

**State Water Project and Central Valley Project
Drought Contingency Plan
May 1, 2021 – September 30, 2021**

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This Drought Contingency Plan (Drought Plan) is prepared by the California Department of Water Resources (DWR) and the U.S. Bureau of Reclamation (Reclamation) in an effort to provide updated information about areas of potential concern given the current dry hydrology of 2021. DWR and Reclamation operate the State Water Project (SWP) and the Central Valley Project (CVP), respectively, to the 2020 Record of Decision (ROD) as analyzed in the 2019 U.S. Fish and Wildlife Service (USFWS) Biological Opinion and 2019 National Marine Fisheries Service (NMFS) Biological Opinion on the Coordinated Long-Term Operation of the Central Valley Project and the State Water Project (Collectively the 2019 Biological Opinions), and DWR also operates the SWP to the 2020 California Department of Fish and Wildlife (CDFW) Incidental Take Permit (ITP). This updated Drought Plan will be submitted by DWR to CDFW in response to Condition 8.21 of CDFW's ITP. Concurrently, this plan will be shared with the Water Operations Management Team (WOMT) which includes representatives from DWR, Reclamation, USFWS, NMFS, CDFW, and the State Water Resources Control Board (SWRCB) (collectively referred to as Agencies). This report was first drafted in February and subsequently updated in March, April, and May 2021.

Over the past several months, as part of implementing the action included in the 2019 Biological Opinions and ITP, DWR and Reclamation have worked with the Agencies to identify actions that could potentially be implemented during a drought (not specifically for Water Year (WY) 2021) to manage the State's limited water supplies and protect species. These actions (known as the Drought Toolkit) describe the anticipated coordination, process, planning and potential drought response actions in the event of a drought. DWR and Reclamation are committed to continued development of the Drought Toolkit and will continue to coordinate with the Agencies as any actions from that Drought Toolkit are being considered for implementation in WY 2021.

On May 10, 2021, the Governor issued an Emergency Proclamation on drought conditions for the Sacramento –San Joaquin Bay-Delta (Delta) and other watersheds because of the continuing extreme dry conditions in the Delta watersheds. As such, this updated Drought Plan includes the latest hydrological conditions, species status update, drought monitoring plan, drought actions, and SWP and CVP (collectively referred to as Projects) May operations forecast that incorporate the May 1 Bulletin 120 (B120) and planned drought actions that are known at this time.

DWR and Reclamation will continue to provide weekly hydrology and condition updates through WOMT and will provide updates and seek Agency input on how best to manage multiple needs for water supply. In addition, DWR and Reclamation will coordinate with the existing Long-term Operation Agency working groups and Drought Relief Year (DRY) Team to develop a robust drought monitoring program with updates to WOMT and other forums as necessary.

I. Current Hydrologic Conditions

Water Year 2021 has developed into one of the driest on record—drier than 2014 and 2015, and the driest since 1977—and together WYs 2020 and 2021 are the second driest two-year period on record, behind only 1976-77. Both the Sacramento Valley and San Joaquin River indices are classified as Critical. Although well below average rainfall, the snowpack in March 2021 indicated that sufficient reservoir inflow was likely available to meet Project requirements. Conditions significantly changed at the end of April 2021 when it became clear that expected reservoir inflow from snowmelt failed to materialize. The May 90% exceedance forecast for the Sacramento River Index identified a reduction of expected

runoff of 685 TAF from those generated only a month earlier in April. The combination of factors, including the May 2021 inflow forecast deficit being far less than predictable with available forecasting methods, parched watershed soils and extremely low rainfall, continued dry and warm conditions, and limited available water supplies in the Sacramento – San Joaquin Bay-Delta (Delta) have created extremely critical conditions that require significant drought actions across the Projects and the State. As announced by the Governor in his May 10, 2021 Emergency Proclamation, the continuation of extremely dry conditions in the Delta watershed mean there is not an adequate water supply to meet minimum needs throughout the State.

As shown in blue on the following chart, the Northern Sierra Precipitation total as of May 28, 2021, is 23 inches and 47% of average to date. As of May 28, 2021, the snowpack has essentially dissipated across the entire Sierra Nevada.

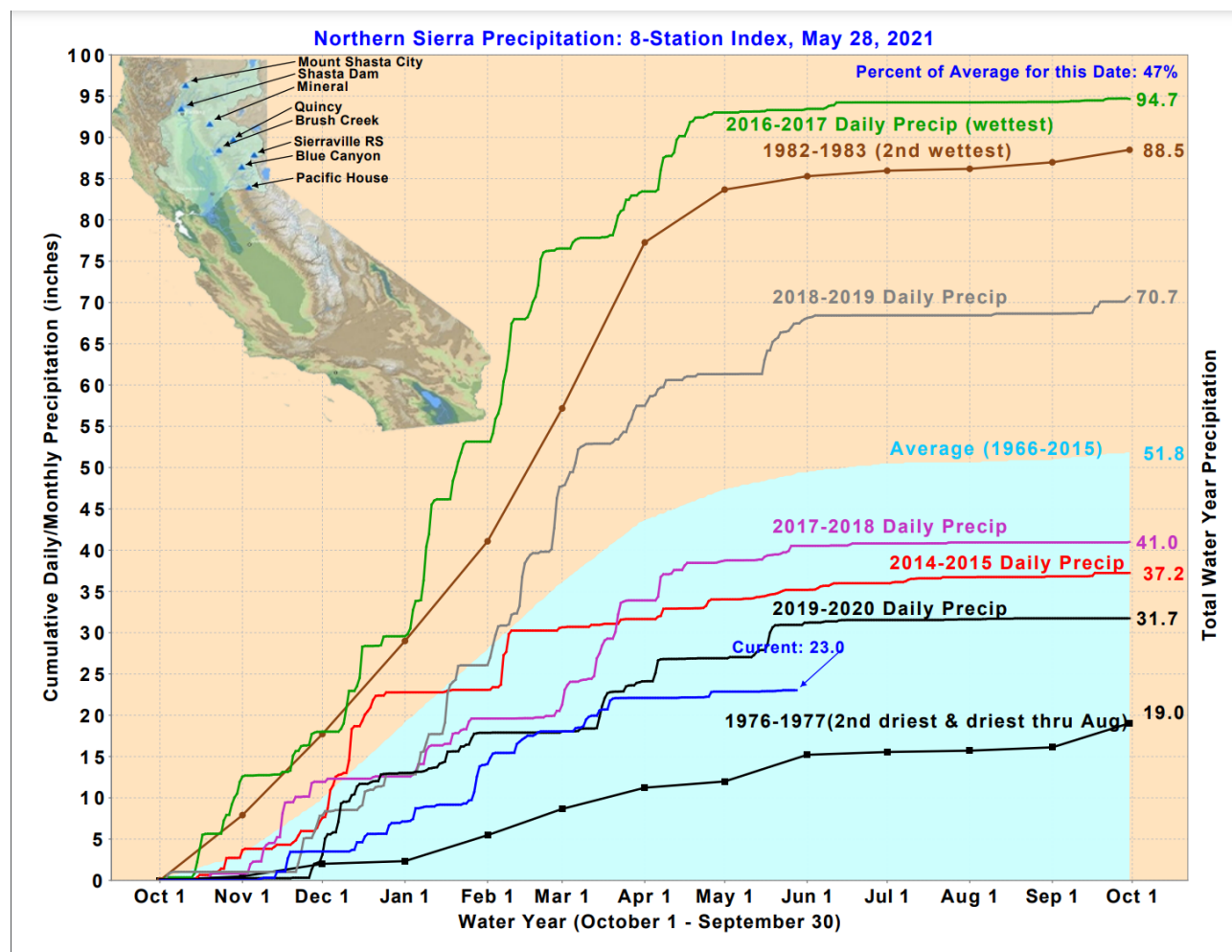


Figure 1. Northern Sierra Precipitation: 8-Station Index through May 28, 2021

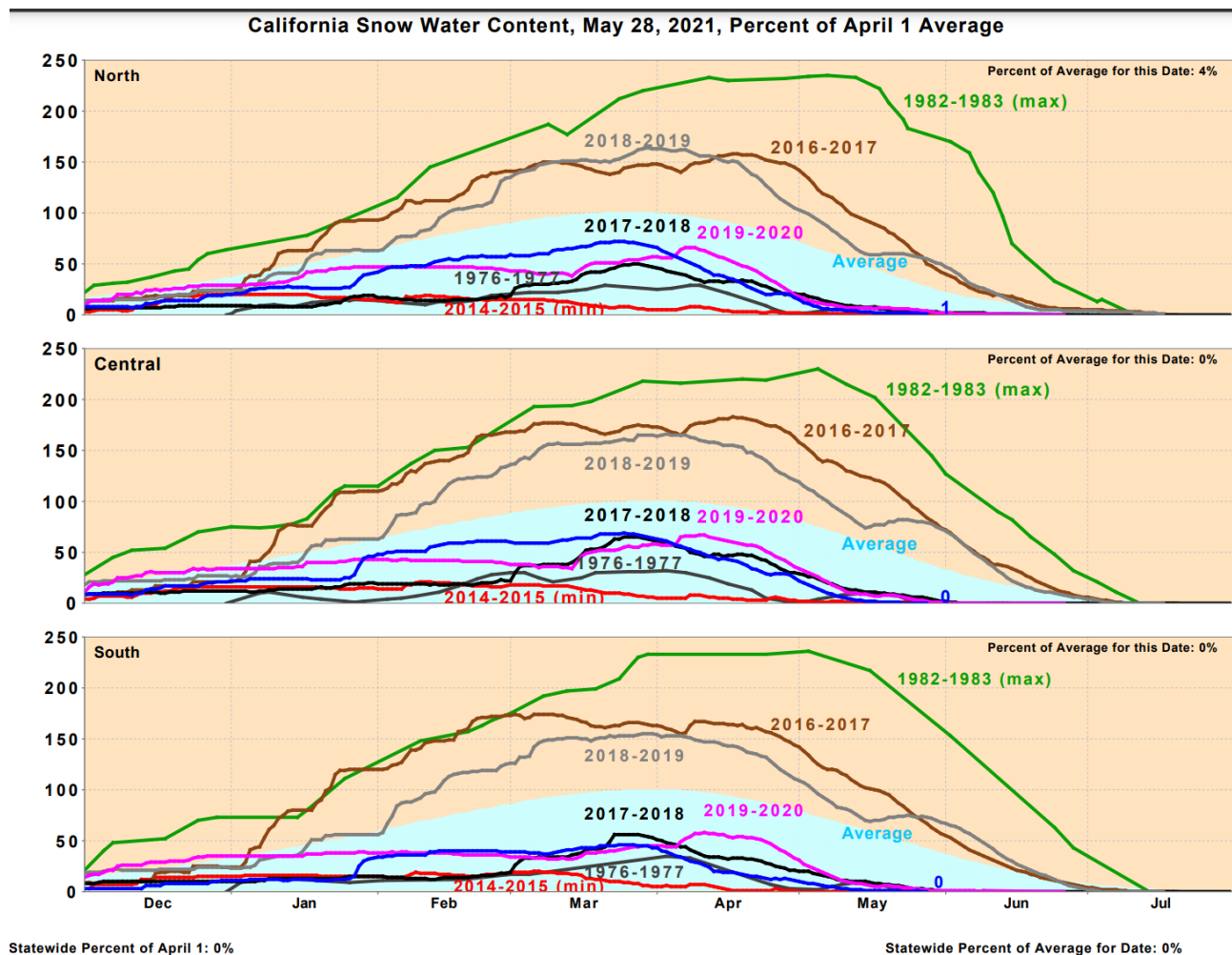


Figure 2. California Snow Water Content through May 28, 2021

A. Water Quality

Based on the April 1 operational forecast, the Projects are expected to meet D-1641 objectives through the spring and summer months; however, dry and warm conditions flipped the system into a depletion mode much earlier than normal. By early May, operations forecasts identified substantial hydrologic deficits. Due to growing concern about water temperature and water supply, it became apparent the Projects would have difficulty meeting D-1641 objectives without modifications to the D-1641 standards. Consequently, on May 17, 2021, the Projects submitted a Temporary Urgency Change Petition (TUCP) to the SWRCB, requesting modifications to the Outflow objective and relocation of the Emmaton compliance point to Threemile Slough for June through August 15.

