

Project Description for February – March 2015 Drought Response Actions To Support Endangered Species Act Consultations

In order to cope with a possible fourth consecutive year of drought, the Bureau of Reclamation (Reclamation) and the project applicant, the California Department of Water Resources (DWR), are considering temporary modifications to operation of the Central Valley Project (CVP) and State Water Project (SWP). Coordinated long-term operation of the CVP and SWP previously underwent Endangered Species Act (ESA) consultation that resulted in biological opinions (BiOps) from the U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS) in 2008 and 2009, respectively. The first part of this project description describes the specific actions that Reclamation and DWR propose to implement in February and March of 2015 related to changes in D-1641 standards in the Project Description of the 2008 and 2009 BiOps. The second part of this project description is a proposed framework for future requests for OMR flexibility. The third part of this project description (Programmatic Considerations) describes potential operations that may be implemented in 2015 and beyond to address the ongoing drought conditions or to help recover from the conditions created from the previous three years of drought, in the event the hydrology becomes wetter.

Proposed February-March 2015 Actions

Reclamation and DWR are using the 90 percent exceedance forecast for Central Valley hydrology for the purpose of ESA consultation to predict the actions that are necessary to modify the Project Description and Reasonable and Prudent Alternatives (RPAs) described in the 2008 and 2009 BiOps. At this time the actual January 2015 hydrology is trending drier than the 90 percent exceedance forecast. However, Reclamation and DWR consider the 90 percent exceedance a conservative hydrologic estimate on which to base the ESA consultation. The following near-term actions in February and March 2015 are proposed under a dry hydrologic forecast, and may or may not be implemented depending on observed conditions and ability of the applicant to obtain modifications to water rights permits.

- Delta Outflow
 - The minimum monthly Net Delta Outflow Index (NDOI) described in Figure 3 of D-1641 (see Attachment 1) during the months of February and March to be no less than 4,000 cfs.
- Export Limits
 - The maximum Export Limits included in Table 3 of D-1641 (see Attachment 2) be modified as follows: During February and March when footnote 10 of Table 3 of D-1641 is not being met, the combined maximum SWP and CVP export rate for SWP and CVP contractors at the Clifton Court Forebay Intake and C.W. “Bill” Jones pumping plants will be no greater than 3,500 cfs on a 3-day running average. During February and March when an NDOI of at least 5,500 cfs is not being met, or the Delta Cross Channel (DCC) gates are open during a period inconsistent with footnote 23 of Table 3 of D-1641, the combined maximum SWP and CVP export rate will be no greater than 1,500 cfs. When precipitation and runoff events occur that allow the DCC gates to be closed and footnote 10 of Table 3 of D-1641 is being met [3-day average Delta Outflow of 7,100 cfs,

or electrical conductivity of 2.64 millimhos per centimeter on a daily or 14-day running average at the confluence of the Sacramento and the San Joaquin rivers (Collinsville station C2) if applicable], but any additional Delta Outflow requirements contained in Table 4 of D-1641 (see Attachment 3) are not being met, then exports of natural and abandoned flows are permitted up to D-1641 Export Limits contained in Table 3 and, in compliance with applicable laws and regulations including ESA and CESA.

- Delta Cross Channel Gate Operations
 - The DCC Gate Closure requirements included in Table 3 be modified as follows: The DCC gates may be opened during February and March as necessary to preserve limited storage in upstream reservoirs and reduce intrusion of high salinity water into the Delta while reducing impacts on migrating Chinook salmon. Requirements for closure of the DCC gates from February 1 through March 31 shall be determined through the Real-Time Drought Operations Management (RTDOMT) process. The DCC gate triggers matrix (as described in Appendix G of the April 2014 Drought Operations Plan and Operational Forecast) will be used to determine operation of the DCC gates. The triggers outlined in this matrix provide direction and a method that balances water quality and fishery objectives in the Delta.
- Vernalis Flows
 - Table 3 San Joaquin River flow requirements at Airport Way Bridge, Vernalis, for February and March be modified as follows: Base flow period averages (consistent with D1641, Table 3, Footnote 12) shall be no less than 500 cfs.

