

## CWF H3+ Operations Criteria

On July 16, 2018 the Hearing Officers issued an order to DWR to modify and resubmit exhibit DWR-1143rev.

We hereby direct DWR to submit an exhibit complying with our March 27, 2018 ruling, the June 28, 2018 notice, and this ruling, no later than **noon on July 19, 2018**.<sup>1</sup> The exhibit must clearly identify each proposed operating criterion for the WaterFix Project, the document where the regulatory requirement or other basis for the criterion can be found, and must either quote the specific language being referenced or cite the section/page number of that document. The column that describes operating criteria should include the most recent and accurate description of each operating criterion, and should not include operating criteria that are no longer proposed to be included as part of the project....

Where proposed operating criteria are described differently in different environmental, planning or regulatory documents for the WaterFix Project, the exhibit must identify those discrepancies, identify which description is the proper basis for the operating criteria in question, and explain why. In particular, the exhibit must reconcile the apparent conflict in how spring outflow criteria have been described in CEQA documents, the ITP application, and the ITP itself, and must clarify the criteria for October/November Old and Middle River flows and corresponding export constraints.

In addition, it has become evident during the hearing that discrepancies exist between certain proposed operating criteria and the manner in which those criteria were modeled, and that some modeling assumptions are not in fact proposed operating criteria. For example, the text from SWRCB-108 quoted in DWR's July 11, 2018 submittal describes a discrepancy between the spring Delta outflow criteria required by the ITP and the manner in which those operating criteria were modeled. The revised exhibit must clearly describe any significant discrepancies between operating criteria and modeling assumptions, and identify operating assumptions that were included in Petitioners' modeling runs for the WaterFix Project but are not being proposed as operating criteria.

This order is addressed in two sections.

### **Section I.**

CWF H3+ modeling assumptions are consistent with the Adopted Project Criteria. DWR disputes the July 16, 2018 SWRCB Order that contends there are discrepancies between certain proposed operating criteria and the manner in which those criteria were modeled, or that all modeling assumptions are appropriate as operating criteria.

Originally Prepared at the Request of the Hearing Officers in the CA WaterFix Water Rights Change Petition based upon Protestant Comments on Wednesday, February 28, 2018. Revised in Response to March 27<sup>th</sup> Ruling, June 28<sup>th</sup> Notice, and July 16<sup>th</sup> Ruling.

DWR has presented extensive testimony in both Part 1 and Part 2 of the hearing demonstrating that the modeling submitted by DWR in this hearing, and used in determining the permit conditions, is an appropriate and a reasonable representation of the SWP/CVP operations with and without California WaterFix (CWF).

In response to the Board order that DWR “identify operating assumptions that were included in Petitioners’ modeling runs for the WaterFix Project but are not being proposed as operating criteria”, DWR is providing following synopsis of the testimony presented on one such modeling assumption that is not being proposed as an operating criteria.

As explained in Part 2 Transcript Volume 06 Feb 27<sup>th</sup>, 2018, pp. 195 – 198, Petitioners’ CWF H3+ modeling presented in the Part 2 of the hearing included a new minimum flow requirement of 3,000 cfs from January to August at Rio Vista while the Adopted Project did not propose such criterion. As noted by DWR expert witness Mr. Reyes, inclusion of this requirement in the CWF H3+ modeling would not materially differ from the modeling results without this requirement. As part of the recently submitted Part 2 rebuttal testimony, Mr. Reyes presented a sensitivity analysis for the CWF H3+ scenario without the additional Jan – Aug 3,000 cfs minimum flow requirement (DWR-1226 pp. 3-5). Based on the conclusions presented in DWR-1226, DWR believes that the existing CWF H3+ modeling is appropriate.

## **Section II.**

The Table included below summarizes the new and existing water operations criteria for CWF H3+ operational scenario adopted in the July 2017 CWF Certified Final EIR (“Adopted Project Criteria”) (*SWRCB-109, SWRCB-108*). This information is also found within Table 3.3-1 located in Revised BA (*DWR-1142*), Table 3.3-1 of NMFS CWF BO Appendix A2 (*SWRCB-106*), and Table 6.1-2 in the USFWS CWF BO (*SWRCB-105*).

