

STATE OF CALIFORNIA
CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY
STATE WATER RESOURCES CONTROL BOARD

**In the Matter of Specified License and Permits¹ of the
Department of Water Resources and U.S. Bureau of Reclamation
for the State Water Project and Central Valley Project**

**ORDER APPROVING TEMPORARY URGENCY CHANGES TO WATER RIGHT
LICENSE AND PERMIT TERMS RELATING TO DELTA WATER QUALITY
OBJECTIVES**

BY THE EXECUTIVE DIRECTOR:

1.0 OVERVIEW

This Order takes action on a Temporary Urgency Change Petition (TUCP) submitted by the U.S. Bureau of Reclamation (Reclamation) and Department of Water Resources (DWR) (collectively referred to as Petitioners) to modify certain terms of the Central Valley Project (CVP) and State Water Project (SWP) (collectively Projects) water right permits and license included in State Water Resources Control Board (State Water Board) Water Rights Decision 1641 (D-1641) during the period from April 1 through June 30, 2022, including requirements to meet Sacramento-San Joaquin Delta (Delta) outflow, San Joaquin River flow, and agricultural salinity requirements. The Petitioners indicate that they are requesting the changes because the Projects' storage and inflow may be insufficient to meet D-1641 requirements and additional operational flexibility is needed to support other Project priorities. This order conditionally approves the requested changes.

2.0 INTRODUCTION

The Delta watershed is currently experiencing extreme dry hydrologic conditions, with January to March of 2022 being among the driest on record following record dry conditions in 2021. Large storms early in Water Year (WY)² 2022 resulted in above average snow water content but these reserves have steadily dwindled in the months since. Exceptionally low storage conditions in Project reservoirs, along with below average projected inflows, indicate that the

¹ The petition was filed for Permits 16478, 16479, 16481, 16482 and 16483 (Applications 5630, 14443, 14445A, 17512 and 17514A, respectively) of the Department of Water Resources' State Water Project and License 1986 and Permits 11315, 11316, 11885, 11886, 11887, 11967, 11968, 11969, 11970, 11971, 11972, 11973, 12364, 12721, 12722, 12723, 12725, 12726, 12727, 12860, 15735, 16597, 20245, and 16600 (Applications 23, 234, 1465, 5638, 13370, 13371, 5628, 15374, 15375, 15376, 16767, 16768, 17374, 17376, 5626, 9363, 9364, 9366, 9367, 9368, 15764, 22316, 14858A, 14858B, and 19304, respectively) of the United States Bureau of Reclamation's Central Valley Project.

² A "Water Year" is October of the preceding year through September of the current year.

Projects will be unable to meet all demands for water from the Projects, including requirements of D-1641 implementing portions of the water quality and flow objectives in the Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary (Bay-Delta Plan).

On April 21, 2021, Governor Newsom issued the first emergency proclamation associated with the current drought for the Russian River watershed and directed state agencies to take immediate action to bolster drought resilience and prepare for impacts on communities, businesses, and ecosystems. On May 10, 2021, Governor Newsom extended the state of emergency to include 41 counties including the Delta watershed due to warm temperatures and extremely dry soils resulting in a historic and unanticipated depletion of runoff from the Sierra-Cascade snowpack.

Directive 4 of the Governor's May 10, 2021, Emergency Proclamation states that "to ensure adequate, minimal water supplies for purposes of health, safety, and the environment, the [State] Water Board shall consider modifying requirements for reservoir releases or diversion limitations – including where existing requirements were established to implement a water quality control plan – to conserve water upstream later in the year in order to protect cold water pools for salmon and steelhead, improve water quality, protect carry over storage, or ensure minimum health and safety water supplies." In May 2021, DWR and Reclamation jointly submitted a TUCP pursuant to Water Code section 1435 et seq. requesting that, consistent with Directive 4 of the Emergency Proclamation the State Water Board temporarily modify, from June to August 15, 2021, the Projects' license permit terms and conditions requiring compliance with D-1641 Delta outflow and Western Delta agricultural salinity requirements. On June 1, 2021, the Executive Director issued a Temporary Urgency Change Order (TUCO) conditionally approving the request. The State Water Board received multiple petitions for reconsideration of the TUCO, and on February 15, 2022, issued water right order 2022-095 (WRO 2022-095 or Reconsideration Order) which denied in part and granted in part the petitions for reconsideration. The June 1, 2021 TUCO and Reconsideration Order are discussed in greater detail below.

Directive 5 of the Governor's May 10, 2021, Emergency Proclamation states that to ensure the protection of water needed for health, safety, and the environment, the Water Board "shall consider emergency regulations to curtail water diversion when water is not available at the water right holders' priority of right or to protect releases of stored water." On August 3, 2021, the State Water Board adopted an emergency regulation that went into effect August 19, 2021, authorizing curtailments of water rights and claims in the Delta watershed for up to one year. Since the regulation went into effect the State Water Board has been curtailing water diversions based on available supplies and water right and claimant demands. The State Water Board plans to continue to issue curtailments and to consider renewal of the emergency regulation in order to continue to issue curtailments as appropriate.

On March 18, 2022, in response to the ongoing drought emergency, the Petitioners jointly filed the TUCP that is the subject of this Order. Citing Directive 4 of the Governor's May 10, 2021 Emergency Proclamation, the TUCP seeks changes to permit and license conditions imposed pursuant to D-1641 that require the Projects to meet flow-dependent water quality objectives designed to protect fish and wildlife and agricultural beneficial uses in the Delta.

The Petitioners indicate that they are requesting the changes because the Projects' storage and inflow may be insufficient to meet D-1641 requirements and additional operational flexibility is needed to support other Project priorities, including: minimum health and safety supplies (defined as minimum demands of water contractors for domestic supply, fire protection, or sanitation during the year); preservation of upstream storage for release later in the summer to control saltwater intrusion into the Delta; preservation of cold water to manage river temperatures for various runs of Chinook salmon and steelhead; maintenance of protections for State and federally endangered and threatened species and other fish and wildlife resources; and other critical water supply needs. The State Water Board issued a public notice of the TUCP on March 18, 2022, with a public comment period closing on April 6, 2022³. The notice was subsequently published by the petitioners in newspapers having general circulation and published within the counties wherein the points of diversion for the subject water rights lie.

This Order approves, subject to conditions, the changes described below for the period of April 4 through June 30:

- (1) Reduces the Delta outflow requirement as measured by the Net Delta Outflow Index (NDOI) from a minimum of 7,100 cubic-feet per second (cfs) on a 3-day running average to 4,000 cfs on a 14-day running average.⁴
- (2) Moves the Western Delta agricultural salinity compliance point on the Sacramento River at Emmaton 2.5 to 3 miles upstream to Threemile Slough.
- (3) Limits the maximum export rate to 1,500 cfs whenever unmodified D-1641 requirements are not being met.
- (4) Reduces the minimum monthly average flow requirement on the San Joaquin River at Airport Way Bridge, Vernalis from 710-1140 cfs (April 1-14 and May 16-June 30) and 3,110-3,540 cfs (April 15 – May 15) to a minimum monthly average of 710 cfs.⁵

Unless renewed, changes approved as part of a TUCP request may remain in effect for up to 180 days. The changes approved by this order will be effective until June 30, 2022. The terms and conditions of approval of the TUCP will remain in effect until compliance is completed.

Directive 4 of the of the Governor's May 10, 2021 Emergency Proclamation also requires that modifications to reservoir releases or diversion limitations be monitored and evaluated to inform future actions. The terms and conditions included in this Order are intended to comply

³ The State Water Board will promptly consider all comments received and may modify this order accordingly based on those comments.

⁴ Note: From May 1 – June 30, unmodified D-1641 includes an offramp to a minimum average flow of 4,000 cfs if the Sacramento River Index is less than 8.1 MAF at the 90% exceedance level.

⁵ Pursuant to the National Marine Fisheries Service (2019) Biological Opinion on the Long-Term Operation of the Central Valley Project and State Water Project, Reclamation proposes to operate New Melones Reservoir on the Stanislaus River in accordance with Stepped Release Plan, which includes a spring pulse flow (approximately April 15 – May 15). Reclamation proposes to increase New Melones Reservoir releases and Stanislaus River flows, if necessary, to meet the proposed Vernalis base flow of 710 cfs.

with this requirement and to support the findings required by the Water Code for approval of a TUCP.

This Order is consistent with the legal requirements governing approval of a TUCP. To approve a TUCP, the State Water Board or its Executive Director, acting under delegated authority, must find (1) that there is an urgent need for the proposed changes, (2) that the changes will not injure any legal user of water, (3) that the changes will not result in unreasonable effects to fish and wildlife, and (4) that the changes are in the public interest. In addition, the State Water Board must protect public trust resources to the extent feasible and in the public interest.

There is an urgent need for the proposed changes. According to water supply forecasts from DWR's Bulletin 120, the 3-water year period of 2020 to 2022 will be among the driest on record and despite historic large storms in October and December of WY 2022, precipitation patterns have remained well below normal for WY 2022. Storage levels in SWP and CVP reservoirs are critically low and will likely recede quickly over the coming spring and summer months as precipitation remains low, remaining snowmelt is abstracted by dry soils depleted of moisture from successive years of drought, and water is released from Project reservoirs for salinity control, fish and wildlife protection, and water supply.

This Order will not injure any lawful user of water, including because it limits modification of the Emmaton salinity compliance point to times when the Petitioners are not collectively directly diverting or storing water.

As conditioned by this Order, the potential impacts of the changes on fish and wildlife are not unreasonable and the changes, as conditioned, are in the public interest. In determining whether the impacts of a change on fish and wildlife would be unreasonable, and whether the impacts to public trust resources would be in the public interest, the impacts of the change must be weighed against the benefits of the change to all beneficial uses, including fish and wildlife, and the public interest. To avoid unreasonable impacts on fish and wildlife and public trust uses, this Order approves changes that support reservoir storage and health and safety supplies but limits increases in water supply deliveries for other purposes due to those changes. In addition, this Order requires the Petitioners to evaluate the possibility of dedicating a portion of the volume of water conserved by the changes approved in this Order to provide pulse flows or other improvements above and beyond D-1641 requirements in the next water year² to the extent feasible based on hydrologic conditions. It is widely recognized that the Delta ecosystem is in a state of crisis and that the population abundance of several native estuarine species has continued to decline, strongly suggesting that the current water quality objectives are inadequate to protect fish and wildlife beneficial uses. Additional instream flow could help aquatic species recover after experiencing current drought conditions. In addition, this Order requires compliance with the final Sacramento River Temperature Management Plan (TMP) pursuant to State Water Board Order 90-5, as approved by the State Water Board's Executive Director.

As described in more detail in the sections of this Order describing findings of fact regarding effects to fish and wildlife and public trust resources, the changes approved in this Order will

reduce freshwater flows into the Delta to provide a benefit to upstream storage in order to avoid near historic low storage levels in Project reservoirs that could jeopardize supplies needed for multiple purposes this summer and into next year, particularly if conditions are dry. Conserving upstream storage is particularly important because water released from storage is needed to control salinity in the Delta and protect water supply and quality of water exported from Delta Project facilities to agricultural and municipal recipients. For the foregoing reasons, and as explained in more detail below, the impacts to fish and wildlife and public trust resources in the Delta are not unreasonable, or contrary to the public interest, taking into consideration the need to conserve water upstream for use later in the year for multiple beneficial uses.

In addition, this Order requires consultations on real-time operations with the State Water Board and fisheries agencies; reporting on hydrologic conditions, operation outlooks, and real-time operations; and, an accounting of water volumes conserved in storage, water deliveries, and water transfers. To better prepare for possible future TUCPs, this Order also requires an analysis of ecological impacts of temporary urgency change actions in combination with other associated drought actions, including a special study for harmful algal blooms and invasive aquatic weeds. Finally, this Order contains provisions for continuing authority to modify the Order based on comments, objections, or new information.

For ease of navigation, this Order includes the following Table of Contents.

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3.0 BACKGROUND

3.1 Bay-Delta Plan and D-1641

The Bay-Delta Plan establishes water quality objectives for the reasonable protection of beneficial uses of water in the watershed, including fish and wildlife, agricultural, and municipal and industrial uses. The water quality objectives included in the Bay-Delta Plan were developed through a rigorous and extensive public process to determine the flow-dependent water quality requirements that are needed to reasonably protect beneficial uses. During that process, the State Water Board considered and balanced the various beneficial uses of water under various hydrologic conditions.

The Bay-Delta Plan includes various flow dependent water quality objectives, including salinity, river flows, and Delta outflows, as well as operational constraints on the Projects. The Bay-Delta Plan objectives were adopted to protect fish and wildlife populations living in or migrating through the watershed and to prevent water in the Delta from becoming too salty to be diverted or exported from the Delta for municipal, industrial, and agricultural uses. Water Year Type indices are used in the Bay-Delta Plan to coarsely adjust to California's variable hydrology by indexing the numeric value and time period of each flow and water quality objective to water year type (wet, above normal, below normal, dry, and critical). Higher flows and lower salinity levels are required in wet years and less stringent requirements for flows and salinity apply during drier years. Some of the water quality objectives also include additional relaxations in extreme dry conditions, such as this year.

As the result of agreements that Petitioners reached regarding implementation of the 1995 Bay-Delta Plan, the State Water Board implements many of the Bay-Delta Plan flow and water quality objectives through conditions in the Projects' water right permits and license, which specify that the Projects operate to meet flow and salinity objectives and other requirements. Specifically, D-1641 places responsibility on the Petitioners to achieve the water quality objectives specified in Tables 1, 2, and 3 of the 1995/2006 Bay-Delta Plan as well as satisfying other requirements. The flow and water quality requirements established by the State Water Board in D-1641 are summarized in the tables and figures contained in Attachment 1 to this Order: Table 1 (Municipal and Industrial Beneficial Uses), Table 2 (Agricultural Beneficial Uses), and Table 3 (Fish and Wildlife Beneficial Uses). Included in Attachment 1 are footnotes to Table 3 that refer to definitions and other requirements contained in Figure 1 (Sacramento Valley Water Year Hydrologic Classification), Figure 2 (San Joaquin Valley Water Year Hydrologic Classification), Figure 3 (Formulas for NDOI and Percent Inflow Diverted), and Table 4 (Chippis Island and Port Chicago Maximum Daily Average Electrical Conductivity (EC)).

Since adoption of D-1641, native and migratory fish populations have declined substantially. Several of these species of fish are listed as threatened or endangered under the California Endangered Species Act (CESA), the federal Endangered Species Act (ESA), or both, including Delta smelt, longfin smelt, green sturgeon, Central Valley steelhead (steelhead), winter-run Chinook salmon (winter-run) and spring-run Chinook salmon (spring-run). Abundance of longfin and Delta smelt are at such low levels they are difficult to detect in

the estuary, survival of juvenile salmonids and returns of spawning adults are chronically low, and risks of extirpation for multiple fish species are high.

The State Water Board is currently in the process of revising the Bay-Delta Plan and implementing those revisions for the reasonable protection of fish and wildlife and agriculture uses as discussed further below. As part of those processes, the State Water Board is also reevaluating the responsibilities for meeting Bay-Delta Plan objectives.

Currently, the Petitioners hold primary responsibility for meeting Bay-Delta Plan flow and salinity requirements as part of D-1641. During times of limited supplies, meeting those requirements can prevent the storage of water for use later in the year and can require significant contributions of previously stored water releases, both due to limited natural flows and due to other water users diverting water when it is not available under their water rights. These circumstances prevent the building of reservoir storage in the winter and spring and deplete reservoir storage in the summer and fall, and in years like this year when reservoir storage is at critically low levels, create significant concerns for temperature management, health and safety water supplies, hydropower production, and salinity management in the Delta if dry conditions persist. As discussed above under the Governor's Executive Order Directive 5, in August 2021, the State Water Board adopted emergency regulations in response to persistent drought conditions allowing it to formally curtail water diversions in the Delta watershed and thereby provide a level of protection for water previously stored by the Projects. The Petitioners' TUCP seeks to further reduce impacts to reservoir storage attributable to storage releases needed to meet outflow and salinity requirements this spring and summer.

3.1.1 Delta Outflow Requirements

The Delta outflow objective is intended to protect estuarine habitat for anadromous fish and other estuarine dependent species. Delta outflows affect migration patterns of both estuarine and anadromous species and the availability of habitat. Freshwater flow is an important cue for upstream migration of adult salmon and is a factor in the survival of smolts moving downstream through the Delta. The population abundance of several estuarine-dependent species of fish and shrimp vary positively with flow, as do other measures of the health of the estuarine ecosystem. Freshwater inflow also has chemical and biological consequences through its effects on loading of nutrients and organic matter, pollutant concentrations, and residence time.

The Delta outflow objectives include requirements for calculated minimum net flows from the Delta to Suisun and San Francisco Bays (or NDOI) and maximum salinity requirements (measured as EC). Since salinity in the Bay-Delta system is closely related to freshwater outflows, both types of objectives are indicators of the extent and location of low salinity estuarine habitat. Listed in Table 3 of the Bay-Delta Plan and D-1641, the Delta outflow objectives vary by month and water year type. With some flexibility provided through a limited set of compliance alternatives, the basic outflow objective sets minimum outflow requirements that apply year-round.

