FINDING OF EMERGENCY

Executive Summary

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 extreme hydrologic conditions over the past two years. Water supply in many parts of California, including the Sacramento-San Joaquin Delta (Delta) watershed, is insufficient to meet a significant portion of water demands. Addressing the severe water shortage in the Delta watershed requires urgent action to ensure water supplies are and will remain available to meet human health and safety needs, prevent saltwater intrusion into the Delta, and minimize impacts to fish and wildlife.

The Delta watershed provides a vital surface water supply for the state, supplying two-thirds of Californians with at least some portion of their drinking water and supplying water for irrigation to millions of acres of farmland. 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. Maintaining low salinity water quality needed for human uses in the Delta requires adequate freshwater flows to prevent tidal inflows of ocean salts. During dry periods, a significant portion of the water used to ensure that salinity does not intrude into the Delta comes from water in upstream reservoirs that was stored during earlier wet periods. Protecting stored water supplies is imperative to ensure that adequate supplies are available to prevent salinity intrusion, which would render this critical water source unusable for humans and impact ecosystem functions. Ensuring water is available to meet minimum human health and safety needs, notwithstanding the shortage conditions, is also of the utmost importance. Additional efforts are needed in the Delta watershed this year to ensure that water right holders and claimants without other means of accessing water supplies for basic health and safety can continue to divert water, even under critical drought conditions.

It is imperative that water right holders and claimants, who do not have water available at their priority of right and do not provide water for minimum human health and safety uses, cease diversions of water that is needed for more senior rights or that was released from upstream reservoirs for use downstream. An emergency regulation will enable the State Water Resources Control Board (State Water Board or Board) to enforce the water right priority system with respect to all water right holders and claimants in a timely manner and to protect critical water storage needed for minimum health and safety, salinity control in the Delta, and some ecosystem protection.

Governor Newsom's Drought Emergency Proclamations

On April 21, 2021, Governor Gavin Newsom declared a drought state of emergency under the provisions of the California Emergency Services Act (Gov. Code section 8550 et. seq.), in Mendocino and Sonoma counties due to drought conditions in the Russian River watershed (April 2021 Proclamation). The April 21, 2021 proclamation also directed state agencies to take immediate actions to bolster drought resilience across the state.

On May 10, 2021, Governor Newsom expanded the drought proclamation to include counties within the Klamath River, Sacramento-San Joaquin Delta, and Tulare Lake watersheds (May 2021 Proclamation). The May 2021 Proclamation directed the State Water Board to consider emergency regulations to curtail water diversions when water is not available at water right holders' priority of right or to protect releases of stored water in the Delta watershed. For purposes of approving these emergency regulations, the May 2021 Proclamation suspended the California Environmental Quality Act (Pub. Resources Code, § 21000 et seq.) (CEQA).

On July 8, 2021, Governor Newsom further expanded the emergency proclamation to include nine additional counties (Inyo, Marin, Mono, Monterey, San Luis Obispo, San Mateo, Santa Barbara, Santa Clara, and Santa Cruz) (July 2021 Proclamation). Currently, a total of 50 of the state's 58 counties are under a drought state of emergency. Governor Newsom also signed Executive Order N-08-21 on July 8, 2021 urging all Californians to voluntarily reduce their water use by 15 percent compared to 2020 levels (July 2021 Executive Order). The July 2021 Executive Order encourages Californians to take actions to conserve water, such as irrigating landscapes more efficiently, fixing leaks, and installing water-efficient showerheads. The July 2021 Executive Order also directs the State Water Board to monitor progress on voluntary conservation in the coming months.

Emergency Defined

Water Code section 1058.5 grants the State Water Board the authority to adopt emergency regulations in certain drought years 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." Section 1058.5 applies to regulations "adopted in response to conditions which exist, or are threatened, in a critically dry year immediately preceded by two or more consecutive below normal, dry, or critically dry years or during a period for which the Governor has issued a proclamation of a state of emergency

under the California Emergency Services Act (Chapter 7 (commencing with Section 8550) of Division 1 of Title 2 of the Government Code) based on drought conditions." As described above, the May 2021 Proclamation declared a state of emergency covering the Sacramento-San Joaquin Delta watershed based on drought conditions.

Emergency regulations adopted under Water Code section 1058.5 remain in effect for up to one year and may be renewed if the Board finds that drought conditions as defined remain in effect. Section 1058.5, subdivision (b) provides that, notwithstanding Government Code sections 11346.1 and 11349.6, the Board's finding of emergency in connection with an emergency regulation promulgated under section 1058.5 is not subject to review by the Office of Administrative Law (OAL).

Government Code section 11346.1, subdivision (a)(2), requires that, at least five working days prior to submission of the proposed emergency action to OAL, the adopting agency provide a notice of the proposed emergency action to every person who has filed a request for notice of regulatory action with the agency. After submission of the proposed emergency to OAL, OAL must allow interested persons five calendar days to submit comments on the proposed emergency regulations as set forth in Government Code section 11349.6.

The information contained within this finding of emergency provides information to support the State Water Board's emergency rulemaking under Water Code section 1058.5 and also meets the applicable requirements of Government Code sections 11346.1 and 11346.5.

Evidence of Emergency

As of July 20, 2021, after two years of low precipitation, the United States Drought Monitor now reports that 100 percent of California is experiencing moderate to exceptional drought, with 85 percent of California experiencing extreme to exceptional drought (USDM 2021). The United States Seasonal Drought Outlook, released by the Climate Prediction Center on June 17, 2021, and valid for June 17 through September 30, 2021, shows drought is likely to persist through summer in California (NOAA 2021). Within the Delta watershed, conditions have been extraordinarily dry; together water years (WY) 2020 and 2021 are expected to be the second driest two-year period on record, behind only WY 1967-1977 (DWR & Reclamation 2021b). As of July 20, 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 watershed being 18.3 inches. Furthermore, very little rain has fallen since about mid-March; total precipitation from April through June was only 16 percent of average in the Northern

Sierra Nevada mountains and 10 percent of average in the San Joaquin Basin (DWR 2021a, DWR 2021b).

In most years, California receives about half of its precipitation in the months of December, January, and February, with much of that precipitation falling as snow in the Sierra Nevada mountains. A handful of large winter storms can make the difference between a wet year and a dry one. In normal years, the snowpack stores water during the winter months and releases it through melting in the spring and summer to replenish rivers and reservoirs. However, dry conditions this year resulted in low snowpack in California's mountains. As of April 1, 2021, the statewide snowpack water content was at about 62 percent of the historical average for that date. One month later, the snowpack water content had fallen to about 24 percent of the historical average for May 1 (DWR 2021c).

Exacerbating the impact of reduced precipitation and snowpack has been a low runoff efficiency throughout the Sierra Nevada mountains in 2021. Runoff efficiency is the relative amount of runoff that occurs in response to a given quantity of precipitation; a low efficiency means that much of the rainfall runoff or snowmelt that was in the system was either lost to evaporation or infiltration. In several mountain watersheds, total runoff for 2021 has been similar to conditions in 2014 and 2015 even though more snowpack was present this year than occurred in 2014 and 2015 (DWR 2021d). Forecasts early in the year did not anticipate this low runoff efficiency and thus overestimated the amount of runoff that would be available throughout the Delta watershed. As of the end of June, estimates of unimpaired runoff were close to what was forecasted in February at a 99 percent exceedance probability; in other words, February forecasts suggested that there was only a 1 percent chance that unimpaired flow would be as low as it was (DWR 2021e, DWR 2021f). As of May 2021, total runoff statewide was estimated at only 35 percent of the annual average runoff (DWR 2021g).

The dry conditions this year and last year have caused storage in most of California's reservoirs to fall well below average levels, with total storage statewide for July 1 at 61 percent of the historical average. Current storage levels in key reservoirs reflect this trend. On July 1 Shasta Lake, California's largest reservoir that is part of the Central Valley Project (CVP), was at about 1.7 million acre-feet (MAF) of storage, or only 38 percent of its capacity (47 percent of average for July 1), while Trinity Reservoir, another CVP reservoir, was at a storage level of about 1.2 MAF, or only 47 percent of its capacity (56 percent of average for July 1). Lake Oroville, the State Water Project's (SWP) principal reservoir and the State's second largest reservoir, was at a storage level of about 1.1 MAF, or only 32 percent of its capacity (39 percent of average for July 1). Folsom Reservoir, a CVP reservoir on the American River critical for municipal water supplies in the greater Sacramento areas, was at a storage level of about 290 thousand acre-feet (TAF), or only 30 percent of its capacity (36 percent of average for

July 1). New Melones Reservoir, a CVP reservoir on the Stanislaus River, was at a storage level of about 1.2 MAF, or 51 percent of its capacity (79 percent of average for July 1). New Don Pedro Reservoir on the Tuolumne River was at a storage level of about 1.3 MAF, or 62 percent of its capacity (77 percent of average for July 1). Lake McClure on the Merced River was at a storage level of about 390 TAF, or 38 percent of its capacity (53 percent of average for July 1). San Luis Reservoir, a critical south-of Delta reservoir for both the SWP and CVP, was at a storage level of about 670 TAF, or 33 percent of its capacity (52 percent of average for July 1) (DWR 2021h).

Many local, state and federal water agencies in California have taken actions in response to drought conditions and limited water supplies, including reducing or eliminating contract water deliveries and implementing mandatory and voluntary conservation efforts. Earlier this year, the State's two major water supply projects, the CVP and SWP, announced severe reductions in contract deliveries. In May 2021, the United States Bureau of Reclamation (Reclamation) announced that its regular CVP agricultural contractors would receive no deliveries in 2021 and its municipal and industrial contractors would receive 25 percent of their historic use or minimum health and safety supplies, whichever is greater (Reclamation 2021a). In March 2021, the Department of Water Resources (DWR) announced that deliveries to SWP contractors would be reduced to 5 percent in 2021 for both municipal and agricultural contractors (DWR 2021k). In addition to water supply reductions and conservation efforts, many water users have requested and received approvals for 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.

State Water Board Planning and Response to Drought

On March 22, 2021, the State Water Board sent Letters Regarding Ongoing Dry Conditions in Most California Watersheds to all water right holders and claimants in the state regarding ongoing dry conditions in most California watersheds. This informational letter encouraged water right holders and claimants to plan and prepare for potential water shortages later this year. The letter also reminded 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.

On May 12, 2021, State Water Board staff posted a draft Water Unavailability Methodology for the Delta watershed (Water Unavailability Methodology) summary report, technical appendices, and a water unavailability visualization tool to its website. The Water Unavailability Methodology compares the best available supply and demand data throughout the Delta watershed to determine water unavailability for the purpose of informing diverters when there is an insufficient supply to meet their priority of water right. A public workshop regarding the May 12, 2021 draft version of the Water

Unavailability Methodology was held on May 21, 2021, during which numerous parties provided oral comment. Numerous written comments on the draft Water Unavailability Methodology were also submitted. The Water Unavailability Methodology was updated based on the comments received.

