

Interagency 2015 Drought Strategy
For the Central Valley Project and State Water Project
December 11, 2014
Working Draft

Overview

This Interagency 2015 Drought Strategy (2015 Drought Strategy) has been prepared by the Bureau of Reclamation (Reclamation), California Department of Water Resources (DWR), U.S. Fish and Wildlife Service (FWS), National Marine Fisheries Service (NMFS) and California Department of Fish and Wildlife (CDFW). This 2015 Drought Strategy is comprised of three components which are outlined in this document: (1) a preliminary framework for the Drought Contingency Plan for Operations of the CVP and SWP (DCP), (2) the DCP Biological Monitoring Plan, and (3) Other Drought-Related Measures. The DCP, when finalized by the above agencies, will be submitted to the State Water Resources Control Board (SWRCB) on January 15, 2015, as required by the SWRCB's final Temporary Urgency Change Order dated October 7, 2014. The purpose of issuing this Drought Strategy is to inform stakeholders and the public of 2015 drought response actions being taken by the state and federal government relating to project water operations and related matters.

Introduction and Goals

As California approaches the winter after a third consecutive dry year, economic and environmental challenges for our State are mounting. Since December 2013, state and federal agencies that supply water, regulate water quality, and protect fish and wildlife have worked together to cope with persistent drought. Together, these agencies worked through existing statutory and regulatory obligations so that water operations could adjust quickly to changes in the weather and environment to support and improve water supply deliveries when possible while protecting water quality and fish and wildlife as required under state and federal laws and permits. The agencies recognize the importance of their efforts to minimize potential impacts from drought to food security, provide economic stability, and provide for species protection in California.

On January 17, 2014, the Governor issued a drought State of Emergency proclamation. On January 29, Reclamation and DWR sought a temporary modification to their water rights permits and licenses to allow appropriate modification of CVP and SWP operations to respond to the drought conditions. On January 31, 2014, the Executive Director of the State Water Resources Control Board (SWRCB) issued an Order that granted temporary modification to Water Rights Decision 1641 (D-1641). The modification allowed the Projects to reduce Delta outflow and thus

conserve upstream storage for later use. It also allowed the Projects to pump to meet critical supply needs when Delta outflow was lower than would typically allow such pumping

Consistent with the petition and subsequent acknowledgement in the Order, Reclamation and DWR convened a Real Time Drought Operations Management Team (RTDOMT) comprised of representatives from Reclamation, DWR, fisheries agencies, and the SWRCB to discuss more flexible operations of the Projects while protecting beneficial uses. Together, through subsequent petitions vetted through the RTDOMT and submitted to the SWRCB, Reclamation and DWR received modifications to the Order and adjustments to water operations under drought provisions of the smelt and salmon biological opinions. The RTDOMT developed a Drought Operations Plan (DOP) for April to November 2014 to address water operations which incorporated regulatory adjustments to balance water supply and biological benefits.

The modified Order, DOP, and subsequent biological reviews created flexibility for water operations which conserved water in upstream reservoirs for future beneficial uses. Some of the major modifications included shifting the Agricultural Western Delta Salinity Standard (EC) compliance from Emmaton upstream to Threemile Slough, adjusting Delta Outflow requirements, adapting OMR regulatory flows, and varying flow standards at Vernalis. These modifications allowed the projects to conserve a significant amount of water while operating under the Order and DOP.

As we approach 2015, Reclamation, DWR, FWS, NMFS and CDFW have prepared this 2015 Drought Strategy to be in a better position to address 2015 challenges and to inform stakeholders about the agencies' anticipated drought response efforts. The Strategy will help the five agencies to maximize operational flexibility of the CVP and the SWP to support water supplies while minimizing the adverse effects of the drought on water quality and imperiled species. This Strategy is currently intended to address drought responses through November 2015 through development and implementation of the individual key Strategy components and incorporates lessons learned from last year. The agencies recognize that effectively addressing a fourth year of drought will require extraordinary cooperation and action by water managers at the state, federal and local level to implement innovative water management measures. The agencies will support those efforts as appropriate to meet water needs in 2015.

The goals of this 2015 Drought Strategy are to operate the CVP and SWP and take other related actions consistent with the following core principles:

1. **Operate the CVP and SWP during the continuing drought to meet essential human health and safety needs and lessen critical economic losses throughout the CVP and SWP service areas from January 15 through November 15, 2015.** As a first priority, the Projects must assure that adequate water supplies are available for drinking water, sanitation, and fire suppression for communities within their service areas. Beyond

providing for these basic needs, this 2015 Drought Strategy provides for operation of the CVP and SWP systems to lessen critical economic losses due to water shortages through project water deliveries and by facilitating voluntary water transfers and exchanges to the extent possible, while balancing the other purposes of the Strategy described below.

2. **Control of salt water intrusion in the Sacramento-San Joaquin Delta (Delta).** Salt water pushes inland from San Francisco Bay, driven in large part by tidal rise and fall of the ocean, and reaching inland to the point where fresh water inflows to the Delta present a barrier that keeps the salinity from proceeding further. The fresh water inflows to the Delta are primarily determined by managed releases from upstream reservoirs. If there is not enough water in upstream reservoirs to release to rivers to repel the saltwater, the salinity intrusion impairs water quality in the channels from which water supplies are drawn, not just for the SWP and CVP but also for Delta farmers and water districts in nearby Contra Costa, Alameda and San Joaquin counties. Maintenance of sufficient reservoir storage is critical to control Delta salinity in the upcoming (2015) spring through the fall months; therefore, this 2015 Drought Strategy balances the often conflicting needs of protecting upstream storage, providing critically needed water deliveries from the Delta in the spring and summer, and maintaining salinity control in the Delta for diversions and deliveries later in the year and possibly into 2016. If winter forecasts show there will not be enough water in upstream reservoirs to repel the saltwater and to meet health and safety and other critical needs, then installation of Emergency Drought Barriers will be considered to lessen water quality impacts.
3. **Preserve cold water pools in upstream reservoirs for temperature management to maintain cool water temperatures for salmon and steelhead.** These same water supplies also serve other beneficial uses including water deliveries and Delta salinity management in water year (WY) 2015 and in WY 2016 if dry conditions continue.
4. **Maintain adequate protections for state and federally endangered and threatened species and other fish and wildlife resources.** Operational criteria will be implemented this year in a manner that provides adequate fishery protections. This 2015 Drought Strategy identifies the criteria that have been or could be modified in order to balance all needs while continuing to provide the protections required by law. The key components that will be used to implement the strategy will be reviewed under applicable laws, including the federal Endangered Species Act (ESA), California ESA and the California Water Code.
5. **Provide an overview of biological monitoring that may be implemented to assist in development of forecasted operations as well as guide daily operations to increase the agencies' ability to support and improve water deliveries while also meeting**

water quality and species requirements. The goal of the monitoring is to provide data that can be assessed so that biological needs and water supply objectives are considered in real time (*i.e.*, on a weekly or daily basis). Monitoring provides important information to decision makers when considering the potential effects of real-time operations. Monitoring allows for decisions to be made using relevant information such as species presence and risk level.