Old and Middle River (OMR) Flow Management Consultation Framework

If conditions warrant, Reclamation and DWR plan to propose short-term flexibilities consistent with the Interagency 2015 Drought Strategy for the CVP and SWP (2015 Drought Strategy) to allow OMR exceedances of the 14-day running average, measured using the OMR Index, during sporadic storm events under continued drought conditions. Limited exceedances of the –5,000 cfs OMR flow limit to –6,000 cfs, to be implemented only on the ascending limb of the hydrograph, will be requested to capture natural or abandoned flow in the Delta from sporadic storms (increase exports) under drought conditions. Any short-term flexibility in OMR would off-ramp should NMFS or USFWS determine that less negative OMR is required to protect listed fish species under the RPAs set forth in their respective BiOps, should conditions different from those that were expected during the period of operational flexibility occur. To implement this OMR flexibility, an objective of at least 7,100 cfs NDOI or 2.64 EC at Collinsville, or the objective of 4,000 cfs NDOI in May and June, whichever is applicable¹, must be achieved. Additionally, operations will be consistent with the Export Limits described in Table 3 of D-1641. If warranted by continued drought conditions, Reclamation and DWR may seek additional OMR

¹ The 7,100 cfs NDOI or 2.64 EC at Collinsville objective does not apply in May and June if the best available estimate of the Sacramento River Index for the water year is less than 8.1 MAF at the 90% exceedance level. Under this circumstance, a minimum 14-day running average NDOI of 4,000 cfs is required in May and June.

flexibility beyond what is described herein. Implementing these limited exceedances will be evaluated at that time.

Additional details regarding potential OMR flexibilities are provided in the 2015 Drought Strategy. The 2015 Drought Strategy articulates the following for winter OMR flexibility under the 2009 NMFS BiOp:

- *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.

Additionally, the 2015 Drought Strategy articulates the following regarding OMR flexibility under 2008 USFWS BiOp from January 15 through March:

- *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)[December 1-January 15] and period (2)[January 15-March] 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.

To complete an ESA consultation in a timely manner, and if flexibilities are warranted, the following OMR consultation process has been developed. This process is intended to explore and evaluate risks associated with any proposal and streamline ESA compliance through ongoing coordination between Reclamation, DWR, and the state and federal fish and wildlife agencies. Any OMR proposal will be discussed as part of the RTDOMT process.

Streamlined OMR Consultation Framework:

1. Identify upcoming storm event
2. Evaluate forecasted run-off and anticipated available in-Delta flows
3. Develop and model a specific OMR and outflow proposal, including specific proposed OMR flow and expected duration of action
4. Finalize proposed project description
5. Prepare listed species and critical habitat biological review including:
 - Existing Delta conditions and supporting hydrodynamic modeling
 - Species distribution and risk of entrainment in the South and Central Delta
 - Particle Tracking Model (PTM) results, including enhanced PTM if available for salmonids
 - Discussion of any existing RPA action that may be in place and any associated effects analysis that provides biological support for a deviation from that action

If Reclamation and DWR determine through the described streamlined process that OMR flexibility is warranted, then Reclamation and DWR will describe the requested flexibility in a reinitiation request that provides the information described above. USFWS and NMFS will provide an evaluation of the anticipated effects of the action on listed species and critical habitats. DWR and CDFW will undertake a similar process for CESA.

Programmatic Considerations for Future Drought-Related Actions

During the continuing drought, operation of the CVP and SWP must provide for, at a minimum, essential human health and safety needs throughout the CVP and SWP service areas, and retain the capability to provide for such minimum needs throughout water year (WY) 2015 and WY 2016 if drought conditions continue. For clarity, Reclamation and DWR'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 such as outdoor landscape irrigation. While most California communities have adequate reserve supplies, some will require continued delivery of limited amounts of water through the CVP and SWP systems to meet these basic needs. Human health and safety concerns may drive specific consultation requests throughout WY 2015 if not considered in the existing exception procedures of the BiOps.

The description below is included to highlight specific actions and factors that may be considered throughout 2015, and identifies actions that may be included in future consultations, if necessary. This is not intended to be a fully inclusive list, nor does inclusion in the list mean the agencies will go forward with any action. Reclamation and DWR are not proposing these actions at this time, however these

actions are considered in looking at the future status of the species in light of the actions proposed in February and March 2015.

