SAIC Consultant Team Recommendations for Long Term Operations
(January 29, 2010 draft C)

As per Steering Committee request, the SAIC consultant team has prepared these recommendations for BDCP long term water operations to be evaluated in the full BDCP Effects Analysis. These recommendations are based on issues raised by technical experts in the Mini-Effects Analysis and specific technical expertise of the consultant team. The recommendations provided are presented as changes to the prior consultant team recommendations in the July 30, 2009 draft of Chapter 3 *Conservation Strategy* depicted in the table *DRAFT Proposed Long-Term BDCP Water Operations Range of Criteria for Effects Analysis* starting on page 3-70, and taken together constitute a new proposal. References to "range A" and "range B" in this document are for background context only; the operations presented here represent SAIC consultant team recommendations for additional analysis. References to adaptive ranges in this document are consultant recommendations; no decision has been made as to the inclusion of adaptive operational ranges in the BDCP or the content of such adaptive ranges.

Sacramento River Hood Bypass Operations

The effects of changes in Sacramento River flows on estuarine and anadromous fish, food supplies, and water quality were key areas of evaluation during the mini-effects analysis. Results of the mini-effects analysis identified three aspects of Sacramento River flows for potential modification prior to the full effects analyses. The first issue for consideration was the seasonal time periods used for regulating Sacramento River bypass flows (i.e., flows remaining in the river and "bypassing" the proposed new North Delta export facilities). The second issue for consideration was the development of an additional operating rule that would protect pulse flows during the winter and spring from being diverted into the North Delta intakes. Results of analysis of past fishery monitoring studies considered during the mini-effects analysis showed that pulse flows provide an environmental cue that stimulates the downstream migration of juvenile winter-run Chinook salmon into the Delta and subsequently their migration into coastal marine waters. Pulse flows provide a change in river flow over a short time period and are also typically associated with increases in turbidity and suspended sediments within the water column. Increased turbidity has been identified as an important environmental condition affecting pre-spawning adult delta smelt geographic distribution within the Delta and lower reaches of the Sacramento River. The bypass operations included in the mini-effects analysis did not include specific provisions for operations in response to seasonal pulse flow events. The third issue for consideration was the establishment of progressive export operations that establish higher bypass flows early in the winter, but allow progressively higher export rates as conditions prove to be wetter through the winter and spring.

SAIC proposes a Sacramento River bypass operations based on three parameters "Constant Low Flow Pumping," "Initial Pulse Protection," and "Post-Pulse Operations." Three levels of Post-Pulse Operations are identified in table 1 (Level I) and table 2 (Levels II and III) below and the criteria for proposed operations of Constant Low Flow Pumping, Initial Pulse Protection, and Post-Pulse Operations are provided in table 3 below, along with a recommended analytical range.

Based on results of the mini-effects analysis the SAIC consultant team has developed the following Sacramento River bypass "Level I" operating criteria modified from the previous Range B that extends the seasonal time period when higher bypass requirements would be in effect to increase potential benefits earlier in the fall and winter and provide a longer period for juvenile salmonid migration and rearing (the recommended revision is shaded in yellow):

Table 1. Level I Post-Pulse Operations as compared to previous Range B operations