The Delta outflow objectives included in the Bay-Delta Plan and D-1641 for the February through June time frame are identified in Table 3, including footnote 10, and Table 4 of D-

1641. Pursuant to footnote 10, the minimum daily NDOI during February through June is 7,100 cfs calculated as a 3-day running average. This requirement may also be met by achieving either a daily average or 14-day running average EC at the confluence of the Sacramento and San Joaquin Rivers of less than or equal to 2.64 millimhos per centimeter (mmhos/cm) (Collinsville station C2). The standard does not apply in May and June if the best available May estimate of the Sacramento River Index (described in footnote 5) for the water year is less than 8.1 million acre feet (MAF) at the 90% exceedance level. Under this circumstance, a minimum 14-day running average flow of 4,000 cfs is required in May and June.

Additional Delta outflow objectives are also contained in Table 4, which requires a certain number of days of compliance with specified flows or EC requirements at specified stations (Chippis Island and Port Chicago) based on the previous month's Eight River Index. San Joaquin River Flow at Vernalis as noted above, D-1641 Table 3 sets forth water quality objectives for fish and wildlife beneficial uses. Table 3 includes San Joaquin River Flow objectives at Airport Way Bridge, Vernalis (Vernalis) from February through June, in order to provide minimum net downstream freshwater flows in the San Joaquin River to protect fish and wildlife beneficial uses. The objectives from February 1 through April 14 and May 16 through June, referred to as the base flow period, require a specified minimum monthly average flow rate based on the San Joaquin Valley Water Year Hydrologic Classification (at the 75 percent exceedance level) and include two levels. The higher flow level applies when 2 parts per thousand isohaline, commonly referred to as "X2",⁶ is required to be at or west of Chippis Island pursuant to Table 4 discussed above.

The San Joaquin Valley Water Year Hydrologic Classification is forecasted to be critically dry. As such, per Table 3, the San Joaquin River flow requirement at Vernalis in a critically dry water year from April 1-14, May 16-31, and June, is 710 to 1,140 cfs. Since April 15 through May 15⁷ are a crucial period for out-migrating juvenile salmon, D-1641 requires an increase in monthly average flows at Vernalis, commonly referred to as a "pulse flow," of 3,100 cfs to 3,540 cfs in critically dry water years, again with the higher flow level required when X2 is required to be at or west of Chippis Island.

In 2018, the State Water Board amended the Bay-Delta Plan to revise flow objectives for fish and wildlife beneficial uses on the lower San Joaquin River and salinity objectives in the Southern Delta for agricultural beneficial uses. The Board has not yet implemented the 2018 Bay-Delta Plan through a water right or water quality action amending or otherwise conditioning the Projects' permits; therefore, D-1641 and the 1995 flow and water quality objectives remain in regulatory effect.⁸ The update included revised narrative and numeric flow objectives on the lower San Joaquin River, including its three salmon-bearing eastside

⁶ X2 is the distance in kilometers from the Golden Gate Bridge to the point where salinity, when measured at the river bottom, is about 2 parts per thousand (ppt).

⁷ Pursuant to footnote 14 of D-1641, the time period may be varied and should be scheduled through consultation with the fisheries agencies.

⁸ The State Water Board is also in the process of updating other portions of the Bay-Delta Plan focused on protection of fish and wildlife beneficial uses, including Delta outflow and Sacramento River and Delta tributary inflows but has not yet completed that process.

tributaries, the Stanislaus, Tuolumne, and Merced Rivers, and at Vernalis. The updated requirements for the San Joaquin River are in the process of transitioning from the fixed flow objectives based on water year type included in D-1641 to the current lower San Joaquin River minimum baseflow and tributary flow objectives in Table 3 of the 2018 Bay-Delta Plan. The 2018 tributary flow objective is expressed as a percent of unimpaired flow that varies based on tributary-specific hydrology (precipitation and runoff) and includes adaptive implementation provisions that apply to the Stanislaus, Tuolumne, and Merced Rivers to achieve reasonable protection for fish and wildlife beneficial uses with contributions from all three of these salmon-bearing tributaries.

On March 7, 2022, the State Water Board notified Reclamation of its interest in working cooperatively on New Melones Reservoir operations that are consistent with new and existing flow objectives prior to implementing the updated 2018 Bay-Delta Plan, including flows during the February through June time period.

3.1.2 Export Limitations

The export limits objective listed in Table 3 of the Bay-Delta Plan and D-1641 includes requirements for the protection of fish and wildlife uses that limit the quantity of inflow that is diverted from the south Delta by the Projects' pumping facilities. For February through June (with the exception of April 15 to May 15 when exports are limited to 1,500 cfs), exports are limited to either 35 or 45 percent of Delta inflows, unless the Executive Director allows for a variation upon concurrence of the United States Fish and Wildlife Service (USFWS), National Marine Fisheries Service (NMFS), and the California Department of Fish and Wildlife (CDFW) (hereafter collectively referred to as the fisheries agencies).

3.2 Drought Conditions and Water Supply

3.2.1 Hydrology

According to water supply forecasts from DWR's Bulletin 120, the 3-water year period of 2020 to 2022 will be among the driest on record⁹. Despite historic large storms in October and December of WY 2022, precipitation patterns have remained well below normal for WY 2022. As of March 22, 2022, the Northern Sierra 8-Station Precipitation Index was at 33.0 inches, 79 percent of average following the driest January and February on record. Figure 1 shows the level of precipitation for the Northern Sierra as of March 22, 2022.

⁹ Department of Water Resources Bulletin 120 (B120) Report: <https://cdec.water.ca.gov/snow/bulletin120/>

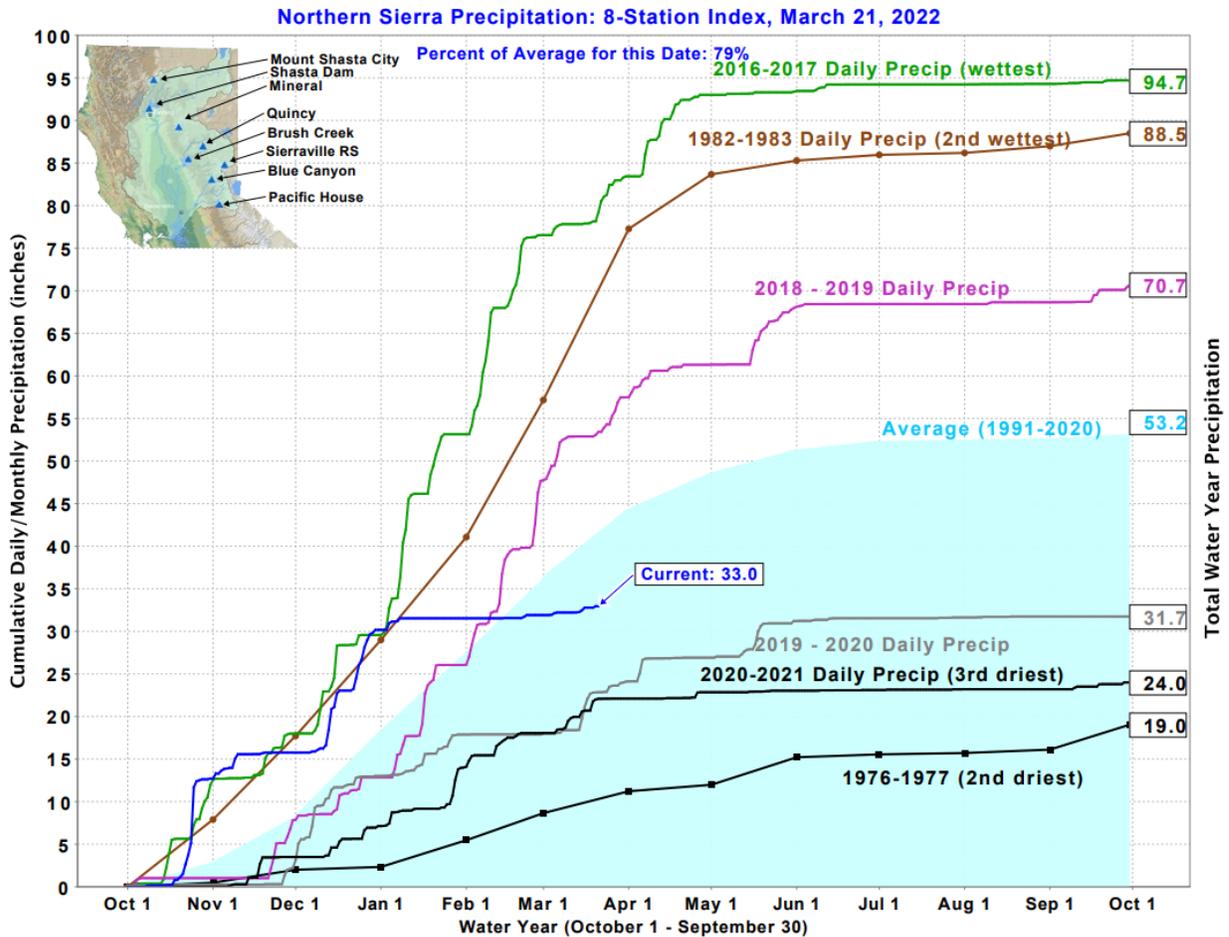


Figure 1. Northern Sierra Precipitation: 8-Station Index as of March 22, 2022.
 Source: https://cdec.water.ca.gov/reportapp/javareports?name=PLOT_ESI.pdf, accessed March 22, 2022

Precipitation conditions are also extremely low in the San Joaquin Valley. As of March 22, 2022, the San Joaquin 5-Station Precipitation Index is at 21.5 inches, 69 percent of average for this time of year. As of March 22, 2022, hydrology in WY 2022 is trending similar to WY 2015 with 38 percent of the state experiencing an Extreme Drought as recorded by the National Drought Mitigation Center, U.S. Drought Monitor. Of additional concern is the lack of snowmelt runoff in the watersheds that will feed into the major Sacramento Valley reservoirs. Also, as of March 22, 2022, snowpack in the Northern Sierra region was 42 percent of historic average which contrasts with the snowpack in 2021, which was 70% of historic average. However, despite a modest snowpack in 2021, runoff efficiency was 20% of historic average and an estimated 685,000 acre-feet of anticipated snowmelt runoff was lost to extreme dry soils, sublimation, and evaporation due to dry soils parched from 2 years of drought, high temperatures, and loss of tree cover due to fire scars. Similar conditions may occur in 2022 and result in less than anticipated runoff through the summer months.

3.2.2 Reservoir Storage Levels

Water storage levels in many Project reservoirs are significantly lower than historic average conditions for this time of year with many reservoirs likely already at or near their peak storage levels for the WY creating significant concerns for reservoir storage this summer and fall and going into next year if conditions remain dry. Figure 2 shows the storage levels of major reservoirs in California as of March 23, 2022. The storage levels of most reservoirs in the Central Valley were significantly below historical average. Shasta Reservoir, the largest reservoir for the State and a significant source of CVP supplies for agriculture and Delta water quality, is approximately 1,720 thousand acre feet (TAF), 648 TAF below the March 23, 2021 storage level, 45 percent of historic average, and 25 percent of total capacity. As the largest reservoir in the Delta watershed, Shasta typically provides a significant portion of the water needed for salinity control in the Delta as well as hydropower for critical grid reliability. Conditions at Shasta Reservoir present significant concerns and place additional stress on the other Project reservoirs in the Sacramento River watershed, including Oroville and Folsom.

In WY 2021, Lake Oroville experienced historic low reservoir storage levels that resulted in a loss of power production at the Hyatt Powerplant. In WY 2022 Lake Oroville, the largest reservoir for the SWP, benefited from early season storms to rebuild some storage relative to last year, reaching a storage level of approximately 1,642 TAF as of March 23, 2022, which is 232 TAF above March 23, 2021 storage levels, 61 percent of historic average, and 31 percent of total capacity. Without modifications to historic release patterns, it is possible that storage in Oroville will be insufficient to support power production as early as August of 2022. Folsom Reservoir, which provides municipal water supply for cities in the Sacramento area, recovered well following the large early season storms in WY 2022 and is at approximately 547 TAF of storage, 195 TAF above end of January 2021 storage, 96 percent of historical average, and 39 percent of total capacity. While Oroville and Folsom are in somewhat better conditions than WY 2021 given that Shasta Reservoir is in significantly worse condition, Oroville and Folsom are expected to be relied upon more heavily this summer and fall to meet Delta flow and water quality requirements.

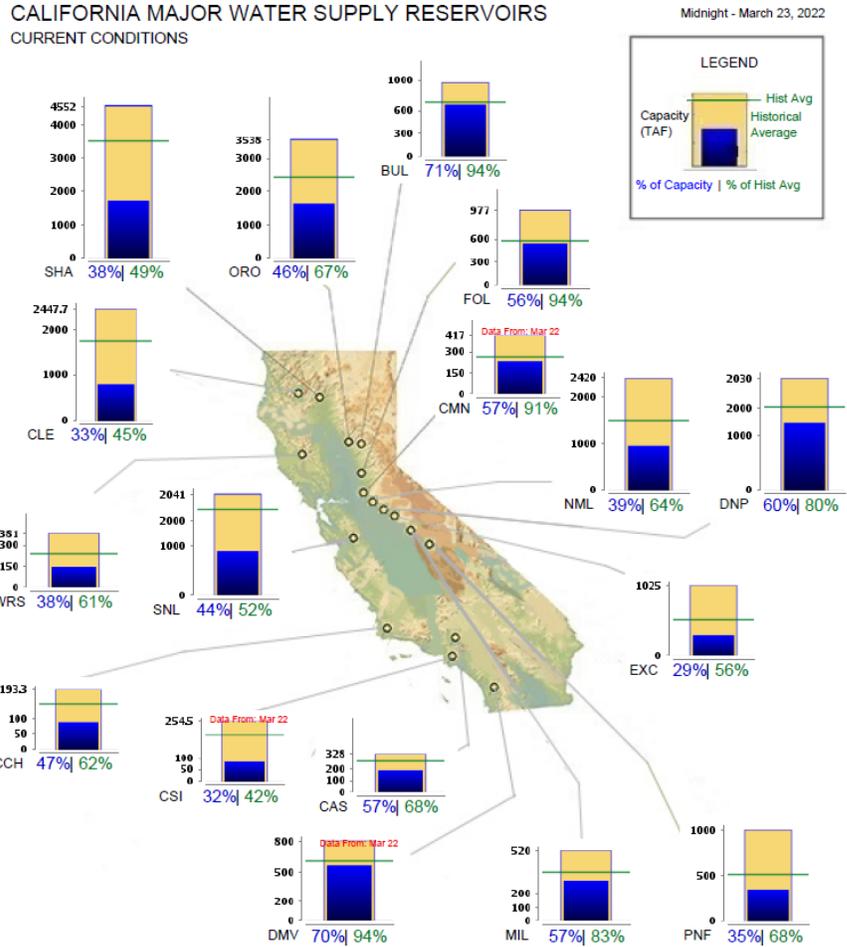


Figure 2. Major Reservoir Conditions in California as of March 23, 2022
Source: <https://cdec.water.ca.gov/reportapp/javareports?name=rescond.pdf>, accessed March 24, 2022.

Changing precipitation patterns associated with climate change and sequential years of reservoir outflows exceeding inflows are contributing to challenging water supply conditions for purposes of fulfilling water quality and supply obligations in water year 2022. Large Project reservoirs primarily filled in 2019 after a wet water year, see Figure 1, and inflows to the reservoirs were greater than outflows, see Table 1. However, inflows to large Project reservoirs were substantially lower than outflows in 2020 and 2021 which lead to starting WY 2022 with very low storage levels. Although October and December 2021 had substantial precipitation, dry conditions in January, February, and March did not provide significant precipitation for inflows as storm runoff or anticipated as snowmelt in later spring and summer months.

Table 1. Summary of Reservoir Inflows and Outflows WY 2019 – WY 2022 (Oct – Mar)

Reservoir	Max Storage (TAF)	WY 2019		WY 2020		WY 2021		WY 2022	
		Volume (TAF)		Volume (TAF)		Volume (TAF)		Volume (TAF)	
		Inflow - Outflow	EOS	Inflow - Outflow	EOS	Inflow - Outflow	EOS	Inflow - Outflow	EO Mar
Shasta	4,552	1112	3271	-1122	2082	-1036	1002	-117	1735
Oroville	3,538	917	2045	-545	1503	-805	980	896	1676
New Melones	2,400	303	1999	-456	1497	-623	828	104	935
Folsom	977	238	598	-184	353	323	316	-2	584

Source: <https://cdec.water.ca.gov/dynamicapp/wsSensorData> for Shasta Dam (SHA), Oroville Dam (ORO), New Melones Reservoir (NML), and Folsom Lake (FOL), sensor numbers 76 (daily) inflow, 23 (daily) outflow, and 15 (monthly and daily) reservoir storage. EO Mar (end of March) reservoir storage is the daily value for March 31, 2022.

According to the Projects’ February operations outlooks submitted with the TUCP, the TUCP is expected to improve reservoir storage by over 500 TAF at Oroville and Folsom reservoirs. As described further below, the TUCP is also to support other management actions to maintain Shasta Reservoir storage.