State Water Board staff presented an update on the Water Unavailability Methodology at the regularly scheduled June 1, 2021 public State Water Board Meeting. This was an informational item only and no State Water Board action was taken during the June 1 Board Meeting.

Based on comments received on the draft and further review, an updated methodology was released on June 15, 2021. In addition, on June 15, 2021, the State Water Board issued Notices 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 Watershed (June 15 Notice of WUA). The June 15 Notice of WUA advised that water appeared to be unavailable as of at least June 15, 2021 for the approximately 4,300 water right holders with a post-1914 appropriative water right in the Delta watershed. The June 15 Notice of WUA also warned approximately 2,300 water users with more senior water right claims that information indicates water would become unavailable this summer for some pre-1914 appropriative claimants and riparian claimants, and that the State Water Board planned to issue further notices of water unavailability. The June 15 Notice of WUA also informed water right holders and claimants that development of an emergency regulation was under consideration.

On July 23, 2021, an updated version of the Water Unavailability Methodology was posted to the State Water Board's Delta drought webpage. The July 23, 2021 Water Unavailability Methodology included updates to address water unavailability for more senior water right claimants, including pre-1914 appropriative and riparian claimants. In addition, on July 23, 2021, the State Water Board issued a Notice of Water Unavailability for Senior Water Right Claims in the Delta Watershed (July 23 Notice of WUA), which advised diverters that, based on the best available information, 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 State Water Board relied on the updated Water Unavailability Methodology to identify which water rights in the Delta watershed face insufficient supplies to support diversion. The July 23 Notice of WUA identified that, as of the date of the notice, water was not available for all post-1914 appropriative water rights in the Delta watershed, all pre-1914 appropriative water right claims in the San Joaquin watershed, all pre-1914 appropriative water right claims with a priority date of 1883 or later in the Sacramento watershed, and for some pre-1914 appropriative water right claims with a priority date earlier that 1883 in specific Sacramento River tributary

subwatersheds. The July 23 Notice of WUA also identified that for riparian water right claims, water supply is insufficient to fully satisfy demands in the San Joaquin River watershed from July through September 2021, in the Bear River subwatersheds during July and August 2021, in the Upper American River subwatershed during September 2021, and in the Putah Creek subwatershed during July 2021. In times of such supply shortage, riparian users are required to share the shortage on a correlative basis.

The July 23, 2021 Notice of WUA also alerted water right holders and claimants that draft emergency regulations were available for public review. State Water Board staff held a public workshop on July 27, 2021 to provide an overview of the proposed emergency regulations and updates to the Water Unavailability Methodology and to receive public input.

Need for the Regulation

Immediate action is needed to effectively and efficiently administer and enforce the State's water rights system in light of severely limited water availability in the Delta watershed during the current drought. The State Water Board will need to curtail water diversions when natural and abandoned flows decrease: (1) to protect senior water right holders; (2) to prevent the illegal diversion of previously stored water released for downstream use or rediversion, including water released from storage to meet flow and water quality requirements; and (3) to ensure that minimum human health and safety needs are met. Where natural and abandoned flows are present but are insufficient to satisfy all water rights, the State Water Board may need to curtail diversions pursuant to junior water rights to protect senior water right holders and to protect releases of stored water. The State's current system for curtailing most diversions and enforcing those curtailments will not provide for timely and effective implementation of the State's water right system during the current drought when numerous water diversions require curtailment and enforcement in a short period of time. The emergency regulation will improve the State Water Board's ability to quickly and effectively implement and enforce those curtailments to ensure that the State's water right priority system is effectively implemented during the drought emergency.

In order to more effectively implement the water rights priority system in the Delta watershed under current drought conditions, the State Water Board needs access to better and more current information regarding water rights, water use, water needs, and procedures that allow the State Water Board to obtain and use the best available information quickly. The State Water Board needs an enforceable mechanism to collect enhanced reporting information related to diversions and uses of water in the Delta watershed to inform water demand estimates and the curtailment process. Additional information is also needed regarding the basis of right and priority date for some water rights and claims to inform curtailment decisions.

This section gives a brief overview of the Delta watershed. Subsequent sections provide a summary of existing laws and regulations and discuss the effect of the proposed regulation. Additional detail regarding the methodology for determining the availability of water for diversions in the Delta watershed and how the additional information related to diversions and uses of water in the Delta watershed will be used is also contained in later sections within the Informative Digest.

Overview of Delta Watershed

The Delta watershed encompasses the Sacramento and San Joaquin River systems shown in Figure 1. These river systems, including their tributaries, drain water from about 40 percent of California's land area. The region has a Mediterranean climate, with dry summers and wet winters. Annual precipitation can vary widely, from years of intense storms and widespread flooding to multi-year droughts. Precipitation is generally more plentiful farther north in the watershed. Due to the variation in annual and seasonal water supply and the uneven distribution of supplies over the region, the entire watershed has seen significant hydrologic development since the California Gold Rush began in 1849. Despite the development, intense droughts can still stress the system and cause available water supply to fall short of demands, creating competition between water users for the limited water resources.

Figure 1: Delta Watershed Location

Geographically, the northern part of the Delta watershed is the Sacramento River watershed, through which the Sacramento River, the longest river in California, runs south stretching over 400 miles. The Sacramento River is fed by numerous tributaries and creeks over its course, including the Pit, Feather, and American Rivers, bringing runoff from the northern Sierra Nevada to the east and Coast Mountain Ranges to the west. The southern portion of the Delta watershed is the San Joaquin River watershed, which covers the northern portion of the San Joaquin Valley. The San Joaquin River begins in the Sierra Nevada to the east and flows approximately 100 miles west before turning north for another 260 miles. The San Joaquin River contains several major tributaries, including the Merced, Tuolumne, and Stanislaus Rivers. Where the Sacramento and San Joaquin Rivers meet, they form the Sacramento-San Joaquin Delta before discharging into the San Francisco Bay and the Pacific Ocean.

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, San Francisco Bay, and near-shore ocean, as well as a diverse assemblage of species upstream of the Delta. Several federal and California Endangered Species Act listed estuarine and anadromous species are found in the Delta watershed, such as delta smelt, longfin smelt, California Central Valley steelhead, Central Valley spring-run Chinook salmon, and Sacramento River winter run Chinook salmon. Water from the Delta is also vital for humans, providing a portion of the drinking water supplies to more than two-thirds of Californians, as well as an important source of supplies for various industries, and millions of acres of farmland.

Throughout the Delta watershed, numerous water agencies and irrigation districts, as well as thousands of individuals, divert water for beneficial use. Within the Delta watershed, Reclamation operates the federal CVP and DWR operates the SWP, together referred to as the Projects. The Projects include systems of dams, reservoirs, canals, and pumping plants that serve to deliver water to contractors throughout the state, generate hydropower, provide flood control, and meet other requirements to maintain water quality and minimum flows for the protection of various uses, including drinking water, agriculture, and fish and wildlife.

The CVP primarily delivers water for agricultural uses, as well as municipal and industrial uses, in the Central Valley, maintaining long-term agreements to supply water to more than 250 contractors. On average, the CVP annually delivers about 5 MAF to irrigate 3 million acres of farmland and another 600 TAF to serve about 2.5 million people in the Central Valley and Bay Area (Reclamation 2020). In addition, the CVP is also required to provide 800 TAF per year for fish and wildlife protection to mitigate the

effects of the CVP and 410 TAF per year to state and federal wildlife refuges (Reclamation 2021b).

The SWP provides water supply for urban areas in the Bay Area and Southern California and for farmland in the southern San Joaquin Valley, maintaining long-term agreements to supply water to 29 contractors. On average, the SWP annually delivers about 3 MAF to serve 27 million people and 750 thousand acres of farmland (DWR 2021l).

The Projects maintain major water supply and hydropower reservoirs throughout the foothills of the Delta watershed, primarily in the Sacramento Valley. The largest of these reservoirs are the CVP's Lake Shasta on the Sacramento River and the SWP's Lake Oroville on the Feather River. In addition, the CVP also operates Trinity Lake outside of the Delta watershed, but is able to divert some water from the Trinity River into the Sacramento River through the Clear Creek Tunnel. Overall, the CVP has about 12 MAF of total storage capacity, while the SWP has about 5.8 MAF of storage capacity (Reclamation 2020, DWR 2021l). From these reservoirs, water can be released when needed to meet contract demands and downstream flow and water quality requirements.

To serve contract demands located outside of the Delta watershed, the Projects export water from the Delta. While annual export amounts vary widely with water supply conditions, total exports have averaged about 4.5 MAF per year over the last 15 years (DSC 2021). These exports are made through two major pumping facilities located at the southern end of the Delta, either pumping into the California Aqueduct towards southern California or the Delta Mendota Canal to the San Joaquin Valley. Exported water may also be stored for later use in San Luis Reservoir, which is an off-stream reservoir jointly operated by the SWP and CVP.

INFORMATIVE DIGEST

Summary of Existing Laws and Regulations

California Water Rights

A water right is a usufructuary right to divert water and apply it to beneficial use. California has two primary types of surface water rights – "appropriative" and "riparian," and each has different attributes that affect the source of water that may be diverted, the amount of water that may be diverted, when and where the water may be diverted, the authorized purposes and place of use, and the priority of right relative to other water right holders, among other parameters. Since the December 19, 1914 effective date of the Water Commission Act of 1913, development of an appropriative water right has required a water right permit issued by the State Water Board or its predecessor. Appropriative rights initiated before December 19, 1914, and subsequently perfected are called pre-1914 appropriative rights.

California's water right priority system establishes which water right holders may divert, and how much, when there is insufficient water in the stream for all users. For appropriators, older water rights are more senior to, or have priority over, newer, more junior water rights. Senior water appropriators are more likely to be able to divert water at times of shortage than junior water right holders. However, once water is stored or imported, only the entity that stored or imported the water has a right to it, though other appropriators may acquire contingent junior rights to any abandoned or return flows. Riparian right holders, although generally senior to appropriative water right holders, are only entitled to divert natural flow. They are not entitled to divert water to storage or to redivert storage releases or imported water, or the return flows from storage releases or imported water. (*El Dorado Irrigation Dist. v. State Water Resources Control Bd*. (2006) 142 Cal.App.4th 937, 962.)

