

DRAFT Proposed Long-Term BDCP Water Operations Range of Criteria (July 16, 2009)ⁱ

Range A	Proposed Operations	Range B																																													
<p>1. North Delta Diversion Bypass Flows <i>Objectives include flows of the functional equivalent thereof to (1) maintain fish screen sweeping velocities, (2) reduce upstream transport from downstream channels, (3) support salmonid and pelagic fish transport to regions of suitable habitat, (4) reduce predation effects downstream, and (5) maintain or improve rearing habitat in the north Delta.</i></p>																																															
<p>Based on the objectives stated above, it is recommended to implement the following operating criteria:</p> <ul style="list-style-type: none"> Bypass flows sufficient to prevent upstream tidal transport at two points of control: (1) Sacramento River upstream of Sutter Slough and (2) Sacramento River downstream of Georgiana Slough. These points are used to prevent upstream transport toward the proposed intakes and to prevent upstream transport into Georgiana Slough. 	<p>Based on the objectives stated above, it is recommended to implement the following operating criteria:</p> <ul style="list-style-type: none"> Bypass flows sufficient to prevent upstream tidal transport at two points of control: (1) Sacramento River upstream of Sutter Slough and (2) Sacramento River downstream of Georgiana Slough. These points are used to prevent upstream transport toward the proposed intakes and to prevent upstream transport into Georgiana Slough. 	<p>Based on the objectives stated above, it is recommended to implement the following operating criteria:</p> <ul style="list-style-type: none"> Bypass flows sufficient to prevent upstream tidal transport at two points of control: (1) Sacramento River upstream of Sutter Slough and (2) Sacramento River downstream of Georgiana Slough. These points are used to prevent upstream transport toward the proposed intakes and to prevent upstream transport into Georgiana Slough. 																																													
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15,000 cfs	20,000 cfs	11,400 cfs plus 20% of the amount over 15,000 cfs
20,000 cfs	no limit	12,400 cfs plus 0% of the amount over 20,000 cfs

Range A: Dec & Jun

If Sacramento River flow is over--	But not over--	The bypass is:
0 cfs	9,000 cfs	100% of the amount over 0 cfs
9,000 cfs	15,000 cfs	9,000 cfs plus 30% of the amount over 9,000
15,000 cfs	20,000 cfs	10,800 cfs plus 20% of the amount over 15,000 cfs
20,000 cfs	no limit	11,800 cfs plus 0% of the amount over 20,000 cfs

Base flow + percentage of flow above base

Dec & Jun: 9,000 cfs + 20%
 Jan & May: 9,000 cfs + 30%
 Feb-Apr: 9,000 cfs + 40%
 Jul-Sep: 5,000 cfs
 Oct-Nov: 7,000 cfs

* Fremont Weir spill to the Yolo Bypass included as available for diversion as long as base bypass flow is satisfied.

** Percentage will vary linearly over a 10-day period when transitioning between months

15,000 cfs	20,000 cfs	13,000 cfs plus 35% of the amount over 15,000 cfs
20,000 cfs	no limit	14,750 cfs plus 20% of the amount over 20,000 cfs

Proposed Operations: Dec & Jun

If Sacramento River flow is over--	But not over--	The bypass is:
0 cfs	11,000 cfs	100% of the amount over 0 cfs
11,000 cfs	15,000 cfs	11,000 cfs plus 40% of the amount over 11,000
15,000 cfs	20,000 cfs	12,600 cfs plus 20% of the amount over 15,000 cfs
20,000 cfs	no limit	13,600 cfs plus 20% of the amount over 20,000 cfs

* Base flow value of 11,000 cfs is replaced with 9,000 cfs in Dry and Critical years as indicated by the 50% forecast

Base flow + percentage of flow above base

Dec & Jun: 11,000 cfs + 20% (9,000 cfs + 20% in Dry and Critical years, 50% forecast)
 Jan & May: 11,000 cfs + 35% (9,000 cfs + 35% in Dry and Critical years, 50% forecast)
 Feb-Apr: 11,000 cfs + 50% (9,000 cfs + 50% in Dry and Critical years, 50% forecast)
 Jul-Sep: 5,000 cfs
 Oct-Nov: 7,000 cfs

** Fremont Weir spill to the Yolo Bypass included as available for diversion as long as base bypass flow is satisfied.

*** Percentage will vary linearly over a 10-day period when transitioning between months

17,000 cfs	20,000 cfs	16,400 cfs plus 50% of the amount over 17,000 cfs
20,000 cfs	no limit	17,900 plus 20% of the amount over 20,000 cfs

Range B: Dec & Jun

If Sacramento River flow is over--	But not over--	The bypass is:
0 cfs	15,000 cfs	100% of the amount over 0 cfs
15,000 cfs	17,000 cfs	15,000 cfs plus 60% of the amount over 15,000
17,000 cfs	20,000 cfs	16,200 cfs plus 40% of the amount over 17,000 cfs
20,000 cfs	no limit	17,400 plus 20% of the amount over 20,000 cfs

Base flow + percentage of flow above base

Dec & Jun: 15,000 cfs + 20%
 Jan & May: 15,000 cfs + 40%
 Feb-Apr: 15,000 cfs + 60%
 Jul-Sep: 5,000 cfs
 Oct-Nov: 7,000 cfs

* Fremont Weir spill to the Yolo Bypass included as available for diversion as long as base bypass flow is satisfied.