Water quality in the Delta continues to be monitored, and salinity is expected to increase during the spring through fall, as is typical during dry conditions. As a first step to moderate the gradual salinity degradation in the Delta, the Projects have planned minimal exports and sufficient outflow to maintain Delta water quality. With the likely issuance of a TUCP Order from the SWRCB, the net delta outflow index (NDOI) will be modified in June and July to 3,000 cfs from 4,000 cfs. However, the Projects expect that slightly higher outflow will be needed, in combination with the minimal exports, to maintain sufficiently low salinity in the Delta. These conditions will be necessary until the first significant runoff events begin to improve Delta salinity condition, likely later in the year.

The Delta Cross Channel (DCC) gates control the diversion channel near Walnut Grove, about 30 miles south of Sacramento. They are typically opened for recreational purposes on weekends between May 21 and June 15 - opening on Saturday, closing on Monday, with an extended gate opening during the Memorial Day weekend. However, ongoing drought conditions require that the DCC gates remain closed until further notice to help maintain water quality standards in the Sacramento River channel. The Projects will continue to coordinate with the Agencies through the relevant technical teams and WOMT for DCC operations.

B. SWP and CVP Upstream Reservoir Storage

In the Sacramento River watershed, storage in upstream reservoirs remains well below average for this time of year. Lake Oroville's end-of-April storage was approximately 1.49 million acre-feet (MAF) (42% of capacity and 52% of historical average) and about 1.0 MAF lower than in 2020. Lake Shasta's end-of-April storage was approximately 2.28 MAF (50% of capacity and 58% of historical average), and Folsom Lake's end-of-April storage was approximately 360 TAF (37% of capacity and 49% of historical average), both of which were 1.42 MAF and 230 TAF lower than in WY 2020, respectively. Trinity Reservoir, which also supports flows on the Sacramento River, was approximately 1.30 MAF at the end of April (53% of capacity and 66% of historical average).

In the San Joaquin watershed, end-of-April storage in New Melones Reservoir was 1.46 MAF, which is 65% of capacity and 97% of historical average, but about 444 TAF lower than this time last year.

C. Biology

i. Salmonids

DWR and Reclamation are implementing the 2020 ROD, and DWR also operates to the ITP. The Salmon Monitoring Team (SaMT) convenes weekly to consider and discuss relevant data and factors, provide information to the WOMT, Reclamation, and DWR, and develop an operations plan to reduce adverse effects of Delta operations of the Projects to salmonids and green sturgeon. For information on weekly SaMT meeting materials (Operations Outlook, notes, and Proposed Action Assessment documents), please visit the Salmon Monitoring Team page. The webpage provides a log of weekly documents downloadable through links.

As of May 6, 2021, the preliminary estimate of outmigrating salmonids past the Red Bluff Diversion Dam (RBDD) USFWS Rotary Screw Trap (RST) was 2,096,218 natural juvenile winter-run Chinook salmon, 118,104 juvenile spring-run Chinook salmon, and about 8.1 million juvenile fall-run Chinook salmon. In addition, the SaMT considers historic and current observations at key monitoring locations in the lower Sacramento River Basin (e.g., Knights Landing, Tisdale, Sacramento trawls and beach seines), hatchery releases, and acoustic-tagged salmonids in the system.

The SaMT produces weekly distribution estimates for salmonids. Juvenile salmonids are in the Delta and significant proportions have migrated out of the Delta past Chipps Island. The SaMT also conducts a weekly assessment and determines the likelihood of exceeding single-year loss thresholds in the Proposed Action (50%, 75%, or 90% of threshold for each salmonid species / run) and daily loss thresholds as recommended in the ITP. On May 18, 2021, the SaMT determined the likelihood of exceeding any of the aforementioned thresholds remained unlikely due to persistent low-flow, low turbidity conditions, and an Old and Middle River (OMR) index more positive than -5,000 cfs. Risk level for the daily entrainment threshold can change quickly with a precipitation-driven high flow event; however, no such events were in the near-term (7-day) forecast. The members of SaMT are not confident in projecting beyond seven days (longer-term) due to uncertainty regarding weather forecasting.

The recent use of the warm water power bypass at Shasta Dam created warm Sacramento River temperatures in April and May to conserve cold water in Shasta Reservoir for use later in the year. When pre-spawn mortality of winter-run Chinook salmon was recently observed, the bypass was reduced to provide colder water downstream. The Shasta warm water power bypass is estimated to have conserved approximately 340 TAF of cold water (<52 deg F) for water temperature management this summer and fall. As of May 20, adult winter-run Chinook salmon carcasses have been collected, indicating spawning in the Sacramento River upstream of the confluence of Clear Creek. Many adult salmon have been observed holding downstream of the Keswick Dam fish trap, which likely are winter-run and spring-run Chinook salmon. Many spring-run Chinook salmon have been observed in many upper Sacramento River tributaries including Clear Creek, Butte Creek, Mill Creek, and Deer Creek. These spring-run Chinook salmon are expected to over summer in these tributaries and the upper Sacramento River.

ii. Delta Smelt

DWR and Reclamation operate to the 2020 Record of Decision, and DWR also operates to the ITP. The Smelt Monitoring Team (SMT) began meeting to discuss current WY 2021 conditions in November 2020. Delta Smelt catch has been low (Table 1). The 2020 Fall Midwater Trawl was completed in December 2020, and the 2020 index was zero (“0”) for the third year in a row. Additionally, the Spring Kodiak Trawl (SKT) did not detect any Delta Smelt in WY 2021 (CDFW, 2021).

Since the start of WY 2021, Enhanced Delta Smelt Monitoring (EDSM) has caught seven Delta Smelt of year class (YC) 2020 and eight of YC 2021 as of May 18, 2021. Additionally, two YC 2020 Delta Smelt were collected in hatchery broodstock sampling by the Fish Conservation and Culture Laboratory (FCCL). The 20-mm Survey collected one larva (YC 2021) in the Sacramento Deep Water Ship Channel (DSWC) in May 2021. No Delta Smelt have been detected at either the Tracy Fish Collection Facility or the Skinner Fish Collection Facility in WY 2021. This overall lack of detections reflects the overall decline in the population to levels where we can no longer reliably detect them. Based on sampling and hydrology to date, it is likely that Delta Smelt are at a low risk of entrainment into the South Delta and the export facilities, and the situation continues to be closely monitored by the SMT in their weekly assessments. Protections continue to rely upon environmental surrogates.

As of May 20, Barker Slough Pumping Plant (BSPP) restrictions for the protection of young of year Delta Smelt are not in place due to lack of detections at 20mm station 716. Larvae have been detected nearby in the lower Deepwater Ship Channel (DWSC), but the SMT has not made any recommendations for BSPP restrictions based on these detections.

Table 1. Catch of Delta Smelt from major monitoring surveys in fall of 2020 and spring of 2021

Survey	Year Class	Date	Number of fish	Location
FMWT	No catch	2020	0	
EDSM	2020	September 2020	1	Suisun Marsh
EDSM	2020	November 2020	1	Suisun Marsh
EDSM	2020	January 2021	2	SDWSC
Hatchery	2020	January 2021	2	SDWSC

Broodstock				
EDSM	2021	March	3	SDWSC
EDSM	2020	March	1	SDWSC
EDSM	2021	May	1	Lower Sacramento
EDSM	2021	May	3	SDWSC
20mm	2021	May	1	Lower Sacramento
Spring Kodiak Trawl	No catch	2021	0	
Salvage	No catch	2021	0	

iii. Longfin Smelt

DWR operates to the ITP which includes Longfin Smelt operational considerations. Salvage data from WY1994 through WY2014 indicates that salvage of adult Longfin Smelt is generally rare and typically occurs between the months of December and February. In WY2020, young of year (age 0) Longfin Smelt were mostly observed at the salvage facilities between April and May. The majority of Longfin Smelt salvage typically occurs after February when young of year fish rearing in the south and central Delta have grown large enough to be effectively screened by the fish collection facilities. As of May 11, 2021, 531 juvenile Longfin Smelt have been salvaged at the state facility, and 184 juvenile Longfin Smelt have been salvaged at the federal facility. (Salvage estimates are expanded based on sampling effort.)

The SMT tracks Longfin Smelt distribution and salvage to assess risk and make appropriate operational recommendations consistent with the Longfin Smelt ITP, and the most recent assessment concluded that no recommendation would change salvage trajectory of Longfin Smelt in the South Delta. However, because of continuing dry conditions, the OMR recommendations are unlikely to control SWP operations in the foreseeable future. The SMT has not made any OMR recommendations for the protection of Longfin Smelt since March 16, 2021.

II. SWP and CVP Operational Considerations

DWR and Reclamation have developed a May operational forecast through December 31, 2021, using the 90% exceedance forecast from the May 1 B120 forecast from DWR's Hydrology and Flood Operations Office within the Division of Flood Management. The operational forecast developed for this Drought Plan is designed to make the most efficient use of the limited water resources in WY 2021 for multiple beneficial uses while meeting regulatory requirements and managing the potential risks of continued drought conditions into the next water year.

There are three main goals of SWP and CVP Project operations with the May operations forecast:

1. Meet health and safety requirements throughout the Projects' service areas, including those that rely on Project exports;
2. Preserve upstream Project storage to the extent possible for temperature management, instream uses in the water year, peak-summer power production, and carry-over storage for future drought protection; and
3. Meet regulatory and water right obligations.