3.2.3 Project Water Supplies

The SWP and CVP provide water supplies under different types of contracts, including: service contracts with contractors north and south of the Delta that do not have their own underlying rights; settlement and other contractor supplies to users within the Delta watershed (Sacramento River, Feather River, Stanislaus River, and North Delta) who divert water under their own rights and claims and also divert previously stored Project water when those rights are not adequate to meet demand (settlement/supplemental supply); and settlement and exchange contractors who receive replacement and supplemental supplies from the CVP exported from the Delta in exchange for diversions by those users under their own rights and claims from the upper San Joaquin River. Project allocations for 2022 have not yet been fully announced or finalized but initial information is available and summarized below.

In December 2021, DWR announced that the initial allocation to the 29 long-term SWP Table A contractors would focus on critical health and safety needs.¹⁰ After the December storms, DWR announced on January 20, 2022, that SWP allocation would be 15 percent of requested

¹⁰ Department of Water Resources news releases: <https://water.ca.gov/News/News-Releases/2021/Dec-21/SWP-December-Allocation>.

supplies for 2022.¹¹ However, as dry conditions persisted through January, February, and early March, DWR reduced the SWP allocation to 5 percent on March 18, 2022.¹² DWR also operates Lake Oroville to deliver water to Feather River Agencies pursuant to agreements, post-1914 appropriated water rights, and riparian and pre-1914 water right claims. SWP allocations to the Feather River Agencies are based on the April 1 DWR Bulletin 120 forecast, which is expected to result in these contractors' allocations being reduced to approximately 50 percent of the maximum contract amount (955,000 acre-feet) minus a volume that is not subject to reduction. The total volume of expected deliveries to long-term SWP Table A contractors in 2022 is 210,266 acre-feet (5 percent of maximum contract amount of 4,172,786 acre-feet).¹³ Assuming the lower allocation to Feather River Agencies, the total volume of SWP deliveries to Feather River Agencies will be approximately 586,000 acre-feet.

On February 23, 2022, Reclamation announced the initial 2022 water supply allocation for CVP contractors.¹⁴ Agricultural water service contractors north-of-Delta and south-of-the Delta were allocated 0 percent of their contract supply. American River municipal and industrial water service and repayment contractors north-of-the Delta and served by Folsom Reservoir were allocated 25 percent of historical use. Other Sacramento River, north-of-Delta municipal and industrial service contractors were allocated 55 percent of their historic use or public health and safety needs, whichever is greater. South-of-Delta municipal and industrial service contractors were allocated 25 percent of historical use. Wildlife refuges were allocated water consistent with a critical year designation in their contracts, which was 75 percent of their maximum contract amount in 2021.¹⁵ Class 1 Friant Division Contractors were allocated 15 percent of Class 1 water supply and 0 percent of Class 2 water supply, however, it is possible these allocations will change based on limited supplies. Water supply allocations for Eastside irrigation and municipal and industrial water service and repayment contractors will be announced in May. On April 1, 2021, Reclamation reduced allocations for CVP municipal and industrial service contractors to public health and safety needs.¹⁶ Details identifying the volume of allocation have not been released.

As described below under Sacramento River Temperature Management, this year the CVP Sacramento River Settlement Contractors' have agreed to a reduction in use from roughly 1.6 MAF to 450 TAF due to the extreme dry conditions in the upper Sacramento River watershed and significant concerns with Shasta Reservoir storage conditions this year and going into next for temperature management, hydropower production, salinity management, and water supplies. Due to the current Shasta Critical Year conditions, the San Joaquin River Exchange Contractors are expected to be allocated 75% of their contract amount. Typically, all

¹¹ Department of Water Resources news releases: <https://water.ca.gov/News/News-Releases/2022/Jan-21/December-Storms-Allow-for-Modest-Increase-in-Planned-State-Water-Project-Deliveries>.

¹² Department of Water Resources news releases: <https://water.ca.gov/News/News-Releases/2022/March-22/SWP-Allocation-March>.

¹³ Department of Water Resources Notice to State Water Project Contractors: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/State-Water-Project/Management/SWP-Water-Contractors/Files/NTC_21-06_032321.pdf, accessed May 18, 2021

¹⁴ U.S. Bureau of Reclamation news releases: <https://www.usbr.gov/newsroom/#/news-release/4104>

¹⁵ 2021 CVP Allocations: <https://www.usbr.gov/mp/cvp-water/docs/cvp-allocation.pdf>;

¹⁶ U.S. Bureau of Reclamation news releases: <https://www.usbr.gov/newsroom/#/news-release/4157>

allocations to the San Joaquin River Exchange Contractors are delivered from Delta exports. Given the extreme dry conditions, it is expected that a portion of the allocations to the Exchange Contractors will be provided from Friant Reservoir, which may result in further reductions in Friant contract allocations and other changes to Exchange Contractor diversions.

3.2.4 Governors Executive Orders

As noted above in the Introduction, on April 21, 2021, Governor Newsom proclaimed a State of Emergency to exist in Mendocino and Sonoma counties due to drought conditions in the Russian River Watershed. On May 10, 2021, Governor Newsom extended the State of Emergency to 39 additional counties in the Klamath River, Sacramento-San Joaquin Delta, and Tulare Lake watersheds due to drought conditions. Among other things, the proclamation called for voluntary approaches to move water; consideration of request to modify requirements for reservoir releases or diversion limitations; and actions to ensure critical instream flows for salmon, steelhead, and other native fish species.

Ordinarily, the State Water Board must comply with any applicable requirements of the California Environmental Quality Act (CEQA) (Pub. Resources Code, Division 13, § 21000 et seq.) prior to issuance of a temporary urgency change order pursuant to Water Code section 1435. (See Cal. Code Regs., tit. 23, § 805.) Directive 11 of the Governor's May 10, 2021 Drought Proclamation and Executive Order waived CEQA and the regulations adopted to implement CEQA for the purposes of carrying out Directives 3, 4, 5, 6, 8, and 9, to the extent that CEQA otherwise would have applied to specified actions necessary to mitigate the effects of the drought, including the State Water Board's action on the TUCP.

The Governor's Proclamation also suspended Water Code section 13247 as applied to actions taken pursuant to Directive 4. Section 13247 requires state agencies, including the State Water Board, to comply with water quality control plans unless otherwise directed or authorized by statute. Absent suspension of section 13247, the State Water Board could not approve a petition to modify water right permits and licenses in a way that does not provide for full attainment of the water quality objectives as specified in the Bay-Delta Plan, even during a drought emergency.

On July 8, 2021, due to worsening drought conditions and the increased risk of the drought continuing into 2022, Governor Newsom extended the State of Emergency to the nine additional counties of Inyo, Marin, Mono, Monterey, San Luis Obispo, San Mateo, Santa Barbara, Santa Clara, and Santa Cruz, such that the drought State of Emergency was in effect in 50 counties. On that same day, Governor Newsom issued Executive Order N-10-21, calling on Californians to voluntarily reduce water use by 15 percent to preserve the State's surface and groundwater supplies and better prepare for the potential for continued dry conditions.

On October 19, 2021, due to continued drought conditions and the hottest meteorological summer on record, Governor Newsom extended the State of Emergency to include all remaining counties in California.

On March 28, 2022, in response to a third consecutive year of dry conditions resulting in continuing drought in all parts of the State, Governor Newsom incorporated and continued all of the prior drought Proclamations and added additional actions to increase water conservation, including a directive to the State Water Board to adopt emergency regulations addressing urban conservation and banning the watering of “non-functional turf.” In addition, the Governor’s Proclamation streamlined dedications of instream flow under Water Code section 1707, liberalized rules around hauling water for emergency human use, called for stepped up prosecution of illegal water diversions, placed limitations on the permitting of new or enlarged groundwater wells, streamlined groundwater recharge projects, and called on DWR to develop a multi-year water transfer program.

3.3 2021 TUCP and Drought

On June 1, 2021, the Executive Director approved a TUCO conditionally approving the TUCP¹⁷ jointly submitted by Reclamation and DWR, which requested temporary modifications, from June to August 15, 2021, of the Projects’ license and permit terms and conditions requiring compliance with D-1641. The TUCP was submitted in response to WY 2021 being the driest year on record since 1977 and concerns that reservoir conditions would be insufficient to meet D-1641 requirements. The June 1 TUCO: (1) changed the minimum NDOI in June and July from a monthly average of 4,000 cfs to an average of 3,000 cfs with a 14-day running average in June and a monthly average in July (7-day running average in July of no less than 2,000 cfs); (2) limited the combined maximum export rate in June and July to no greater than 1,500 cfs when Delta outflow was below 4,000 cfs, and allowed the 1,500 cfs limit to be exceeded when the Petitioners met Delta outflow requirements pursuant to D-1641 or were moving transfer water; and (3) changed the Western Delta agricultural salinity requirement at Emmaton to a compliance location at Threemile Slough on the Sacramento River from June 1 through August 15. Conditions of the TUCO included regular reporting of operation outlooks and forecasts, additional modeling, and the development of an operational strategy for 2022 if dry or critically dry conditions continued into WY 2022.

The State Water Board received multiple petitions for reconsideration of the TUCO¹⁸, as well as the associated June 10, 2021, approval of the TMP pursuant to Water Right Order 90-5. The 2021 TUCP was approved in part to provide for improved storage and temperature management conditions on the Sacramento River and the TUCO included a condition requiring compliance with the approved TMP. On February 15, 2022, the State Water Board issued the Reconsideration Order¹⁹ which denied in part and granted in part the petitions for reconsideration. The Reconsideration Order imposes additional conditions on the Projects in

¹⁷ The June 1, 2021 TUCO is posted on the State Water Board’s webpage dedicated to TUCP actions. Available at: <https://www.waterboards.ca.gov/drought/tucp/>

¹⁸ (1) California Sportfishing Protection Alliance (CSPA), AquAlliance, and California Water Impact Network (CWIN); (2) Natural Resources Defense Council (NRDC), the Bay Institute (TBI), Defenders of Wildlife, San Francisco Baykeeper, Sierra Club California, Restore the Delta (RTD), Golden State Salmon Association, CSPA, and Pacific Coast Federation of Fisherman’s Associations, Institute for Fisheries Research; (3) RTD, Little Manila Rising, and Save California Salmon; (4) South Delta Water Agency (SDWA), Central Delta Water Agency, and Rudi M. Mussi Investment LP.

¹⁹ The Reconsideration Order is available at: https://www.waterboards.ca.gov/waterrights/board_decisions/adopted_orders/orders/2022/wro2022_0095.pdf

response to substantial issues raised in the petitions for reconsideration, to the extent that the petitions sought to improve future planning for dry conditions. The Reconsideration Order also addressed some of the major objections filed on the 2021 TUCP and the potential for the Projects to be jointly operating until September 30, 2022, pursuant to measures imposed by the court in federal litigation. Those measures are now in effect.²⁰

3.4 Delta Emergency Regulations

In response to the extreme dry conditions in 2020 and 2021, the State Water Board took actions to protect senior water right holders and prevent unauthorized diversion of previously stored water, including Project reservoir storage supplies needed to meet minimum health and safety water supply needs, salinity control in the Delta, and minimal environmental needs for temperature control and flows in the Bay-Delta watershed. In late winter of 2021, the State Water Board sent letters to all water right holders in the State advising them to prepare for water supply shortages and expedited efforts to develop a method to assess water unavailability in the Delta watershed. The State Water Board released a draft methodology in May of 2021 for public comments and updated the methodology in June of 2021. Based on the methodology, in June of 2021 notices of water unavailability were issued to all post-1914 appropriative water rights holders and a warning was issued to senior water rights claimants that water was likely to be unavailable for many of those users.

The Governor's May 10 drought proclamation also directed the State Water Board to consider emergency regulations to issue formal curtailments of water diversions when water is not available at water right holders' priority of right or to protect previously stored releases of water. The State Water Board released a draft emergency regulation and notices of water unavailability to senior claimants in July of 2021. On August 3, 2021, the Board adopted an emergency curtailment regulation. On August 19, 2021, the Office of Administrative Law approved the regulation, which became effective upon filing with the Secretary of State on the same day. Initial curtailment orders were then issued on August 20, 2021. Since that time, curtailments have been implemented based on precipitation and runoff conditions and water right and claimant demands. The emergency regulation will remain in effect until August 19, 2022, unless modified. With exceptionally dry conditions continuing in early 2022, the State Water Board plans to consider readoption of the emergency regulation in summer 2022.

3.5 Delta Interim Operations and Sacramento River Temperature Management

3.5.1 Interim Operations Plan

In 2016, Reclamation and DWR requested reinitiation of consultation pursuant to the federal ESA on the Projects' coordinated long-term operations. In response, on October 21, 2019, the USFWS and NMFS issued new Biological Opinions (2019 BiOps). Thereafter, on February 20, 2020, Reclamation approved a Record of Decision (ROD) modifying CVP operations pursuant to the 2019 BiOps. The same day, the California Natural Resources Agency (CNRA), California Environmental Protection Agency (CalEPA), and the California Attorney General, on behalf of the people of California (collectively "State Parties"), filed litigation in federal district court against Reclamation, USFWS, and NMFS (collectively "Federal Defendants") challenging the 2019 BiOps and 2020 ROD as insufficiently protective of

²⁰ See Interim Operations Plan, *supra*.

threatened and endangered species, among other causes of action.²¹ A group of environmental plaintiffs also challenged the 2019 BiOps and 2020 ROD in a parallel action that was later coordinated.²² On March 31, 2020, CDFW, finding federal ESA coverage no longer sufficient to also meet CESA standards, issued its own more protective Incidental Take Permit (ITP).

On January 20, 2021, President Biden issued Executive Order 13990 (EO 13990), entitled “Protecting Public Health and the Environment and Restoring Science to Tackle the Climate Crisis.” EO 13990 directed federal agencies to review all actions taken during the four previous years and to consider whether to take additional actions to fulfill environmental objectives and bolster resilience to climate change. As part of EO 13990 implementation, the Federal Defendants reinitiated consultation September 30, 2021, on the 2019 BiOps. Thereafter, the U.S. District Court for the Eastern District of California solicited proposals for more protective interim SWP/CVP operations for WY 2022 while the reconsultation is underway.

The State and Federal Parties, recognizing the need to harmonize the Projects’ operations, particularly if the 2022 water year was below normal, dry, or critically dry, negotiated an Interim Operations Plan (IOP) and filed it with the court as their respective Proposed Orders that aligned the CVP with the ITP and established operational priorities, Sacramento River temperature management and planning requirements, and storage goals for Shasta Reservoir. Environmental plaintiffs filed a Proposed Order requesting stricter measures, including imposition of D-1641 (i.e. a bar to TUCP requests) and Defendant Intervenor water contractors filed a Proposed Order leaving the 2019 BiOps in place during the pendency of the reconsultation.

On March 14, 2022, the Court adopted the Order proposed by the Federal Defendants. The Order requires the SWP and CVP to comply with the IOP (paragraphs 6 through 17 of the Order) through September 30, 2022, and remands the 2019 BiOps and 2020 ROD to USFWS, NMFS, and Reclamation, respectively, without vacating them. That leaves the 2019 BiOps and 2020 ROD in place for all measures not addressed in the IOP. The court also stayed the litigation until September 30, 2022, and requested the Federal Defendants and California Plaintiffs file a joint status report on August 31, 2022, “describing the status of discussions regarding a plan for interim coordinated operations to govern for the water year beginning October 1, 2022, or some other interval of time.”²³

The IOP adds the State Water Board as a member of the Water Operations Management Team, which makes real-time species risk assessments for the Projects’ Delta operations and requires that the Executive Director be included in Director level operational discussions. Among other measures, the IOP creates a Shasta Planning Group consisting of NMFS,

²¹ *California Natural Resources Agency et al., v. Raimondo*, (E.D. Cal., Case No. 1:20-cv-00426-DAD-EPG) (hereafter *CNRA v. Raimondo*).

²² *Pacific Coast Federation of Fishermen’s Associations et al., v. Raimondo* (E.D. Cal., Case No. 1:20-cv-00431-DAD-EPG) (hereafter *PCFFA v. Raimondo*).

²³ *PCFFA v. Raimondo, CNRA v. Raimondo*, Order Granting Federal Defendants’ Motion for Voluntary Remand Without Vacatur (Final Order) (March 14, 2022).

USFWS, Reclamation, DWR, CDFW, and the State Water Board for Sacramento River temperature management planning purposes. If the water year type this year remains critical (or dry), which it is extremely likely to be the case, the IOP provides that Reclamation will not schedule or make deliveries of stored water from Shasta Reservoir for other than public health and safety, as defined in the IOP, until Reclamation receives approval of a TMP from NMFS that shows Reclamation will meet temperature criteria and end-of-September (EOS) carryover storage consistent with the IOP terms and conditions. The IOP states that NMFS may approve a draft TMP as soon as April 1, 2022, provided that the plan includes carryover storage volumes and temperature targets that are consistent with IOP Paragraphs 12 through 17.²⁴

3.5.2 Sacramento River Temperature Management

As described above under the IOP, storage levels in Shasta Reservoir affect Reclamation's ability to control temperatures in the Sacramento River. State Water Board Order 90-5 sets terms and conditions for the maintenance of water quality in the Sacramento River below Shasta Dam, Keswick Dam and the Spring Creek Power Plant for the protection of fish species, including endangered winter-run. Order 90-5 requires Reclamation submit a TMP if factors outside Reclamation's reasonable control preclude Reclamation from maintaining 56 degrees at Red Bluff Diversion Dam (RBDD), approximately 55 miles downstream of Keswick Dam, during periods when higher temperatures at RBDD would be detrimental to the fishery.

