receive notices of water unavailability or curtailment orders if both the Sacramento River watershed analysis and the San Joaquin River watershed analysis show that water will be unavailable at their priority of right. The hydrology of the Legal Delta is complex, and this proration method offers a simplified and generous assessment of water unavailability to appropriators in the Legal Delta during this critically dry period.

Consistent with the analysis contained in State Water Board Order WR 89-8, the methodology assumes that riparian claims do not have access to supply outside the watershed where they are located (i.e., a riparian claim along the San Joaquin River in the Legal Delta does not have a right to divert natural or abandoned flow of water originating from the Sacramento River). Therefore, Statements of Diversion and Use with points of diversion within the Legal Delta that claim only riparian rights are excluded from the Legal Delta proration process described in the previous paragraph and are only charged against supply in the watershed where they are located. Statements of Diversion and Use with points of diversion in the Legal Delta claiming both riparian rights and pre-1914 or other non-riparian categories of right were assumed for the purposes of the methodology to be riparian claims and were therefore accorded senior priority over all appropriative water rights (see section 2.2.4 above).²⁶

Monthly supply ratios for the Sacramento and San Joaquin River watersheds were calculated based on data for 2021; for past months of 2021, these months' FNF values were used. For current or future months, the exceedance forecast selected for use in determining water unavailability for each watershed (see section 3.1.1 below) was used for the proration. These supplies include abandoned instream flows in excess of FNF (see section 2.1.6 above) and do not include flows from headwater subwatersheds assumed to be disconnected from the Delta watershed (see section 2.3.2 above).

The methodology does not assume there is storage (residence time) longer than a month in the Legal Delta that would affect water unavailability given the extremely dry conditions that have persisted for an extended period and the supplementation of flows in the Delta with previously stored water for many months. The methodology also only accounts for freshwater natural flows from the Sacramento and San Joaquin Rivers as part of the available supplies and does not include any water supplies from tidal inflows to the Legal Delta. Saline water entering the Legal Delta from the San Francisco Bay via tidal action is assumed to be of insufficient quality to be usable for agricultural or municipal purposes. Technical Appendix D explains the technical analysis that supports these assumptions.

²⁶ This categorization of colorable riparian claims within the Legal Delta is consistent with the legal principles described in a memorandum dated December 15, 2017, regarding Issues Related to Overlap between Pre-1914 and Riparian Water Right Claims in the Delta and available on the website of the Office of the Delta Watermaster (<u>Overlap Memo</u>).

2.4 Water Unavailability Visualizations

The Water Unavailability Methodology includes two major types of water unavailability visualizations: the headwater subwatershed visualizations (14 in total) and the watershed-wide visualizations,²⁷ consisting of one for the Sacramento River watershed and one for the San Joaquin River watershed. Samples of these graphs are provided below in Figures 12, 13, and 14. Each graph can display demand data from either the 2018 or 2019 demand datasets. The demands are sorted by water right priority, with riparian demand at the bottom of the graphs, followed by pre-1914 appropriative demand, which are grouped by priority decade. Project demands are stacked at the top (see section 2.2.6 above).

The subwatershed visualization displays four water supply scenarios: the 10 percent, 50 percent, 90 percent, and 99 percent FNF exceedance forecasts, representing optimistic, neutral, pessimistic, and extremely pessimistic forecasts, respectively. Because conditions in the Delta watershed are currently extremely dry, the adjustments to the supply and demand datasets described in section 2.3 above were done using the 90 percent FNF exceedance forecast.²⁸ As a result, the watershed-wide visualizations display a single supply scenario, the adjusted 90 percent exceedance forecast.





²⁷ Supply and demand within the watershed-wide analyses is adjusted as described in section 2.3 above.

²⁸ Section 3.1.1 below describes how daily FNF may be used to determine which monthly FNF exceedance forecast most closely represents actual conditions.



Figure 13. Sample Sacramento River Watershed Water Unavailability Visualization

Figure 14. Sample San Joaquin River Watershed Water Unavailability Visualization



The visualizations have been made available on the Board's Delta Water Unavailability Methodology webpage using the Tableau interactive platform and will be updated monthly to reflect current supply conditions and forecasts. As discussed above, the 2018 demand dataset is planned to be used to assess if insufficient supply is available to meet demands (i.e., the demands positioned above the applicable supply line(s) in the visualizations). In cases where riparian demand exceeds supply (i.e., in disconnected headwater subwatersheds or for riparian demands above the applicable supply line(s) in the visualization) there may be water unavailable to meet all riparian demands. Section 3.1 below describes the proposed process for issuing notices of water unavailability or curtailment orders to diverters.

3 Implementation

3.1 Issuance of Notices of Water Unavailability and Curtailment Orders

The Water Unavailability Methodology is being used to determine when there is insufficient supply to meet diverters' priorities of right within the Delta watershed based on the best available information, either at the scale of a headwater subwatershed or the wider Sacramento or San Joaquin River watersheds. Based on prior outputs of the methodology, on June 15 and July 23, 2021, the State Water Board issued notices of water unavailability (also referred to simply as "notices") to water right holders and/or claimants in the Delta watershed indicating that water supplies are not available for their use. Notices, unlike curtailment orders, are not directives to stop diverting. Rather, they inform affected diverters that water is expected to be unavailable for their diversion in a future time frame. These notices also play an important policy and public relations role by offering the opportunity for voluntary compliance prior to formal enforcement action by the Board. Diverting unavailable water can result in penalties for injuring more senior water right holders and public trust resources.

Given the dire water supply conditions in the Delta watershed, on August 20, 2021, based on the output of the methodology and the authority granted to the Board under the emergency regulation, the Board issued curtailment orders to all post-1914 appropriative water right holders in the Delta watershed, many pre-1914 appropriative claimants, as well as some riparian claimants. Unlike notices of water unavailability, curtailment orders are directives to stop diverting. The curtailment orders will continue to be updated as conditions change, require affected right holders and claimants to cease diversions when water is not available under a water right holder's or claimant's priority of right unless and until (1) they have authorization to continue diverting pursuant to one of the exceptions enumerated in the regulation, or (2) they receive notice that the curtailment order has been temporarily suspended or permanently lifted. In addition, the emergency regulation authorizes the State Water Board to require enhanced reporting of some larger water users to provide additional information on past diversion and use, and future projected use. That information is planned to be used to better inform future curtailment decisions.

As discussed above, appropriative diverters in the Legal Delta will only receive notices of water unavailability or curtailment orders if supply is unavailable to them from both the Sacramento and the San Joaquin Rivers, the issuance of which will be coordinated with the Office of the Delta Watermaster. In addition, implementation of this methodology will operate separately from issuance of curtailment notices pursuant to standard water right Term 91, which has been in effect since April 29, 2021, and is likely to be in effect until significant precipitation occurs.

3.1.1 Exceedance Forecast Selection

The methodology requires the selection of an appropriate future supply forecast (e.g., 10 percent, 50 percent, 90 percent, or 99 percent exceedance forecasts) for use in determining which diverters should receive notices of water unavailability or curtailment orders. To account for the potential variability of daily water supply and the degree of uncertainty inherent in monthly forecasts, cumulative daily FNF estimates²⁹ for the current month, sourced from CDEC and CNRFC³⁰ (see Table 1 and Table 2 above) will be compared to the most recent monthly supply forecasts. Interactive visualizations of these comparisons for total supplies in the Sacramento and San Joaquin River watersheds have been made available on the Board's Delta Water Unavailability Methodology webpage using the Tableau interactive platform. These plots will be updated periodically throughout each month to reflect current supply conditions.

The comparison of monthly forecasts to cumulative daily supplies over the month will provide an indication of which forecast is likely to be the most accurate predictor of actual conditions. These evaluations are planned to error in favor of reducing curtailments. For example, if the cumulative daily FNF tracks close to the 90 percent monthly supply forecast, the 90 percent supply forecast would be used to determine the priority at which notices or orders should be issued. If the daily cumulative FNF exceeds the 90 percent supply forecast only part way through the month, the 50 percent supply forecast may be used. In addition, the State Water Board will continually evaluate the need to discontinue notices of water unavailability or curtailment orders based on forecasted or actual precipitation and runoff that does, or is expected to, result in a measurable increase to available supplies. Additional available datasets that may be used to monitor and forecast precipitation and runoff include Quantitative Precipitation Forecasts (QPF) from CNRFC, Atmospheric River (AR) Activity subseasonal outlooks from the Center for Western Weather and Water Extremes, use of the USGS Basin Characterization Model, and other tools.

²⁹ As described in section 2.1.4 above, daily FNF data are valuable for the purpose of this check but are not suitable to replace past or forecasted monthly FNF values because they are based on fewer data points than are available at the end of each month and due to the lag time between upstream operations and their effect on downstream flow measurements.

³⁰ Occasionally, CDEC or CNRFC may report negative daily FNFs. These values are replaced with zero values before any further calculations are performed.

Different exceedance forecasts may be used between the Sacramento River watershed and the San Joaquin River watershed, if appropriate. The exceedance forecast selected for the watershed-wide analyses will also be used for that watershed's headwater subwatershed analyses. For example, if the 90 percent exceedance forecast is determined to be the most likely to accurately predict conditions in the Sacramento River watershed, it will be used for the Sacramento River watershed-wide analysis as well as each of the headwater subwatershed analyses for that watershed.

3.2 Water Quality and Public Trust Resources

The Water Unavailability Methodology does not account for any of the following: (a) water needs for public trust resources; (b) natural instream losses and evaporation; or (c) non-agricultural consumptive uses in the Delta (e.g., open water evaporation, riparian vegetation, etc.).³¹ Currently, notices of water unavailability or curtailment orders are not proposed to be issued to make water available for the environment, only to make water available for senior water right holders and claimants and to prevent the unlawful diversion of storage releases which are intended to meet water quality and flow requirements or contract demands. The methodology does not affect other obligations that water users may have for meeting flow and other requirements.

3.3 Communication and Public Engagement Strategy

State Water Board staff has engaged with a number of water users on issues related to the development of the Water Unavailability Methodology. In addition, a public workshop regarding the May 12, 2021 draft version of the methodology was held on May 21, 2021, during which numerous parties provided oral comment. Numerous written comments on the draft methodology were also timely received by the May 25, 2021 deadline. Since that time, modifications have been made to the methodology to support the determination of water unavailability for water right holders and claimants in the Delta watershed. These changes are described throughout this document, as well as its technical appendices.

The State Water Board will continue to regularly update the information used to determine water unavailability in the methodology as new data becomes available and as needed to address wet season information needs as described above. Regular updates regarding issues related to water unavailability will be provided to the public during Board meetings. At least monthly updates will also be provided on the Board's Delta Water Unavailability Methodology webpage, including updated water unavailability visualizations. If daily cumulative FNF significantly exceeds the forecasted monthly supply used in the methodology, the webpage will be updated more frequently to communicate any changed conditions to diverters.

³¹ For context, the State Water Board's 1977 Drought Report Appendix, Table 14 estimated that non-agricultural consumptive water use in the Delta was as high as 74,560 AF in June 1977.
This methodology does not represent a static assessment of how the State Water Board will determine water unavailability within the Delta watershed. The methodology may change as the season progresses and based on new information and refined analyses, as appropriate. This methodology is a first step toward refining the Board's process for issuing notices of water unavailability or curtailment orders, which includes refinements upon the 2014 and 2015 methodology that were feasible given existing time and data constraints. Additional refinements to the methodology beyond those discussed above may be needed if the methodology is applied during the upcoming wet season.

Public engagement was also an important component in the development of the emergency regulation ultimately adopted by the Board on August 3, 2021. Public comment was solicited and received, and public comment was received during a July 27, 2021 workshop and at the Board meeting, which led to refinement of the regulation.

4 Areas of Potential Refinement

4.1 Near-Term Opportunities

4.1.1 **Supply**

California water supply data is generated by agencies other than the State Water Board and is, therefore, subject to the data quality assurance programs and improvements of those agencies. In the near-term, the State Water Board will continue to focus refinement efforts on improvements to the preparation of supply data for use in water unavailability analyses. These improvements relate to analysis repeatability, automation of the data preparation process, and data documentation. Within the next few years, the Board may further improve the preparation of supply data via the implementation of additional data validation methods, refinement of the process to identify and fill data gaps, and incorporation of new supply data as it becomes available. The Board may also alter the assumptions of the analysis to reflect increased understanding of groundwater interactions, riparian evapotranspiration, and evaporative losses.

4.1.2 Demand

The State Water Board will continue to refine the demand dataset used in the Water Unavailability Methodology as appropriate by streamlining existing processes and improving demand estimates and accounting. This includes the identification of additional data entry errors, estimation of demand values where necessary and feasible, and additional data quality control methods. In addition, as discussed above, emergency regulations may be adopted that require the submittal of demand projections that can be used in the methodology as appropriate. Refinement of the representation of non-consumptive uses will also be evaluated. The Board will also continue ongoing work with diverters to improve water accounting by minimizing instances of duplicate reporting, identifying incorrectly reported re-diversions, refining estimates of return flows from larger scale diverters such as those diverting more than 100,000 AF per year, and increasing compliance with the regulations that resulted from SB88. The Board may also consider specific demand issues within the Legal Delta for lands below sea level as described in the proposed emergency regulations.

Over the next few years, the State Water Board plans to develop cross-validation methods using other datasets such as aerial imagery, OpenET, and land use datasets to assess the validity of reported demand values. The Board may also refine the subwatershed demand aggregation method (see section 2.2.5 above) by developing more accurate estimates of proportional demand for water rights that have PODs located in more than one subwatershed. In addition, the Board may use the historical demand record to develop statistical and predictive approaches to identify outliers in the demand dataset and, in conjunction with outside datasets, develop higher temporal resolution for demand estimates.

4.2 Longer-Term Opportunities

In the next several years as part of larger efforts, the State Water Board will work toward developing a data management plan for the demand dataset. The plan's primary functions will be to formalize quality assurance measures, improve data intake processes, and publish the dataset in accordance with Assembly Bill 1755 and the State Water Board's Open Data Resolution to the extent feasible. During the plan development, the Board will expand upon existing data validation efforts using land usebased demand estimates and collaborate with other agencies or organizations to identify where the installation of telemetered diversion gages is needed to enable the validation of demand data to an acceptable level of accuracy. The Board may also look to refine internal and external accounting methods for contracted water, water transfers, and other issues.

Ultimately, the demand data is most limited by the number of required or available telemetered diversion measurement gages and the relatively infrequent manual reporting requirements. These spatial and temporal limitations prevent the State Water Board from conducting a finer scale analysis and responding in real time to limited water availability. New requirements for reporting diversions and transitioning to land use-based demand estimates could improve the spatial and temporal coverage of water demand data in California and improve the Board's ability to effectively monitor and manage water supplies.

In the long-term, the Board is also planning to evaluate the use of more sophisticated dynamic evaluation tools capable of addressing the complexities of water unavailability issues in the Delta watershed and other areas of the state with greater spatial and temporal resolution. To be effective, however, these tools are dependent on data of adequate quality.

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Technical Appendix A

Technical Appendix A: Methodology Spreadsheet Description is available on the Delta Water Unavailability Methodology webpage at

https://www.waterboards.ca.gov/drought/drought_tools_methods/delta_method.html

Technical Appendix B

Technical Appendix B: Demand Dataset Description and Preparation is available on the Delta Water Unavailability Methodology webpage at https://www.waterboards.ca.gov/drought/drought_tools_methods/delta_method.html

Appendix C

Appendix C: Summary of Public Comments is available on the Delta Water Unavailability Methodology webpage at https://www.waterboards.ca.gov/drought/drought_tools_methods/delta_method.html

Technical Appendix D

Technical Appendix D: Justification for Water Availability within the Legal Delta is available on the Delta Water Unavailability Methodology webpage at https://www.waterboards.ca.gov/drought/drought_tools_methods/delta_method.html

EXHIBIT J

Technical Appendix A: Methodology Spreadsheet Description

This appendix outlines the process used to assess water supply and demand in the Sacramento-San Joaquin Delta (Delta) watershed and describes each input used for the analysis and output produced by the analysis. Each section of this document describes a separate tab in the Delta Water Unavailability Methodology Excel workbook ("spreadsheet"), the significance of each column, and data sources.

Subwatersheds

This tab shows how Hydrologic Unit Code Level 8 (HUC8) watersheds from the U.S. Geological Survey (USGS) Watershed Boundary Database (WBD) are categorized into "subwatersheds" for the purpose of this analysis. It also indicates the primary watershed that each subwatershed is tributary to, as well as the subwatershed "type" (headwater or lower) assigned to each. These relationships underpin much of the analysis. A map of Delta subwatersheds can be found in Figure 5 of the main report.

Field Name(s)	Definition & Methodology	Data Source(s)
Watershed	The two primary river systems in the Delta watershed: Sacramento and San Joaquin.	USGS WBD
Subwatershed	An area encompassing one or more HUC8 watersheds, determined based on geospatial mapping of stream and diversion locations and the unavailability of full natural flow (FNF) supply locations ("gages"). Subwatershed is the smallest area over which water unavailability is determined.	Staff- determined

Field Name(s)	Definition & Methodology	Data Source(s)
Subwatershed Type	 Subwatersheds are categorized as either 'headwater' or 'lower' for the purpose of this analysis: A headwater subwatershed contains water demands which can only be met by water supplies within the subwatershed (i.e., there are no tributaries flowing into the subwatershed). A lower subwatershed can receive water supplies from outside its boundaries (i.e., it is located downstream of the headwaters). 	Staff- determined
HUC8	The boundaries of watersheds which contain land that all drains to the outlet, as delineated and classified by the USGS. This delineation provides a consistent boundary for classifying water supplies and demands for the analysis.	USGS WBD

To the right of the data table is a key for the various colors used for each tab of the spreadsheet. **Green tabs** contain data fields that can be updated or revised to change the analysis; cells with modifiable data are **highlighted green** throughout the spreadsheet. **Orange tabs** contain only a limited number of data fields that accept updates. **Red tabs** contain only data outputs and should not be modified.

Supply Past Monthly

This tab contains historical monthly supply data for each of the 20 subwatersheds in the analysis, dating back as far as water year (WY) 1901 for some subwatersheds (NOTE: a water year runs from October of the previous year through September; e.g., WY 2021 is October 2020 through September 2021). Supply data consists of full natural flow (FNF, also known as "unimpaired flow") data compiled from the California Data Exchange Center (CDEC), a March 2016 report from the Department of Water Resources (DWR) on unimpaired flows in the Central Valley from WY 1922-2014, and the California Nevada River Forecast Center (CNRFC). Direct links to individual gage datasets are provided in the spreadsheet. Supply volumes are provided in units of acrefeet (AF), converted from thousand acre-feet (TAF) for some data sources. Certain fields are estimated or adjusted using gap-filling (GF) procedures, which are explained in the next section.

Field Name(s)	Definition & Methodology	Data Source(s)
Year, WY, Month	The calendar year, water year, and calendar year month of the respective water supply volume. The dataset begins with water year 1901 (starting in October 1900) and continues through the end of water year 2021 (September 2021); data fields for current and future months are blank.	
Sacramento Bend	Monthly FNF data for the Sacramento River at Bend subwatershed (including the Sacramento, McCloud, and Pit Rivers above Shasta Reservoir and Cow, Cottonwood, Battle, Clear, and Paynes Creeks): - CDEC station SBB, sensor 65 for WY 1906-Present.	CDEC
Stony	Monthly FNF data for the Stony Creek subwatershed (at Black Butte Reservoir): - DWR subbasin UF4 for WY 1922-2014. - CNRFC station EPRC1 (daily TAF summed to monthly AF) with GF augmentation for WY 2015-Present.	DWR, CNRFC w/ staff adjustments
Cache	Monthly FNF data for the Cache Creek subwatershed (above Rumsey): - DWR subbasin UF3 for WY 1922-2014. - GF extrapolation based on Stony Creek for WY 2015-Present.	DWR, staff estimates
Upper Feather	Monthly FNF data for the Upper Feather River subwatershed (at Oroville Dam): - CDEC station FTO, sensor 65 for WY 1906-Present.	CDEC
Yuba	Monthly FNF data for the Yuba River subwatershed (near Smartville): - CDEC station YRS, sensor 65 for WY 1901-Present.	CDEC
Bear	Monthly FNF data for the Bear River subwatershed (near Wheatland): - DWR subbasin UF10 for WY 1922-2014. - GF extrapolation based on Yuba River for WY 2015-Present.	DWR, staff estimates

Field Name(s)	Definition & Methodology	Data Source(s)
Upper American	Monthly FNF data for the Upper American River subwatershed (at Folsom Dam): - CDEC station AMF, sensor 65 for WY 1901-Present.	CDEC
Putah	Monthly FNF data for the Putah Creek subwatershed (near Winters): - DWR subbasin UF2 for WY 1922-2014. - GF extrapolation based on Stony Creek for WY 2015-Present.	DWR, staff estimates
Upper Sacramento Valley	 Monthly FNF data for the Upper Sacramento River Valley subwatershed (tributaries between Bend and Butte Slough, including Redbank, Elder, Thomes, Antelope, Mill, Deer, Big Chico, and Butte Creeks): DWR subbasins UF5+UF7 for WY 1922- 2014. CNRFC stations EDCC1+TCRC1+MLMC1+DCVC1+BKCC1 (daily TAF summed to monthly AF) with GF augmentation for WY 2015-Present. 	DWR, CNRFC w/ staff adjustments
Sacramento Valley Floor	 Monthly FNF data for the Sacramento Valley Floor subwatershed (minor east and west side tributaries between Stony Creek and the Delta, including tributaries to the Lower Feather and American Rivers): DWR subbasin UF1 for WY 1922-2014. GF extrapolation based on Sacramento, Feather, and American Rivers for WY 2015-Present. 	DWR, staff estimates
Sac Total	The sum of all subwatershed supplies in the Sacramento River watershed for the given month.	Calculated
Sac Complete Dataset?	Indicates if supply data values are present for all 10 subwatersheds in the Sacramento River watershed for the given month (TRUE/FALSE).	Calculated
Sac Water Year Type	Reconstructed water year hydrologic classification index for the Sacramento Valley, as published by DWR.	DWR

Field Name(s)	Definition & Methodology	Data Source(s)
Chowchilla	Monthly FNF data for the Chowchilla River subwatershed (at Buchanan Reservoir): - DWR subbasin UF20 for WY 1922-2014. - CNRFC station BHNC1 (daily TAF summed to monthly AF) for WY 2015- Present.	DWR, CNRFC
Upper San Joaquin	Monthly FNF data for the Upper San Joaquin River subwatershed (at Friant Dam): - CDEC station SJF, sensor 65 for WY 1901-Present.	CDEC
Fresno	Monthly FNF data for the Fresno River subwatershed (near Daulton or at Hidden Dam): - DWR subbasin UF21 for WY 1922-2014. - CNRFC station HIDC1 (daily TAF summed to monthly AF) for WY 2015- Present.	DWR, CNRFC
Merced	Monthly FNF data for the Merced River subwatershed (near Merced Falls): - CDEC station MRC, sensor 65 for WY 1901-Present.	CDEC
Tuolumne	Monthly FNF data for the Tuolumne River subwatershed (at La Grange Dam): - CDEC station TLG, sensor 65 for WY 1901-Present.	CDEC
Stanislaus	Monthly FNF data for the Stanislaus River subwatershed (below Goodwin Reservoir): - CDEC station SNS, sensor 65 for WY 1901-Present.	CDEC
Calaveras	Monthly FNF data for the Calaveras River subwatershed (at Jenny Lind or New Hogan Reservoir): - DWR subbasin UF15 for WY 1922-2014. - CNRFC station NHGC1 (daily TAF summed to monthly AF) for WY 2015- Present.	DWR, CNRFC

Field Name(s)	Definition & Methodology	Data Source(s)
Mokelumne	Monthly FNF data for the Mokelumne River subwatershed (near Mokelumne Hill): - CDEC station MKM, sensor 65 for WY 1901-Present.	CDEC
Cosumnes	Monthly FNF data for the Cosumnes River subwatershed (at Michigan Bar): - CDEC station CSN, sensor 65 for WY 1908-Present.	CDEC
San Joaquin Valley Floor	 Monthly FNF data for the San Joaquin River Valley Floor subwatershed (including minor east and west side tributaries between the Chowchilla and American Rivers): DWR subbasins UF12+UF17+UF24 for WY 1922-2014. CNRFC stations MPAC1+OWCC1+MEEC1 (daily TAF summed to monthly AF) + GF extrapolation based on Mokelumne, Cosumnes, San Joaquin, Merced, Tuolumne, and Stanislaus Rivers for WY 2015-Present. 	DWR, CNRFC, staff estimates
SJ Total	The sum of all subwatershed supplies in the San Joaquin River watershed for the given month.	Calculated
SJ Complete Dataset?	Indicates if supply data values are present for all 10 subwatersheds in the San Joaquin River watershed for the given month (TRUE/FALSE).	Calculated
SJ Water Year Type	Reconstructed water year hydrologic classification index for the San Joaquin Valley, as published by DWR.	DWR
Total Supply	The sum of all water supplies in the Delta (Sacramento and San Joaquin River watersheds) for the given month.	Calculated
% Sacramento	The percent of the given month's total Delta watershed supply which came from the Sacramento River watershed.	Calculated
% San Joaquin	The percent of the given month's total Delta watershed supply which came from the San Joaquin River watershed.	Calculated

Field Name(s)	Definition & Methodology	Data Source(s)
Delta Complete Dataset?	Indicates if supply data values are present for all 20 subwatersheds in the Delta watershed for the given month (TRUE/FALSE).	Calculated

Supply Gap Filling (GF)

This tab contains monthly factors which are used to fill gaps in supply data for select subwatersheds, either to estimate missing past/forecasted data (extrapolation) or to adjust existing supply data (augmentation). These monthly average factors are computed based on supply data described in the previous section, and detailed methods for each subwatershed are described in the table below.

Field Name(s)	Definition & Methodology	Data Source(s)
Month	Month of the calendar year for which the gap-filling factor applies.	
Cache-Stony Ratio (CSR)	Monthly factor used to extrapolate the FNF supply for the Cache Creek subwatershed based on data for the Stony Creek subwatershed: - CSR = DWR subbasin UF3 / DWR subbasin UF4 for WY -1922-2014, removed outlying values >20 and averaged by month. - GF Cache = CSR*(EPRC1*SIF) for WY 2015-Present and Forecasts.	Calculated
Stony Increase Factor (SIF)	Monthly factor used to augment recent FNF supply values for the Stony Creek subwatershed to approximate the entire subwatershed's supply based on past DWR data (CNRFC station EPRC1 is located upstream of several tributaries): - SIF = DWR subbasin UF4 / CNRFC station EPRC1 for WYs 2013-2014, removed outlying values >6 and averaged by month. - GF Stony = SIF*EPRC1 for WY 2015- Present and Forecasts.	Calculated

Field Name(s)	Definition & Methodology	Data Source(s)
Bear-Yuba Ratio (BYR)	Monthly factor used to extrapolate the FNF supply for the Bear River subwatershed based on data for the Yuba River subwatershed: - BYR = DWR subbasin UF10 / CDEC station YRS for WY -1922-2014, removed outlying value >1 and averaged by month. - GF Bear = BYR*YRS for WY 2015- Present and Forecasts.	Calculated
Elder-Thomes Increase Factor (ETIF)	Monthly factor used to augment recent FNF supply values for west side tributaries in the Upper Sacramento River Valley subwatershed to approximate the supply of all west side tributaries based on past DWR data (CNRFC stations EDCC1 and TCRC1 do not include all west side tributaries): - ETIF = DWR subbasin UF5 / (CNRFC stations EDCC1+TCRC1) for WYs 2013- 2014, removed outlying values >8 and averaged by month. - GF Upper Sacramento Valley West = ETIF*(EDCC1+TCRC1) for WY 2015- Present and Forecasts.	Calculated
Mill-Deer-Butte Increase Factor (MDBIF)	Monthly factor used to augment recent FNF supply values for east side tributaries in the Upper Sacramento River Valley subwatershed to approximate the supply of all east side tributaries based on past DWR data (CNRFC stations MLMC1, DCVC1, and BKCC1 do not include all east side tributaries): - MDBIF = DWR subbasin UF7 / (CNRFC stations MLMC1+DCVC1+BKCC1) for WYs 2013-2014, averaged by month. - GF Upper Sacramento Valley East = MDBIF*(MLMC1+DCVC1+BKCC1) for WY 2015-Present and Forecasts.	Calculated

Field Name(s)	Definition & Methodology	Data Source(s)
Putah-Stony Ratio (PSR)	 Monthly factor used to extrapolate the FNF supply for the Putah Creek subwatershed based on data for the Stony Creek subwatershed: PSR = DWR subbasin UF2 / DWR subbasin UF4 for WY 1922-2014, removed outlying values of zero and averaged by month. GF Putah = PSR*(EPRC1*SIF) for WY 2015-Present and Forecasts. 	Calculated
Sacramento Valley Ratio (SRVR)	Monthly factor used to extrapolate the FNF supply for the Sacramento River Valley Floor subwatershed based on data for the Sacramento, Feather, and American Rivers (no recent or projected supply data exists for the Valley Floor): - SRVR = DWR subbasin UF1 / CDEC stations SBB+FTO+AMF for WY 1922- 2014, removed outlying values >0.3 and averaged by month. - GF Sacramento Valley Floor = SRVR*(SBB+FTO+AMF) for WY 2015- Present and Forecasted.	Calculated
San Joaquin- Mokelumne- Cosumnes Ratio (SJMCR)	Monthly factor used to extrapolate the FNF supply for east side tributaries in the San Joaquin River Valley Floor subwatershed based on data for the Mokelumne and Cosumnes Rivers (no recent or projected supply data exists for the Valley Floor): - SJMCR = DWR subbasin UF12 / CDEC stations MKM+CSN for WY -1922-2014, removed outlying values >5 and averaged by month. - GF San Joaquin Valley Floor East = SJMCR*(MKM+CSN) for WY 2015- Present and Forecasted.	Calculated

Field Name(s)	Definition & Methodology	Data Source(s)
San Joaquin- Merced- Tuolumne- Stanislaus Ratio (SJMTSR)	Monthly factor used to estimate the FNF supply for west side tributaries in the San Joaquin River Valley Floor subwatershed based on data for the San Joaquin, Merced, Tuolumne, and Stanislaus Rivers (no recent or projected supply data exists for the Valley Floor): - SJMTSR = DWR subbasin UF24 / CDEC stations SJF+MRC+TLG+SNS for WY - 1922-2014, removed outlying values >0.06 and averaged by month. - GF San Joaquin Valley Floor West = SJMTSR*(SJF+MRC+TLG+SNS) for WY 2015-Present and Forecasted.	Calculated

Supply Adjust (SA)

This tab contains monthly instream flow requirements for each subwatershed, which are used to increase available supplies to account for the abandonment of these dedicated flows below their intended reach. Flow requirements are sourced from the Division's Sacramento Valley Water Allocation Model (SacWAM) and Water Supply Effects (WSE) model. Only requirements which crossed subwatershed boundaries or ended near the bottom of a subwatershed (less than 30 river miles from its mouth) are included. If the instream flow reach ends higher up in the subwatershed, such that it may meet demand within that subwatershed itself, the abandoned instream flow is not considered in the analysis. The origin of each instream flow requirement is detailed in the Note column.

All flow values in the Supply Adjust (SA) table are given in average cubic feet per second (CFS) by month, which are converted to acre-feet (AF) per month later in the analysis (see Headwater Reductions and Analysis Watersheds sections below). The supply contribution of each subwatershed to the watershed-wide analysis is represented by the greater of either the past or forecasted full natural flow (FNF, see next section) or the abandoned instream flow in this table for the respective subwatershed and month. In other words, during very dry conditions instream flows were assumed to consist of supplemental reservoir releases which would replace available natural flows when abandoned below their intended reach. During wet conditions instream flows were assumed to consist of bypassed natural flows, which would not contribute abandoned water in excess of FNF below their intended reach.