The operational forecast provided in this Drought Plan reflects potential outcomes given the hydrologic forecast on May 1 and assumptions on regulatory and policy decisions regarding prioritization of an extremely limited water supply. However, the real-time operations are expected to vary to adjust to real-time system conditions. The hydrologic and operational scenario used in this Drought Plan are discussed in the Projected Hydrology and Runoff section later in the document.

The following are the Projects' critical operational considerations and objectives under the current drought conditions, reflected in the operational forecast. Drought conditions along with potential concerns and actions are primarily reflected in the 90% exceedance forecast.

A. Health and Safety Requirements

Operations of the SWP and CVP must provide for, at a minimum, essential human health and safety needs throughout the SWP and CVP service areas and retain the capability to provide for such minimum needs throughout WY 2021 and WY 2022 should extremely dry conditions persist. For clarity, DWR and Reclamation's consideration of these essential human health and safety needs includes adequate water supplies and water quality for drinking water, sanitation, and fire suppression, but does not extend to other urban water demands (e.g., outdoor landscape irrigation). While most California communities may have reserve water supplies, some communities will require continued delivery of limited amounts of water through the CVP and SWP facilities to meet these basic needs.

Reclamation currently uses its Municipal and Industrial (M&I) Water Shortage Policy to determine the amount of water to be provided to its M&I contractors in those years where human health and safety needs govern CVP allocations to these contractors. Under these conditions, M&I contractors are required to update population estimates and non-CVP water source information to determine how much water will be needed from the CVP to meet their overall human health and safety demand for that year. The vast majority of CVP contractors throughout the entire service area that receive M&I water from the CVP have other available supplies to help meet their demand.

B. Fish and Wildlife Protections

The SWP and CVP operations outlined in this Drought Plan are based on the requirements set forth in the Incidental Take Statements in the 2019 Biological Opinions and the ITP to address unavoidable impacts to the effects on endangered species due to drought. DWR and Reclamation will coordinate with agencies to address the potential for exceedances. This Drought Plan also includes actions taken by other entities to help reduce the supplemental water needed from the Projects for meeting health and safety needs. While these actions are not within control of the Projects, they affect the operation of the Projects. Therefore, these actions are included as assumptions for the purposes of describing project operations.

The operations forecast included in this Drought Plan covers May 1 to December 31, 2021. This Drought Plan outlines actions that are being implemented this year in response to the extreme dry conditions. The primary objectives of the spring and summer action presented in this Drought Plan is to preserve additional storage upstream for water temperature management and health and safety needs while also maintaining instream flows and Delta protective actions.

C. Regulatory and Senior Water Right Requirements

Both DWR and Reclamation have commitments to deliver water for Delta salinity and outflow, to senior water rights holders with contracts for either SWP or CVP water supplies, and to wildlife refuges. These commitments are made through D-1641, various contracts and agreements which preserve state-granted pre-Project (senior) water rights, and through the Central Valley Project Improvement Act (CVPIA). D-1641 includes reduced requirements in dry and critically dry conditions to recognize the limited water supply in those years. The various senior water right contracts and wildlife refuge deliveries also include provisions for reduced deliveries in critically dry years. To date, all the dry and critically dry-year provisions mentioned above have been triggered in 2021.

Reclamation and DWR allocate water to agricultural and M&I contractors based on available water supply after meeting other obligations as described above. Given the critically dry hydrology, this available supply is extremely limited.

D. Operational Flexibility

Another objective of this Drought Plan is to maximize Project operations flexibility to meet critical water supply deliveries while meeting Delta standards. The flexibility allows Project operators to adjust quickly to changes in the weather and environment and to maximize the beneficial use of the limited water supply.

III. Operations Forecasts - Projected Hydrology and Runoff, Releases and Storage

A. May 1, 2021 – Projected Hydrology and Runoff

The DWR’s Hydrology and Flood Operations Office within the Division of Flood Management produces estimates of water year runoff for the major watersheds of the Sacramento and San Joaquin River basins beginning in December and updates these as part of DWR’s Bulletin 120 (B120) update process through May of each year. The Water Supply Index (WSI) forecasts that are utilized for this Drought Plan are unique to this water year and informed by precipitation, runoff, and other antecedent hydrologic conditions as they existed on May 1, 2021. The May 1 B120 runoff forecast also incorporates actual snowpack measurements through the end of April.

The May operational forecast included in this Drought Plan combines the runoff associated with antecedent conditions with the anticipated runoff resulting from precipitation predicted to occur through September 30 under the 90% hydrologic exceedance scenario. For example, the 90% exceedance hydrology assumes inflows from rainfall and snowmelt at levels that are likely to be exceeded with a 90% probability, or in other words, there is a 10% or less chance of actual conditions turning out to be this dry or drier from this point forward.

The May 1 WSI forecast is the last WSI that will be issued for WY 2021 and includes the final determination of the water year classifications for the Sacramento Valley (based on the 50% exceedance) and the San Joaquin Valley (based upon the 75% exceedance) as shown below:

Sacramento River Unimpaired Runoff	50% Exceedance: 6.7 MAF (38% average)
Sacramento Valley Index (50% exceedance)	4.0 MAF - Critical WY Oct-Apr Sacramento Region Runoff: 34% of historical average
San Joaquin Valley Index (75% exceedance)	1.3 MAF - Critical WY Oct-Apr San Joaquin Region Runoff: 34% of historical average

In December, the estimates of the water year runoff range widely at the various exceedances due to the large hydrologic uncertainty. The forecasts are updated monthly, and over time the uncertainty decreases and result in the forecasts converging. By May, at this point, the 50% forecast reflects the dry conditions.

B. SWP and CVP Operations Forecasts

Monthly operations forecasts are generally updated monthly and are typically completed by the third week of the month. The current operational forecast uses the 90% exceedance hydrologic forecast as model inputs to simulate SWP and CVP Project operations under various regulatory requirements and produce forecasted reservoir storages, releases, flows, and deliveries under the same set of hydrologic exceedance. The operations forecast gives general guidance for annual water delivery, storage management, and power planning purposes for each exceedance assumption. Actual hydrologic events act in time steps shorter than a month and are often unpredictable more than a few days to a week out. Day-to-day operations are driven by operating criteria such as those found in U.S. Army Corps of Engineers flood control manuals, D-1641, the NMFS and USFWS 2019 Biological Opinions, and the ITP for the SWP. Output from the forecast model as provided in this Drought Plan represents system responses to the overlay of very specific operating criteria.

The operations forecast assumptions utilize existing storage conditions, actual precipitation through April 2021, forecasted precipitation based on the hydrology, projected water supply deliveries, meeting existing flow and water quality standards, and fish and wildlife protections and major known actions by other agencies that may have an impact on project operations. These actions are described in more detail below. The operations forecast includes monthly storage levels, reservoir releases, Delta export rates, and Delta outflow through December 31, 2021. Considering the lack of snowpack remaining in the Northern Sierra basin as of May 1, 2021 and the minimal average rainfall through the summer, variation in expected runoff is minimal absent uncharacteristic late season precipitation events. Therefore, DWR and Reclamation will be planning potential operations based on only the 90% exceedance hydrological scenario. The storage and flows under the May 1, 2021 90% hydrologic scenario are included in Attachment 1.

In addition to the inflow forecast (B120) developed by DWR, an accretion/depletion forecast is also developed. This forecast uses hydrologic data and statistical correlation to estimate accretions/depletions which are the net gain or loss between the main upstream reservoirs (Shasta, Oroville and Folsom) and the Delta, as measured at Freeport along the Sacramento River. This forecast includes expected inflow from smaller tributaries and creeks, diversions from various water users north of the Delta and natural losses due to infiltration and evaporation. Generally, this forecast provides an adequate estimate of what the Projects can expect for losses or gains between the reservoirs and the Delta, and therefore can help determine the necessary releases for meeting Delta needs throughout the year. During drought years when significant, unique actions are taken by other agencies to either reduce demands or increase releases from other water management systems, these estimates may not capture those specific actions. As an example, in the drought years of 2014 and 2015, the estimated accretions/depletions varied significantly from the May forecast due to the various actions taken throughout the basin. Figures 3 and 4 show the difference between the May forecasted accretion/depletions and the actual observed accretion/depletions. Between 2014 and 2015, the May forecasts for seasonal accretions/depletions differed by approximately 340 TAF from the observed data. A similar pattern of depletions is forecasted for 2021, as shown in Figure 5.

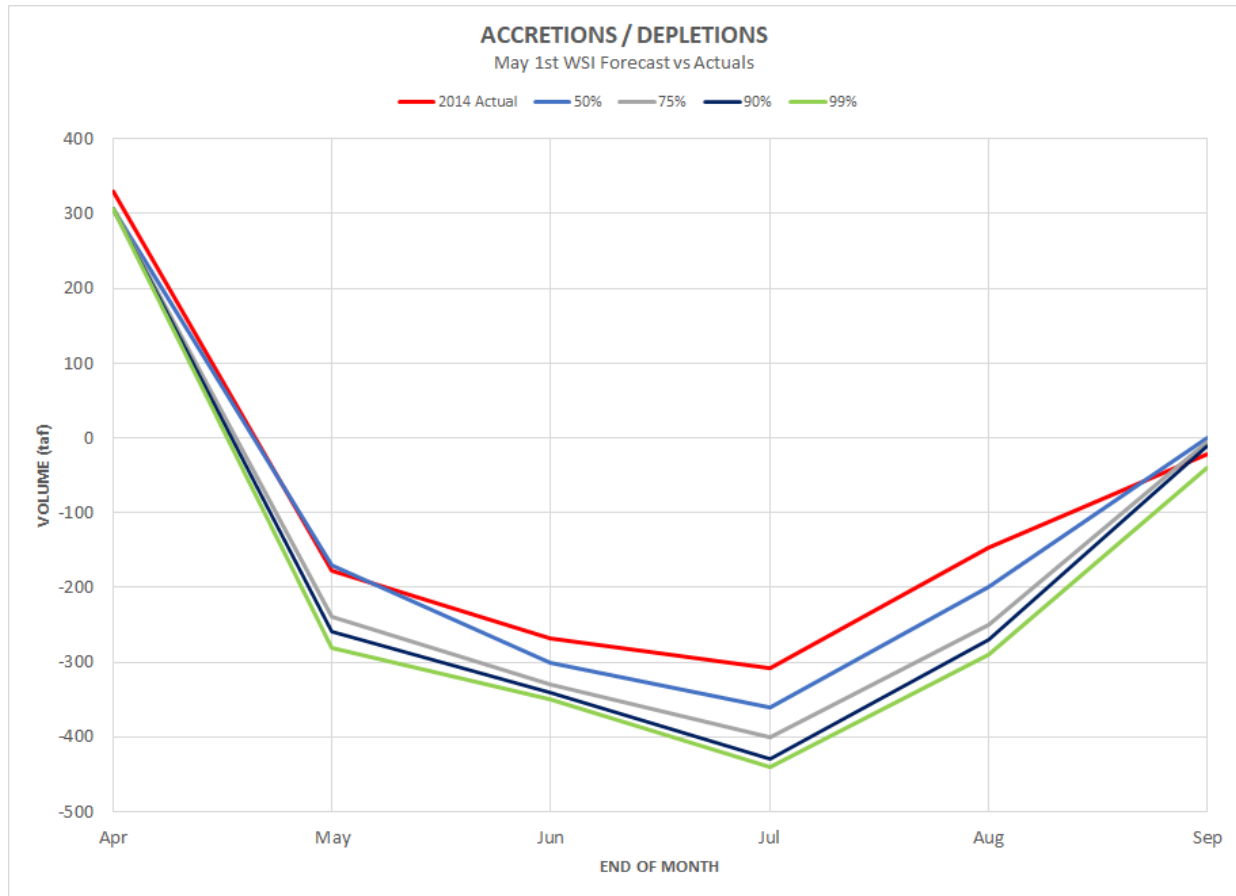


Figure 3. Comparison of 2014 Accretions/Depletions (between May 1 and September 30)