Upstream Reservoirs: Upstream reservoirs will be operated through the winter and spring to preserve and build storage. Upstream reservoir storage, while improved from end of September 2014 storage, remains extremely low in the early part of WY 2015. Reclamation and DWR will be trying to develop cold water resources in the winter and spring in those reservoirs where temperature management is needed later in the year. This may include working with the Sacramento River Settlement Contractors to shift early spring demand later into the year to conserve water in Shasta Reservoir, if warranted.

Water Supply: Throughout dry conditions, CVP and SWP systems will be operated to lessen critical economic losses to agricultural, municipal, and industrial uses due to water shortages through project water deliveries and by facilitating voluntary water transfers and exchanges to the extent possible, while balancing the needs of upstream storage, fishery and wildlife resource protection, and operational flexibility. A key to minimizing water supply shortages for economic purposes will be to take advantage of opportunities to export natural or abandoned flow in the winter and spring while maintaining Delta water quality and minimizing adverse effects to listed fish. Release of stored water in summer and fall will be managed to concurrently benefit in-stream temperature objectives, wildlife objectives, meet Sacramento Valley in-basin needs, and preserve carry over storage to meet objectives in WY 2016.

Refuges: One of the requirements of the Central Valley Project Improvement Act (CVPIA) passed by Congress in 1992 included providing water for state, federal and private managed wetlands in order to maintain and improve wetland habitat areas. For south of Delta refuges, water from San Luis Reservoir can be made available to meet refuge needs when total demand from direct diversions from the Delta are not feasible. The CVPIA and refuge water supply contracts allow for flexibility to transfer water from refuges both within basin as well as north of the Delta to south of the Delta. Water transfers from north of Delta refuges to south of Delta refuges would occur to support priority habitat needs of south of Delta refuges given available capacity to facilitate the transfer. This water would be directly diverted or could be stored in San Luis Reservoir and used when most needed by south of the Delta refuges. Refuge deliveries are included in CVP operational scenarios and forecasts, and calculations regarding anticipated reservoir levels into the late fall and early winter.

Biological Opinion Flexibilities: The specific flexibilities being sought in this consultation for February and March and OMR Flow Management Consultation Framework are described above. The items included below are potential flexibilities that may be sought through future consultations. Many of these items are further described in the Interagency 2015 Drought Strategy Working Draft dated December 11, 2014.

- NMFS BiOp Provisions
 - Flexibility with San Joaquin I:E ratio: Currently, the agencies are discussing several concepts for providing additional flexibility in the April-May period, if conditions remain very dry. These operations will be discussed further and evaluated as part of the phased

operations plan as hydrology is updated. The agencies will declare the San Joaquin I:E ratio as early as possible prior to the April/May implementation.

- Head of Old River Barrier (HORB):
 - The spring HORB, as described in the 2008 Biological Assessment Project Description, will be installed and operational by April 1, 2015, 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.
 - Although not described in the NMFS RPA, the fall HORB barrier is typically installed upon request of CDFW and 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.
- USFWS BiOp Provisions
 - 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, Reclamation will work with DWR, NMFS, USFWS, CDFW, and others to refine the Fall Outflow Adaptive Management Plan (AMP) based on findings to date, including, if appropriate, proposing new experimental management strategies based on those findings.

D-1641 Related Actions: Reclamation and DWR may seek adjustments under D-1641, including: (1) triggers for modified X2 criteria to balance upstream storage and fish protection, (2) triggers for moving Western Delta Ag compliance point (i.e., Emmaton to Three-Mile Slough), (3) San Joaquin flows at Vernalis, (4) Rio Vista flow requirements, and (5) Net Delta Outflow requirements. Additionally, Reclamation and DWR may exercise the flexibility provided in D-1641 to adjust the E/I ratio's averaging period for sporadic storm events (similar to 2014).

Preferential Pumping: The projects will consider a facility shift in exports in April and May 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.

Temporary Emergency Drought Barriers: If hydrologic forecasts show there will be insufficient water in upstream reservoirs to repel the saltwater and meet health and safety and other critical needs, then installation of Emergency Drought Barriers will be considered to lessen water quality impacts. Excessive salinity increases in the Delta could render the water undrinkable for 25 million Californians and unusable by farms reliant upon this source. Temporary rock (rip-rap) Emergency Drought 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. Consultation on installation and operation of the barriers will be conducted on the barriers prior to installation and may require additional adjustments to D-1641.