<table>
<tr><th>Previous Range B</th><th>Recommended Level I Post-Pulse Operations (same as prior Proposed Operations, except for Dec & Jan)</th></tr>
<tr><td>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) 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.
Range B: Feb - Apr
<table>
<tr><th>If Sacramento River flow is over--</th><th>But not over--</th><th>The bypass is:</th></tr>
<tr><td>0 cfs</td><td>15,000 cfs</td><td>100% of the amount over 0 cfs</td></tr>
<tr><td>15,000 cfs</td><td>17,000 cfs</td><td>15,000 cfs plus 80% of the amount over 15,000</td></tr>
<tr><td>17,000 cfs</td><td>20,000 cfs</td><td>16,600 cfs plus 60% of the amount over 17,000 cfs</td></tr>
<tr><td>20,000 cfs</td><td>no limit</td><td>18,400 plus 30% of the amount over 20,000 cfs</td></tr>
</table>
Range B: Jan & May
<table>
<tr><th>If Sacramento River flow is over--</th><th>But not over--</th><th>The bypass is:</th></tr>
<tr><td>0 cfs</td><td>15,000 cfs</td><td>100% of the amount over 0 cfs</td></tr>
<tr><td>15,000 cfs</td><td>17,000 cfs</td><td>15,000 cfs plus 70% of the amount over 15,000</td></tr>
<tr><td>17,000 cfs</td><td>20,000 cfs</td><td>16,400 cfs plus 50% of the amount over 17,000 cfs</td></tr>
<tr><td>20,000 cfs</td><td>no limit</td><td>17,900 plus 20% of the amount over 20,000 cfs</td></tr>
</table></td><td>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) 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.
Dec - Apr
<table>
<tr><th>If Sacramento River flow is over--</th><th>But not over--</th><th>The bypass is:</th></tr>
<tr><td>0 cfs</td><td>15,000 cfs</td><td>100% of the amount over 0 cfs</td></tr>
<tr><td>15,000 cfs</td><td>17,000 cfs</td><td>15,000 cfs plus 80% of the amount over 15,000</td></tr>
<tr><td>17,000 cfs</td><td>20,000 cfs</td><td>16,600 cfs plus 60% of the amount over 17,000 cfs</td></tr>
<tr><td>20,000 cfs</td><td>no limit</td><td>18,400 plus 30% of the amount over 20,000 cfs</td></tr>
</table>
May
<table>
<tr><th>If Sacramento River flow is over--</th><th>But not over--</th><th>The bypass is:</th></tr>
<tr><td>0 cfs</td><td>15,000 cfs</td><td>100% of the amount over 0 cfs</td></tr>
<tr><td>15,000 cfs</td><td>17,000 cfs</td><td>15,000 cfs plus 70% of the amount over 15,000</td></tr>
<tr><td>17,000 cfs</td><td>20,000 cfs</td><td>16,400 cfs plus 50% of the amount over 17,000 cfs</td></tr>
<tr><td>20,000 cfs</td><td>no limit</td><td>17,900 plus 20% of the amount over 20,000 cfs</td></tr>
</table></td></tr>
</table>

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

Jul-Sep: 5,000 cfs
Oct-Nov: 7,000 cfs

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

Jul-Sep: 5,000 cfs
Oct-Nov: 7,000 cfs

The SAIC consulting team recommends revisions to the months of operations of the Sacramento River bypass operational criteria under the previous Range A to the create the "Level III" operating criteria and recommends revisions to the months of operations under the previous Proposed Operations (see yellow highlight) to create a "Level II" operating criteria as shown below:

Table 2. Level III and Level II Post-Pulse Operations

Recommended Level III Post-Pulse Operations (same as prior Range A, except for Dec & Jan)	***Recommended Level II Post-Pulse Operations (same as prior Proposed Operations, except for Dec & Jan)***
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) 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.	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) 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.

Dec - Apr

If Sacramento River flow is over--	But not over--	The bypass is:
0 cfs	9,000 cfs	100% of the amount over 0 cfs

Dec - Apr

If Sacramento River flow is over--	But not over--	The bypass is:
0 cfs	11,000 cfs	100% of the amount over 0 cfs

9,000 cfs	15,000 cfs	9,000 cfs plus 50% of the amount over 9,000
15,000 cfs	20,000 cfs	12,000 cfs plus 20% of the amount over 15,000 cfs
20,000 cfs	no limit	13,000 cfs plus 0% of the amount over 20,000 cfs

May

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 40% of the amount over 9,000
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