Supply Forecast

This tab contains forecasted monthly supply data for each of the 20 subwatersheds in the analysis. Like past supply data, forecasted values consist of full natural flow (FNF, also known as "unimpaired flow") estimates published by other agencies. Sources include DWR's Bulletin 120 Water Supply Forecast (B-120) Sacramento Water Supply Index (SRWSI) and San Joaquin Water Supply Index (SJWSI), the California Nevada River Forecast Center (CNRFC), and gap-filled (GF) data for certain watersheds without published forecasts. Direct links to individual forecast datasets are provided in the spreadsheet. Supplies volumes are provided in units of thousand acre-feet (TAF) and converted in the spreadsheet to acre-feet (AF).

This tab is grouped vertically into six tables, separated by black rows. Each table contains forecasted FNF values with a given exceedance probability: 10%, 25%, 50%, 75%, 90%, and 99%. Data fields for past months of the year reference the Past Supply Monthly tab, while forecast values for future months are updated at the beginning of each month. CNRFC forecasts are downloaded on the first of each month, while new B-120 SRWSI/SJWSI forecasts are published on the fifth business day of each month from December-May. CNRFC forecasts require additional intermediate data processing to convert from their default format of 39 daily forecast traces in thousands of cubic feet per second (TCFS) to monthly exceedance probabilities in TAF, which is done outside of the spreadsheet.

Field Name(s)	Definition & Methodology	Data Source(s)
Year, Month, Date	The calendar year, calendar year month, and date of the respective water supply forecast.	
Sacramento Bend	Monthly FNF forecasts for the Sacramento River at Bend subwatershed: - B-120 SRWSI. - When B-120 unavailable, CNRFC station BDBC1 (daily TCFS converted to monthly TAF).	B-120
Stony	Monthly FNF forecasts for the Stony Creek subwatershed (at Black Butte Reservoir): - CNRFC station EPRC1 (daily TCFS converted to monthly TAF) with GF augmentation.	CNRFC w/ staff adjustments
Cache	Monthly FNF forecasts for the Cache Creek subwatershed (above Rumsey): - GF extrapolation based on Stony Creek.	Staff estimates

Field Name(s)	Definition & Methodology	Data Source(s)
Upper Feather	Monthly FNF forecasts for the Upper Feather River subwatershed (at Oroville): - B-120 SRWSI. - When B-120 unavailable, CNRFC station ORDC1 (daily TCFS converted to monthly TAF).	B-120
Yuba	Monthly FNF forecasts for the Yuba River subwatershed (near Smartville plus Deer Creek or Englebright Reservoir): - B-120 SRWSI. - When B-120 unavailable, CNRFC station HLEC1 (daily TCFS converted to monthly TAF).	B-120
Bear	Monthly FNF forecasts for the Bear River subwatershed (near Wheatland): - GF extrapolation based on Yuba River.	Staff estimates
Upper American	Monthly FNF forecasts for the Upper American River subwatershed (below Folsom Lake): - B-120 SRWSI. - When B-120 unavailable, CNRFC station FOLC1 (daily TCFS converted to monthly TAF).	B-120
Putah	Monthly FNF forecast for the Putah Creek subwatershed (near Winters): - GF extrapolation based on Stony Creek.	Staff estimates
Upper Sacramento Valley	Monthly FNF forecasts for the Upper Sacramento River Valley subwatershed (tributaries between Bend and Butte Slough, including Redbank, Elder, Thomes, Antelope, Mill, Deer, Big Chico, and Butte Creeks): - CNRFC stations EDCC1+TCRC1+MLMC1+DCVC1+BKCC1 (daily TCFS converted to monthly TAF) with GF augmentation.	CNRFC w/ staff adjustments

Field Name(s)	Definition & Methodology	Data Source(s)
Sacramento Valley Floor	Monthly FNF forecasts for the Sacramento Valley Floor subwatershed (minor east and west side tributaries between Stony Creek and the Delta, including tributaries to the Lower Feather and American Rivers): - GF extrapolation based on Sacramento, Feather, and American Rivers.	Staff estimates
Sac Total	The sum of all subwatershed supplies in the Sacramento River watershed for the given month and forecast exceedance.	Calculated
Supply forecasts	for all Sacramento subwatersheds are converted	to AF.
Chowchilla	Monthly FNF forecasts for the Chowchilla River subwatershed (at Buchanan Reservoir): - CNRFC station BHNC1 (daily TCFS converted to monthly TAF).	CNRFC
Upper San Joaquin	Monthly FNF forecasts for the Upper San Joaquin River subwatershed (inflow to Millerton Lake): - B-120 SJWSI. - When B-120 unavailable, CNRFC station FRAC1 (daily TCFS converted to monthly TAF).	B-120
Fresno	Monthly FNF forecasts for the Fresno River subwatershed (at Hidden Dam): - CNRFC station HIDC1 (daily TCFS converted to monthly TAF).	CNRFC
Merced	Monthly FNF forecasts for the Merced River subwatershed (below Merced Falls or Exchequer Reservoir): - B-120 SJWSI. - When B-120 unavailable, CNRFC station EXQC1 (daily TCFS converted to monthly TAF).	B-120

Field Name(s)	Definition & Methodology	Data Source(s)
Tuolumne	Monthly FNF forecasts for the Tuolumne River subwatershed (below La Grange Reservoir or New Don Pedro Reservoir): - B-120 SJWSI. - When B-120 unavailable, CNRFC station NDPC1 (daily TCFS converted to monthly TAF).	B-120
Stanislaus	Monthly FNF forecasts for the Stanislaus River subwatershed (below Goodwin Reservoir or New Melones Reservoir): - B-120 SJWSI. - When B-120 unavailable, CNRFC station NMSC1 (daily TCFS converted to monthly TAF).	B-120
Calaveras	Monthly FNF forecasts for the Calaveras River subwatershed (New Hogan Reservoir): - CNRFC station NHGC1 (daily TCFS converted to monthly TAF).	CNRFC
Mokelumne	Monthly FNF forecasts for the Mokelumne River subwatershed (near Mokelumne Hill): - CNRFC station MHBC1 (daily TCFS converted to monthly TAF).	CNRFC
Cosumnes	Monthly FNF forecasts for the Cosumnes River subwatershed (at Michigan Bar): - CNRFC station MHBC1 (daily TCFS converted to monthly TAF).	CNRFC
San Joaquin Valley Floor	Monthly FNF forecasts for the San Joaquin River Valley Floor subwatershed (including minor east and west side tributaries between the Chowchilla and American Rivers): - CNRFC stations MPAC1+OWCC1+MEEC1 (daily TCFS converted to monthly TAF) + GF extrapolation based on Mokelumne, Cosumnes, San Joaquin, Merced, Tuolumne, and Stanislaus Rivers.	CNRFC, staff estimates
SJ Total	The sum of all subwatershed supplies in the San Joaquin River watershed for the given month and forecast exceedance.	Calculated

Field Name(s)	Definition & Methodology	Data Source(s)	
Supply forecasts	Supply forecasts for all San Joaquin subwatersheds are converted to AF.		
% Sacramento	The percent of total Delta watershed supply for the given month and forecast exceedance which came from the Sacramento River watershed.	Calculated	
% San Joaquin	The percent of total Delta watershed supply for the given month and forecast exceedance which came from the San Joaquin River watershed.	Calculated	
Stony	Original monthly FNF forecasts (pre-GF augmentation) for the Stony Creek subwatershed (at Black Butte Reservoir): - CNRFC station EPRC1 (daily TCFS converted to monthly TAF).	CNRFC	
Sacramento Minor Streams West	Original monthly FNF forecasts (pre- GF augmentation) for two west side streams in the Upper Sacramento River Valley subwatershed (Elder and Thomes Creeks at Paskenta): - CNRFC stations EDCC1+TCRC1 (daily TCFS converted to monthly TAF).	CNRFC	
Sacramento Minor Streams East	Original monthly FNF forecasts (pre- GF augmentation) for three east side streams in the Upper Sacramento River Valley subwatershed (Mill Creek at Los Molinos, Deer Creek at Vina, and Butte Creek at Chico): - CNRFC stations MLMC1+DCVC1+BKCC1 (daily TCFS converted to monthly TAF).	CNRFC	
San Joaquin Valley Floor	Original daily FNF data (before being added to other GF extrapolated datasets) for three east side streams in the San Joaquin River Valley Floor subwatershed (Mariposa Creek at Mariposa Reservoir, Owens Creek at Owens Reservoir, and Bear Creek at McKee Road): - CNRFC stations MPAC1+OWCC1+MEEC1 (daily TCFS converted to monthly TAF).	CNRFC	

Supply Daily Monitoring

This tab contains daily cumulative supply data (full natural flow, FNF) for a single month, which are compared to the monthly water supply forecasts described in the previous section for the purpose of selecting the most appropriate supply forecast to use when issuing notices of water unavailability or curtailment orders. Additional methods to assess water unavailability based on precipitation events or other forecasts may be used during the wet season.

There are inherent uncertainties in the forecasting of water supply, and daily water supplies may vary depending on changing conditions (e.g., precipitation, temperatures, or snowpack). Since supply forecasts are only updated at the beginning of each month, this daily cumulative data monitoring helps provide an indication of which forecast is likely to be the most accurate predictor of actual conditions as the month continues. If the daily cumulative FNF exceeds a given forecast only partway through the month, the next highest forecast may be used to adjust the timing or scope of notices of water unavailability or curtailment orders.

This tab is grouped vertically into three tables, separated by black rows:

- The top table shows monthly forecasted FNF values for each subwatershed by exceedance, all in acre-feet (referencing the Supply Forecast tab). The cells in this table have conditional formatting to highlight red if the cumulative daily supply for that subwatershed (middle table) has exceeded the given monthly forecast.
- 2. The middle table shows the calculated total cumulative daily FNF for each subwatershed, all converted to acre-feet (AF).
- 3. The bottom table contains the daily FNF supply values, which are updated from the data sources linked in the middle table (NOTE: any negative reported values are changed to zero). These values are in the default units of each source: AF, thousand acre-feet (TAF), or cubic feet per second (CFS).

Unless otherwise noted, the below table defines fields from the bottom table in the spreadsheet. Values in the top table reference the previous Supply Forecast tab, while values in the middle table are computed from data in the bottom table.

Field Name(s)	Definition & Methodology	Data Source(s)
Forecast	The exceedance probability of the given forecasted supply value (top table only).	
Date	Days of the (calendar year) month over which water supply is being tracked. This tab can only track one month's supply at a time.	

Field Name(s)	Definition & Methodology	Data Source(s)
Sacramento Bend	Daily FNF data for the Sacramento River at Bend subwatershed: - CDEC station BND, sensor 8	CDEC
Stony	Daily FNF data for the Stony Creek subwatershed (at Black Butte Reservoir): - CNRFC station EPRC1 with GF augmentation (original data to right of the main table).	CNRFC w/ staff adjustments
Cache	Daily FNF data for the Cache Creek subwatershed (above Rumsey): - GF extrapolation based on Stony Creek (with GF augmentation).	Staff estimates
Upper Feather	Daily FNF data for the Upper Feather River subwatershed (at Oroville Dam): - CDEC station ORO, sensor 8.	CDEC
Yuba	Daily FNF data for the Yuba River subwatershed (near Smartville): - CDEC station YRS, sensor 8.	CDEC
Bear	Daily FNF data for the Bear River subwatershed (near Wheatland): - GF extrapolation based on Yuba River.	Staff estimates
Upper American	Daily FNF data for the Upper American River subwatershed (at Lake Natoma): - CDEC station NAT, sensor 8.	CDEC
Putah	Daily FNF data for the Putah Creek subwatershed (near Winters): - GF extrapolation based on Stony Creek.	Staff estimates
Upper Sacramento Valley	Daily FNF data for the Upper Sacramento River Valley subwatershed (tributaries between Bend and Butte Slough, including Redbank, Elder, Thomes, Antelope, Mill, Deer, Big Chico, and Butte Creeks): - CNRFC stations EDCC1+TCRC1+MLMC1+DCVC1+BKCC1 with GF augmentation (original data to right of main table).	CNRFC w/ staff adjustments

Field Name(s)	Definition & Methodology	Data Source(s)
Sacramento Valley Floor	 Daily FNF for the Sacramento Valley Floor subwatershed (minor east and west side tributaries between Stony Creek and the Delta, including tributaries to the Lower Feather and American Rivers): - GF extrapolation based on Sacramento, Feather, and American Rivers. 	Staff estimates
Sac Total	The sum of all subwatershed supplies in the Sacramento River watershed for the given day (all converted to AF).	Calculated
Chowchilla	Daily FNF data for the Chowchilla River subwatershed (at Buchanan Reservoir): - CNRFC station BHNC1.	CNRFC
Upper San Joaquin	Daily FNF data for the Upper San Joaquin River subwatershed (at Friant Dam): - CDEC station SJF, sensor 8.	CDEC
Fresno	Daily FNF for the Fresno River subwatershed (at Hidden Dam): - CNRFC station HIDC1.	CNRFC
Merced	Daily FNF for the Merced River subwatershed (at New Exchequer Dam/Lake McClure): - CDEC station EXC, sensor 8.	CDEC
Tuolumne	Daily FNF data for the Tuolumne River subwatershed (at La Grange Dam): - CDEC station TLG, sensor 8.	CDEC
Stanislaus	Daily FNF data for the Stanislaus River subwatershed (at Goodwin Dam): - CDEC station GDW, sensor 8.	CDEC
Calaveras	Daily FNF data for the Calaveras River subwatershed (at New Hogan Reservoir): - CNRFC station NHGC1.	CDEC
Mokelumne	Daily FNF data for the Mokelumne River subwatershed (near Mokelumne Hill): - CDEC station MKM, sensor 8.	CDEC
Cosumnes	Daily FNF data for the Cosumnes River subwatershed (at Michigan Bar): - CDEC station MHB, sensor 8.	CDEC

Field Name(s)	Definition & Methodology	Data Source(s)
San Joaquin Valley Floor	 Daily FNF data for the San Joaquin River Valley Floor subwatershed (including minor east and west side tributaries between the Chowchilla and American Rivers): CNRFC stations MPAC1+OWCC1+MEEC1 (original data to right of main table) + GF extrapolation based on Mokelumne, Cosumnes, San Joaquin, Merced, Tuolumne, and Stanislaus Rivers. 	CNRFC, staff estimates
SJ Total	The sum of all subwatershed supplies in the Sacramento River watershed for the given day (all converted to AF).	Calculated
Total Supply	The sum of all water supplies in the Delta (Sacramento and San Joaquin River watersheds) for the given day (all converted to AF).	Calculated
% Sacramento	The percent of the given month's total Delta supply which came from the Sacramento River watershed.	Calculated
% San Joaquin	The percent of the given month's total Delta supply which came from the San Joaquin River watershed.	Calculated
Stony	Original daily FNF data (pre-GF augmentation) for the Stony Creek subwatershed (at Black Butte Reservoir): - CNRFC station EPRC1.	CNRFC
Sacramento Minor Streams West	Original daily FNF data (pre-GF augmentation) for two west side streams in the Upper Sacramento River Valley subwatershed (Elder and Thomes Creeks at Paskenta): - CNRFC stations EDCC1 and TCRC1.	CNRFC
Sacramento Minor Streams East	Original daily FNF data (pre-GF augmentation) for three east side streams in the Upper Sacramento River Valley subwatershed (Mill Creek at Los Molinos, Deer Creek at Vina, and Butte Creek at Chico): - CNRFC stations MLMC1, DCVC1, and BKCC1.	CNRFC

Field Name(s)	Definition & Methodology	Data Source(s)
San Joaquin Valley Floor	Original daily FNF data (before being added to other GF extrapolated datasets) for three east side streams in the San Joaquin River Valley Floor subwatershed (Mariposa Creek at Mariposa Reservoir, Owens Creek at Owens Reservoir, and Bear Creek at McKee Road): - CNRFC stations MPAC1, OWCC1, and MEEC1.	CNRFC

Demand

This tab contains monthly water diversion (demand) data for active, consumptive water right records in the Delta watershed. This data originated from the State Water Board's Electronic Water Rights Information Management System (eWRIMS) database. Technical Appendix B describes the process used to select these water right records and quality-control reported data to produce this dataset. In this tab each row quantifies water diversions (demand) for a single water right or claim in each month of the 2018 and 2019 calendar years, which are used as proxies for 2021 water demand in this analysis. Demand data are further adjusted in the Demand Separated tab (see next section) to account for water rights with diversion points in multiple subwatersheds and return flows.

Field Name(s)	Definition & Methodology	Data Source(s)
Application ID	Water Right Application ID Number; each water right record on file with the State Water Board is assigned a unique Application ID Number.	eWRIMS database

Field Name(s)	Definition & Methodology	Data Source(s)
Water Right Type	 Water right or claim type (see Appendix B for additional information on the different Statement assigned categories): Appropriative: A post-1914 appropriative water right pursuant to a permit or license from the Board. Statement of Div[ersion] and Use (Riparian): A riparian water right claim. Statement of Div[ersion] and Use (Riparian/Pre-1914): A riparian and pre-1914 appropriative water right claim. Statement of Div[ersion] and Use (Pre-1914): A pre-1914 appropriative water right claim. Statement of Div[ersion] and Use (Pre-1914): A pre-1914 appropriative water right claim. Statement of Div[ersion] and Use (Reserved): A federal reserved water right claim. Statement of Div[ersion] and Use (Other): Any other category of water right claim (e.g. court decreed/adjudicated or contract/agreement). Statement of Div[ersion] and Use (Unclassified): A water right claim with an unspecified category. 	eWRIMS database w/ staff adjustments
Water Right Status	 Status of the water right or claim, according to the Board's records: Licensed: A post-1914 appropriative water right for which the Board has issued a license. Permitted: A post-1914 appropriative water right for which the Board has issued a permit. Claimed: A water right claimed by the owner (i.e., Statements of Diversion and Use) which the Board 	eWRIMS database
Primary Owner	Name of the primary owner of the water right record.	eWRIMS database

Field Name(s)	Definition & Methodology	Data Source(s)
Beneficial Use(s)	Concatenated list of the beneficial use(s) of water associated with the water right record, as defined by Water Code §§ 660-669.	eWRIMS database
Priority Date	The priority date of the water right or claim (YYYY/MM/DD): - Appropriative: Assumed to be the earlier of the Application Acceptance Date and Application Received Date attributes. - Statement of Div[ersion] and Use (Riparian): 'Riparian' and assumed to be senior to all non-Riparian demands. - Statement of Div[ersion] and Use (Riparian/Pre-1914, Pre-1914, Reserved, Other, or Unclassified): Assumed to be January 1 st of the earliest claimed Year Diversion Commenced attribute, which is present in the Initial Statement of Diversion and Use and annual Supplemental Statements of Diversion and Use. Further adjusted in the Demand Separated tab for Riparian/Pre-1914 and Other Statements and Appropriative Project rights.	eWRIMS database
Face Value (AFA)	The maximum annual amount of water authorized for diversion under an appropriative water right. Statements, including Riparian and Pre-1914 Appropriative claims, do not have an assigned face value; for the purposes of this analysis, their face value is assumed to be zero.	eWRIMS database

Field Name(s)	Definition & Methodology	Data Source(s)
2018/2019 Annual Diversion	The total reported diversion of the water right record in calendar year 2018 or 2019. These values include user-reported direct diversions and diversions to storage from annual reports. Values for select water right records were manually reviewed by staff and corrected as necessary.	eWRIMS database w/ staff adjustments
2018/2019 Review	 Indicates whether and how the 2018 or 2019 reported diversion was reviewed or corrected by staff: Estimated Downward: Staff reviewed and corrected the user-reported diversion value to be higher than reported. Estimated Upward: Staff reviewed and corrected the user-reported diversion value to be lower than reported. Reviewed Not Changed: Staff reviewed the reported diversion value but did not apply a correction. Not Reviewed: Staff did not manually review this annual report. 	Staff-determined
Jan-Dec 2018/2019 Diversion	The total reported diversion of the water right record in each month of calendar year 2018 or 2019. These values include user-reported direct diversions and diversions to storage from annual reports. Values for select water right records were manually reviewed by staff and corrected as necessary.	eWRIMS database w/ staff adjustments

Demand Factors

This tab contains monthly factors which are used to adjust demand data to account for return flows within each subwatershed on a monthly basis. Demand factors are calculated for each month in the Sacramento and San Joaquin River watersheds as the percent of diversion which returned as flow within the same month (Factor = Total Diversions / Total Return Flows) from May through September. Data used to determine

the factors, which include return flows from both agricultural and municipal water uses, were sourced from CalSim 3 results published by DWR. Results from WY 2014 are used, as its hydrology most closely matches forecasts for the remainder of WY 2021.

All values in the Demand Factor table are given as multipliers (i.e., a demand factor of 0.6 means that the analysis will reduce demands within the given subwatershed in the given month by 40%). Demand values in the analysis are adjusted by multiplying monthly demand for a given water right or claim by the monthly factor for the appropriate subwatershed where it diverts. The 2021 Methodology currently only applies demand factors to reduce demands within lower valley portions of the Delta watershed (the Sacramento Bend, Upper Sacramento Valley, Sacramento Valley Floor, and San Joaquin Valley Floor subwatersheds) because return flows from diversions within headwater subwatersheds are not expected to be available within the same subwatershed (i.e., they return further downstream on the valley floor). Demand adjustments are done in the Demand Separated tab of the spreadsheet (see next section).

Demand Separated

This tab contains monthly demand data for water rights and claims in the Delta watershed, which are modified from the Demand tab (see previous section) to account for return flows and water rights with points of diversion (PODs) in multiple subwatersheds. This demand separation is necessary because annual water right reports, and thus the data in the Demand tab of the spreadsheet, are provided for each water right record rather than each POD. While the data necessary to separate demands originated from the Division's eWRIMS database, staff judgement is required to develop the Demand Weights listed in this tab based on the nature of PODs associated with each right. Demand adjustments to account for return flows are sourced from the Demand Factors tab of the spreadsheet. Each row quantifies monthly demands from a single water right or claim's POD(s) within a single HUC8.

Field Name(s)	Definition & Methodology	Data Source(s)
Application ID	Application ID of the water right or claim, sourced from the Demand tab. Water rights with PODs in multiple HUC8s are split into multiple rows, one for each HUC8.	eWRIMS database

Field Name(s)	Definition & Methodology	Data Source(s)
Water Right Type	 Water right or claim type, sourced from the Demand tab: Appropriative: A post-1914 appropriative water right pursuant to a permit or license from the Board. Statement of Div[ersion] and Use (Riparian): A riparian water right claim. Statement of Div[ersion] and Use (Riparian/Pre-1914): A riparian and pre-1914 appropriative water right claim. Statement of Div[ersion] and Use (Pre-1914): A pre-1914 appropriative water right claim. Statement of Div[ersion] and Use (Pre-1914): A pre-1914 appropriative water right claim. Statement of Div[ersion] and Use (Reserved): A federal reserved water right claim. Statement of Div[ersion] and Use (Other): Any other category of water right claim (e.g. court decreed/adjudicated or contract/agreement). Statement of Div[ersion] and Use (Unclassified): A water right claim with an unspecified category. 	eWRIMS database w/ staff adjustments
HUC8	The name of the Hydrologic Unit Code Level 8 where demand in the row is located. Water right or claim PODs are automatically assigned a HUC8 value in eWRIMS based on their location. This tab contains additional detail not found in the Demand tab, splitting rights that have PODs in multiple HUC8s into multiple rows (one for each HUC8).	eWRIMS database, USGS WBD
Subwatershed	Subwatershed where demand in the row is located. Sourced from the Subwatersheds tab based on the HUC8 value.	Staff- determined
Watershed	The watershed in which the demand occurs: the Sacramento River watershed or the San Joaquin River watershed. Sourced from the Subwatersheds tab based on the HUC8 value.	eWRIMS database, USGS WBD

Field Name(s)	Definition & Methodology	Data Source(s)
Legal Delta?	Indicates if demand for that row occurs within the Legal Delta (TRUE/FALSE). Assigned in the eWRIMS database based on the location of water right or claim POD(s) and validated to ensure only rows which account for Legal Delta demands are flagged as TRUE. Statements claiming only Riparian rights which are located in the Legal Delta are marked as FALSE (with a note in the Demand Comment column) because these demands are not prorated between watersheds per Board Order WR 89-8 (see Watershed Viz and Watershed Analysis sections).	eWRIMS database w/ staff adjustments
Priority Date	The priority date of a water right or claim, sourced from the Demand tab (YYYY/MM/DD), with some exceptions: - The priorities of Statements categorized as "Riparian", "Riparian/Pre-1914" or "Other" are marked as 'Riparian' because the water right record does not contain sufficient information to further disaggregate their demands. They are conservatively assumed to have a more senior priority date than all appropriative water rights and claims. ¹ - Project rights listed in Board Decision 1641 (excepting 2 New Melones Project rights, per Board Decision 1422) are marked as 'Project' and assumed to be junior to all other water rights and claims.	eWRIMS database w/ staff adjustments
Priority Year	The year of the priority date, sourced from the previous column. Riparian or Project priorities are shown as blank.	eWRIMS database w/ staff adjustments

¹ For claims within the Legal Delta, this categorization of colorable riparian claims is consistent with recent judicial decisions (see e.g., *Modesto Irrigation District v. Heather Robinson Tanaka*, 48 Cal.App.5th 898 (2020)) and with the legal principles described in a memorandum dated December 15, 2017 regarding Issues Related to Overlap between Pre-1914 and Riparian Water Right Claims in the Delta and available on the website of the Office of the Delta Watermaster (Overlap Memo).

Field Name(s)	Definition & Methodology	Data Source(s)
Demand Weight	 The percent of the specified water right or claim's demand which occurs within the specified HUC8: Demand Weight = (number of PODs within the respective HUC8) / (total number of PODs). Only active PODs that are not Points of Rediversion or Points of Offstream Storage are considered in this calculation. The sum of Demand Weights for most water rights is equal to one (see exception in next column). 	Staff- determined
Demand Comment	 Additional detail about the Demand Weight or other aspects of the demand: Has POD(s) outside Delta watershed: The water right has one or more associated PODs which divert from streams outside the Delta watershed (sum of Demands Weights is less than one). In Legal Delta but not prorated between watersheds: The POD in the specified HUC8 is located within the Legal Delta but is associated with a Statement claiming only riparian rights. Per Board Order WR 89-8, the riparian demand is not prorated between watersheds. Inactive: The POD in the specified HUC8 is not actively used (Demand Weight is zero). Point of Rediversion/Offstream Storage: The POD does not divert natural flow (Demand Weight is zero). Project: The water right is listed in Board Decision 1641, so its Priority Date is set to 'Project.' Also indicates actual water right 	Staff- determined

Field Name(s)	Definition & Methodology	Data Source(s)
January- December 2018/2019	Monthly demands of the specified water right or claim within the specified HUC8, calculated as follows: (Application ID Demand for month of 2018 or 2019, sourced from Demand tab) * (Demand Factor for subwatershed and month, sourced from Supply Adjust tab) * (Demand Weight)	Calculated

Headwater Reductions

This tab compiles supply and demand data from each subwatershed in the Delta watershed and: 1) reduces any demands that cannot be met in headwater subwatersheds so that they are not reflected in the watershed-wide analysis, and 2) removes both supply and demand for any headwater subwatersheds considered to be disconnected from the Delta watershed because local supplies are insufficient to meet all riparian demands. Supply data is sourced from the Supply Forecast tab of the spreadsheet, while demand data is sourced from the Demand Separated tab of the spreadsheet.