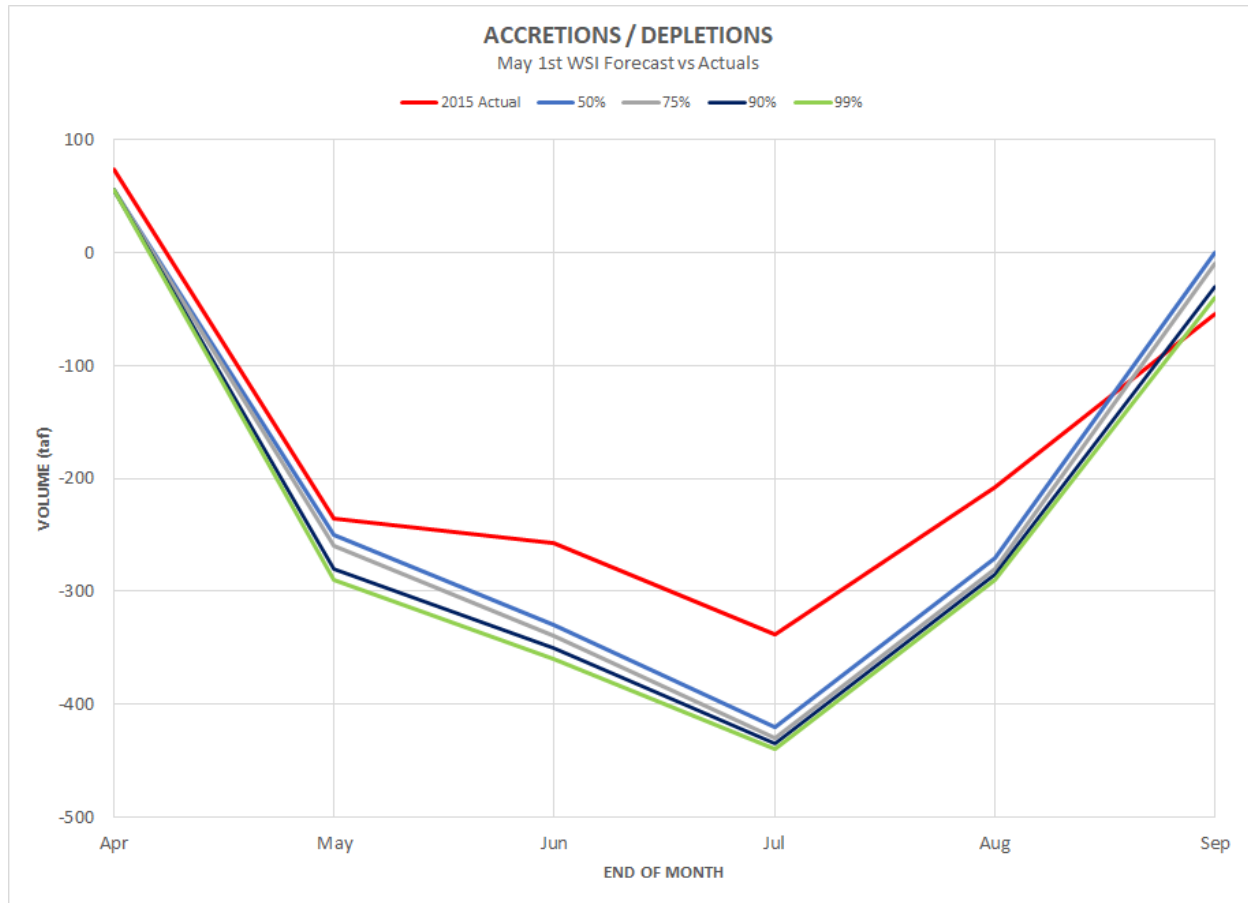


Figure 4. Comparison of 2015 Accretions/Depletions (between May 1 and September 30)

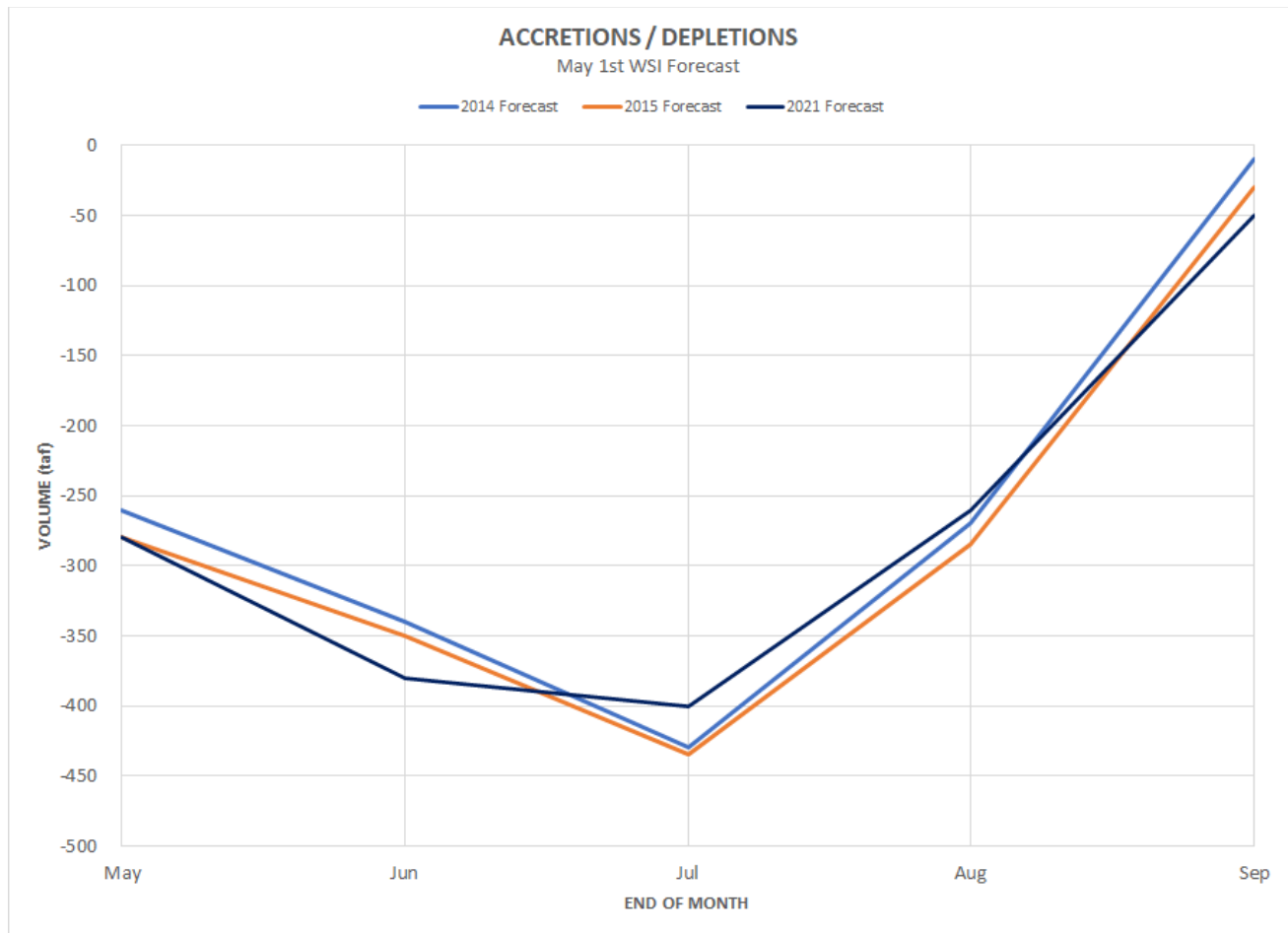


Figure 5. Comparison of May 1 90% Exceedance Accretion/Depletion Forecasts from 2014, 2015 and 2021

Many of the drought actions that affect the accretion/depletions that occurred in 2014 and 2015 are also either being implemented or planned for implementation in 2021. Below is a general list of actions that occurred in 2014 and 2015 that affected the observed accretions and depletions and are also likely to occur in 2021. These actions are described in more detail under the Drought Actions section.

- Reductions in surface water use from Senior Water Right holders through either land fallowing or groundwater substitution for transferring out of basin in the Fall
- Increased releases from smaller systems, such as the Yuba River, for transfers south of the delta
- Curtailment orders from the SWRCB
- Very low project allocations to parties north of the delta
- Urban water conservation measures from various water agencies throughout the Sacramento Basin

Due to similar drought actions being taken in 2021, Reclamation and DWR developed this operational forecast using the average of observed accretions and depletions for water years 2014 and 2015. While volumes of particular actions are not precisely the same in both those years as they are expected to be in 2021, the net resulting depletions between the upstream reservoirs and the Delta are expected to be similar. In addition, the June through September depletion values have been further revised between Keswick Dam and Wilkins Slough to more precisely account for the expected diversions to senior water right holders in this area. Given the extreme hydrology and critical conditions of WY 2021, this approach allows the Projects to craft a more realistic operation that accounts for the significant actions being taken

throughout the basin and recognizes the interconnected nature of these actions to project operations.

For the month of May, the runoff for certain watersheds have continued to decline, indicating the potential to consider a more conservative forecast for the remainder of the year. In addition, the weekly B120 inflow updates for Shasta and Folsom reservoirs have seen slight declines. The table below outlines the April to July unimpaired runoff for 90% and 99% exceedances versus the B120 weekly updates to the 90% exceedance forecast throughout May.

Reservoir	May 1 90%	May 1 99%	May 11 90%	May 18 90%	May 25 90%
Shasta	760 TAF	710 TAF	740 TAF	700 TAF	720 TAF
Oroville	460 TAF	397 TAF	460 TAF	470 TAF	480 TAF
Folsom	380 TAF	321 TAF	350 TAF	340 TAF	350 TAF

Significant reductions to the 90% exceedance inflow may cause challenges with meeting the goals outlined in this plan. As a result, Reclamation and DWR are continuing to work on additional actions to secure water for both water supply and fishery protection. Potential actions being considered are referenced briefly below and will be shared through WOMT as additional information becomes available.