6. **Highlight other drought-related measures that the federal and state agencies will pursue in 2015.** These actions, if implemented, may be helpful under certain conditions in alleviating some impacts to water supply caused by the drought. These measures may also have additional utility beyond the drought.

Key Components

Key components associated with the 2015 Drought Strategy for the CVP and SWP include the following:

- Drought Contingency Plan for Operations
- Biological Monitoring Plan
- Other 2015 Drought-Related Measures

1. Drought Contingency Plan (DCP) for Operations of the CVP and SWP

Reclamation and DWR are working collaboratively with the FWS, NMFS, CDFW and the SWRCB to prepare a 2015 DCP for operations of the CVP/SWP (also “Projects”) in the event that water supplies remain very low. The 2015 Interagency Drought Strategy will be used by DWR and Reclamation to inform the Drought Contingency Plan to be completed per the SWRCB final Temporary Urgency Change Order dated October 7, 2014. The SWRCB’s October 7, 2014, Order required the agencies to develop a two-phased DCP. Phase 1 was submitted to the SWRCB on October 15 (*see Enclosure I*) and addresses operation of the CVP and SWP from *October 15, 2014, through January 15, 2015*. Phase 2 is due to the SWRCB by January 15, 2015, and will include forecasted conditions related to the operation of the CVP and SWP from *January 15, 2015, through September 30, 2015*. The DCPs will be modified as needed in the future based on evolving circumstances, including additional direction from the SWRCB as well as current hydrologic and biological conditions. The agencies will use the outline below to develop the Phase 2 DCP ordered by the SWRCB. However, it may be difficult to include some of the actions outlined below in the monthly hydrology forecasts requested by the SWRCB.

Phase 2 of the 2015 DCP will address a range of potential hydrologic/runoff conditions through forecasted operation of the CVP and SWP to (not in order of priority):

- Meet essential human health and safety needs and, where possible, lessen critical economic losses
- Manage salinity intrusion in the Sacramento-San Joaquin Delta
- Manage cold water in Project reservoirs for various cold water species
- Maintain protections for listed species and other fish and wildlife resources to the extent possible given the severity of the drought
- Provide SWP and CVP contractual deliveries based on forecasts and available water supplies. The SWP initial water supply allocation is made December 1. The CVP initial allocation is released in February. Updated forecasting occurs monthly thereafter.

Anticipated Collaboration Process

Reclamation and DWR have recommenced the RTDOMT meetings that were established in 2014 (see Introduction). Reclamation, DWR, CDFW, FWS, NMFS, and the SWRCB will meet at least once a week in order to review real-time water operation and biological information to assess potential drought response actions. The RTDOMT provides state and federal water operators, fish agencies, and the SWRCB with a reliable communication schedule and established points of contact to timely respond to emerging issues.

Biological information will be collected through standard survey programs and via additional monitoring, including Early Warning Surveys (*see section 2 and Enclosure II for the DCP Biological Monitoring Plan*). The available physical and biological data will be evaluated on an ongoing basis by the RTDOMT agencies to ensure efficient water operations management through potentially dynamic weather and flow events. As circumstances permit, the Projects may request adjustments in OMR flow management through the RTDOMT process. In considering such requests, the RTDOMT will convene and evaluate real-time and forecasted hydrology, data from various monitoring and sampling locations, and any recommendations from the Delta Operations for Salmonids and Sturgeon (DOSS) or Smelt Working Group (SWG). If temporary adjustments to the Biological Opinions or D-1641 are requested by the Projects, they will submit a written request to the appropriate agencies for consultation or approval.

The RTDOMT will also monitor water transfers and address operational issues associated with making transfers in light of drought operations.

Summary of anticipated contents of the Phase 2 of the DCP:

- I. Introduction and Purposes of the Plan*
- II. 2015 Water Conditions and Forecasted Operations of the CVP and SWP for January 15-November 15, 2015*
- III. Critical CVP/SWP Operational Considerations*

- A. Essential Human Health and Safety
- B. Storage Conditions going into 2016 will be assessed in early January 2015 and included in the January 15 report to the SWRCB.
- C. Maintaining Salinity Control through Emergency Drought Barriers
 - i. Excessive salinity increases in the Delta could render the water undrinkable by 25 million Californians and unusable by farms reliant upon this source. Temporary rock (rip-rap) barriers may be installed at up to three locations in the Delta during drought conditions in 2015 or in a subsequent year if necessary to manage salinity in the Delta when there is not enough water in upstream reservoirs to release to rivers to repel the saltwater.
 - ii. An interagency group is considering installing barriers – at this time, the following timeline is considered: The temporary rock barriers may be installed on or about May 7 in West False River and no sooner than May 22 at the Sutter Slough and Steamboat Slough. Construction would require approximately 30-60 days. Barrier removal would commence on or about October 1 and would require approximately 30-60 days for Sutter and Steamboat Sloughs and approximately 45-60 days for West False River.
- D. Coldwater management and other fishery needs: The end-of-September 2014 storage of approximately 1.163 million acre-feet in Shasta Reservoir is very low and may not be adequate to maintain winter-run Chinook salmon egg incubation and fry production throughout the 2015 broodyear (through September 2015) in the Sacramento River without a marked increase in inflow into Shasta Lake. The April 8, 2014, *Central Valley Project and State Water Project Drought Operations Plan and Operational Forecast April 8, 2014 through November 15, 2014* (DOP) included a winter-run contingency plan (Attachment D), which provided for an enhanced monitoring program, various infrastructure improvements and decision points based on various considerations in order to minimize the negative effects of the drought and operations in 2014. A similar winter-run contingency plan will be needed for 2015.
- E. CVP and SWP Water Supplies for WY 2015: Reclamation and DWR will follow their normal processes for making allocations of supplies for 2015. Water contractors will be involved regularly in discussions regarding 2015 CVP/SWP operations and contract allocations.
- F. Refuge Water Supply: Central Valley Project Improvement Act (CVPIA) refuge water supplies will follow their normal process in making allocations. CVPIA refuge managers will be involved regularly in discussions regarding 2015 CVP/SWP operations and contract allocations.
- G. Operational Flexibility to support potential exchanges and transfers: The agencies will support efforts to implement extraordinary one-year transfers or multi-year exchange agreements between water users.

H. Water re-use and conservation: The agencies intend to pursue water re-use and promote conservation efforts where appropriate to make the most use of limited supplies.