Field Name(s)	Definition & Methodology	Data Source(s)
Subwatershed	Smallest area over which water unavailability is determined, based on one or more HUC8s. Sourced from the Demand Separated tab.	Staff- determined
Subwatershed Type	 Subwatersheds are categorized as either - 'headwater' or 'lower' for the purpose of this analysis: A headwater subwatershed contains water demands which can only be met by water supplies within the subwatershed (i.e., there are no tributaries flowing into the subwatershed). A lower subwatershed can receive water supplies from outside its boundaries (i.e., it is located downstream of the headwaters). 	Staff- determined
Watershed	The two primary river systems in the Delta: Sacramento and San Joaquin.	USGS WBD
Field Name(s)	Definition & Methodology	Data Source(s)
----------------------------------------------------------------------------------------------------------------------	------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	-----------------------------------------------
MonthNum and Month	The calendar year month (either number or three-letter abbreviation) of the respective water supply and demand.	
Riparian Demand 2018	The sum of calendar year 2018 demand for all Riparian water right claims (Water Right Type = Riparian, Riparian/Pre-1914, or Other Statements) for the respective subwatershed and month, excluding demands in the Legal Delta. Sourced from the Demand Separated tab.	eWRIMS database w/ staff adjustments
Pre-1914 Demand 2018	The sum of calendar year 2018 demand for all pre-1914 appropriative water right claims (Water Right Type = Pre-1914 or Unclassified Statements) for the respective subwatershed, month, and demand year, excluding demands in the Legal Delta. Sourced from the Demand Separated tab.	eWRIMS database w/ staff adjustments
1914-1919, 1920s, 1930s, 1940s, 1950s, 1960s, 1970s, 1980s, 1990s, 2000s, and 2010s Demand 2018	The sum of calendar year 2018 demand for all Post-1914 Appropriative rights (Water Right Type = Appropriative or Reserved Statement) with a priority date within the specified decade for the respective subwatershed and month, excluding demands in the Legal Delta. Sourced from the Demand Separated tab.	eWRIMS database w/ staff adjustments
Project Demand 2018	The sum of calendar year 2018 demand for all Project water rights which export water outside the Delta watershed for the respective subwatershed and month, excluding demands in the Legal Delta. Sourced from the Demand Separated tab.	eWRIMS database w/ staff adjustments
2019 demand data	a is disaggregated in the same manner as 2018	demand data.
Supply Forecast 10%, 50%, 90% or 99% Exceedance	Supply for the respective subwatershed and month. For past months, the actual value from the Supply Past Monthly tab is shown. For future months, the forecasted supply with the respective exceedance probability from the Supply Forecast tab is shown.	CDEC, B-120, CNRFC, staff estimates

Field Name(s)	Definition & Methodology	Data Source(s)	
Discontinuity? (2018 Demand, 90% Exceedance Supply)	Whether a given headwater subwatershed is considered disconnected from the Delta watershed in a given month (Yes/No). A headwater subwatershed is considered disconnected when the supply (using the 90% exceedance forecast for future months) is insufficient to meet the 2018 demands of all riparian claims of right in the subwatershed.	Staff- determined	
2018 Total Demand	The sum of 2018 all demand values for the respective subwatershed and month.	Calculated	
2018 Reduced Demand for Discontinuity & Unmet Demand (90% Exceedance Supply)	 2018 demands for the respective subwatershed and month, eliminating any demand which cannot physically be met by available supply: In headwater subwatersheds, the lesser of 2018 Total Demand or 90% Supply Forecast 90% Exceedance. In disconnected headwater subwatersheds, equal to zero. In lower subwatersheds, the 2018 Total Demand (no reduction due to supply). 	Calculated	
2019 demand data as 2018 demand o	2019 demand data is summed and analyzed for discontinuity in the same manner as 2018 demand data.		
Supply Forecast 90% Exceedance with Headwater Abandoned Flow Replacement	Supply for the respective subwatershed and month which contributes to the Delta watershed. The greater of either the Supply Forecast 90% Exceedance value or the abandoned flow for the respective subwatershed and month (sourced from the Supply Adjust tab, converted to acre- feet per month).	B-120, CNRFC, staff estimates	

Field Name(s)	Definition & Methodology	Data Source(s)
2018/2019 Reduced Supply for Discontinuity (90% Exceedance with Abandoned Flow Replacement)	When discontinuity is found for the respective subwatershed and month based on demand data from the respective year (i.e., Discontinuity? = Yes), both supply and demand are removed from the watershed-wide analysis. This column sets supplies for disconnected headwater subwatersheds to zero.	Calculated

Subwatershed Viz

This tab compiles supply and demand data from each subwatershed in the Delta watershed to generate the interactive Headwater Subwatershed Analysis visualization at:

https://www.waterboards.ca.gov/waterrights/water_issues/programs/drought/drought_to ols_methods/delta_method.html

Field Name(s)	Definition & Methodology	Data Source(s)
Subwatershed	Smallest area over which water unavailability is determined, based on one or more HUC8s. Sourced from the Demand Separated tab.	Staff-determined
Subwatershed Type	 Subwatersheds are categorized as either 'headwater' or 'lower' for the purpose of this analysis: A headwater subwatershed contains water demands which can only be met by water supplies within the subwatershed (i.e., there are no tributaries flowing into the subwatershed). A lower subwatershed can receive water supplies from outside its boundaries (i.e., it is located downstream of the headwaters). 	Staff-determined
Watershed	The two primary river systems in the Delta: Sacramento and San Joaquin.	USGS WBD

Field Name(s)	Definition & Methodology	Data Source(s)
MonthNum and Month	The calendar year month (either number or three-letter abbreviation) of the respective water supply and demand.	
Discontinuity?	Whether a given headwater subwatershed is considered disconnected from the Delta watershed in a given month based on a given year of demand data (Yes/No). Sourced from the Discontinuity? column in the Headwater Reductions tab.	Staff-determined
Demand Type	Demand category, based on water right or claim priority. Post-1914 appropriative demands are largely separated by priority decade, except for demand by the Central Valley Project and the State Water Project (Project Demand).	eWRIMS w/ staff adjustments
Demand Year	Calendar year of demand data (2018 or 2019).	eWRIMS database
Demand	Monthly total demand for the respective subwatershed, month, demand year, and demand type, prior to the elimination of unmet headwater demand and demand in disconnected subwatersheds. Sourced from the Demand columns in the Headwater Reductions tab.	eWRIMS database w/ staff adjustments
Demand After Reduction (90% Exceedance Supply)	Monthly demand for the respective subwatershed, month, and demand year, after unmet headwater demand and demand in disconnected subwatersheds are removed. If Cumulative Demand exceeds the available supply, the remaining supply is credited towards the last added (senior) demand type and later (junior) demands are zero.	Calculated

Field Name(s)	Definition & Methodology	Data Source(s)
2021 Supply 10%, 50% 90%, and 99% Exceedance	Supply for the respective subwatershed and month. For past months, the actual value from the Supply Past Monthly tab is shown. For future months, the forecasted supply with the respective exceedance probability from the Supply Forecast tab is shown (NOTE: supply is available to all demand types by priority; values are shown only in the Riparian Demand rows due to Tableau plotting limitations).	CDEC, B-120, CNRFC, staff estimates
Supply After Reduction (90% Exceedance Supply)	Monthly supply for the respective subwatershed and month (past months from the Supply Past Monthly tab, future months from the Supply Forecast tab). Set to zero if Discontinuity? = Yes.	Calculated
Cumulative Demand for Subwatershed & Month	Total cumulative demand for the respective subwatershed, month, and demand year (used as an intermediate calculation to inform the Demand After Reduction value). Added from most senior to most junior rights or claims.	Calculated
Watershed Supply Summary Table (Watershed, MonthNum, Month, Supply Type, Supply)	Monthly supply statistics for the Sacramento River and San Joaquin River watersheds. Sourced from the Supply Past Monthly and Supply Forecast tabs to compare median hydrologic conditions of past wet years and critically dry years to 90% exceedance forecasts for 2021.	CDEC, B-120, CNRFC, staff estimates

Watershed Viz

This tab compiles supply and demand data used to assess water unavailability at the watershed level. Formulas in this tab: 1) remove any demands that cannot be met in headwater subwatersheds, 2) remove both supply and demand for any disconnected headwater subwatersheds, and 3) distribute demand within the Legal Delta between the

Sacramento River and the San Joaquin River watersheds before producing final supply and demand values that populate the interactive Watershed Analysis visualization at:

https://www.waterboards.ca.gov/waterrights/water_issues/programs/drought/drought_to ols_methods/delta_method.html

Field Name(s)	Definition & Methodology	Data Source(s)
Watershed	The two primary river systems in the Delta: Sacramento and San Joaquin.	USGS WBD
MonthNum and Month	The calendar year month of the respective water supply and demand.	
Delta Watershed Supply Ratio	The percent of supply that the respective watershed (Sacramento River or San Joaquin River) contributes to the Delta watershed in the respective month. Based on 90% exceedance supply forecasts, including the greater of FNF or subwatershed abandoned flow, and calculated after supplies from disconnected subwatersheds are removed based on demands for the respective year. Sourced from the 2018 and 2019 Reduced Supply for Discontinuity columns in the Headwater Reduction tab.	Calculated
Demand Type	Demand category, based on water right or claim priority. Post-1914 appropriative demands are largely separated by priority decade, except for demand by the Central Valley Project and the State Water Project (Project Demand).	eWRIMS w/ staff adjustments
Demand Year	Calendar year of demand data (2018 or 2019).	eWRIMS database
Headwater Demand Reduction	The amount of demand removed from the watershed-wide analysis due to reduction of demands that cannot be met by supplies in headwater subwatersheds. Sourced from the Subwatershed Viz tab: Headwater Demand Reduction = Demand column – Demand after Reduction	Calculated

Field Name(s)	Definition & Methodology	Data Source(s)
Demand w/o Legal Delta (Headwater Reduced)	Total demand for the respective watershed, month, and demand year, excluding demand in the Legal Delta. Sourced from the Demand Separated tab: Demand w/o Legal Delta (Headwater Reduced) = total watershed demand – demand from PODs in the Legal Delta (Legal Delta? = TRUE) – Headwater Demand Reduction	Calculated
Legal Delta Demand	Demand for PODs within the Legal Delta (Legal Delta? = TRUE) for the respective month and demand type. Sourced from the Demand Separated tab.	eWRIMS w/ staff adjustments
Legal Delta Demand Prorated by Watershed	Demand for PODs within the Legal Delta (Legal Delta? = TRUE) for the respective watershed, month, and demand type. Legal Delta demands are prorated between the Sacramento River and San Joaquin River watersheds based on the percent of supply that each contributes in a given month (based on the 90% exceedance supply forecast, accounting for supply reductions due to disconnection and the replacement of abandoned instream flows in excess of subwatershed FNF): Prorated Legal Delta Demand by Watershed = Delta Watershed Supply Ratio * Legal Delta Demand In other words, if the Sacramento River watershed constitutes 80% of Delta watershed supply in a given month, then 80% of Legal Delta demand is charged against the Sacramento River watershed supply for that month and 20% is charged against the San Joaquin River watershed.	Calculated

Field Name(s)	Definition & Methodology	Data Source(s)
Total Watershed Demand	Total demand for the respective watershed, month, and demand year after Legal Delta demand has been prorated between the two watersheds: Total Watershed Demand = Demand w/o Legal Delta (Headwater Reduced) + Legal Delta Demand Prorated by Watershed	Calculated
Total Watershed Supply	Total supply for the respective watershed and month after excluding supply from disconnected subwatersheds. Sourced from the 2018 and 2019 Reduced Supply for Discontinuity columns in the Headwater Reduction tab (NOTE: supply is available to all demand types by priority; values are shown only in the Riparian Demand rows due to Tableau plotting limitations).	Calculated

Daily Supply Viz

This tab compiles monthly supply data from the Supply Forecast tab and daily supply data from the Supply Daily Monitoring tab to produce a comparison between monthly forecasts and cumulative daily supply, which may be used to adjust the timing or scope of notices of water unavailability or curtailment orders. This data populates the interactive Watershed Analysis Weekly Supply Updates visualization at:

https://www.waterboards.ca.gov/waterrights/water_issues/programs/drought/drought_to ols_methods/delta_method.html

Field Name(s)	Definition & Methodology	Data Source(s)
Date	Individual days of the current month.	
Watershed	The two primary river systems in the Delta: Sacramento and San Joaquin.	USGS WBD

Field Name(s)	Definition & Methodology	Data Source(s)
Daily Cumulative	The cumulative total supply (sum of respective date and all previous days of the month) for the respective watershed, in acre-feet. Equal to '#N/A' if supply data are not available for all subwatersheds in the respective watershed (i.e., dates in the future). Sourced from the Supply Daily Monitoring tab.	CDEC, CNRFC, staff estimates
Fcast 99%, 90%, 75%, 50%, 25%, and 10% exc	Monthly forecasted supply for the respective watershed and exceedance probability, in acre-feet, Equal to the same value for all days of the month in order to plot as a horizontal line. Sourced from the Supply Forecast tab.	B-120, CNRFC, staff estimates

Analysis Headwaters

This tab contains a tabular version of the water supply and demand visualizations for 14 headwater subwatersheds in the Delta watershed. In each, past and forecasted supplies are used to determine water unavailability for each water right or claim in order of priority date. Rights or claims which are not expected to have water available to meet their demands due to limited local supplies are flagged for the receipt of a notice of water unavailability or curtailment order, and these unmet demands are excluded from the Watershed Analysis (see next section). If the Headwaters Analysis indicates that any Riparian claims of right (senior demands) would face water unavailability, all supplies and demands from that subwatershed are excluded from its respective Watershed Analysis. In other words, these streams are assumed to not have connectivity to the Delta watershed due to senior demands exceeding all available water supplies.

This analysis is set-up for each headwater subwatershed as follows:

- 1. The water rights and claims listed in the Demand Separated tab of the spreadsheet are grouped by subwatershed.
- 2. Any rights or claims located in the Legal Delta (Legal Delta? = TRUE) are excluded; this only occurs in the furthest downstream reaches of the Putah Creek, Stanislaus River, Calaveras River, and Cosumnes River headwater subwatersheds. Water unavailability for these rights or claims is only analyzed in the Watershed Analysis, as they are assumed to have access to water from both the Sacramento and San Joaquin Rivers and not be limited by local supplies.
- 3. Any duplicate rights within each subwatershed are merged; this only occurs in the Sacramento River above Bend and Upper American River headwater

subwatersheds, where there are rights that divert from multiple HUC8s within the same subwatershed.

- 4. Rights and claims within each subwatershed are sorted by priority date, with the most senior rights or claims first: Riparian, Pre-1914 Appropriative, Appropriative, Project (see the explanations of Statement assigned categories and priority assumptions in the Demand and Demand Separated sections). All Riparian claims of right are assumed to have senior priority over all pre-1914 appropriative claims, which are in turn assumed to have priority over all post-1914 appropriative rights.
- 5. On a monthly basis for each right or claim within a subwatershed, each of the following parameters is calculated or determined: demand, cumulative supply available, water unavailability (i.e., will this right or claim receive a notice of water unavailability or curtailment order?), demand met, and demand unmet.

This tab is grouped into sixteen tables. The fourteen tables on the left, separated by black rows, contain the analysis for each headwater subwatershed: Sacramento River above Bend, Stony Creek, Cache Creek, Upper Feather River, Yuba River, Bear River, Upper American River, Putah Creek, Upper San Joaquin River, Merced River, Tuolumne River, Stanislaus River, Calaveras River, and Cosumnes River.

The upper table on the right side of this tab indicates the supply forecast exceedance and monthly supply volumes used for each individual subwatershed, sourced from the Supply Forecast tab. The lower table on the right side of this tab indicates if any Riparian claims within each subwatershed faced water unavailability in each month (i.e., if the subwatershed's supplies and demands should be excluded from the Watershed Analysis due to lack of connectivity with the Delta watershed). These cells have conditional formatting to **highlight red** if the subwatershed lacks connectivity.

NOTE: To save computation time, this tab contains largely static values. The first row of the top table (or the first two rows of the 2021 Supply Cumulative column), highlighted in blue, contain sample formulas described in detail in the table below.

Field Name(s)	Definition & Methodology	Data Source(s)
Subwatershed	Smallest area over which water unavailability is determined, based on one or more HUC8s. This tab contains data for only headwater subwatersheds (see Subwatersheds section), sourced from the Demand Separated tab.	Staff- determined
Application ID	Application ID of each water right or claim, sourced from the Demand Separated tab. Any duplicate Application IDs within a single subwatershed are merged.	eWRIMS database

Field Name(s)	Definition & Methodology	Data Source(s)
Primary Owner	Name of the primary owner of the water right or claim, sourced from the Demand tab.	eWRIMS database
Water Right Type	Water right or claim type, sourced from the Demand tab: Appropriative or Statement of Div[ersion] and Use (Riparian, Riparian/Pre-1914, Pre-1914, Reserved, Other, or Unclassified).	eWRIMS database w/ staff adjustments
Priority Date	The priority date of a water right or claim, sourced from the Demand tab (YYYY/MM/DD). Riparian, Riparian/Pre- 1914, and Other Statements are denoted as 'Riparian' priority and are assumed to be senior to all other demands, while Project rights listed in Board Decision 1641 are denoted as 'Project' priority and are assumed to be junior to all other demands.	eWRIMS database w/ staff adjustments
2018 Demand, Jan-Sep	Monthly demands by each water right or claim in the respective subwatershed, summed from the Demand Separated tab. Excludes any demands in the Legal Delta.	eWRIMS database w/ staff adjustments
2021 Supply Cumulative, Jan-Sep	 Available water supply to meet each water right or claim's Demand, calculated as follows: For the first water right or claim in each subwatershed, equal to the subwatershed's monthly supply from the upper-right table in the spreadsheet. For the next water right or claim, the Supply Cumulative available to the previous right or claim minus the previous right or claim's Demand Potentially Met in Subwatershed (see below). Continued for each next junior water right or claim, until all Demands are accounted for or there is no remaining water supply available. 	CDEC, B-120, CNRFC, staff estimates, staff- determined

Field Name(s)	Definition & Methodology	Data Source(s)
Curtailment in Subwatershed? Jan-Sep	If water is anticipated to be unavailable to the respective water right or claim in the respective month. Determined if Demand exceeds Supply Cumulative (TRUE/FALSE). These cells have conditional formatting to highlight red if water is unavailable for a given right or claim and month.	Staff- determined
Demand Potentially Met in Subwatershed, Jan-Sep	 Amount of each right or claim's Demand which can be met by available supply within a given month, calculated as follows: If Supply Cumulative > Demand, equal to Demand. If 0 < Supply Cumulative < Demand, equal to Supply Cumulative (i.e., Curtailment in Subwatershed, but a portion of Demand can be met). If Supply Cumulative = 0, equal to zero (i.e., Curtailment in Subwatershed). 	Calculated
Demand Unmet in Subwatershed, Jan-Sep	 Amount of each right or claim's Demand which cannot be met by available water supply within a given month, calculated as follows: If Demand Potentially Met = Demand, equal to zero. If Demand Potentially Met < Demand, equal to Demand – Demand Potentially Met. If Demand Potentially Met = 0, equal to Demand. 	Calculated

Analysis Watersheds

This tab contains a tabular version of the Sacramento and San Joaquin Watershed-wide water supply and demand visualizations. In each watershed, total forecasted supplies are used to determine water unavailability for each right or claim in order of priority date. Demands compared in this analysis include those in headwater subwatersheds which may be met by local supplies (see previous section), as well as all demands located in lower subwatersheds and within the Legal Delta. Rights or claims which are not expected to have water available to meet their demands are flagged for the receipt of a

notice of water unavailability or curtailment order. This is in addition to those flagged for receipt of a notice of water unavailability or curtailments order in the Headwater Subwatershed Analysis; while there may be enough water present locally to meet a given demand, those supplies may not actually be available if they are needed to supply more senior rights or claims further downstream in the watershed. Headwater subwatersheds where not all senior demands (Priority Date = Riparian) can be met by available supplies have their supplies and demands removed from the Watershed Analysis.

This analysis is set-up for each watershed as follows:

- The water rights and claims listed in the Demand Separated tab of the spreadsheet are grouped by watershed. Rights or claims within the Legal Delta (Legal Delta? = TRUE) are present in both watersheds so that they can be prorated to each based on available supplies.
- 2. Any duplicate rights within each subwatershed are merged; this occurs only in the Sacramento River above Bend, Upper American River, Upper Sacramento Valley, Sacramento Valley Floor, and San Joaquin Valley Floor subwatersheds, where some rights divert from multiple HUC8s within the same subwatershed.
- 3. Rights and claims within each subwatershed are sorted by priority date, with the most senior rights or claims first: Riparian, Pre-1914 Appropriative, Appropriative, Project (see the explanations of Statement assigned categories and priority assumptions in the Demand and Demand Separated sections). All Riparian claims of right are assumed to have senior priority over all pre-1914 appropriative claims, which are in turn assumed to have priority over all post-1914 appropriative rights.
- 4. On a monthly basis for each right or claim within a watershed, each of the following parameters is calculated or determined: demand (both total and headwater subwatershed demand which can potentially be met by local supplies), cumulative supply available, water unavailability (i.e., will this right or claim receive a notice of water unavailability or curtailment order?), demand met, and demand unmet.

This tab is grouped into four tables. The two tables on the left, separated by black rows, contain the analysis for the Sacramento and San Joaquin River watersheds. The upper table on the right side of this tab indicates the supply forecast exceedance and monthly supply volumes used for each individual subwatershed, which are summed to a total for each watershed. Monthly supply ratios for the Delta watershed are calculated for each watershed for the purpose of Legal Delta demand proration. The lower table on the right side of this tab indicates any headwater subwatersheds whose supplies and demands were excluded if any Riparian claims were flagged for receipt of a notice of water unavailability or curtailment order (sourced from the Analysis Headwaters tab). These cells have conditional formatting to **highlight red** if the subwatershed was excluded.

NOTE: To save computation time, this tab contains largely static values. The first row of the top table (or the first two rows of the 2021 Supply Cumulative column), **highlighted in blue**, contain sample formulas described in detail in the table below.

Field Name(s)	Definition & Methodology	Data Source(s)
Watershed	The watershed in which the demand occurs, Sacramento River or San Joaquin River. Sourced from the Demand Separated tab. Legal Delta demands (Legal Delta? = TRUE) are present in both watersheds, with their demands prorated between them.	USGS WBD
Subwatershed	Smallest area over which water unavailability is determined, based on one or more HUC8s. Sourced from the Demand Separated tab.	Staff- determined
Application ID	Application ID of each water right or claim, sourced from the Demand Separated tab. Any duplicate Application IDs within a single subwatershed are merged.	eWRIMS database
Water Right Type	Water right or claim type, sourced from the Demand tab: Appropriative or Statement of Div[ersion] and Use (Riparian, Riparian/Pre-1914, Pre-1914, Reserved, Other, or Unclassified).	eWRIMS database w/ staff adjustments
Primary Owner	Name of the primary owner of the water right or claim, sourced from the Demand tab.	eWRIMS database
Priority Date	The priority date of a water right or claim, sourced from the Demand tab (YYYY/MM/DD). Riparian, Riparian/Pre- 1914, and Other Statements are denoted as 'Riparian' priority and assumed to be senior to all other demands, while Project rights listed in Board Decision 1641 are denoted as 'Project' priority and are assumed to be junior to all other demands.	eWRIMS database w/ staff adjustments

Field Name(s)	Definition & Methodology	Data Source(s)
Legal Delta?	If demand for that row occurs within the Legal Delta (TRUE/FALSE), sourced from the Demand Separated tab. Each water right or claim located in the Legal Delta is present in both the Sacramento and San Joaquin Watershed Analyses.	eWRIMS database w/ staff adjustments
Headwater Subwatershed?	If demand for that row occurs within a headwater subwatershed (TRUE/FALSE), sourced from the Subwatersheds tab.	Staff- determined
2018 Demand, Jan-Sep	Monthly demands by each water right or claim in the respective subwatershed, summed from the Demand Separated tab. If the right or claim is located in the Legal Delta (Legal Delta? = TRUE), the demand is multiplied by the respective watershed's supply ratio for the respective month (from the upper-right table in the spreadsheet) in order to prorate these demands between both watersheds.	eWRIMS database w/ staff adjustments
Curtailment in Subwatershed? Jan-Sep	If water is anticipated to be unavailable in a headwater subwatershed (TRUE/FALSE): - If located in a headwater subwatershed, equal to the Curtailment in Subwatershed? value in the Analysis Headwaters tab for the respective right or claim and month. - FALSE if located in a lower subwatershed. These cells have conditional formatting to highlight red if water is unavailable for a given right or claim and month.	Staff- determined

Field Name(s)	Definition & Methodology	Data Source(s)
Demand Potentially Met in Subwatershed, Jan-Sep	Monthly demands by each water right or claim which can physically be met within the respective subwatershed: - If supply is less than the total demand of Riparian Statements in the given headwater subwatershed and month, equal to zero (see lower table to right in spreadsheet). - If located in a headwater subwatershed and nonzero, equal to the Demand Potentially Met in Subwatershed value in the Analysis Headwaters tab for the respective right or claim and month. - If located in a lower subwatershed, equal to 2018 Demand.	Calculated
2021 Supply Cumulative, Jan-Sep	 Available water supply to meet each water right or claim's Demand Potentially Met, calculated as follows: For the first water right or claim in each watershed, equal to the total watershed monthly supply from the upper-right table in the spreadsheet. For the next water right or claim, the Supply Cumulative available to the previous right or claim minus the previous right or claim's Demand Met in Watershed (see below). Continued for each next junior water right or claim, until all Demands are accounted for or there is no remaining water supply available. 	CDEC, B-120, CNRFC, staff estimates
Curtailment in Watershed? Jan-Sep	If water is anticipated to be unavailable to the respective water right or claim in the respective month. Determined if Demand Potentially Met exceeds Supply Cumulative (TRUE/FALSE). These cells have conditional formatting to highlight red if water is unavailable for a given right or claim and month.	Staff- determined

Field Name(s)	Definition & Methodology	Data Source(s)
Demand Met in Watershed, Jan-Sep	 Amount of each right or claim's Demand Potentially Met which can be met by available supply within a given month, calculated as follows: If Supply Cumulative > Demand Potentially Met, equal to Demand Potentially Met. If 0 < Supply Cumulative < Demand Potentially Met, equal to Supply Cumulative (i.e., Curtailment in Watershed, but a portion of Demand can be met). If Supply Cumulative = 0, equal to zero (i.e., Curtailment in Watershed). 	Calculated
Demand Unmet in Watershed, Jan-Sep	Amount of each right or claim's Demand which can be physically met in the watershed that will be unmet by available water supply within a given month, calculated as follows: - If Demand Met = Demand Potentially Met, equal to zero. - If Demand Met < Demand Potentially Met, equal to Demand Potentially Met – Demand Met. - If Demand Met = 0, equal to Demand Potentially Met.	Calculated
Curtailment Order? Jan- Sep	If the water right or claim is anticipated to receive a notice of water unavailability or curtailment order in the given month, either from the Headwaters Analysis (Curtailment in Subwatershed?) or Watershed Analysis (Curtailment in Watershed?). These cells have conditional formatting to highlight red if water is unavailable for a given right or claim and month.	Staff- determined

Field Name(s)	Definition & Methodology	Data Source(s)
Demand Deficit, Jan- Sep	 Amount of each right or claim's total Demand which will be unmet, either by unavailable headwater subwatershed supply or by overall watershed supply, within a given month. Calculated as follows: If Subwatershed is disconnected, equal to Demand Unmet in Subwatershed from the Headwater Analysis tab. If Subwatershed is not disconnected, equal to Demand Unmet in Watershed. 	Calculated

Analysis Legal Delta

This tab contains information on water rights and claims located in the Legal Delta. Because these rights and claims are assumed to have access to supplies from both the Sacramento and San Joaquin Rivers to meet their demands (see 2018 Demand column in Analysis Watersheds tab), this tab quantifies total demands and demands met from each watershed to identify which rights or claims may receive notices of water unavailability or curtailment orders. Per State Water Board Order WR 89-8, this analysis assumes that demands by Statements of Diversion and Use claiming only Riparian water rights can only be met by supply from the watershed in which they are located; therefore, they are excluded from all demand proration between watersheds and are not listed in this tab.

Water rights or claims in the Legal Delta will only receive a notice of water unavailability or curtailment order if water is anticipated to be unavailable from both watersheds. This tab does not contain any new analysis, it only compiles values from the Analysis Watersheds tab for rights or claims located in the Legal Delta (Legal Delta? = TRUE in the Demand Separated tab). Duplicate rights were merged in this tab, so each row represents a single water right's total demand.

NOTE: To save computation time, this tab contains largely static values. The first row of the table, **highlighted in blue**, contain sample formulas described in detail in the table below.

Field Name(s)	Definition & Methodology	Data Source(s)
Application ID	Application ID of each water right or claim, sourced from the Demand Separated tab.	eWRIMS database

Field Name(s)	Definition & Methodology	Data Source(s)
Primary Owner	Name of the primary owner of the water right or claim, sourced from the Demand tab.	eWRIMS database
Priority Date	The priority date of a water right or claim, sourced from the Demand tab (YYYY/MM/DD). Riparian/Pre-1914 and Other Statements are denoted as 'Riparian' priority and assumed to be senior to all other demands, while Project rights listed in Board Decision 1641 are denoted as 'Project' priority and are assumed to be junior to all other demands.	eWRIMS database w/ staff adjustments
2018 Sacramento Demand, Jan- Sep	Monthly demands by each water right or claim from the Sacramento River watershed, sourced from the 2018 Demand column of the Analysis Watersheds tab.	eWRIMS database w/ staff adjustments
2018 San Joaquin Demand, Jan- Sep	Monthly demands by each water right or claim from the San Joaquin River watershed, sourced from the 2018 Demand column of the Analysis Watersheds tab.	eWRIMS database w/ staff adjustments
Curtailment in Sacramento? Jan-Sep	If the water right or claim is anticipated to face water unavailability from the Sacramento River watershed in a given month, sourced from the Curtailment in Watershed? column of the Analysis Watersheds tab. These cells have conditional formatting to highlight red if water is unavailable for a given right or claim and month.	Staff- determined
Curtailment in San Joaquin? Jan-Sep	If the water right or claim is anticipated to face water unavailability from the San Joaquin River watershed in a given month, sourced from the Curtailment in Watershed? column of the Analysis Watersheds tab. These cells have conditional formatting to highlight red if water is unavailable for a given right or claim and month.	Staff- determined

Field Name(s)	Definition & Methodology	Data Source(s)
Sacramento Demand Met, Jan-Sep	Amount of each right or claim's Demand in the Sacramento River watershed which can be met by available supplies, sourced from the Analysis Watersheds tab.	Staff- determined
San Joaquin Demand Met, Jan-Sep	Amount of each right or claim's Demand in the San Joaquin River watershed which can be met by available supplies, sourced from the Analysis Watersheds tab.	Staff- determined
Curtailment Order? Jan- Sep	If the water right or claim is anticipated to face water unavailability from both the Sacramento and San Joaquin River watersheds in a given month, meaning it would receive a notice of water unavailability or curtailment order. These cells have conditional formatting to highlight red if water is unavailable for a given right or claim and month.	Staff- determined

Analysis Curtailments

This tab contains information on the monthly curtailment status of all water rights and claims in the Delta watershed. It does not contain any new analysis, it only compiles values from the Analysis Headwaters, Analysis Watersheds, and Analysis Legal Delta tabs to determine which rights or claims face water unavailability each month. Information presented for each right or claim includes ownership, location, total monthly demands, and monthly curtailment status based on either headwater subwatershed or watershed-wide water unavailability. Any rights with PODs in multiple subwatersheds are merged into single rows in this tab.

NOTE: To save computation time, this tab contains largely static values. The first row of the table, **highlighted in blue**, contain sample formulas described in detail in the table below.

Field Name(s)	Definition & Methodology	Data Source(s)
Application ID	Application ID of each water right or claim, sourced from the Demand Separated tab.	eWRIMS database
Primary Owner	Name of the primary owner of the water right or claim, sourced from the Demand tab.	eWRIMS database

Field Name(s)	Definition & Methodology	Data Source(s)
Water Right Type	Water right or claim type, sourced from the Demand tab: Appropriative or Statement of Div[ersion] and Use (Riparian, Riparian/Pre-1914, Pre-1914, Reserved, Other, or Unclassified).	eWRIMS database w/ staff adjustments
Priority Date	The priority date of a water right or claim, sourced from the Demand tab (YYYY/MM/DD). Riparian and Other Statements are denoted as 'Riparian' priority, while Project rights listed in Board Decision 1641 are denoted as 'Project' priority.	eWRIMS database w/ staff adjustments
Watershed	The watershed in which the demand occurs, Sacramento River or San Joaquin River. Sourced from the Demand Separated tab; water rights with multiple PODs that fall in both watersheds are denoted as 'Both.'	USGS WBD
Subwatershed	Smallest area over which water unavailability is determined, based on one or more HUC8s. Sourced from the Demand Separated tab; water rights with PODs in multiple subwatersheds are denoted as 'Multiple.'	Staff- determined
Legal Delta?	If demand for that row occurs within the Legal Delta (TRUE/FALSE), sourced from the Demand Separated tab; water rights with multiple PODs both within and outside the Legal Delta are denoted as 'Both.'	eWRIMS database w/ staff adjustments
2018 Demand, Jan-Sep	Total monthly demands by each water right or claim, indexed from the Demand tab.	eWRIMS database w/ staff adjustments

Field Name(s)	Definition & Methodology	Data Source(s)
Curtailment in Subwatershed? Jan-Sep	If the water right or claim is anticipated to face water unavailability due to limited local supplies in a headwater subwatershed. Sourced from the Curtailment in Subwatershed? column of the Analysis Watersheds tab. Rights or claims in the Legal Delta or rights with PODs in multiple subwatersheds will only equal TRUE if water is unavailable from all potential sources. These cells have conditional formatting to highlight red if water is unavailable for a given right or claim and month.	Staff- determined
Curtailment in Watershed? Jan-Sep	If the water right or claim is anticipated to face water unavailability due to limited supplies in its respective watershed. Sourced from the Curtailment in Watershed? column of the Analysis Watersheds tab. Rights or claims in the Legal Delta or rights with PODs in multiple subwatersheds will only equal TRUE if water is unavailable from all potential sources. These cells have conditional formatting to highlight red if water is unavailable for a given right or claim and month.	Staff- determined
Curtailment Order? Jan- Sep	If the water right or claim is anticipated to face water unavailability due to either limited local supplies or watershed wide supplies (if either Curtailment in Subwatershed? or Curtailment in Watershed is TRUE).	Staff- determined

EXHIBIT K

Technical Appendix B: Delta Watershed Demand Dataset

This appendix documents the process used to prepare the Sacramento-San Joaquin Delta (Delta) watershed demand dataset for the Water Unavailability Methodology for the Delta Watershed (methodology). Specifically, this appendix summarizes: (1) the process used to select water right records in the Delta watershed, (2) the quality control process used to review diversion data submitted by water right holders and claimants and address diversion data reporting inaccuracies, and (3) demand dataset updates and formatting. In the future, the State Water Board may also rely upon updated reporting of projected demands for larger users that is provided pursuant to emergency regulations.