- Increased releases from New Melones Reservoir beyond those forecasted in Attachment 1.
- Increased releases from Lake Oroville beyond those forecasted in Attachment 1.
- Reduction of storage at Whiskeytown Reservoir
- Water purchases for the purposes of meeting the goals outlined in this Plan
- Reoperation of non-CVP/SWP facilities to temporarily increase reservoir storage at CVP/SWP facilities
- Requests for additional voluntary reductions from senior water right holders
- Coordination with the Water Board for consideration of additional curtailments
- Short-term reductions in exports to meet unexpected Delta salinity conditions

C. Contractual Obligations

Under the 90% exceedance hydrologic scenario, the operational forecast assumes fulfilling the contractual obligations between DWR and North Delta Water Agency. For the Feather River Settlement Contractors (FRSC), the full 50% delivery shortage provision was triggered based on the April 1 hydrologic exceedance forecast scenarios and the reduction is included in the attached forecast.

Deliveries to Sacramento River Settlement contractors, San Joaquin River Exchange contractors, and wildlife Refuges are determined by the Shasta Index. For 2021, an index below 3.9 MAF indicates a “Shasta Critical” year, which triggers reduced allocations. The May 50% exceedance hydrology indicates the index will continue to be less than 3.9 MAF. As a result, the Sacramento River Settlement contractors, the San Joaquin River Exchange contractors, and the wildlife refuges are represented as a reduction to their Shasta Critical volumes. Reclamation made an initial determination on February 12 based on the Shasta Index from the February 1 forecast, and this determination has continued through the March, April, and May forecasts.

IV. SWP and CVP Areas of Potential Concern

B. May 1, 2021 90% Exceedance

The 90% exceedance operations forecast incorporates critically dry conditions for WY 2021. Despite beginning WY 2021 with relatively high carryover storage after the dry WY 2020, each Project reservoir exhibits extremely low projected carryover storage at the end of WY 2021. This forecast includes the trade-off between storage management and meeting the Sacramento Valley in-basin uses and includes the quantifiable drought actions described in Section IV. Not all drought actions are able to be quantified to a level of detail that can be directly represented in the operational forecast. These actions are noted as such in their description. Current system-specific operations, the 90% exceedance and expected drought actions forecast areas of potential concern and are further described in detail below.

i. D-1641 SWRCB Bay Delta Standards

Under very dry conditions, SWRCB D-1641 includes flexibilities of Spring X2 water quality and outflow standards in May and June. Spring X2 does not apply in May and June when the best available May estimate of the Sacramento River Index for the water year is less than 8.1 MAF under the 90% exceedance forecast. The Sacramento River Index refers to the sum of the unimpaired runoff in the water year as published in the DWR B120 for the following locations: Sacramento River above Bend Bridge, near Red Bluff; Feather River, total unimpaired inflow to Oroville Reservoir; Yuba River at Smartville; and American River, total unimpaired inflow to Folsom Reservoir. Because the 90% exceedance forecast of the SVI was well below the 8.1 MAF the Spring X2 is not required in May and June.

Due to the extreme dry conditions, on May 17, 2021, a Temporary Urgency Change Petition (TUCP) to modify D-1641 delta water quality and outflow requirements was submitted to the SWRCB due to continuing dry conditions. This TUCP is further described in detail below in Drought Actions and is posted on the SWRCB's webpage at:

https://www.waterboards.ca.gov/waterrights/water_issues/programs/drought/tucp/index.html.

ii. Trinity River

Spring flows on the Trinity River will be consistent with the annual allocation as prescribed by the Trinity River Main-stem Fishery Restoration Record of Decision. Consistent with fish health criteria, releases to augment flows in the Lower Klamath River will also be considered. The storage forecasted for the end of September is extremely low at just over 600 TAF and does not leave a storage buffer in the event WY 2022 is also dry. In addition, low storages of this level also typically bring temperature management concerns both in this water year and in WY 2022.

iii. Sacramento River

Releases from Shasta and Keswick Reservoirs into the Sacramento River are expected to be controlled by a number of different requirements for WY 2021. Between June and September, necessary releases will be determined by the need to meet senior and riparian water right demands along the Sacramento River, Delta outflow and water quality needs and temperature management between Keswick Dam and the Clear Creek confluence. As outlined in the May 21, 2021 letter from the SWRCB (Attachment 3), in an effort to strike a balance between water supply and fishery protection, Reclamation will be making releases from Shasta Reservoir with the intention to maintain a minimum of 1.25 MAF in storage by the end of September. This minimum Shasta Storage requirement will limit the ability of Shasta to increase

releases to respond to unexpected salinity events and will increase the reliance on releases from Folsom Dam and Oroville Dam. This forecast was developed with the best available information to avoid further exacerbating the already critically low storages in Oroville and Folsom; however real time conditions may deviate from this forecast. Failed drought actions, worsening hydrologic conditions, emergency management and other factors may lead to a change in this approach. Should this happen, the Projects will notify the WOMT agencies, including the SWRCB staff.

The key areas of concern for the upper Sacramento River include temperature management, meeting in-basin demands (including senior water right deliveries and Delta requirements) and carryover reservoir storage. Water temperature management is of significant concern given the storage peaked in March and full use of the Shasta Dam temperature control device is not be possible. Drought actions currently being implemented and/or planned are described in the Drought Actions section and are briefly listed below:

- Shasta warm water power bypass to conserve cold water for temperature management in the summer and fall
- Voluntary diversion reductions by the Sacramento River Settlement Contractors
- Delayed release and delivery of water transfers
- Coordination on the timing of diversions to the Sacramento River Settlement Contractors to limit required release changes
- Temporary Urgency Change Petition to modify Delta requirements
- Emergency drought barrier to minimize Delta salinity intrusion
- Minimum exports to limit releases needed to support Delta needs
- Use of New Melones to meet Delta outflow and salinity requirements to limit upstream releases on the Sacramento River needed to support Delta needs
- Urban water conservation to limit releases needed to support Delta needs
- Potential curtailments from the SWRCB to limit releases needed to support Delta needs
- Reduced allocations to CVP M&I water service contractors
- Continuation of the winter-run reintroduction program on Battle Creek
- Increased intake of winter-run at Livingston-Stone National Fish Hatchery with contingencies to maintain suitable hatchery water temperatures.

Throughout the remainder of WY 2021 and into the beginning of WY 2022, Reclamation will work with DWR, the other WOMT agencies, and water users throughout the basin to identify additional actions that may be taken to support increasing carryover at Shasta, Oroville and Folsom reservoirs. Reclamation will continue to coordinate through the Sacramento River Temperature Task Group, which includes the Agencies and Sacramento River Settlement Contractors.

iv. Clear Creek

Flows on Clear Creek will be consistent with the 2020 Record of Decision implementing the Proposed Action as analyzed in the NMFS 2019 Biological Opinion. A prescribed Spring pulse flow was implemented May 7-16, reaching maximum flow of 840 cfs. In addition, Reclamation is working with NMFS and through the Clear Creek Technical Team (CCTT) to develop a potential additional water-neutral emergency pulse flow to help move observed Spring-run Chinook salmon up stream. This pulse flow would likely be implemented in early to mid-June. Pulse flows and operations will continue to be closely evaluated through the CCTT to minimize effects on water temperature management and/or ability to help meet other system flow needs. Concerns with Clear Creek temperature management are similar to those of the Trinity system. On June 1, a temperature goal 60 deg F at IGO gage (downstream of

Whiskeytown) is required. Clear Creek temperatures will continue to be evaluated and coordinated through the CCTT.

v. Feather River

Minimum Feather River flow and temperature requirements are prescribed in the 1983 Agreement between CDFW and DWR for Management of Fish and Wildlife for Lake Oroville and the 2004 Biological Opinion issued by NMFS. Total releases to the Feather River through the High Flow channel of the Feather River are currently at 1,850 cfs and the flow through the City of Oroville through the low flow channel is 650 cfs. DWR's primary objective is to maintain the lowest possible releases in spring and summer to meet in-basin requirements with the objective of conserving storage for temperature management in the late summer and fall. DWR is targeting a minimum end of September carryover target in Lake Oroville of 850 TAF for Feather River temperature management as this is the storage level at which operational challenges may be encountered for temperature management (further discussed in Section V.H) and power generation. Lake Oroville's Hyatt Powerplant also plays a significant role in supporting the power grid reliability; therefore, maintaining minimal storage for temperature management operations for as long as possible through the summer, will also provide a secondary benefit of helping maintain grid integrity during peak summer power demand for the State of California.

vi. American River

Releases from Folsom Reservoir (and Nimbus Dam) into the American River are expected to be controlled by a number of different requirements for WY 2021. Between June and September, releases are expected to be made primarily to meet minimum instream flow requirements and Delta outflow and water quality needs. Due to Folsom's close proximity to the Delta, the Shasta minimum storage requirement and the inability to reduce the already minimum exports, releases from Folsom are expected to be relied upon throughout the summer to respond to salinity conditions. Flows on the American River will be consistent with the provisions of the 2020 Record of Decision implementing the Proposed Action as analyzed in the NMFS 2019 Biological Opinion. The key areas of concerns for the American River include meeting minimum health and safety deliveries within the American River basin, carryover storage and water temperature management to protect fisheries health.

Folsom Reservoir is a key (and sometimes the sole) water source for many M&I communities within the American River basin, some with senior water rights. For many in the area, this supply is contingent on a minimum storage within Folsom Reservoir. Although the exact storage varies with the demand expected, Reclamation generally assumes a storage less than 110 TAF is not adequate to operate the facilities to meet expected demands. Given the potential for a very dry fall where storage may continue to decrease, Reclamation is targeting a minimum end of September storage of 200 TAF in Folsom Reservoir. This goal, combined with the flexibility to decrease to minimum releases of under 600 cfs by the fall, is expected to protect the water supply to meet minimum public health and safety needs in the event of a dry fall.

Water temperature management is of significant concern given the low storage, which does not allow for use of the highest shutter gates, requiring colder water to be released earlier in the season and therefore not be available later in the late summer/early fall. Due to the significantly dry hydrology, storages in Folsom Lake are well below those levels experienced in both 2014 and 2015 and are only slightly higher than storages experienced in 1977.