All water rights in California, including riparian and appropriative, are subject to overarching principles that may serve to limit water rights, including: (1) the rule that all water use must be reasonable; and (2) the public trust doctrine. (*Stanford Vina Ranch Irrigation Co. v. State of California* (2020) 50 Cal.App.5th 976, 994; *United States v. State Water Resources Control Board* (1986) 182 Cal.App.3d 82, 100].) California Constitution, Article X, section 2, and Water Code section 100 establish the state policy that the water resources of the state be put to beneficial use to the fullest extent possible, and that rights to the use of water are limited to such water as is reasonably required for the beneficial use served, and do not extend to the waste, unreasonable use, unreasonable method of use, or unreasonable method of diversion of the water. 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. Vallejo* (1935) 2 Cal.2d 351, 366-367.) What constitutes an unreasonable use, method of use, or method of diversion depends on the facts and circumstances of each case and is subject to change. (*People ex rel. State Water Resources Control Board v. Forni* (1976) 54 Cal.App.3d 743, 750.) Under the reasonable use doctrine, water right holders and claimants may be required to endure some inconvenience or to incur reasonable expenses. (*Id*. at pp. 751-752.) Water Code section 275 directs the State Water Board to take all appropriate actions before executive, legislative, or judicial agencies to implement the reasonable use doctrine.

The common law public trust doctrine requires the protection of public trust uses of navigable water bodies to the extent feasible and in the public interest. Public trust uses include navigation, commerce, fishing, recreation, and the preservation of fish and wildlife habitat. The State Water Board has a duty of continuing supervision over water rights to ensure they are exercised in a manner consistent with the public trust doctrine. (*National Audubon Society v. Superior Court* (1983) 33 Cal.3d 419.)

When the amount of water available in a surface water source is not sufficient to support the needs of existing water right holders, junior right holders must cease diversion in favor of higher-priority rights. However, existing law does not specify how to calculate when flows are unavailable for diversion, and in complex water systems such as the Delta watershed it is not always clear to a junior diverter whether there is sufficient natural and abandoned flow in the system to support their diversion and senior water uses. Diverting water when it is unavailable under a diverter's priority of right may constitute an unauthorized diversion and a trespass against the state. The State Water Board may subject such violations to an Administrative Civil Liability (ACL) of up to $1,000 per day plus $2,500 per acre-foot of water illegally diverted during a drought under the Water Code, or such diversions could be referred to the Attorney General's office for enforcement. The State Water Board may also issue administrative cease and desist orders and request court injunctions to require that diversions stop.

Existing law allows for a departure from the priority system to the extent necessary to prevent the unreasonable diversion or use of water. (Cal. Const., art. X, § 2; *El Dorado Irrigation Dist. v. State Water Resources Control Bd*., *supra*, 142 Cal.App.4th at pp. 965-966.) Existing law does not specify, however, whether an exception to curtailments in order of priority is warranted to ensure minimum human health and safety needs continue to be met during the current drought emergency.

Office of the Delta Watermaster

The Office of the Delta Watermaster was created as part of the Delta Reform Act of 2009. The Delta Watermaster is an independent officer of the State, reporting jointly to the Board and to the Delta Stewardship Council. Water Code section 85230 authorizes the Delta Watermaster to oversee the day-to-day administration of water rights, and,

when necessary, to take enforcement action, related to water diversions within the Legal Delta.[1]

Existing Diversion Measurement and Reporting Requirements

All water right holders and claimants are required to submit annual reports of water diversion and use (annual reports) to the State Water Board. 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. 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.

Pursuant to regulations implementing Senate Bill 88 (SB88), all water right diverters authorized to divert more than 10 acre-feet (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. SB 88 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. 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.

Russian River Emergency Regulation

The State Water Board's Russian River emergency regulation became effective on July 12, 2021. In general, this existing emergency regulation authorizes the State Water Board's Deputy Director of the Division of Water Rights (Deputy Director) to issue curtailment orders in the Russian River watershed, requiring recipients to cease diversions unless the diversion falls under an enumerated exception or until they receive notice that the curtailment order has been lifted. Although the proposed regulation also addresses the need to curtail diversions during a drought emergency, it would be applicable to diversions of water in the Delta watershed, which is geographically and hydrologically distinct from the Russian River watershed. The

[1] The Legal Delta is defined in Water Code § 12220. The Legal Delta is also shown on Figure 1.

proposed regulation ensures consistency with the existing Russian River emergency regulation by using previously defined terms and expanding the scope of certain provisions.

Comparable Federal Statutes and Regulations

There is no comparable federal statute or regulation. The proposed regulation is not inconsistent or incompatible with existing state regulations.

Policy Overview and Effect of Proposed Regulation

The intent of the proposed emergency regulation is to give the State Water Board the tools it needs in this drought emergency to more effectively:

1. Protect senior diverters;
2. Protect releases of previously stored water;
3. Ensure continued access to water supplies for minimum human health and safety needs; and
4. Obtain information from water users needed to do the above.

The proposed emergency regulation will provide more clarity to the public and water right holders and claimants regarding the information and methodology the State Water Board's Division of Water Rights will use for determining the extent to which water is unavailable for diversion at water users' different priorities of right. It also will authorize the Deputy Director to issue curtailment orders requiring recipients to cease diversions when water is unavailable 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 lifted. The emergency regulation will allow for more effective and enforceable curtailments during the drought emergency through curtailment orders that are based on a specified methodology or comparable tool for determining when water is unavailable under water right priorities—an issue of fact frequently contested in traditional enforcement proceedings to prevent unauthorized diversions—and by making the requirement to cease diversions in response to a curtailment order a regulatory requirement regardless of the curtailed user's basis of right.

The proposed emergency regulation will simplify and expedite the Board's ability to exercise its existing authority to prevent water right holders and claimants from diverting stored water releases when there is not natural or abandoned flow available under their priority of right. Enforcement of this authority will minimize the extent to which the CVP

and SWP must release more stored water to compensate for downstream water users diverting storage releases intended for downstream use or needed to meet water quality and flow requirements, thereby preserving scarce water supplies for minimum human health and safety needs. The regulation will facilitate the State Water Board's implementation of the water right priority system, obviating the need to rely on the CVP's and SWP's stored water releases to both meet their intended and necessary purposes and compensate for downstream water users' diversions in excess of their rights. The regulation will prevent the unreasonable use of stored water necessary for minimum human health and safety needs while such water supplies are in danger of being depleted.

The proposed regulation also will promote the human right to water codified in Water Code section 106.3 by establishing procedures for important exceptions to curtailments based on minimum human health and safety needs. In addition, the proposed emergency regulation will authorize the Deputy Director to issue orders requiring recipients to provide the State Water Board with information related to current and projected diversion and use of water in the Delta watershed. The emergency regulation will thus provide the State Water Board with an enforceable mechanism to obtain current year demand data to inform its unavailability determinations.

Proposed Emergency Regulation Section 876

Proposed section 876 is reserved for future use.

Proposed Emergency Regulation Section 876.1

Proposed section 876.1 provides that the Deputy Director may issue curtailment orders in order of water right priority in the Delta watershed when natural and abandoned flows are insufficient to support all diversions. The Deputy Director will consult with and obtain the concurrence of the Delta Watermaster prior to issuing curtailment orders in the Legal Delta. This section identifies sources of sufficiently reliable information that will be considered in the Deputy Director's decisions to issue, suspend, or reimpose curtailment orders under this section. This section provides that the Deputy Director may evaluate available supplies against demands using the Water Unavailability Methodology for the Delta watershed, as described in a report dated July 23, 2021, or comparable tools. Initial orders will be sent to water right holders or claimants or their agent of record on file with the Division of Water Rights. Changes in water availability and updates on curtailments will be posted on the State Water Board's drought announcement website and distributed to those who have signed up for the State Water Board's Delta Drought email list. Water right holders and claimants who receive an order under this section may submit information to the Deputy Director to propose a correction to a water right priority date or provide other information relevant to the issue

of whether curtailment was appropriate. This section provides that curtailment orders are subject to administrative and judicial review.

Emergency Regulation Section 877.1

The proposed additions to section 877.1 define the terms Informational Order, Legal Delta, Delta Watermaster, and Sacramento-San Joaquin Delta or Delta Watershed, which are used in other proposed or amended sections of Article 24. Existing definitions in this section, including minimum human health and safety needs, administrative terms, and terms specific to the Russian River watershed, are unchanged and used throughout Article 24.

Emergency Regulation Section 878

Existing section 878 provides that certain diversions for non-consumptive uses may continue after the issuance of a curtailment order, provided that a certification has been submitted to the Deputy Director. Such non-consumptive uses include direct diversions for hydropower and direct diversions dedicated for the benefit of fish and wildlife under Water Code section 1707. Proposed amendments to this section make several existing provisions applicable to the Delta watershed. The proposed addition to this section provides that direct diversions within the Legal Delta used exclusively to irrigate lands entirely below sea level may be non-consumptive uses for purposes of this section in certain situations.

Emergency Regulation Section 878.1

Existing section 878.1 describes the procedure for a water user subject to a curtailment order to divert under an authorized exception for minimum human health and safety needs. Diversions serving such needs at a rate of 55 gallons per capita per day or less may proceed without further approval from the Deputy Director and require submittal of a certification providing specified information to demonstrate necessity as well as diligence in reducing water demands and seeking out alternative water supplies.

Diversions serving minimum human health and safety needs at a rate greater than 55 gallons per capita per day, or which cannot be quantified on a per capita per day basis, cannot proceed until the diverter submits a petition containing the information specified in this section and receives approval from the Deputy Director. Diversions necessary to resolve immediate human health or safety threats may proceed while a petition is being prepared or pending. Proposed amendments to this section make it applicable to recipients of curtailment orders in the Delta watershed in addition to the Russian River watershed.

Proposed Emergency Regulation Section 878.2

Proposed section 878.2 provides that water right holders and claimants in the Delta watershed subject to a curtailment order may propose alternative water sharing agreements that achieve the purposes of the curtailment process described under section 876.1 as an alternative to curtailment. Proposals must demonstrate that the alternative water sharing agreement will not injure non-party legal users of water or result in an unreasonable impact on fish and wildlife. The Deputy Director may approve a proposal subject to conditions, including record keeping and reporting requirements. 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. Diversions made under such proposals are subject to the terms of Article 24, including reporting, compliance, and enforcement.

Emergency Regulation Section 879

Existing section 879 sets forth the reporting requirements for water right holders in the Russian River watershed that are subject to a curtailment order, including requirements applicable to diversions under an authorized exception to curtailment.

The proposed addition to this section provides reporting requirements for water right holders and claimants in the Delta watershed to inform water unavailability determinations and the curtailment process described under section 876.1. It requires recipients of initial orders to submit certifications regarding their diversion and use. In addition, it provides that the Deputy Director may require water right holders and claimants with an authorized face value or recent annual reported diversion amount of one TAF or greater to provide information on prior diversions and demand projections for subsequent months. The Deputy Director will consult with and obtain the concurrence of the Delta Watermaster prior to requiring such information in the Legal Delta.

The proposed addition also provides that the Deputy Director, or the Delta Watermaster for rights in the Legal Delta, may issue informational orders requiring water right holders, diverters, or users to provide additional information related to a diversion and use of water in the Delta watershed, such as: 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 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. Information provided in accordance with an informational order may inform curtailment decisions under this regulation, but is not intended for other purposes.