Initial Selection of Water Right Records in the Delta Watershed

This section describes the process and computer code logic used to select water right records in the Delta watershed for inclusion in the demand dataset. These water right records were selected from the full list of all of California's water right records using information contained within the State Water Resources Control Board's (State Water Board) Electronic Water Rights Information Management System (eWRIMS) database. The eWRIMS database contains information on water right permits and licenses issued by the State Water Board and other claimed water rights, including reported diversion and use data submitted by water right holders and claimants through the Report Management System (RMS). The eWRIMS database system can be accessed at: https://www.waterboards.ca.gov/waterrights/water_issues/programs/ewrims/

Selection of All Water Right Records in California

Using information from the eWRIMS database, a dataset of all water right records in California was created. The dataset of all water right records included other associated information, such as the water right type, status, and reported diversions for calendar years 2018 and 2019.

To compile this dataset, the full record of California's water rights and claims and annually reported water diversion information was obtained from the eWRIMS database. The eWRIMS database is continuously updated by modifications to water right records, such as the addition of new water right records or changes in water right status. Water diversion and use information contained within the eWRIMS database is also updated when annual reports of water diversion and use (annual reports) are submitted or modified by diverters. The initial selection of water right records in the Delta watershed and quality control review described below required a static copy of the eWRIMS datasets, which were downloaded on January 15, 2021.

Several plain text comma-separated values (.csv) files, known as eWRIMS flat files, contain the data fields used to create the dataset. Data was compiled from the eWRIMS flat files by the water right Application ID Number. The eWRIMS flat files that contain the data fields used to create the dataset are titled:

- Water Rights Master Flat File: This file contains general information associated with each water right record on file with the State Water Board. Several fields within this flat file were selected, such as: primary owner name, water source name, water right face value, water right status (e.g., active, etc.), and water right type (e.g., Appropriative, Statement of Diversion and Use, etc.).
- Water Rights Annual Water Use Report: This file contains the monthly water diversion and use data submitted by water right holders and claimants in annual reports. Reported total diversions, which included the amounts directly diverted and the amounts diverted or collected to storage, were selected for each month during calendar years 2018 and 2019. For Statements of Diversion and Use, this file contains information about the water right type (e.g., pre-1914, riparian, etc.) submitted by water right claimants as well as information about the year diversion first commenced, as discussed under *Disaggregation of Statements of Diversion and Use*.
- Water Rights Uses and Seasons: This file contains additional information regarding authorized diversion and storage seasons and beneficial uses¹ for each water right record. Beneficial use information was selected and compiled for each water right record. Some water right records have multiple beneficial uses, and each of the beneficial uses for each of the water right records was aggregated by Application ID Number.
- Water Rights Point of Diversion Flat File: This file contains general information associated with each water right record on file with the State Water Board, including several fields that are also available in the Water Rights Master Flat File. This file contains additional fields that were incorporated into the demand dataset, including: point of diversion location (latitude/longitude), application received date, and application acceptance date. The application acceptance date and application

¹ The beneficial uses of water pertaining to water rights are defined in the California Code of Regulations (CCR) §§ 659-672 to include: domestic, irrigation, power, municipal, mining, industrial, fish and wildlife preservation and enhancement, aquaculture, recreational, stockwatering, water quality, frost protection, and heat control.

received date fields were used to identify a water right priority date for the post-1914 appropriative water right records, as discussed under *Update and Format Demand Dataset*.

Information from the eWRIMS flat files was used to create one dataset of water rights and claims for all of California on record with the State Water Board.

Selection of Active Water Right Records in California

The dataset of all water right records was limited to those with an active-type water right status, which includes the following water right statuses:

- Claimed
- Licensed
- Permitted
- Registered
- Certified

By only including active-type statuses, water rights with inactive-type statuses, such as inactive, rejected, and cancelled, were excluded from the demand dataset.

Selection of Active Water Right Records in the Delta Watershed

The dataset of active water right records in California was then limited to diversions located in the Delta watershed. Using geographic information system (GIS) software, water right records located in the Delta watershed were selected based on the spatial location of each water right Point of Diversion (POD).

The Division of Water Rights has created an eWRIMS Web Mapping Application that provides the spatial location of all of the water right PODs in California. A public version of the eWRIMS GIS System is available at:

https://waterrightsmaps.waterboards.ca.gov/viewer/index.html?viewer=eWRIMS.eWRIM S_gvh#

The Delta watershed boundaries used for the spatial selection include the following Hydrologic Unit Code level 4 (HUC4) watersheds, as defined by the U.S. Geological Survey (USGS) Watershed Boundary Dataset (WBD):

HUC4 Subregion Number	HUC4 Subregion Name
1802	Sacramento
1804	San Joaquin

The GIS attributes of water right PODs within the Delta watershed were then exported as a plain text .csv file.

Selection of Consumptive Water Right Records in the Delta Watershed

The Delta watershed demand dataset was then further subdivided to include only water right records with consumptive beneficial uses. Water right records that contain only non-consumptive beneficial uses were excluded from the Delta watershed demand dataset. These beneficial use types and combinations include:

- Power
- Power and Recreational
- Power and Industrial
- Power and Domestic
- Power and Fish and Wildlife Preservation and Enhancement
- Fish and Wildlife Preservation and Enhancement

The above beneficial use types and combinations were assumed to be associated primarily with non-consumptive uses of water, including hydropower generation and instream flows. Water right records with the Power and Industrial and Power and Domestic beneficial use combinations were assumed to be primarily associated with hydropower generation, with a negligible amount of incidental industrial or domestic uses of water as a conservative assumption for purposes of avoiding overestimation of demands. Accounting for instream flows is described in the main report.

A small number of water right records did not contain beneficial use information in the eWRIMS flat files. These water right records were initially included in the demand dataset. However, many of these were eventually found to be non-consumptive during the review process described below.

Selection of Appropriative Water Rights and Statements of Diversion and Use in the Delta Watershed

The Delta watershed demand dataset was again subdivided to include only the following water right types:

- Appropriative
- Statement of Diversion and Use

Appropriative water rights include post-1914 appropriative water rights (e.g., water right permits and licenses). Statements of Diversion and Use include pre-1914 appropriative and riparian claims.

By limiting the demand dataset to Appropriative water rights and Statements of Diversion and Use, minor water right types such as Stockponds and Registrations were excluded from the dataset. Similarly, other types of water right records such as Temporary Permits were also excluded. These other water right types were assumed to constitute a negligible amount of the water diversion and use within the Delta watershed. Excluding these uses represents a conservative assumption for the purposes of avoiding overestimation of demands.

Quality Control Review

Diversion data contained within annual reports is self-reported and is not systematically verified for accuracy upon submittal to the State Water Board. As a result, an internal review and quality control effort was conducted. The quality control review process was focused on the review of the total diversion amounts for 2018 and 2019 reported by water right holders or their agents in annual reports. The total diversion amount includes the amount directly diverted and the amount diverted or collected to storage.

The water right records in the Delta watershed demand dataset after initial selection were too numerous to feasibly review in their entirety at this time. Therefore, the scope of the review was narrowed to a subset of water right records, with a focus on the largest diversions in the Delta watershed.

Selection of Largest Diversions in Delta Watershed for Quality Control Review

The approximately 12,000 total water right records in the demand dataset after initial selection were subdivided to approximately 580 water right records that include the largest diversions in the Delta watershed. Criteria used to identify this selection of water right records includes:

- Statements of Diversion and Use with total reported diversion of 5,000 acre-feet (AF) or greater for either 2018 or 2019
- Appropriative water rights with a face value of 5,000 AF or greater, or a total reported diversion of 5,000 AF or greater for either 2018 or 2019

These water right records were the focus of the quality control review process described below, and together represent over 90% of demands in the Delta watershed.

Quality Control Review

The quality control process focused on review of diversion data obtained from annual reports submitted by water right holders and their agents for calendar years 2018 and 2019. For each of the approximately 580 water right records included in the quality control review, the 2018 and 2019 annual reports were accessed through the eWRIMS

database system. The contents of the annual reports were reviewed, including but not limited to the following information:

- Purpose of Use
- Amount of Water Diverted and Used, including monthly amounts directly diverted, monthly amounts diverted or collected to storage, and monthly amounts used
- Maximum Rate of Diversion, including maximum monthly diversion rates
- Comments and Additional Remarks

The specific issues that were investigated during the quality control review, and corrected when possible, included:

- Non-consumptive diversions improperly appearing as consumptive
- Duplicate diversion values, such as the same diversions reported under multiple water right records
- Diversion data entry and reporting errors, such as incorrect units of measurement and decimal placement errors
- Reported diversions in excess of the water right's face value (applies to post-1914 appropriative water rights only)

In general, the issues that were investigated relate to the correction of over-reporting of diversion amounts. An overview of the commonly identified issues and corrections that were applied to the demand dataset is provided below.

In some cases, it was not possible to resolve outstanding issues without further information. State Water Board staff has contacted numerous water right holders or their agents to gather this information. However, it was not feasible to contact all water right holders or agents in all cases where a potential reporting related error was identified or a correction applied to a diversion value. Efforts were prioritized to contact water right holders or agents based on several factors, including reported diversion size and relative level of uncertainty regarding potential reporting-related inaccuracies. Some water right holders and agents did not provide timely responses to inquiries regarding potential reporting related errors. In the absence of additional information provided by the water right holder or agent, estimates of the actual diversion amounts were used based on information contained within the annual report and supplemental information available within the eWRIMS database.

Non-Consumptive Diversions and Uses

Annual reports reviewed for some water right records appeared to indicate that water was diverted only for non-consumptive use. Water right records were generally identified as non-consumptive based on the reported purposes of use contained within the 2018 and 2019 annual reports. Some non-consumptive purposes of use identified during the quality control review include instream flow uses (e.g., "maintain a live

stream"), power generation, or non-consumptive aquaculture uses. These records were removed from the demand dataset.

In some cases, annual reports included both consumptive and non-consumptive purposes of use, such as both power generation and irrigation. It was generally assumed that all water diverted under these records was used consumptively. However, for some water right records, comments or additional remarks included in the annual report appeared to indicate that only a portion of the water diverted was used consumptively, but information was not provided within the annual report to quantify the volume of water diverted for consumptive uses. If it was not possible to quantify the volume of water diverted for consumptive uses, the water right record was identified for outreach to the water right holder to resolve the issue.

Duplication of Reported Diversion Amounts

Some 2018 and 2019 annual reports contain comments, additional remarks, or other information that clearly indicated that a particular diversion was fully reported under two or more separate rights (i.e., duplicated). In these cases, reported diversions were retained for only one record and were changed to zero for the other record(s) in the demand dataset.

Some water right holders have multiple water rights or claims. In some cases, identical monthly diversion amounts were reported under multiple records associated with a particular water right holder, but the annual reports did not clearly indicate if the same diversion volumes were reported under multiple water right records. If it was not possible to determine if the water right holder had reported duplicative diversion volumes under multiple records, the water right records were identified for outreach to the water right holder to resolve the issue.

Some 2018 and 2019 annual reports contain information that appeared to identify some duplicate reporting of the same diversion volumes under multiple water right records, including water right records held by different water right holders. If it was not possible to quantify the volume of water reported under multiple water right records, the water right records were identified for outreach to the water right holders to resolve the issue.

Diversion Data Entry and Reporting Issues

Numerous diversion data entry and reporting issues were identified during the quality control review, including data entry, unit reporting, and other related issues. Commonly encountered diversion data entry and reporting issues are summarized below.

Diversion data entry issues encountered during the quality control review include misplaced decimal points, apparent reporting of monthly diversion volumes in the wrong data field within the annual report, and other similar issues. When the data entry issue was identifiable, the diversion data was corrected accordingly. Unit reporting issues encountered during the quality control review include apparent reporting of monthly diversion amounts using incorrect units of measurement, such as reporting of diversion volumes in units of acre-feet instead of gallons. These unit reporting errors generally resulted in unreasonably large diversion amounts, particularly when compared with the reported purpose of use. Other information contained within the annual report, such as the reported purpose of use, crop acreage, maximum rate of diversion, amount beneficially used, and comments and additional remarks, was generally used to identify and correct the reported diversion amounts. In some cases, a comparison of 2018 and 2019 reported diversions with reported diversions in prior annual reports provided information that informed a correction to the diversion amount.

In some cases, a diversion data entry or unit reporting error was detected, but it was unclear how the reported diversion amounts should be corrected. If it was not possible to correct the diversion amount without supplemental information provided by the water right holder, the water right record was identified for outreach to the water right holder to resolve the issue.

Some additional data reporting errors were also identified during the quality control review, such as annual reports that contain reported monthly diversion volumes in excess of the reported maximum monthly rate of diversion. In some cases, it was determined that the water right holder or their agent likely reported the maximum monthly rate of diversion using incorrect units, such as gallons per day (GPD) instead of gallons per minute (GPM). In many cases, this specific issue did not require a correction to the reported monthly diversion amounts. However, some other miscellaneous reporting-related issues were identified during the quality control review that required additional information to resolve. These water right records were generally identified and prioritized for outreach to the water right holder.

Reported Diversions in Excess of Water Right Face Value

Annual reports submitted for some post-1914 appropriative water rights included reported diversions in excess of the water right face value. In most instances, the reported diversion amount was changed to the face value amount or other updated value based on information contained within the annual report or supplemental information available in other documentation accessed through the eWRIMS database, such as the water right permit or license.

In addition to the records review described above, approximately 100 post-1914 appropriative rights were identified that reported diversions less than 5,000 AF but in excess of the face value of the water right. Most of these diversions are very small. Due to time constraints, no investigation of the approximately 100 post-1914 appropriative water right records with 2018 or 2019 reported diversions in excess of the water right face value was conducted. In these cases, the reported diversion amounts within the demand dataset were updated to equal the face value of the water right.

Update and Format Demand Dataset

Following completion of the quality control review process described above, several additional steps were completed to update, format, and export the demand dataset for use in the Water Unavailability Methodology Excel workbook (spreadsheet). The contents of the spreadsheet are described in Appendix A.

Select water right records (Application ID Numbers) were removed from the initial demand dataset as a result of the quality control review discussed above, including water right records that appeared to divert water only for non-consumptive use. As discussed in the main report, several consumptive water right records were also removed from the dataset, including consumptive water rights associated with the Central Valley Project (CVP) Trinity River Division (A005628, A015374, A015375, A016767, and A017374). A small number (less than 10) of additional water right records were determined to be located outside of the Delta watershed based on their Hydrologic Unit Code level 8 (HUC8) watershed and were also removed from the demand dataset. These records all contain PODs located near the boundary of the Delta watershed that were improperly included in the spatial selection of water right records in the Delta watershed.

The quality control process described above focused on the review of the annual total diversion amounts for calendar years 2018 and 2019. If an annual diversion amount was adjusted as a result of a correction applied during the quality control process, the monthly diversion values were adjusted in a proportional manner.

Some water right holders did not submit annual reports in 2018 or 2019. When an annual report is not submitted, there is no diversion data value recorded in the eWRIMS flat files. In instances where a water right holder did not submit an annual report, the diversion amount was recorded as zero in the demand dataset. This provides a conservative assumption for the purposes of avoiding the overestimation of demands.

Upon completion of the quality control review process, diversion values were merged with a March 16, 2021 copy of the eWRIMS datasets to produce a demand dataset that reflects updates to eWRIMS database information that occurred between January 15 and March 16, 2021. For example, a small number of diverters submitted new or revised 2018 or 2019 annual reports between January 15 and March 16, 2021. These new or revised diversion values were incorporated into the demand dataset. In addition, seven water right records were removed from the demand dataset due to changes in water right status from an active-type status to an inactive-type status between January 15 and March 16, 2021.

Appendix A contains more information about the field names and content included in the demand dataset used in the spreadsheet. Many of the demand dataset fields were obtained directly from the eWRIMS flat files. Several other fields, including the Watershed and Legal Delta (True/False) fields, were determined based on a GIS

analysis. One field, Priority Date, was determined for post-1914 appropriative rights and select Statements of Diversion and Use using multiple data fields contained within the eWRIMS flat files. The Priority Date for post-1914 appropriative water right types was based on the 'Application Acceptance Date' and 'Application Received Date' fields in the eWRIMS database and was determined to be the earlier date among the two fields. The Priority Date for Statements of Diversion and Use was based on the year diversion first commenced or was assigned a Priority date of "Riparian," depending on the Statement of Diversion and Use assigned category. These Statement of Diversion and Use assigned categories and priority dates are described in greater detail in the next section.

The demand data diversion values are structured in a wide format, such that each water right record (Application ID Number) exists on a single row with total annual and monthly diversion amounts for both 2018 and 2019. Some water right records divert from multiple subwatersheds or divert within the Legal Delta, with access to water from both the Sacramento and the San Joaquin River watersheds. The demands of these water right records are modified and expanded upon in the Demand Separated tab of the methodology spreadsheet. Appendix A provides additional details on these modifications.

Disaggregation of Statements of Diversion and Use

Water right holders and claimants that divert water under Statements of Diversion and Use provide information about the water right claim type to the State Water Board in Initial Statements of Water Diversion and Use and in annual reports (Supplement Statements of Diversion and Use). This user-submitted information was obtained from the Initial Statements of Diversion and Use and the 2018 and 2019 annual reports, and was used to disaggregate Statements of Diversion and Use into several categories.

Statement of Diversion and Use water right claim type information provided in the Initial Statement of Diversion and Use is stored in the 'Sub-Type' field in the Water Rights Point of Diversion Flat File. Statement of Diversion and Use water right claim type information provided in the 2018 and 2019 annual reports is stored in the 'Diverted and Used Under' field in the Water Rights Annual Water Use Report Flat File. Water right claim type information were concatenated, capitalized for uniformity, and reduced to a minimum set of unique and ordered values for each Statement of Diversion and Use.

The Statement of Diversion and Use water right claim type information was then searched for keywords and a category (Riparian, Riparian/Pre-1914, Pre-1914, Reserved, Other, or Unclassified) was assigned based on matches as summarized below. The search was conducted in sequence and stopped when the first match was found, following the sequence below with the assigned category in bold:

- 1. **Riparian/Pre-1914** Keywords: RIPARIAN, or RIPERIAN and PRE-1914, PRE-14, PRE1914, or PRE14
- 2. Riparian Keywords: RIPARIAN, or RIPERIAN
- 3. **Pre-1914** Keywords: PRE-1914, PRE-14, PRE1914, or PRE14
- 4. **Reserved** Keywords: RESERVE, or RESERVATION
- 5. **Other** Keywords: COURTADJ, COURTDECREE, COURT DECREE, HOLDING CONTRACT, COWELL AGREEMENT, or CONTRACT WITH YOLO COUNTY
- 6. Removal from demand dataset Keywords: STOCKPOND, STOCK POND, PENDING, or PENDINGAPPROPRIATE
- 7. **Unclassified** did not contain any of the above keywords.

Statements of Diversion and Use assigned to the Riparian category contain the keyword RIPARIAN or RIPERIAN, but do not contain the keywords PRE-1914, PRE-14, PRE1914, or PRE14. Statements of Diversion and Use assigned to the Pre-1914 category contain the keyword PRE-1914, PRE-14, PRE1914, or PRE14, but do not contain the keywords RIPARIAN or RIPERIAN. Statements of Diversion and Use assigned to the Riparian/Pre-1914 category contain keywords for both the Riparian and Pre-1914 categories.

Priority dates were assigned to each record in the Riparian/Pre-1914, Pre-1914, Reserved, and Unclassified categories based upon the earliest 'Year Diversion Commenced' value reported in the Initial Statements of Diversion and Use, the 2018 annual report, or the 2019 annual report. These values can be found in the 'Year Diversion Commenced' column of both the Water Rights Point of Diversion Flat File and the Water Rights Annual Water Use Report Flat File. Though priority dates were assigned to Statements of Diversion and Use in the Riparian/Pre-1914 category, for the purposes of evaluating water unavailability these claims are assigned a non-priority date value of "Riparian" and are assumed to have senior priority over all appropriative water rights.² Statements in the Riparian and Other categories are similarly assigned a "Riparian" priority and assumed to all have equal senior priority.

² For claims within the Legal Delta, this categorization of colorable riparian claims is consistent with recent judicial decisions (see e.g., *Modesto Irrigation District v. Heather Robinson Tanaka*, 48 Cal.App.5th 898 (2020)) and with the legal principles described in a memorandum dated December 15, 2017 regarding Issues Related to Overlap between Pre-1914 and Riparian Water Right Claims in the Delta and available on the website of the Office of the Delta Watermaster (Overlap Memo).

EXHIBIT L

Appendix C: Summary of Public Comments

The table below summarizes the substantive technical, factual, or legal comments that have been received to date regarding the Water Unavailability Methodology as well as the section of the Water Unavailability Methodology summary report that is responsive to each comment.

Commenter	Summary of Comments	Response Section
Written Comments		
Valley Aglands, Inc.	Notices of Water Unavailability (Notices) should be issued earlier to manage post-1914 priorities of right. If conditions are very dry, Notices should be issued to partially curtail all riparians as well.	1
Association of California Water Agencies	Notices should be very clear that they are not curtailment orders.	See <u>June 15,</u> 2021 Notices
Byron-Bethany Irrigation District	Methodology cannot support any curtailments. Some of the flaws from Order WR 2016-0015 still exist. Distinguish supply gages in Figure 5. Add Hydrologic Unit Code level 8 watersheds map. Do not make Delta return flows available to rights upstream. Treat Delta as its own supply and demand area with water always present. Legal Delta's return flows stay available locally. Add municipal return flows as additional supply. Do not omit mainstem reservoir releases in excess of full natural flow (FNF). Acknowledge residence time of water in the Delta (about 3 months). Use hydrodynamic models for Delta water availability instead of upstream FNF. Consider Delta water quality. Include return flows from rediversion of stored Project water. Attached 2016 Expert Report of Susan Paulsen.	1, 2.1.3, 2.2.8, 2.3.3
Commenter	Summary of Comments	Response Section
-----------------------------------------	--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	-------------------------------------
California Farm Bureau Federation	Better describe actual curtailment process. How will the recent Temporary Urgency Change Petition from the Department of Water Resources' (DWR) State Water Project (SWP) and the U.S. Bureau of Reclamation's (Reclamation) Central Valley Project (CVP) (collectively Projects) affect this effort? Focus on improved functional data instead of poor reporting/measurement. Encourage voluntary agreements instead of curtailments.	3
Central Delta Water Agency	Tidal flow should be available natural flow supply (about 330,000 cubic feet per second or about 19.6 million acre-feet per month). Identify any rights within tidal influence zone. Natural tidal flows are of sufficient quality for beneficial use; the Projects are required to ensure this. Historically the Delta was less salty but development (deepening ship channels) have made it saltier. Acknowledge that Delta lowland diversions help the Projects by improving Delta water quality. Curtailing Delta lowland rights would not save any water due to weed growth and shallow groundwater. Account for water transfers (e.g., groundwater substitution or land fallowing) and channel accretions/depletions. Do not curtail any water users in the Delta. Attached 1993 Delta Atlas Tidal Flows figure, 2014 testimony of Christopher Neudeck, 2014 South Delta sounding elevations map, 2010 Contra Costa Water District memo on historical Western Delta salinity, 1956 DWR Report on Delta Lowland water quality, 1993 Delta Atlas elevation map, 2014 GEI memo on Delta Wetlands curtailment, and 1993 Delta Atlas Legal Delta map.	1, 2.1.2, 2.2.8, 2.3.3
Cold Springs Water Company	Inadequate justification for curtailing any water rights in San Joaquin Watershed. Support users with no alternative water sources.	See <u>June 15,</u> 2021 Notices

Commenter	Summary of Comments	Response Section
California Water Research	Consider diversions by Sacramento River Settlement Contractors under Reclamation's CVP permits (Reclamation's reports are unclear on relationship). Cross-check diversions greater than face value. Document assumptions on Settlement Contractor demand met by stored water versus natural flow. Ensure Reclamation is complying with reporting requirements for CVP. Attached data table estimating diversions by contractors with post-14 rights.	2.2.2, 2.2.6
East Bay Municipal Utility District	Methodology not real-time or appropriate for individual curtailments (i.e., demands based on 2018 which may not represent current conditions). More technical documentation of process needed. Better describe actual curtailment process. Why is the Mokelumne River subwatershed considered a lower subwatershed? Were adjustments made to include the entire watershed in FNF gages? Better explain treatment of riparian and pre-1914 users. Better explain calculations of pasted values.	2.1.3, 2.2, 2.2.4, 2.3.1, Technical Appendix A
Jennifer Spaletta (Delta and tributary water users)	Acknowledge that Delta channels below sea level always have water; the issue is quality not quantity. Use 2020 Demand data for permits and licenses and real-time data for largest diverters with telemetry (e.g., Projects). Support voluntary agreements (e.g., fallowing/forbearance). Attached 2016 Expert Report of Susan Paulsen.	1, 2.2, 2.3.3
Merced Irrigation District	Disagrees with treatment of Projects as most junior. Methodology too generous to SB88 violators. Make sure that abandoned flows are actually abandoned and not being delivered downstream. Do not enact emergency regulations and risk litigation. More information coming on proposed San Joaquin voluntary agreement.	2.2.6, 2.2.8

Commenter	Summary of Comments	Response Section
Northern California Water Association	Curtailments based on waste and unreasonable use are not effective. Better align water availability with actual and projected water supplies (see MBK comments at workshop). Real-time system like Term 91 works well. Sacramento water rights should not be curtailed for users south of North Delta Water Agency, reconsider Legal Delta proration (see Order WR 89-8). The State Water Resources Control Board's (State Water Board or Board) January 1978 Report has good recommendations. Fully utilize complaint process. Use online alert system to lift curtailments. Support voluntary agreements (flow agreements exist on nearly all Sacramento tributaries).	2.1, 2.3.3
Tim O'Laughlin	Do not include Stanislaus River water as available downstream (adjudicated). Include New Melones releases as abandoned downstream of Vernalis. Reclamation's planned New Melones releases for Delta outflow are illegal. Most of Reclamation's Project diversions are San Joaquin River water. Decide if the Delta is a "pool" or not. Curtailing diversions in the Delta does not save water. Are flows to meet X-2 protected? Is tidal flow available for appropriation? Do Central and South Delta have a right to stored water? See comment letter for additional questions.	1, 2.2.6, 2.3.3
Santa Clara Valley Water District	Consider impacts on transfers and exchanges. Enforce SB88 requirements. Balance human water needs with environment.	2.1.2

Commenter	Summary of Comments	Response Section
San Joaquin Tributaries Authority	Supply forecasts of FNF are insufficient to support curtailments, and DWR's Bulletin 120 (B-120) has been inaccurate in 2021. Evaluate supply on a daily basis. Better explain how past data is used in forecasts. Disclose all CalSim 3 results and better validate San Joaquin River return flows. Abandoned flows in headwater subwatersheds not included. Demand estimates based on past data are inaccurate. Disaggregate statement demand into riparian and pre-1914 demands. Account for reductions in demand due to drought. Better explain headwater subwatershed disconnection. Contractor demands double-counted. Do not include rediversions of rim dam releases. Regulations and curtailments of riparian and pre-1914 users are outside the Board's jurisdiction without adjudication. Assuming flow connectivity may be incorrect. Only enforce priority system through complaints.	1, 2.1.4, 2.1.6, 2.2, 2.2.4, 2.2.6, 2.2.8, 2.3.2, 4.1.2
State Water Contractors	Use smaller timestep than monthly. Validate demand data using land use information. Rely on real-time water use data. Supports voluntary agreements. Critiques arguments of Delta water users.	2.1.4, 2.2, 4.1.2
Jeanne Zolezzi (Banta-Carbona Irrigation District, Patterson Irrigation District, West Stanislaus Irrigation District)	Methodology has not improved since 2015 and is insufficient to curtail individual users. Use updated (lower) demand data for this year. Remove riparian demands if no natural flow available. Use finer time scale than monthly. California Data Exchange Center station data inaccurate. Summer San Joaquin Project demand is too high. Include San Joaquin River accretions. New Melones releases are abandoned after Vernalis. Curtailments not necessary on San Joaquin River. The State Water Board has no duty to protect the Projects.	1, 2.2, 2.2.6, 2.2.8, 2.3.2

Commenter	Summary of Comments	Response Section
Verbal Comment		
Mark Van Camp (MBK Engineers)	Mark Van Camp (MBK Engineers)Appreciates the inclusion of abandoned water at a subwatershed scale. Appreciates the approach of erring on the side of conservative demand estimates and liberal supply estimates so curtailments are not premature. Compare B-120 and California Nevada River Forecast Center forecasts for Sacramento River watershed locations. Reconsider the apportionment of Delta demands between watersheds	
Late Comment		
Environmental Law Foundation	Consider public trust needs before making allocation decisions. Revise demand estimates to include demands for instream flow. Create a separate public trust process to ensure that there are sufficient flows for fish survival during the drought. Apply methodology to all users including pre-1914 users.	2.2.4, 3.2

EXHIBIT M

Technical Appendix D: Assessment of Water Availability Issues Within the Legal Delta

This appendix provides additional background information used to evaluate water unavailability in the Legal Delta portion of the Sacramento-San Joaquin Delta (Delta) Watershed.

Introduction

The evaluation of water availability and unavailability for diversion in the Legal Delta is complex due to a number of factors, including (1) the considerations of tidal influence on freshwater residence time in the Legal Delta as well as water quality (e.g., its suitability for agricultural use), (2) the operations of the State Water Project (SWP) and Central Valley Project (CVP) (collectively the "Projects"), that release previously stored water from upstream storage for use in the Legal Delta, over which they retain claim and control for various beneficial uses, and (3) natural depletions of water in the Legal Delta due to aquatic and riparian vegetation, concerning which there is some uncertainty. The Water Unavailability Methodology for the Delta Watershed (Methodology) summary report explains that application of a residence time longer than one month is not warranted at this time given the extremely dry conditions that have persisted for an extended period and the supplementation of flows in the Delta with previously stored Project water for many months. The methodology also explains that only freshwater natural flows from the Sacramento and San Joaquin Rivers are accounted for as part of the available supplies and does not include any water supplies from tidal inflows to the Legal Delta because saline water entering the Legal Delta from the San Francisco Bay via tidal action is assumed to be of insufficient quality to be usable for agricultural or municipal purposes. This appendix provides further technical support for these assumptions used in the Methodology.

This analysis focuses on water unavailability in the southern Delta because the predominant source of fresh water into the Legal Delta is from the Sacramento River to the north. Therefore, the effects of hydrodynamics on residence time, water quality, and water availability would be greatest in the southern Delta.

Appropriate Use of Hydrodynamic Models

Hydrodynamic models may provide useful insights into the complex movement of water within the Legal Delta when appropriately applied and validated. However, during periods of low inflow and high salinity, the commonly used California Department of Water Resources (DWR) Delta Simulation Model II (DSM2) does not accurately replicate observed conditions. For example, in written comments submitted to the State Water Resources Control Board (State Water Board or Board) by the Byron-Bethany Irrigation District (BBID) on May 25, 2021, a report from Dr. Susan Paulsen was referenced that compared observed salinity to modeled salinity values from DSM2 (see Figure 1). The model-calculated chloride concentration (a measure of salinity) is approximately three times higher than the measured chloride concentration in the vicinity of Clifton Court Forebay in the southern Delta in August and twice as high as the measured concentration in October. Additionally, the modeled results show a peak chloride concentration about 3 weeks earlier than observed. It is, therefore, inappropriate to rely solely upon results from a model for time periods when model results are off by almost a factor of three. However, other analyses and methods can be used to understand the relationship between Delta outflow, water availability, and water quality. These other methods also demonstrate why models alone may be unable to correctly calculate salinity during low Delta outflow conditions, as very small volumes of high salinity water can have very large effects on chlorides, salinity, and electrical conductivity (EC).