IV. *Overview of 2015 Forecasts and Operations*

A. Overview

B. Process: The five agencies will continue coordinating with the SWRCB through the existing RTDOMT.

C. CVP and SWP Forecasts

V. *Proposed Upstream Tributary Operations (Temperatures and flows) – January 15- November 15, 2015- this section is under development; following is the current outline for the plan*

A. Upper Sacramento River, Trinity River, and Clear Creek Flows and Temperature Management Planning – NMFS Reasonable and Prudent Alternative (RPA) Action 1.2.3.C

i. Trinity Operations

ii. Clear Creek Operations

iii. Shasta Operations/Keswick Release Schedule

iv. These operations will be developed further and refinements will be incorporated based on operation from last year.

B. Folsom/American River Operations

C. New Melones/Stanislaus River Operations

D. Oroville/Feather River Operations

VI. *Proposed Delta Operations – Winter*

A. 2009 Biological Opinion and Conference Opinion on the Long-term Operations of the Central Valley Project and the State Water Project (NMFS BiOp) Provisions

i. Delta Cross Channel (DCC) Operation–Based on current and projected water quality in the Delta, and at least 3 weeks prior to any need to open the DCC gates, Reclamation and DWR will determine whether adjustments in the timing of the opening of the DCC gates should occur in order to address the prospects of elevated salinities in the Delta (Action IV.1.2). The DCC gate triggers matrix (as described in Appendix G of the DOP) will be used to determine operation the DCC gates. The triggers outlined in this matrix provide direction and a method that balances water quality and fishery objectives in the Delta. There is a reasonable potential that water quality will be adversely affected by a continuation of the drought into early water year (WY) 2015; therefore the January 15 DCP is expected to propose modifications to water quality criteria to achieve the aforementioned balance.

- ii. The interagency group continues to discuss short-term flexibilities to allow OMR exceedances of the 14-day running average during sporadic storm events under an exceptionally dry hydrology: Upon the onset of RPA Action IV.2.3 for OMR flow management, OMR shall be no more negative than -5,000 cfs as a 14-day running average, and no more negative than -6,250 cfs as a 5-day running average, except as needed to capture sporadic storms (increase exports). This exception would be evaluated based on listed species distribution and risk in the South and Central Delta, and if conditions remain very dry (according to subsections below).
1. While Action IV.2.3 is in effect, and drought conditions remain, the Projects may request an adjustment to its implementation by requesting that the use of the OMR Index criteria (as approved by USFWS, NMFS, and CDFW) to be no more negative than -6,000 cfs for limited periods in order to capture additional natural or abandoned flow in the Delta because of infrequent storm events. Through this operational flexibility, the Projects are expected to be able to increase exports over what they would otherwise be able to do, while providing protections for the listed species. During any potential adjustment to Action IV.2.3, the action triggers provided in RPA Action IV.2.3 (*e.g.*, combined older juvenile Chinook salmon loss density) will continue to be in effect. Additional flexibility, use of the OMR Index to be no more negative than -6,500 cfs for short periods, may be requested by the Projects to capture the peak of storm events. Once the operational flexibility has been exercised, operations will conform OMR flows consistent with RPA Action IV.2.3.
 2. On occasion, there may be multiple rainfall events that occur one right after the other that make implementation of subsection 3, below, difficult, especially in consideration of the Projects exporting as much natural and abandoned flow as possible. In these situations, Reclamation and DWR may request additional flexibility in OMR flow management through the RTDOMT. In considering the request, the RTDOMT will convene and evaluate real-time and forecasted hydrology, data from various monitoring locations (*e.g.*, Knights Landing RSTs, Sacramento trawl and beach seines, Jersey Point and Prisoners Point trawls, and the Federal and state fish facilities), and any advice from the DOSS, in making a decision whether to grant the additional flexibility, and for what duration.
 3. A similar flexibility was granted and implemented during a few storms in water year 2014. However, increases in combined exports lagged behind (a couple-day lag time) the peak of the increased natural flow in the Delta. If flexibility is requested and subsequently granted, increased exports during sporadic storm events in water year 2015 will

be implemented during the ascending limb of the hydrograph, followed by a subsequent reduction in exports during the descending limb of the storm events. The key to this operation is to capture the spike in water availability prior to a coincident spike in listed fish presence in the central and south Delta. This request will be accompanied by augmented real-time monitoring at Prisoners Point and Jersey Point in order to evaluate the timing, location and magnitude of listed anadromous salmonid species in the Delta.

4. Hatchery winter-run and their exposure to the hydrodynamic effects from exports: Livingston Stone National Fish Hatchery (LSNFH) managers will coordinate with DOSS to time the hatchery release of winter-run chinook to good hydrologic conditions, and track their movement down the Sacramento River into and through the Delta utilizing the acoustically-tagged winter-run released at approximately the same time. Real-time acoustic receivers will be deployed along the Sacramento River and Delta at various locations. DOSS will review the real-time acoustic tag data to determine the likely timing and distribution of the hatchery winter-run in the Sacramento River and into the Delta, and advise NMFS and Water Operations Management Team (WOMT) of potential risk of hatchery winter-run to the influences of the hydrodynamic effects of increased exports during the sporadic storm events. Beginning in March 2015, enhanced Particle Tracking Model (PTM) modeling will also be utilized to inform real time OMR limits and in consideration of any requests for flexibility in OMR flow management.

- iii. Fish migration non-physical barriers (*e.g.*, Georgiana Slough, Delta Cross Channel)
- iv. Preferential export shift to Jones Pumping Plant: One option to help reduce increased impacts on migrating fisheries due to these adjustments in operations may be to shift facility operations so that minimal export pumping will occur at the SWP's Banks Pumping Plant and the majority will occur at the CVP's Jones Pumping Plant. This export shift typically increases survival of salmonids through these facilities since fewer fish will enter the SWP where losses are higher due to substantial pre-screen mortality associated with Clifton Court Forebay. Combined exports would remain the same. The amount of shifted pumping from Banks to Jones would be made available to the SWP.

B. 2008 Biological Opinion for Delta Smelt (FWS BiOp) Provisions

- i. December-January OMR management. OMR management for Delta Smelt is best divided into two time periods to distinguish the early months (December

and first half of January) when a “first flush” migration can occur from later months when the fish are less likely to strongly respond to freshets.