Emergency Regulation Section 879.1

Existing section 879.1 provides that compliance with Article 24 is a condition of all water right permits, licenses, certificates, and registrations for diversions in the Russian River watershed. The proposed amendment makes this section applicable to any watershed identified in Article 24, including the Delta watershed.

Emergency Regulation Section 879.2

Existing section 879.2 clarifies the compliance obligations of a diverter in the event the diverter is subject to overlapping or conflicting requirements under Article 24. It also clarifies authorities under which the State Water Board may pursue enforcement for violations of Article 24 in the Russian River watershed. The proposed amendments make the existing provisions applicable to the Delta watershed as well.

Documents Incorporated by Reference

The proposed regulation identifies that the Water Unavailability Methodology for the Delta watershed report dated July 23, 2021 is incorporated by reference. The Water Unavailability Methodology for the Delta Watershed reported dated July 23, 2021 includes a summary report, and technical appendices A, B, and C. The Water Unavailability Methodology report is incorporated by reference due to its length (over 130 total pages) and its inclusion of maps and graphs, which would be cumbersome, unduly expensive, and impractical to reproduce in the regulations. The report is available on the State Water Board's Delta Water Unavailability Methodology webpage at: https://www.waterboards.ca.gov/drought/drought_tools_methods/delta_method.html.

Data and Methodology for Issuing, Suspending, and Reimposing Curtailments

The following subsections describe the data and methodologies that may be used to support the issuance of curtailment orders for the Delta watershed pursuant to section 876.1 of the regulation and for the suspension and reimposition of curtailment orders.

The regulation would authorize the Deputy Director to rely upon the Water Unavailability Methodology or a comparable tool for curtailment decisions. A summary of the July 23, 2021 version of the Water Unavailability Methodology is provided below. The Water Unavailability Methodology is also described in more detail in the Water Unavailability Methodology for the Delta Watershed report dated July 23, 2021. The Water Unavailability Methodology summary report, technical appendices, spreadsheet, and water unavailability visualization tool are available at: https://www.waterboards.ca.gov/waterrights/water_issues/programs/drought/drought_tools_methods/delta_method.html.

The Water Unavailability Methodology compares the best available estimates for supply and demand within the Sacramento and San Joaquin River watersheds and within delineated subwatersheds to determine if supply may be insufficient to meet certain priorities of right. The State Water Board may develop these estimates using the sources and methods described in the Water Unavailability Methodology report as well as any other pertinent, reliable, and publicly available information. The following sections summarize the sources of the supply and demand data used within the methodology to date, as well as additional sources that may be incorporated, such as sub-monthly supply data that may enable to the Board to temporarily suspend curtailment orders in light of precipitation or runoff events, demand data obtained from 2020 annual reports of water diversion and use, and projected demand data provided by large diverters pursuant to section 879 subdivision (d)(2) of the emergency regulation. The following sections also describe adjustments made to the supply and demand data as needed and the output of the supply and demand comparisons. The Board intends to update the methodology if 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 that would result in limiting curtailments were used within the methodology itself and will also be used in the methodology's implementation.

Water Supply Estimates

Water in a stream system may consist of a combination of natural flows, imported supplies, storage releases, abandoned flows, and return flows. The Water Unavailability Methodology supply analysis only accounts for the natural and

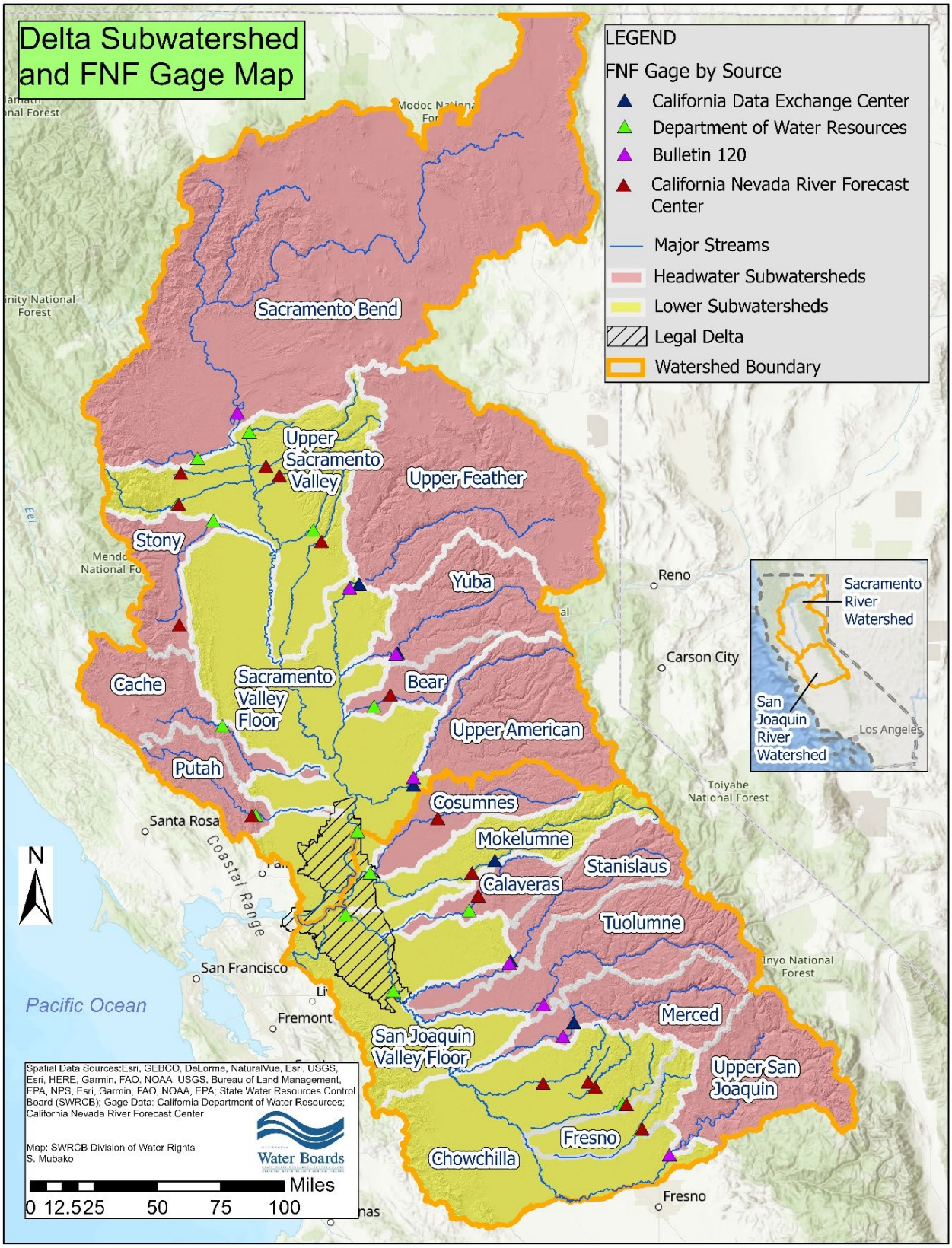
abandoned flows within the Delta watershed available for diversion by water right holders and claimants under their own water rights. The Water Unavailability Methodology does not account for supplies imported to the Delta watershed from other watersheds or for releases of previously stored water for downstream uses, as those supplies would be unavailable 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 a downstream subwatershed, and the water is not released for delivery to a downstream user, these flows are considered to be abandoned and part of available supplies in the downstream subwatershed. Finally, return flows are not explicitly represented in the supply, but rather they are applied as a demand reduction for the initial diverter because they represent a component of that diversion that is introduced back into the system.

The methodology for determining available water supplies incorporates past and projected future full natural flow (FNF) (or unimpaired flow) estimates and assumes all FNF is available for diversion. FNF is a theoretical water supply estimate representing 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 calculated in hindsight from measured streamflow, adjusted for upstream operations by subtracting imported water and adding upstream diversions, changes in storage, and evaporative losses. When forecasting for FNF into the future, it is predicted based on 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, FNF forecasts generally provide a range of possible water supply volumes with the probability 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.

Spatially, the Water Unavailability Methodology estimates available supply at a subwatershed level. Subwatershed boundaries were defined using the U.S. Geologic Survey (USGS) Watershed Boundary Dataset (WBD) and National Hydrography Dataset (NHD), which delineate land areas draining to streams. Subwatersheds within 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 use of these boundaries for supply estimates produced by DWR, 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. Figure 2 shows the location and boundaries of the subwatersheds as well as the location of the FNF gages.

Figure 2: Delta Subwatershed and FNF Gage Map



The water supply dataset used in the Water Unavailability Methodology consists of monthly FNF data because it negates the need to consider water's transit time within the Delta watershed. However, because there is no single data source that provides both past and forecasted monthly 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 are considered hierarchically; that is, if data for a particular subwatershed is not available from the preferred data source, the next source is used if available, and the next after that. The sources of past FNF supply data, in order of preference, are 1) the California Data Exchange Center (CDEC), 2) DWR's Estimates of Natural and Unimpaired Flows for the Central Valley of California: Water Years 1922-2014 report (DWR 2016), and 3) the National Oceanic and Atmospheric Administration (NOAA) National Weather Service California Nevada River Forecast Center (CNRFC) estimates of daily FNF. The sources of forecasted supply data, in order of preference, are 1) DWR's California Cooperative Snow Surveys Bulletin 120 Water Supply Forecast (B-120) and 2) CNRFC daily FNF forecasts.

As data from the above sources is not perfect, data gaps may remain for some subwatersheds. These gaps can include periods of missing data when none of the sources above reported any values or data that represents only a portion of the FNF in a subwatershed because not all streams within the subwatershed had data available. Where there are no reported values for a period of time for a subwatershed, the values are filled in by extrapolating them based on the data of a nearby subwatershed with similar hydrology that has data during the missing time period. This is done by calculating the ratio of monthly FNF between the two subwatersheds for time periods of overlapping data and then multiplying the data from the neighboring subwatershed for the missing time period by the ratio. Where past or forecasted data is available but does not represent the entire FNF supply of a subwatershed, the data is augmented by correlating the available data with data from another source that represents the entire subwatershed, but may not cover the period in question. This is done by calculating the ratio of monthly FNF between the two sources for time periods of overlapping data and then multiplying the available but incomplete data by the augmentation ratio.

