PROPOSED OPERATIONS FOR:
ALTERNATIVE 4 - ENHANCED AQUATIC CONSERVATION, INTAKES 9,000 CFS
INTAKES # 2, 3, AND 5

Long-Term BDCP Water Operations Analytical Range
(Black Type is February 5, 2010 Draft presented at BDCP Steering Committee on February 11, 2010)

1. North Delta Diversion Bypass Flows

Objectives include flows to (1) maintain fish screen sweeping velocities, (2) minimize upstream transport from downstream channels, (3) support salmonid and pelagic fish transport to regions of suitable habitat, (4) minimize predation effects downstream, and (5) maintain or improve rearing habitat in the north Delta.

~~*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.*~~

Proposed Operations
Constant Low-Level Pumping (Dec-Jun): ~~Diversions up to 6% of river flow for flows greater than 5,000 cfs. No more than 300 cfs at any one intake.~~ Diversions up to 5% of river flow for flows greater than 5,000 cfs. No more than 300 cfs at any one intake.
Initial Pulse Protection: Low level pumping maintained through the initial pulse period. For the purpose of monitoring, the initiation of the pulse is defined by the following criteria: (1) Wilkins Slough flow changing by more than 45% over a five day period and (2) flow greater than 12,000 cfs. Low-level pumping continues until (1) Wilkins Slough returns to prepulse flows (flow on first day of 5-day increase), (2) flows decrease for 5 consecutive days, or (3) flows are greater than 20,000 cfs for 10 consecutive days. After pulse period has ended, operations will return to the bypass flow table (SubTable A for Level I). These parameters are for modeling purposes. Actual operations will be based on real-time monitoring of fish movement. If the first flush begins before Dec 1, May bypass criteria must be initiated following first flush and the second pulse period will have the same protective operation.
Post-Pulse Operations: After initial flush(es), go to Level I post-pulse bypass rule (see SubTable A for Level 1) until ~~15~~ 20 total days of bypass flows above 20,000 cfs. Then go to the Level II post-pulse bypass rule (Subtable A for Level II) until ~~30~~ 45 total days of bypass flows above 20,000 cfs. Then go to the Level III post-pulse bypass rule (Subtable A for Level III).

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Sub-Table A. Post-Pulse Operations for North Delta Diversion Bypass Flows

Level I Post-Pulse Operations			Level II Post-Pulse Operations			Level III Post Pulse Operations		
Based on the objectives stated above, it is recommended to implement the following operating criteria: • Bypass flows sufficient to prevent upstream tidal transport at two points of control: (1) Sacramento River upstream of Sutter Slough and (2) downstream of Georgiana Slough. These points are used to prevent upstream transport toward the proposed intakes and to prevent upstream transport into Georgiana Slough. **Percentages will vary linearly over a 10-day period when transitioning between months.								
Dec - Apr			**Dec - Apr**			**Dec - Apr**		
If Sacramento River flow is over...	**But not over...**	**The bypass is...**	**If Sacramento River flow is over...**	**But not over...**	**The bypass is...**	**If Sacramento River flow is over...**	**But not over...**	**The bypass is...**
0 cfs	5,000 cfs	100% of the amount over 0 cfs	0 cfs	5,000 cfs	100% of the amount over 0 cfs	0 cfs	5,000 cfs	100% of the amount over 0 cfs
5,000 cfs	15,000 cfs	Flows remaining after constant low level pumping (main table)	5,000 cfs	11,000 cfs	Flows remaining after constant low level pumping (main table)	5,000 cfs	9,000 cfs	Flows remaining after constant low level pumping (main table)
15,000 cfs	17,000 cfs	15,000 cfs plus 80% of the amount over 15,000	11,000 cfs	15,000 cfs	11,000 cfs plus 60% of the amount over 11,000	9,000 cfs	15,000 cfs	9,000 cfs plus 50% of the amount over 9,000
17,000 cfs	20,000 cfs	16,600 cfs plus 60% of the amount over 17,000 cfs	15,000 cfs	20,000 cfs	13,400 cfs plus 50% of the amount over 15,000 cfs	15,000 cfs	20,000 cfs	12,000 cfs plus 20% of the amount over 15,000 cfs
20,000 cfs	no limit	18,400 plus 30% of the amount over 20,000 cfs	20,000 cfs	no limit	15,900 plus 20% of the amount over 20,000 cfs	20,000 cfs	no limit	13,000 plus 0% of the amount over 20,000 cfs
May			**May**			**May**		
If Sacramento River flow is over...	**But not over...**	**The bypass is...**	**If Sacramento River flow is over...**	**But not over...**	**The bypass is...**	**If Sacramento River flow is over...**	**But not over...**	**The bypass is...**
0 cfs	5,000 cfs	100% of the amount over 0 cfs	0 cfs	5,000 cfs	100% of the amount over 0 cfs	0 cfs	5,000 cfs	100% of the amount over 0 cfs