The collaborative process for Shasta operations put forth in the court approved IOP identify an end of September Shasta storage target of 1.2 MAF to 1.8 MAF in a critical water year. As part of that collaborative process, Reclamation, CalEPA, DWR, NMFS, USFWS, and CDFW, working with the Sacramento River Settlement Contractors, who hold contracts with Reclamation for water stored in Shasta, developed a TMP approach that seeks to maintain winter-run habitat for the longest period possible. This approach for Shasta operations creates a target for an average water release schedule of 4,500 cfs from Keswick Dam below Lake Shasta and a target for Wilkins Slough on the Sacramento River of more than 3,000 cfs. Under these parameters, Shasta is projected to have an EOS carryover storage greater than 1 MAF.

The collaborative process for Shasta operations put forth in the court approved IOP identify an EOS target of 1.2 MAF to 1.8 MAF in a critical water year. As part of that collaborative process, Reclamation, CalEPA, DWR, NMFS, USFWS, and CDFW, working with the Sacramento River Settlement Contractors, who hold contracts with Reclamation for water stored in Shasta, developed a TMP approach that seeks to maintain winter-run habitat for the longest period possible. This approach for Shasta operations creates a target for an average water release schedule of 4,500 cfs from Keswick Dam below Lake Shasta and a target for Wilkins Slough on the Sacramento River of more than 3,000 cfs. Under these parameters, Shasta is projected to have an EOS carryover storage of 1.2 MAF. This approach is expected to be reflected in a final TMP that is submitted to NMFS for approval pursuant to the IOP and to the State Water Board for approval pursuant to State Water Board Order 90-5 and Order 2022-0095 by May 1, 2022. While the TUCP is expected to primarily improve storage in

²⁴ Final Order, *supra*, p. 6.

Oroville and Folsom Reservoirs according to the Projects' February operations outlook submitted with the TUCP, the TUCP will help to support storage in Shasta Reservoir occurring as part of the Shasta planning process described above.

3.6 Substance of the 2022 Temporary Urgency Change Petition

As indicated above, on March 18, 2022, the Petitioners filed a TUCP with the State Water Board pursuant to California Water Code section 1435 et seq. in response to critically dry conditions in the Bay-Delta watershed. The TUCP requests that the State Water Board temporarily modify requirements included in the water right permits and license for the Projects. Specifically, the TUCP requests that the State Water Board make changes to requirements imposed by D-1641 to meet flow and water quality objectives established in the Bay-Delta April 1 to June 30.

The March 18 TUCP requests:

1. From April 1 – April 30, reduce the minimum Delta outflow requirement as measured by the NDOI) from a minimum of 7,100 cfs on a 3-day running average to 4,000 cfs on a 14-day running average. For May 1 – June 30, a minimum NDOI of 4,000 cfs on a 14-day running average is requested if the May 1 forecast of the Sacramento River Index is greater than 8.1 million acre-feet (MAF) at the 90% exceedance level. If the index is less than 8.1 MAF, D-1641 already includes an offramp allowing for the lower outflow level.
2. Move the Western Delta agricultural salinity compliance point on the Sacramento River at Emmaton 2.5-3 miles upstream to Threemile Slough.
3. Limit the maximum export rate to 1,500 cfs when the unmodified D-1641 requirements are not being met.
4. Reduce the minimum monthly average flow requirement on the San Joaquin River at Airport Way Bridge, Vernalis from 710 – 1140 cfs (April 1 – 14 and May 16 – June 30) and 3,110 – 3,540 cfs (April 15 – May 15) to a minimum monthly average of 710 cfs from April 1 – June 30.²⁵

According to the Petitioners, these changes would allow management of reservoir releases on a pattern that conserves upstream storage for fish and wildlife protection and Delta salinity control while providing critical water supply needs. The petition indicates that if sufficient precipitation were to occur to recover upstream storage, then the Petitioners would resume operating consistent with D-1641. According to a February operational outlook that was submitted with the TUCP, the proposed TUCP changes would conserve over 500 TAF of storage primarily in Folsom and Oroville Reservoirs and provide for modest increases in exports from the Delta. However, the Shasta operations described above are not factored into this outlook, nor are the latest hydrologic conditions, which may result in some differences.

²⁵ Pursuant to the NMFS (2019) Biological Opinion on the Long-Term Operation of the Central Valley Project and State Water Project, Reclamation proposes to operate New Melones Reservoir on the Stanislaus River in accordance with the Stepped Release Plan, which includes a spring pulse flow (approximately April 15 – May 15). Reclamation proposes to increase New Melones Reservoir releases and Stanislaus River flows, if necessary, to meet the proposed Vernalis base flow of 710 cfs.

3.7 Status of Fish Species and Biological Reviews

3.7.1 Delta Smelt

Delta smelt was listed as threatened under the federal ESA March 5, 1993 (58 FR 12863), and their critical habitat was designated on December 19, 1994. In a 5-year status review in 2010, USFWS determined that Delta smelt should be listed as endangered but has not yet reclassified the species because of higher priority listing actions. Delta smelt was also listed as threatened under CESA in 1993 and as endangered in 2009.

Delta smelt is an endemic fish species to the San Francisco Bay-Delta and is comprised of only one genetic population. The majority of Delta smelt live only one year. Delta smelt exhibit two basic life history strategies (Moyle et al. 2018²⁶). One is to remain and complete their life cycle in freshwater tidal waters of the north Delta. The other is for larvae or small juveniles to be carried by river currents to brackish rearing habitats of the estuary, primarily Suisun Bay and Marsh. A recent study indicated that a small proportion of Delta smelt employ a brackish-water resident life history (Hobbs et al. 2019²⁷). In early winter, mature Delta smelt migrate from rearing brackish estuarine habitats to freshwater spawning areas in the Delta. Delta smelt spawning occurs from early February through May and larval fish have been observed from late February through June. During and after a variable period of larval development, the young fish migrate downstream until they reach the low salinity zone (LSZ) where Delta smelt reside until the following winter. The location of the Delta smelt population follows changes in the location of the LSZ which depends primarily on Delta outflow.

Delta smelt have shown significant declines in population abundance since 2002 in a phenomenon known as the Pelagic Organism Decline (POD).²⁸ Delta smelt has not recovered from the POD and is currently at risk for extinction. The abundance of Delta smelt is measured with the Spring Kodiak Trawl Index (January-May), the 20-mm Survey (March-July), the Summer Tow Net Survey (June-August), and the Fall Midwater Trawl (FMWT) Survey (September-December), as well as the Enhanced Delta Smelt Monitoring program established in 2016 to increase sampling for this rare species. A small number of individuals is currently being collected by the above surveys: the 2021 FMWT abundance index for Delta smelt was zero (0) for the fourth consecutive year in a row²⁹, and only one (1) wild type Delta smelt has been collected in WY 2022³⁰.

²⁶ Moyle, P. B., J. A. Hobbs, and J. R. Durand. 2018. Delta Smelt and Water Politics in California. *Fisheries* 43(1): 42 – 50.

²⁷ Hobbs, J.A., L.S. Lewis, M. Willmes, C. Denny, and E. Bush. 2019. Complex life histories discovered in a critically endangered fish. *Scientific Reports*. 9:16772. <https://doi.org/10.1038/s41598-019-52273-8>.

²⁸ The concurrent decline of four pelagic species (Delta Smelt, Longfin Smelt, Striped Bass, and Threadfin Shad) in the Upper Estuary attributed to three general factors acting individually or in concert to lower pelagic productivity, including toxins, invasive species and water project operations.

²⁹ Data available from CDFW Fall Midwater Trawl Survey Monthly Abundance Indices, <https://www.dfg.ca.gov/delta/data/fmwt/indices.asp>.

³⁰ Data available from SacPAS Delta Smelt, http://www.cbr.washington.edu/sacramento/workgroups/delta_smelt.html. According to SacPAS, 2 individuals have also been captured in the Chipps Island Trawl.

To aid in the recovery of Delta smelt, an interagency effort has begun to raise and release cultured Delta smelt into the Delta. The USFWS and CDFW, along with DWR and Reclamation, have begun experimental releases of captively produced Delta smelt into the Delta to help inform future supplementation of the species in the wild. All cultured Delta smelt are marked to distinguish them from wild fish in monitoring efforts.

The period of the TUCP overlaps with the spring portion of the adult spawning, and egg and larval/early juvenile periods, when the majority of the population would be in the Delta. The Biological Review submitted by the Petitioners in support of the March 18, 2022 TUCP concludes the ongoing drought will produce poor habitat conditions for Delta smelt. Best available science indicates there is a positive correlation between the density of the zooplankton *Eurytemora affinis* (*E. affinis*), an important Delta smelt larval/juvenile prey, and Delta outflow during the March-May period. An important impact from reduced outflow is a reduction in the density of *E. affinis* in the LSZ by 14% under the TUCP compared to baseline conditions. Additionally, there is evidence that Mississippi silverside, a predator of Delta Smelt, will benefit from reduced outflow conditions and would increase in abundance under the TUCP. The increase in Mississippi silverside may result in increased predation risk for Delta smelt.

Delta smelt have a strong positive relationship with the extent of the LSZ, typically described based on the location of X2. Ecologically, X2 serves as an indicator of habitat suitability for many Bay-Delta Estuary organisms and is associated with variance in abundance of diverse components of the ecosystem (Jassby et al. 1995³¹). At all times of year, the location of X2 influences both the area and quality of habitat available for Delta smelt to successfully complete their life cycle. In general, Delta smelt habitat quality and surface area are greater when X2 is located in Suisun Bay. Both habitat quality and quantity diminish the more frequently and the further the LSZ moves upstream, toward the confluence of the Sacramento and San Joaquin rivers (Feyrer et al. 2007³²), thus further constraining the habitat for juvenile Delta smelt closer to the upstream spawning areas in the lower Sacramento River, San Joaquin River, and the Cache Slough Complex/Sacramento Deep Water Ship Channel. According to the Biological Review submitted by the Petitioners in support of the March 18, 2022, TUCP X2 is expected to shift upstream by up to an additional 7.5 km further than would have occurred without a change in Delta outflow in April through June, and decrease habitat in the North Delta by up to 27%. Polansky et al. (2021)³³ found a negative relationship between Delta Smelt recruitment and both the location of X2 during March through May and the Project's Export to Delta Inflow (E:I) ratio. In addition, recruitment and post-larval survival rates were positively correlated to Delta outflow. Therefore, with a decrease in Delta outflow and an increase in X2, there is evidence that the TUCP will have a negative effect on the

³¹ Jassby, A. D., W. J. Kimmerer, S. G. Monismith, C. Armor, J. E. Cloern, T. M. Powell, J. R. Schubel, and T. J. Vendlinski. 1995. Isohaline position as a habitat indicator for estuarine populations. *Ecological Applications* 5:272–289.

³² Feyrer, F, M. L. Nobriga, and T. R. Sommer. 2007. Multi-decadal trends for three declining fish species: habitat patterns and mechanisms in the San Francisco Estuary, California, USA. *Canadian Journal of Fisheries and Aquatic Sciences* 64:723–734.

³³ Polansky, L., K. B. Newman, and L. Mitchell. 2021. Improving inference for nonlinear state-space models of animal population dynamics given biased sequential life stage data. *Biometrics* 77(1):352-361. Available at <https://onlinelibrary.wiley.com/doi/epdf/10.1111/biom.13267>.

recruitment and post-larval survival of Delta Smelt in 2022. Overall, the TUCP is expected to have a negative impact on the Delta smelt population by reducing recruitment and survival rates and degrading the habitat extent and quality. However, reductions in Delta outflow combined with export restrictions are expected to preserve upstream storage by up to 500 TAF or more, which will be important for the protection of fish and wildlife beneficial uses, and the ecosystem as a whole, and salinity control in the Delta later in the year in the event dry conditions continue through 2022 and into 2023.

3.7.2 Longfin Smelt

Longfin smelt was listed as threatened under CESA in 2009 and as a candidate for listing under ESA in 2012. Longfin smelt is a native, semi-anadromous open water fish moving between fresh water and saltwater. Longfin smelt generally have a 2-year life cycle. During the second year, they primarily inhabit the San Francisco Bay and are thought to be pelagic (living or occurring in open water). Spawning typically takes place as early as November and may extend into June, peaking between February and April. Spawning occurs in fresh or slightly brackish water over aquatic vegetation or sandy-gravel substrates when temperatures drop roughly below 64.5°F (Baxter et al. 2009³⁴). Longfin smelt eggs hatch between December and May, with a peak hatch in February. Delta outflow transports the buoyant larvae and juveniles downstream to higher salinity habitats.

The 2021 FMWT abundance index³⁵ for Longfin smelt was 323, up from the 2020 index of 28 and the greatest index since 2011, but still significantly lower than indices prior to the POD in 2002. Like Delta smelt, Longfin smelt suffered a drastic decline in abundance around 2002 and was included in the POD. Longfin smelt were once a common species in the San Francisco estuary, but the population has declined and is now about one-tenth of 1 percent of its abundance when sampling began 50 years ago.

In the spring, juvenile Longfin smelt distribution is monitored through the Smelt Larva Survey (January-March)³⁶ and the 20-mm Survey (March-July)³⁷. Survey #3³⁸ for the Smelt Larva Survey was completed for February 7–14, 2022, showing the greatest density of larvae in Honker Bay/Suisun Marsh, with catches occurring upstream to Fisherman’s Cut on the San Joaquin River and into the Cache Slough Complex on the Sacramento River. Survey #4³⁹ was completed for February 22-25, 2022, showing the greatest density of larvae near Chipps Island, but also a larger dispersion of individuals toward the interior of the Delta when

³⁴ Baxter, R., M. Nobriga, S. Slater, and R. Fujimura. 2009. Effects Analysis: State Water Project Effects on Longfin Smelt. California Department of Fish and Game. Available at https://www.waterboards.ca.gov/waterrights/water_issues/programs/bay_delta/docs/cmnt091412/sldmwa/baxter_et_al_2009.pdf.

³⁵ Data available from CDFW Fall Midwater Trawl Survey Monthly Abundance Indices, <https://www.dfg.ca.gov/delta/data/fmwt/indices.asp>

³⁶ Data available at CDFW Smelt Larva Survey, <https://wildlife.ca.gov/Conservation/Delta/Smelt-Larva-Survey>

³⁷ There is currently no data for the 20-mm survey for 2022.

³⁸ Data available from CDFW Smelt Larvae Survey #3, Fish Distribution Map, https://www.dfg.ca.gov/delta/data/sls/CPUE_Map.asp

³⁹ Data available from CDFW Smelt Larvae Survey #4, Fish Distribution Map, https://www.dfg.ca.gov/delta/data/sls/CPUE_map.asp

compared to the previous survey. Distributions from occurrences in these two surveys in 2021 may be generally representative of the upcoming spring months for this year. During February through early March of 2021, Longfin smelt were concentrated in Suisun Bay and around the confluence of the Sacramento River and San Joaquin River. From late March through June, the Longfin smelt distribution was concentrated in the lower Sacramento River. However, Longfin smelt were present in or near the central Delta throughout the February to April timeframe. Salvage of Longfin smelt in 2021 included 0 in February, 78 in March, 483 in April, 304 in May, and 0 in June during a period of minimal exports of 1,500 cfs for that month⁴⁰. The TUCP in 2022 will reduce outflow from 7,100 cfs to 4,000 cfs while maintaining similar levels of exports to 2021, creating the potential for a greater risk of entrainment in 2022 under the TUCP due to a substantial decrease in outflows in 2022 compared with 2021 when a TUCP was not in effect in April and May.

Reduced delta outflow under the TUCP has the potential to degrade habitat quality for Longfin smelt. As described above for Delta smelt, the TUCP may reduce the abundance of a key prey zooplankton species, *E. affinis*. Furthermore, FMWT indices have shown a positive relationship to Delta outflow in the preceding winter and spring months. Delta outflow during the January-June period was positively correlated to the longfin smelt FMWT index based on the data collected between 1967 and 2016⁴¹. Positive population growth is correlated with flows of 51,000 cfs between January and March or 35,000 cfs between March and May (The Bay Institute, 2010⁴²). With and without the TUCP, it is likely that Longfin smelt would experience limited recruitment in 2022 as NDOI would be significantly lower than these thresholds for positive population growth. The Biological Review submitted by the Petitioners in support of the March 18, 2022 TUCP includes a statistical modeling analysis based on December-May Delta outflows suggesting that the TUCP conditions would result in approximately 5% lower longfin smelt abundance (modeled 2022 longfin smelt FMWT index) compared to the baseline conditions. Overall, the TUCP has the potential to further degrade habitat quality for Longfin smelt, and result in poor recruitment of juveniles in 2022. As addressed for Delta smelt, the reduced outflow and export limitations are expected to preserve upstream storage by as much as more than 500 TAF, which will be important for the protection of fish and wildlife beneficial uses and the ecosystem as a whole, and salinity control in the Delta later in the year in the event dry conditions continue through 2022 and into 2023.