The exact definition of the CWF H3+ spring outflow criteria is provided in the Section 5.3.2.3.2 *Effects of Spring Outflow* of the CWF ITP application (*DWR-1036 page 5-28*). The Table below reflects the CWF H3+ spring outflow criteria that was proposed, modeled, adopted by DWR in the Certified Final EIR, and considered in the NMFS CWF BO and USFWS CWF BO.

Part 1 of the Table “clearly identify each proposed operating criterion for the WaterFix Project, the document where the regulatory requirement or other basis for the criterion can be found, and must either quote the specific language being referenced or cite the section/page number of that document.”

Part 2 of the Table reconciles the permit terms of the issued biological opinions (BiOps) and the Incidental Take Permit (ITP) as they relate to the parameters listed in the Part 1 of the Table.

PART 1		
Parameter	CWF Adopted Project Criteria	CWF H3+ CalSim II Assumptions
<b>New Criteria Included in the Proposed Action</b>		
North Delta bypass flows <sup>28</sup>	<p>(SWRCB-102 Table 3-7 p.3-45, DWR-1142 Table 3.3-1, pp. 3-81 – 3-87, SWRCB-105 Table 6.1-2 pp. 23-25, SWRCB-106 Appendix A2 Table 3.3-1 pp. 3-81 – 3-87)</p> <ul style="list-style-type: none"> <li>• Bypass Flow Criteria (specifies bypass flow required to remain downstream of the North Delta intakes):                             <ul style="list-style-type: none"> <li>○ October, November: Minimum flow of 7,000 cfs required in river after diverting at the North Delta intakes.</li> <li>○ December through June: see below</li> <li>○ July, August, September: Minimum flow of 5,000 cfs required in river after diverting at the North Delta intakes.</li> </ul> </li> <li>• Pulse Protection:                             <ul style="list-style-type: none"> <li>○ Low-level pumping of up to 6% of total Sacramento River flow at Freeport such that bypass flow never falls below 5,000 cfs. No more than 300 cfs can be diverted at any one intake.</li> <li>○ Low level pumping maintained during the pulse protection period.</li> <li>○ Pulse is determined based on the real-time monitoring of juvenile fish movement as described in Section 3.3.3.1 <i>North Delta Diversion</i> <ul style="list-style-type: none"> <li>If the initial pulse begins and ends before Dec 1, the bypass flow criteria for the month (Oct-Nov) when the pulse occurred would take effect. On Dec 1, the Level 1 rules defined below apply unless a second pulse occurs.</li> </ul> </li> </ul> </li> <li>• Post-pulse Criteria (specifies bypass flow required to remain downstream of the North Delta intakes):                             <ul style="list-style-type: none"> <li>○ December through June: once the pulse protection ends, post-pulse bypass flow operations will not exceed Level 1 pumping unless specific criteria have been met to increase to Level 2 or Level 3. If those criteria are met, operations can proceed as defined in Table 3.3-2. Allowable diversion will be greater of the low-level pumping or the diversion allowed by the post-pulse bypass flow rules in Table 3.3- 2. The specific criteria for transitioning between and among pulse protection, Level 1, Level 2, and/or Level 3 operations, will be developed and based on real-time fish monitoring and hydrologic/behavioral cues upstream of and in the Delta as discussed in Section 3.3.3.1, <i>North Delta Diversion</i>. During operations, adjustments to the default allowable diversion level specified in Table 3.3-2 are expected to be made to improve water supply and/or migratory conditions for fish by making real-time adjustments to the diversion levels at the north Delta intakes. These adjustments are expected to fall within the operational bounds analyzed for the BA and will be managed under real time operations (RTOs). (Table 3.3-2 is included below on page 8.)</li> <li>○ In addition, north Delta diversion at the three intakes are subjected to approach velocity and sweeping velocity restrictions at the proposed fish screens (SWRCB-102 p. 3-45). A sweeping velocity of 0.4 ft/s is identified in SWRCB-102 Appendix 5A p. 5A-B25 and 5A-B62.</li> </ul> </li> </ul>	<p>DWR-1069 Table 2 and Sub-Table A pp. 10-17 and DWR-1142 Appendix 5A Section 5.A.5.2</p> <ul style="list-style-type: none"> <li>• Same as the Adopted Project Criteria</li> </ul>