- ii. December 1 through January 15. Delta Smelt may migrate into fresher water in response to physical environmental stimuli, including turbid freshets passing through the Delta, during December and early January. These freshets usually originate in the Sacramento River drainage. As such, Delta Smelt residing in or near the Low Salinity Zone usually move into the Sacramento River side of the Delta in response to early freshets. The current understanding is that they do not enter the San Joaquin River side of the Delta unless the freshet originated in the San Joaquin drainage or there is high negative OMR flow during the freshet that carries a strong plume of turbid Sacramento River water into the Central and South Delta. During December and January, but not other months, there is a significant potential for large numbers of Delta Smelt to be drawn into the Central and South Delta and become entrained at the pumps if high negative OMR flow is maintained while turbid freshets are passing through the Delta. Moreover, fish drawn into the Central and South Delta during such events are likely to remain in those areas and may spawn, potentially creating a management challenge that can persist for an extended period. Hence, there is considerable value in planning early freshet operations that optimize water exports while avoiding potentially lingering Delta Smelt entrainment concerns.
- iii. January 15 through March. The proposed approach for Delta Smelt in the early winter is focused on avoiding drawing Delta Smelt into areas where adult Delta Smelt and their progeny would be at risk of entrainment. If successful, that approach should minimize the need to take actions for Delta Smelt later in the winter that are more restrictive than those needed to protect salmon. In the event storms are infrequent, the RTDOMT expects to implement short-term flexibilities when they occur to allow OMR exceedances in situations where such exceedances may allow for increased water exports while avoiding excessive take of Delta Smelt. Any such request will be accompanied by augmented real-time monitoring at Prisoners Point and Jersey Point in order to evaluate in real-time any changes in the distribution or density of Delta Smelt in the Central Delta. In accordance with the approach employed in last year’s drought operations, such a request will also be accompanied by an analysis of effects of the proposed operations on Delta Smelt distribution and entrainment risk. The analyses will address monthly and real-time Delta Smelt distributional information and trends,

physical environmental conditions, and, if appropriate, hydrodynamic model output.

Management decision-making during both period (1) and period (2) of the winter will be aided by review of information obtained through “early warning” trawl sampling for Delta smelt that began on December 1. Early-warning drought monitoring will include a survey of the Spring Kodiak Trawl program in December, where the program formerly began in January, and a “real-time” component that samples as frequently as on alternate days in the Central Delta. The “real-time” component has a high potential to quickly answer whether Delta smelt are in danger of moving so far into the Central and South Delta that strong entrainment concerns will eventuate. The information from the “early warning” sampling will be very carefully evaluated along with other sources of information bearing on operations management.

The combination of turbidity modeling and augmented biological monitoring is expected to allow more focused management of OMR flow. Where in the past agencies were forced to rely on a combination of monthly biological monitoring and real-time turbidity and flow monitoring, it may now be possible to incorporate real-time monitoring in all three of these areas into management decision-making. As such, FWS expects to be able to more narrowly focus reductions in exports during early storm events than would have been possible in the past, while still maintaining adequate entrainment protection for Delta smelt that may be in the lower Sacramento and San Joaquin rivers.

C. D-1641 Provisions

- i. Triggers for DCC gate operation to balance water quality and fish
- ii. Modify D-1641 Export to Inflow (E/I) ratio’s averaging period for sporadic storm events (similar to last year)
- iii. Triggers for modified X2 criteria to balance upstream storage and fish protection
- iv. Modify Vernalis-based flows if drought persists

D. Consistency with CESA for SWP

- i. CDFW will work in coordination with FWS and NMFS through the RTDOMT to review requests by DWR for operational adjustments to implement the actions described above pursuant to the California Endangered Species Act (CESA) and the existing consistency determinations on the BiOps

for the SWP, to ensure ongoing CESA compliance in light of flexibility provided in the RPAs and the range of effects analyzed.

- ii. Compliance with Longfin Smelt Incidental Take Permit (ITP) – CDFW will work through the RTDOMT and in consultation with the Smelt Working Group (SWG) to monitor the risk to Longfin Smelt and review proposed changes in operations to ensure compliance with the Longfin Smelt ITP for the SWP. The proposed approach for Longfin Smelt in the early winter is focused on avoiding drawing Longfin Smelt into areas where adult Longfin Smelt and their progeny would be at risk of entrainment. If successful, that approach should minimize the need to take actions for Longfin Smelt during the winter that are more restrictive than those needed to protect salmon. The RTDOMT will continue to consider short-term flexibilities to allow OMR exceedances in situations where such exceedances may allow for increased water exports while avoiding excessive take of Longfin Smelt. Any such request will be accompanied by analysis of the effects of the proposed operations on to Longfin Smelt based on the distribution and entrainment risk of Longfin Smelt in the Central and South Delta. The analyses will address monthly and real-time Longfin Smelt distributional information and trends, physical environmental conditions, and, if appropriate, hydrodynamic model output.

VII. *Proposed Delta Operations – Spring*

A. NMFS BiOp Provisions

- i. Short-term flexibilities to allow OMR exceedances of the 14-day running average during sporadic storm events under an exceptionally dry hydrology: Upon the onset of RPA Action IV.2.3 for OMR flow management, OMR shall be no more negative than -5,000 cfs as a 14-day running average, and no more negative than -6,250 cfs as a 5-day running average, except as needed to capture sporadic storms (increase exports). This exception would be evaluated based on listed species distribution and risk in the South and Central Delta, and if conditions remain very dry (according to subsections below).
 - 1. While Action IV.2.3 is in effect, and drought conditions remain, the Projects may request an adjustment to its implementation by requesting that the use of the OMR Index criteria (as approved by USFWS, NMFS, and CDFW) to be no more negative than -6,000 cfs for limited periods in order to capture additional natural or abandoned flow in the Delta because of infrequent storm events. Through this operational flexibility, the Projects are expected to be

able to increase exports over what they would otherwise be able to do, while providing protections for the listed species. During any potential adjustment to Action IV.2.3, the action triggers provided in RPA Action IV.2.3 (e.g., combined older juvenile Chinook salmon loss density) will continue to be in effect. Additional flexibility, use of the OMR Index to be no more negative than -6,500 cfs for short periods, may be requested by the Projects to capture the peak of storm events. Once the operational flexibility has been exercised, operations will conform OMR flows consistent with RPA Action IV.2.3. Through this operational flexibility, the Projects are expected to be able to increase exports over what they would otherwise be able to do, while providing protections for the listed species. During any potential adjustment to Action IV.2.3, the action triggers provided in RPA Action IV.2.3 (e.g., combined older juvenile Chinook salmon loss density) will continue to be in effect. Additional flexibility may be requested by the Projects to address changing hydrologic and species distribution conditions throughout the water year.

2. On occasion, there may be multiple rainfall events that occur one right after the other that make implementation of subsection B, below, difficult, especially in consideration of the desire for the Projects to export as much natural and abandoned flow as possible. In those situations, Reclamation and DWR may request additional flexibility in OMR flow management through the RTDOMT. In considering the request, the RTDOMT will convene and evaluate real-time and forecasted hydrology, data from various monitoring locations (e.g., Knights Landing RSTs, Sacramento trawl and beach seines, Jersey Point and Prisoners Point trawls, and the Federal and state fish facilities), and any advice from the DOSS, in making a decision whether to grant the additional flexibility, and for what duration.
3. A similar flexibility was granted and implemented during a few storms in water year 2014. However, increases in combined exports lagged behind (a couple-day lag time) the peak of the increased natural flow in the Delta. If flexibility is requested and subsequently granted, increased exports during sporadic storm events in water year 2015 will be implemented during the ascending limb of the hydrograph, followed by a subsequent

reduction in exports during the descending limb of the storm events. The key to this operation is to capture the spike in water availability prior to a coincident spike in listed fish presence in the central and south Delta. This request will be accompanied by augmented real-time monitoring at Prisoners Point and Jersey Point in order to evaluate the timing, location and magnitude of listed anadromous salmonid species in the Delta.