⁴⁰ Pursuant to the June 1, 2021 TUCP Order. Available at: <https://www.waterboards.ca.gov/drought/tucp/>

⁴¹ State Water Resources Control Board (State Water Board). 2017. Scientific Basis Report in Support of New and Modified Requirements for Inflows from the Sacramento River and its Tributaries and Eastside Tributaries to the Delta, Delta Outflows, Cold Water Habitat, and Interior Delta Flows. With assistance from ICF. 427 pages Available at https://www.waterboards.ca.gov/water_issues/programs/peer_review/docs/scientific_basis_phase_ii/201710_bd_phasel1_sciencereport.pdf

⁴² The Bay Institute. 2010. Written Testimony of Jonathan Rosenfield and Christina Swanson. Exhibit 2 Regarding Development of Flow Criteria for the Sacramento-San Joaquin Delta Ecosystem. Available at https://www.waterboards.ca.gov/waterrights/water_issues/programs/bay_delta/deltaflow/docs/exhibits/bay_inst/tb_i_exh2.pdf

3.7.3 Estuarine Habitat Conditions

The Delta outflow objectives in Table 3 and 4 of D-1641 are designed to protect the estuarine ecosystem that provides habitat for several species of pelagic and benthic fish and crustaceans whose populations show strong positive relationships to Delta outflow including longfin smelt, Delta smelt, Sacramento splittail, starry flounder, and California Bay shrimp. Many of these species have undergone population declines over the history of water development in the Delta. Decreasing Delta outflow under the TUCP constrains habitat and food availability by shifting X2 and the LSZ inland from the shallow, cooler, and more favorable habitats of Suisun Bay and Marsh to the deeper channelized, warmer, and less hospitable habitats of the lower Sacramento and San Joaquin Rivers and their confluence in the interior Delta. This reduction in habitat quantity and quality will also result in lower survival and recruitment of estuarine dependent aquatic species that have already experienced substantial population declines.⁴³

Two zooplankton species, the mysid shrimp *Neomysis mercedis* and the calanoid copepod *Eurytemora affinis*, represent important food resources for larval and juvenile stages of pelagic fish, such as Delta smelt and longfin smelt. The mysid shrimp is most abundant in the LSZ, while *E. affinis* has been observed from the LSZ to freshwater in the Sacramento and San Joaquin rivers. The population abundance of these species exhibited positive relationship to Delta outflow between February and June, encompassing the proposed period of the TUCP, to benefit the zooplankton community⁴⁴. An introduced calanoid copepod, *P. forbesi*, is also an important food item for longfin smelt, Delta smelt, and other planktivorous fish in the Delta. *P. forbesi* is distributed from freshwater to about 7 ppt, and their abundance is positively related to Delta outflow between June and September.

Two introduced filter-feeding bivalves, *Potamocorbula amurensis* (overbite clam) and *Corbicula fluminea* (Asian clam), are present in the Bay-Delta system, and they have been reported to control phytoplankton biomass in the estuary. The overbite clam mostly are distributed in the saline environments of Suisun Bay and Marsh, and San Pablo Bay, while the Asian clam dominates in the fresh water of the Delta. Distribution of recruits of these clam species overlap at a salinity of about 2 ppt, while adults are much more tolerant of salinity change and can overlap anywhere between freshwater and a salinity of 10 ppt.

During the 2012-2016 drought, *Potamocorbula* intruded into the Sacramento and San Joaquin River confluence and Sacramento River south regions as salinity increased in these areas, and their biomass remained high in these regions in October 2014 through January 2016⁴⁵. *Potamocorbula* could have the largest effect in the confluence during successive dry years, as

⁴³ State Water Board. 2017. Scientific Basis Report in Support of New and Modified Requirements for Inflows from the Sacramento River and its Tributaries and Eastside Tributaries to the Delta, Delta Outflows, Cold Water Habitat, and Interior Delta Flows. With assistance from ICF. 427 pages Available at https://www.waterboards.ca.gov/water_issues/programs/peer_review/docs/scientific_basis_phase_ii/201710_bd_phasel1_sciencereport.pdf

⁴⁴ Ibid.

⁴⁵ Kimmerer, W., F. Wilkerson, B. Downing, R. Dugdale, E. S. Gross, K. Kayfetz, S. Khanna, A. E. Parker, and J. K. Thompson. 2019. Effects of drought and the emergency drought barrier on the ecosystem of the California Delta. *San Francisco Estuary and Watershed Science* 17(3). Available at: <https://doi.org/10.15447/sfew.2019v17iss3art2>

seen during 2015, when the adults can reproduce in a dry spring, and the larvae can expand their distribution into the Sacramento River as the LSZ shifts upstream. The expansion of *Potamocorbula* distribution in the river confluence and Sacramento River south regions resulted in very high grazing rates with the grazing turnover time of 4 to 7 days in the confluence. The impacts of such high grazing rates of bivalves on phytoplankton and zooplankton communities have not been quantitatively estimated in the Delta; however, the Biological Review submitted by the Petitioners in support of the March 18, 2022, TUCP concludes that continued drought conditions, shifting LSZ, and further deprived river flows under the TUCP would worsen the already deteriorated food web conditions in the estuary.

Harmful algal blooms (HABs) are an overgrowth of algae that cause harm to the aquatic ecosystem or limit the use of waterbodies. Cyanobacteria blooms, also called blue-green algae, are typically the type of HAB found in California's freshwater and estuarine systems, including the Delta. Cyanobacteria can quickly multiply into a bloom when conditions are favorable with abundant light, elevated water temperature, elevated levels of nutrients, high residence time, and lack of water turbulence and velocity. Some cyanobacteria produce toxins that can cause adverse health effects, including mortality, to fish and wildlife, humans, and pets. Although not every cyanobacterial bloom is toxic, blooms can cause adverse impacts in their toxic and nontoxic forms to drinking water, recreation, tribal and cultural uses, irrigation, aquatic life, and local communities adjacent to bloom sites that experience odor, visual impairment, and other associated impacts.

Environmental conditions that promote HABs can also promote the excessive growth of submerged and floating invasive aquatic vegetation, generally referred to as aquatic weeds. Excessive aquatic weeds cause adverse effects in the Delta including changes to water chemistry (e.g., low dissolved oxygen), reduced flow and turbidity, out competition of other primary producers, changes to the food web, impedance of navigation and water conveyance, odor, and poor aesthetics.⁴⁶ Excessive aquatic weeds can alter the complexity of aquatic habitat and harm native fishes by impeding movement or increasing predation risk to non-native fish. Individually and in combination, excessive aquatic weeds and HABs adversely impact the ecology, economy, culture, and quality of life in the Delta watershed.

The frequency and duration of HABs and expansion of aquatic weeds tend to increase in the Delta with drought conditions due to elevated water temperatures and increased residence times from reduced freshwater inflows, reduced circulation, and elevated air temperatures. The 2021 TUCO recognized that the changes authorized by the 2021 TUCO and the installation of the Emergency Drought Salinity Barrier (EDSB) could contribute to increases in HABs and expansion of aquatic weeds in the Delta. In addition, public comments provided during the Reconsideration Order process highlighted and reinforced that impacts from HABs and aquatic weeds compound existing adverse conditions in economically disadvantaged and historically marginalized communities by further limiting access to clean drinking water, recreational opportunities (e.g., swimming, fishing, boating, adjacent biking and walking),

⁴⁶ Boyer, K. and M. Sutula. 2015. Factors Controlling Submerged and Floating Macrophytes in the Sacramento-San Joaquin Delta. Southern Coastal Water Research Project Technical Report 870. August 2015. Available at: https://www.waterboards.ca.gov/centralvalley/water_issues/delta_water_quality/delta_nutrient_research_plan/science_work_groups/2015_10_macro_whitepaper.pdf

sustenance, and affordable and safe housing. HABs also increase exposure to poor air quality, odors, and poor visual aesthetics which can depress property values.⁴⁷ Expansion of aquatic weeds contribute to historically low native fish populations such as Chinook salmon, which are important for supporting tribal culture and subsistence fishing.

To address concerns from impacts due to HABs and aquatic weeds, Condition 8 in the 2021 TUCO required DWR and Reclamation to complete a special study evaluating and documenting the effects of the 2021 TUCO and associated actions, including the EDSB, on the prevalence and extent of HABs and expansion of invasive aquatic weeds. On December 15, 2021, DWR and Reclamation submitted an initial HABs and aquatic weed report in response to Condition 8 that described the special study and presented preliminary analyses regarding the drivers of the occurrence of HABs and spread of submerged aquatic vegetation (SAV) and identified possible mitigation strategies.⁴⁸ The initial report compared trends for HABs and aquatic weeds in the Delta for multiple years (~2014-2021) with varying hydrological conditions and with and without drought actions e.g., the installation of the EDSB and TUCOs in place.

Initial findings of the study confirmed that drought conditions during the years studied increased the length, frequency, and duration of HABs caused by cyanobacteria. Temperature was found to be an important driver in bloom development, and blooms tended to be the most severe during years when warmer water (i.e., warmer than 19 degrees Celsius) started earlier in the year and lasted into October. In 2021, a local increase in cyanobacteria during July and August in Franks Tract may have been exacerbated by increased residence times as a result of the EDSB. Concentrations of cyanobacteria toxins in Franks Tract exceeded standards for drinking water and potentially had sub-lethal effects on fish and wildlife. While the study highlighted elevated levels of HABs and toxins, the report acknowledged that a lack of available data and consistent HAB monitoring in the Delta precluded the ability to discern whether the observed HABs were caused by typical drought conditions or exacerbated by the 2021 TUCO and EDSB.

The December report also described the prevalence of aquatic weeds across the Delta and reported that the Delta has seen an increase in the coverage of SAV over the past 15 years with a significant increase during the 2014-2016 drought.⁴⁹ The construction of the EDSB further decreases water velocities and is likely the cause for SAV filling the center channel in Franks Tract as seen during 2015.⁵⁰ Subsequent wet years have failed to reduce SAV

⁴⁷ [California Water Boards' Framework and Strategy for Freshwater Harmful Algal Bloom Monitoring: Full Report with Appendices](https://ftp.sccwrp.org/pub/download/DOCUMENTS/TechnicalReports/1141_FHABStrategy_FullReport.pdf) (March 2021 Southern California Coastal Water Research Project Technical Report 114.1B) https://ftp.sccwrp.org/pub/download/DOCUMENTS/TechnicalReports/1141_FHABStrategy_FullReport.pdf

⁴⁸ Hartman, R., E. Ateljavich, M. Berg, K. Bouma-Gregson, D. Bosworth, N. Rasmussen, T. Flynn, and T. Pennington. 2021. Report on the Impact of the Emergency Drought Barrier on Harmful Algal Blooms and Aquatic Weeds in the Delta. Sacramento: California Department of Water Resources. 86 pp. + appendix. Available at https://www.waterboards.ca.gov/waterrights/water_issues/programs/drought/tucp/docs/2021/20211215_cond8-report.pdf

⁴⁹ Ibid

⁵⁰ Kimmerer, W., F. Wilkerson, B. Downing, R. Dugdale, E. S. Gross, K. Kayfetz, S. Khanna, A. E. Parker, and J. K. Thompson. 2019. Effects of drought and the emergency drought barrier on the ecosystem of the California

coverage across the Delta. Not all of the data collected for the aquatic weed study were available for the December report, so no conclusions were made regarding the impacts of the 2021 TUCO or EDSB installation on the Delta-wide prevalence of aquatic weeds; however, DWR and Reclamation planned to submit a supplemental report with complete analyses in the spring of 2022 in order to incorporate additional data and provide more time to process multiple sources of information.

To address the additional issues highlighted about the December 15 interim HABs and aquatic weed report during the reconsideration of the 2021 TUCO, the Reconsideration Order required DWR and Reclamation to perform additional analyses for the special study. DWR and Reclamation were required to coordinate with local watershed groups to determine if additional data are available that should be incorporated in the analysis and report. The next draft of the report is required to summarize the impacts to sub-regions of the Delta and to analyze the potential or presence of disproportionate impacts to vulnerable communities. The study is required to be coordinated with Interagency Ecological Program (IEP) and Delta Science Program (DSP), and any broader watershed evaluation of HABs and aquatic weeds. DWR and Reclamation are required to submit the draft report to the State Water Board by June 1, 2022.

3.7.4 Winter-Run Chinook Salmon

Winter-run was listed as endangered under CESA in 1989 and listed as endangered under the ESA in 1994. The federal listing includes both natural and artificially propagated stocks. Prior to the summer spawning period for winter-run, adults migrate through the Delta and hold in the upper Sacramento River below Keswick Dam until they are ready to initiate spawning, with the majority of spawning typically occurring between June and July upstream of Clear Creek. After spawning, the fertilized eggs require cold water to ensure their proper development, with temperatures below 53.5 degrees F being optimal and warmer temperatures becoming lethal.⁵¹ These optimal temperatures are needed from the onset of spawning through juvenile emergence which spans from May through October and into November. Downstream rearing and migration of juveniles occurs from fall through the spring when temperature conditions are typically more favorable, and juveniles may experience less temperature impacts due to their ability to seek thermal refugia after egg emergence. Juveniles proceed to rear and slowly migrate downstream following emergence, reaching the Delta as early as October and remaining in the Delta through May. Historically, a majority of winter-run exit the Delta in March and April.

In 2021, the Sacramento River had the largest return of adult winter-run since 2006 with an estimated 10,269 adults. Assuming a 3-year life cycle, the adults that returned to spawn in 2021 originated from eggs laid during 2018 that migrated downstream as juveniles during WY 2019. While there was a modest return of 2,458 adults in 2018, juvenile production from that return was high due to favorable instream conditions and temperatures. WY 2018 was a below normal year following the wettest year on record in 2017, resulting in favorable storage

Delta. *San Francisco Estuary and Watershed Science* 17(3). Available at: <https://doi.org/10.15447/sfews.2019v17iss3art2>

⁵¹ Martin, B. T., Pike, A., John, S. N., Hamda, N., Roberts, J., Lindley, S. T., & Danner, E. M. 2017. Phenomenological vs. biophysical models of thermal stress in aquatic eggs. *Ecology Letters*, 20 (1), 50-59.

conditions and cold water supplies in Shasta Reservoir. WY 2019 was a wet year resulting in favorable migration conditions for juvenile winter-run. These conditions led to a relatively high egg-to-fry survival level of 26.3% and an overall survival of eggs reaching the smolt life stage and reaching the Delta of 8% in WY 2019, which yielded the second largest number of juveniles reaching the delta since 2013 that returned as spawners in 2021.

Despite high returns, adult winter-run displayed limited spawning success due to record low storage in Shasta Reservoir in 2021 that exposed incubating eggs to sub-optimal water temperatures, increased pre-spawn mortality of 5.6%⁵² influenced by a warm water bypass in May of 2021, and a third consecutive year of a Thiamine deficiency in spawning adults. On January 14, 2022, NMFS released a juvenile production estimate letter⁵³ that estimated a record low egg-to-fry survival rate of 2.6%, worse than the previous low for brood year 2014 of 4.2%.

NMFS estimates approximately 125,038 juveniles will reach the Delta in 2022. As of March 29, the Salmon Monitoring Team (SaMT) estimated 1-5% of juvenile winter-run had yet to enter the Delta, 75-84% were currently in the Delta, and 15-20% of juveniles have exited the Delta. For the juveniles entering the Delta and rearing from April to June, the TUCP is expected to reduce through-Delta-survival. Juveniles will be exposed to impacts from reverse flows and slower mean flow velocity, both of which have been shown to result in longer travel times⁵⁴ as a result of the TUCP, and thereby increasing predation risk relative to baseline conditions. However, limited exports will minimize the risk of entrainment into the pumping facilities for salmonids in the south Delta. Overall, the TUCP is expected to reduce the relative through-Delta survival of salmon by 10%, 9% and 9% in April, May and June, respectively.⁵⁵ These reduced survival rates reflect an increased routing risk into the interior Delta through the Delta Cross Channel⁵⁶. Historical patterns of juvenile outmigration indicate that most juvenile winter-run Chinook Salmon will exit the Delta by the end of April and conclude by the end of May. The TUCP has the greatest potential to negatively impact winter-run in April, a reduced risk in May, and little to no impact in June, based on historic distributions of juvenile winter-run Chinook Salmon. However, lifecycle modeling has not been conducted to estimate the full impact of the TUCP.

For the past two years, juveniles have experienced poor survival rates during outmigration. Acoustically tagged hatchery fish reflected a minimum overall survival rate down the mainstem Sacramento River from Redding to the Tower Bridge and through the Delta from Tower Bridge to Benicia of 3.2% and 3.6% in 2020 and 2021⁵⁷, respectively (Table 2).

⁵² Doug Killam with CDFW, Personal Communication, November 11, 2021.

⁵³ Available at: <https://media.fisheries.noaa.gov/2022-01/jpe-letter-2021.pdf>

⁵⁴ Romine, J. G., R. W. Perry, S. J. Brewer, N. S. Adams, T. L. Liedtke, A. R. Blake, and J. R. Burau. 2013. *The Regional Salmon Outmigration Study--survival and migration routing of juvenile Chinook salmon in the Sacramento-San Joaquin River Delta during the winter of 2008-09*. USGS Open-File Report 2013-1142. U.S. Geological Survey, Reston, VA.

⁵⁵ See Table WR3 in Appendix 2 of the TUCP filed on March 18, 2022.