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5,000 cfs	15,000 cfs	Flows remaining after constant low level pumping (main table)	5,000 cfs	11,000 cfs	Flows remaining after constant low level pumping (main table)	5,000 cfs	9,000 cfs	Flows remaining after constant low level pumping (main table)
15,000 cfs	17,000 cfs	15,000 cfs plus 70% of the amount over 15,000	11,000 cfs	15,000 cfs	11,000 cfs plus 50% of the amount over 11,000	9,000 cfs	15,000 cfs	9,000 cfs plus 40% of the amount over 9,000
17,000 cfs	20,000 cfs	16,400 cfs plus 50% of the amount over 17,000 cfs	15,000 cfs	20,000 cfs	13,000 cfs plus 35% of the amount over 15,000 cfs	15,000 cfs	20,000 cfs	11,400 cfs plus 20% of the amount over 15,000 cfs
20,000 cfs	no limit	17,900 plus 20% of the amount over 20,000 cfs	20,000 cfs	no limit	14,750 plus 20% of the amount over 20,000 cfs	20,000 cfs	no limit	12,400 plus 0% of the amount over 20,000 cfs
Jun			**Jun**			**Jun**		
If Sacramento River flow is over...	**But not over...**	**The bypass is...**	**If Sacramento River flow is over...**	**But not over...**	**The bypass is...**	**If Sacramento River flow is over...**	**But not over...**	**The bypass is...**
0 cfs	5,000 cfs	100% of the amount over 0 cfs	0 cfs	5,000 cfs	100% of the amount over 0 cfs	0 cfs	5,000 cfs	100% of the amount iover 0 cfs
5,000 cfs	15,000 cfs	Flows remaining after constant low level pumping (main table)	5,000 cfs	11,000 cfs	Flows remaining after constant low level pumping (main table)	5,000 cfs	9,000 cfs	Flows remaining after constant low level pumping (main table)
15,000 cfs	17,000 cfs	15,000 cfs plus 60% of the amount over 15,000	11,000 cfs	15,000 cfs	11,000 cfs plus 40% of the amount over 11,000	9,000 cfs	15,000 cfs	9,000 cfs plus 30% of the amount over 9,000
17,000 cfs	20,000 cfs	16,200 cfs plus 40% of the amount over 17,000 cfs	15,000 cfs	20,000 cfs	12,600 cfs plus 20% of the amount over 15,000 cfs	15,000 cfs	20,000 cfs	10,800cfs plus 20% of the amount over 15,000 cfs
20,000 cfs	no limit	17,400 plus 20% of the amount over 20,000 cfs	20,000 cfs	no limit	13,600 plus 20% of the amount over 20,000 cfs	20,000 cfs	no limit	11,800 plus 0% of the amount over 20,000 cfs
Jul-Sep: 5,000 cfs Oct-Nov: 7,000 cfs			**Jul-Sep: 5,000 cfs** **Oct-Nov: 7,000 cfs**			**Jul-Sep: 5,000 cfs** **Oct-Nov: 7,000 cfs**		

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2. South Delta Channel Flows

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

~~*Minimize take at south Delta pumps by reducing incidence and magnitude of reverse flows during critical periods for pelagicspecies.*~~

Proposed Operations

OMR Flows

- South Delta exports cannot cause OMR to fall below +1,000 cfs during Dec-Mar.
- South Delta exports cannot cause OMR to fall below +3,000 cfs during Jun.
- South Delta pumping is not allowed during April, May, Oct, and Nov

~~• FWS smelt and NMFS BO's model of adaptive restrictions (temperature, turbidity, salinity, smelt presence)~~

~~Table below provides a rough representation of the current estimate of "most likely" operation under FWS and NMFS BO's 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 (BN, 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.~~

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Proposed Operations
South Delta Export - San Joaquin Inflow Ratio: 50% Dec - Mar & Jun ~~- 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~~

3. Fremont Weir/Yolo Bypass

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.