Hatchery Operations: Livingston Stone National Fish Hatchery (LSNFH) managers will coordinate with Delta Operations for Salmonids and Sturgeon (DOSS) to time the hatchery release of winter-run Chinook salmon to coincide with favorable hydrologic conditions, and to track their movement down the Sacramento River into and through the Delta utilizing acoustically-tagged winter-run Chinook salmon released at approximately the same time and real-time acoustic receivers deployed in the Sacramento River and Delta at various locations. DOSS will review the real-time acoustic tag data to determine the likely migration 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 risks to hatchery winter-run salmon.

Transfers and Exchanges: Reclamation and DWR will continue to facilitate water transfers and exchanges. If these transfers or exchanges are conveyed through the Delta outside the transfer window described in the 2008 and 2009 BiOps (July-September), Reclamation and DWR will consult with USFWS and NMFS prior to conveyance of the transfer water and DWR will request a consistency determination from CDFW.

Trinity Releases: Spring flows on the Trinity River will be consistent with annual allocations as provided through the Trinity River Main-stem Fishery Restoration Record of Decision. Flows for the remainder of the year will make consistent with SWRCB order WR 90-5. Consistent with fish health criteria, releases to augment flows in the Lower Klamath River may be considered.

Attachment 1

D-1641 Table 3 – Water Quality Objectives for Fish and Wildlife Beneficial Uses

**TABLE 3
WATER QUALITY OBJECTIVES FOR FISH AND WILDLIFE BENEFICIAL USES**

COMPLIANCE LOCATION	INTERAGENCY STATION NUMBER (RKI [1])	PARAMETER	DESCRIPTION (UNIT) [2]	WATER YEAR TYPE [3]	TIME PERIOD	VALUE	
SAN JOAQUIN RIVER SALINITY							
San Joaquin River at and between Jersey Point and Prisoners Point [4]	D-15 (RSAN018) -and- D-29 (RSAN038)	Electrical Conductivity (EC)	Maximum 14-day running average of mean daily EC(mmhos/cm)	W,AN,BN,D	Apr-May	0.44 [5]	
EASTERN SUISUN MARSH SALINITY							
Sacramento River at Collinsville	C-2 (RSAC081)	Electrical Conductivity (EC)	Maximum monthly average of both daily high tide EC values (mmhos/cm), or demonstrate that equivalent or better protection will be provided at the location	All	Oct	19.0	
-and- Montezuma Slough at National Steel	S-64 (SLMZU25)				Nov-Dec	15.5	
-and- Montezuma Slough near Beldon Landing	S-49 (SLMZU11)				Jan	12.5	
					Feb-Mar	8.0	
				Apr-May	11.0		
WESTERN SUISUN MARSH SALINITY							
Chadbourne Slough at Sunrise Duck Club	S-21 (SLCBN1)	Electrical Conductivity (EC)	Maximum monthly average of both daily high tide EC values (mmhos/cm), or demonstrate that equivalent or better protection will be provided at the location	All but deficiency period [6]	Oct	19.0	
-and- Suisun Slough, 300 feet south of Volanti Slough	S-42 (SLSUS12)				Nov	16.5	
					Dec	15.5	
					Jan	12.5	
					Feb-Mar	8.0	
					Apr-May	11.0	
					Deficiency Period [6]	Oct	19.0
						Nov	16.5
						Dec-Mar	15.6
						Apr	14.0
			May	12.5			