The last step in preparing the supply dataset is to incorporate the contribution of abandoned storage releases for instream flows. Current data limitations make it difficult to determine when instream flow requirements are met by previously stored water that will be abandoned. Therefore, to avoid artificially inflating supply estimates by assuming all instream flows have been met by releases of stored water (if the requirement is met by diverters simply bypassing flow it would already be included in the FNF values), the methodology uses the greater of the FNF value and the instream

flow value to represent the supply contribution of the subwatershed to the respective watershed-wide supply. In other words, it is assumed that if the FNF is greater than the instream flow requirement then the requirement is being met by FNF; conversely, if the instream flow requirement is greater than the FNF then it is assumed that the requirement is met, at least in part, by storage releases which can be considered abandoned below the intended reach. In addition, for determining the contribution of abandoned instream flows to the supply, only those instream flows that apply for reaches ending near the bottom of a subwatershed are considered. The methodology does not currently account for instream flows that end higher up in the subwatershed.

Monthly Demand Dataset

The Water Unavailability Methodology evaluates the demands for natural and abandoned flows in the Delta watershed by basis of water right. It is not intended to account for demands for previously stored water, imported supplies, and contractual demands. For this analysis, water demand is based on diversion data acquired from the State Water Board's Electronic Water Rights Information Management System (eWRIMS) computer database. The eWRIMS database system contains information on water rights throughout the state, including monthly diversion data filed in annual reports by water right holders. The Water Unavailability Methodology estimates monthly water demand 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 derived from eWRIMS diversion data for 2018 and 2019, the most current years with annual reports available. The methodology primarily relies on 2018 demand data to develop the demand dataset for 2021, while 2019 is included primarily for comparative purposes. 2018 was a below normal water year and is assumed to more closely resemble demands during this critically dry year, than 2019 which was a wet water year. 2018 diversion data is used because it is the driest year with data available since updated water right measurement and reporting requirements went into effect with Senate Bill 88.[2] The reliance on 2018 demand data may underestimate actual demand in 2021 since demands are likely to be greater during a critically dry year due to drier soil conditions, as well as higher losses to evaporation and seepage. However, conservation activities that may be pursued this year could offset higher critical year demands to some degree. Overall, using below normal year demand estimates for a critically dry year is a conservative assumption that should avoid overestimating

[2] 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 for use in implementation of the methodology in mid-June 2021 for the purpose of issuing notices of water unavailability; however, it may be incorporated in the future.

demand and thus overpredicting the unavailability of water supplies. In addition to demand estimates derived from water diversion and use reports submitted by diverters, the State Water Board may also rely upon updated reporting of projected demands for larger users that is provided pursuant to emergency regulations to refine the demand dataset. (See further discussion in the "Need for Enhanced Reporting and Informational Orders During the Drought Emergency" section below.)

Only active water rights within the Delta watershed classified as Appropriative (including post-1914 appropriative water rights) or Statements of Diversion and Use (including pre-1914 appropriative and riparian claims) are included in the demand dataset. Minor water right types, such as registrations and stockponds, are assumed to constitute a negligible amount of the water diversion and use within the Delta watershed and are not included in the dataset, which represents a conservative assumption for purposes of limiting curtailments. Furthermore, water right records identified as non-consumptive based on the beneficial use type (e.g., hydropower generation, fish and wildlife preservation and enhancement, etc.) are also excluded at this time. Approximately 12,000 water right records are included in the demand dataset at this time, including approximately 5,000 post-1914 appropriative water rights and 7,000 statements of diversion and use.

Water right diversion data contained within annual reports is self-reported and is not systematically verified for accuracy upon receipt. As a result, following the selection of water right records for inclusion in the demand dataset, an internal review and quality control effort was conducted. Due to the number of water right records included in the demand dataset, the scope of the quality control and review effort was narrowed to focus on the largest diversions in the Delta watershed, including 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. For this narrowed subset of records, the diversion data from the 2018 and 2019 annual reports was then reviewed for reporting inaccuracies and errors. Any errors identified were replaced with the best estimates of the actual diversion values. These estimates were determined based on supplemental information available within the annual reports and the eWRIMS database or, in some cases, additional information received by contacting the water right holder or their agent. In addition, 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. For these records, the reported diversion amounts were updated to equal the face value of the water right.

Spatially, demand values within the demand dataset are aggregated at the same subwatershed scale as the supply values within the supply dataset. For most water right records, the entire demand is attributed to the subwatershed where the point(s) of diversion (POD) are located. However, a small number of water right records were

found to have PODs spanning multiple subwatersheds. For these records, the total reported diversion is split among the applicable subwatersheds based on the proportion of the total PODs located within each subwatershed.

Project demands present unique situations and the Water Unavailability Methodology treats these diversions differently when establishing the demand dataset as compared to the demands of other water rights. For example, diversions by the Projects for uses outside of the Delta watershed are subject to area of origin protection, which 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 diversions were assumed to have the lowest priority date. While some of the Projects' diversions serve inbasin purposes within the area of origin that are not a lower priority, 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, some water rights with PODs in the Delta watershed represent demands for CVP water imported from the Trinity River. These water rights and correlating diversion data were removed from the Delta consumptive diversion dataset because the Trinity River imports are not part of the supply forecasting for the watershed in this methodology.

In recognition that only a portion of consumptive-use diversions are actually consumptively used due to return flows from irrigation and, to a lesser extent, municipal uses, a return flow factor is applied to diversion values within the demand dataset. Aggregate monthly return flow factors were estimated for the Sacramento and San Joaquin River watersheds based on results of the CalSim 3 model for year 2014. CalSim 3 is a hydrologic simulation model developed by Reclamation and DWR that includes representation of the Sacramento and San Joaquin watersheds, including estimates of return flows. Water year 2014 was selected for analysis because it is a recent year out of the period of simulation for CalSim 3 (1922 to 2015) with hydrology that closely matches the forecast for 2021. The return flow factors are calculated as the ratio of the total monthly watershed return flow to the total monthly watershed diversion. Demands in these subwatershed are multiplied by 1 minus the return flow factor to remove the portion of the diversion that would be returned and not consumptively used. Spatially, most diversions and return flows occur in the Sacramento and San Joaquin Valley regions. Accordingly, return flow factors were only used to reduce demands in the Sacramento Bend, Upper Sacramento Valley, Sacramento River Valley Floor, and San Joaquin River Valley Floor subwatersheds.

Evaluation of Available Supplies Against Demands

To determine the availability of supply to meet demands, supply and demand data produced using the Water Unavailability Methodology can be visually compared using the Water Unavailability Visualization Tool. The Water Unavailability Visualization Tool is available at: https://www.waterboards.ca.gov/waterrights/water_issues/programs/drought/drought_tools_methods/delta_method.html. For this visual comparison, the 2018 demand data is first sorted by water right priority and then grouped into summary categories based on water right priority. The categories are then stacked with the highest priority category on the bottom and the lowest on top to produce bar charts of total monthly demand. These demand categories are plotted against the monthly quantities of forecasted 2021 supply to create a graphical representation of supply compared to demand.

Determining which diverters should be curtailed requires the selection of an appropriate future supply forecast. Four water supply forecast scenarios at the 10 percent, 50 percent, 90 percent, and 99 percent FNF exceedance forecasts levels are overlayed on the demand bar chart, representing optimistic, neutral, pessimistic, and extremely pessimistic forecasts, respectively. To account for the potential variability of daily water supply and the degree of uncertainty inherent in monthly forecasts, cumulative daily FNF estimates for the current month (sourced from CDEC and CNRFC) are compared to the most recent monthly supply forecasts. This will provide an indication of which forecast is likely to be the most accurate predictor of actual conditions for that month. Comparing this forecasted supply line at the appropriate exceedance level with the demand bars, shows the demand that cannot likely be met by available supply and for which curtailment could occur.

While the monthly supply and demand datasets are planned for use in determining when the issuance of curtailment orders are appropriate, 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. The State Water Board will continually evaluate the need to discontinue 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 sub-seasonal outlooks from the Center for Western Weather and Water Extremes, use of the USGS Basin Characterization Model, and other tools.

The supply and demand comparison is performed at two different spatial levels, including one at the subwatershed level and one at the watershed-wide (Sacramento or San Joaquin) level. 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, whereas demands in a downstream subwatershed could be met by the local supply within that subwatershed, as well as any unused supply from upstream subwatersheds. Only performing a subwatershed comparison would underestimate the supply available for downstream subwatersheds and would not account for the relative priority of right between water rights within different watersheds. Only performing a watershed-wide comparison would overestimate the supply available for headwaters subwatersheds and may unfairly short downstream junior demands that could divert, in favor of upstream senior demands who can't physically access the supply. Using both comparisons together allows for water unavailability to be determined based on physical supplies within a headwater subwatersheds and for the accounting of senior demands that may have priority to divert that supply further downstream.

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. Furthermore, if the headwater subwatershed analysis indicates that the total demand of riparian claimants exceeds the available supply in a particular headwater subwatershed, that headwater subwatershed's supplies and demands are removed from the watershed-wide analysis for that month. In other words, it is assumed that the given stream would not have continuity with the larger Delta watershed due to fulfillment of the local senior water right demands.

Diverters with appropriative water rights with points of diversion within the Legal Delta may have access to water supplies entering the Delta from both the Sacramento and San Joaquin River watersheds.[3] To account for this, appropriative demands within the Legal Delta were divided between the two watersheds based on the monthly proportion of connected supply available from each watershed. For example, if the Sacramento River watershed contributes 80 percent of the connected supply within the Delta watershed for 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. Monthly supply ratios for Sacramento and San Joaquin River watersheds were calculated based on data for 2021. For months that have already occurred, these proportions are based on the

[3] Consistent with the analysis contained in State Water Board Order WR 89-8, the Water Unavailability 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).

reported monthly FNF values. For the present month or future months, the proportions are based on forecasted FNF values at the same exceedance level selected for use in determining water unavailability for each watershed.

Need for Enhanced Reporting and Informational Orders During the Drought Emergency

The proposed reporting components of the regulation include three components. The first component would provide authority for the Deputy Director to require water right holders and claimants to complete a one-time certification form indicating that they are taking actions needed to comply with any curtailment orders that may be issued.

The second component of the proposed reporting regulation is enhanced water diversion and use reporting. Pursuant to existing water right reporting requirements, water right holders and claimants are already required to maintain records of their diversions and to report yearly. The proposed emergency regulation would require more frequent reporting by some water users.

As discussed above, the demand dataset currently used in the Water Unavailability Methodology is derived from 2018 reported diversion data. Although the demand dataset that is based on historical reported diversions represents the best information currently available for estimating demands under specific water rights, refinements to those demand estimates may be warranted, particularly during the precipitation and runoff period when there is a desire by water right holders and claimants to rebuild severely depleted reservoir storage. Historical diversion data that exists in the demand data set does not reflect demand that was not met and the increased demand that exists due to the drought related extreme low reservoir levels that is relevant to determinations of water unavailability or other specific demand variations that exist within particular years.