PART 2	
Additional Permit Terms: USFWS BO, NMFS BO, CDFW ITP and Clarification Letter	Discussion
<ul style="list-style-type: none"> <li>• NMFS BiOp Condition 11 (SWRCB-106 p.1199) and CDFW ITP Condition of Approval 9.9.5.1 (SWRCB-107 pp.190-191) include additional description of RTOs for the north Delta diversion intakes.</li> <li>• CDFW ITP Condition 9.9.4.1 (SWRCB-107 p. 188) and NMFS BiOp Condition 11 (SWRCB-106 pp. 1199-1200) require managing NDD intake operations at all times to avoid increasing the magnitude, frequency, or duration of flow reversals in the Sacramento River at the Georgiana Slough junction above pre-Project levels.</li> </ul>	<ul style="list-style-type: none"> <li>• NMFS has analyzed the effects of the project as characterized by an initial approach to operations as identified by the operational criteria of the PA and completed auxiliary analyses when possible to evaluate the effects of real-time operations that are within the operational criteria identified in the PA (SWRCB-106 p. 45). Revisions to the real-time operations of the north Delta diversions are analyzed in Section 2.5.1.2 Operations Effects (SWRCB-106 p. 99). DWR believes based on the NMFS analyses that the modeling is reflective of the biological opinion.</li> <li>• NMFS and CDFW require an operations plan to be developed prior to the initiation of operations for managing the flow reversals in the Sacramento River at the Georgiana Slough junction to pre-Project level. When such plan is implemented any effects identified in the existing modeling will be reduced, and thus the existing modeling is an appropriate conservative approach. (See also SWRCB-108 pp. 156-157).</li> </ul>

<sup>28</sup> Sacramento River flow upstream of the intakes to be measured flow at Freeport. Bypass flow is the Sacramento River flow quantified downstream of the Intake # 5. Sub-daily north Delta intakes' diversion operations will maintain fish screen approach and sweeping velocity criteria