TABLE 3 (continued)
WATER QUALITY OBJECTIVES FOR FISH AND WILDLIFE BENEFICIAL USES

COMPLIANCE LOCATION	INTERAGENCY STATION NUMBER(RKI1(j))	PARAMETER	DESCRIPTION (UNIT) [2]	WATER YEAR TYPE [3]	TIME PERIOD	VALUE
DELTA OUTFLOW						
		Net Delta Outflow Index (NDOI) [7]	Minimum monthly average [8] NDOI (cfs)	All	Jan	4,500 [9]
				All	Feb-Jun	[10]
				W,AN	Jul	8,000
				BN		6,500
				D		5,000
				C		4,000
				W,AN,BN	Aug	4,000
				D		3,500
				C		3,000
				All	Sep	3,000
				W,AN,BN,D	Oct	4,000
				C		3,000
				W,AN,BN,D	Nov-Dec	4,500
				C		3,500
RIVER FLOWS						
Sacramento River at Rio Vista	D-24 (RSAC101)	Flow rate	Minimum monthly average [11] flow rate (cfs)	All	Sep	3,000
				W,AN,BN,D	Oct	4,000
				C		3,000
				W,AN,BN,D	Nov-Dec	4,500
				C		3,500
San Joaquin River at Airport Way Bridge, Vernalis	C-10 (RSAN112)	Flow rate	Minimum monthly average [12] flow rate (cfs) [13]	W,AN	Feb-Apr 14 and May 16-Jun	2,130 or 3,420 1,420 or 2,280 710 or 1,140
				BN,D		
				C		
				W	Apr 15- May 15 [14]	7,330 or 8,620
				AN		5,730 or 7,020
				BN		4,620 or 5,480
				D		4,020 or 4,880
				C		3,110 or 3,540
				All	Oct	1,000 [15]
EXPORT LIMITS						
		Combined export rate [16]	Maximum 3-day running average (cfs)	All	Apr 15- May 15 [17]	[18]
			Maximum percent of Delta inflow diverted [19] [20]	All	Feb-Jun	35% Delta inflow [21]
				All	Jul-Jan	65% Delta inflow
DELTA CROSS CHANNEL GATES CLOSURE						
Delta Cross Channel at Walnut Grove	—	Closure of gates	Closed gates	All	Nov-Jan Feb-May 20 May 21- Jun 15	[22] — [23]

Table 3 Footnotes

- [1] River Kilometer Index station number.
- [2] Determination of compliance with an objective expressed as a running average begins on the last day of the averaging period. The averaging period commences with the first day of the time period of the applicable objective. If the objective is not met on the last day of the averaging period, all days in the averaging period are considered out of compliance.
- [3] The Sacramento Valley 40-30-30 Water Year Hydrologic Classification Index (see Figure 1) applies unless otherwise specified.
- [4] Compliance will be determined at Jersey Point (station D15) and Prisoners Point (station D29).
- [5] This standard does not apply in May when the best available May estimate of the Sacramento River Index for the water year is less than 8.1 MAF at the 90% exceedence level. [Note: The Sacramento River Index refers to the sum of the unimpaired runoff in the water year as published in the DWR Bulletin 120 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.]
- [6] A deficiency period is: (1) the second consecutive dry water year following a critical year; (2) a dry water year following a year in which the Sacramento River Index (described in footnote 5) was less than 11.35 MAF; or (3) a critical water year following a dry or critical water year. The determination of a deficiency period is made using the prior year's final Water Year Type determination and a forecast of the current year's Water Year Type; and remains in effect until a subsequent water year is other than a Dry or Critical water year as announced on May 31 by DWR and USBR as the final water year determination.
- [7] Net Delta Outflow Index (NDOI) is defined in Figure 3.
- [8] For the May-January objectives, if the value is less than or equal to 5,000 cfs, the 7-day running average shall not be less than 1,000 cfs below the value; if the value is greater than 5,000 cfs, the 7-day running average shall not be less than 80% of the value.
- [9] The objective is increased to 6,000 cfs if the best available estimate of the Eight River Index for December is greater than 800 TAF. [Note: The Eight River Index refers to the sum of the unimpaired runoff as published in the DWR Bulletin 120 for the following locations: Sacramento River flow at Bend Bridge, near Red Bluff; Feather River, total inflow to Oroville Reservoir; Yuba River flow at Smartville; American River, total inflow to Folsom Reservoir; Stanislaus River, total inflow to New Melones Reservoir; Tuolumne River, total inflow to Don Pedro Reservoir; Merced River, total inflow to Exchequer Reservoir; and San Joaquin River, total inflow to Millerton Lake.]
- [10] The minimum daily net Delta outflow shall be 7,100 cfs for this period, calculated as a 3-day running average. This requirement is also met if either the daily average or 14-day running average EC at the confluence of the Sacramento and the San Joaquin rivers is less than or equal to 2.64 mmhos/cm (Collinsville station C2). If the best available estimate of the Eight River Index (described in footnote 9) for January is more than 900 TAF, the daily average or 14-day running average EC at station C2 shall be less than or equal to 2.64 mmhos/cm for at least one day between February 1 and February 14; however, if the best available estimate of the Eight River Index for January is between 650 TAF and 900 TAF, the Executive Director of the SWRCB is delegated authority to decide whether this requirement applies. If the best available estimate of the Eight River Index for February is less than 500 TAF, the standard may be further relaxed in March upon the request of the DWR and the USBR, subject to the approval of the Executive Director of the SWRCB. The standard does not apply in May and June if the best available May estimate of the Sacramento River Index (described in footnote 5) for the water year is less than 8.1 MAF at the 90% exceedence level.