Figure 1. Example Comparison of Observed Salinity and Modeled Salinity in the Vicinity of Clifton Court Forebay, January–December 1931 (Paulsen, 2015)



Residence Time

Simple flow volumes and estimates of residence times based on inflow that are applied broadly to the Legal Delta also may not provide a sufficient answer to inform determinations regarding water unavailability because they do not account for mixing from tidal action and consumptive water use within the Legal Delta. Mixing of water, particularly in Suisun Bay, makes the mixed water from that source too salty for beneficial use far earlier than simple residence times and fingerprinting may suggest because they may not correctly consider the effects of even small volumes of very saline water. For example, fully half of the water at a particular location could come from water that entered from the Sacramento River spanning several months, but if the other half came from Suisun Bay, with an EC of 20,000 microsiemens per centimeter (μ s/cm), the water would have an EC of just over 10,000 μ s/cm and would be unusable for almost all purposes.

Fortunately, bathymetry data available as a result of recent improvements in digital elevation models (USGS 2017) can be used to better understand the effects of extremely low Delta outflow on water availability and water quality in the Legal Delta. To improve hydrodynamic models in the Delta, the USGS and Inter-Agency Ecological Program (IEP) sponsored the development of a 10-meter horizontal grid of bathymetry in the Delta (USGS 2007). The survey determined the volume and area for the various regions of the Delta shown in Figure 2 below.





Table 1 contains the summary areas and volumes from the USGS report, with a conversion to volumes in thousand acre-feet (TAF).

Table 1 also contains tidal flux volumes based on variable tidal ranges for the four regions from California Data Exchange Center (CDEC) river stage gages. The tidal variation is greatest to the west in Suisun Bay and decreases in the eastern, northern, and southern regions of the Delta.

Region	Water Surface Area (million meters ²)	Volume (million meters ³)	Water Surface Area (acres)	Volume (TAF)	Tidal Range (feet)	Tidal Flux* (TAF/day)	Exchange Rate* (days)
Suisun Bay	165	954	40,772	773	3.6	297	2.6
Northern Delta	74	407	18,286	330	2.9	108	3.1
Central Delta	66	267	16,309	216	2.4	78	2.8
Southern Delta	10	28	2,471	23	2.4	12	2.0
Total	316	1,656	78,085	1,343		494	2.7
Total without Suisun Bay	150	702	37,066	569		197	2.9

Areas and volumes from USGS (2007).

Tidal ranges from CDEC river stage data for gages MRZ, M13, SJJ, and OH4 (see Figure 2): http://cdec4gov.water.ca.gov/dynamicapp/wsSensorData

* Tidal flux is the volume of water exchanged each day, which is calculated by multiplying water surface area by the tidal range multiplied by the frequency (i.e., twice per day). The exchange rate is calculated by the channel volume divided by the tidal flux.

The Stockton and Sacramento Deep Water Ship Channels were deepened and widened for navigation, altering Legal Delta hydrodynamics by increasing tidal flow volumes and therefore increasing seawater dispersion into the Legal Delta (CCWD 2010). These large channels, not present in the early part of the century, are part of the reason that channel volumes are so much bigger in the northern and central Delta than the southern Delta.

may suggest, based on volume alone, that a pool of water in Suisun Bay and the Legal Delta could provide a prolonged water supply in the Legal Delta. However,

also shows that an amount of water equal to the entire volume of Suisun Bay is exchanged by the tides over less than three days. Similarly, in each of the Delta regions an amount of water greater than the total volume is exchanged by the tides over less than three days (less than two days in the southern Delta). The large tidal influence greatly reduces the residence time of fresh water in the Legal Delta and thus has a large effect on the water quality (as discussed below in the following section).

Figure 3 shows the four regions of the Delta scaled according to their channel volumes. Superimposed on the graphic is a scaled representation of the 297 TAF/day tidal flux and the net Delta outflow to Suisun Bay in July; it is this positive net outflow that stops saltwater from flowing into the Legal Delta. This schematic shows how large the daily tidal flux is in comparison to the volume of the regions of the Delta. For example, tidal flux in the southern Delta is equal to approximately half its channel volume. Figure 3 makes two things visually clear:

- 1. The importance of tidal flux compared to the total volume of water in Suisun Bay and regions of the Delta, and
- 2. The relatively small volume of water in southern Delta channels compared to Suisun Bay and other regions of the Delta.

Figure 3. Schematic of Suisun Bay and Delta Regions with Scaled Channel Volumes, Daily Tidal Flux, and Net Delta Monthly Outflow, July 2021



In addition to tidal exchanges, irrigated and riparian vegetation consumes a large volume of water from Legal Delta channels. Consumptive use of water in the Legal Delta, as estimated for regulatory purposes, is presented in the DAYFLOW documentation (DWR 2019); DAYFLOW results for 2021 are summarized in Table 2 below. Table 2 shows that consumptive water use in the southern Delta is very large, especially when compared with the channel volumes in Table 1.

The monthly depletions for each Delta region are shown as a percent of channel volume in Table 3. Table 3 shows that consumptive water use in the southern Delta is more than three times (313%) the volume of water in the southern Delta channels in the month of July and just under that in June and August. Therefore, without considering the twice daily tidal flux discussed above, and without considering diversions by the Projects from Clifton Court Forebay and the Jones Pumping Plant, there are three full

exchanges of water in the southern Delta that are attributable to consumptive use. Without considering tidal flux, the residence time of water in the southern Delta is about 10 days throughout June, July, and August. Tidal flux has the effect of exchanging an amount equivalent to the volume of water in southern Delta channels around 15 times per month (one exchange every two days).

Table 2. Gross Channel Depletions Distributed by Delta Region,	, March-October
2021	

Month	DAYFLOW Delta Gross Channel Depletions (TAF)	Northern Delta Depletions* (TAF)	Central Delta Depletions* (TAF)	Southern Delta Depletions* (TAF)
March 2021	80	41	18	22
April 2021	112	57	25	30
May 2021	149	76	33	40
June 2021	223	114	49	60
July 2021	267	136	59	73
August 2021	232	118	51	63
September 2021	156	80	34	42
October 2021	114	58	25	31

* Depletions for the three regions are based on a proportional distribution of total DAYFLOW Delta gross channel depletions based on the service areas of the North, Central, and South Delta Water Agencies.

Month	DAYFLOW Delta Gross Channel Depletions (TAF)	Northern Delta	Central Delta	Southern Delta
March 2021	80	12%	8%	94%
April 2021	112	17%	11%	132%
May 2021	149	23%	15%	176%
June 2021	223	34%	23%	263%
July 2021	267	41%	27%	315%
August 2021	232	36%	24%	274%
September 2021	156	24%	16%	184%
October 2021	114	18%	12%	135%

Fable 3. Monthly Depletions as a Percent of Channel Volume, March–Octob	ber
2021	

Figure 4 shows the July 2021 gross monthly depletions¹ from Table 3 for different regions of the Delta in relation to their channel volumes. This schematic clearly shows how the volume of consumptive use in the southern Delta greatly exceeds the volume of water that can be stored in southern Delta channels.





¹ Shown in the figure as consumptive use because in July and other months with no precipitation, channel depletions and consumptive use are the same value.

Simple estimates of residence time that only consider the total volume of the Legal Delta and inflow overestimate the residence time because they do not consider the enormous twice daily tidal flux, the variable channel volumes in different regions of the Delta, or consumptive water use. When these factors are considered, the residence time is less than three days for Suisun Bay and the northern, central, and southern Delta. The northern Delta has a longer residence time than the other regions, but it is still well under a month.

Water Quality

In addition to decreased residence times attributable to tidal flux and consumptive use, the effects of reduced Delta outflow on water quality must also be considered for determining water availability. Although there is water present at all times in the channels of the Legal Delta, in the absence of releases of water from storage upstream by the Projects that water is not necessarily of suitable quality for agricultural use. One of the principal purposes of the Projects is to release adequate water to maintain Delta outflow at levels sufficient to repel water in Suisun Bay from entering the Legal Delta. During low flow conditions, the typical minimum flow needed to maintain a freshwater barrier to repel salinity from entering the Legal Delta is a net Delta outflow of 3,000 to 4,500 cubic feet per second (cfs). Flows in this range and higher have been maintained during May, June, and July this year (Figure 5). Flows approaching, and lower than, 3,000 cfs even for short periods can result in salinity intrusion into the Legal Delta.



Figure 5. Net Delta Outflow, May–July 2021

Absent Project storage releases in 2021, water quality in much of the Legal Delta would have been of a quality unsuitable for agriculture much of this summer. While historical records of similarly dry periods may show that water was of sufficient quality for use throughout the summer, these periods did not include changes to the geography such as the deepening of ship channels or the increase in demand by more senior water users upstream, both of which have further degraded water quality.

Evaluation of Flows in the Legal Delta

Another way to evaluate the natural and abandoned flows that may be available in the Legal Delta is to evaluate conditions absent Project operations to determine how much water would be available in the Delta absent supplementation of Delta inflows with previously stored Project water and absent diversions by water users that have contracts with the Projects. The analysis conservatively assumes that all diversions by Project contractors are from Project previously stored water even though many of these water users have their own water rights and claims of right under which they would divert some portion of natural and abandoned flows reducing to some extent the water available in the Delta. This section presents an estimate of Legal Delta conditions without the operations of the Projects.

The amount of Project water released from previously stored water in Project reservoirs can be estimated by computing the difference between reservoir outflow and inflow (Project water is equal to outflow minus inflow). This assumes that all reservoir inflow is natural or abandoned. If the outflow is less than the inflow, the reservoir is storing water and there is no release of stored Project water occurring. To estimate the portion of Legal Delta inflow that originated as stored water releases from Project reservoirs upstream, the large deliveries of contract water by the Projects in the Sacramento, Feather, and American River basins need to be accounted for. Figure 6 shows the stretches of the rivers with Project reservoirs where Project contractors divert water and downstream locations that do not have significant Project contract diversions, described as Project or non-Project, respectively (described in more detail below).

From the Sacramento River, the largest CVP deliveries are to the Sacramento River Settlement Contractors that were allocated 75% of the contract amount, or about 1.6 million acre-feet (MAF), in 2021. These diversions primarily occur above Wilkins Slough. Therefore, it was assumed that the Projects were responsible for providing storage withdrawals to meet all depletions between Keswick Dam and Wilkins Slough. This is a very conservative assumption because the Sacramento River Settlement Contractors also have their own water rights and claims of right under which they would divert natural and abandoned flows that would not constitute a contract delivery. From Wilkins Slough to Freeport it was assumed that all depletions were from stream losses and non-Project diversions and therefore are not the responsibility of the Projects. From the Feather River, the largest SWP deliveries are to the Feather River Service Area Contractors, which primarily divert from the Thermalito Complex below Oroville Dam. Similar to the Sacramento River, it was assumed that the Projects are responsible for all depletions between Oroville Dam and Thermalito Dam. Like the Sacramento River Settlement Contractors, this is also a very conservative assumption because the Feather River Service Area Contractors also have their own water rights and claims of right for which they would divert natural and abandoned flows. It was also assumed that inflows to the Feather from Kelly Ridge were abandoned. Depletions from below Thermalito Dam to Freeport were assumed to not be the responsibility of the Projects.

On the American River, most Project deliveries to urban contractors are directly from Folsom Reservoir or from the Folsom South Canal that diverts from Lake Natoma. Therefore, it was assumed that all Project storage releases below Nimbus Dam were available at Freeport.

On the San Joaquin River, Project deliveries occur above Goodwin Dam. Therefore, it was assumed that all depletions between New Melones Dam and Goodwin Dam were from previously stored Project water. Again, this is a conservative assumption because water users in this stretch also have their own water rights that they divert natural and abandoned flows under. All depletions between Goodwin Dam and Vernalis were then assumed to be from natural and abandoned flows.

In summary, this method assigns all depletions between the major Project reservoirs and specified downstream control points (Wilkins Slough, Thermalito Dam, Nimbus Dam, and Goodwin Dam) to the Projects. All depletions downstream of these points, and upstream of inflow to the Legal Delta, are assigned to natural and abandoned flow. This method may slightly underestimate depletions of Project water because it does not account for other small Project diversions downstream of these control points (and upstream of the Legal Delta). It also likely underestimates depletions of natural and abandoned flows upstream of these points by Project contractors with their own water rights and other non-Project water right holders in reaches considered to be Project reaches. However, this method captures the major Project water depletions downstream of Project reservoirs and upstream of the Legal Delta. The natural and abandoned inflow estimated using this method is different than the unimpaired flows used in the Water Unavailability Methodology because the Methodology provides a total estimate of natural flow available for diversion in the entire Delta watershed before any diversion has taken place. The method described above provides an estimate of natural and abandoned flow that reaches the Legal Delta after upstream diversions have taken place.



Figure 6. Predominant Delivery Types Along Reaches Connecting Major Project Reservoirs and the Legal Delta

The method also provides an estimate of Project water entering the Delta, which is calculated as the sum of the Project water below the upstream control points described above. The natural and abandoned Delta inflow was estimated as the total observed Delta inflow (including inflows from Delta Eastside Tributaries, Yolo Bypass, and Sacramento Regional Water Treatment Plant) minus the Project Delta inflow. Figure 7 shows estimates of Legal Delta inflow from previously stored Project water and natural or abandoned flow, as well as a line representing total Project exports and Delta outflow. From early June through July, more Project water entered the Legal Delta than was exported and provided as Delta outflow. Total Legal Delta inflow from the Projects increased over these three months to maintain the freshwater barrier so that salt did not intrude into the Legal Delta.





Without the release of Project Water from storage, the only Delta inflow would be from natural and abandoned flows. If Delta depletions remained the same, they would be met by natural and abandoned flows until fully consumed, and Delta outflow would decrease to zero and then go negative. Figure 8 shows the effect that removing Project water would have on Delta outflow, going from slightly positive in May to negative in June and July. In the absence of Project water, Delta outflow becomes negative (reverse Delta outflow) over these three months because inflow of natural and abandoned flow decreases at the same time that Legal Delta depletions increase from May through July.



Figure 8. Legal Delta Inflows and Outflows without SWP and CVP Storage Releases and Exports, May–July 2021

As shown in Table 5, Legal Delta inflow from natural and abandoned flows exceeded Legal Delta consumptive use in May. Therefore, these inflows could have provided the water consumptively used in the Legal Delta. In June and July, however, with diminishing flows, net consumptive use in the Legal Delta exceeded inflows from natural and abandoned flows.

Month	Natural and Abandoned Legal Delta Inflow (TAF)	Net Delta Consumptive Use (TAF)	Calculated Net Delta Outflow (TAF)	Calculated Net Delta Outflow (cfs)
May 2021	302	148	155	2,514
June 2021	194	220	-26	-437
July 2021	198	268	-70	-1,138

Table 1	Coloulated	Not Dolto		····	Dralast	Inflow	NASSA IN	1.1 2024
Table 4.	Calculated	Net Delta	UUITTIOW	WITHOUT	Project	INTIOWS.	11/12/0-11	IV ZUZ1
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Without Project storage releases, there would not have been enough natural and abandoned Legal Delta inflow in June and July 2021 to prevent the net inflow of water from Suisun Bay into the Legal Delta. Instead of the average net Delta outflow of 3,300 cfs that occurred in June and July (Figure 5), there would have been negative net

Delta outflow in June and July.² Inflow of higher saline water from the west would have been particularly large in the southern Delta because it has disproportionately small channel volumes relative to its depletions. Table 6 shows that specific effect in the southern Delta, where consumptive use exceeded natural and abandoned inflows from the San Joaquin River in May, June, and July. The combined net inflow into the southern Delta from the central Delta and Suisun Bay for these three months, absent Project water from the San Joaquin River, would have been 115 TAF – five times the 23 TAF volume of southern Delta channels.

Month	Natural and Abandoned San Joaquin River Inflow to Legal Delta (TAF)	Southern Delta Consumptive Use (TAF)	"Replacement" Inflow to Southern Delta (TAF)
May 2021	37	40	3
June 2021	13	60	47
July 2021	8	72	64
Sum	57	172	115

Table 5. Calculated Southern Delta Replacement Water with No Legal Delta Inflow from San Joaquin River Project Releases, May-July 2021

Figure 9 shows the conditions that would have occurred in July 2021 if there had been no Project water entering the Legal Delta. The figure shows consumptive use in the three Delta regions relative to their channel volumes, the volume of natural and abandoned Legal Delta inflow, and net Delta outflow, which reverses in July. The volume of Sacramento River and eastside tributary natural and abandoned flow (198 + 10 = 208 TAF) is just slightly higher than the combined Northern and Central Legal Delta July consumptive use (136 + 59 = 195 TAF). The volume of San Joaquin River natural and abandoned flows (8 TAF) is a small fraction of southern Legal Delta consumptive use (73 TAF). This shows that, with continued use and in the absence of Project water, southern Legal Delta channels would be pulling water from the central Legal Delta and Suisun Bay. The figure shows that there would be negative net Delta outflow from the central and southern Legal Delta because consumptive use would be disproportionately higher than freshwater inflow.

² No additional use or export in the Legal Delta, other than net Legal Delta consumptive use, are considered in this calculation: diversions by the North Bay Aqueduct, Contra Costa Canal, and Byron Bethany Irrigation District are considered to be zero.

Figure 9. Schematic of Suisun Bay and Delta Regions with Scaled Channel Volumes, Consumptive Use, Natural and Abandoned Legal Delta Inflow, and Net Delta Outflow Reverse Flow, July 2021 Sacramento River inflow (198 taf)



Estimation of Water Quality in the Delta Without Previously Stored Project Water

This section presents a discussion of Legal Delta water quality absent Project operations. Without the presence of upstream Project storage releases in the Legal Delta, diversions in the southern Delta that exceed inflows from upstream would cause water from Suisun Bay and the central Delta to enter the southern Delta. The average EC in the far western boundary of the Legal Delta, at Emmaton (see Figure 2), was approximately 2,200 µs/cm in May 2021, when the average net Delta outflow was over 5,000 cfs. The EC increased to an average of over 4,000 µs/cm in June and July 2021, when the average Delta outflow dropped to an average 3,300 cfs (Figure 10). This relatively large increase in salinity occurred in response to a relatively small reduction in net Delta outflow from 5,000 to 3,300 cfs. This minimal Delta outflow was still enough to maintain a freshwater barrier between Suisun Bay and the Legal Delta, but salinity increased due to more water from Suisun Bay being mixed with Sacramento River water at Emmaton. Absent any Delta outflow, large volumes of Suisun Bay water and its associated salts would start entering the Legal Delta.



Figure 10. Historical Net Delta Outflow and Electrical Conductivity at Emmaton, May–July 2021

The EC at the far eastern boundary of Suisun Bay, downstream of Emmaton, would have been far higher if there had been no Delta outflow to freshen water in Suisun Bay. Further west in Suisun Bay, the average EC from May–July 2021 was 11,000, 20,000, and 31,000 μ s/cm at Collinsville, Port Chicago, and Martinez, respectively (east to west, see Figure 2). Without the benefit of Project water flowing into the Delta, this high EC water would have intruded into the Legal Delta and would mix much more with water already present because of the large daily tidal flux. It does not take much of this high salinity water to have a large effect on water quality; a 50/50 mix of 20,000 μ s/cm, assuming there was no salt in the other components of the mix.

Without Project water, conditions in the southern Delta in July 2021 would have been far worse than a 50/50 mix of Martinez-quality water because there would be very little low-salinity water present to mix with. Only 8 TAF of San Joaquin River water would have flowed into the southern Delta in July 2021 (see Table 5), while consumptive use was 73 TAF (see Table 2). Only 11 percent of the monthly consumptive use would have been met by low-salinity water from the San Joaquin River. The other 89 percent would have to have been met with water that flowed into the southern Delta through the central Delta from Suisun Bay. A 90/10 mix of Martinez and San Joaquin River water could approach 18,000 µs/cm.

Although some salt-tolerant crops can continue to be grown with relatively saline water, doing so requires very high leaching fractions to move the salts through the root zone. The types of soils in the southern Delta do not provide the high leaching requirements

needed to support high salinity irrigation water, and salt-tolerant crops are not generally grown in the southern Delta. Even if such crops were grown in the southern Delta and such leaching were possible, there is nowhere for the leached water to go except back into the southern Delta channels. With no net Delta outflow, the southern Delta is a closed system where the salt levels would continue to rise.

Slight to moderate restrictions on use are generally considered for irrigation water with salinity between 700 and 3,000 μ s/cm, with severe restrictions for salinity over 3,000 μ s/cm (Ayers and Westcot, 1985). Determining the sensitivity of crops to highly saline water is not a simple matter because the effect on the crop is based on the salinity in the root zone, which can be higher than the salinity of applied irrigation water. This is because soil salinities generally increase as water is consumed by the plant and salts are left behind in the soil.

Sensitive crops start showing declines in yield for soil-water salinities (soil extract EC) over 2,000 μ s/cm, with 100% yield reduction at 8,000 μ s/cm. Moderately sensitive crops start showing reductions at 3,000 μ s/cm, with 100 percent reduction at 16,000 μ s/cm. Moderately tolerant and tolerant crops start showing reductions at 7,000 and 10,000 μ s/cm, with 100 percent reduction at 24,000 to 32,000 μ s/cm (Hoffman 2010). These effects would occur at lower thresholds of applied water salinity depending on initial soil salinity and leaching fractions of the soils, among other things. In 2007, less than ten percent of the crops grown in the southern Delta were moderately tolerant or tolerant (Hoffman 2010).

An additional problem associated with applying highly saline water to crops is that salts will eventually have to be flushed from the root zone before yields can be restored. When that occurs, the salts will continue to impair the use of the receiving water as an agricultural supply until such time as all the salts are flushed from channels in the Legal Delta.

Conclusions

Although there will always be water in the Delta channels that are at or below sea-level, by August 2021 the quality of the water in those channels would be too salty for agricultural or urban beneficial uses absent the releases of previously stored water by the Projects. This analysis shows that when tidal flux, consumptive use, Delta outflow, the operations of the Projects, and water quality are considered, the assumptions regarding residence time and water quality in the Water Unavailability Analysis are valid.

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EXHIBIT N





State Water Resources Control Board

August 20, 2021

RICK GILMORE, GENERAL MANAGER

7995 BRUNS ROAD BYRON, CA 94514 AUG 24 2021

RECEIVED

Byron-Bethany Irrigation District

INITIAL ORDER IMPOSING WATER RIGHT CURTAILMENT AND REPORTING REQUIREMENTS IN THE SACRAMENTO-SAN JOAQUIN DELTA WATERSHED

This letter and the enclosed Order contain important information regarding the curtailment status for the PRE-1914 APPROPRIATIVE CLAIM owned by BYRON-BETHANY IRRIGATION DISTRICT, associated with Water Right ID S021256. This letter also describes a certification that is required to be submitted by **September 3**, **2021**.

Enclosed with this letter is an Order imposing water diversion curtailment and reporting requirements issued pursuant to an emergency regulation adopted by the State Water Resources Control Board (State Water Board or Board) that became effective on August 19, 2021. The enclosed Order specifies the steps that you, or your agent of record, must follow to curtail water diversions when water is determined to be unavailable for this water right or claim of right and to comply with reporting requirements. You or your agent of record are responsible for immediately notifying all parties that divert water under the Water Right ID S021256 of the enclosed Order.

Please note that you will receive a similar letter and Order for each water right or claim of right in the Sacramento-San Joaquin Delta (Delta) watershed for which you are the designated mail receiver.

Emergency Regulation

In response to ongoing drought conditions and associated water supply shortages in the Delta watershed, on August 3, 2021, the State Water Board adopted an emergency regulation authorizing the curtailment of diversions when water is determined to be unavailable at a water right holder's or claimant's priority of right. (Cal. Code Regs., tit. 23, §§ 876–879.2.) The regulation was approved by the Office of Administrative Law and went into effect upon filing with the Secretary of State on August 19, 2021. The regulation will remain in effect for up to one year but could be repealed if water supply conditions improve. The State Water Board may readopt the regulation if drought conditions continue through next year. The regulation is available on the State Water Board's Delta Drought webpage at: www.waterboards.ca.gov/drought/delta/

1001 | Street, Sacramento, CA 95814 | Mailing Address: P.O. Box 100, Sacramento, CA 95812-0100 | www.waterboards.ca.gov

Curtailed Water Rights and Claims of Right in the Delta Watershed

The following priorities of water rights and claims of right are curtailed, meaning water diversions are required to cease under these rights and claims, for the remainder of August 2021:

- 1. All post-1914 appropriative water rights in the Delta watershed (including the Sacramento River and San Joaquin River watersheds and the Legal Delta);
- 2. All pre-1914 appropriative water right claims in the San Joaquin River watershed;
- 3. All pre-1914 appropriative water right claims in the Sacramento River watershed and in the Legal Delta with a priority date of 1883 or later; and
- 4. Some pre-1914 appropriative water right claims on specific tributaries to the Sacramento River with a priority date earlier than 1883.

Due to changes in available water supplies and demands following the irrigation season, the curtailments listed above change in the month of September. In the Sacramento River watershed, drainage from rice fields temporarily increases available water supplies and results in the suspension of curtailments for rights and claims on the Sacramento Valley floor in September. However, water rights and claims on some Sacramento River tributaries will remain curtailed, and some rights and claims that were not curtailed in August are curtailed in September due to limited local supplies. In the San Joaquin River watershed where no increase in available water supplies occurs in September, curtailments implemented in August will remain in effect unless water supply conditions improve (precipitation events occur) and the State Water Board changes its curtailment determinations accordingly. The following priorities of water rights and claims are curtailed for the month of September 2021, unless the State Water Board advises that this determination has been updated:

- 1. All post-1914 appropriative water rights in the San Joaquin River watershed;
- 2. All pre-1914 appropriative water right claims in the San Joaquin River watershed;
- All riparian water right claims in the American River watershed upstream of Folsom Reservoir;
- 4. A subset of Central Valley Project and State Water Project water rights in the Sacramento River watershed and in the Legal Delta; and
- 5. Some pre-1914 appropriative water right claims and post-1914 appropriative rights on specific tributaries to the Sacramento River.

On a weekly basis, or more frequently if warranted due to precipitation and runoff events, updates will be provided regarding applicable curtailments, including any curtailments that may apply after September 2021 as discussed further below.

Action Required: Monitoring of Curtailment Status

Water right holders and claimants are required to monitor for changes in curtailments by signing up for email updates or frequently visiting the State Water Board's website where regular updates will be posted. All future curtailment orders, including the suspension or reimposition of curtailment, will be issued electronically. Hard copy notices will not be provided. Notice of new or changed curtailment orders and the

bases for curtailment decisions will be provided through updates to the Board's Delta Watershed Curtailment Status List (Status List) and through notices issued electronically using the Delta Drought email subscription list. The Status List will be updated at least weekly and more often if needed as hydrologic conditions evolve to reflect changes to water availability.

It is the responsibility of the water right holder, claimant, or agent of record to:

- 1. Determine if Water Right ID S021256 is currently curtailed by regularly checking the Status List posted on the State Water Board's Delta Drought webpage at: www.waterboards.ca.gov/drought/delta/ or
- 2. Subscribe to the Delta Drought email subscription list at: www.waterboards.ca.gov/resources/email_subscriptions/swrcb_subscribe.html

Response Required: Compliance Certification Form and Monthly Reporting

Water right holders, claimants, or agents of record who receive the enclosed Order are required to submit, under penalty of perjury, an online Compliance Certification Form for each water right or claim of right by **September 3**, **2021**. Your online submittal will be used to assess compliance with the enclosed Order and relevant provisions of the emergency regulation, as well as inform the Board whether you plan to seek an exception to curtailment. The Compliance Certification Form must be accessed on the State Water Board's Survey Portal at: https://public.waterboards.ca.gov/

In addition, the regulation includes provisions for requiring enhanced reporting of water diversion information to inform future curtailment decisions. For water rights and claims with a face value or reported annual diversion amount of 5,000 acre-feet or greater in 2018 and/or 2019, the enclosed Order requires: 1) monthly reporting of water diversion and use information for prior months, and 2) monthly reporting of projected demand data. As the right holder, claimant, or agent of record, you must submit the form titled "Delta Watershed Enhanced Reporting of Actual Diversions and Projected Demand" on the Board's Survey Portal by **September 10, 2021**. A new version of this form will be made available every month and must be submitted no later than the 10th of each month.

The following credentials are needed to access the Survey Portal:

Login:	S021256
Password:	342056

State Water Board staff will hold a webinar to explain the reporting requirements associated with the enclosed Order. Notice of this webinar will be posted on the Delta Drought webpage and sent via the Delta Drought email list.

Exceptions to Curtailment

An exception to curtailment may be authorized if: (1) the water right or claim is used only for a non-consumptive use (i.e., all water is returned to the stream) as described in section 878 of the emergency regulation; or (2) water diverted under the water right or

claim is the diverter's only source of water and it is needed for minimum human health and safety needs, as described in section 878.1 of the regulation.

If you wish to seek an exception to curtailment <u>now or possibly in the future</u> in order to continue diversions for non-consumptive uses or to meet minimum human health and safety needs, you must submit your request by **September 10, 2021,** <u>regardless of the current curtailment status of this right.</u> Submit your exception request(s) using the form(s) available on the Board's Survey Portal at: https://public.waterboards.ca.gov/ (Login credentials are provided above.)

Consideration of Additional Information

You may submit additional information if you believe that: (1) a correction to the water right priority date for this water right or claim should be made; or (2) curtailment of this water right or claim is not appropriate as demonstrated by verifiable circumstances, such as the right authorizes diversion from a stream system that has been adjudicated and is disconnected, and therefore curtailment would not make water available to serve senior downstream water rights and claims (see section 876.1, subdivision (e) of the regulation). Proposals and supporting information should be submitted to the Deputy Director as specified below within **14 days of receipt of the enclosed Order**.

Water users may also propose alternative water sharing agreements that would achieve the purposes of the curtailment process pursuant to section 878.2 of the regulation. Proposed alternative agreements may be submitted to the Deputy Director at any time, but they may not be implemented instead of complying with a curtailment order unless all potentially affected water right holders and claimants concur with the proposal, or it has been approved by the Deputy Director.

Proposals and supporting information for changes to water right priorities, applicability of curtailments, and alternative water sharing agreements should be submitted to the Deputy Director at Bay-Delta@waterboards.ca.gov. The Deputy Director and Delta Watermaster as appropriate will review timely submitted information as soon as practicable and inform the affected water right holder or claimant of the determination or decision.

Potential Enforcement

The enclosed Order includes enforceable requirements regarding a water right or claim of right that require your immediate attention due to current and possible future limitations in water supplies.

A water right holder or claimant who diverts water that is not legally available, or violates the enclosed Order or the regulation, may be subject to administrative fines, a cease and desist order, or prosecution in court. The State Water Board has enforcement discretion and decisions related to enforcement and associated penalties are based on the specific circumstances of the violation. Fines may be up to \$1,000 per day of violation and up to \$2,500 for each acre-foot diverted or used in excess of a valid water right. (Wat. Code, §§ 1052, 1055, 1846.)

Request for Reconsideration

You may submit a petition within 30 days to request that the State Water Board reconsider the enclosed Order. The process and grounds for reconsideration are provided by California Code of Regulations, title 23, sections 768 through 771. Any petition requesting reconsideration of an order that requires enhanced reporting or curtailment must be filed with the State Water Board no later than **September 20, 2021**. To ensure timely consideration, any petition for reconsideration should be sent by email to Bay-Delta@waterboards.ca.gov.

If you have any questions, please review the Frequently Asked Questions (FAQs) on the Delta Drought webpage (www.waterboards.ca.gov/drought/delta/). You may also contact staff at Bay-Delta@waterboards.ca.gov or (916) 319-0960. Please be aware that calls and emails will be answered as soon as possible in the order received. Depending on volume, responses may take a day or longer.