⁵⁶ See Table WR4 in Appendix 2 of the TUCP filed on March 18, 2022.

⁵⁷ Data Available through CalFishTrack at <https://oceanview.pfeg.noaa.gov/CalFishTrack/index.html>

Acoustic tag studies in 2022 are expected to be conducted in April and May this year. Reductions in outmigration survival from the TUCP will compound on top of the poor spawning success observed in 2021 and be detrimental to the 2021 brood year of winter-run. Typically exhibiting a 3-year life cycle, a third consecutive year of poor overall survival may have population level impacts and threaten the persistence of winter-run.

Table 2. Survival rates of acoustically tagged, hatchery origin winter-run Chinook Salmon from 2020 and 2021

Year	Minimum Survival to the Delta (Tower Bridge)	Minimum Through-Delta Survival	Minimum Overall Survival
2020	13.2%	23.9%	3.5%
2021	10.1%	35.7%	3.6%

Adult winter-run may experience a temporary delay in upstream migration under the TUCP. However, the Petitioners have concluded that these temporary delays would not have any permanent physiological impairments. Reduced flows on Sacramento River at Freeport may dilute olfactory cues important for adult navigation to their natal stream and result in increased rates of straying⁵⁸. The TUCP is expected to have limited effects on adults through temporary delays to upstream migration, but the overall impacts remain uncertain for adult winter-run.

EOS storage in Shasta Reservoir is a key indicator of the ability to maintain temperatures for the benefit of winter-run, with increased EOS storage resulting in reduced temperature dependent mortality. As of March 20, 2022, Shasta storage was more than 600 TAF below the storage in 2021. While the TUCP is primarily expected to provide storage benefits in Oroville and Folsom reservoirs rather than Shasta, the TUCP will help to support maintenance of Shasta storage along with the Shasta planning process outlined in the IOP.

3.7.5 Spring-Run Chinook Salmon

Spring-run were listed as threatened under the ESA and CESA in 1999. The ESA listing was reaffirmed in 2005 and expanded to include the Feather River hatchery stock. Escapement of spring-run has remained persistently low since 2012. Spring-run adults migrate to natal streams between February and September, with peak migration in May and June. Following the summer holding period in cold water refugia, spawning occurs between late August and November with a peak in October and November. Juvenile spring-run express two different life history patterns. Some juveniles begin to migrate downstream into the Delta from late-fall through spring and exit the Delta by May as young-of-year (YOY). The remaining juveniles can rear in the streams for up to a year and emigrate from their natal streams as yearlings.

⁵⁸ California Department of Water Resources (2020). Final Environmental Impact Report for long-term operation of the California State Water Project. California Department of Water Resources, Division of Environmental Services, West Sacramento, CA

Yearling spring-run typically emigrate during the fall/early winter of the following year and have left the Delta by the end of January.

Although the Central Valley spring-run Chinook salmon were likely the most abundant salmonid in the Central Valley under historical conditions, large dams eliminated access to almost all historical habitat, and spring-run salmon populations have suffered the most severe declines of any of the four Chinook salmon runs in the Sacramento River basin. The Central Valley, as a whole, is estimated to have supported up to 600,000 spring-run salmon between the late 1880s and 1940s. However, from 1970 through 2012, the spring-run salmon run size estimates have fluctuated from highs near 30,000 to lows near 3,000.⁵⁹ During 2011-2020, the average annual spring-run salmon escapement was 10,641 fish, ranging from 1,591 fish in 2017 to 23,810 fish in 2013.

Similar to winter-run above, spring-run were exposed to unseasonably warm temperatures over summer of 2021. Pre-spawn mortality was observed to be over 90% on the Butte Creek system, the most productive stream for spring-run, with less than 1,500 adults remaining to spawn out of the 15,000 adults that returned in the spring. On the mainstem Sacramento River, water temperatures below Keswick Reservoir reached nearly 60 degrees Fahrenheit (F) during peak incubation in October, likely resulting in near total loss of spring-run eggs on the Sacramento River. The impacts of drought and warm temperatures likely resulted in poor spawning success for spring-run across the Central Valley in 2021.

Young of Year spring-run that manage to successfully hatch and emigrate in the Sacramento River basin will experience similar migratory impacts to winter-run Chinook as described above. Juvenile spring-run Chinook exhibit slightly later migration timings through the Delta than winter-run Chinook, with a greater proportion of juveniles present in the Delta during May and June. Through-Delta-survival will be reduced through the combination of reduced outflow and an increased routing risk to the interior Delta through the DCC and Georgiana Slough. For YOY emigrating from the San Joaquin River basin, the Petitioners indicated that increased CVP exports would increase through-Delta survival of juvenile salmon from the San Joaquin River basin based upon historic statistical relationships. However, the positive relationship between the CVP exports and juvenile survival reflects more fish being salvaged and later released at Chipps Island under higher CVP exports which is not expected to result in meaningful improvements in survival. Lower San Joaquin River flows at Vernalis under the TUCP would also be expected to result in reduced through-Delta survival. The overall impacts of the TUCP are difficult to discern due to a lack of life cycle modeling and compounding impacts of drought. Development of a life cycle model for spring-run has been limited by insufficient data, significantly larger range of occupied habitat, and challenges in distinguishing run types in salmonids during sampling.

As of March 29, SaMT estimated 100% of spring-run had yet to exit the Delta. There is the potential for nearly all juvenile YOY spring-run to be negatively impacted by the TUCP. Yearling spring-run are not expected to be present in the Delta during the TUCP and will not

⁵⁹ Azat, J. 2021. GrandTab.2021.06.30 California Central Valley Chinook Population Database Report. California Department of Fish and Wildlife.

be impacted. Overall, the TUCP will have greater negative impacts on YOY spring-run compared to winter-run, in addition to pre-existing impacts of the drought in 2021.

Adult spring-run will be present in the Delta during the TUCP and may experience similar migratory delays and risks of straying as winter-run, described above. Peak adult migration for spring-run has historically been during May and June, but migration occurs from as early as March and continues through September. Under the TUCP modification in May and June, the peak of adult migration will experience reduced flows through the Delta and possibly reduced olfactory cues for navigating back to natal streams that may result in increased rates of straying. The TUCP is expected to have limited effects on adults through temporary delays to upstream migration, but the overall impacts remain uncertain for adult spring-run.

3.7.6 Fall-Run Chinook Salmon

Central Valley fall-run and late-fall run Chinook salmon (fall-run) are a California Fish Species of Special Concern. Adult fall-run migrate upstream and spawn from late September through January. Generally, fall-run juveniles emigrate from their natal streams during winter through spring. Fall-run juveniles have typically exited the Delta by the end of June. Although fall-run are currently the most abundant of all Central Valley salmon runs, natural production of fall-run Chinook salmon in the mainstem Sacramento River has declined since 1967–1991. Of the three runs discussed in this Order, fall-run will have been the least impacted by drought conditions in 2021. Spawning during the later fall and winter months, fall-run would have benefited from natural cooling of water temperatures and increased flow from precipitations events.

Juvenile fall-run emigrating from the Sacramento River and rearing in the Delta from April through June will experience similar migratory impacts to those described above for winter-run Chinook. Fall-run emigrating from the San Joaquin River will experience similar uncertain changes to through Delta survival as described for spring-run above. Adult fall-run will not be present in the Delta from February through April and will not be impacted by the TUCP. A life cycle model for fall-run does not exist due to similar challenges as described for spring-run above.

Fall-run on the American and Feather Rivers are expected to benefit to some extent from increased reservoir storage in Folsom and Oroville reservoirs as a result of the changes in the TUCP that are expected to improve temperature management to some degree. However, updated operational outlooks and temperature modeling are not currently available to fully evaluate expected benefits.

3.7.7 Central Valley Steelhead

Steelhead were listed as threatened under the ESA in 1998. Adult steelhead typically migrate upstream and spawn during the winter months when river flows are high and water clarity is low. Unlike Chinook salmon, adult steelhead may not die after spawning and can return to coastal ocean waters and return to spawn more than once. Juvenile steelhead rear for 1 or 2 years in cool, clear, fast-flowing, streams and rivers (Moyle 2002). Outmigration of juvenile steelhead peaks from February through May for the Sacramento River and April through May for the San Joaquin River.

Juvenile steelhead emigrating through the Delta are expected to experience similar migratory impacts described for winter-run above. However, the full measure of the impacts is uncertain for steelhead because survival as a function of flow has not been examined in a similar manner to that of Chinook Salmon. As with juvenile winter-run, limited rates of export should minimize the risk of entrainment to juvenile steelhead. Unlike spring-run, Petitioners concluded that juvenile steelhead emigrating from the San Joaquin River basin are expected to have a 25% reduction in through-Delta-survival due to the TUCP than the base case for the month of April, and no change for May and June.⁶⁰ A life cycle model for steelhead does not exist due to similar challenges as described for the spring-run above.

Juvenile steelhead on the American and Feather Rivers are expected to benefit to some extent from increased reservoir storage in Folsom and Oroville reservoirs as a result of the changes in the TUCP that are expected to improve temperature management to some degree for the benefit of steelhead. However, updated operational outlooks and temperature modeling are not currently available to fully evaluate expected benefits.

3.7.8 Southern Distinct Population Segment of Green Sturgeon

Green sturgeon were listed as threatened under the ESA in 2006. Information on green sturgeon is extremely limited; thus information on their life history is inferred from those of white sturgeon. Adult green sturgeon begin their upstream spawning migration into the San Francisco Bay in March, reach Knights Landing during April, and spawn between March and July. Juveniles spend 1 to 4 years in freshwater and estuarine habitats before they enter the ocean. Juvenile green sturgeon are routinely collected at the Projects salvage facilities throughout the year. Salvage records indicate that sub-adult green sturgeon may be present in the Delta during any month of the year in low numbers but are most commonly salvaged in July and August. There was no salvage of Green Sturgeon during WY 2021. The Projects' exports will be at low levels during the duration of the TUCP Order; therefore, salvage is expected to remain low to zero.

Juvenile and sub-adult green sturgeon typically occupy regions of the Delta which are tidally dominated and not effected heavily by riverine flows. However, the biological processes are poorly understood for juveniles and sub-adults and the impacts of the TUCP and reduced Delta outflows remain uncertain. Similar to adult winter-run Chinook salmon, adult green sturgeon may experience minor delays in migration travel times in April through June, but the impacts are not expected to be significant.

3.8 Emergency Drought Salinity Barrier

On May 14, 2021 DWR applied for water quality certification to install the EDSB at West False River to help preserve water quality in the Delta.⁶¹ The temporary rock barrier reduces the intrusion of high-salinity water into the central and south Delta, helps to protect water supplies used by people who live in the Delta and in Contra Costa, Alameda, and Santa Clara counties, and allows water managers to retain more water in upstream reservoirs for release later in the year. The State Water Board evaluated the temporary rock barrier's potential

⁶⁰ See Table SH3 in Appendix 2 of the TUCP filed on March 18, 2022.

⁶¹ State Water Board, Water Quality Certification Program Public Notices. https://www.waterboards.ca.gov/waterrights/water_issues/programs/water_quality_cert/docs/emergency_drought_barriers/edb_2021_public_notice.pdf

Executive Director the authority to hold a hearing, if necessary, and act on a TUCP. (Resolution 2012-0029, ¶¶ 2.2, 4.4.1.)⁶⁴

The Petitioners filed the TUCP on March 18, 2022, and the State Water Board issued notice of the TUCP the same day. The State Water Board also posted the TUCP and associated notice on its website and notified persons on its email distribution accordingly, and instructed the Petitioners of their obligation to publish the State Water Board notice in newspapers having general circulation and published within the counties wherein the points of diversion lie. (Id., 1438, subd. (b)(1).) In its notice, the State Water Board advised that objections to the TUCP would be accepted until noon on Wednesday, April 6, 2022. The State Water Board will give prompt consideration to any such objections received, which may form the basis for future modifications of this Order.

6.0 REQUIRED FINDING OF FACT

Water Code section 1435 provides that a permittee or licensee who has an urgent need to change the point of diversion, place of use, or purpose of use from that specified in the permit or license may petition for a conditional temporary change order. The State Water Board's regulations set forth the filing and other procedural requirements applicable to TUCPs. (Cal. Code Regs., tit. 23 §§ 805, 806.) The State Water Board's regulations also clarify that requests for changes to permits or licenses other than changes in the point of diversion, place of use, or purpose of use may be filed, subject to the same filing and procedural requirements that apply to changes in point of diversion, place of use, or purpose of use. (Id., § 791, subd. (e).)

Before approving a temporary urgency change, the State Water Board must make the following findings:

1. the permittee or licensee has an urgent need to make the proposed change;
2. the proposed change may be made without injury to any other lawful user of water;
3. the proposed change may be made without unreasonable effect upon fish, wildlife, or other instream beneficial uses; and
4. the proposed change is in the public interest.

(Wat. Code, § 1435, subd. (b)(1-4).)

The State Water Board exercises continuing supervision over TUCOs and may modify or revoke TUCOs at any time. (Wat. Code, §§ 1439, 1440.) TUCOs expire automatically 180 days after issuance, unless they are revoked, or an earlier expiration date is specified. (Id., § 1440.) The State Water Board may renew TUCOs for a period not to exceed 180 days. (Id., § 1441.)

⁶⁴ The Deputy Director for Water Rights may act on a temporary urgency change petition if there are no objections to the petition.

6.1 Summary of the Ordering Conditions that Support the Required Findings of Fact

As summarized and described in the introduction, this Order conditionally approves changes to Delta outflow requirements; Western Delta agricultural salinity requirements on the Sacramento River at Emmaton; San Joaquin River flow requirements at Airport Way Bridge, Vernalis; and allowable exports from the Delta from April through June 2022. This Order also includes the following conditions, which are intended to ensure that the changes can be made (1) without injury to other legal users of water; (2) without unreasonable effects on fish, wildlife, or other instream beneficial uses; (3) consistent with the public trust doctrine; and (4) in the public interest:

- To prevent injury to other lawful users of water, the compliance location for EC will remain at Emmaton when the Projects are directly diverting or storing water on a net basis from sources within the Bay-Delta watershed and not supplementing flows in the Delta to meet water quality or flow requirements.
- For the benefit and protection of fish and wildlife on the San Joaquin River, variable daily flows and spring pulse flows on the Stanislaus River may be implemented consistent with the letter from the State Water Board's Executive Director to Reclamation regarding compliance with D-1641 San Joaquin River at Vernalis flow requirements dated March 7, 2022. To the extent that any modifications are made to daily variable flows or spring pulse flows, Reclamation is required to submit documentation of the modifications, including associated concurrence from the fisheries agencies.
- During the effective period of the changes approved in this Order, at least 5 working days prior to conducting any water transfers, the Petitioners must provide detailed accounting for the transfers to the State Water Board identifying: the volume of water being transferred, when, and between which parties; how water is being made available for transfer; and information to support that the transfers will not cause injury to other legal users of water or unreasonable impacts to fish, wildlife, or other instream beneficial uses, including through reductions in carryover storage in Project reservoirs or stream depletions due to groundwater substitution transfers.
- The Executive Director reserves authority to modify the requirements of this Order, including the export limits, to ensure that the changes approved in this Order are in the public interest and meet the intent of this Order to improve reservoir storage conditions for the protection of health and safety water supplies and the environment. In order to inform the Executive Director's determinations, the Petitioners must provide an accounting of the total quantities of SWP and CVP water planned to be exported from the Delta, the purposes for which that water will be exported, and an explanation of why it is in the public interest to export that water when D-1641 requirements are not being met. This information must be provided 5 days in advance of export operations and must cover operations from April through June 2022.
- During the effective period of this Order, in the circumstance that precipitation events occur that enable the Petitioners to fully comply with the D-1641 Delta outflow and

Sacramento River at Emmaton salinity requirements, then the applicable D-1641 exports limits are operative, except that any SWP and CVP exports greater than 1,500 cfs are required to be limited to natural or abandoned flow, or transfers as specified in condition 1.d.ii.

- Water deliveries and exports for other than health and safety purposes are not authorized to be greater under the changes approved in this Order than would occur absent the changes approved in this Order. DWR and Reclamation must provide documentation by the 10th of each month confirming that water deliveries and exports during the prior month were no greater under the TUCP Order than they would have been absent the TUCP approval.
- The Petitioners must consult on a regular basis with designated representatives from the State Water Board and the fisheries agencies concerning current conditions and potential changes to SWP and CVP operations to meet health and safety requirements and to reasonably protect all beneficial uses of water.
- In the event of improved hydrologic conditions next year, the Petitioners must evaluate the feasibility of dedicating a portion of the water conserved as a result of the changes approved in this Order to provide pulse flows or other flow enhancements above and beyond D-1641 requirements.
- The Petitioners must conduct modeling, monitoring, analysis, and reporting and prepare other technical information necessary to inform operational decisions and assess drought emergency actions authorized by this Order and any subsequent TUCOs in combination with other drought actions.
- In coordination with the State Water Board, Central Valley Water Board, IEP, DSP), the fisheries agencies, and USEPA, DWR and Reclamation shall continue and build upon the special study on the prevalence and extent of HABs and expansion of invasive aquatic weeds in the Delta, and prepare a report identifying long-term monitoring needs and implementation options for HABS to generate baseline information needed to evaluate potential effects of future drought response actions.
- Pursuant to the requirements of this Order and State Water Board Order WR 90-5, Reclamation, in consultation with the fisheries agencies, must implement the Sacramento River Temperature Management Plan as approved by the Executive Director.
- Pursuant to the requirements of this Order and State Water Board Water Quality Certification for the West False River EDSB, the Petitioners must implement the EDSB Monitoring Plan, conduct associated impact analyses, and complete reporting required by the certification.
- Petitioners must immediately notify the Executive Director if any significant change in conditions occurs that warrants reconsideration of this Order.