Under this circumstance, a minimum 14-day running average flow of 4,000 cfs is required in May and June. Additional Delta outflow objectives are contained in Table 4.

- [11] The 7-day running average shall not be less than 1,000 cfs below the monthly objective.
- [12] Partial months are averaged for that period. For example, the flow rate for April 1-14 would be averaged over 14 days. The 7-day running average shall not be less than 20% below the flow rate objective, with the exception of the April 15-May 15 pulse flow period when this restriction does not apply.
- [13] The water year classification for the San Joaquin River flow objectives will be established using the best available estimate of the 60-20-20 San Joaquin Valley Water Year Hydrologic Classification (see Figure 2) at the 75% exceedence level. The higher flow objective applies when the 2-ppt isohaline (measured as 2.64 mmhos/cm surface salinity) is required to be at or west of Chippis Island.
- [14] This time period may be varied based on real-time monitoring. One pulse, or two separate pulses of combined duration equal to the single pulse, should be scheduled to coincide with fish migration in San Joaquin River tributaries and the Delta. The USBR will schedule the time period of the pulse or pulses in consultation with the USFWS, the NMFS, and the DFG. Consultation with the CALFED Operations Group established under the Framework Agreement will satisfy the consultation requirement. The schedule is subject to the approval of the Executive Director of the SWRCB.
- [15] Plus up to an additional 28 TAF pulse/attraction flow during all water year types. The amount of additional water will be limited to that amount necessary to provide a monthly average flow of 2,000 cfs. The additional 28 TAF is not required in a critical year following a critical year. The pulse flow will be scheduled by the DWR and the USBR in consultation with the USFWS, the NMFS and the DFG. Consultation with the CALFED Operations Group established under the Framework Agreement will satisfy the consultation requirement.
- [16] Combined export rate for this objective is defined as the Clifton Court Forebay inflow rate (minus actual Byron-Bethany Irrigation District diversions from Clifton Court Forebay) and the export rate of the Tracy pumping plant.
- [17] This time period may be varied based on real-time monitoring and will coincide with the San Joaquin River pulse flow described in footnote 18. The DWR and the USBR, in consultation with the USFWS, the NMFS and the DFG, will determine the time period for this 31-day export limit. Consultation with the CALFED Operations Group established under the Framework Agreement will satisfy the consultation requirement.
- [18] Maximum export rate is 1,500 cfs or 100% of 3-day running average of San Joaquin River flow at Vernalis, whichever is greater. Variations to this maximum export rate may be authorized if agreed to by the USFWS, the NMFS and the DFG. This flexibility is intended to result in no net water supply cost annually within the limits of the water quality and operational requirements of this plan. Variations may result from recommendations of agencies for protection of fish resources, including actions taken pursuant to the State and federal Endangered Species Act. Any variations will be effective immediately upon notice to the Executive Director of the SWRCB. If the Executive Director of the SWRCB does not object to the variations within 10 days, the variations will remain in effect. The Executive Director of the SWRCB is also authorized to grant short-term exemptions to export limits for the purpose of facilitating a study of the feasibility of recirculating export water into the San Joaquin River to meet flow objectives.
- [19] Percent of Delta inflow diverted is defined in Figure 3. For the calculation of maximum percent Delta inflow diverted, the export rate is a 3-day running average and the Delta inflow is a 14-day running average, except when the CVP or the SWP is making storage withdrawals for export, in which case both the export rate and the Delta inflow are 3-day running averages.