** Percentages will vary linearly over a 10-day period when transitioning between months

*** Beginning Dec 1, the first storm event exceeding 20,000 cfs at Freeport will be bypassed for up to 7 days (first flush concept).

2. South Delta Channel Flows

Minimize take at south Delta pumps by reducing incidence and magnitude of reverse flows during critical periods for pelagic species.

OMR Flows

Old and Middle River flows no less than the values below:

Combined Old and Middle River flows no less than values below* (cfs)					
Month	W	AN	BN	D	C
Jan	-5000	-5000	-5000	-5000	-5000
Feb	-5000	-5000	-5000	-5000	-5000
Mar	-5000	-5000	-5000	-5000	-5000
Apr	-5000	-5000	-5000	-5000	-5000
May	-5000	-5000	-5000	-5000	-5000
Jun	-5000	-5000	-5000	-5000	-5000
Jul	N/A	N/A	N/A	N/A	N/A
Aug	N/A	N/A	N/A	N/A	N/A
Sep	N/A	N/A	N/A	N/A	N/A
Oct	N/A	N/A	N/A	N/A	N/A
Nov	N/A	N/A	N/A	N/A	N/A
Dec	-6800	-6800	-6800	-6800	-6800

* Values are monthly average for use in modeling. December 20-31 targets are -5000 cfs and are averaged with an assumed background of -8000 cfs for December 1-19.

OMR Flows

- FWS smelt BO model of adaptive restrictions (temperature, turbidity, salinity, smelt presence)

Table below represents current estimate of "most likely" operation under FWS BO for modeling purposes

Combined Old and Middle River flows no less than values below* (cfs)					
Month	W	AN	BN	D	C
Jan	-4000	-4000	-4000	-5000	-5000
Feb	-5000	-4000	-4000	-4000	-4000
Mar	-5000	-4000	-4000	-3500	-3000
Apr	-5000	-4000	-4000	-3500	-2000
May	-5000	-4000	-4000	-3500	-2000
Jun	-5000	-5000	-5000	-5000	-2000
Jul	N/A	N/A	N/A	N/A	N/A
Aug	N/A	N/A	N/A	N/A	N/A
Sep	N/A	N/A	N/A	N/A	N/A
Oct	N/A	N/A	N/A	N/A	N/A
Nov	N/A	N/A	N/A	N/A	N/A
Dec	-6800	-6800	-6300	-6300	-6100

* Values are monthly average for use in modeling. December 20-31 targets are -5000 cfs (W, AN), -3500 cfs (AN, D), and -3000 cfs (C), and are averaged with an assumed background of -8000 cfs for December 1-19. Values are reflective of the "most likely" operation under the FWS Delta Smelt Biological Opinion. Values for modeling may be updated based on review by fishery agencies.

South Delta Export - San Joaquin Inflow

Consider replacement of OMR with sliding scale SJR EI ratio that provides similar or greater protection than FWS smelt BO

South Delta Export - San Joaquin Inflow Ratio

- 50% Mar & Jun
- 25% April & May
- 75% Oct, 50% Nov
- 100% Dec-Feb

OMR Flows

- Old and Middle River flows no less than -5,000 cfs during Jul-Sep.

	<p>Ratio</p> <ul style="list-style-type: none"> • Sliding scale for flows above the established OMR to share additional SJR flows between export and environment; export share would increase at higher flows • Time value of benefit; crediting outside of period in which flows are acquired <p>[Note that Conveyance WG/HOTT recommends continuing to evaluate the concept of isolating Old River to address south Delta channel flows.]</p>	
<p>3. Fremont Weir/Yolo Bypass <i>Considerations include (1) increasing spawning and rearing habitat for splittail and rearing habitat for salmonids, (2) providing alternate migration corridor to the mainstem Sacramento River, and (3) increasing effectiveness of habitat and food transport in Cache Slough.</i></p>		
<p>Same as “Proposed Operations”</p>	<p>Modified Fremont Weir and Control Gate</p> <ul style="list-style-type: none"> • Spills into Yolo Bypass enabled at water surface elevation 17.5 ft NAVD88 (~15,000 cfs Sac R at Fremont flow) by notch and new gates, as compared to current weir elevation of 33.5 ft (~56,000 cfs Fremont flow). • Flows: 2,000-6,000 cfs* depending on hydrology • Duration: 30-45 days • Period: Gates operable December - April 15 (occasionally April 16-May 15 depending of hydrologic conditions) <p>* Flows less than 3,000 cfs may require physical modifications to the Yolo Bypass and toe drain to achieve levels of desired floodplain habitat.</p> <p>** Physical modifications to Yolo Bypass and</p>	<p>Same as “Proposed Operations”</p>