Drought actions currently being implemented and/or planned for WY 2021 are described in the Drought Actions section and are briefly listed below:

- Temporary Urgency Change Petition to reduce Delta needs
- Emergency drought barrier to reduce Delta needs
- Minimum exports to limit releases needed to support Delta needs
- Use of New Melones Reservoir to meet Delta outflow and salinity requirements to limit releases needed to support Delta needs
- Urban water conservation to both reduce water deliveries from Folsom Reservoir and limit releases needed to support Delta needs
- Potential curtailments from the SWRCB to both reduce water deliveries from Folsom Reservoir and limit releases needed to support Delta needs
- Reduced allocations to CVP M&I water service contractors
- Temperature shutter de-gangng to help conserve cold water for later in the summer and fall

These potential provisions and actions being considered will help to ensure that urban water users in the greater Sacramento area will continue to have access to surface water and groundwater, and that flows on the lower American River will meet the minimum flow standards for fish.

vii. Stanislaus River

Flows on the Stanislaus River are typically managed in a manner consistent with the provisions of the 2020 Record of Decision implementing the Proposed Action as analyzed in the NMFS 2019 Biological Opinion. Generally, flows in the winter and spring will follow the Stepped Release Plan schedules (from the Proposed Action) as modified through the interagency Stanislaus Watershed Team. Storage in WY 2021 has been at or near average with relatively high storage carried over from previous wet years. Given the critically low storage levels of the other CVP and SWP reservoirs, New Melones will be used throughout the summer of 2021 to support meeting Delta outflow and salinity objectives. This action is expected to reduce the carryover storage into WY 2022 as a trade-off for avoiding catastrophic conditions at Shasta, Oroville, and Folsom reservoirs. Despite this action being planned, carryover remains a concern for New Melones Reservoir. New Melones has a very low refill rate, meaning it only typically fills in very wet years (such as 2017) and can go many years between filling even with non-drought hydrology. For this reason, storage within New Melones can be relied upon for meeting basin requirements for several years after the last filling. Given the expected increased releases for meeting delta requirements, the 90% exceedance forecast shows a carryover storage of approximately just under 900 TAF at the end of September. While this storage is relatively high compared to the other reservoir within the system, it may still present challenges with regard to meeting future requirements should WY 2022 or even WY 2023 also be dry.

V. Drought Actions

DWR and Reclamation, in coordination with partner agencies have undertaken and are undertaking a number of measures to respond to conditions in WY 2021. These actions for WY2021 are described below.

A. Drought and Dry Year Toolkit

The Drought Toolkit is being developed in accordance with Alternative 1 (Preferred Alternative) as described Reclamation's 2020 Record of Decision for the Coordinated Long-Term Operation of the Central Valley Project (CVP) and State Water Project (SWP), dated February 2020, and analyzed in the National Marine Fisheries Service (NMFS) Biological Opinion, dated October 2019. The Drought Toolkit provides a coordination process and identifies potential measures under Shasta Cold Water Pool Management Dry Years, Drought Years, and Successive Dry Years.

The coordination process starts with WOMT convening the Drought Relief Year (DRY) team to assess available actions and to plan for future actions if drought conditions persist. A more complete description of the DRY team is provided in a team Charter finalized in April 2021. The DRY team is responsible for evaluating and reporting on the effectiveness of any implemented action and updating the Drought Toolkit. The DRY team will, at a minimum, convene when Shasta Cold Water Pool Management is in critical condition (i.e., Tier 3 years where there may be a high risk of exceeding 56°F before October 1st) and Tier 4 years. Agencies may determine that there is a need for the DRY team based on real-time conditions and will coordinate the decision through WOMT.

To support an efficient and organized drought response, the Drought Toolkit contains summaries of potential Drought Relief Actions (DRAs). Individual action summaries provide DRY team members with a quick reference based on both the seasonal timing and implementation times for rapid evaluation. DRAs are not meant to be comprehensive for any single water year, but rather are intended to act as a repository of the institutional knowledge gained when an action is implemented. This Drought Toolkit leverages planning and communication channels to implement actions that can be taken year-round to support operational flexibility and ongoing habitat and restoration actions that may bolster the species' resilience, especially during drought and successive dry year conditions.

B. Sacramento River Meet and Confer Actions

Coordination with the Sacramento River Settlement Contractors began in March and resulted in technical support for options on water temperature management, demand reductions, delayed water transfers, and weekly coordination with operators

C. Shasta Reservoir Warm Water Power Bypass

On April 18, 2021 Reclamation adjusted operations to bypass Shasta Dam's powerplant and temperature control device (TCD) due to the low water elevation in Shasta Reservoir. Reclamation released water from the warmer, upper layers of Shasta Reservoir directly through the dam's river outlets into the Sacramento River. The purpose of this warm water release is to maintain Sacramento River flows through the spring while preserving the limited supply of colder water for use later in the summer when most critical for endangered winter-run Chinook salmon. Fishery agencies provided preliminary guidance on the maximum temperatures (60 deg F at Clear Creek - CCR), and Reclamation has been coordinating with the Agencies weekly on the need for potential revisions. Monitoring for unanticipated effects

includes monitoring temperatures and their impacts to hatchery winter-run Chinook salmon at LSNFH and monitoring winter-run Chinook salmon in the Sacramento River (e.g., observations of pre-spawning mortality in adults). When fisheries conditions showed possible adverse effects from the warmer release, Reclamation began to manage the river temperatures to 57 deg F at the SAC gage (Sacramento River upstream from Highway 44 bridge) beginning on May 15 by adjusting the release blend from the bypass with the powerplant and TCD. The bypass was reduced as water temperatures in Shasta Lake increased in order to maintain downstream river temperatures at 57 deg F at SAC. On May 24, the bypass ended and is estimated to have conserved over 300 TAF of cold water (<52 deg F) for use later in the summer and fall.

D. Agricultural Delivery Efficiencies and Reductions

Sacramento River Settlement Contractors (SRSC) scheduled diversions and transfers to other Sacramento Valley Water Users for 2021 are 1,117,000 AF, an amount that is less than the volumes diverted and transferred in 2015. Diversions and transfers are 65% of Settlement Contract totals, an additional 10% reduction from the 75% shortage provisions. Sacramento River Settlement Contractors have made available 170,000 AF of reduced diversions to make water available for transfer to other areas of the State in critical need. SRSC are considering alternatives to rice decomposition water that will provide water additional savings. The SRSC propose to establish, in cooperation with Reclamation, an emergency groundwater pumping program to further reduce offset diversions and address the migratory needs of the Pacific Flyway. Weekly coordination with Reclamation and contractors on diversions maximizes efficiencies to retain as much water in Shasta Lake as possible while meeting demands.

E. Water Transfer Demand Delay Programs

CVP South-of-Delta agricultural water service and repayment contractors coordinate with Reclamation to store water purchased from Sacramento River Settlement Contractors in Shasta Reservoir over the summer in order to assist with management of the coldwater pool.

F. Temporary Urgency Change Petition

DWR and Reclamation submitted a Temporary Urgency Change Petition (TUCP) to SWRCB on May 17, 2021. The TUCP included the following:

1) Reduction of Outflow Requirements (June 1 through June 30, 2021)

Beginning June 1, Reclamation and DWR request modification of D-1641 outflow. The requested change would modify the minimum NDOI described in Figure 3 of D-1641 during the month of June to no less than 3,000 cfs on a 14-day average, to allow for some storage conservation for fishery protection and improving carryover storage while meeting minimum CVP and SWP export levels.

2) Reduction of Outflow Requirements (July 1 through July 31, 2021)

Beginning July 1, Reclamation and DWR request modification of D-1641 outflow. The requested change would modify the minimum NDOI described in Figure 3 of D-1641 in July from a monthly average of 4,000 cfs to a monthly average of 3,000 cfs (Table 3, footnote 8 remains applicable) to allow for some storage conservation for fishery protection and improving carryover storage while meeting minimum CVP and SWP export levels.

3) Exports (June 1 through July 31, 2021)

June 1 through July 31, the maximum combined SWP and CVP exports will be limited to 1,500 cfs when Delta outflow is less than 4,000 cfs. SWP and CVP exports may exceed 1,500 cfs when Delta outflow meets D-1641 or for moving transfer water (beginning July 1, 2021).

The minimum combined export of 1,500 cfs, is consistent with other regulatory requirements. The combined 1,500 cfs export rate represents a sustainable rate and provides the CVP and SWP real-time operational flexibility in the Delta to meet D-1641 salinity and water quality standards, as Delta conditions can rapidly change due to weather and tidal cycles. Absent this flexibility, additional sustained upstream releases would be required to manage the real-time changes in Delta conditions. In addition, the 1,500 cfs rate allows the CVP the ability to maintain a one-unit operation and minimizes the need to start and stop the unit in a 24-hour period (i.e. cycling) which could result in catastrophic damage. This rate also allows the SWP to meet Byron Bethany Irrigation District diversions, who divert from Clifton Court Forebay, and also provides for water supply delivery to the SWP South Bay Public Water Agencies who are not directly connected to San Luis Reservoir and who rely on direct diversions from the Delta to meet their municipal and industrial demands.

4) Modification of the Western Delta Salinity Compliance Point (June 1 through August 15, 2021)

In a critical year, D-1641 requires the Agricultural Western Delta Salinity Standard at Emmaton have a 14-day running average of 2.78 millimhos per centimeter from April 1 to August 15. Reclamation and DWR are petitioning the SWRCB to modify this requirement by moving the compliance location from Emmaton to Threemile Slough on the Sacramento River from June 1 through August 15, 2021.

Reclamation and DWR are awaiting response from the SWRCB on the TUCP request.

Reclamation and DWR may have a need to request modification of the Rio Vista flow requirement contained in D-1641 for September through December 2021 to be no less than 2,500 cfs. It is not yet clear whether such a request will be necessary.

G. Emergency Drought Salinity Barrier

California continues to take actions to mitigate drought conditions, and on May 10, 2021, Governor Gavin Newsom expanded the State of Emergency issued on April 21 to include 39 additional counties. Two critical actions will allow the CVP and SWP to preserve critical reservoir storage resources for later use including cold water resources needed this fall for salmon. First, DWR and Reclamation have submitted a TUCP to the SWRCB to modify D-1641 water rights conditions, and second, DWR is expeditiously moving forward with the installation of an emergency drought salinity barrier at West False River. This drought salinity barrier is a rock-filled channel closure in the Sacramento-San Joaquin River Delta, and it will allow DWR and Reclamation to maintain control of salinity in the Delta with the reduction of freshwater releases from upstream reservoirs including Lake Oroville, Folsom Reservoir and Shasta Lake. Blocking this waterway slows saltwater intrusion into the interior Delta, thus preserving fresh water for beneficial uses later in year.

H. Water Temperature Management

Folsom Shutter De-gangng: Direct operational drought related needs at the Folsom Dam to facilitate real time operations. This work directly contributes to water temperatures and flows in the Lower American River. Temperature control device shutter de-gangng may help preserve Folsom Reservoir's coldwater pool by controlling the elevations in the reservoir where water is released.

Shasta Temperature Management Plan: Reclamation coordinate a draft TMP through the SRTTG and provided a draft to NMFS and the SWRCB on May 4. Reclamation received comments from NMFS and the SWRCB and provided a final TMP on May 28.