To address these issues, the emergency regulation would authorize the Deputy Director to require enhanced monthly reporting of past diversions and projected demands in order to use that data to refine demand estimates and otherwise inform curtailment decisions. In order to minimize the burden on the majority of water right holders in the Delta watershed that are smaller and may have more limited abilities to report on a regular basis, these reporting provisions would only apply to the largest diversions in the Delta watershed, including those with a total authorized face value or recent annual reported diversion amount of one TAF or greater. These rights and claims account for well over 90 percent of the water diverted within the Delta watershed but represent less than 10 percent of the water rights and claims in the watershed.

The third component of the proposed reporting regulation would provide authority to the Deputy Director to issue orders requiring reporting of additional information about water

rights and claims to inform curtailment decisions, such as information regarding the basis of claims of water right. Pre-1914 appropriative and riparian claims of right are not permitted by the State Water Board, or in most cases validated by a court. As such there may be instances in which additional information is needed related to these claims to inform curtailment decisions. Additional information may also be needed from post-1914 appropriative right holders to address specific issues that may arise with implementation of curtailments, including information such as where water is planned to be diverted from for water rights that have points of diversion in different watersheds. This information may be used to improve the demand dataset for implementing the methodology, and may inform curtailment decisions, but is not intended for other purposes.

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Mandate on Local Agencies or School Districts

The proposed emergency regulation does not impose a mandate on local agencies or school districts because it does not mandate a new program or a higher level of service of an existing program. The regulation is generally applicable to public and private entities, and is not unique to local government. No state reimbursement is required by part 7 (commencing with section 17500) of Division 4 of the Government Code.

Suspension of California Environmental Quality Act

As stated above, Governor Gavin Newsom issued a Proclamation on May 10, 2021, addressing the drought state of emergency in all counties in the Sacramento-San Joaquin Delta watershed. Among other things, the Proclamation suspended the California Environmental Quality Act (CEQA) as applied to the State Water Board's adoption of an emergency regulation to curtail diversions in the Delta watershed when water is not available under the diverter's priority of right and to protect releases of stored water. CEQA is therefore suspended as to adoption of this regulation.

Cost Estimate

The fiscal effects resulting from the proposed emergency regulation are the costs that would be incurred by state and local government agencies to respond to any requirements therein, pursuant to Government Code section 11346 et seq. This Fiscal Impact Statement has been prepared in accordance with State Administrative Manual 6600-6616.

The fiscal effect on local and state government agencies as a result of the proposed emergency regulation includes the costs: (1) to complete and submit certification forms; (2) to prepare ongoing diversion reporting on a monthly basis; and (3) for exceptions to priority-based curtailments for minimum human health and safety needs.

The State Water Board conservatively estimates the cost to all state and local governmental agencies due to the emergency regulation will be $455,000 to complete the mandatory certification forms, and $11.1 million to provide ongoing diversion reporting.

The minimum health and safety exception to curtailments would result in additional costs to water users who must curtail diversions to ensure water is available for health and safety purposes under rights that would have otherwise been curtailed. The fiscal effect on state and local government is the cost that will result from additional curtailments of rights held by state or local government entities needed to allow diversions for minimum health and safety uses under more junior rights to continue.

These impacts are conservatively estimated to amount to decreased revenue and increased costs totaling $32.6 million to $41.0 million. This consists of reduction in agricultural and municipal water agency revenues from lost water sales of $5.4 million to $10.9 million and a corresponding reduction in state and local tax revenues of $1.1 million. There is also estimated to be additional loss in state and local tax revenue that could range from $5.6 million to $12.7 million associated with reduced agricultural production resulting from the additional curtailed agricultural supply. Agricultural and municipal water agencies may also incur estimated water replacement costs of $16.4 million to $21.1 million. The fiscal effect on state and local government that will result from government agencies being able to continue to divert a quantity of water by relying upon the health and safety exception is an estimated net benefit of $148.7 million. This consists of: 1) $135.2 million reduction in decreases of water agency revenue; and 2) a $13.5 million reduction in the corresponding decrease in state and local tax revenues. These are reductions in costs that state and local governments would otherwise incur absent the health and safety exception.

The proposed regulations are not anticipated to have a financial impact on school districts or to result in costs or savings in federal funding to the State.

Appendix 1 details how these costs were estimated.

APPENDIX 1: FISCAL IMPACT STATEMENT

Fiscal Effect on Local and State Government

Summary

The fiscal effects resulting from the proposed emergency regulation are the costs that would be incurred by state and local government agencies to respond to any requirements therein, or otherwise due to the requirements therein, and the savings to state and local government agencies, pursuant to Government Code section 11346 et seq. This Fiscal Impact Statement has been prepared in accordance with State Administrative Manual 6600-6616.

The fiscal effect on local and state government agencies as a result of the proposed emergency regulation includes the costs: (1) to complete and submit certification forms; (2) to prepare ongoing diversion reporting on a monthly basis; and (3) for exceptions to priority-based curtailments for minimum human health and safety needs.

The State Water Board conservatively estimates the cost to all state and local governmental agencies due to the emergency regulation will be $455,000 to complete the mandatory certification forms, and $11.1 million to provide ongoing diversion reporting.

The minimum health and safety exception to curtailments would result in additional costs to water users who must curtail diversions to ensure water is available for health and safety purposes under rights that would have otherwise been curtailed. The fiscal effect on state and local government is the cost that will result from additional curtailments of rights held by state or local government entities needed to allow diversions for minimum health and safety uses under more junior rights to continue. These impacts are conservatively estimated to amount to decreased revenue and increased costs totaling $32.6 million to $41.0 million. This consists of reduction in agricultural and municipal water agency revenues from lost water sales of $5.4 million to $10.9 million and a corresponding reduction in state and local tax revenues of $1.1 million. There are also estimated to be additional loss in state and local tax revenue that could range from $5.6 million to $12.7 million associated with reduced agricultural production resulting from the additional curtailed agricultural supply. It is also estimated that agricultural and municipal water agencies would also incur water replacement costs of $16.4 million to $21.1 million. The fiscal effect on state and local government that are estimated to result from government agencies being able to continue to divert a quantity of water by relying upon the health and safety exception is a net benefit of $148.7 million. This consists of: 1) $135.2 million reduction in decreases of water agency revenue; and 2) a $13.5 million reduction in the corresponding decrease in state and

local tax revenues. These are reductions in costs that state and local governments would otherwise incur absent the health and safety exception.

The proposed regulations are not anticipated to have a financial impact on school districts or to result in costs or savings in federal funding to the State.

Fiscal Costs of Proposed Reporting Requirements

The fiscal effect on local and state government agencies as a result of the proposed reporting requirements includes the costs: (1) to complete and submit certification forms; and (2) for larger users to prepare ongoing diversion and demand projections on a monthly basis. The time and effort required to submit the certification forms and prepare these monthly filings is considered an additional cost of compliance for these water right holders and claimants.

The cost estimates are conservative because most water right holders and claimants are already required to comply with measurement and reporting regulations that went into effect with Senate Bill (SB) 88 (2015-16). Pursuant to regulations implementing SB 88, 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. SB 88 set expectations for both the accuracy of measurement devices as well as the monitoring frequency of the device and included a measurement device installation deadline of January 1, 2018 or earlier. It is likely that costs for measuring associated with the reporting under the proposed regulation overlap with existing SB 88 requirements because diverters are already subject to existing measurement requirements.

The proposed regulation would also require all diverters in the Delta watershed to complete and submit the certification form upon receipt of initial orders. Curtailments themselves (and associated costs to diverters) are already part of the existing prohibition against unlawful diversion and associated Board authority. All other costs of the regulation would be the same as for curtailments issued by the Board under its current authorities because local and state governments would need to comply in essentially the same manner.

The estimated cost of the requirement to submit the certification form is associated with changing from a request for information to a mandated obligation to submit the information. The Board determined the total number of state and local government agencies in the Delta watershed and multiplied that number by an estimated average

time to complete a simple online certification form multiplied by an average staff cost per hour.

Based on information compiled from the State Water Board's eWRIMS database, water right holders and claimants representing approximately 17,000 water rights and claims would receive an initial order and would be required to submit a certification form. Among those, it is estimated that as many as 7,000 of these water rights and claims may be held by state, local, and district/agency entities. The estimated maximum amount of time to complete the required certification form as a result of the proposed regulation is one hour of staff time per water right record at an assumed pay rate of $65 per hour. The cost burden on local and state governmental agencies for this requirement is therefore about $455,000 in total.

Water right holders and claimants who have been issued an initial order and whose water right or claim has a total authorized face value or recent annual reported diversion amount of one thousand acre-feet (TAF) or greater may be required to submit monthly information regarding prior diversions and demand projections. Approximately 1,731 water right records in the Delta watershed meet these criteria and may be subject to the monthly reporting requirement, including approximately 45 state and 504 local and district/agency water rights. This reporting requirement could require monthly reporting for one year. For these diverters, the monthly reporting is assumed to require both analytical and senior staff time. The first month is assumed to require the most effort, including three working days of time for mid-level staff compiling and organizing hydrologic data, plus one working day of senior staff review. The remaining eleven months of the regulation is assumed to require one working day of mid-level staff plus a half-day of senior staff time. The estimated average daily cost is assumed to be $800 for mid-level staff and $1,400 per working day for senior staff. Therefore, the cost for twelve months of reporting is estimated at $20,300 per entity. For the approximately 549 state and local governments, this represents a total estimated cost of $11,144,700.

The total maximum costs to state and local government agencies as a result of the proposed reporting requirements is approximately $11,600,000.

Fiscal Costs of a Health and Safety Exception

This section presents the methods used to estimate the fiscal effects on state and local government that could result from implementation of exceptions to curtailments for minimum health and safety needs in the Delta watershed. A range of values is estimated that depends upon the extent of replacement groundwater pumping that may occur. The period covered by the regulation is assumed to be one year (365 days) from date of enactment.

The proposed emergency regulation includes an exception from curtailments for minimum health and safety needs. The State Water Board does have enforcement discretion that it could employ to achieve similar results where the Board is using its authority to implement the water rights system; however, the Board and the courts have concurrent jurisdiction to enforce the water rights priority system. This analysis conservatively assumes that exceptions to curtailments for minimum health and safety needs would only be made under the regulation, and would not occur without the emergency regulation. To determine the fiscal effects of including the health and safety exception, this analysis identifies the maximum amount of water that could continue to be diverted under a health and safety exception. Implementation of the health and safety exception could require additional curtailments of other water right holders that would not otherwise have been curtailed. There would be two types of fiscal effects attributable to implementation of the health and safety exception:

1. Costs to state and local governments as a result of additional curtailments needed to facilitate the health and safety exception; and
2. Benefits to state and local governments that would otherwise be curtailed if they could not continue to divert by way of a health and safety exception to curtailment.

The exceptions to curtailments for minimum health and safety needs are specified in section 878.1. The exception would provide for diversion of water for minimum human health and safety needs of no more than 55 gallons per person per day.