~~*Considerations include (1) increasing spawning and rearing habitat for splittail and rearing habitat for salmonids for >30 days, (2) providing alternate migration corridor to the mainstem Sacramento River, and (3) increasing effectiveness of habitat and food transport in Cache Slough.*~~

Proposed Operations
• 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: 3,000-8,000 cfs* depending on hydrology • Duration: 30-45 days • Period: Gates operable December - April 15 (occasionally April 16 – May 15 depending on hydrologic conditions). * Flows less than 3,000 cfs may require physical modifications to the Yolo Bypass and toe drain to achieve levels of desired floodplain habitat.
~~Sacramento Weir - No change in operations; improve upstream fish passage facilities~~
~~Lisbon Weir - No change in operations; improve upstream fish passage facilities~~
~~Fremont Weir – Improve fish passage at existing weir elevation; construct opening and operable gates at elevation 17.5 feet with fish passage facilities; construct opening and operable gates at a smaller opening with fish passage enhancement at elevation 11.5 feet~~
~~***Fremont Weir Gate Operations -***~~
~~December 1-March 30 (extend to May 15, depending on hydrologic conditions and measures to minimize land use and ecological conflicts) open the 17.5 foot and 11.5 foot elevation gates when Sacramento River flow at Freeport is greater than 25,000 cfs (provides local and regional flood control benefit and coincides with pulse flows and juvenile salmonid migration cues, provides seasonal floodplain inundation for food production, juvenile rearing, and spawning) to provide Yolo Bypass inundation of 3,000 to 6,000 cfs depending on river stage. Operating the gates to allow Yolo Bypass inundation when Sacramento River flow is greater than 25,000 cfs will reduce impacts to water supply associated with Hood bypass flow constraints. Potential impacts to water supply would be avoided or minimized through an operations plan.~~
~~Close the 17.5 foot elevation gates when Sacramento River flow at Freeport recedes to less than 20,000 cfs but keep 11.5 foot elevation gates open to provide greater opportunity for fish within the bypass to migrate upstream into the Sacramento River; close 11.5 foot elevation gates when Sacramento River flow at Freeport recedes to less than 15,000 cfs~~

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4. Delta Cross Channel Gate Operations

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.

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

5. Rio Vista Minimum Instream Flows

Maintain minimum flows for outmigrating salmonids and smelt.

Proposed Operations
Sep-Dec: Per D-1641
Jan-Aug: Minimum of ~~3,000 cfs~~ 5,000 cfs

6. Delta Inflow & Outflow

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.

Proposed Operations
Delta Outflow:
~~Jul-Jan: Per D-1641~~
~~Feb-Jun: Per D-1641~~
Feb-Aug &Dec - Jan: Per D-1641
Sep-Nov: Fall X2 per FWS Smelt BO
~~- Proportional Reservoir Release concept will continue to be evaluated to the extent that it provides similar response to outflow, inflow, and upstream storage conditions~~

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7. Operations for Delta Water Quality and Residence Time

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.

Proposed Operations
Assumptions:
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)

8. In-Delta Agricultural and Municipal & Industrial Water Quality Requirements

Existing M&I and AG salinity requirements

Proposed Operations
Assumptions:
Existing D-1641 North and Western Delta AG and MI standards
EXCEPT move compliance point from Emmaton to Three Mile Slough juncture.
Maintain all water quality requirements contained in the NDWA/ DWR Contract and other DWR contractual obligations.

9. Habitat Restoration Opportunity

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Proposed Operations
65,000 acres of Tidal Habitat Restoration
~~20~~ 40 linear miles of Channel Margin Habitat Enhancement
5,000 acres of Riparian forest and scrub Habitat Restoration
~~10,000~~ 20,000 acres of Seasonally Inundated Floodplain Restoration
Yolo Bypass Habitat Improvements and Modify Fremont Weir

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