- ii. Flexibility with San Joaquin I/E ratio. Currently, the agencies are discussing several concepts for providing additional flexibility in the April-May period, in the event that conditions remain very dry. These operations will be discussed further and evaluated as part of the phased operations plan as hydrology is updated. These concepts include the following:
 - a. Consider different functional forms of the relationship between Vernalis flow and exports in the implementation of the San Joaquin I/E ratio, such that if there is a dry year classification, the ratio is less than 2:1 (closer to 1:1).
 - b. If critically dry, consider added flexibility in the 1:1 ratio on the shoulders of Vernalis pulse flows to capture sporadic storm events (similar to last year).
 - c. Clarify the treatment of potential transfers during this period.
 - d. Declare San Joaquin River water year classification (dry or critically dry year classification) as early as possible (see Reclamation's February 7, 2014, letter to NMFS for example).
- iii. The spring head of Old River barrier (HORB) will be installed and operational by April 1 if hydrological conditions are compatible. The HORB is installed in the spring and is intended to prevent downstream-migrating salmonids in the San Joaquin River from entering Old River. Flow conditions will be assessed to determine actual date of installation.
- iv. Preferential export shift to Jones Pumping Plant: An element to reduce potentially greater exports during April and May 2015 than would occur under an unmodified RPA Action IV.2.1 could be a facility shift in exports so that minimal pumping will occur at the SWP's Banks Pumping Plant and the majority will occur at the CVP's Jones Pumping Plant. This export shift will increase survival of salmonids through these facilities, since fewer fish will enter the SWP, where loss is higher due to substantial pre-screen mortality associated with Clifton Court Forebay. Combined exports would remain the

same. The amount of shifted pumping from Banks to Jones would be made available to the SWP.

B. FWS BiOp Provisions

- i. The proposed approach for Delta Smelt in the early winter is focused on avoiding drawing Delta Smelt into areas where adult Delta Smelt and their progeny would be at risk of entrainment. If successful, that approach should minimize the need to take actions for Delta Smelt in the spring that are more restrictive than those needed to protect salmon. In the event storms are infrequent, the RTDOMT expects to implement short-term flexibilities when they occur to allow OMR exceedances in situations where such exceedances may allow for increased water exports while avoiding excessive take of Delta Smelt. Any such request will be accompanied by augmented real-time monitoring at Prisoners Point and Jersey Point in order to evaluate in real-time any changes in the distribution or density of Delta Smelt in the Central Delta. In accordance with the approach employed in last year's drought operations, such a request will also be accompanied by an analysis of effects of the proposed operations on Delta Smelt distribution and entrainment risk. The analyses will address monthly and real-time Delta Smelt distributional information and trends, physical environmental conditions, and, if appropriate, hydrodynamic model output.

C. D-1641 Provisions

- i. Implement D-1641 E/I ratio's averaging period for sporadic storm events (similar to last year).
- ii. Triggers for modified X2 criteria to balance upstream storage and fish protection.
- iii. Triggers for moving Western Delta Ag compliance point (i.e.:Emmaton to Three-Mile Slough).
- iv. Modify San Joaquin-based flows at Vernalis if drought persists.

D. Consistency with CESA for SWP

- i. CDFW will work in coordination with FWS and NMFS through the RTDOMT to ensure that requests by DWR for operational adjustments to implement the actions described above pursuant to the CESA and the existing consistency determinations on the BiOps for the SWP, to ensure ongoing CESA compliance in light of flexibility in the RPAs and the range of effects analyzed.
- ii. Compliance with Longfin Smelt ITP – CDFW will work through the RTDOMT and in consultation with the SWP to monitor the risk to Longfin

Smelt and review proposed changes in operations to ensure compliance with the Longfin Smelt ITP for the SWP. The proposed approach for Longfin Smelt in the spring is focused on minimizing entrainment of Longfin Smelt juveniles. If successful, that approach should minimize the need to take actions for Longfin Smelt during the spring that are more restrictive than those needed to protect salmon. The RTDOMT will continue to consider short-term flexibilities to allow OMR exceedances in situations where such exceedances may allow for increased water exports while avoiding excessive take of Longfin Smelt. Any such request will be accompanied by analysis of the effects of the proposed operations on to Longfin Smelt based on the distribution and entrainment risk of Longfin Smelt in the Central and South Delta. The analyses will address monthly and real-time Longfin Smelt distributional information and trends, physical environmental conditions, and, if appropriate, hydrodynamic model output.

- E. Maintaining Salinity Control through Possible Emergency Drought Barriers: Reclamation and DWR's planning assumptions for 2015 include the possibility of installing temporary rock barriers across three Delta waterways to mitigate water quality impacts when there is not enough water in upstream reservoirs to meet other beneficial uses and repel the saltwater. The three barriers would be constructed at Sutter Slough, Steamboat Slough and West False River. Releases from Shasta, Folsom, Oroville and other reservoirs to provide sufficient Delta outflow to repel saltwater and protect Delta water quality could be reduced with the temporary barriers in place. If the barriers are determined to be necessary, DWR would complete installation within 30-60 days, delaying construction as long as possible to minimize effects on fish. In the event barriers are installed, barrier-associated biological and physical monitoring will be initiated in a timely fashion, in some cases in advance of barrier installation. Additionally, adjustments to D-1641 will need to occur.
- F. Allow transfers outside the July through September window provided for in the Biological Opinions if conditions permit.

VIII. Proposed Delta Operations – Summer and Fall

- A. Maintaining Salinity Control through Possible Emergency Drought Barriers: Use of the temporary rock barriers, if applicable, would continue throughout the summer. If temporary rock barriers are constructed, removal would commence on or near October 1. For Sutter Slough and Steamboat Slough, removal must start no later than October 15, and complete barrier removal must occur by November 1. For a barrier at West False, complete removal must occur by November 15.
- B. NMFS BiOp Provisions

C. FWS BiOp Provisions

- i. Fall X2 Action (if Sacramento Valley classification is above normal or wet). This RPA component is not expected to be triggered in WY 2015; however, during the year, Reclamation will work with DWR, NMFS, FWS, CDFW and others to refine the Fall Outflow AMP based on findings to date, including, if appropriate, proposing new experimental management strategies based on those findings.