Approach to Analysis

The underlying method used to determine the fiscal effect of the health and safety exception on state and local governments is to determine the maximum likely number of people in the affected region whose domestic and municipal use rely on: 1) surface water rather than groundwater; and 2) direct diversion of surface water rather than releases from storage.

The potentially affected population to be served by water exempted from curtailment for health and safety needs is multiplied by 55 gallons per person per day, and by 365 days, to determine the maximum possible quantity of additional water that could be subject to further curtailment to allow for this demand to continue. This amount is further reduced to reflect the ability of these surface water users to rely on alternative sources of water such as groundwater pumping. The final net additional curtailment needed to satisfy the health and safety exception is the amount of water that water right holders, who would not have otherwise been curtailed, must cease diverting to accommodate health and safety diversions under junior water rights. To determine the effect on state and local government, eWRIMS is used to determine the percent of public water agencies (i.e.,

local government agencies) that could be potentially affected by the additional curtailment. This percent is assumed to be evenly distributed amongst all water rights. The fiscal effect on state and local government is comprised of the following elements:

1. A reduction in agricultural and municipal water agency revenues from lost water sales;
2. A corresponding reduction in state and local tax revenues;
3. Loss in state and local tax revenue associated with reduced agricultural production resulting from curtailed agricultural supply; and
4. Water replacement costs to agricultural and municipal water agencies.

There is also a fiscal benefit to state and local governments that can continue to use water for health and safety needs that would have been curtailed absent the health and safety exception. This fiscal benefit is calculated by determining the quantity of water and the number of state and local agencies that may use the health and safety exception to continue to divert water when they would otherwise be curtailed.

The Delta watershed comprises the Sacramento River and San Joaquin River watersheds. Because of hydrologic and other differences between the Sacramento River watershed and the San Joaquin River watershed, the fiscal effects are analyzed and presented separately.

Changes in Water Requirement

Drinking water for the nearly 40 million residents of California (2020 estimate, California Department of Finance) is provided from a combination of groundwater and surface water sources. Of those, about 27 million, or two-thirds, receive a portion of their water supply from the State Water Project (DWR 2021). The Central Valley Project (CVP) delivers about 600,000 acre-feet of surface water from direct diversion or storage releases for municipal use (Reclamation 2014). Assuming an average use of 192 gallons per person per day for overall municipal use (not just residential use), the CVP serves 2.8 million residents. When curtailments are in effect, CVP and SWP water supplied to their contractors outside of the Delta watershed is likely to be from stored water, not direct diversion. In addition, most of these contractors have other sources of supply. Since these water suppliers all have access to a portfolio of options for replacement of curtailed surface water, they would likely not have a need to continue diversions pursuant to a health and safety exception. As such, the effects of the exception would fall only within the Delta watershed, and not beyond it.

It is estimated that the municipal utilities servicing residents in California obtain approximately 40% of their supply from surface water diversions during drought years

(Carle 2004). This proportion appears to be similar in the Sacramento and San Joaquin River watersheds among water providers. The population of the Sacramento River watershed is approximately 4.1 million residents, and 40% of that total is about 1.7 million persons. Based on a conservative assumption that providers of these 1.7 million residents face limited replacement options, then total health and safety curtailments of approximately 102,000 acre-feet would be the maximum required among water right holders.[4] The population of the San Joaquin River hydrologic region is approximately 2.3 million residents (California Water Resilience Portfolio, 2020). Forty percent of 2.3 million is about 0.9 million persons. Total health and safety curtailments of approximately 57,000 acre-feet would be the maximum required among water right holders in this region.

This represents a conservative assumption because it is highly unlikely that the water rights associated with the water supplies for all of these residents would be curtailed or that all of these municipal providers would not have or be able to obtain an alternate source of supply, such as groundwater or previously stored supplies, that would obviate a need to rely on the health and safety exception to serve these minimum health and safety needs. For example, State Water Board databases indicate there are 37 water providers within the Delta watershed that are likely candidates to qualify for a health and safety exception due to a potential lack of alternative supplies. These providers serve a total of approximately 34,965 persons, compared to the 2.6 million persons assumed as one of the conservative assumptions used in this analysis.

Several other simplifying assumptions are included in this analysis because of the uncertainty regarding exactly where curtailments will occur, how many may be needed, and where any curtailment exception for health and safety purposes would be needed. This analysis is assumed to present a conservatively high estimate of the impacts and benefits of the health and safety exception to curtailments in the Delta watershed.

Estimates of the Distribution of Source Water for the Emergency Regulation

In order to determine the fiscal impacts of the health and safety exception, the fiscal analysis includes assumptions about the types of additional water use that are expected to be curtailed to allow for continued diversions of water for health and safety needs. The fiscal impacts of curtailments vary based on the type of use that must be curtailed, primarily between agricultural and urban uses. For the purpose of this analysis, agricultural water use is assumed to have one average value and domestic is assumed to have another.

[4] 1.6 million residents * 55 gallons per capita * 365 days * 325,851 gallons per acre-foot = approximately 102,000 acre-feet.

To estimate the relative percentage of agricultural versus domestic and other use, and the relative percentage of state and local governments that may be affected, the analysis is based on eWRIMS data from the Delta watershed. Agricultural irrigation use represents approximately 87 percent of water diverted from the watershed, with domestic and other uses accounting for the remaining 13 percent. Of the water used for agriculture, 94 percent was provided by public agencies (e.g., irrigation districts) with the remaining 6 percent being provided by private entities. Of the water used for domestic and other uses, 93 percent was provided by public agencies (e.g., municipalities) with the remaining 7 percent being provided by private entities. Based on these percentages, the 102 TAF maximum curtailment in the Sacramento River watershed is assumed to be comprised of 83 TAF of agricultural, 12 TAF of municipal (that are not otherwise accruing the benefit of health and safety diversions under these regulations), and 6 TAF of various private diverters (see Table 1). Similarly, the 57 TAF maximum curtailment in the San Joaquin River watershed would be comprised of 46 TAF of agricultural, 7 TAF of municipal, and 3 TAF of private diverters.

Table 1. Assumed maximum curtailment required from diverters for health and safety exception (acre-feet).

	Sacramento River Watershed	San Joaquin River Watershed
Maximum Curtailment	101,899	56,679
Agricultural – public	83,333	46,352
Municipal – public	12,320	6,853
Private diverters	6,246	3,474

Changes in Quantity of Water Available for Sale by Public Agencies

Reductions in surface water available for diverters being curtailed as a result of the emergency regulation would likely be offset to some extent by increased groundwater pumping and water purchases (short-term leases). The net loss in water available for sale by public agencies is the amount of curtailed water they cannot replace in this fashion.

The time required to construct new wells is generally greater than the timeframe for the emergency regulations, but pumping from existing wells will likely be increased to replace a portion of the supplies reduced by curtailments. As not all affected water right holders will have access to additional groundwater pumping, however, only a portion of the curtailed water can be replaced by additional pumping. In addition, the Sustainable Groundwater Management Act (SGMA) may result in restrictions on the amount of replacement groundwater available. Agriculture is more likely to respond to curtailments

with groundwater replacement pumping and fallowing, while municipal and urban areas tend to have more capacity to trade water and to implement short term conservation.

A 2015 UC Davis report (Howitt et al., 2015) on the economic effects of the drought contained an analysis and projection of the amount of replacement groundwater by region that would likely be used by agriculture, based on groundwater pumping records and interviews with irrigation districts. The report estimated that 52 percent in the Sacramento River watershed and 76 percent in the San Joaquin River watershed of curtailed surface water would be replaced by additional groundwater pumping. Although drought conditions in 2015 were somewhat different than current conditions, there are enough similarities to use these projections for estimates. One key difference from 2015, however, is the implementation of SGMA, which may result in less groundwater replacement in many locations and overall. This suggests that the use of the estimates from the 2015 UC Davis report would be high and may overstate contemporary groundwater replacement levels for agriculture.

Previous analyses (e.g., 2014 emergency regulations) have estimated that only 20 percent of public agricultural supply can be replaced by groundwater pumping during the curtailment period. This modest level of replacement has the effect of greater reduction in overall water supply, reduced agricultural production, and smaller sales of irrigation district water to growers. For the remainder of this analysis, a range of costs is presented that represents the range between high and low levels of replacement water assumptions.

Municipal groundwater replacement rates are assumed to range from 40 to 50 percent in the Sacramento River watershed, and 20 to 50 percent in the San Joaquin River watershed. In the latter case, the lower bound rate (20 percent) is used to account for the larger presence of critically dry groundwater basins. Municipalities are also anticipated to implement voluntary (or possibly mandatory) conservation measures that are consistent with their Urban Water Management Plans and past responses to drought conditions. For this analysis, it is assumed that 20 percent of their surface water supply curtailment would be absorbed by water conservation and would not need to be replaced, a target similar to the drought in 2015 (PPIC, 2015, p. 8).

Water transfers and leases between agricultural districts and growers, among municipalities, and between agriculture and municipal providers, are serving an increasingly prominent role in the Central Valley. It is assumed that 5 percent of agricultural supply and 10 percent of municipal supply reductions can be replaced by additional purchases or water transfers (personal comm., Medellin-Azuara 2014). These replacement percentages are generally consistent with recent historic levels of water transfers during past periods of drought.

Tables 2 and 3 provide a summary of the net reductions, in AF, of water supply available for public agricultural and municipal water agencies being curtailed and the amount available for municipal agencies under the health and safety exception. This does not include net reductions in supply for private diversions.

Table 2. Agricultural Agency and Irrigation Districts Net Curtailment (Acre-Feet)

	Sacramento River Watershed	San Joaquin River Watershed
Surface Water Supply Curtailment (Maximum) (AF)	83,000	46,000
Groundwater Replacement (Range of %)	20%–52%	20%–76%
Water Transfer and Leases	5%	5%
Net Reduction (AF)	62,250–35,719	34,500–8,700

Table 3. Municipal Water Provider Net Curtailment (Acre-Feet)

	Sacramento River Watershed	San Joaquin River Watershed
Surface Water Supply Curtailment (Maximum) (AF)	12,000	7,000
Conservation	20%	20%
Groundwater Replacement (Range of %)	40%–50%	20%–50%
Water Transfer and Leases	10%	10%
Net Reduction (AF)	3,600–2,400	1,400–3,500

As shown in Table 2, the volume of groundwater replacement that may take place has a significant effect on the net reduction in overall water supply for agricultural producers. A similar circumstance is evident for municipal providers, as shown in Table 3. As water diversions that would otherwise have been curtailed continue, further curtailments will be required of additional agricultural and municipal public agencies, and to the extent water made unavailable by these further curtailments can be replaced by those agencies, there is an effective net increase in the total amount of water available to public agencies across the state and a net decrease in water available to agricultural water agencies. In effect, water is being curtailed from diverters who do not have a health and safety need, to the benefit of municipal agencies that have no ability to find alternative sources for those minimum amounts necessary to serve those health and safety uses. Also, and strictly from the perspective of public agencies, the curtailment of

private diversions pursuant to these regulations would have the effect of increasing water available for public agencies (see Table 4).