	the toe drain may be required to achieve levels of desired floodplain habitat enhancement.	
4. Delta Cross Channel Gate Operations <i>Considerations include (1) reduce transport of outmigrating Sacramento River fish into central Delta, (2) maintain flows downstream on Sacramento River, (3) and providing sufficient Sacramento River flow into interior Delta when water quality for M&I and AG may be of concern.</i>		
Same as "Proposed Operations"	Oct-Nov: DCC gate closed if fish are present (assume 15 days per month; may be open longer depending on presence of fish) Dec-Jun: DCC gate closed Jul-Sep: DCC gate open	Same as "Proposed Operations"
5. Rio Vista Minimum Instream Flows <i>Maintain minimum flows for outmigrating salmonids and smelt.</i>		
Sep-Dec: Per D-1641 Jan-Aug: Minimum of 3,000 cfs	Sep-Dec: Per D-1641 Jan-Aug: Minimum of 3,000 cfs	Sep-Dec: Per D-1641 Jan-Aug: Minimum of 3,000 cfs
6. Delta Inflow & Outflow <i>Considerations include (1) Provide sufficient outflow to maintain desirable salinity regime downstream of Collinsville during the spring, (2) explore range of approaches toward providing additional variability to Delta inflow and outflow.</i>		
Delta Outflow: Jul-Jan: Per D-1641 Feb-Jun: Per D-1641*, except no Roe Island triggering * Current relaxation of Collinsville standard to 4,000 cfs in May and June revised to state when the Eight River Index is 10.0 or less as established on May 1. ** Proportional Reservoir Release concept will	Delta Outflow: Jul-Jan: Per D-1641 Feb-Jun: Per D-1641 * Proportional Reservoir Release concept will continue to be evaluated to the extent that it provides similar response to outflow, inflow, and upstream storage conditions	Delta Outflow: Jul-Aug & Jan: Per D-1641 Sep-Nov: Fall X2 per FWS Smelt BO Feb-Jun: NGO X2-Eight River Index approach (storage off-ramps to be refined) * Proportional Reservoir Release concept will continue to be evaluated to the extent that it provides similar response to outflow, inflow, and upstream storage conditions

<p>continue to be evaluated to the extent that it provides similar response to outflow, inflow, and upstream storage conditions</p>		<p>** Continue analysis of NGO watershed unimpaired runoff approach as it relates to PREs and parties outside of BDCP. Carry into “related action” alternative.</p>
<p>7. Operations for Delta Water Quality and Residence Time <i>Considerations include (1) maintain a minimum level of pumping from the south Delta during summer to provide limited flushing for general water quality conditions (reduce residence times), (2) for M&I and AG salinity improvements, and (3) to allow operational flexibility during other periods to operate either north or south diversions based on real-time assessments of benefits to fish and water quality.</i></p>		
<p>Same as “Proposed Operations”</p>	<p>Assumptions for analysis: Jul-Sep: Prefer south delta pumping up to 3,000 cfs before diverting from north Oct-Jun: Prefer north delta pumping (real-time operational flexibility)</p>	<p>Same as “Proposed Operations”</p>
<p>8. In-Delta Agricultural and Municipal & Industrial Water Quality Requirements <i>Existing M&I and AG salinity requirements.</i></p>		
<p>Same as “Proposed Operations”</p>	<p>Existing D-1641 North and Western Delta AG and MI standards EXCEPT move compliance point from Emmaton to Three Mile Slough juncture.</p>	<p>Same as “Proposed Operations”</p>
<p>9. Habitat Restoration Targets</p>		
<p>Same as “Proposed Operations”</p>	<p>65,000 acres Tidal Marsh (subtidal, sea level rise accommodation, mitigation credits) 10,000 acres Floodplain 5,000 acres Riparian <hr/> 80,000 acres Total</p>	<p>Same as “Proposed Operations”</p>

ⁱ This table provides a summary of proposed long-term Delta water operations for the purpose of conducting the BDCP impact and conservation assessment. Information in this table provides the basis for hydrologic and hydrodynamic modeling inputs for the assessment. More specifics regarding criteria and rationale for each water operational parameter will be provided in the text of water operations conservation measures in Chapter 3 *Conservation Strategy*.

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