Sincerely,

Ent Shoald

Erik Ekdahl, Deputy Director State Water Resources Control Board

Enclosure: Order Imposing Water Right Curtailment and Reporting Requirements in the Sacramento-San Joaquin Delta Watershed for Water Right ID S021256

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STATE OF CALIFORNIA CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY STATE WATER RESOURCES CONTROL BOARD

DIVISION OF WATER RIGHTS

IN THE MATTER OF WATER RIGHT ID S021256 OF BYRON-BETHANY IRRIGATION DISTRICT

ORDER IMPOSING WATER RIGHT CURTAILMENT AND REPORTING REQUIREMENTS IN THE SACRAMENTO-SAN JOAQUIN DELTA WATERSHED

ISSUED AUGUST 20, 2021

FINDINGS:

- On May 10, 2021, Governor Gavin Newsom issued a Proclamation of a State of Emergency (Proclamation) for 41 counties, including those within the Sacramento-San Joaquin Delta (Delta) watershed in response to drought conditions. The Proclamation finds that it is necessary to act expeditiously to mitigate the effects of drought conditions in the Delta watershed, both to ensure the protection of health, safety, and the environment and to prepare for potential sustained drought conditions.
- 2. On June 15, 2021, the State Water Resources Control Board (State Water Board or Board) issued a Notice of Water Unavailability (June 15 Notice) to all post-1914 appropriative water right holders in the Delta watershed. The June 15 Notice advised that water appeared to be unavailable for diversion as of at least June 15, 2021, for all post-1914 appropriative water right holders in the Delta watershed. The June 15 Notice also warned water users with more senior water right claims that information indicated that water was expected to be unavailable this summer for some pre-1914 appropriative and riparian claimants and that the State Water Board planned to issue further notices of water unavailability. The June 15 Notice also informed water right holders and claimants that development of an emergency curtailment regulation was under consideration.
- 3. On July 23, 2021, the State Water Board issued a Notice of Water Unavailability (July 23 Notice) for senior water right claims in the Delta watershed, which advised diverters that, based on the best information available to the Board, water supply appeared to be insufficient to support lawful diversion under some pre-1914 appropriative water right claims and to support full diversions by some riparian claims in the Delta watershed. The July 23 Notice also notified water right holders and claimants that a draft emergency regulation was available for public review and comment.
- 4. On August 3, 2021, the State Water Board adopted an emergency curtailment and reporting regulation in response to ongoing drought conditions and

BYRON-BETHANY IRRIGATION DISTRICT Water Right ID: S021256 Page 2 of 6

associated water supply shortages in the Delta watershed. (Cal. Code Regs., tit. 23, §§ 876–879.2.) State Water Board Resolution No. 2021-0028¹ adopting the emergency regulation describes the need for the regulation and its intent and is incorporated by reference into this Order. The regulation was approved by the Office of Administrative Law and became effective upon filing with the Secretary of State on August 19, 2021.

- Section 879, subdivision (d)(1) of the regulation requires all recipients of initial curtailment or reporting orders to submit a certification regarding actions needed to comply with section 876.1.
- 6. Section 879, subdivision (d)(2) of the regulation authorizes the Deputy Director for the Division of Water Rights or authorized designee (Deputy Director) to require water right holders and claimants who have been issued an initial order under section 876.1 and whose water right or claim has a total authorized face value or recent annual reported diversion amount of one thousand acre-feet or more to report the following information by the date specified: (1) prior diversions, including direct diversions and diversions to storage, and (2) demand projections for subsequent months through October 1, 2022, including direct diversions and diversions to storage.

In order to refine projections of demands for use in curtailment decisions, this Order imposes enhanced reporting requirements on water right holders or claimants whose water right or claim has a total authorized face value or recent annual reported diversion amount of five thousand acre-feet or more. This information is not currently in the State Water Board's possession. These water rights and claims encompass the majority of water demand and use in the Delta watershed. Having up-to-date, refined demand data for these rights will improve curtailment decisions. With respect to the requirements imposed by this Order on water right holders and claimants in the Legal Delta, the Deputy Director has consulted with and obtained the concurrence of the Delta Watermaster, as required by the regulation. In addition, the Deputy Director and the Delta Watermaster have considered the need for the information to inform curtailment decisions and the burden of producing it.

7. Section 876.1 of the regulation establishes the process by which curtailment of water rights and claims of right in the Delta watershed may take place. When natural and abandoned flows are insufficient to support all diversions, the Deputy Director or authorized designee may issue curtailment orders to water right holders and claimants in the Delta watershed, requiring the curtailment of water diversion under designated water rights and claims in order of water right priority,

¹ Resolution 2021-0028 is available at:

www.waterboards.ca.gov/board_decisions/adopted_orders/resolutions/2021/rs2021_00 28_regs.pdf

except as provided in sections 878, 878.1, and 878.2. Before issuing curtailment orders in the Legal Delta, as defined by the regulation, the Deputy Director must consult with and obtain the concurrence of the Delta Watermaster.

- 8. Section 876.1, subdivision (d) of the regulation specifies the information that the Deputy Director must consider in determining whether water is unavailable under a water right holder's or claimant's priority of right, and whether to order curtailment of water diversions under specific rights or claims. The regulation also authorizes the Deputy Director to evaluate water unavailability using the Water Unavailability Methodology for the Delta Watershed (Methodology), which was developed by the State Water Board for this purpose, or a comparable tool. Demand data used in the Methodology is based on annual water use reports submitted to the Division of Water Rights for 2018 and 2019 as described in the Methodology. Supply data used in the Methodology is derived from estimates of full natural flow, which were then adjusted to account for abandoned instream flows as described in the Methodology. Evaluation of available supplies against demands is performed at the Sacramento and San Joaquin River watershed scale.
- This curtailment is based on consideration of the information described in section 876.1, subdivision (d) of the regulation and evaluation of available supply and demand data using the most recent version of the Methodology, documented by a summary report dated August 20, 2021.

The most recent version of the Methodology includes updates to the treatment of the San Joaquin River Exchange Contractors within the Methodology's spreadsheet in keeping with the description of their treatment within the summary report, and the removal of demand from the disconnected Goose Lake watershed, in accordance with section 876.1, subdivision (d) of the regulation. The summary report has also been updated to address certain comments received on the Methodology, including comments concerning the unique hydrology of the Legal Delta. The results of the Methodology that are used to inform these curtailments are available in both spreadsheet and graphical form on the Board's Water Unavailability Methodology for the Delta Watershed webpage at:

www.waterboards.ca.gov/drought/drought_tools_methods/delta_method.html

The Delta Watershed Curtailment Status List (Status List) reflects the water rights and claims for which natural and abandoned flows have been determined to be currently unavailable as a result of this evaluation.

10. In accordance with section 876.1 of the regulation, the Deputy Director has determined that natural and abandoned flows are insufficient to satisfy the needs of all diverters in the Delta watershed. The Deputy Director has determined that water is unavailable for direct diversions and diversions to storage in the Delta watershed for those water rights and claims specified on the Status List, except BYRON-BETHANY IRRIGATION DISTRICT Water Right ID: S021256 Page 4 of 6

to the extent that water released from storage is rediverted as authorized by a water right or contract. With respect to the curtailment orders issued to water right holders and claimants in the Legal Delta, the Deputy Director has consulted with and obtained the concurrence of the Delta Watermaster. Therefore, the Deputy Director has concluded that issuance of curtailment orders pursuant to the regulation is necessary and appropriate.

IT IS HEREBY ORDERED:

- In accordance with section 876.1, subdivision (c) of the regulation, water right holders or agents of record who receive this Order are responsible for immediately providing notice of this Order to all diverters exercising the water right or claim covered by this Order.
- BYRON-BETHANY IRRIGATION DISTRICT or agent is required, by September 3, 2021, to submit under penalty of perjury an online Compliance Certification Form in accordance with section 879, subsection (d)(1) of the regulation. The online Compliance Certification Form must be accessed using the Login: S021256 and Password: 342056 on the Water Right Form and Survey Submittal Portal located at: https://public.waterboards.ca.gov
- Effective August 20, 2021, diversion of water pursuant to water rights and claims specified as curtailed on the Status List shall cease unless the diversion is subject to an authorized exception to curtailment as described by section 878, section 878.1, or section 878.2 of the regulation.
- 4. BYRON-BETHANY IRRIGATION DISTRICT or agent is required, by the 10th day of every month commencing in September 2021, to submit an online form titled "Delta Watershed Enhanced Reporting of Actual Diversions and Projected Demand" in accordance with section 879, subsection (d)(2) of the Regulation. The "Delta Watershed Enhanced Reporting of Actual Diversions and Projected Demand" form must be accessed using the Login: S021256 and Password: 342056 on the Water Right Form and Survey Submittal Portal located at: https://public.waterboards.ca.gov
- 5. BYRON-BETHANY IRRIGATION DISTRICT shall receive all subsequent modifications to this Order, including communications that may change the curtailment status of PRE-1914 APPROPRIATIVE CLAIM S021256, through electronic notification via the State Water Board's Delta Drought email distribution list or as posted on the Status List on the State Water Board's Delta Drought website at: www.waterboards.ca.gov/drought/delta/
- 6. Pursuant to section 879.2 of the regulation, failure to comply with the regulation or this Order, including diversion or use in violation of curtailment, is subject to enforcement action, including the imposition of any applicable penalties pursuant to Water Code sections 1052, 1058.5, 1831, 1845, and 1846. To the extent of any conflict between the requirements of this Order and any other applicable
BYRON-BETHANY IRRIGATION DISTRICT Water Right ID: S021256 Page 5 of 6

orders or conditions of approval, the diverter must comply with the requirements that are most stringent.

- 7. Nothing in this Order is intended to or shall be construed to limit or preclude the State Water Board from exercising its authority under any statute, regulation, ordinance, or other law, including but not limited to, the authority to bring enforcement against diverters for unauthorized diversion or use in violation of Water Code section 1052.
- 8. Nothing in this Order shall excuse individual water right holders and claimants from meeting any more stringent requirements that may be imposed by applicable legally binding legislation, regulations, or a water right permit requirement. This Order does not authorize any act which results in the taking of a threatened, endangered, or candidate species or any act which is now prohibited, or becomes prohibited in the future, under either the California Endangered Species Act (Fish & G. Code, §§ 2050-2097) or the federal Endangered Species Act (16 U.S.C.§§ 1531-1544). If a "take" will result from any act authorized under this Order, the diverter shall obtain authorization for an incidental take. Diverter shall be responsible for meeting all requirements of the applicable Endangered Species Act(s) for actions authorized under this Order.

STATE WATER RESOURCES CONTROL BOARD

Sup Ehrold

Erik Ekdahl, Deputy Director Division of Water Rights

Dated: August 20, 2021

BYRON-BETHANY IRRIGATION DISTRICT Water Right ID: S021256 Page 6 of 6



EXHIBIT O





State Water Resources Control Board

August 20, 2021

WEST SIDE IRRIGATION DISTRICT

PO BOX 177 TRACY, CA 95378

INITIAL ORDER IMPOSING WATER RIGHT CURTAILMENT AND REPORTING REQUIREMENTS IN THE SACRAMENTO-SAN JOAQUIN DELTA WATERSHED

This letter and the enclosed Order contain important information regarding the curtailment status for the POST-1914 APPROPRIATIVE WATER RIGHT owned by WEST SIDE IRRIGATION DISTRICT, associated with Water Right ID A000301. This letter also describes a certification that is required to be submitted by **September 3**, **2021**.

Enclosed with this letter is an Order imposing water diversion curtailment and reporting requirements issued pursuant to an emergency regulation adopted by the State Water Resources Control Board (State Water Board or Board) that became effective on August 19, 2021. The enclosed Order specifies the steps that you, or your agent of record, must follow to curtail water diversions when water is determined to be unavailable for this water right or claim of right and to comply with reporting requirements. You or your agent of record are responsible for immediately notifying all parties that divert water under the Water Right ID A000301 of the enclosed Order.

Please note that you will receive a similar letter and Order for each water right or claim of right in the Sacramento-San Joaquin Delta (Delta) watershed for which you are the designated mail receiver.

Emergency Regulation

In response to ongoing drought conditions and associated water supply shortages in the Delta watershed, on August 3, 2021, the State Water Board adopted an emergency regulation authorizing the curtailment of diversions when water is determined to be unavailable at a water right holder's or claimant's priority of right. (Cal. Code Regs., tit. 23, §§ 876–879.2.) The regulation was approved by the Office of Administrative Law and went into effect upon filing with the Secretary of State on August 19, 2021. The regulation will remain in effect for up to one year but could be repealed if water supply conditions improve. The State Water Board may readopt the regulation if drought conditions continue through next year. The regulation is available on the State Water Board's Delta Drought webpage at: www.waterboards.ca.gov/drought/delta/

1001 | Street, Sacramento, CA 95814 | Mailing Address: P.O. Box 100, Sacramento, CA 95812-0100 | www.waterboards.ca.gov

Curtailed Water Rights and Claims of Right in the Delta Watershed

The following priorities of water rights and claims of right are curtailed, meaning water diversions are required to cease under these rights and claims, for the remainder of August 2021:

- 1. All post-1914 appropriative water rights in the Delta watershed (including the Sacramento River and San Joaquin River watersheds and the Legal Delta);
- 2. All pre-1914 appropriative water right claims in the San Joaquin River watershed;
- 3. All pre-1914 appropriative water right claims in the Sacramento River watershed and in the Legal Delta with a priority date of 1883 or later; and
- 4. Some pre-1914 appropriative water right claims on specific tributaries to the Sacramento River with a priority date earlier than 1883.

Due to changes in available water supplies and demands following the irrigation season, the curtailments listed above change in the month of September. In the Sacramento River watershed, drainage from rice fields temporarily increases available water supplies and results in the suspension of curtailments for rights and claims on the Sacramento Valley floor in September. However, water rights and claims on some Sacramento River tributaries will remain curtailed, and some rights and claims that were not curtailed in August are curtailed in September due to limited local supplies. In the San Joaquin River watershed where no increase in available water supplies occurs in September, curtailments implemented in August will remain in effect unless water supply conditions improve (precipitation events occur) and the State Water Board changes its curtailment determinations accordingly. The following priorities of water rights and claims are curtailed for the month of September 2021, unless the State Water Board advises that this determination has been updated:

- 1. All post-1914 appropriative water rights in the San Joaquin River watershed;
- 2. All pre-1914 appropriative water right claims in the San Joaquin River watershed;
- **3.** All riparian water right claims in the American River watershed upstream of Folsom Reservoir;
- 4. A subset of Central Valley Project and State Water Project water rights in the Sacramento River watershed and in the Legal Delta; and
- **5.** Some pre-1914 appropriative water right claims and post-1914 appropriative rights on specific tributaries to the Sacramento River.

On a weekly basis, or more frequently if warranted due to precipitation and runoff events, updates will be provided regarding applicable curtailments, including any curtailments that may apply after September 2021 as discussed further below.

Action Required: Monitoring of Curtailment Status

Water right holders and claimants are required to monitor for changes in curtailments by signing up for email updates or frequently visiting the State Water Board's website where regular updates will be posted. All future curtailment orders, including the suspension or reimposition of curtailment, will be issued electronically. Hard copy notices will not be provided. Notice of new or changed curtailment orders and the

bases for curtailment decisions will be provided through updates to the Board's Delta Watershed Curtailment Status List (Status List) and through notices issued electronically using the Delta Drought email subscription list. The Status List will be updated at least weekly and more often if needed as hydrologic conditions evolve to reflect changes to water availability.

It is the responsibility of the water right holder, claimant, or agent of record to:

- Determine if Water Right ID A000301 is currently curtailed by regularly checking the Status List posted on the State Water Board's Delta Drought webpage at: www.waterboards.ca.gov/drought/delta/ or
- 2. Subscribe to the Delta Drought email subscription list at: www.waterboards.ca.gov/resources/email subscriptions/swrcb subscribe.html

Response Required: Compliance Certification Form and Monthly Reporting

Water right holders, claimants, or agents of record who receive the enclosed Order are required to submit, under penalty of perjury, an online Compliance Certification Form for each water right or claim of right by **September 3, 2021**. Your online submittal will be used to assess compliance with the enclosed Order and relevant provisions of the emergency regulation, as well as inform the Board whether you plan to seek an exception to curtailment. The Compliance Certification Form must be accessed on the State Water Board's Survey Portal at: https://public.waterboards.ca.gov/

In addition, the regulation includes provisions for requiring enhanced reporting of water diversion information to inform future curtailment decisions. For water rights and claims with a face value or reported annual diversion amount of 5,000 acre-feet or greater in 2018 and/or 2019, the enclosed Order requires: 1) monthly reporting of water diversion and use information for prior months, and 2) monthly reporting of projected demand data. As the right holder, claimant, or agent of record, you must submit the form titled "Delta Watershed Enhanced Reporting of Actual Diversions and Projected Demand" on the Board's Survey Portal by **September 10, 2021**. A new version of this form will be made available every month and must be submitted no later than the 10th of each month.

The following credentials are needed to access the Survey Portal:

Login:	A000301	
Password:	5KWTCR	

State Water Board staff will hold a webinar to explain the reporting requirements associated with the enclosed Order. Notice of this webinar will be posted on the Delta Drought webpage and sent via the Delta Drought email list.

Exceptions to Curtailment

An exception to curtailment may be authorized if: (1) the water right or claim is used only for a non-consumptive use (i.e., all water is returned to the stream) as described in section 878 of the emergency regulation; or (2) water diverted under the water right or

claim is the diverter's only source of water and it is needed for minimum human health and safety needs, as described in section 878.1 of the regulation.

If you wish to seek an exception to curtailment <u>now or possibly in the future</u> in order to continue diversions for non-consumptive uses or to meet minimum human health and safety needs, you must submit your request by **September 10, 2021,** <u>regardless of the current curtailment status of this right.</u> Submit your exception request(s) using the form(s) available on the Board's Survey Portal at: https://public.waterboards.ca.gov/ (Login credentials are provided above.)

Consideration of Additional Information

You may submit additional information if you believe that: (1) a correction to the water right priority date for this water right or claim should be made; or (2) curtailment of this water right or claim is not appropriate as demonstrated by verifiable circumstances, such as the right authorizes diversion from a stream system that has been adjudicated and is disconnected, and therefore curtailment would not make water available to serve senior downstream water rights and claims (see section 876.1, subdivision (e) of the regulation). Proposals and supporting information should be submitted to the Deputy Director as specified below within **14 days of receipt of the enclosed Order**.

Water users may also propose alternative water sharing agreements that would achieve the purposes of the curtailment process pursuant to section 878.2 of the regulation. Proposed alternative agreements may be submitted to the Deputy Director at any time, but they may not be implemented instead of complying with a curtailment order unless all potentially affected water right holders and claimants concur with the proposal, or it has been approved by the Deputy Director.

Proposals and supporting information for changes to water right priorities, applicability of curtailments, and alternative water sharing agreements should be submitted to the Deputy Director at Bay-Delta@waterboards.ca.gov. The Deputy Director and Delta Watermaster as appropriate will review timely submitted information as soon as practicable and inform the affected water right holder or claimant of the determination or decision.

Potential Enforcement

The enclosed Order includes enforceable requirements regarding a water right or claim of right that require your immediate attention due to current and possible future limitations in water supplies.

A water right holder or claimant who diverts water that is not legally available, or violates the enclosed Order or the regulation, may be subject to administrative fines, a cease and desist order, or prosecution in court. The State Water Board has enforcement discretion and decisions related to enforcement and associated penalties are based on the specific circumstances of the violation. Fines may be up to \$1,000 per day of violation and up to \$2,500 for each acre-foot diverted or used in excess of a valid water right. (Wat. Code, §§ 1052, 1055, 1846.)

Request for Reconsideration

You may submit a petition within 30 days to request that the State Water Board reconsider the enclosed Order. The process and grounds for reconsideration are provided by California Code of Regulations, title 23, sections 768 through 771. Any petition requesting reconsideration of an order that requires enhanced reporting or curtailment must be filed with the State Water Board no later than **September 20, 2021**. To ensure timely consideration, any petition for reconsideration should be sent by email to Bay-Delta@waterboards.ca.gov.

If you have any questions, please review the Frequently Asked Questions (FAQs) on the Delta Drought webpage (www.waterboards.ca.gov/drought/delta/). You may also contact staff at Bay-Delta@waterboards.ca.gov or (916) 319-0960. Please be aware that calls and emails will be answered as soon as possible in the order received. Depending on volume, responses may take a day or longer.

Sincerely,

Enh Ehold

Erik Ekdahl, Deputy Director State Water Resources Control Board

Enclosure: Order Imposing Water Right Curtailment and Reporting Requirements in the Sacramento-San Joaquin Delta Watershed for Water Right ID A000301

STATE OF CALIFORNIA CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY STATE WATER RESOURCES CONTROL BOARD

DIVISION OF WATER RIGHTS

IN THE MATTER OF WATER RIGHT ID A000301 OF WEST SIDE IRRIGATION DISTRICT

ORDER IMPOSING WATER RIGHT CURTAILMENT AND REPORTING REQUIREMENTS IN THE SACRAMENTO-SAN JOAQUIN DELTA WATERSHED

ISSUED AUGUST 20, 2021

FINDINGS:

- On May 10, 2021, Governor Gavin Newsom issued a Proclamation of a State of Emergency (Proclamation) for 41 counties, including those within the Sacramento-San Joaquin Delta (Delta) watershed in response to drought conditions. The Proclamation finds that it is necessary to act expeditiously to mitigate the effects of drought conditions in the Delta watershed, both to ensure the protection of health, safety, and the environment and to prepare for potential sustained drought conditions.
- 2. On June 15, 2021, the State Water Resources Control Board (State Water Board or Board) issued a Notice of Water Unavailability (June 15 Notice) to all post-1914 appropriative water right holders in the Delta watershed. The June 15 Notice advised that water appeared to be unavailable for diversion as of at least June 15, 2021, for all post-1914 appropriative water right holders in the Delta watershed. The June 15 Notice also warned water users with more senior water right claims that information indicated that water was expected to be unavailable this summer for some pre-1914 appropriative and riparian claimants and that the State Water Board planned to issue further notices of water unavailability. The June 15 Notice also informed water right holders and claimants that development of an emergency curtailment regulation was under consideration.
- 3. On July 23, 2021, the State Water Board issued a Notice of Water Unavailability (July 23 Notice) for senior water right claims in the Delta watershed, which advised diverters that, based on the best information available to the Board, water supply appeared to be insufficient to support lawful diversion under some pre-1914 appropriative water right claims and to support full diversions by some riparian claims in the Delta watershed. The July 23 Notice also notified water right holders and claimants that a draft emergency regulation was available for public review and comment.
- 4. On August 3, 2021, the State Water Board adopted an emergency curtailment and reporting regulation in response to ongoing drought conditions and

WEST SIDE IRRIGATION DISTRICT Water Right ID: A000301 Page 2 of 6

associated water supply shortages in the Delta watershed. (Cal. Code Regs., tit. 23, §§ 876–879.2.) State Water Board Resolution No. 2021-0028¹ adopting the emergency regulation describes the need for the regulation and its intent and is incorporated by reference into this Order. The regulation was approved by the Office of Administrative Law and became effective upon filing with the Secretary of State on August 19, 2021.

- 5. Section 879, subdivision (d)(1) of the regulation requires all recipients of initial curtailment or reporting orders to submit a certification regarding actions needed to comply with section 876.1.
- 6. Section 879, subdivision (d)(2) of the regulation authorizes the Deputy Director for the Division of Water Rights or authorized designee (Deputy Director) to require water right holders and claimants who have been issued an initial order under section 876.1 and whose water right or claim has a total authorized face value or recent annual reported diversion amount of one thousand acre-feet or more to report the following information by the date specified: (1) prior diversions, including direct diversions and diversions to storage, and (2) demand projections for subsequent months through October 1, 2022, including direct diversions and diversions to storage.

In order to refine projections of demands for use in curtailment decisions, this Order imposes enhanced reporting requirements on water right holders or claimants whose water right or claim has a total authorized face value or recent annual reported diversion amount of five thousand acre-feet or more. This information is not currently in the State Water Board's possession. These water rights and claims encompass the majority of water demand and use in the Delta watershed. Having up-to-date, refined demand data for these rights will improve curtailment decisions. With respect to the requirements imposed by this Order on water right holders and claimants in the Legal Delta, the Deputy Director has consulted with and obtained the concurrence of the Delta Watermaster, as required by the regulation. In addition, the Deputy Director and the Delta Watermaster have considered the need for the information to inform curtailment decisions and the burden of producing it.

7. Section 876.1 of the regulation establishes the process by which curtailment of water rights and claims of right in the Delta watershed may take place. When natural and abandoned flows are insufficient to support all diversions, the Deputy Director or authorized designee may issue curtailment orders to water right holders and claimants in the Delta watershed, requiring the curtailment of water diversion under designated water rights and claims in order of water right priority,

¹ Resolution 2021-0028 is available at:

www.waterboards.ca.gov/board_decisions/adopted_orders/resolutions/2021/rs2021_00 28_regs.pdf

WEST SIDE IRRIGATION DISTRICT Water Right ID: A000301 Page 3 of 6

except as provided in sections 878, 878.1, and 878.2. Before issuing curtailment orders in the Legal Delta, as defined by the regulation, the Deputy Director must consult with and obtain the concurrence of the Delta Watermaster.

- 8. Section 876.1, subdivision (d) of the regulation specifies the information that the Deputy Director must consider in determining whether water is unavailable under a water right holder's or claimant's priority of right, and whether to order curtailment of water diversions under specific rights or claims. The regulation also authorizes the Deputy Director to evaluate water unavailability using the Water Unavailability Methodology for the Delta Watershed (Methodology), which was developed by the State Water Board for this purpose, or a comparable tool. Demand data used in the Methodology is based on annual water use reports submitted to the Division of Water Rights for 2018 and 2019 as described in the Methodology. Supply data used in the Methodology is derived from estimates of full natural flow, which were then adjusted to account for abandoned instream flows as described in the Methodology. Evaluation of available supplies against demands is performed at the Sacramento and San Joaquin River watershed scale.
- This curtailment is based on consideration of the information described in section 876.1, subdivision (d) of the regulation and evaluation of available supply and demand data using the most recent version of the Methodology, documented by a summary report dated August 20, 2021.

The most recent version of the Methodology includes updates to the treatment of the San Joaquin River Exchange Contractors within the Methodology's spreadsheet in keeping with the description of their treatment within the summary report, and the removal of demand from the disconnected Goose Lake watershed, in accordance with section 876.1, subdivision (d) of the regulation. The summary report has also been updated to address certain comments received on the Methodology, including comments concerning the unique hydrology of the Legal Delta. The results of the Methodology that are used to inform these curtailments are available in both spreadsheet and graphical form on the Board's Water Unavailability Methodology for the Delta Watershed webpage at:

www.waterboards.ca.gov/drought/drought tools methods/delta method.html

The Delta Watershed Curtailment Status List (Status List) reflects the water rights and claims for which natural and abandoned flows have been determined to be currently unavailable as a result of this evaluation.

10. In accordance with section 876.1 of the regulation, the Deputy Director has determined that natural and abandoned flows are insufficient to satisfy the needs of all diverters in the Delta watershed. The Deputy Director has determined that water is unavailable for direct diversions and diversions to storage in the Delta watershed for those water rights and claims specified on the Status List, except WEST SIDE IRRIGATION DISTRICT Water Right ID: A000301 Page 4 of 6

to the extent that water released from storage is rediverted as authorized by a water right or contract. With respect to the curtailment orders issued to water right holders and claimants in the Legal Delta, the Deputy Director has consulted with and obtained the concurrence of the Delta Watermaster. Therefore, the Deputy Director has concluded that issuance of curtailment orders pursuant to the regulation is necessary and appropriate.

IT IS HEREBY ORDERED:

- 1. In accordance with section 876.1, subdivision (c) of the regulation, water right holders or agents of record who receive this Order are responsible for immediately providing notice of this Order to all diverters exercising the water right or claim covered by this Order.
- WEST SIDE IRRIGATION DISTRICT or agent is required, by September 3, 2021, to submit under penalty of perjury an online Compliance Certification Form in accordance with section 879, subsection (d)(1) of the regulation. The online Compliance Certification Form must be accessed using the Login: A000301 and Password: 5KWTCR on the Water Right Form and Survey Submittal Portal located at: https://public.waterboards.ca.gov
- 3. Effective August 20, 2021, diversion of water pursuant to water rights and claims specified as curtailed on the Status List shall cease unless the diversion is subject to an authorized exception to curtailment as described by section 878, section 878.1, or section 878.2 of the regulation.
- 4. WEST SIDE IRRIGATION DISTRICT or agent is required, by the 10th day of every month commencing in September 2021, to submit an online form titled "Delta Watershed Enhanced Reporting of Actual Diversions and Projected Demand" in accordance with section 879, subsection (d)(2) of the Regulation. The "Delta Watershed Enhanced Reporting of Actual Diversions and Projected Demand" form must be accessed using the Login: A000301 and Password: 5KWTCR on the Water Right Form and Survey Submittal Portal located at: https://public.waterboards.ca.gov
- 5. WEST SIDE IRRIGATION DISTRICT shall receive all subsequent modifications to this Order, including communications that may change the curtailment status of POST-1914 APPROPRIATIVE WATER RIGHT A000301, through electronic notification via the State Water Board's Delta Drought email distribution list or as posted on the Status List on the State Water Board's Delta Drought website at: www.waterboards.ca.gov/drought/delta/
- 6. Pursuant to section 879.2 of the regulation, failure to comply with the regulation or this Order, including diversion or use in violation of curtailment, is subject to enforcement action, including the imposition of any applicable penalties pursuant to Water Code sections 1052, 1058.5, 1831, 1845, and 1846. To the extent of any conflict between the requirements of this Order and any other applicable

WEST SIDE IRRIGATION DISTRICT Water Right ID: A000301 Page 5 of 6

orders or conditions of approval, the diverter must comply with the requirements that are most stringent.

- 7. Nothing in this Order is intended to or shall be construed to limit or preclude the State Water Board from exercising its authority under any statute, regulation, ordinance, or other law, including but not limited to, the authority to bring enforcement against diverters for unauthorized diversion or use in violation of Water Code section 1052.
- 8. Nothing in this Order shall excuse individual water right holders and claimants from meeting any more stringent requirements that may be imposed by applicable legally binding legislation, regulations, or a water right permit requirement. This Order does not authorize any act which results in the taking of a threatened, endangered, or candidate species or any act which is now prohibited, or becomes prohibited in the future, under either the California Endangered Species Act (Fish & G. Code, §§ 2050-2097) or the federal Endangered Species Act (16 U.S.C.§§ 1531-1544). If a "take" will result from any act authorized under this Order, the diverter shall obtain authorization for an incidental take. Diverter shall be responsible for meeting all requirements of the applicable Endangered Species Act(s) for actions authorized under this Order.

STATE WATER RESOURCES CONTROL BOARD

Enh Ehrold

Erik Ekdahl, Deputy Director Division of Water Rights

Dated: August 20, 2021

WEST SIDE IRRIGATION DISTRICT Water Right ID: A000301 Page 6 of 6

EXHIBIT P

(Without Reference to File)

SENATE THIRD READING SB 104 (Budget and Fiscal Review Committee) As Amended February 26, 2014 Majority vote. Budget Bill Appropriation Takes Effect Immediately

SENATE VOTE: Vote not relevant

Original Committee Reference: BUDGET

<u>SUMMARY</u>: Contains necessary statutory and technical changes to implement SB 103 (Budget and Fiscal Review Committee), which amends the 2013-14 Budget Act related to urgent drought relief. This bill, along with SB 103, proposes \$687.4 million in expenditures for drought relief activities.