PART 1		
Parameter	CWF Adopted Project Criteria	CWF H3+ CalSim II Assumptions
South Delta operations <sup>29 30</sup>	<p>(SWRCB-108 p.130, DWR-1142 Table 3.3-1, pp. 3-81 – 3-87, SWRCB-105 Table 6.1-2 pp. 23-25, SWRCB-106 Appendix A2 Table 3.3-1 pp. 3-81 – 3-87)</p> <ul style="list-style-type: none"> <li>• October, November<sup>32</sup>: To be determined based on real time operations and protection of the D-1641 San Joaquin River 2-week pulse.</li> <li>• December: OMR flows will not be more negative than an average of -5,000 cfs when the Sacramento River at Wilkins Slough pulse (same as north Delta diversion bypass flow pulse defined in Table 3.3-2) triggers<sup>31</sup>, and no more negative than an average of -2,000 cfs when the delta smelt USFWS (2008) BiOp action 1 triggers. No OMR flow restriction prior to the Sacramento River pulse or delta smelt action 1 triggers.</li> <li>• January, February <sup>33</sup>: OMR flows will not be more negative than a 3-day average of 0 cfs during wet years, -3,500 cfs during above-normal years, or -4,000 cfs during below-normal to critical years, except -5,000 in January of dry and critical years.</li> <li>• March <sup>34</sup>: OMR flows will not be more negative than a 3-day average of 0 cfs during wet or above-normal years or -3,500 cfs during below-normal and dry year and -3,000 cfs during critical years.</li> <li>• April, May <sup>35</sup>: Allowable OMR flows depend on gaged flow measured at Vernalis, and will be determined by a linear relationship. If Vernalis flow is below 5,000 cfs, OMR flows will not be more negative than -2000 cfs. If Vernalis is 6,000 cfs, OMR flows will not be less than +1000 cfs. If Vernalis is 10,000 cfs, OMR flows will not be less than +2,000 cfs. If Vernalis is 15,000 cfs, OMR flows will not be less than +3,000 cfs. If Vernalis is at or exceeds 30,000 cfs, OMR flows will not be less than 6,000 cfs.</li> <li>• June: Similar to April and May, allowable flows depend on gaged flow measured at Vernalis (except without interpolation). If Vernalis is less than 3,500 cfs, OMR flows will not be more negative than -3,500 cfs. If Vernalis exceeds 3,500 cfs up to 10,000 cfs, OMR flows will not be less than 0 cfs. If Vernalis exceeds 10,000 cfs up to 15,000 cfs, OMR flows will not be less than +1,000 cfs. If Vernalis exceeds 15,000 cfs, OMR flows will not be less than +2,000 cfs.</li> <li>• July, August, September: No OMR flow constraints<sup>36</sup>.</li> <li>• OMR criteria under 2008 USFWS and 2009 NMFS BiOps or the above, whichever results in more positive, or less negative OMR flows, will be applicable<sup>37</sup>.</li> </ul>	<p>DWR-1069 Table 3 and 4 pp. 18-20 and SWRCB-108 p.130</p> <ul style="list-style-type: none"> <li>• Same as the Adopted Project Criteria</li> </ul>

PART 2	
Additional Permit Terms: USFWS BO, NMFS BO, CDFW ITP and Clarification Letter	Discussion
<ul style="list-style-type: none"> <li>• No additional permit terms</li> </ul>	

<sup>29</sup> The criteria do not fully reflect the complexities of CVP/SWP operations, dynamic hydrology, or spatial and temporal variation in the distribution of aquatic species. As a result, the criteria will be achieved by operating within an initial range of real time operational criteria from January through March and in June. This initial range, including operational triggers, will be determined through future discussion, including a starting point of -1250 to -5000 cfs based on a 14-day running average, and will be informed by the Adaptive Management Program, including real time monitoring. Further, the 3-day averaging period may be modified through future discussion. Modifications to the 3-day average period and the range of operating criteria may be needed, in part, because: 1) the water year type is forecasted in February but not finalized until May and 2) 0 cfs, or positive, OMR in wet and above normal years may be attained coincident with unimpaired flows.

<sup>30</sup> OMR measured through the currently proposed index-method (Hutton 2008) with a 14-day averaging period consistent with the current operations (USBR 2014).

<sup>31</sup> December Sacramento River pulse determined by flow increases at Wilkins Slough of greater than 45% within 5- day period and exceeding 12,000 cfs at the end of 5-day period, and real-time monitoring of juvenile fish movement. Preliminary discussions with engineers indicates ramping down can begin within an hour of the trigger and full ramp down could be complete within approximately 12 hours. The Wilkins Slough trigger will be reviewed through future discussion, which will be informed by the Adaptive Management Program, including real time monitoring.

<sup>32</sup> As a result of formal consultation with USFWS and NMFS, and as a result of DFW’s issuance of the Draft 2081(b) ITP, DWR and Reclamation have included clarifications to the CWF operations flow criteria contained in Table 3.3-1 table. Although the October/November south Delta operational criteria were updated for the PA (see criteria described in the left column), for CALSIM modeling purposes in the effects analysis for the BA, the operational criteria listed here were used in the PA scenario to compare against the NAA, which has no OMR flow restrictions in October or November. As described in footnote 27, an analysis (model results submitted to USFWS on 5/5/17) was performed which indicated that the effects of the updated operational criteria are consistent with the effects analyzed in this BA; therefore, it was determined no changes to the CALSIM II modeling assumptions or performance of additional analysis was necessary.