D. D-1641 Provisions

- i. Rio Vista Flow
- ii. Net Delta Outflow
- iii. October San Joaquin base flow at Vernalis

E. CDFW Consistency Determination and CESA ITP Provisions

F. Fall head of Old River barrier

- i. Fall HORB installation. The fall HORB barrier is similar in design to the spring barrier, but smaller in size. The fall barrier is intended to benefit migrating adult salmon in the San Joaquin River by improving flow and dissolved oxygen conditions in the river downstream of the barrier. The fall HORB is typically installed upon request by CDFW.

G. Allow transfers outside the July through September window provided for in the Biological Opinions if conditions permit.

- IX. *Measures to Minimize Effects of Drought Operations to Species-* Agencies are exploring potential measures to minimize effects of drought operations to species. Current ideas include less negative OMRs following peak storm events, enhanced protection of hatchery winter run Chinook release through real-time operations informed by monitoring, providing for additional flows in the San Joaquin River, shifting exports to Jones Pumping Plant (CVP), and construction of non-physical barriers at Georgiana Slough and/or the DCC.

2. DCP Biological Monitoring Plan

Reclamation, DWR, FWS, CDFW and NMFS have been working on a DCP Biological Monitoring Plan focused on smelt and salmonids for 2015 and beyond (*See Enclosure II*). The goals of this initiative is to provide additional data on the location and movement of Delta Smelt and salmonids that will increase the agencies' ability to manage water operations in a manner that protects the imperiled fish while supporting and improving water deliveries.

Delta Smelt Early Warning Surveys

Reclamation and FWS have been coordinating for several months to develop early warning surveys to provide information on Delta smelt distribution that will inform water operations in WY2015. The current drought has highlighted the need to improve the array of information that is collected to support management decisions pertaining to the effect of winter/spring exports on the Delta Smelt population. The overall intent for early warning surveys is to inform FWS and others whether, during weather events and freshets, substantial numbers of Delta Smelt are moving, or being moved, into areas potentially subject to entrainment. This information will allow exports to continue as long as Delta smelt are not in the area of influence of the pumps and result in additional exports. The early warning surveys were initiated in December 2014 and will continue through April 2015. FWS is also conducting additional Kodiak trawling at Jersey Point and Prisoner's Point. A Delta Smelt mark and recapture element may also be implemented in this monitoring program. A FWS proposal dated September 26, 2014, identifies resource needs totaling \$830,000. Reclamation, FWS, CDFW and DWR are collaborating to leverage available funds from all agencies and integrate Delta smelt and salmonid trawl efforts to improve efficiency.

Salmonids Near-term Drought Monitoring

Reclamation, NMFS, FWS, CDFW and DWR have been coordinating on long-term and near-term drought monitoring efforts. In WY 2014, various salmonid monitoring efforts (e.g., installation of temperature and dissolved oxygen probes adjacent to winter-run redds, implementation of a DCC gate operations trigger matrix, and increased beach seining and trawling efforts to determine the timing and magnitude of salmonid emigration into the Delta) were implemented in order to determine the effect of the drought and operations on the salmonids and to be able to make optimal real-time management decisions regarding operations and protection of the listed anadromous fish species.

Similar activities are planned for 2015, as long as drought conditions continue. Additional trawling and beach seining in the northern Delta, as well as more frequent sampling at rotary screw traps further upstream in the Sacramento River Basin, would accompany any modifications in operations of the DCC gates from those specified in the NMFS BiOp or D-1641. Temperature and dissolved oxygen probes are planned to be deployed within redds of fall-run and winter-run salmon, to monitor and allow for management of water conditions. An additional Kodiak trawl is planned for December to monitor distributions of Delta Smelt and salmonids, and the early warning trawling planned for Jersey Point and Prisoner's Point will monitor salmonid species as well. This early warning trawling will provide information from additional locations in the Delta about the presence of salmonids, which will help to inform management decisions about OMR reverse flows. Sampling frequency at salvage facilities at the export pumps may also be increased to provide more accurate information about entrainment impacts.

Other studies on migration paths and mortality will continue in 2015 for winter-run and spring-run salmon, as well as steelhead and sturgeon, to improve scientific knowledge about the population dynamics of these species. An enhanced particle tracking model that includes simulation of fish migration behavior will be tested in a pilot project to verify accuracy and the ability of the model to inform real-time management decisions. Using recent data, the upstream temperature model will also be recalibrated to improve its ability to predict temperature conditions in the Sacramento River. A feasibility study on the use of passive integrated transponders to monitor the movement and fate of salmonids will also be conducted in 2015 to determine if this technology could be usefully deployed in California to improve knowledge of salmonid populations.

In conclusion, the interagency group will conduct this monitoring in 2015 and beyond in order to improve our understanding of timing and distribution of species in the Delta, as well as inform targeted research and data gaps associated with risks associated with water operations.

3. **Other 2015 Drought-Related Measures**

Other drought-related measures have been discussed in the past as administrative actions. These actions are being taken as part of the Interagency 2015 Drought Strategy. The actions, taken as a whole, will increase the agencies' ability to operate the CVP and SWP in a manner that protects water quality and imperiled fish species while supporting and improving water supplies. The first category is a list of items first identified in late 2013 that will be continued in WY 2015.

➤ ***Status of August 2013 Items:***

- ***Incidental take to provide operational flexibility.*** Investigate a regression analysis based on measured turbidity in the Sacramento River and modeled OMR flows over an 18-year period to evaluate a new cumulative salvage index calculation. The current incidental take statement (ITS) in the 2008 FWS Biological Opinion calculates the incidental take limit (ITL) based on the cumulative salvage index (CSI) from three years, 2006-2008. Metropolitan Water District of Southern California and Reclamation staff have developed a new calculation utilizing 18 years of data to calculate the CSI. The new calculation was reviewed by environmental groups in October 2014 and was part of the RPA Annual Science Review on November 6 and 7, 2014.
 - ***Status:*** Adjustments and new analysis were performed based on comments from environmental groups and the public meeting of the Long-term Operations Annual Science Review. Reclamation submitted the proposal to FWS on November 21, 2014, requesting that FWS consider using this

new CSI calculation. If FWS concludes the proposal has merit, this new calculation could be utilized in calculating the ITL for 2015.