- [20] The percent Delta inflow diverted values can be varied either up or down. Variations are authorized subject to the process described in footnote 18.
- [21] If the best available estimate of the Eight River Index (described in footnote 9) for January is less than or equal to 1.0 MAF, the export limit for February is 45% of Delta inflow. If the best available estimate of the Eight River Index for January is greater than 1.5 MAF, the February export limit is 35% of Delta inflow. If the best available estimate of the Eight River Index for January is between 1.0 MAF and 1.5 MAF, the DWR and the USBR will set the export limit for February within the range of 35% to 45%, after consultation with the USFWS, the NMFS and the DFG. Consultation with the CALFED Operations Group established under the Framework Agreement will satisfy the consultation requirement.
- [22] For the November-January period, close Delta Cross Channel gates for a total of up to 45 days. The USBR will determine the timing and duration of the gate closure after consultation with the USFWS, the NMFS and the DFG. Consultation with the CALFED Operations Group established under the Framework Agreement will satisfy the consultation requirement.
- [23] For the May 21-June 15 period, close Delta Cross Channel gates for a total of 14 days. The USBR will determine the timing and duration of the gate closure after consultation with the USFWS, the NMFS and the DFG. Consultation with the CALFED Operations Group established under the Framework Agreement will satisfy the consultation requirement.

Attachment 2

D-1641 Figure 3 - NDOI and Percent Inflow Diverted

Figure 3
NDOI and PERCENT INFLOW DIVERTED¹

The NDOI and the percent inflow diverted, as described in this footnote, shall be computed daily by the DWR and the USBR using the following formulas (all flows are in cfs):

$NDOI = DELTA\ INFLOW - NET\ DELTA\ CONSUMPTIVE\ USE - DELTA\ EXPORTS$ $PERCENT\ INFLOW\ DIVERTED = (CCF + TPP) \div DELTA\ INFLOW$

where $DELTA\ INFLOW = SAC + SRTP + YOLO + EAST + MISC + SJR$

- SAC* = Sacramento River at Freeport mean daily flow for the previous day; the 25-hour tidal cycle measurements from 12:00 midnight to 1:00 a.m. may be used instead.
- SRTP* = Sacramento Regional Treatment Plant average daily discharge for the previous week.
- YOLO* = Yolo Bypass mean daily flow for the previous day, which is equal to the flows from the Sacramento Weir, Fremont Weir, Cache Creek at Rumsey, and the South Fork of Putah Creek.
- EAST* = Eastside Streams mean daily flow for the previous day from the Mokelumne River at Woodbridge, Cosumnes River at Michigan Bar, and Calaveras River at Bellota.
- MISC* = Combined mean daily flow for the previous day of Bear Creek, Dry Creek, Stockton Diverting Canal, French Camp Slough, Marsh Creek, and Morrison Creek.
- SJR* = San Joaquin River flow at Vernalis, mean daily flow for the previous day.

where $NET\ DELTA\ CONSUMPTIVE\ USE = GDEPL - PREC$

- GDEPL* = Delta gross channel depletion for the previous day based on water year type using the DWR's latest Delta land use study.²
- PREC* = Real-time Delta precipitation runoff for the previous day estimated from stations within the Delta.

and where $DELTA\ EXPORTS^3 = CCF + TPP + CCC + NBA$

- CCF* = Clifton Court Forebay inflow for the current day.⁴
- TPP* = Tracy Pumping Plant pumping for the current day.
- CCC* = Contra Costa Canal pumping for the current day.
- NBA* = North Bay Aqueduct pumping for the current day.

1 Not all of the Delta tributary streams are gaged and telemetered. When appropriate, other methods of estimating stream flows, such as correlations with precipitation or runoff from nearby streams, may be used instead.

2 The DWR is currently developing new channel depletion estimates. If these new estimates are not available, DAYFLOW channel depletion estimates shall be used.

3 The term "Delta Exports" is used only to calculate the NDOI. It is not intended to distinguish among the listed diversions with respect to eligibility for protection under the area of origin provisions of the California Water Code.

4 Actual Byron-Bethany Irrigation District withdrawals from Clifton Court Forebay shall be subtracted from Clifton Court Forebay inflow. (Byron-Bethany Irrigation District water use is incorporated into the GDEPL term.)