Feather River Temperature Management: The main intake structure at Lake Oroville has a number of shutters, that can be added or removed to control the elevation and temperature of water released from Lake Oroville. Typically, once a shutter is removed, it is not re-installed until the following year. Because of low lake elevation this year, there was not enough storage to support the installation of all the shutters, which is typical in a dry year. Therefore, when storage is low and the shutters are exhausted, it is common for DWR to blend warmer water being conveyed through the main Hyatt intakes with colder water from the low-level river valve outlet system (RVOS). Maintaining minimal storage through September will provide for this more efficient temperature blending operation and avoid depleting large volumes of cold water when not needed for downstream temperatures and conserve the colder water for when it is needed in the later summer and fall for fisheries. Current modeling suggests that the forecasted operations is sufficient to maintain temperature compliance on the Feather River. DWR will continue to coordinate with State and federal fishery agencies on water temperature management activities through the summer and fall in the on-going bi-weekly Feather River coordination meetings and will provide updates to WOMT, as necessary.

I. Curtailments

DWR and Reclamation anticipate the SWRCB will pursue curtailment of other water users in the Central Valley and Delta.

J. Water Use Efficiency and Conservation

CVP and SWP water contractors and agencies are taking a number of measures to reduce water use and provide additional flexibility for drought operations. Examples include:

City of Roseville: The City of Roseville has encouraged customers to reduce their water use by 10% and began use of its groundwater wells to help meet customer demands and to offset Roseville's surface water demand from Folsom Lake. Roseville is furthermore expediting two Aquifer Storage and Recovery (ASR) projects to bolster capacity.

City of Sacramento: The City of Sacramento is maintaining its aggressive conservation practices, increasing outreach efforts to its customers and shifting its drinking water productions to divert less water from the American River and more from the Sacramento River and groundwater wells. This will reduce City of Sacramento water diversions on the lower American River by about 30% based on long term practices.

Contra Costa Water District: After the 2014-2015 drought, Contra Costa Water District (CCWD) officially adopted many of the temporary drought restrictions as permanent prohibitions on water use for the purpose of conserving the available water supply and preventing waste and unreasonable use. CCWD partnered with seven other Bay Area agencies to develop the Bay Area Regional Reliability Drought Contingency Plan (BARR-DCP) – funded in part by Reclamation – to approach drought mitigation and response from a regional, integrated perspective. While many of the BARR-DCP drought mitigation measures are in various stages of planning, CCWD continues to invest in a robust water use efficiency program, providing tools and resources to our customers. During this drought emergency, CCWD will ask customers to take additional actions to conserve to reduce our diversion of surface water.

Friant Water Authority: Landowners in the Friant Division will fallow lands as a result of water shortages while working to increase the installation of drip systems and other water saving technologies. The Friant

Water Authority (FWA) recently completed an upgrade of the Supervisory Control and Data Acquisition (SCADA) system to add more efficiency and precision to operation of the Friant-Kern Canal and is working to repair all reaches of the Friant-Kern Canal to maximize the use and flexibility of available water supplies. Additionally, FWA is conducting reverse flow operations in the Friant-Kern Canal to help contractors retrieve supplies banked in Kern County and facilitating a transfer program to allow farmers to pump water into the canal and deliver it to other contractors in need.

Grassland Water District: Surface water transfers are not available for refuge water supply contractors this year. Grassland Water District plans to supplement surface water reductions by operating its newly built water recapture and recirculation facility, and also taking advantage of recycled water from nearby communities. After a brief wetland irrigation period this spring, the District is conserving all of its reduced water supply for use in the fall and winter to support migratory birds.

Kern County Water Agency: KCWA and many of the SWP agricultural contractors are working closely with DWR to facilitate operational exchanges to recover banked groundwater to meet critical deliveries this year. There are also several drought planning efforts that are underway or planned such as investments in groundwater banks, canal lining projects, and investments in efficient irrigation practices. Many growers are also implementing scheduling services and technologies to optimize irrigation, or redeveloping land by removing permanent crops from service or planting crops that require less water. However, even with all this past and current investment, that still hasn't shielded growers from having to fallow land.

Metropolitan Water District: Metropolitan's regional communication effort is emphasizing the critical importance of water conservation to manage supply in this extremely dry year, while preparing for a potential dry water year in 2022. Further, Metropolitan is taking significant new actions to preserve State Water Project supplies by constructing physical improvements in its distribution system, and also funding a cost offset program to shift delivery pathways and locations to its member agencies to allow greater use of Colorado River Aqueduct and regionally stored water supplies. As part of its ongoing commitment to conservation and local supply development, Metropolitan provided more than \$43 million in incentives in 2019-2020 to fund recycling, conservation, and groundwater recovery projects and programs, with a cumulative investment of \$1.5 billion in those efforts since 1990.

Sacramento River Settlement Contractors: Scheduled diversions and transfers to other Sacramento Valley Water Users for 2021 are 1,117,000 AF, an amount that is less than the volumes diverted and transferred in 2015. Sacramento River Settlement Contractors have reduced diversions by 170,000 AF to make water available for transfer to other areas of the State in critical need. SRSC are considering alternatives to rice decomposition water that will provide additional water savings. The Sacramento River Settlement Contractors are working to establish, in cooperation with Reclamation, an emergency groundwater pumping program of up to 60,000 AF to further reduce diversions and address the migratory needs of the Pacific Flyway. SRSC diversions and transfers are scheduled to be 64% of Settlement Contract totals, an additional 11% voluntary reduction from the 75% shortage provisions. Weekly coordination with CVO and contractors on diversions maximizes efficiencies to retain as much water in Shasta as possible while meeting demands.

San Joaquin River Exchange Contractors Water Authority: The member agencies of the San Joaquin River Exchange Contractors Water Authority are operating under their contractual shortage provision and are taking voluntary actions to further reduce demands during the critical summer period. Such actions include maximizing the use of groundwater wells owned by the member agencies and incentivizing landowners to use private well resources within the districts. Additionally, Exchange Contractors are making water available for transfer through groundwater substitution or fallowing to other south of Delta agencies who are in critical need of water supplies.

San Luis Water District: By investing in real-time soil and ET monitoring systems plus deficit irrigation,

farmers in San Luis WD have been able to conserve approximately 14% more water than in 2014 and 2015. From water year 2020 to 2021 San Luis WD landowners rescheduled the maximum allowed in San Luis Reservoir to reduce demand in 2021. San Luis WD is developing partners to facilitate time of year swaps where Ag contractors borrow water from M&I contractors in the summer months, and repayment to the M&I contractors in the fall and winter months.

Tehama-Colusa Canal Authority: The seventeen water service/repayment CVP Water Districts/Contractors that make up the Tehama-Colusa Canal Authority (TCCA) , a 150,000 acre service area spanning four counties along the westside of the Sacramento Valley, received an initial allocation of 5%, which was then reduced to zero. It is estimated that approximately 50 thousand acres of annual crops will be fallowed as a result of the drought conditions. Significant acreage throughout the service area planted to permanent crops will rely heavily on groundwater. Also, many of the TCCA districts are purchasing expensive alternative water supplies from senior water right holders via crop idle and groundwater substitution transfers to avoid crop failures and long term or permanent damage to their orchards. The TCCA and the districts are managing all water supplies as tightly as possible under the dire circumstances.

Valley Water: Valley Water is committed to increasing conservation and has over 20 conservation programs to reduce demand on existing water supplies. Valley Water has maintained a call for conservation since 2014, including asking municipalities to implement water waste restrictions. Since then, residents and businesses have reduced their average annual water use by 20% compared to 2013. The Board will evaluate additional conservation measures, including mandatory restrictions, at their June 8, 2021 board meeting.

Public outreach emphasizes being drought-ready and promotes Valley Water's many conservation programs. The multilingual spring water conservation campaign includes digital ads, print advertorials, social media posts, and radio ads. The new summer campaign is utilizing focus groups and market research to encourage water conservation further.

Valley Water has committed to increasing program incentives and funding for the Landscape Rebate Program from \$1 to \$2 per square foot. Valley Water is working to expand its partnership with, Our City Forest, a local nonprofit organization that helps residents convert their lawns into drought-tolerant landscapes as part of the Lawn Buster Program; a program designed for low-income community members, veterans, people with disabilities, and residents age 60 and over. Additionally, Valley Water doubled the maximum rebate amount for its Water-Efficient-Technologies Rebate Program to \$100,000 for implementing water conservation projects in commercial and institutional facilities.

Valley Water newest program, the online Shopping Cart is an incredibly popular tool that allows Santa Clara County homes and businesses to easily order free water-efficient tools like efficient showerheads and faucet aerators. In May, the Fixture Replacement Program was launched, replacing 1.6 gallon per flush toilets and inefficient showerheads/faucet aerators with high-efficiency fixtures.

Water Forum: The American River water purveyors are currently undertaking or considering actions, consistent with the Sacramento Water Forum Agreement, to reduce surface water diversions from the American River by shift diversions from the lower American River to the Sacramento River, and/or by shifting from using surface water to groundwater as a supply source as part of the region's plan for sustainability. In addition, based on a resolution passed by the Regional Water Authority Board (Adopted on May 13, 2021), water purveyors are requesting that customers voluntarily reduce water use by 10% in an effort to conserve water. The Water Forum will continue to provide scientific expertise (e.g., water temperature modeling, fisheries, and hydrology), and consensus-based recommendations to support State and Federal agency decision making and to protect the environmental of the lower American River.

Westlands Water District: This year Westlands Water District is implementing all Best Management

Practices in the District's Water Management Plan, including drip irrigation, relying on conserved/stored water from last year through the peak irrigation season, and participating in programs to acquire water through groundwater substitution, land fallowing, and reservoir releases, from willing sellers. Westlands anticipates its farmers will fallow approximately 210,000 acres this year because of insufficient water supplies. Additionally, annual crops like tomatoes and permanent crops, like almonds, are being abandoned in the field and will not receive additional water or be harvested. Further, Westlands has prohibited all outdoor use of municipal and industrial water, including landscape watering, to protect health and safety and has requested all water users voluntarily reduce all in-door consumption by 25 percent. Westlands has also supported a delay in the delivery of water it purchased from willing sellers within the Sacramento Valley, so that water can remain in Shasta Reservoir to improve the cold-water pool and provide benefits in the late summer and fall to winter-run and fall run salmon.

K. CVP/SWP Operational Exchange at San Luis Reservoir

DWR's Operations Control Office and Reclamation's Central Valley Operations Office are coordinating and assessing whether there is adequate storage in the SWP State share of San Luis Reservoir to support deliveries to Reclamation's senior water rights holders, (Exchange Contractors and Refuge Water Supply) while avoiding a need to release water from Friant Dam. This action reduces the required releases from upstream reservoirs to meet these demands, avoids the significant losses expected between Friant Dam and Mendota Pool and preserves the already low allocation for the Friant Water Users to lessen the reliance on critically sensitive groundwater pumping.