Table 4. Net Change in Water Available for Public Agencies (Thousand Acre-Feet)

	Sacramento River Watershed		San Joaquin River Watershed	
	Low*	High*	Low*	High*
Health and Safety Exception	102	102	57	57
Agricultural Agency	-62	-36	-35	-9
Municipal	-4	-2	-4	-1
Net Change in Water Supply	36	64	19	47

* “Low” versus “high” extent of groundwater replacement for curtailed surface water (see Tables 2 and 3).

Fiscal Impacts to Public Water Supply Agencies

Fiscal impacts to both public agricultural and urban water agencies are assumed to result primarily from changes in water sale revenues and increased water replacement and conservation costs. These are calculated below by applying unit sales and cost values to the supply change estimates developed above.

Change in State and Local Agency Water Sale Revenues

Estimates of the price of water charged by public agricultural and municipal water supply agencies were developed after an informal review of agency rates and previously developed public information. These prices are then applied to the net change in water available for sale as calculated and presented above in Table 4. This provides an estimate of the total associated change in revenue to these agencies. Table 5 presents the estimated change as ranges based on extent of groundwater replacement. The results indicate that there is a greater reduction in water sales revenues to agricultural and municipal agencies associated with lower groundwater replacement. However, when accounting for the health and safety exception to curtailment, the net effect for public agencies as a whole is positive.

Table 5. Net Change in Public Agency Water Sales Revenues ($ million)

	Rate ($) per AF	Sacramento River Watershed		San Joaquin River Watershed	
		Low*	High*	Low*	High*
Health and Safety Exception	$850	$86.7	$86.7	$48.5	$48.5
Agricultural Agency	$50	-$3.1	-$1.8	-$1.7	-$0.4
Municipal	$850	-$3.1	-$2.0	-$3.0	-$1.2
Net Change in Revenues		$80.5	$82.9	$43.8	$46.8

* “Low” versus “high” extent of groundwater replacement for curtailed surface water (see Tables 2 and 3).

Increased Public Agency Water Supply Replacement and Conservation Costs

State and local agricultural and municipal agencies affected by curtailments pursuant to the proposed regulation are anticipated to pump groundwater and purchase additional supplies to replace a portion of their reduced surface water supplies. These agencies will also likely need to implement conservation and enforcement measures to address the shortages that remain after obtaining such replacement water.

The cost of replacing curtailed surface water diversions with groundwater will be primarily the energy costs associated with the additional pumping. Based on prevailing energy rates and groundwater depth and other information contained in the SWAP[5] agricultural economics model, an average of $84 per acre-foot of additional cost is assumed for replacement water obtained in this manner. The cost of leasing replacement surface water from willing sellers is assumed to be $500 per acre-foot in the Sacramento River watershed and $600 per acre-foot in the San Joaquin River watershed.

Public agencies are also anticipated to incur costs associated with conservation and enforcement measures needed to address the overall shortage of water available for use in their service areas. The costs of implementing these measures are estimated to be $30 per acre-foot and $165 per acre-foot for the shortage amounts within the public agricultural and municipal water agency service areas respectively (pers comm., Medellin-Azuara 2014).

[5] SWAP (Statewide Agricultural Production Model (SWAP, Howitt et al. 2012)

Table 6. Net Change in Public Agency Water Sales Revenues ($ million)

	Rate ($) per AF	Sacramento River Watershed		San Joaquin River Watershed	
		Low*	High*	Low*	High*
Agriculture					
Additional Groundwater Pumping	$84	$1.4	$3.6	$1.1	$4.0
Water Transfers	$500–$600	$2.1	$2.1	$1.9	$1.9
Conservation and Enforcement	$30	$1.9	$1.1	$1.0	$0.3
Municipal					
Additional Groundwater Pumping	$84	$0.4	$0.5	$0.2	$0.4
Water Transfers	$500–$600	$0.6	$0.6	$0.5	$0.5
Conservation and Enforcement	$165	$0.6	$0.4	$0.6	$0.2
Net Change in Revenues		$6.3	$7.9	$3.7	$5.3

* “Low” versus “high” extent of groundwater replacement for curtailed surface water (see Tables 2 and 3).

Total Fiscal Impact to Public Water Supply Agencies

The total maximum fiscal impact to public agricultural and municipal water supply agencies (e.g., irrigation districts and municipalities) resulting from both decreased water sales and increased replacement and conservation costs are summarized in Table 7. The subset of municipal water providers granted a health and safety exception, will receive a benefit which, as a whole, is larger than the additional costs incurred by other water providers. In addition, there is a net effect of a transfer or redistribution of impacts from agriculture to municipalities. Finally, it should be emphasized that these impacts represent the maximum potential impact, and the actual impact may be far less if fewer municipal water agencies require continued diversions to meet minimum health and safety needs, notwithstanding curtailment, than are assumed in this analysis.

Table 7. Total Fiscal Impact on Public Water Supply Agencies ($ million)

	Sacramento River Watershed		San Joaquin River Watershed	
	Low*	High*	Low*	High*
Municipal Water Providers	$88.8	$87.6	$50.4	$48.5
Agricultural Agencies	-$6.6	-$7.5	-$3.9	-$4.8
Net Change in Revenues	$82.2	$80.2	$46.5	$43.8

* “Low” versus “high” extent of groundwater replacement for curtailed surface water (see Tables 2 and 3).

Changes to State and Local Government Tax Revenues

Changes to government tax revenues would be expected due to increased public agency water sales and reduced agricultural production sales (revenue) resulting from the curtailments associated with these emergency regulations.

Tax Revenue Impacts from Changed Public Agency Water Sales

Increased overall water sales by public water agencies as described above will result in higher associated government income tax revenues. An estimated tax rate was applied to the increased public agency revenues to determine the corresponding impact on government income tax revenues. An average tax rate of $99 per $1,000 was estimated using an IMPLAN[6] model for the region. This is an estimate of the impact primarily on income taxes collected by state government and local governments; however, it does not include a breakdown of these two categories or consider indirect and induced economic effects.

Table 8 provides a summary of impacts on tax revenues from changes in sales by municipal water providers and agricultural agencies. For municipal providers, the change results from *increased* sales of water by suppliers to meet minimum health and safety needs as compared to if those suppliers’ right to continue diversions were curtailed, and decreased sales for those not utilizing the exception. Agricultural agencies would experience decreased sales. Overall, the exception would lead to an increase in state and local tax revenues.

[6] Economic impact analysis software - IMPLAN (http://www.implan.com).

Table 8. Net Change in Tax Revenues due to Changes in Agency Sales Revenues ($ million)

	Tax rate	Sacramento River Watershed		San Joaquin River Watershed	
		Low*	High*	Low*	High*
Change in Exempted Agency Sales		$86.7	$86.7	$48.5	$48.5
Change in Curtailed Municipal Provider Sales		-$3.1	-$2.0	-$3.0	-$1.2
Change in Agricultural Agency Sales		-$3.1	-$1.8	-$1.7	-$0.4
Applicable tax rate	10%				
Net Change in Tax Revenues		$8.1	$8.3	$4.4	$4.7

* “Low” versus “high” extent of groundwater replacement for curtailed surface water (see Tables 2 and 3).

Tax Revenue Impacts from Reduced Agricultural Production

Agricultural production sales revenue by growers would be negatively affected as irrigation surface water supplies are reduced by further curtailments than would occur without the minimum health and safety needs exception. Reduced agricultural production in turn would reduce associated income tax revenues. An analysis of the impact of curtailments on agricultural gross revenue was performed by multiplying an estimate of the amount of agricultural revenue generated per acre-foot of applied water by the total amount (from both public and private sources) of irrigation water reduced as a result of further curtailments than would occur without the minimum health and safety needs exception. The estimate of revenue per acre-foot of applied water was developed by calculating a weighted average of cropping patterns and acreage, irrigation water requirement, and revenue per acre across SWAP model geographic units covering the Sacramento River watershed and San Joaquin River watershed, respectively. The product gross revenue per acre-foot in the Sacramento River watershed is estimated at approximately $1,200 per acre-foot, and approximately $1,500 per acre-foot in the San Joaquin River watershed. Revenue per acre-foot of applied water varies throughout the region, and an average value provides a reasonable, if conservative, estimate that assumes curtailment affects all irrigated lands equally. This estimate likely overstates impacts as it does not factor in the likelihood that farmers can be expected to fallow lower revenue crops first as water becomes more scarce, or that water transfer activity may increase in drought conditions. In either case, lower revenue crops may predominate any acreage decrease, making the impact smaller. The same income tax

rate developed above is then applied to this reduction in agricultural production to estimate the associated impact to income tax revenues. Table 9 provides a summary of the impact (decrease) on state and local tax revenues in the Sacramento River watershed and San Joaquin River watershed.

Table 9. Change in Tax Revenue as a Result of Reduced Agricultural Production ($ million)

	Sacramento River Watershed		San Joaquin River Watershed	
	Low*	High*	Low*	High*
Change in Irrigation Supply (TAF)	-62	-36	-35	-9
Product Gross Revenue ($) per acre-foot	$1,200	$1,200	$1,500	$1,500
Change in Agricultural Production Sales ($ million)	-$74.7	-$42.9	-$51.8	-$13.1
Net Change in Tax Revenues @ 10% ($ million)	-$7.5	-$4.3	-$5.2	-$1.3

* “Low” versus “high” extent of groundwater replacement for curtailed surface water (see Tables 2 and 3).

Total Tax Revenue Impacts for State and Local Governments

The total impact on income tax revenues resulting from both increased public agency water sales and reduced agricultural production are summarized in Table 10. This is an estimate of impacts mainly on income taxes collected by the state and local governments. This represents an upper bound tax revenue impact based on the curtailment estimates presented in this analysis, with actual impacts likely being less depending on actual curtailments. Also, fiscal support to local agencies from the state could in turn be affected, but such tax and funding relationships between the state and numerous local agencies are difficult to characterize and cannot be readily estimated. The proposed regulations are not anticipated to result in costs or savings in federal funding to the State.

Table 10. Total Tax Revenue Impacts for State and Local Governments ($ million)

	Sacramento River Watershed		San Joaquin River Watershed	
	Low*	High*	Low*	High*
Due to Changes in Public Agency Sales Revenues ($ million)	$8.1	$8.3	$6.0	$6.4
Due to Reduced Agricultural Product Sales ($ millions)	-$7.5	-$4.3	-$7.1	-$1.8
Net Change in Tax Revenues	$0.6	$4.0	-$0.8	$3.4

* “Low” versus “high” extent of groundwater replacement for curtailed surface water (see Tables 2 and 3)

Appendix 1 References

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