The Senate amendments delete the Assembly version of this bill, and instead:

- Accelerate the appropriation of \$472.5 million (Proposition 84) to the Department of Water Resources (DWR) for the remaining Integrated Regional Water Management (IRWM) grants. Specify that \$200 million of these funds be used for drought preparedness/response projects. Allow \$21.8 million of appropriated funds to be used for projects submitted prior to the enactment of this legislation.
- 2) Direct the Department of Public Health (DPH), by June 30, 2014, to adopt revised, emergency groundwater replenishment regulations using recycled water.
- 3) Authorize the use of \$10 million (Housing Rehabilitation Loan Fund) by the Department of Housing and Community Development (HCD) for housing or utility subsidies for people who become un- or underemployed due to drought conditions.
- 4) Provide HCD flexibility to maximize migrant housing units for greater use, including extending the period of occupancy beyond the standard 180-day period and redefining persons and families eligible to occupycenters.
- 5) Enhance the State Water Resources Control Board (SWRCB) drought response authority by streamlining authority to enforce water rights laws and increasing penalty amounts for illegally diverting water during drought conditions.
- 6) Specify that this legislation is contingent on the enactment of SB 103.
- 7) Contain an appropriation allowing this bill to take effect immediately upon enactment.

<u>COMMENTS</u>: This bill contains the statutory changes necessary to implement SB 103, the urgent drought relief legislation. It contains three main components:

 Infrastructure Investments to Improve Water Supply. This legislation speeds up appropriation of funds for shovel ready water supply projects. The Governor's Water Action Plan in the 2014-15 budget calls for new appropriations of funds for projects that increase water supply reliability and address the current drought. Specifically, the bill accelerates IRWM, Local Assistance funds, to support a third and final round of the IRWM Implementation Grant Program and directs at least \$200 million of these funds be used for drought preparedness/response projects.

The California Water Plan identified IRWM as one of the key initiatives needed to address long-term water supply reliability for the state. The IRWM program provides incentives to regionally integrate and leverage local financial investment for water conservation efforts, habitat protection for local species, water recycling, stormwater capture, and desalination projects.

- 2) Housing Assistance. The bill authorizes HCD to administer rental vouchers to persons rendered homeless, or at risk of becoming homeless, due to unemployment or other economic hardship resulting from the drought. Further, the bill stipulates that HCD adopt guidelines establishing criteria for the program, including income limits, and subsidy amounts.
- 3) Enhanced State Water Resources Control Board Drought Response Authority. Under existing law, the SWRCB has authority to develop emergency drought regulations in a critically dry year following two dry years. Because of how narrowly the existing statute was crafted, this authority is not available to the SWRCB during this year, even though reservoir and drought conditions are the worst on record. The new authorities provided by the legislation would be more flexible and allow the SWRCB to invoke them in a critically dry year that follows two below normal, dry, or critically dry years, or if the Governor declares a drought emergency. The same drought definition is used in the streamlined water right enforcement and enhanced water right drought penalties contained elsewhere in the legislation.

The bill expands current emergency drought rulemaking authority for the SWRCB. Currently, the Board can adopt emergency regulations to prevent the waste, unreasonable use, unreasonable method of use, or unreasonable method of diversion or to promote conservation or water recycling. The legislation includes explicit authority for the SWRCB to issue emergency regulations requiring curtailment of water diversions when water is unavailable to satisfy a diverter's priority of water right and requiring reporting to the SWRCB.

Any curtailment regulations would follow established California water right laws concerning priority. Those laws generally mean that senior water rights must be satisfied before junior water rights can divert anything. The legislation also allows the SWRCB to enforce its emergency drought regulations through cease and desist orders, and also authorizes local enforcement of the regulations as an infraction, subject to a fine of up to \$500 per day of violation.

The legislation establishes higher penalties for certain water rights violations in times of drought. Penalties for illegally diverting water during a drought would rise from the current amount of up to \$500 per day. During a drought, the amounts would be up to \$1,000 per day and up to \$2,500 per acre-foot of water illegally diverted or used. Separately, if the SWRCB has issued a cease and desist order to a person and the person violates the cease and desist order, the person may be subject to penalties of up to \$1,000 per day. During a drought, the

authorized penalty amount for violation of a cease and desist order would rise up to \$10,000 per day.

The bill includes prudent changes to the Water Code designed to enhance SWRCB's ability to respond to drought. A key aspect of drought response is ensuring the existing water rights laws are followed. To facilitate compliance, the legislation includes streamlined authority to enforce water rights laws and heightened penalty amounts for illegally diverting water during drought conditions.

In addition, the drought response requires the ability to effectively establish and enforce emergency drought regulations. The legislation builds on existing authority of the SWRCB to adopt emergency drought regulations to promote conservation and prevent waste and unreasonable use of water during times of drought.

Analysis Prepared by: Gabrielle Meindl / BUDGET / (916) 319-2099

FN: 0003049

EXHIBIT Q

STATE OF CALIFORNIA STATE WATER RESOURCES CONTROL BOARD

In the Matter of Water Quality Certification for the

California Department of Water Resources 2021 Emergency Drought Salinity Barrier Project

Source: Sacramento – San Joaquin Delta

County: Contra Costa

WATER QUALITY CERTIFICATION FOR FEDERAL PERMIT OR LICENSE

1.0	INTRODUC	CTION	.1
2.0	PROJECT	DESCRIPTION	.2
3.0	WATER RI	GHTS AND TEMPORARY URGENCY CHANGE PETITION	.2
4.0	REGULAT	ORY AUTHORITY	.3
	 4.1 Water Qu 4.2 Water Qu 4.2.1. Sacram 4.2.2. Bay-De 4.3 Clean Wa 4.4 Construct 4.5 Statewide 4.6 State Web Material to 4.7 Aquatic W 	ality Certification and Related Authorities ality Control Plans and Related Authorities ento and San Joaquin Rivers Basin Plan Ita Plan ter Act Section 303(d) Listing ion General Permit Mercury Provisions tland Definition and Procedures for Discharges of Dredged or Fill o Waters of the State /eed Control General Permit	.3 .5 .5 .6 .7 .7
5.0	CALIFORN	IA ENVIRONMENTAL QUALITY ACT	.8
6.0	RATIONAL	E FOR WATER QUALITY CERTIFICATION CONDITIONS	. 8
	6.1 Overview6.2 Rationale6.3 Rationale6.4 Rationale6.5 Rationale6.6 Rationale6.7 Rationale	for Condition 1: Monitoring, Analysis, and Reporting for Condition 2: Project Activities for Condition 3: Erosion and Sedimentation Control Measures for Condition 4: Hazardous Material Control Measures for Condition 5: Project Activity Progress Reports for Conditions 6 through 25	.8 10 12 12 13 13
7.0	CONCLUS	ION	14
8.0	WATER QU	JALITY CERTIFICATION CONDITIONS	15
CO	NDITION 1.	MONITORING, ANALYSIS, AND REPORTING	15
СО	NDITION 2.	PROJECT ACTIVITIES	18
СО	NDITION 3.	EROSION AND SEDIMENTATION CONTROL MEASURES	19
СО	NDITION 4.	HAZARDOUS MATERIALS CONTROL MEASURES	20
CO	NDITION 5.	PROJECT ACTIVITY PROGRESS REPORTS	21
СО	NDITIONS 6 -	25	21
9.0	REFEREN	CES	24
10.0	FIGURES.		26

1.0 Introduction

The California Department of Water Resources (DWR) is proposing to implement the 2021 Emergency Drought Salinity Barrier Project (Project). The Project consists of installation of a temporary emergency drought salinity barrier across West False River in the Sacramento-San Joaquin Delta (Delta). The barrier will be constructed of embankment rock (riprap). The purpose of the Project is to control saltwater intrusion into the Central and south Delta and conserve water in upstream reservoirs for other uses. Pursuant to Clean Water Act section 401, the State Water Resources Control Board (State Water Board) has authority to consider whether a proposed activity involving a discharge to navigable waters complies with applicable water quality standards and other appropriate requirements of state law and to issue a water quality certification if those requirements will be met. The State Water Board concludes that, as conditioned herein, water quality certification may be issued.

During drought conditions, the release of water stored in upstream reservoirs may be insufficient to repel salinity moving upstream from San Francisco Bay. According to DWR's analyses, without the protection of the drought salinity barrier, saltwater intrusions could render Delta water unusable for agricultural needs, reduce habitat value for aquatic species, and affect roughly 25 million Californians who rely on the export of this water for personal use. Installation of the temporary rock barrier at West False River would limit salinity intrusion into the Central and south Delta and would potentially conserve water for a variety of usessystem-wide.

On May 10, 2021, California Governor Gavin Newsom issued a Proclamation of State of Emergency (May 2021 Proclamation) due to drought conditions and directed DWR, among other things, to implement plans that address potential Delta salinity issues, including installation and removal of emergency drought salinity barriers as needed. The May 2021 Proclamation mandates that such emergency barriers be designed to conserve water for use later in the year to meet state and federal Endangered Species Act requirements, preserve to the extent possible water quality in the Delta, and retain water supply for human health and safety uses. The State Water Board and the California Department of Fish and Wildlife (CDFW) are also directed to immediately consider any necessary regulatory approvals needed to install emergency drought salinity barriers. Additionally, the May 2021 Proclamation suspends Water Code section 13247, which requires state agencies to comply with water quality control plans approved by the State Water Board, and suspends the California Environmental Quality Act (CEQA) for purpose of implementing actions such as the Project.

Installation and removal of the Project will require a permit from the United States Army Corps of Engineers (USACE) pursuant to Section 404 of the Clean Water Act. DWR is seeking emergency authorization under USACE's Regional General Permit (RGP) 8 – Emergency Repair and Protection Activities.

2021 Emergency Drought Salinity Barrier Project Water Quality Certification

2.0 **Project Description**

The Project will be located on West False River approximately 0.4 mile east of its confluence with the San Joaquin River, in Contra Costa County. The barrier will be constructed between Jersey and Bradford Islands, approximately 4.8 miles northeast of the City of Oakley, at the same site and in the same alignment as the emergency drought barrier installed in 2015 (See Figure 1). The approximately 800-foot-long rock barrier would be trapezoid-shaped, with an approximately 200-foot-wide base (in water) tapering to an approximately 12-foot-wide top (above water), set perpendicular to the channel (See Figure 2). The barrier would consist of approximately 84,000 cubic yards of well-graded embankment rock no larger than 18 inches in diameter, which would extend from the Jersey Island levee on the south side to the Bradford Island levee on the north side.

The Project is not designed to allow fish passage. While the drought salinity barrier is in place, fish could move through the adjacent San Joaquin River and other channels including Fisherman's Cut, East False River, and Dutch Slough.

Vessel traffic through West False River will be blocked at the Project site. However, alternative routes are available via the Lower San Joaquin River and the Stockton Deep Water Ship Channel in the San Joaquin River for navigation between Antioch and eastern Delta locations, or via Fisherman's Cut or East False River for navigation to south Delta destinations. DWR will install signs on each side of the barrier and float lines with orange ball floats across the width of the channel to deter boaters from approaching the barrier. Solar-powered warning buoys with flashing lights would be installed on the barrier crest to prevent nighttime accidents. DWR will post signs at upstream and downstream entrances to the waterway or other key locations, informing boaters of the restricted access. Navigation signage would comply with the requirements set forth by the United States Aids to Navigation System and the California Waterway Marker System, as appropriate. DWR will coordinate with U.S. Coast Guard District 11 and the California Department of Parks and Recreation, Division of Boating and Waterways, regarding procedures for safe vessel passage. DWR or its contractor will post a notice to mariners, which would include information on the location, date, and duration of channel closure, and would provide copies of the notice to marinas throughout the Delta.

DWR anticipates starting construction as soon as possible and completing installation of the barrier by no later than July 1, 2021. Removal of the barrier would be completed no later than November 30, 2021. Details on the barrier construction and removal can be found in Section 2.2 – Project Description of DWR's application for water quality certification.

3.0 Water Rights and Temporary Urgency Change Petition

In State Water Board Revised Decision 1641 (D-1641), the State Water Board amended the water right license and permits of DWR and the United States Bureau of Reclamation (Reclamation) for the State Water Project (SWP) and the Central Valley

2021 Emergency Drought Salinity Barrier Project Water Quality Certification

Project (CVP) to require them to meet certain water quality objectives in the Water Quality Control Plan for the San Francisco Bay/Sacramento–San Joaquin Delta Estuary (Bay-Delta Plan) designed to protect fish and wildlife, municipal and industrial, and agricultural use in the San Francisco Bay/Sacramento San Joaquin Delta (Bay-Delta). Specifically, D-1641 places responsibility on DWR and Reclamation for the implementation of measures to ensure that specified water quality objectives in the Bay-Delta Plan, included in Tables 1, 2, and 3 of D-1641, are met, in addition to other requirements.

On May 17, 2021, DWR and Reclamation (collectively, Petitioners) filed a Temporary Urgency Change Petition (May 17 TUCP) with the State Water Board pursuant to Water Code section 1435 et seq. in order to address critically dry conditions in the Bay-Delta. The May 17 TUCP requests that the State Water Board temporarily change the Petitioners' permit and license terms for the SWP and CVP. Specifically, the May 17 TUCP requests temporary changes to conditions imposed pursuant to D-1641 that requires the Petitioners to meet specified flow and water quality objectives established in the Bay-Delta Plan. Unless renewed, the changes sought by a TUCP may remain in effect for 180 days. The Petitioners are expected to submit an additional TUCP later this summer that will propose changes during the fall and winter time period.

The May 17 TUCP seeks modifications to Petitioners' permit and license terms that apply from June through August 15 that, if approved, will: (1) change the minimum Net Delta Outflow Index (NDOI) in June and July from an average of 4,000 cubic feet per second (cfs) to an average of 3,000 cfs with a 14-day running average in June and a monthly average in July (7-day running average in July of no less than 2,000 cfs); (2) limit the combined maximum export rate in June and July to no greater than 1,500 cfs when Delta outflow is below 4,000 cfs, and allow the 1,500 cfs limit to be exceeded when the Petitioners are meeting Delta outflow requirements pursuant to D-1641 or for moving transfer water (after July 1); and (3) change the Western Delta agricultural salinity requirement compliance location on the Sacramento River at Emmaton to a compliance location at Threemile Slough on the Sacramento River from June through August 15. According to the Petitioners, these changes would allow management of reservoir releases on a pattern that conserves upstream storage for fish and wildlife protection and Delta salinity control while providing critical water supply needs.

4.0 Regulatory Authority

4.1 Water Quality Certification and Related Authorities

The federal Clean Water Act (33 U.S.C. §§ 1251-1388) was enacted "to restore and maintain the chemical, physical, and biological integrity of the Nation's waters." (33 U.S.C. § 1251(a).) The Clean Water Act relies significantly on state participation and support in light of "the primary responsibilities and rights of States to prevent, reduce, and eliminate pollution" and "plan the development and use" of water resources. (33 U.S.C. § 1251(b).) Section 101 of the Clean Water Act (33 U.S.C. § 1251(b).) requires federal agencies to "co-operate with State and local agencies todevelop

comprehensive solutions to prevent, reduce and eliminate pollution in concert with programs for managing water resources."

Section 401 of the Clean Water Act (33 U.S.C. § 1341) requires any applicant for a federal license or permit that may result in a discharge into navigable waters to provide the licensing or permitting federal agency with certification that the project will comply with specified provisions of the Clean Water Act, including water quality standards promulgated pursuant to section 303 of the Clean Water Act (33 U.S.C. § 1313). Clean Water Act section 401 directs the agency responsible for certification to set effluent limitations and other conditions necessary to ensure compliance with the Clean Water Act and with "any other appropriate requirement of State law." (33 U.S.C. § 1341(d).) Section 401 further provides that water quality certification conditions shall become conditions of any federal license or permit for the project.

The State Water Board is the state agency responsible for Clean Water Act section 401 certification in California. (Wat. Code, § 13160.) The State Water Board has delegated authority to act on applications for water quality certification to the Executive Director of the State Water Board. (Cal. Code Regs., tit. 23, § 3838, subd. (a).)

Water Code section 13383 authorizes the State Water Board to "establish monitoring, inspection, entry, reporting, and recordkeeping requirements" and obtain "other information as may be reasonably required" for activities subject to certification under section 401 of the Clean Water Act. The State Water Board delegated this authority to the Deputy Director of the Division of Water Rights (Deputy Director) for certain activities subject to water quality certification, as provided for in State Water Board Resolution No. 2012-0029 (State Water Board 2012). In the *Redelegation of Authorities Pursuant to Resolution No. 2012-0029* memo issued by the Deputy Director on October 19, 2017, this authority is redelegated to the Assistant Deputy Directors of the Division of Water Board 2017).

On May 14, 2021, DWR filed an application for water quality certification with the State Water Board under section 401 of the Clean Water Act, in connection with its application to the USACE, filed the same day, under section 404 of the Clean Water Act for an emergency authorization (RGP8).

State Water Board staff provided public notice of the application for section 401 water quality certification pursuant to California Code of Regulations, title 23, section 3858, by posting notice of DWR's application and information describing the Project on the State Water Board's website on May 17, 2021. Notice was sent to interested persons through the State Water Board's email subscription list.

On May 19, 2021, State Water Board staff provided the Central Valley Regional Water Quality Control Board (Central Valley Regional Water Board) an opportunity to comment on the Project certification.

4.2 Water Quality Control Plans and Related Authorities

The nine California Regional Water Quality Control Boards (Regional Water Boards) have primary responsibility for the formulation and adoption of water quality control plans for their respective regions, subject to State Water Board and United States Environmental Protection Agency approval, as appropriate. (Wat. Code, § 13240 et seq.) The State Water Board may also adopt water quality control plans, which will supersede regional water quality control plans for the same waters to the extent of any conflict. (*Id.*, § 13170.)

For a specified area, water quality control plans designate the beneficial uses of water that are to be protected (such as municipal and industrial, agricultural, and fish and wildlife beneficial uses), water quality objectives for the reasonable protection of the beneficial uses and the prevention of nuisance, and a program of implementation to achieve the water quality objectives. (Wat. Code, §§ 13241, 13050, subds. (h), (j).) The water quality control plans are consistent with state and federal antidegradation policies. The beneficial uses, together with the water quality objectives contained in the water quality control plans, and applicable anti-degradation requirements, constitute California's water quality standards for purposes of the Clean Water Act.

The State Water Board's water quality certification for the Project must ensure compliance with the water quality standards in the Central Valley Regional Water Board's Water Quality Control Plan for the Sacramento River Basin and the San Joaquin River Basin (SR/SJR Basin Plan) (Central Valley Regional Water Board, 2018) and the Bay-Delta Plan (State Water Board, 2018). The two plans were adopted and are periodically revised pursuant to Water Code section 13240.

421. Sacramento and San Joaquin Rivers Basin Plan

The Central Valley Regional Water Board's SR/SJR Basin Plan designates the beneficial uses of water to be protected along with the water quality objectives necessary to protect those uses. The beneficial uses include: municipal and domestic supply; agriculture irrigation and stock watering; municipal and domestic supply; industrial process and service supply; hydropower generation; canoeing and rafting, water contact and non-contact recreation; warm and cold freshwater habitat; warm and cold migration of aquatic organisms; warm and cold spawning habitat; wildlife habitat; and navigation. The SR/SJR Basin Plan identifies water quality objectives to protect these beneficial uses, including but not limited to: chemical constituents; color; dissolved oxygen; oil and grease; pH; salinity; sediment; settleable material; suspended material; temperature; toxicity; and turbidity.

4.2.2. Bay-Delta Plan

The Bay-Delta Plan establishes water quality objectives to protect beneficial uses of water in the Bay-Delta and tributary watersheds, including drinking water supply, irrigation supply, and fish and wildlife. The State Water Board adopts the Bay-Delta Plan pursuant to its authorities under the Porter-Cologne Water Quality Control Act (Wat. Code, § 13000 et seq.) and the federal Clean Water Act (33 U.S.C. § 1313).

2021 Emergency Drought Salinity Barrier Project Water Quality Certification

The State Water Board has historically developed the water quality control plan for the Bay-Delta for several reasons. The Bay-Delta is a critically important natural resource that is both the hub of California's water supply system and the most valuable estuary and wetlands system on the West Coast. Because diversions of water within and upstream of the Bay-Delta are a driver of water quality in the Bay-Delta watershed, much implementation of the Bay-Delta Plan relies on the combined water quality and water right authority of the State Water Board. In addition, the Bay-Delta falls within the boundaries of two Regional Water Boards. Having the State Water Board develop and adopt a water quality control plans that crosses Regional Water Boards' boundaries ensures a coordinated approach.

The beneficial uses in the Bay-Delta Plan are: municipal and domestic supply; industrial service supply; industrial process supply; agricultural supply; groundwater recharge; navigation; water contact recreation; non-contact water recreation; shellfish harvesting; commercial and sport fishing; warm freshwater habitat; cold freshwater habitat; migration of aquatic organisms; spawning, reproduction, and/or early development; estuarine habitat; wildlife habitat; and rare, threatened, or endangered species. The Bay-Delta Plan is complementary to the SR/SJR Basin Plan, providing reasonable protection for the beneficial uses that require control of salinity and water project operations (flows and diversions). The Bay-Delta Plan supersedes the SR/SJR Basin Plan to the extent there is any conflict.

4.3 Clean Water Act Section 303(d) Listing

The Delta waterways are listed as impaired under Clean Water Act section 303(d) for chlordane, dichlorodiphenyltrichloroethane, diazinon, dieldrin, mercury, polychlorinated biphenyls, and unknown toxicity. Section 303(d) requires total maximum daily loads (TMDLs) to be developed for impaired waterbodies. TMDLs are control programs that define the maximum amount of a pollutant that a waterbody can receive without exceeding water quality standards and establish waste load allocations and load allocations for point and nonpoint sources of pollution, respectively.

4.4 Construction General Permit

Coverage under the *General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities* (Construction General Permit)¹ is required for discharges of pollutants associated with construction activities that disturb one or more acres of soil or activities that disturb less than one acre but are part of a larger common plan of development that in total disturbs one or more acres. Construction activities subject to the Construction General Permit include clearing, grading, and disturbances to the ground, such as stockpiling or excavation, but do not include regular maintenance activities performed to restore the original line, grade, or capacity of a facility. Coverage is required pursuant to Clean Water Act sections 301

¹ Water Quality Order No. 2009-0009-DWQ NPDES No. CAS000002, as amended by Order No. 2010-0014-DWQ and Order No. 2012-0006-DWQ. Available online at: https://www.waterboards.ca.gov/water_issues/programs/stormwater/construction.html Last accessed: May 19, 2021.

and 402 which prohibit certain discharges of stormwater containing pollutants except in compliance with a National Pollutant Discharge Elimination System (NPDES) permit. (33 U.S.C. §§ 1311, 1342(p); 40 C.F.R. pts. 122, 123, and 124.)

4.5 Statewide Mercury Provisions

On May 2, 2017, the State Water Board adopted Resolution No. 2017-0027, which approved Part 2 of the Water Quality Control Plan for Inland Surface Waters, Enclosed Bays, and Estuaries of California – Tribal and Subsistence Fishing Beneficial Uses and Mercury Provisions². Resolution No. 2017-0027 provides a consistent regulatory approach throughout the state by setting mercury limits to protect the beneficial uses associated with the consumption of fish by both people and wildlife. The State Water Board also established three new beneficial use definitions (tribal traditional culture, tribal subsistence fishing, and subsistence fishing) for use by the State Water Board and Regional Water Boards. The State Water Board also approved one narrative and four numeric mercury objectives to apply to inland surface waters, enclosed bays, and estuaries of the state that have any of the following beneficial use definitions: commercial and sport fishing, tribal traditional culture, tribal subsistence fishing, wildlife habitat, marine habitat, preservation of rare and endangered species, warm freshwater habitat, cold freshwater habitat, estuarine habitat, or inland saline water habitat, with the exception of waterbodies or waterbody segments with site-specific mercury objectives. These provisions will be implemented through NPDES permits, certifications, waste discharge requirements, and waivers of waste discharge requirements.

4.6 State Wetland Definition and Procedures for Discharges of Dredged or Fill Material to Waters of the State

On April 2, 2019, the State Water Board adopted the *State Wetland Definition and Procedures for Discharges of Dredged or Fill Material to Waters of the State* (Dredge or Fill Procedures)³, which became effective on May 28, 2020. The Dredge or Fill Procedures provide the Water Boards' definition of wetland, wetland delineation procedures, and procedures for submitting applications for activities that could result in discharges of dredged or fill material to waters of the state. The Dredge or Fill Procedures ensure that State Water Board regulatory activities will result in no net loss of wetland quantity, quality, or permanence, compliant with the *California Wetlands Conservation Policy*, Executive Order W-59-93. DWR may implement section IV of the Dredge or Fill Procedures when conducting dredge or fill activities that may impact waters of the state, including wetlands.

² The provisions are available online at: https://www.waterboards.ca.gov/water_issues/programs/mercury/. Last accessed on May 19, 2021.

³ The Dredge or Fill Procedures are available online at: https://www.waterboards.ca.gov/water_issues/programs/cwa401/docs/procedures_co nformed.pdf. Last accessed on May 19, 2021.

4.7 Aquatic Weed Control General Permit

The Statewide National Pollutant Discharge Elimination System Permit for Residual Aquatic Pesticide Discharges to Waters of the United States from Algae and Aquatic Weed Control Applications (Aquatic Weed Control General Permit)⁴ applies to projects that require aquatic weed management activities. The Aquatic Weed Control General Permit sets forth detailed management practices to protect water quality from pesticide and herbicide use associated with aquatic weed control.

5.0 California Environmental Quality Act

CEQA applies to discretionary projects that may cause a direct or indirect physical change in the environment. (Pub. Resources Code, § 21000 et seq.). When proposing to undertake or approve a discretionary project, state agencies must comply with the procedural and substantive requirements of CEQA. Ordinarily, the State Water Board must comply with any applicable requirements of CEQA prior to issuance of a water quality certification. Governor Newsom's May 2021 Proclamation suspends CEQA and regulations adopted pursuant to CEQA for purposes of carrying out various directives, including this Project. The State Water Board will file a Notice of Exemption with the State Clearinghouse within five days of issuing this certification.

6.0 Rationale for Water Quality Certification Conditions

6.1 Overview

Section 6.0 of the certification provides an explanation of why the conditions in Section 8.0 are necessary to assure that any discharge authorized under the certification will comply with water quality requirements, and, as necessary, includes a citation to federal, state, or tribal law that authorizes the condition. Section 4.0 also sets forth citations to applicable regulatory authority. The explanation and citations should be evaluated in the context of the water quality certification as a whole, but the water quality certification conditions are set forth only in Section 8.0.

Pursuant to Clean Water Act section 401 and California Code of Regulations, title 23, section 3859, subdivision (a), the State Water Board, when issuing water quality certifications, may set forth conditions to ensure compliance with applicable water quality standards and other appropriate requirements of state law. Under California Water Code section 13160, the State Water Board is authorized to issue water quality certifications under the Clean Water Act and has delegated this authority to the Executive Director. (Cal. Code Regs., tit. 23, § 3838, subd. (a).)

As explained in Section 4.0, the conditions in the certification are generally required pursuant to the Central Valley Regional Water Board's SR/SJR Basin Plan and the

⁴Water Quality Order No. 2013-0002-DWQ and NPDES No. CAG990005, as amended by Order No. 2014-0078-DWQ, Order No. 2015-0029-DWQ, Order No. 2016-0073-EXEC, and any amendments thereto. Available online at:

https://www.waterboards.ca.gov/water_issues/programs/npdes/pesticides/weed_contr ol.html. Last accessed: May 19, 2021.

State Water Board's Bay-Delta Plan. These plans are adopted and periodically revised pursuant to Water Code section 13240. Water quality control plans include water quality standards, which consist of existing and potential beneficial uses of waters of the state, water quality objectives to protect those uses, and the state and federal antidegradation policies. For instance, the SR/SJR Basin Plan includes water quality objectives for chemical constituents, oil and grease, pH, sediment, suspended material, toxicity and turbidity, which ensure protection of beneficial uses.

The State Water Board's Antidegradation Policy, "Statement of Policy with Respect to Maintaining High Quality Waters in California," Resolution No. 68-16, requires that the quality of existing high-quality water be maintained unless any change will be consistent with the maximum benefit to the people of the state, will not unreasonably affect present or anticipated future beneficial uses of such water, and will not result in water quality less than that prescribed in water quality control plans or policies. The Antidegradation Policy further requires best practicable treatment or control of the discharge necessary to assure that pollution or nuisance will not occur and the highest water quality consistent with maximum benefit to the people of the state will be maintained. The state Antidegradation Policy incorporates the federal Antidegradation Policy (40 C.F.R. section 131.12 (a)(1)), which requires "[e]xisting instream water uses and the level of water quality necessary to protect the existing uses shall be maintained and protected."

The Dredge or Fill Procedures, adopted pursuant to Water Code sections 13140 and 13170, authorize approval of dredge or fill projects subject to satisfaction of specified requirements.

California Code of Regulations, title 23, sections 3830 et seq. set forth state regulations pertaining to water quality certifications. In particular, section 3856 sets forth information that must be included in water quality certification requests, and section 3860 sets forth standard conditions that shall be included in all water quality certification actions.

Water Code sections 13267 and 13383 authorize the Regional Water Boards and State Water Board to establish monitoring and reporting requirements for persons discharging or proposing to discharge waste. Moreover, this water quality certification ensures continued monitoring, reporting, and assessment of water quality for discharges that may impact Delta quality, including waterways listed as impaired under Clean Water Act section 303(d). Data from this water quality certification and other monitoring efforts are used to inform existing control programs in the Delta.

Authorization under the water quality certification is granted based on the application submitted. An applicant is required to detail the scope of project impacts in a complete application pursuant to California Code of Regulations, title 23, section 3856, subdivision (h). Pursuant to Water Code section 13260, subdivision (c), each person discharging waste, or proposing to discharge waste shall file a report of waste discharge relative to any material change or proposed change in the character, location, or volume of the discharge. Pursuant to Water Code section 13264, subdivision (a), a permittee is

2021 Emergency Drought Salinity Barrier Project Water Quality Certification

prohibited from initiating the discharge of new wastes, or making material changes to the character, volume, and timing of waste discharges authorized herein without filing a report required by Water Code section 13260 or its equivalent for certification actions under California Code of Regulations, title 23, section 3856. (See also State Water Board Water Quality Order No. 2003-0017-DWQ, *Statewide General Waste Discharge Requirements for Dredged or Fill Discharges that have Received State Water Quality Certification*.)

The conditions in this water quality certification were developed to ensure compliance with water quality standards and water quality requirements established under the Porter-Cologne Water Quality Control Act, the federal Clean Water Act, including requirements in the SR/SJR Basin Plan and Bay-Delta Plan, and other appropriate requirements of state law. The conditions are necessary to protect the beneficial uses of water identified in the water quality control plans, prevent degradation of water quality, and ensure compliance with state and federal water quality requirements.⁵

When preparing this certification, State Water Board staff reviewed and considered the: (1) SR/SJR Basin Plan; (2) Bay-Delta Plan; (3) DWR's May 14, 2021 water quality certification application and supplemental information; (4) DWR's May 14, 2021 application to the USACE for a Clean Water Act section 404 RGP 8 (emergency activities); (5) DWR's 2021 Emergency Drought Salinity Barrier – Monitoring Plan; (6) existing water quality conditions; (7) Project-related controllable factors; (8) May 2021 Proclamation; and (9) other information in therecord.