L. New Melones Releases to Support Delta Outflow

Reclamation has made releases from New Melones Reservoir to support Delta outflow that preserves health and safety and assists with balancing critical storage levels in Folsom, Oroville, and Trinity reservoirs while preserving water in Shasta Lake to meet end of September storage objectives.

On May 7, 2021 the Directors of the Resources agencies met and recommended to increase releases from New Melones Reservoir to support Delta outflow requirements under D-1641 for a period of time until the Delta was back in a sustainable condition. As a result, on May 10 and 11, Reclamation increased releases from Goodwin Dam from 500 cfs to 1,500 cfs to meet Delta outflow. At the 1,500 cfs release level, the Delta needs were fully met. On May 13, Delta conditions began to change where salinity at Emmaton was increasing and additional releases from New Melones Reservoir were less effective in meeting Delta requirements. As such, Goodwin Dam releases were decreased over the next week to 600 cfs.

The brief increase in releases from New Melones from May 10 to May 19 helped meet D-1641 outflow requirements and allow for storage conservation in the critically low upstream storage reservoirs (Oroville, Shasta and Folsom reservoirs). Reclamation anticipates similar increased releases from New Melones Reservoir throughout the summer to support Delta water quality and outflow. Depending on salinity conditions, New Melones Reservoir may be more effective in meeting Delta conditions later in the summer when Delta salinity concerns begin to move further south.

M. Water Acquisition Programs

DWR and Reclamation are coordinating with project and non-project water users on the ability to make water available to support Delta outflow and reduce the reliance upon CVP and SWP reservoirs to prevent salinity intrusion and maintain the ability to deliver Health and Safety water supplies.

N. Conservation Hatcheries

Reclamation funds the USFWS to manage the Livingston-Stone National Fish Hatchery for the conservation of winter-run Chinook salmon. Fish agencies met to discuss increased hatchery broodstock and production in anticipation of 2021 conditions. Reclamation is preparing to acquire chillers to ensure cold water for the hatchery.

To address potential fish impacts at the Nimbus Fish Hatchery (a mitigation hatchery) due to drought, CCAO is working with CDFW to assess potential alternatives to help reduce steelhead mortality through the summer given expected warm lower American River temperatures. Additional actions are under discussion.

DWR and Reclamation support the U.C. Davis Fish Conservation and Culture Laboratory and U.S. Fish and Wildlife Service Livingston Stone National Fish Hatchery to maintain a refugial population of Delta Smelt.

O. Pacific Flyway Protection

DWR and Reclamation propose to coordinate with water districts in the Sacramento and Feather River basins to pump groundwater to support a portion of the Pacific Flyway that would otherwise rely on rice decomposition practices.

P. Habitat Restoration

Reclamation and the Fish and Wildlife Service continue to support SDM and the implementation of spawning and rearing habitat on the Sacramento, Clear Creek, American, and Stanislaus basins under the CVPIA.

Q. Directors Meeting

In the event of low egg-to-fry survival, DWR and Reclamation will convene a meeting of the Regional Directors of the Department of Water Resources, National Marine Fisheries Service, Fish and Wildlife Service, and California Department of Fish and Wildlife to identify actions to address the potential for a third year of low survival.

VI. Monitoring and Science Efforts to Inform Operations

A. Delta Smelt Surveys

The Enhanced Delta Smelt Monitoring Program (EDSM) conducts high intensity sampling year-round and provides regional population estimates for Delta Smelt across their range. The robustness of the EDSM design is evident in its detections of Delta Smelt despite extremely low population level in WY2021. This information has helped to inform export operation decisions and development of weekly assessments by the SMT.

The EDSM surveys are conducted in addition to several other key surveys, including the seasonal fish assemblage surveys and the Bay Studies performed by CDFW which provide year-round abundance and distribution data to inform species assessments. As part of the new ITP (Section 7.6.2), CDFW, DWR, and partners will be testing improved methods to measure larval smelt entrainment at the SWP. These new larval entrainment sampling efforts will be in a pilot phase starting in WY 2022.

The Delta Smelt population is at extremely low abundance in WY 2021, which has caused limited observations and is expected to continue for the foreseeable future. As a consequence, as outlined in the Biological Opinions and DWR's ITP, management activities may focus more on abiotic conditions including turbidity, temperature, and hydrology when assessing the likelihood of entrainment. Particle tracking models and real-time abiotic condition monitoring will also be considered and, as appropriate, guide management actions. Reclamation supports the FWS on pursuing supplementation of Delta Smelt to address, in part, allee effects from the previous drought.

B. Longfin Smelt Surveys

Longfin Smelt are sampled by a variety of long-term DFW monitoring programs, including the San Francisco Bay Study, Smelt Larva Survey, and others. While there are limitations to these monitoring efforts with respect to Longfin Smelt, most notably an absence of shallow water sampling and limited sampling downstream of Carquinez Straits, the 2020 Incidental Take Permit mandated the creation and implementation of the Longfin Smelt Science Plan (COA 7.6.3) which includes improvements to the Longfin Smelt monitoring network to fill these key gaps. While Longfin Smelt distribution and abundance data from across their whole range, especially during the summer months, may be incomplete in the short term, coverage in the Delta, confluence, and Suisun Bay are anticipated to be sufficient to detect meaningful drought impacts.

DFW monitoring programs conduct high intensity sampling in the Delta during the winter and spring months to inform the real time operations of the SWP and CVP for the management of Longfin Smelt entrainment and salvage. Additionally, as part of the new ITP (Section 7.6.2), CDFW, DWR, and partners will be testing improved methods to measure larval smelt entrainment at the SWP. These new larval entrainment sampling efforts will be in a pilot phase starting in WY 2022. As with Delta Smelt, particle tracking models and real-time abiotic condition monitoring will also be used to inform and guide management actions for Longfin Smelt.

C. Salmonids Monitoring

An extensive salmonid monitoring program exists throughout the Central Valley and is described in the Biological Assessment (Appendix C) of the LTO and updated annually in coordination with NMFS. Additional monitoring efforts that may evaluate drought effects and improve status and trend fish and ecosystem monitoring while preserving inferences from existing long-term datasets are being discussed and considered through the Sacramento River Science Partnership. Salmonid monitoring efforts include

rotary screw traps, acoustic tagging, trawls, carcass surveys, red surveys, and beach seining. Environmental DNA sampling is being investigated to complement the Sacramento, Mossdale, and Chipps Island trawls observations to improve salmonid detection at Delta entry and Delta exit points.

Other studies on migration paths and mortality will continue in WY 2021 for winter-run and spring-run Chinook salmon, and steelhead, to improve knowledge of population dynamics of these species. Juvenile sampling is being investigated to evaluate the temperature experience of early salmonid life stages in the upper Sacramento River during summer and fall 2021. Several new or updated models, such as the STARS model and DSM2, are available to simulate fish migration rate, routing, and survival in the Delta in response to flow and other variables. These models will be used to inform real-time management decisions to minimize the impact of drought actions on the survival of salmonids migrating through the Delta.

As a potential additional tool, DWR's ITP requires the development of a predictive tool to improve management of winter-run Chinook salmon salvage. One such modeling tool is already in an advanced state of development (housed on SacPAS), and another has been initiated. These models will be piloted by SaMT to provide additional information regarding real-time operations, potentially improving the ability to reduce entrainment throughout the winter and spring months when salmonids are present in the Delta. Monitoring and tools utilized by SaMT improve our understanding of timing and distribution of species in the Delta, as well as inform targeted research to fill data gaps to identify additional risks to salmonids resulting from water operations.

D. Ecosystem Drought Monitoring and Assessment

Monitoring during the previous major drought (2014-2015) demonstrated that there can be major ecological changes in the estuary. For example, the previous drought showed increases in harmful algal blooms, aquatic weeds, and invasive fishes (e.g. centrarchids). These changes are likely to further intensify again under drought conditions, and in the Delta and Suisun Marsh monitoring focuses on measuring these effects to understand the impacts of this potential drought and efficacy of different management actions taken to address these ecological stressors.

DWR is developing a drought monitoring and synthesis plan for the Delta and Suisun Marsh built on existing monitoring and synthesis efforts (see Attachment 2). The analysis and synthesis will be conducted by a team of multi-agency scientists with opportunities for input and participation by stakeholders and experts from academia and industry.

This plan will have three major goals:

- Monitor the status of important environmental drivers in the Delta during the current drought.
- Examine the effects of this drought on critical ecological conditions in the Delta.
- Assess the effects of the TUCP and Drought Barrier on the Delta ecosystem.

The monitoring plan relies upon the extensive existing network, which includes additions made during the 2014 and 2015 years and adds additional efforts where necessary to capture specific actions. The monitoring program is a more coordinated telemetry network for anadromous fishes, and the State's surveys of aquatic vegetation. Reclamation and CDFW are also leading an interagency team to explore whether the seasonal fish assemblage surveys funded by Reclamation and DWR can be improved to better characterize the status and trends of the ecosystem while preserving the utility to make inferences from long-term datasets.

The Delta Ecosystem Monitoring and Synthesis Plan will be conducted in coordination with other effectiveness monitoring outside the Delta conducted through the DRY team.

VII. Next Steps

For WY 2021, DWR and Reclamation will coordinate to determine feasible actions, continue updating the Drought Plan, and provide weekly hydrology and operations updates at the WOMT meetings.

DWR and Reclamation will use the weekly LTO Implementing Agency Coordination meeting (which focuses on planning and reporting as opposed to WOMT's focus on real-time decisions) to identify and oversee a group of agency experts to report on the outcomes and effectiveness of actions taken under this Drought Plan for the purpose of updating and improving the Drought Toolkit.

The report may include:

- Accounting of water supply for water saving actions;
- Physical conditions;
- Biological observations;
- Preliminary attribution of effects, if possible; and
- Recommendations on next steps.

The schedule for the report will be developed by the agency experts with the intention of informing potential actions in WY 2021. The report would include, at minimum, input from stakeholders through forums such as the Collaborative Science and Adaptive Management Plan and, if desired, a SWRCB workshop.

In addition, DWR and Reclamation will continue to collaborate with Agencies to develop the Drought Toolkit which will be completed in August 2021. The Drought Toolkit establishes a Dry Relief Year (DRY) Team comprised of technical experts and/or policy makers from each of the six WOMT agencies. The DRY Team will also update the Drought Toolkit with any additional actions and evaluations of the effectiveness of any implemented actions. This update will be completed annually by February and discussed with the LTO Implementing Agency Coordination group and WOMT.

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Attachment 1- Operations Forecast Results

OPERATIONS FORECAST RESULTS

To Be Added

For the May 2021 Drought Plan

Attachment 2- Drought Monitoring Plan

Attachment 3- May 21, 2021 letter from SWRCB to Reclamation