This Order reserves the Executive Director's and State Water Board's authority to require modifications to the Order based on public or agency comments or objections or changed circumstances.

6.2 Urgent Need for the Proposed Change

Under Water Code section 1435, subdivision (c), an "urgent need" means "the existence of circumstances from which the board may in its judgment conclude that the proposed temporary change is necessary to further the constitutional policy that the water resources of the state be put to beneficial use to the fullest extent of which they are capable and that waste of water be prevented..."

The Governor's May 2021 statewide drought proclamation emphasized the severity of the ongoing, multi-year drought and the need for state agencies to take action to conserve available water supplies. The proclamation specifically directs the State Water Board to consider modifying requirements for reservoir releases to conserve water for multiple beneficial uses, including water quality and human health and safety.

Storage levels in SWP and CVP reservoirs are critically low and are expected to recede quickly over the coming spring, summer, and fall months as precipitation remains low; remaining snowmelt is abstracted by dry soils depleted of moisture from successive years of drought; snowmelt is sublimated due to excessively warm conditions and lack of canopy cover from burn scars; and water is released from Project reservoirs for salinity control, fish and wildlife protection, and water supply. The cumulative effects of successive years of drought, low reservoir inflow, and reservoir releases have created an immediate and urgent need to conserve remaining reservoir storage through conditional relaxation of requirements imposed on the Projects by D-1641, which would require bypassing of significant reservoir inflows and releases of previously stored water from reservoirs. The repeat occurrence of extreme dry conditions over the last two decades and need for TUCPs over the last decade also points to longer term consideration of the impacts of climate change and need for associated longer term planning and implementation actions outside of TUCPs.

Relevant to the issue of urgency, as well as the findings regarding unreasonable impacts on fish and wildlife and the public interest, are the reservoir storage and water supply benefits that are expected as a result of the changes approved by this order. The projected storage benefits resulting from the proposed changes, are expected to be over 500 TAF in Oroville and Folsom reservoirs, with modest benefits to New Melones Reservoir of 10 TAF according to the February operations outlook. While this outlook does not reflect the Shasta operations discussed above nor recent hydrologic conditions, it provides an estimate of projected storage benefits from the changes approved in this order. The storage benefits would derive from reduced reservoir releases and commensurate reductions in Feather, American, and Stanislaus River flows, and will improve the Projects' ability to maintain a degree of salinity control in the Delta while meeting various water supply obligations for human health and safety, minimum contract allocations, minimal environmental protections, and critical hydropower production. There will be impacts to fish and wildlife from the reduced flows and other changes approved by this Order, but these effects will be offset to some extent by conserving storage for salinity control, minimum water supply allocations, and minimal

fisheries protections, including temperature management as discussed above. Although changes approved by this order are not expected to contribute significantly to conservation of storage in Shasta Reservoir, modification of Shasta Reservoir operations for temperature control and other purposes is currently being addressed through the IOP and Sacramento River temperature management processes described above in the background section of this order.

Maintaining normal Project operations to meet Delta outflow, salinity, and San Joaquin River flow objectives established in D-1641 could have a variety of effects depending how operations would be prioritized. It could significantly deplete storage, reduce deliveries north of the Delta and reduce opportunities to export water, making those supplies unavailable for the remainder of the season, for water supply contractors, prior water right holders, fisheries protection, control of Delta salinity and refuge supplies. Reductions in surface water supplies would also place additional strain on already significantly depleted groundwater basins. As such, there is an urgent need for these changes.

In summary, in light of the severe magnitude of the drought, there is an urgent need for the proposed changes to address or help to minimize the significant impacts to water supplies that have occurred over the last three years, and to help address and avoid associated impacts to salinity control, health and safety supplies, hydropower production, economic impacts, as well as impacts to fish, wildlife, and beneficial uses, especially given that foregone opportunities to conserve storage for later use cannot be regained.

6.3 No Injury to Any Other Lawful User of Water

The proposed changes as conditioned will not injure any other lawful user of water. As used in Water Code section 1435, the term “injury” means invasion of a legally protected interest. (State Water Resources Control Board Cases (2006) 136 Cal.App.4th 674, 738-743.) Riparian and appropriative water right holders with rights to divert water below Project reservoirs only are entitled to divert natural and abandoned flows, and in the case of riparians, only natural flows; they are not entitled to divert water previously stored or imported by the Projects that is released for use downstream, including stored water that is released for purposes of meeting water quality or flow requirements. Similarly, water right holders only are entitled to the natural flows necessary to provide adequate water quality for their purposes of use; they are not entitled to have water released from upstream storage in order to provide better water quality than would exist under natural conditions, and they are not entitled to better water quality than necessary to allow them to use the water to which they are entitled. (See Wright v. Best (1942) 19 Cal.2d 368, 378-379; see also Deetz v. Carter (1965) 232 Cal.App.2d 851, 856.)

The proposed changes to the Western Delta agricultural salinity requirement in the TUCP have the potential to impact other legal users of water if the Projects were diverting natural flows at times that the changes are in effect because those diversions could lead to worse water quality than would exist absent the Project’s operations. However, if the Projects are not diverting natural flows and are supplementing natural flows with storage releases to maintain water quality in the Delta, the proposed changes would not impact other legal users of water because other water right holders do not have the right to better water quality than would exist absent the Project’s operations. Accordingly, to ensure that the TUCP does not

impact other legal users of water this order does not allow for changes in the Western Delta salinity compliance location when the Projects are collectively directly diverting or storing water on a net basis from sources within the Bay-Delta watershed and not supplementing flows in the Delta to meet water quality or flow requirements. When the Projects are not diverting water, they will be permitted to meet salinity requirements at Threemile Slough instead of Emmaton. Records of historic salinity measurements indicate that increases in salinity from this change would be less than what would occur without the Projects because the Projects ensure that salinity does not intrude upstream into the Delta by supplementing natural inflow with storage releases in critically dry conditions like this year when salinity would otherwise intrude far upstream into the Delta in the summer and fall. Moreover, approval of the proposed changes does not affect the Petitioners' obligation to curtail their diversions of natural and abandoned flows to the extent necessary to protect senior water right holders, or to meet any independent contractual obligations that the Petitioners may have. Based on the information provided, and as conditioned herein, the proposed changes will not injure other users of water due to changes in water quality.

6.4 No Unreasonable Effect upon Fish, Wildlife, or Other Instream Beneficial Uses

The changes proposed in the TUCP have the potential to negatively impact fish species, both migratory and resident, as described in the background section 3.7 above and in Appendix 2 of the TUCP. Many fish populations experienced relatively high population abundances in 2021 which will be heavily impacted by the extremely dry hydrologic conditions and potentially exacerbated by the TUCP. While the potential for upstream benefits was not analyzed in the Petitioners' TUCP Biological Review, it is expected that the TUCP would improve upstream storage in Folsom and Oroville reservoirs to improve temperature management to some extent and minimal instream flows, as well as supporting Shasta operations described above for the benefit of Sacramento River temperature management and other purposes. In determining whether the impacts of the proposed changes on fish and wildlife are reasonable, the short-term impacts to fish and wildlife must be weighed against the long-term impacts to all beneficial uses of water if the changes are not approved, including impacts to salinity control in the Delta, health and safety supplies, hydropower production, irrigated agriculture, municipal and industrial use, use by wildlife refuges, stored water needed for downstream temperature control, and other fish and wildlife uses. Further, the effects that have occurred to the species over several years must be considered.

Migratory salmonids will primarily be impacted by the TUCP during their juvenile life stage as they migrate from their natal streams and through the Delta. Following a year with historic low survival after spawning, reduced Delta outflow in April will increase travel times of migratory salmonids, including steelhead, winter-run, spring-run and fall-run, and reduce the overall survival of juveniles exiting the Delta. The month of April has the greatest overlap in the presence of different salmonid runs in the Delta and has the greatest potential for negative impacts to migratory fish, reducing through-Delta-survival by approximately 10% for fish originating from the Sacramento River Basin. For salmonids and steelhead outmigrating from the San Joaquin River, the TUCP has the potential to increase entrainment risk at the pumping facilities, but through-Delta-survival is expected by the Petitioners to be similar to the baseline conditions that would result under the dry hydrologic conditions. A lack of understanding of all driving mechanisms and the impacts of drought on juvenile salmonids is a limiting factor in understanding the full impacts of the TUCP.

The impacts on migratory salmonids and steelhead in May and June are more uncertain. Juveniles will be exiting the Delta as early as March and most will have exited by the end of May as water conditions warm and become increasingly inhospitable, reducing the overall impact of the TUCP as fish presence diminishes. Furthermore, the hydrology this year is very close to the regulatory off-ramp⁶⁵ that would prevent the need for a TUCP in May and June to reduce Delta outflow to 4,000 cfs. Through-Delta-survival for Chinook salmon is expected to be reduced by 9% in both May and June for fish present. Winter-run are expected to have nearly completely exited the Delta by the end of April and entirely exited by the end of May. Spring-run, fall-run, and steelhead will have a greater proportion of their populations impacted during the month of May, but few individuals will remain in June and impacts are expected to be minimal. A lack of migration and survival studies for steelhead migrating through the Delta from the Sacramento River limits the complete understanding of the TUCP impacts.

Upstream benefits to salmonids and steelhead were not evaluated by the petitioners. However, NMFS believes increased storage in Folsom and Oroville is expected to improve summer temperatures for anadromous fish on the Feather River and American River⁶⁶. Both reservoirs will still face a very challenging temperature management season with the TUCP, but the conditions will be improved over baseline to some degree.

For resident fish, Delta smelt and longfin smelt will experience reduced food abundance, more degraded habitat and limited recruitment as a result of the TUCP and reduced Delta outflow in May through June. Longfin smelt and Delta smelt have both experience relative highs in population abundance in 2021, through a naturally high FMWT abundance index for longfin smelt and supplemental hatchery releases of 45,000 cultured Delta smelt. The TUCP is expected to reduce the abundance of a key Delta smelt prey species, *E. affinis*, by 14% and suitable habitat in the North Delta by 27%, resulting in negative impacts to the Delta smelt population. The USFWS attributes the negative impacts to Delta smelt to the long-term effects of drought conditions and does not expect the TUCP to significantly increase these impacts⁶⁷. Similar to winter-run, a life cycle model exists for Delta smelt but was not used to quantify the impacts of the TUCP on Delta smelt recruitment. The impacts to longfin smelt were estimated based on a historic correlation between winter-spring Delta outflow and the FMWT abundance index. Reduced outflow from the TUCP, in addition to reducing key prey species, is estimated to reduce longfin smelt recruitment and the FMWT abundance index by 5% in 2022.

To ensure that the changes approved in this Order that may reduce flows will not have unreasonable impacts on fish and wildlife, this Order includes several provisions including: 1) ensuring that the approved TUCP changes are focused on rebuilding reservoir storage and health and safety supplies by limiting the amount of water delivered for other purposes to no greater than would occur without the TUCP; 2) in the event of improved hydrologic conditions next year, requiring the Petitioners to evaluate the feasibility of dedicating a portion of the water conserved as a result of the changes approved in this Order to provide pulse flows or

⁶⁵ See footnote [10] of Table 3 in the Revised Water Right Decision 1641.

⁶⁶ NMFS March 25, 2022, Letter Regarding the TUCP. Available at: https://www.waterboards.ca.gov/drought/tucp/docs/2022/20220325_Letter_NMFS.pdf

⁶⁷ USFWS March 25, 2022, Letter Regarding the TUCP. Available at: https://www.waterboards.ca.gov/drought/tucp/docs/2022/20220325_Letter_USFWS.pdf

other flow enhancements; 3) requiring the Petitioners to conduct modeling, monitoring, analyses, reporting, and other actions necessary to inform operational decisions and assess drought emergency actions authorized by this Order and any subsequent TUCOs in combination with other drought actions; and, other provisions discussed above.

As discussed above, historically low snowpack will result in very low inflows the remainder of the year that typically maintain stream flows over the summer and provide inflows to reservoirs. These dry conditions are expected to adversely affect habitat conditions for various species. While maintaining the D-1641 flow and water quality requirements would provide some short-term benefits to these species, the overriding effects of the drought would persist. Further, meeting those requirements would reduce the storage available in Project reservoirs later in the year for temperature management and instream flows; power production; deliveries to agriculture, municipalities, wildlife refuges and other users; salinity control; and minimal reserves going into the next water year. As discussed above, of particular concern this year is ensuring that adequate water remains in storage in Oroville Reservoir to provide for power production at the Hyatt Powerplant through the summer and fall, and storage in Folsom Reservoir to maintain water quality for municipalities and temperature management, as well as supporting Shasta reservoir operations for multiple purposes and maintaining overall supplies for salinity control and health and safety supplies. Based on the above, the potential for impairment to fish, wildlife, or other instream beneficial uses from the approved temporary changes is not unreasonable considering the benefits of the changes, and the impacts that could occur if the temporary changes are not approved.

6.5 Impacts to Public Trust Resources

Prior to approval of a TUCP, the Board must find that the proposed change may be made without unreasonable effect upon fish, wildlife, or other instream beneficial uses. In addition, the State Water Board has an independent obligation to consider the effect of the approval of changes in this Order on public trust resources and to protect those resources to the extent feasible and in the public interest. (National Audubon Society v. Superior Court (1983) 33 Cal. 3d 419, 446-447.) Public trust uses include navigation, commerce, fishing, recreation, and the preservation of fish and wildlife habitat. Specific additional public trust resource areas of known concern, in addition to fish and wildlife, are discussed below.

6.5.1 Harmful Algal Blooms and Aquatic Weeds

Harmful algal blooms and aquatic weeds are ubiquitous in many parts of the Delta during the warmer months. Drought conditions, like warmer temperatures and reduced flow velocities, enhance the potential for HABs and the excessive growth of aquatic weeds. The requested actions of the TUCP may contribute to increased blooms or the acceleration of blooms into the month of June through additional reductions in Delta outflow; however, the extent to which the requested TUCP actions will increase HABs or the prevalence of aquatic weeds above the general drought conditions is unknown. This Order includes a condition requiring DWR and Reclamation to continue and expand upon the special study on HABs and aquatic weeds by monitoring for cyanotoxin concentrations in areas where this Order may modify hydrodynamics to Delta waterways. In addition, DWR and Reclamation are required to prepare a report identifying long-term monitoring needs and implementation options for HABs, including the trends in HABs, potential adverse impacts of HABs to beneficial uses of water in

the Delta, and the environmental factors that may influence the variability in HABs in the Delta. To the extent that the changes would impact public trust uses due to an increase in HABs or aquatic weeds, the conditions of this Order would protect those uses to the extent feasible and in the public interest. In light of the extremely dry conditions and benefits of the changes to carryover storage, it would not be in the public interest to deny the TUCP, notwithstanding the potential increase in HABs and aquatic weeds.

6.5.2 Recreation

The temporary reductions in Delta outflow and relaxation of western Delta salinity requirements in D-1641 approved by this Order are not expected to impact water contact recreation that depends on water surface elevation to support activities. Water surface elevation in the Delta is determined by the rise and fall of the tides, which results in upstream and downstream movement of large volumes of water and produces flows and velocities that are generally much greater than the volume of water associated with net Delta outflow. Temporary changes to D-1641 Delta outflow and the western salinity requirements approved in this Order may impact water contact and non-water contact recreation to the extent that they promote conditions that increase the occurrence and severity of HABs, SAV, or other aquatic weeds. Temporary changes in Delta outflow may also impact recreational fishing by modifying survival of fish species that depend on different types of habitat. For example, reductions in Delta outflow may negatively impact juvenile fall-run survival, which could result in fewer adults and a shorter recreational fishing season when the cohort returns in three years. Reductions in Delta outflow may result in habitat conditions that promote survival of introduced recreational fish such as largemouth bass. While this may be a positive impact for recreational fishing of largemouth bass, it is also a negative impact to native fish species consumed by largemouth bass and other predators that use similar habitat. There may be short-term impacts to contact and non-contact recreation and recreational fishing associated with this Order. However, these impacts are not contrary to the public interest in the context of the need to conserve water in reservoirs for use later in the year.

6.5.3 Water Quality and Available Habitat

As described in sections 3.7, 6.3 and 6.4, reductions in Delta outflow and relaxation of the western Delta salinity requirements requested by the TUCP are expected to allow salinity to intrude further upstream when DWR and Reclamation are not diverting or storing water from sources in the Bay-Delta watershed which degrades habitat for native and migratory fish populations and reduces water quality for agricultural uses. However, while the western Delta salinity requirements are being relaxed when DWR and Reclamation are not diverting or storing water compared to D-1641 requirements, the salinity conditions are expected to be similar or better than the natural conditions because DWR and Reclamation would be bypassing all available flow or supplementing flows. Fish and wildlife habitat would be protected to the extent feasible and in the public interest by the conditions of this Order. The near-term potential negative impacts to fish and wildlife are not considered contrary to the public interest in the context of extremely dry conditions, the need to maintain salinity control in the Delta, and the ability to use water conserved in storage later in the year to support multiple beneficial uses such as temperature control for salmon, salinity control in the Delta, and water supply for municipal, industrial, and agricultural uses.