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

Jul-Sep: 5,000 cfs
Oct-Nov: 7,000 cfs

11,000 cfs	15,000 cfs	11,000 cfs plus 60% of the amount over 11,000
15,000 cfs	20,000 cfs	13,400 cfs plus 50% of the amount over 15,000 cfs
20,000 cfs	no limit	15,900 cfs plus 20% of the amount over 20,000 cfs

May

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 50% of the amount over 11,000
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

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

Jul-Sep: 5,000 cfs
Oct-Nov: 7,000 cfs

In addition to the recommended revision to the Range B bypass operations shown above, the SAIC consultant team is also recommending that a new set of operational rules be included in the proposed operations and additional operational analyses of Sacramento River flows to protect the environmental cues provided by short-duration pulse flow events. This SAIC proposal incorporates all levels of Sacramento River bypass operations in the two tables above (Level I

modified from prior Range B, Level II modified from prior Proposed Operations, and Level III modified from the prior Range A) according to a progressive rule (see "Post-Pulse Operations" in the table below). In summary, (1) all prior bypass flow tables were modified to add December and January to the February-April protection period, (2) and the only difference in the range for additional analysis is how many days are required before stepping from Level I to Level II and from Level II to Level III based on wetness. The SAIC recommendation has been based on discussions with NMFS and other resource agencies as well as a review of past pulse flow events that have occurred on the Sacramento River during the late fall, winter, and early spring. NMFS offered this technical assistance in an ex-officio capacity. The SAIC recommendation for pulse flow operations as part of the full-effects analysis is summarized below:

Table 3. Proposed Sacramento River Bypass Operations (Constant Level Pumping, Initial Pulse Protection, Post-Pulse Operations) with Analytical Range

Recommended for Additional Analysis	***Recommended Proposed Operations***	***Recommended for Additional Analysis***
Constant Low-Level Pumping (Dec-Jun): Diversions up to 10% of river flow for flows greater than 5,000 cfs. No more than 300 cfs at any one intake.	**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.	**Constant Low-Level Pumping (Dec-Jun):** Diversions up to 2% of river flow for flows greater than 5,000 cfs. No more than 300 cfs at any one intake.
Initial Pulse Protection: No pulse flow protection criteria implemented.	**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 pre-pulse 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 above. 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	**Initial Pulse Protection:** No range. (Same as proposed operations)

	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 until you have had **10** total days of bypass flows above 20,000 cfs. Then go to the Level II post-pulse bypass ruleuntil you have had **20** total days of bypass flows above 20,000 cfs. Then go to the Level III post-pulse bypass rule.	**Post-Pulse Operations:** After initial flush(es), go to Level I post-pulse bypass ruleuntil you have had **15** total days of bypass flows above 20,000 cfs. Then go to the Level II post-pulse bypass ruleuntil you have had **30** total days of bypass flows above 20,000 cfs. Then go to the Level III post-pulse bypass rule.	**Post-Pulse Operations:** After initial flush(es), go to Level I post-pulse bypass ruleuntil you have had **20** total days of bypass flows above 20,000 cfs. Then go to the Level II post-pulse bypass ruleuntil you have had **45** total days of bypass flows above 20,000 cfs. Then go to the Level III post-pulse bypass rule.

Yolo Bypass Seasonal Floodplain Inundation

Seasonal inundation of the Yolo Bypass during the winter and early spring has been identified through the mini-effects analysis as providing beneficial floodplain habitat that is used by a variety of fish species as spawning and juvenile rearing habitat. Seasonal inundation of the bypass also contributes to the mobilization of organic material and nutrients that are then transported downstream into the Cache Slough complex and lower Sacramento River. The potential biological benefits of floodplain inundation vary among fish species, the frequency and duration of inundation, stranding and fish passage, and the reduction in Sacramento River flows that occur as a result of water being diverted onto the floodplain and away from the river. In the mini-effects analysis it was assumed that water diverted into the Yolo Bypass at the Freemont Weir would be credited as Sacramento River bypass flows for purposes of North Delta diversion operations and that the Freemont Weir would be notched and operable gates installed to allow inundation at an elevation of 17.5 feet. In addition, the mini-effects analysis assumed that the bypass would only be inundated when flows were sufficient to sustain inundation for 30-45 days between December and May 15. The operations included in the mini-effects evaluation are shown below.