- ***Old and Middle River (OMR) Index.*** Reclamation and DWR developed the OMR Index Demonstration Project to test whether using an index rather than actual United States Geological Survey (USGS) gauge data to determine OMR flow enables compliance with the BiOps and the Longfin Smelt ITP.
 - *Status:* This project has been implemented since spring 2014. NMFS granted an initial trial period of one year, subject to modifications based on real-time information. An additional trial period of one year (WY 2015) will be requested. Operations will revert to the RPA should any unanticipated adverse effects occur to listed species. Results of the demonstration project will be presented to the independent review panel during the 2015 annual review expected in November 2015. Reclamation, FWS, NMFS, DWR and CDFW support this action.
- ***New and refined turbidity models.*** For predicting Delta Smelt salvage, develop a model to predict turbidity conditions that lead to entrainment events and determine the conditions likely to create a “turbidity bridge” for the Delta Smelt’s movement between the Central Delta and the export pumps. Further steps are intended to determine under what circumstances export operations can be managed to reduce turbidity intrusion, thereby increasing total seasonal water deliveries while maintaining adequate protection for Delta Smelt.
 - *Status:* The Metropolitan Water District of Southern California funded the agencies’ development of a model based on data from the period 2011-present that has been used to provide turbidity projections for the water projects. The current drought did not provide an opportunity or need to use the model in WY2014. Model results will be shared with the Delta Conditions Team in WY 2015. In addition, discussions are underway to develop tools to evaluate when “first flush” conditions are amenable to management intervention to protect seasonal water exports and Delta smelt. To provide better data for the model as well as to improve the ability to track smelt movement, additional monitoring sampling efforts are being planned in Suisun Marsh and the Central Delta.
- ***Temporary barrier(s).*** Installation of HORB to minimize movement of salmonids from the San Joaquin River into the South Delta.
 - *Status:* The spring HORB was installed every year from 2000-2004 and has been installed in six of the subsequent ten years (including in 2014). In two of those years, the bioacoustic fish fence served as the barrier. It

was not installed in the other four years. The Collaborative Science and Adaptive Management Process, through the Salmon Scoping Team, is currently developing an analysis of the HORB to identify data gaps concerning export effects on hydrodynamics and, if possible, recommend how such processes could be managed to minimize entrainment of salmonids with consequent reductions to predation and salvage. These analyses will supply information to better inform decisions regarding barrier placement and thereby potentially reducing constraints on water pumping.

- **Water transfers.** Water transfers in spring 2014 were considered on a case-by-case basis. It is anticipated that the need for additional water transfers in early WY 2015 could occur if dry conditions persist. For WY 2015, the agencies will continue to identify ways to streamline the water transfer approval process as much as practical.
 - *Status:* Due to continued dry conditions, unusually high river depletions in the Sacramento Valley, water quality conditions in the Delta and minimum exports through the summer 2014, some transfer water was diverted at the federal export facilities between July and September. As a result, Reclamation conducted environmental analysis to extend the period to convey transfer water across the Delta through November 15, 2014. This modification to the established transfer window in both the NMFS and FWS BiOps allowed the conveyance of approximately 75 to 90 TAF of additional transfer water (excluding carriage water) that has been retained in Shasta and Folsom reservoirs for export from the South Delta at the Jones Pumping Plant during WY 2015. Both NMFS and FWS concurred that this modification to the DOP would not result in additional adverse effects to salmon or Delta smelt or to any critical habitat beyond those analyzed in the biological opinions. CDFW also concurred that there would be no effect to existing CESA coverage for the SWP.
- **Delta smelt life cycle model.** Life cycle models allow more detailed and comprehensive evaluation of the effects of environmental and demographic variables on Delta smelt, as well as projecting the population-level consequences of potential management actions. Development of accurate life cycle models for Delta Smelt will allow the agencies to better tailor CVP/SWP water operations to protect the Smelt while supporting and improving water supplies.
 - *Status:* FWS is currently developing a Delta Smelt Life Cycle Model. An initial manuscript is expected to be submitted for peer review shortly, and a technical workshop was held on the model on October 27, 2014. Other

efforts are under development in the Collaborative Science and Adaptive Management Process. They include refinement and further evaluation of the Maunday & Deriso Delta Smelt model, the development of new model-based tools to predict Delta Smelt entrainment vulnerability, proportional entrainment of Delta Smelt depending on water operations and other factors, and population viability consequences of entrainment. These efforts are expected to reinforce each other, potentially providing important new information that can be considered in management decision-making, potentially during the current extended drought.

- ***Technology advances for smelt monitoring.*** The “early warning” monitoring described above addresses a specific informational need for managing water operations during the current drought; however, other informational needs related to Delta Smelt monitoring need to be addressed on a longer-term basis. The “standard” monitoring programs for Delta Smelt are in some cases many decades old, based on original efforts for species other than smelt, and based on sampling methods known to have significant shortcomings. Improving the assessment of smelt abundance and distribution, when coupled with life cycle and other model advancements, is expected to enable improved analysis and management of water operations that maximize exports while providing adequate protection for Delta Smelt. Improvements potentially include use of new sampling gears, random sampling protocols, increased survey efforts, and improved spatial coverage.
 - *Status:* Efforts currently underway at the five agencies and the Interagency Ecological Program include ongoing monitoring methods studies, drought-specific fish monitoring and early-warning monitoring for Delta Smelt.

FWS has initiated an investigation of monitoring gear efficiencies and Delta Smelt distribution with the expressed intent to better understand gear efficiency, distribution and effective monitoring approaches. Application of new information is highly likely to improve the monitoring programs upon which management decisions depend by introducing improved equipment, better sampling protocols and/or improved allocation of survey effort. Improved monitoring would potentially allow for more precisely targeted protective actions when necessary and better evaluation of the population-level impacts of water operations.

- ***Improve hatchery operational coordination with North of Delta diverters.*** Develop and implement a process for better future coordination of hatchery releases to improve survivability. In some instances, hatchery fish releases could

be better timed to coincide with adequate natural flows or other operational releases so as to result in greater fish survival.

- *Status:* In 2014, NMFS, CDFW and FWS developed criteria based on various operational, biological and environmental conditions that, when met, would likely result in extremely poor to non-existent in-river survival for out-migrating Chinook salmon. Based on these criteria, a large proportion of Chinook salmon produced at Central Valley hatcheries were trucked downstream and released at Rio Vista or San Pablo Bay. These criteria will be applied again in 2015 if similar conditions occur. Reclamation has initiated discussions with FWS' flow managers and hatchery managers to develop a *Hatchery and Operations Coordination Plan*. The plan will establish better coordination of hatchery fish releases to coincide with adequate natural flows or other operational releases. Better coordination would reduce the need for specific release of stored water as a separate effort for the hatcheries, as well as further harmonize water operations to support natural spawning of salmon runs. NMFS and FWS will continue to coordinate regarding the status of various NMFS RPA actions (e.g., the DCC gate operations) as they pertain to the consideration and determination of river release or trucking of hatchery fish. Reclamation and FWS will continue work on a coordination plan for implementation in WY 2015.
- ***Adjustment to water quality or flow objectives.*** Identify opportunities to collaborate to review and propose temporary modifications to state water quality or flow objectives in order to balance beneficial uses and avoid disproportionate drought impacts through continued operation. Reclamation will effectively coordinate with DWR, the SWP and CVP contractors, the state and federal fishery agencies, and the SWRCB. The goal is to balance risks and reduce disproportionately high water supply impacts or shift a significant fishery concern or water supply impact to another part of the system.
 - *Status:* In January 2014, Reclamation and DWR, in coordination with FWS, NMFS and CDFW, identified the need to file a TUC Petition to the Water Board. The proposal requested modification of the D-1641 outflow standards (outflow at 7,100 cfs starting February 1) which allowed for movement of the X2 salinity position further upstream into the central part of the Delta. This provided more flexibility in water operations and conserved storage in upstream reservoirs to conserve cold water pools for use later in the year to benefit fishery resources. The petition also requested flexibility in the operations at the DCC gates, providing additional opportunities to manage water quality (mainly salinity) in the