6.6 The Proposed Change is in the Public Interest

The temporary modifications authorized in this Order will make the best use of limited water supplies, within the context of the TUCP process, and are accordingly in the public interest. As discussed above, hydrologic and water supply conditions in the Bay-Delta watershed continue to be highly impacted by the drought and are inadequate to meet all of the needs for water in the basin this year and heading into next year if conditions continue to be dry. To respond to these conditions, the changes in the Order are warranted to reduce to some extent the significant salinity, fisheries, hydropower, and water supply related impacts expected if conditions remain dry. The changes approved in this Order will help conserve stored water so that it can be released for multiple purposes the rest of this year, including salinity control in the Delta and minimal health and safety supplies. The changes approved in this Order balance the various uses of water now and in the future while preserving water right priorities and protecting the public interest. This Order also requires planning, modeling, consulting, monitoring, and reporting and reserves authority to modify the Order to ensure that it remains in the public interest.

7.0 CONCLUSIONS

The State Water Board has adequate information in its files to make the evaluation required by Water Code section 1435 concerning the modification and renewal of the TUCP Order discussed above.

I conclude that, based on the available evidence:

1. The Petitioners have an urgent need to make the proposed changes;
2. The petitioned changes; as conditioned by this Order, will not operate to the injury of any other lawful user of water;
3. The petitioned changes, as conditioned by this Order, will not have an unreasonable effect upon fish, wildlife, or other instream beneficial uses; and
4. The petitioned changes, as conditioned by this Order, are in the public interest.

ORDER

NOW, THEREFORE, IT IS ORDERED that the petition for temporary urgency change in permit and license conditions under Permits 16478, 16479, 16481, 16482 and 16483 (Applications 5630, 14443, 14445A, 17512 and 17514A, respectively) of the Department of Water Resources (DWR) for the State Water Project (SWP) and License 1986 and Permits 11315, 11316, 11885, 11886, 11887, 11967, 11968, 11969, 11970, 11971, 11972, 11973, 12364, 12721, 12722, 12723, 12725, 12726, 12727, 12860, 15735, 16597, 20245, and 16600 (Applications 23, 234, 1465, 5638, 13370, 13371, 5628, 15374, 15375, 15376, 16767, 16768, 17374, 17376, 5626, 9363, 9364, 9366, 9367, 9368, 15764, 22316, 14858A, 14858B, and 19304, respectively) of the United States Bureau of Reclamation (Reclamation) for the Central Valley Project (CVP); is approved in part, subject to the following terms and conditions. Except as otherwise provided below, all other terms and conditions of the subject license and permits, including those added by the State Water Resources Control Board (State Water Board) in Revised Decision 1641 (Decision 1641) shall remain in effect. The changes approved in this Order shall be effective until June 30, 2022, and the other conditions shall remain effective until satisfied.

1. Except as otherwise provided in condition 2, below, during the time periods specified below, or until such time as this Order is amended or rescinded, the requirements of Decision 1641 for DWR and Reclamation to meet specified water quality objectives are amended as follows:
 - a. From April 4 through June 30, 2022, the minimum Delta outflow level specified in Table 3 of D-1641 as measured by the Net Delta Outflow Index (NDOI) described in Figure 3 of D-1641 shall be 4,000 cubic feet per second (cfs) on a 14-day running average.
 - b. From April 4 through June 30, 2022, the Western Delta, Sacramento River at Emmaton electrical conductivity (EC) compliance location specified in Table 2 of D-1641 is moved to Threemile Slough on the Sacramento River. To prevent injury to other lawful users of water, the compliance location for electrical conductivity shall remain at Emmaton when the Projects are directly diverting or storing water on a net basis from sources within the Bay-Delta watershed and not supplementing flows in the Delta to meet water quality or flow requirements.
 - c. From April 4 through June 30, 2022, the minimum monthly average flow requirement on the San Joaquin River at Airport Way Bridge, Vernalis, shall be 710 cfs. Variable daily flows and a spring pulse flow may also be implemented consistent with the letter from the State Water Board's Executive Director to Reclamation regarding compliance with D-1641 San Joaquin River at Vernalis flow requirements dated March 7, 2022 (insert footnote reference). To the extent that any modifications are made to daily variable flows or spring pulse flows, Reclamation shall submit documentation of the modifications, including associated concurrence from the fisheries agencies.
 - d. From April 4 through June 30, 2022, the maximum Export Limits specified in Table 3 of D-1641 are modified as follows:

- i. The combined maximum diversions at the SWP Banks Pumping Plant and the CVP Jones Pumping Plant, excluding transfers, shall be limited to pumping no greater than 1,500 cfs, as a 3-day running average or an alternate averaging period as approved by the Executive Director.
 - ii. During the effective period of the changes approved in this Order, at least 5 working days prior to conducting water transfers, the Petitioners shall provide detailed accounting for the transfers to the State Water Board identifying: the volume of water being transferred, when, and between which parties; how water is being made available for transfer; and information to support that the transfers will not cause injury to other legal users of water or unreasonable impacts to fish, wildlife, or other instream beneficial uses, including through reductions in carryover storage in Project reservoirs or stream depletions due to groundwater substitution transfers.
 - iii. The Executive Director reserves authority to modify the requirements of this Order, including the export limits, to ensure that the changes approved in this Order are in the public interest and meet the intent of this Order to improve reservoir storage conditions for the protection of health and safety water supplies and the environment. In order to inform the Executive Director's determinations, the Petitioners shall provide an accounting of the total quantities of SWP and CVP water planned to be exported from the Delta, the purposes for which that water will be exported, and an explanation of why it is in the public interest to export that water when D-1641 requirements are not being met. The information shall be provided 5 days in advance of export operations and shall cover operations from April through June 30, 2022.
 - iv. During the effective period of this Order, in the circumstance that precipitation events occur that enable the Petitioners to fully comply with the D-1641 Delta outflow and Sacramento River at Emmaton salinity requirements, then the applicable D-1641 exports limits shall be operative, except that any SWP and CVP exports greater than 1,500 cfs shall be limited to natural or abandoned flow, or transfers as specified in condition 1.d.ii.
2. The purpose of the changes approved in this Order are to improve Project reservoir storage conditions to ensure minimal needed supplies for health and safety needs, salinity control, and environmental protections. Accordingly, water deliveries and exports for other than health and safety purposes shall be no greater under the changes approved in this Order than would occur absent the changes approved in this Order. DWR and Reclamation shall provide documentation by the 10th of each month confirming that water deliveries and exports during the prior month were no greater under the TUCP Order than they would have been absent the TUCP approval.
3. The Petitioners shall consult on a regular basis with designated representatives from the State Water Board, the Department of Fish and Wildlife (CDFW), National Marine Fisheries Service (NMFS), and U.S. Fish and Wildlife Service (USFWS) (collectively

fisheries agencies) concerning current conditions and potential changes to SWP and CVP operations to meet health and safety requirements and to reasonably protect all beneficial uses of water.

4. The Petitioners shall calculate and maintain a record of the amount of water conserved in storage and identify the reservoir(s) where storage is conserved. These records shall be submitted on a monthly basis to the State Water Board and fisheries agencies within 10 business days after the first day of the following month. Documentation shall include, but is not limited to, the volume of water needed to meet D-1641 flow and salinity requirements and the volume of water conserved as a result of each of the changes approved by this Order, including the volume of water conserved from modifying Delta outflows, San Joaquin River flows, and Western Delta salinity individually.
5. Through the remainder of the water year, the Petitioners shall submit updated monthly water year operations outlooks identifying information described in a. through f. below. The outlooks shall be posted on DWR's website and updated as necessary based on changed conditions. Monthly updates shall be posted and provided to the State Water Board and fisheries agencies within 20 working days after the first day of the month.
 - a. Upstream: Inflows to and storage levels in the major reservoirs (Shasta, Folsom, Oroville, Trinity, Whiskeytown, San Luis, and New Melones). River releases from the aforementioned reservoirs. Transfers from the Trinity system, including Carr Power Plant and Spring Creek Tunnel flows.
 - b. Delta inflows, channel depletions, exports, and outflows.
 - c. SWP: deliveries to Feather River Service Area contractors, north-of-Delta Table A contractors, south-of-Delta Table A contractors. Information regarding SWP deliveries shall include the monthly and total volume, volumes delivered to specific water users, and the basis of water right or contractual agreement under which the deliveries are made.
 - d. CVP: deliveries to Settlement contractors, American River municipal and industrial (M&I) contractors, Sacramento River agricultural water service contractors, Sacramento River M&I water service contractors, Contra Costa Water District, north-of-Delta refuges, exchange contractors, south-of-Delta agricultural water service contractors, south-of-Delta M&I water service contractors, south-of-Delta refuges, East side water right holders, New Melones East side, and Friant Unit. Information regarding CVP deliveries shall include the monthly and total volume, volumes delivered to specific water users, and the basis of water right or contractual agreement under which the deliveries are made.
 - e. South-of-Delta water transfers, including the transferors, transferees, and the quantities transferred.
 - f. Monthly coordinated operations agreement balances.

6. In the event of improved hydrologic conditions next year, the Petitioners shall evaluate the feasibility of dedicating a portion of the water conserved as a result of the changes approved in this Order to provide pulse flows or other flow enhancements above and beyond D-1641 requirements. The Petitioners shall submit a report of findings and feasible flow enhancement options to the Executive Director by March 15, 2023.
7. The Petitioners shall conduct modeling, monitoring, analysis, and reporting and prepare other technical information necessary to inform operational decisions and assess drought emergency actions authorized by this Order and any subsequent temporary urgency change orders in combination with other drought actions. Specifically, the Petitioners shall conduct monitoring and analyses, including implementation of the Interagency Ecological Program (IEP) annual workplan and ongoing monitoring in the upper watershed, needed to understand the effects of changes authorized by the TUCP Order in combination with other associated actions such as Sacramento River temperature management pursuant to State Water Board Order 90-5, the Interim Operations Plan approved by the United States District Court for the Eastern District of California on March 11, 2022, installation of the temporary drought barrier at False River, and changes to the estuarine salt field and aquatic habitat.
 - a. The Petitioners shall consult with the fisheries agencies and State Water Board staff through the consultation process described in Condition 3 above to identify needed modeling, monitoring, analyses, and reporting. Required modeling, monitoring, analyses, and reporting shall be determined by the Executive Director or other designated representative, taking into consideration inputs from the relevant agencies, including DWR, Reclamation, and the fisheries agencies.
 - b. The Petitioners shall make available technical information in a timeframe that is useful to support State Water Board decisions. Technical information and analyses may include, but are not limited to, planned operations (forecasts) of reservoirs and exports, examination of minimum export rates, modeling and monitoring information of water temperature and water quality parameters, monitoring and assessment information about potential impacts of operational changes on other water users and fish and wildlife, and any other relevant information requested by the fisheries agencies or State Water Board staff.
 - c. The Petitioners shall report to the Board at least monthly at its Board meetings on their drought operations, including information discussed in the terms of this order.
 - d. Consistent with the Governor's July 2020 Water Resilience Portfolio (Executive Order N-10-19), to prepare for and inform decisions regarding ongoing drought conditions, in coordination with the fisheries agencies (CDFW, NMFS, and USFWS), U.S. Environmental Protection Agency (USEPA), Central Valley Regional Water Quality Control Board (Central Valley Water Board), and State Water Board, DWR and Reclamation shall prepare a report identifying longer-term needs and implementation

plans for monitoring and modeling the effects of drought and TUCP actions on fish and wildlife and water quality. The report shall specifically address components identified in CDFW's April 1, 2022 letter regarding this TUCP related to evaluating effects on salmon, Delta smelt, and longfin smelt, including life cycle modeling, entrainment risk assessments, and mechanistic effects of Delta outflow changes. A draft report shall be submitted to the agencies by October 1, 2022, for a 30-day review and comment period and a final report addressing agency comments shall be submitted to the State Water Board by January 15, 2023, unless the Deputy Director for Water Rights approves a change to this schedule.

8. In coordination with the State Water Board, Central Valley Water Board, IEP, Delta Science Program (DSP), the fisheries agencies, and USEPA, DWR and Reclamation shall continue and build upon the special study on the prevalence and extent of harmful algal blooms (HABs) and expansion of invasive aquatic weeds in the Delta as required by the 2021 TUCP, 2021 Emergency Drought Salinity Barrier (EDSB) Certification, and the 2022 Order on Reconsideration of the 2021 TUCP. The special study shall identify the effects of this TUCP Order, any future TUCP Orders, and any associated actions including drought barriers on the prevalence and extent of HABs and expansion of invasive weeds in the Delta. The study shall include the measurements of cyanotoxin concentrations in areas where this TUCP Order may modify hydrodynamics to Delta waterways. The cyanotoxin samples shall be collected consistent with the requirements of any approved extension of the EDSB certification, including, at a minimum, the types of cyanotoxins analyzed, locations, frequency, triggers for additional monitoring, and methods. The draft study plan shall be submitted by April 20, 2022, to the coordinating entities identified in the condition for review and comment. The final study plan incorporating the coordinating entities' comments are due to the State Water Board by May 10, 2022. Cyanotoxin monitoring shall be initiated in May 2022.

The report shall summarize impacts to sub-regions of the Delta consistent with the localized nature of HABs and aquatic weeds and analyze potential for (or presence of) disproportionate impacts to vulnerable communities with respect to drinking water quality, contact and non-contact recreation, impacts to tribal cultural resources, and impacts to aesthetics including odors and the visual character of Delta waterways where HABs and aquatic weeds are prevalent or where this TUCP Order may modify hydrodynamics to Delta waterways. This work shall be coordinated with IEP and DSP, and any broader watershed evaluation of HABs and aquatic weeds.

An interim draft Report shall be submitted to the State Water Board by December 15, 2022, summarizing the results available at that time. A summary of the interim draft report shall be presented at a public Board meeting in January 2023, or as designated by the Deputy Director of the Division of Water Rights. A completed, draft Report shall be submitted to the State Water Board by April 1, 2023, released for public comment, and presented at a public Board meeting as determined in coordination with the Deputy Director of the Division of Water Rights. In coordination with the State Water Board, Central Valley Water Board, IEP, DSP, CDFW, and USEPA, DWR and Reclamation shall review and consider comments from the State Water Board, other agencies, and the public

and modify the final report as appropriate based on these comments. A complete, final report shall be submitted to the State Water Board 30 days after receipt of public and State Water Board staff comments unless the Deputy Director for the Division of Water Rights grants and extension.

9. In coordination with the State Water Board, Central Valley Water Board, IEP, DSP, fisheries agencies, and USEPA, DWR and Reclamation shall prepare a report identifying long-term monitoring needs and implementation options for HABs (including but not limited to cyanobacteria and cyanotoxins) to generate baseline information needed to evaluate potential effects of future drought response actions, including the trends in HABs, potential adverse impacts of HABs on beneficial uses of water in the Delta, and the environmental factors that may influence the variability of HABs in the Delta, including but not limited to flow circulation, residence time, and nutrient concentrations. A draft report shall be submitted to the agencies by November 1, 2022, for a 30-day review and comment period and a final report addressing agency comments shall be submitted to the State Water Board by February 15, 2023, unless the Deputy Director for Water Rights approves a change to this schedule.
10. Pursuant to the requirements of this Order and State Water Board Order WR 90-5, Reclamation, in consultation with the fisheries agencies, shall implement the Sacramento River Temperature Management Plan as approved by the Executive Director.
11. Pursuant to the requirements of this Order and State Water Board Water Quality Certification for the West False River EDSB,⁶⁸ the Petitioners shall implement the EDSB Monitoring Plan, conduct associated impact analyses, and complete reporting required by the certification.
12. This Order may be further modified by the Executive Director or the State Water Board based on public and agency comments or objections, or changed circumstances. Information concerning changes to this Order will be posted on the State Water Board's website within 24 hours.
13. This Order does not authorize any act that results in the taking of a candidate, threatened, or endangered species, or any act that is now prohibited, or becomes prohibited in the future, under either the California Endangered Species Act (Fish and Game Code sections 2050 to 2097) or the federal Endangered Species Act (16 U.S.C.A. sections 1531 to 1544). If a "take" will result from any act authorized under this Order, the Petitioners shall obtain authorization for an incidental take permit prior to construction or operation of the project. Petitioners shall be responsible for meeting all requirements of the applicable Endangered Species Act for the temporary urgency changes authorized under this Order.

⁶⁸ State Water Board (June 2021) Water Quality Certification for the California Department of Water Resources 2021 Emergency Drought Salinity Barrier Project. Available at https://www.waterboards.ca.gov/docs/2021_emergency_drought_salinity_barrier_wqc.pdf. Last Accessed on March 28, 2022.

14. Petitioners shall immediately notify the Executive Director of the State Water Board if any significant change in conditions occurs that warrants reconsideration of this Order.

April 4, 2022

Dated



Eileen Sobeck,
Executive Director