Previous Proposed Operations

Modified Fremont Weir and Control Gate

- 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)

* Flows less than 3,000 cfs may require physical modifications to the Yolo Bypass and toe drain to achieve levels of desired floodplain habitat.

** Physical modifications to Yolo Bypass and the toe drain may be required to achieve levels of desired floodplain habitat enhancement.

Recommendation

Based on the results of hydrologic and operational modeling and discussions during the mini-effects analysis the SAIC consultant team developed a set of recommended modification to the Fremont Weir and seasonal inundation of the Yolo Bypass. The recommendations include improvements for fish passage into and out of the bypass, proposed operations and recommended operations for additional analysis, a reduction in the seasonal period when inundation occurs to reduce land use conflicts, and a modification in the Fremont Weir operations to allow more frequent inundation based on Sacramento River stage, many of which would be shorter than 30-45 days but would reflect hydrologic conditions in the river and allow inundation to change in response to increases and decreases in Sacramento River flow and stage. The Fremont Weir operations have also been modified to reduce impact to North Delta diversions and water supply operations. The SAIC consultant team recommended revisions are summarized below.

Recommended Fremont Weir and Yolo Bypass Operations

Recommended for Additional Analysis	***Recommended Proposed Operations***	***Recommended for Additional Analysis***
N/A	Sacramento Weir - No change in operations; improve upstream fish passage facilities	N/A
N/A	Lisbon Weir - No change in operations; improve upstream fish passage facilities	N/A
Freemont Weir – Improve fish passage at existing weir elevation; construct opening and operable gates at elevation 17.5 feet with fish passage facilities	Freemont 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	N/A
Fremont Weir Gate Operations -		
December 1-March 30 open the 17.5 foot elevation gates when Sacramento River flow at Freeport is greater than	December 1-March 30 (extend to May 15, depending on hydrologic conditions and measures to minimize land use	N/A

25,000 cfs (provides local and regional flood control benefit and coincides with pulse flows and juvenile salmonid migration cues) 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.	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 25,000 cfs	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	N/A

Delta Outflow and X2 Location

Early long-term operations evaluated as part of the mini-effects analysis included provisions for delta outflow and management of X2 location. Range B included in the mini-effects analysis prescribed X2 management locations during both the spring and fall, based on the hypothesis that X2 location is an indicator of the location and area of the low-salinity estuarine habitat, related to production of phytoplankton and zooplankton and important rearing habitat for delta smelt and other fish. Releases of water from Shasta Reservoir and other SWP and CVP impoundments to meet the X2 requirement in the Delta directly affect the reservoir storage and volume of coldwater available to provide suitable flows and water temperatures in the rivers for spawning, egg incubation, and juvenile rearing for Chinook salmon and steelhead. Results of the mini-effects analysis showed that under Range B the volume of coldwater in Shasta Reservoir in dry and critically dry water years was depleted, resulting in a substantial increase in the modeled levels of mortality to winter-run and spring-run Chinook salmon eggs incubating in the Sacramento River. The reduction in the coldwater pool in Shasta Reservoir was substantially greater under Range B operations when compared to Range A, Proposed Operations, RPA operations, or pre-BO levels included in the analysis. The increased potential impacts to winter-run and spring-run Chinook salmon egg survival under Range B were considered to be significant and would require a modification to the adaptive range prior to the full effects analysis. The SAIC consultant team recommends for further evaluation in the full effects analysis a modified X2 proposal to reduce the effects of operations to meet X2 requirements on coldwater pool storage and resulting water temperatures in the Sacramento River during the late summer and early fall period of winter-run and spring-run Chinook salmon spawning is shown below:

Previous Range B	***Recommended for Additional Analysis***
Summer, Winter, and Fall Delta Outflow: Jul-Aug & Dec-Jan: Per D-1641 Sep-Nov: Fall X2 per FWS Smelt BO	**Summer, Winter, and Fall Delta Outflow:** Jul-Aug & Dec-Jan: Per D-1641 Sep-Nov: Fall X2 per FWS Smelt BO
Spring Delta Outflow: 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 ** Continue analysis of NGO watershed unimpaired runoff approach as it relates to	**Spring Delta Outflow:** Feb-Jun: NGO X2-Eight River Index approach in Wet and Above Normal years (storage off-ramps in all year types will be refined to minimize upstream coldwater storage impacts on all reservoirs). If storage off-ramps cannot be reasonably applied, in Below Normal, Dry, and Critical years operate to X2 targets based on X2-Eight River Index method with targets derived from 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

PREs and parties outside of BDCP. Carry into "related action" alternative.	** Continue analysis of NGO watershed unimpaired runoff approach as it relates to PREs and parties outside of BDCP. Carry into "related action" alternative.

The SAIC consulting team recommends that there be no changes or revisions to the Delta outflow/X2 operational criteria under either the previous Range A or Proposed Operations as shown below:

Recommended for Additional Analysis (same as prior range A)	***Recommended Proposed Operations (same as prior proposed operations)***
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 continue to be evaluated to the extent that it provides similar response to outflow, inflow, and upstream storage conditions	**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

South Delta Long-term Water Operations

Analysis of the early long-term operations of the South Delta export facilities as part of the mini-effects analysis showed that constraints on export operations under range B resulted in significant water supply impacts. Under range B the South Delta exports were regulated between October and June based on a proportion of the San Joaquin River inflow that could be exported. Examination of the seasonal timing of migration of San Joaquin River system juvenile fall-run Chinook salmon and steelhead showed that more restrictive operations in the period from October through January provided less biological benefit than more restrictive operations during the primary juvenile salmonid migration period from February through May. The February through May period also coincides with the primary period when larval and early juvenile delta and longfin smelt are present in the Delta and would be vulnerable to entrainment losses resulting from South Delta export operations. Operating the south Delta exports during the February through May period based on an inflow:export ratio has been hypothesized to increase protection of outmigrating San Joaquin Basin Steelhead. No survival studies have been performed, however, to evaluate the relationship between south Delta export rates and juvenile

steelhead salvage or survival. Based on results of the operations modeling and examination of the seasonal period of occurrence and the risk of entrainment of fish into the South Delta export facilities the SAIC consultant team recommendations for further evaluation in the full effects analysis are shown below:

Previous Range B	***Recommended for Additional Analysis***
South Delta Export – San Joaquin Inflow Ratio • 50% Mar & Jun • 25% April & May • 75% Oct, 50% Nov • 100% Dec-Feb	**South Delta Export – San Joaquin Inflow Ratio** • 50% Feb & Mar • 25% April & May
OMR Flows • Old and Middle River flows no less than -5,000 cfs between July and September	**OMR Flows** • Old and Middle River flows same as proposed Operations during December, January, and June • Old and Middle River flows no less than-5,000 cfs between July and November

The SAIC consulting team recommends that there be no changes to the South Delta export operational criteria under either the previous Range A and minor revisions to the Proposed Operations as shown below:

Recommended for Additional Analysis (same as prior range A)	***Recommended Proposed Operations***
OMR Flows Old and Middle River flows no less than the values below:	**OMR Flows** • 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	-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

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

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.

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.
** Resulting operations are expected to be more positive than depicted in this table.

South Delta Export – San Joaquin Inflow Ratio

- 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

[Note that Conveyance WG/HOTT recommends continuing to evaluate the concept of isolating Old River to address south Delta channel flows.]