Attachment 3

D-1641 Table 4 - Number of Days When Maximum Daily Average Electrical Conductivity of 2.64 mmhos/com Must Be Maintained at Specified Location

Table 4. Number of Days When Maximum Daily Average Electrical Conductivity of 2.64 mmhos/cm Must Be Maintained at Specified Location

Number of Days When Maximum Daily Average Electrical Conductivity of 2.64 mmhos/cm Must Be Maintained at Specified Location ^[a]																	
PMI ^[b] (TAF)	Chippis Island (Chippis Island Station D10)					PMI ^[b] (TAF)	Port Chicago (Port Chicago Station C14) ^[d]					PMI ^[b] (TAF)	Port Chicago (Port Chicago Station C14) ^[d]				
	FEB	MAR	APR	MAY	JUN		FEB	MAR	APR	MAY	JUN		FEB	MAR	APR	MAY	JUN
≤ 500	0	0	0	0	0	0	0	0	0	0	0	5250	27	29	25	26	6
750	0	0	0	0	0	250	1	0	0	0	0	5500	27	29	26	28	9
1000	28 ^[c]	12	2	0	0	500	4	1	0	0	0	5750	27	29	27	28	13
1250	28	31	6	0	0	750	8	2	0	0	0	6000	27	29	27	29	16
1500	28	31	13	0	0	1000	12	4	0	0	0	6250	27	30	27	29	19
1750	28	31	20	0	0	1250	15	6	1	0	0	6500	27	30	28	30	22
2000	28	31	25	1	0	1500	18	9	1	0	0	6750	27	30	28	30	24
2250	28	31	27	3	0	1750	20	12	2	0	0	7000	27	30	28	30	26
2500	28	31	29	11	1	2000	21	15	4	0	0	7250	27	30	28	30	27
2750	28	31	29	20	2	2250	22	17	5	1	0	7500	27	30	29	30	28
3000	28	31	30	27	4	2500	23	19	8	1	0	7750	27	30	29	31	28
3250	28	31	30	29	8	2750	24	21	10	2	0	8000	27	30	29	31	29
3500	28	31	30	30	13	3000	25	23	12	4	0	8250	28	30	29	31	29
3750	28	31	30	31	18	3250	25	24	14	6	0	8500	28	30	29	31	29
4000	28	31	30	31	23	3500	25	25	16	9	0	8750	28	30	29	31	30
4250	28	31	30	31	25	3750	26	26	18	12	0	9000	28	30	29	31	30
4500	28	31	30	31	27	4000	26	27	20	15	0	9250	28	30	29	31	30
4750	28	31	30	31	28	4250	26	27	21	18	1	9500	28	31	29	31	30
5000	28	31	30	31	29	4500	26	28	23	21	2	9750	28	31	29	31	30
5250	28	31	30	31	29	4750	27	28	24	23	3	10000	28	31	30	31	30
≤ 5500	28	31	30	31	30	5000	27	28	25	25	4	>10000	28	31	30	31	30

- [a] The requirement for number of days the maximum daily average EC (EC) of 2.64 mmhos per centimeter (mmhos/cm) must be maintained at Chippis Island and Port Chicago can also be met with maximum 14-day running average EC of 2.64 mmhos/cm, or 3-day running average NDOIs of 11,400 cfs and 29,200 cfs, respectively. If salinity/flow objectives are met for a greater number of days than the requirements for any month, the excess days shall be applied to meeting the requirements for the following month. The number of days for values of the PMI between those specified in this table shall be determined by linear interpolation.
- [b] PMI is the best available estimate of the previous month's Eight River Index. (Refer to Footnote 10 for Table 3 for a description of the Eight River Index.)
- [c] When the PMI is between 800 TAF and 1000 TAF, the number of days the maximum daily average EC of 2.64 mmhos/cm (or maximum 14-day running average EC of 2.64 mmhos/cm, or 3-day running average NDOI of 11,400 cfs) must be maintained at Chippis Island in February is determined by linear interpolation between 0 and 28 days.
- [d] This standard applies only in months when the average EC at Port Chicago during the 14 days immediately prior to the first day of the month is less than or equal to 2.64 mmhos/cm.