central part of the Delta. For 2015, Reclamation and DWR will continue to assess hydrological and operational conditions and coordinate with the appropriate agencies and stakeholders to effectively manage water quality in the Delta. Coordination will primarily occur at regular meetings of the RTDOMT, WOMT, and DOSS group and SWG. Additional meetings and briefings will occur as needed.

- ***Other drought related measures 2014-2015:*** In addition to the list above of drought operations and augmented science and monitoring plans, the agencies are undertaking the following additional inter-agency measures that will continue to be implemented in 2015:
 - ***Fisheries management and fish hatchery actions:*** CDFW, FWS and NMFS will meet on a weekly basis to coordinate on critical fisheries management and fish actions. These include, but are not limited to:
 - 1) Coordination on hatchery production and release strategies, including decisions on in-river releases versus trucking.
 - 2) Decisions on emergency angling restrictions if conditions remain dry
 - 3) Emergency monitoring strategies related to adverse in-river conditions, including permitting needs
 - 4) Winter-run Chinook contingency planning
 - 5) Fish rescues

The criteria (based on various operational, biological and environmental conditions) that NMFS, CDFW and FWS developed in 2014 to determine release location of hatchery Chinook salmon will be used again in 2015 if similar conditions occur. Reclamation, FWS' flow managers, and hatchery managers will develop and implement a *Hatchery and Operations Coordination Plan* in 2015 to establish better coordination of hatchery fish releases to coincide with adequate natural flows or other operational releases. Better coordination would reduce the need for specific release of stored water as a separate effort for the hatcheries as well as further harmonize water operations to support natural spawning of salmon runs. NMFS and FWS will continue to coordinate regarding the status of various NMFS RPA actions (e.g., the DCC gate operations) as it pertains to the consideration and determination of river release or trucking.

- ***Projects to reduce drought related effects on salmonids:***
 - 1) Preferential pumping at CVP. The amount of shifted pumping from Banks to Jones would be made available to the SWP.
 - 2) Water purchases (e.g., implementation of the San Joaquin River action from last year)

- 3) Predation related studies/pilot program, including Stanislaus River and lower San Joaquin River.
 - 4) Upstream priority restoration projects (from the Golden Gate Salmon Association, NCWA and CDFW lists).
 - 5) Non-physical barriers at DCC and Georgiana Slough.
- ***Voluntary Drought Initiative*** - NMFS and CDFW will continue to implement the Voluntary Drought Initiative in 2015. This initiative was started in 2014 to encourage minimum flow releases in priority salmonid watersheds where there is no ESA Section 7 nexus.
 - ***Accelerate two pilot projects to advance the use of forecast-based reservoir operations-*** In order to revise the storage and release strategies to improve available water supplies, DWR and Reclamation will accelerate components of the forecast-based reservoir reoperations evaluation. The purpose of these evaluations is to examine if shifting to forecast-based operations will enable the more efficient use of existing storage capacity within the system while still managing flood risks appropriately. DWR and BOR will work with NOAA (NWS, OAR, and NESDIS), USGS, and others as appropriate, in order to test the ability to shift to more precise real-time reservoir operations that can optimize benefits for water supply and flood risk management while also meeting real-time requirements for fish migrations as described above. This will be further developed in consultation with relevant agencies. One specific example includes the DWR System Reoperation Study.
 - ***Seasonal prediction for water resources*** – Using forecasts to better inform reservoir operations on the seasonal timescale requires forecasts with some amount of skill over climatology. In addition to skill, forecasts should be focused on watersheds important for water resources (e.g. the watersheds above the major reservoirs) and focus on, at a minimum, accumulated rainy season precipitation. During the rainy season, a frequently updating forecast for the precipitation expected for the remainder of the season is required. In partnership with DWR, USBR, and other operating agencies, NOAA should move toward developing such a forecast capability. This includes continuing to invest in research and development through NOAA/OAR as well as scoping operational implementation through NOAA/NWS and NOAA/NESDIS.
 - ***DWR System Reoperation Study-*** System reoperation is necessary to improve existing facilities in order to meet system needs more efficiently

and reliably and to better integrate the state's flood control and water supply management. In 2008, DWR was authorized by legislation to conduct a System Reoperation Study in order to analyze how changes influence the system, including the impacts of climate change, and in what ways the system can be optimized to meet water management goals. The study, which considered many reoperation concepts and strategies through a vetting process with experts, is moving four potential reoperation strategies forward for further evaluation including reoperations of Shasta reservoir, Oroville reservoir, New Exchequer Dam (Lake McClure), and further integration of SWP and CVP operations. The current phase of the study provides an evaluation of these potential strategies for benefits and ranking based on their performance in meeting state water management goals and objectives – including drought response efforts. The last phase of the study will focus on a reconnaissance-level assessment of the remaining strategies, including evaluating costs, quantifying economic benefits and developing conceptual designs.

- ***Continue and expand water conservation initiatives at the federal, state and local levels*** - While the 2015 Drought Strategy is focused on operations of the SWP and CVP, it is developed within the context that increased water conservation efforts is a critical aspect of drought response. Making conservation a “California way of life” is the first goal of the Governor’s 2014 California Water Action Plan (Plan) – a strategy setting state priorities and investments for the next five years. The Plan recognizes that with technological advances and a growing population, more can and should be done to increase conservation efforts within the state. Recent legislation, such as SBx7-7 (2007), has set standards requiring a 20-percent reduction in urban per capita water use by 2020, promoting expanded development of sustainable water supplies at the regional level, and requiring agricultural water management plans and efficient water management practices for agricultural water suppliers. The Plan prioritizes building and expanding on conservation efforts and ensuring water security at the local level through conserving and using water more efficiently, protecting habitat for local species, recycling water for reuse, capturing and treating storm water for reuse, and removing salts and other contaminants from brackish water and saltwater.

Next Steps

Following the release of the 2015 Interagency Drought Strategy, the agencies will continue public outreach in early 2015 to inform the planning of drought operations and implementation of the Drought Contingency Plan.