62 Rationale for Condition 1: Monitoring, Analysis, and Reporting

Water quality monitoring, analysis, and reporting conditions are required to confirm that requirements of this water quality certification are sufficient to protect beneficial uses and to comply with water quality objectives to protect those uses under the SR/SJR Basin Plan, Bay-Delta Plan, and other appropriate requirements of state law. These monitoring requirements are consistent with the Water Boards' authority to investigate the quality of any waters of the state and require necessary monitoring and reporting pursuant to Water Code sections 13267 and 13383.

The Project involves rock fill and excavation of the barrier, operation of construction equipment, and staging areas. These activities have the potential to violate the SR/SJR Basin Plan and Bay-Delta Plan water quality objectives or otherwise fail to comply with appropriate requirements of state law. Condition 1 requires DWR to comply with applicable objectives and implement its water quality monitoring program, as modified by this certification, to prevent water quality objective violations and impacts to beneficial uses. As discussed in Section 3.0, DWR's obligations under its water right to meet water quality requirements may be modified through the temporary urgency change petition (TUCP) process. Condition 1 requires compliance with Project-related water quality requirements as they may be modified through the TUCP process. The

⁵ Designated beneficial uses for surface waters in the Project area are described in Section 4.2 of this water quality certification and in the applicable water quality control plans.

modifications and additions to DWR's water quality monitoring program included in this water quality certification further ensure that the Project will not substantially impact water quality.

Turbidity and Settleable Matter. Fill and excavation, and other in-water or wateradjacent work may increase turbidity and sediment above levels protective of beneficial uses. Beneficial uses in the Delta that would be most impacted by increased turbidity levels include cold freshwater habitat, cold migration of aquatic organisms, and wildlife habitat. Turbidity affects fish by impairing vision and altering feeding behavior, predator avoidance, and behavioral interaction with other fish. The SR/SJR Basin Plan prescribes numeric turbidity limits based on natural turbidity levels. The SR/SJR Basin Plan allows appropriate averaging periods to be applied when determining compliance with the turbidity limits, provided that beneficial uses will be protected. Condition 1 requires compliance with the SR/SJR Basin Plan's turbidity and settleable matter limits averaged over 24 hours during in-water and water-adjacent work.

Flow, Temperature, and Salinity. Operation of the temporary rock barrier across West False River could impact flow, temperature, and salinity of Delta waters. Condition 1 requires monitoring those water quality parameters to ensure beneficial uses in the Delta are protected.

Ecological Effects. Previous studies have characterized the effect of the emergency drought barrier installed in 2015 on the Delta ecosystem (Kimmerer et al., 2019). The synthesis was based on retrospective analyses that had to rely on reference conditions that were not always suitable for identifying the barrier's effects. The authors recommended that any study to evaluate the effects of a future barrier should include adequate replication to ensure that suitable reference conditions are available to distinguish the variability between the barrier impacts and other sources of variability. Topics evaluated in the study included movement of water and particles, zooplankton, submerged aquatic vegetation, water quality, nutrients and phytoplankton, and bivalves.

Despite synthesis limitations (i.e., retrospective analyses), the authors were able to conclude that the observed effects of the barrier were as expected (i.e., hydrodynamics, submerged aquatic vegetation, and bivalves) or smaller than expected (i.e., nutrients, phytoplankton, and zooplankton). Overall, the synthesis found evidence of reduced tidal currents and exchange of salts between the west and Central Delta, altered patterns of salinity, increased distribution and abundance of submerged aquatic vegetation, increased penetration of *Potamocorbula* (very small saltwater clams) into the Delta, increased grazing by bivalves, and increased bivalve recruitment near the Sacramento and San Joaquin rivers confluence. The effects were found to be localized (e.g., around False River and Franks Tract) rather than at the entire northern estuary scale. While most effects were likely short-term, the study found evidence that the barrier may have lasting impacts to submerged aquatic vegetation and bivalves.

The synthesis recommended that any future research for barrier impacts should focus on the most likely effects (e.g., circulation patterns, submerged aquatic vegetation, and bivalves) and topics that could have important consequences like cyanobacterial blooms. The collection and synthesis of such information is necessary to understand how installation, operation, and removal of the barrier affects parameters (e.g., vegetation growth, circulation, and flow) that directly impact water quality (e.g., cyanobacteria, salinity) and beneficial uses. This monitoring, synthesis, and associated reporting will provide information on the Project's protection of beneficial uses, including, but not limited to: warm and cold freshwater habitat; warm and cold migration of aquatic organisms; wildlife habitat; cold freshwater habitat; and migration of aquatic organisms.

6.3 Rationale for Condition 2: Project Activities

As described in Section 6.1, this water quality certification is granted based on the application and supporting information submitted in accordance with the State Water Board's regulations and subject to requirements of the Porter-Cologne Water Quality Control Act. Condition 2 requires DWR to implement the Project as described in its certification application and as modified by this water quality certification. Any changes to the Project description after water quality certification issuance could impact the findings, conclusions, and conditions of the water quality certification and may necessitate the filing of a new application. Condition 2 requires DWR comply with the Construction General Permit, described in Section 4.4, to ensure that construction-related Project activities do not impact water quality and beneficial uses. This condition will ensure that DWR meets water quality objectives and avoids unreasonable impacts to beneficial uses.

DWR has identified the need for compensatory mitigation for the Project. The Project will result in the loss of approximately three acres of fish habitat. Condition 2 regarding compensatory mitigation for impacts ensures physical loss and ecological degradation of waters of the state are adequately mitigated. The condition is necessary to ensure compliance with state and federal anti-degradation policies and applicable requirements of state law. Condition 2 requires DWR to develop and implement a plan for compensatory mitigation.

In addition, as explained above, in in D-1641, the State Water Board imposed requirements on DWR and Reclamation to meet certain water quality objectives in the Bay-Delta Plan. The Petitioners have filed a TUCP to temporarily amend D-1641's requirements to meet certain water quality objectives. If the TUCP is approved, DWR will be required to comply with the terms of the TUCP order, including as it may be extended or amended, which may include compliance with applicable state water quality requirements as they are in effect during the drought emergency. Condition 2 requires Project activities to comply with all applicable water quality requirements in connection with the May 17 TUCP, as it may be extended or amended, including those related to controlling saltwater intrusion in the Delta.

64 Rationale for Condition 3: Erosion and Sedimentation Control Measures

Project activities have the potential to cause increased erosion and sedimentation in the Project area. Erosion and sedimentation problems can contribute to significant degradation of the waters of the state; therefore, it is necessary to implement actions to limit or eliminate such discharges in order to avoid or minimize such degradation.

Implementation of control measures and best management practices will assure compliance with water quality objectives and protect beneficial uses identified in the SR/SJR Basin Plan and Bay-Delta Plan. Beneficial uses in West False River that would be most impacted by increased erosion and sedimentation include cold freshwater habitat and wildlife habitat. Condition 3 requires DWR to implement erosion and sedimentation control measures to prevent water quality objective violations and unreasonable impacts to beneficial uses. Condition 3 also includes a post-installation erosion monitoring component to ensure the work area and materials do not cause erosion.

6.5 Rationale for Condition 4: Hazardous Material Control Measures

Conditions related to site management require best practices to prevent, minimize, and/or clean up potential construction spills, including from construction equipment. For instance, fuels and lubricants associated with the use of mechanized equipment have the potential to result in toxic discharges to waters of the state in violation of water quality standards, including the toxicity and floating material water quality objectives. This condition is also required pursuant to Water Code section 13264, which prohibits any discharge that is not specifically authorized in this water quality certification.

The SR/SJR Basin Plan includes narrative water quality objectives for oil, grease, and other hazardous materials. Waters must be free of hazardous materials in concentrations that cause nuisance or "detrimental physiological responses in human, plant, animal, or aquatic life." (Central Valley Regional Water Board, 2018). Beneficial uses in the Delta that would be most impacted by hazardous materials include contact water recreation, cold freshwater habitat, and wildlife habitat. Condition 4 requires development and implementation of a hazardous materials management program to prevent hazardous material spills into waterways, including containment criteria pursuant to California Code of Regulations, title 27, section 20320.

6.6 Rationale for Condition 5: Project Activity Progress Reports

Condition 5 requires DWR to submit Project Activity Progress Reports (Progress Reports) during construction to document Project status and compliance with water quality certification requirements. The Progress Reports will inform the Deputy Director of potential water quality objective violations or impacts to beneficial uses. This will allow quick implementation of remediation measures to limit or prevent any violations or impacts.

6.7 Rationale for Conditions 6 through 25

This water quality certification imposes additional conditions regarding Project approvals, monitoring, enforcement, and potential future revisions. Conditions 6-9, 12-14, 17-19, and 21-22 are necessary to ensure that the Project is implemented to meet water quality standards and other appropriate requirements of state law, or that adjustments are made to ensure continued compliance with water quality requirements in light of new information, changes to the Project, determinations of invalidity or waiver, or changes to standards themselves. Conditions 11, 15, 16, and 20 contain important clarifications concerning the scope and legal effect of this certification, and other legal
requirements that may apply to the Project. In addition, Condition 10 is necessary to comply with Water Code section 13167 and Conditions 23-25 are required by California Code of Regulations, title 23, section 3860, which requires imposition of these conditions for all certifications.

7.0 Conclusion

The State Water Board finds that, with the conditions and limitations imposed under this water quality certification, the Project will be protective of state water quality standards and other appropriate requirements of state law.

8.0 Water Quality Certification Conditions

ACCORDINGLY, BASED ON ITS INDEPENDENT REVIEW OF THE RECORD, THE STATE WATER RESOURCES CONTROL BOARD CERTIFIES that implementation of the 2021 Emergency Drought Salinity Barrier (Project) will comply with sections 301

the 2021 Emergency Drought Salinity Barrier (Project) will comply with sections 301, 302, 303, 306, and 307 of the Clean Water Act, and with applicable provisions of State law, if the California Department of Water Resources (Applicant) complies with the following terms and conditions.

CONDITION 1. Monitoring, Analysis, and Reporting

The Applicant shall monitor, analyze, and report on water quality and related monitoring associated with Project activities as outlined in this condition. Project activities include the construction, operation and maintenance, and removal of the Project. The Applicant shall implement its 2021 Emergency Drought Salinity Barrier – Monitoring Plan (Monitoring Plan), dated May 2021⁶, except as modified by the conditions of this water quality certification or otherwise approved by the Deputy Director of the Division of Water Rights (Deputy Director).

Turbidity and Settleable Matter.

- Turbidity: Waters shall be free of changes in turbidity (due to Project activities) that cause nuisance or adversely affect beneficial uses. Increases in turbidity attributable to the Project shall not exceed the following limits: except for periods of storm runoff, the turbidity of Delta waters shall not exceed 50 nephelometric turbidity units (NTUs) in the waters of the Central Delta and 150 NTUs in other Delta waters.
- Settleable Matter: Activities shall not cause settleable matter to exceed 0.1 milliliters per liter (ml/l) in surface waters.

In determining compliance with the limits shown above for turbidity and settleable matter, a 24-hour averaging period may be applied provided that three consecutive samples do not exceed the given limits. Minimum grab sampling frequency shall be three times per day during disturbance to the bed and bank of the Delta associated with construction of the Project. Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity. The Applicant shall take samples 300 feet upstream of Project activities and 300 feet downstream of the point of river's edge construction activities. If an increase in turbidity or settleable material, caused by Project activities, is observed between the upstream and downstream sampling locations, the monitoring frequency shall be increased to a minimum of every hour during this period. If three consecutive sample results or a 24-hour average turbidity indicate that turbidity levels exceed the limits in the SR/SJR Basin Plan, the associated Project activities shall cease immediately. In addition, any and all actions shall be implemented immediately to reduce and maintain turbidity at or below the given

⁶ As provided to the State Water Board on May 21, 2021.

thresholds. Turbidity shall be measured using NTUs. A hand-held field meter may be used, provided the meter uses a United States Environmental Protection Agencyapproved algorithm/method and is calibrated and maintained in accordance with the manufacturer's instructions. For each meter used for monitoring, a calibration and maintenance log shall be maintained onsite and provided to State Water Board staff upon request.

<u>Other Water Quality Parameters</u>. The Applicant shall monitor the following water quality parameters at the locations described in Table 2 of the Monitoring Plan to ensure compliance with the SR/SJR Basin Plan, Bay-Delta Plan, and any order issued by the State Water Resources Control Board (State Water Board) in response to a Temporary Urgency Change Petition, including the May 17 petition, filed by the Department of Water Resources and United States Bureau of Reclamation, pursuant to Water Code section 1435 et seq., to address critically dry conditions in the Bay-Delta (TUCP Order). Project activities shall comply with all applicable water quality requirements of the State Water Board's TUCP Order, and any extensions or modifications thereto, as they relate to the water quality impacts of the Project. The State Water Board reserves jurisdiction to add to or modify the conditions of this certification as appropriate to ensure compliance.

Continuous Monitoring (every 15 minutes):

- Temperature
- Dissolved Oxygen
- Specific Conductance
- Turbidity
- Flow
- Stage
- Velocity

Monthly Monitoring:

- Chlorophyll
- Nutrients
- Bromide
- Organic Carbon

Continuous monitoring shall be conducted: prior to and during construction; during operation of the Project; during removal of the barrier; and following removal of the barrier until at least December 31, 2021, unless otherwise modified by a State Water Board action or approved by the Deputy Director. The Applicant shall follow the monitoring procedures specified in DWR's Monitoring Plan. Continuous monitoring equipment shall be in place and operational prior to starting in-water work. All additional monitoring shall start and be in full operation prior to commencing in-water work unless otherwise approved by the Deputy Director, and shall continue, as described in the Monitoring Plan, throughout the duration of the Project.

All water quality compliance monitoring shall be conducted using the State Water Board Surface Water Ambient Monitoring Program methods and procedures described in Code of Federal Regulations Title 40, Chapter I, Subchapter D, Part 136 (40 C.F.R. § 136.1 et seq.) unless otherwise approved by the Deputy Director.

<u>Visual Monitoring for Pollutants</u>. The Applicant shall conduct visual inspections for turbidity plumes, oily sheens, and signs of construction-related pollutants⁷ continuously throughout the barrier installation and removal periods.

<u>Fisheries</u>. The Applicant shall perform monitoring for Delta smelt, longfin smelt, and salmonids as outlined in the Biological Resources section of the Monitoring Plan.

<u>Harmful Algal Blooms and Aquatic Weeds</u>. In coordination with the State Water Board, Central Valley Regional Water Quality Control Board (Central Valley Regional Water Board), and Interagency Ecological Program⁸, the Applicant shall complete a special study that identifies the effects of this Project and any associated actions on the prevalence and extent of harmful algal blooms (HABs) and expansion of invasive aquatic weeds in the Sacramento-San Joaquin Delta (Delta). A report on the findings of the special study shall be submitted to the Deputy Director by December 15, 2021.

<u>General Monitoring and Reporting Provisions</u>. The Applicant shall submit monitoring reports to State Water Board staff within 30 days of initiating monitoring and every two weeks thereafter for the remainder of any in-water and water-adjacent work associated with the Project, including Project construction, operation, and removal of the barrier. The monitoring reports shall include the monitoring data, as well as summary and analysis of the data. Within 10 days of initiating in-water work, the Applicant shall consult with State Water Board staff on the analyses that will be included in the monitoring reports. Monitoring reports, which contain turbidity sampling results and all other required monitoring, shall be submitted to the State Water Board's designated Project Manager. The Project Manager may require changes to the format of future monitoring reports.

The Deputy Director and the Central Valley Regional Water Board Executive Officer (Executive Officer) shall be notified promptly, and in no case more than 24 hours, following an exceedance of a water quality objective or the turbidity averaging period limits, or identification of construction-related pollutants. Project activities associated with the exceedance or pollutant shall immediately cease and the Applicant shall

⁷ Visible construction-related pollutants may include oil, grease, foam, fuel, petroleum products, uncured concrete, and construction-related excavated, organic, or earthen material.

⁸ The Interagency Ecological Program (IEP) is a consortium of nine member agencies: three State departments and six federal agencies that has been conducting cooperative ecological investigations since the 1970s. The IEP provides and integrates relevant and timely ecological information for management of the Bay-Delta ecosystem and the water that flows through it.

immediately implement remedial measures to contain or clean up any pollutant. Construction shall not resume without approval from the Deputy Director.

The Applicant may request modifications to the water quality monitoring program. The request shall include the proposed modifications and rationale. Any such modifications shall not be implemented until approved by the Deputy Director.

CONDITION 2. Project Activities

Authorization under the water quality certification is granted based on the application submitted. Unless otherwise modified by conditions of this certification, the Applicant shall implement the Project as described in its May 15, 2021 water quality certification application (DWR 2021) and any supplemental materials received prior to issuance of this water quality certification. The Applicant shall implement all the Avoidance and Minimization Measures described in its May 15, 2021 application for water quality certification, and supplements thereto, relevant to water quality and beneficial uses of the Delta.

The Applicant shall obtain coverage under and comply with the *General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities* (Construction General Permit)⁹ and any amendments thereto.

Pursuant to the State Water Board's Revised Decision 1641, the Applicant's water rights are conditioned on meeting certain water quality objectives in the Bay-Delta Plan, including requirements related to Delta salinity control. If a TUCP Order is issued approving temporary changes to the Applicant's water right terms and conditions involving compliance with the Bay-Delta Plan's water quality objectives, Project activities shall comply with the applicable water quality requirements as they may be temporarily amended by a TUCP Order, to the extent that they relate to the water quality impacts of the Project, and provided that the Applicant complies with the terms of the TUCP Order and this water quality certification.

The Applicant shall submit a Compensatory Mitigation Plan to the Deputy Director for review and approval. The Compensatory Mitigation Plan shall provide information on the impacts to water quality, including to beneficial uses, associated with the Project, and mitigation that will be provided to ensure physical loss and ecological degradation of waters of the state are adequately mitigated. The compensatory mitigation ratio for loss of habitat shall not be less than 1:1. The Deputy Director may require modifications as part of any approval. The Applicant shall implement the Compensatory Mitigation Plan upon approval of the Deputy Director and any other required approvals.

⁹Water Quality Order No. 2009-0009-DWQ NPDES No. CAS000002, as amended by Order No. 2010-0014-DWQ and Order No. 2012-0006-DWQ. Available online at: https://www.waterboards.ca.gov/water_issues/programs/stormwater/construction.html Last accessed: May 19, 2021.

Removal of the barrier and all in-water work associated with the Project shall be completed by no later than November 30, 2021, unless otherwise approved by the Executive Director. If the Applicant proposes to leave portions of the barrier in place, the Applicant shall consult with the United States Army Corps of Engineers and State Water Board staff to determine whether it is necessary to apply for a new permit and associated water quality certification. If it is determined that a new permit is not necessary, the Applicant shall submit a plan for leaving portions of the barrier in place to the Deputy Director for review and approval by no later than November 1, 2021. The Deputy Director may require modifications as part of any approval.

CONDITION 3. Erosion and Sedimentation Control Measures

The Applicant shall implement erosion, sedimentation, and turbidity control measures, including the following measures:

- Control measures for erosion, excessive sedimentation, and sources of turbidity shall be implemented and in place prior to the commencement of, during, and after any ground disturbing activities, or any other Project activities that could result in erosion or sediment discharges to surface water.
- 2) Stockpiles shall be located outside of riparian habitat and protected in accordance with appropriate best management practices. If more than 0.25 inch of rain is forecasted during Project implementation, all stockpiles shall be surrounded with sediment control technologies or berms to prevent sediment run-off.
- 3) Imported materials (i.e., not from on-site rock borrow locations) used for rock slope protection shall be clean prior to use. If materials are washed on-site, washing shall be performed and wash water shall be stored at least 300 feet from any waterway and either disposed of off-site or used for dust abatement.
- 4) If erosion or sedimentation causes increased turbidity above the limits described in Condition 1, the Applicant shall contain the turbid water. The turbid water may be released downstream once the water is below turbidity limits, disposed of offsite, or used for dust abatement, in a manner that does not impair water quality.
- 5) Dredged or excavated material shall be either used as backfill or disposed of offsite in a manner that does not impair water quality. Dredged or excavated material shall be stored at least 300 feet from any waterway, unless otherwise approved by the Deputy Director.
- 6) Sediment control measures shall be in place in all disturbed areas prior to the onset of the first forecasted rain event or October 15, whichever comes first. Sediment control measures shall be monitored and maintained in good working condition until vegetation becomes established.
- 7) Upon Project completion, the Applicant shall inspect the Project site for signs of excessive erosion or other water quality impairment monthly through March 31, 2022. The Applicant shall provide its observations to State Water Board staff no more than two weeks following each inspection. If erosion or other impairments are observed, the Applicant shall notify the Deputy Director and

Executive Officer and include: (1) a description of the erosion or impairment with photo documentation; (2) potential causes of the erosion or impairment; and (3) proposed measures to prevent future erosion or impairment. The Applicant shall implement the proposed measures upon receipt of Deputy Director approval. The Deputy Director may require modifications to the proposed measures, including implementation of alternate measures, as part of any approval.

CONDITION 4. Hazardous Materials Control Measures

The Applicant shall develop and implement a Hazardous Materials Management Program (HMMP) to identify hazardous materials¹⁰ that could be used during construction; describe measures to prevent, control, and minimize the spillage of hazardous materials; describe transport, use, storage, and disposal procedures for these materials; and outline procedures to be followed in the event of a spill of a hazardous material. The HMMP shall be submitted to the Deputy Director for review and approval prior to commencing construction activities. The Deputy Director may require modifications as part of any approval. The Applicant shall implement the submitted HMMP and any modifications once approved by the Deputy Director. At a minimum, the HMMP shall include the following measures:

- The Applicant shall develop and implement, as applicable, onsite Project-specific protocols for hazardous materials spill prevention, containment, and clean up. The protocols shall detail construction equipment types and locations, accessand staging, practices to prevent, minimize, and/or clean up potential spills, and construction sequence. The protocols shall include all applicable requirements of this certification. The Applicant shall provide the protocols to State Water Board staff upon request.
- 2) Caution shall be used when handling and/or storing hazardous materials near waterways. Appropriate materials shall be on site to prevent and manage spills to prevent impacts to surface waters.
- 3) When not in use, equipment shall be stored in upland areas outside the boundaries of waterways.
- 4) All construction equipment shall be inspected for leaks before entering the Project area. All equipment shall be well maintained and inspected daily while on site to prevent leaks of fuels, lubricants, or other fluids into waters of the United Statesor waters of the state. Stationary equipment (e.g., generators) within 100 feet of waterways shall be parked over secondary containment.
- 5) Service and refueling procedures shall be conducted in a designated area, where no potential exists for fuel spills to seep or wash into waterways. Service and

¹⁰Hazardous materials include, but are not limited to, petroleum products, pesticides, fuels, lubricants, oils, hydraulic fluids, raw cement, concrete or the washing thereof, asphalt, paint, coating material, drilling fluids, or other substances potentially hazardous to water quality and beneficial uses.

refueling areas shall include secondary containment including drip pans and/or placement of absorbent material.

- 6) Wet concrete or cement shall not be placed into stream channel habitat. Concrete or cement shall be completely cured before coming into contact with waters of the United States or waters of the state. Any surface water that contacts wet concrete or cement must be pumped out and disposed of in accordance with applicable laws and regulations.
- 7) Any water contaminated by hazardous materials shall be stored according to items (2) and (8) of this condition and disposed of properly off-site in a manner that does not impair water quality.
- 8) Containment areas shall include secondary containment. All containment structures shall comply with California Code of Regulations, title 27, section 20320.

CONDITION 5. Project Activity Progress Reports

No later than 45 days following completion of barrier installation and 45 days following barrier removal, the Applicant shall submit a Project Activity Progress Report (Progress Report) to the Deputy Director. The Progress Report shall include:

- 1) A summary of Project activities performed;
- 2) Documentation of compliance with each condition of this water qualitycertification and details of any failure to meet the certification requirements;
- 3) Details of Project-related adverse impacts to beneficial uses, if applicable; and
- 4) Any proposed modifications to Project implementation to address impacts or other concerns.

The Deputy Director may require the Applicant to implement corrective actions in response to the information provided in a Progress Report. The Applicant shall provide any additional information or clarification requested by the Deputy Director related to a Progress Report.

CONDITIONS 6 – 25

CONDITION 6. Notwithstanding any more specific provision of this certification, any plan developed as a condition of this certification requires review and approval by the Deputy Director. The State Water Board's approval authority, including authority delegated to the Deputy Director or others, includes the authority to withhold approvalor to require modification of a plan, proposal, or report prior to approval. The State Water Board may take enforcement action if the Applicant fails to provide or implement a required item in a timely manner. If a time extension is needed to submit an item for approval, the Applicant shall submit a written request for the extension, with justification, no later than 15 days prior to the deadline. The Applicant shall not implement any plan, proposal, or report until after receiving approval and any other necessary regulatory approvals.

CONDITION 7. The State Water Board reserves the authority to add to ormodify the conditions of this certification: (1) to incorporate changes in technology, sampling, or methodologies; (2) if monitoring results indicate that Project activities could violatewater quality objectives or impair beneficial uses; (3) to implement any new or revised water quality standards and implementation plans adopted or approved pursuant to the Porter-Cologne Water Quality Control Act or section 303 of the Clean Water Act; and (4) to require additional monitoring and/or other measures, as needed, to ensure that Project activities meet water quality objectives and protect beneficial uses.

CONDITION 8. The State Water Board shall provide notice and an opportunity to be heard in exercising its authority to add to or modify the conditions of thiscertification.

CONDITION 9. Unless otherwise specified by conditions in thiscertification, Project activities shall be conducted in a manner consistent with all applicable water quality standards and implementation plans adopted or approved pursuant to the Porter-Cologne Water Quality Control Act or section 303 of the Clean Water Act. The Applicant must take all reasonable measures to protect the beneficial uses of the Delta.

CONDITION 10. Unless otherwise specified in this certification or at the request of the Deputy Director, data and/or reports shall be submitted electronically in a format accepted by the State Water Board to facilitate the incorporation of this information into public reports and the State Water Board's water quality database systems in compliance with California Water Code section 13167.

CONDITION 11. This certification does not authorize any act which results in the take of a threatened, endangered, or candidate species or any act which is now prohibited, or becomes prohibited in the future, under either the California Endangered Species Act (ESA) (Fish & G. Code, §§ 2050–2097) or the federal ESA (16 U.S.C. §§ 1531–1544). If a "take" will result from any act authorized under this certification or water rights held by the Applicant, the Applicant must obtain authorization for the take prior to any construction or operation of the portion of the Project that may result in a take. The Applicant is responsible for meeting all requirements of the applicable ESAs for the Project authorized under this certification.

CONDITION 12. The Applicant shall submit any change to the Project, including operations, facilities, technology changes or upgrades, or methodology, which could have a significant or material effect on the findings, conclusions, or conditions of this certification, to the State Water Board for prior review and written approval. The State Water Board shall determine significance and may require consultation with state and/or federal agencies. If the State Water Board is not notified of a change to the Project, it will be considered a violation of this certification.

CONDITION 13. In the event of any violation or threatened violation of the conditions of this certification, the violation or threatened violation is subject to any remedies, penalties, process, or sanctions as provided for under applicable state or federal law. For the purposes of section 401(d) of the Clean Water Act, the applicability of any state law authorizing remedies, penalties, process, or sanctions for the violation or threatened

violation constitutes a limitation necessary to ensure compliance with the water quality standards and other pertinent requirements incorporated into this certification. In response to any violation of the conditions of this certification, the State Water Board may add to or modify the conditions of this certification as appropriate to ensure compliance.

CONDITION 14. In response to a suspected violation of any condition of this certification, the State Water Board or Central Valley Regional Water Board may require the holder of any federal permit or license subject to this certification to furnish, under penalty of perjury, any technical or monitoring reports the State Water Board deems appropriate, provided that the burden, including costs, of the reports shall bear a reasonable relationship to the need for the reports and the benefits to be obtained from the reports. (Wat. Code, §§ 1051, 13165, 13267, and 13383.)

CONDITION 15. This certification shall not be construed as replacement or substitution for any necessary federal, state, and local approvals. The Applicant is responsible for compliance with all applicable federal, state, or local laws or ordinances and shall obtain authorization from applicable regulatory agencies prior to the commencement of Project activities.

CONDITION 16. Any requirement in this certification that refers to an agency whose authorities and responsibilities are transferred to or subsumed by another state or federal agency, will apply equally to the successor agency.

CONDITION 17. Upon request, a construction schedule shall be provided to State Water Board and Central Valley Regional Water Board staff. The Applicant shall provide State Water Board and Central Valley Regional Water Board staff access to the Project site to document compliance with this certification.

CONDITION 18. A copy of this certification shall be provided to any contractor and all subcontractors conducting Project-related work, and copies shall remain in their possession at the Project site. The Applicant shall be responsible for work conducted by its contractor, subcontractors, or other persons conducting Project-related work.

CONDITION 19. The Applicant shall use analytical methods approved by California's Environmental Laboratory Accreditation Program (ELAP), where such methods are available. Samples that require laboratory analysis shall be analyzed by ELAP-certified laboratories.

CONDITION 20. Nothing in this certification shall be construed as State Water Board approval of the validity of any water rights, including pre-1914 claims. The State Water Board has separate authority under the Water Code to investigate and take enforcement action, if necessary, to prevent any unauthorized or threatened unauthorized diversions of water.

CONDITION 21. This certification serves as Waste Discharge Requirements pursuant to the Porter-Cologne Water Quality Control Act (Water Code sections 13000 et seq.) as authorized by State Water Board Water Quality Order No. 2003-0017-DWQ,

Statewide General Waste Discharge Requirements for Dredged or Fill Discharges that have Received State Water Quality Certification.

CONDITION 22. The provisions of this certification are severable. If any provision of this certification is found invalid, affects the validity of the certification, or would result in a determination that the State Water Board has waived its section 401 certification authority for the Project, the Board reserves authority to consider whether an alternative term would address the water quality issue without being found invalid or resulting in a waiver determination. If any provision of this certification is found invalid, affects the validity of the certification, or would result in a determination that the State Water Board has waived its section 401 certification of this certification is found invalid, affects the validity of the certification, or would result in a determination that the State Water Board has waived its section 401 certification authority for the Project, the remainder of this certification shall not be affected.

CONDITION 23. This certification is subject to modification or revocation upon administrative or judicial review, including but not limited to review and amendment pursuant to California Water Code, section 13330 and California Code of Regulations, title 23, division 3, chapter 28, article 6 (commencing with section 3867).

CONDITION 24. This certification is not intended and shall not be construed to apply to any activity involving a hydroelectric facility and requiring a Federal Energy Regulatory Commission (FERC) license or an amendment to a FERC license unless the pertinent application for certification was filed pursuant to California Code of Regulations, title 23, section 3855, subdivision (b) and that application for certification specifically identified that a FERC license or amendment to a FERC license for a hydroelectric facility was being sought.

CONDITION 25. This certification is conditioned upon total payment of any fee required under California Code of Regulations, title 23, division 3, chapter 28.

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Eileen Sobeck Executive Director

<u>May 28, 2021</u> Date

9.0 References

Central Valley Regional Water Board. 2018. The Water Quality Control Plan for the Sacramento River Basin and the San Joaquin River Basin (Basin Plan). Fifth Edition. Revised May 2018 (with Approved Amendments). Available at: https://www.waterboards.ca.gov/centralvalley/water_issues/basin_plans/. Last accessed May 19, 2021.

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State Water Board. 2019. *State Wetland Definition and Procedures for Discharges of Dredged or Fill Material to Waters of the State*. Resolution No. 2019-0015 and any amendments thereto. Available at: https://www.waterboards.ca.gov/water_issues/programs/cwa401/wrapp.html. Last accessed May 19, 2021.

10.0 Figures



Figure 1. 2021 Emergency Drought Salinity Barrier Location on West False River



Figure 2. Aerial View Depiction of 2021 Emergency Drought Salinity Barrier