<sup>33</sup> Water year type based on the Sacramento 40-30-30 index to be based on 50% forecast per current approaches; the first update of the water year type to occur in February. CALSIM II modeling uses previous water year type for October through January, and the current water year type from February onwards

<sup>34</sup> Water year type as described in the above footnote.

<sup>35</sup> When OMR target is based on Vernalis flow, will be a function of 5-day average measured flow.

<sup>36</sup> The PA operations include a preference for south Delta pumping in July through September months to provide limited flushing flows to manage water quality in the south Delta.

<sup>37</sup> Change in CVP/SWP pumping from the south Delta will occur to comply with OMR targets and will be achieved to the extent exports can control the flow. The OMR targets would not be achieved through releases from CVP/SWP reservoirs. The combined CVP/SWP export rates from the proposed north Delta intakes and the existing south Delta intakes will not be required to drop below 1,500 cfs to provide water supply for health and safety needs, critical refuge supplies, and obligation to senior water rights holders.

PART 1		
Parameter	CWF Adopted Project Criteria	CWF H3+ CalSim II Assumptions
HOR gate operations	<p>(SWRCB-102 Table 3-7 p.3-47, DWR-1142 Table 3.3-1, pp. 3-81 – 3-87, SWRCB-105 Table 6.1-2 pp. 23-25, SWRCB-106 Appendix A2 Table 3.3-1 pp. 3-81 – 3-87)</p> <ul style="list-style-type: none"> <li>• October 1–November 30: RTO management – with the current expectation being that the HOR gate will be operated to protect the D- 1641 pulse flow.</li> <li>• January-March 31, and June 1-15: RTO will determine exact operations to protect salmon fry when migrating. During this migration, operation will be to close the gate subject to RTO for purposes of water quality, stage, and flood control considerations.</li> <li>• April-May: Initial operating criterion will be to close the gate 100% of time subject to RTO for purposes of water quality, stage, and flood control considerations (Section 3.3.3, <i>Real-Time Operational Decision-Making Process</i>). Reclamation, DWR, NMFS, USFWS, and DFW will actively explore the implementation of reliable juvenile salmonid tracking technology that may enable shifting to a more flexible real time operating criterion based on the presence/absence of listed fishes.</li> <li>• June 16 to September 30, December: Operable gates will be open.</li> <li>• To reduce downstream flood risks based on current conditions, HOR gate will remain open if San Joaquin River flow at Vernalis is greater than 10,000 cfs (threshold may be revised to align with any future flood protection actions). (SWRCB-102 p. 3-281)</li> </ul>	<p>DWR-1069 Table 1 pp. 5-6</p> <ul style="list-style-type: none"> <li>• Representation of Adopted Project Criteria for HOR gate operations: Assumed % OPEN: Oct 50%, Nov 100%, Dec 100%, Jan 50%, Feb - Jun 15th 50%, Jun 16-30 100%, Jul - Sep 100%; HOR gate will be open 100% whenever flows are greater than 10,000 cfs at Vernalis.; Oct-Nov: Before the D-1641 pulse = HOR gate open, During the D1641 pulse = for 2 weeks HOR gate closed; After D-1641 pulse: HORB open 50% for 2 weeks</li> </ul>

PART 2	
Additional Permit Terms: USFWS BO, NMFS BO, CDFW ITP and Clarification Letter	Discussion
<ul style="list-style-type: none"> <li>• No additional permit terms</li> </ul>	

PART 1																								
Parameter	CWF Adopted Project Criteria	CWF H3+ CalSim II Assumptions																						
Spring Outflow	<p><i>SWRCB-108 pp.129-130, DWR-1142 Table 3.3-1, pp. 3-81 – 3-87, SWRCB-105 Table 6.1-4 p. 37, SWRCB-106 Section 1.3.1.3 p. 15</i></p> <p><b>Objective</b> March, April, May: Initial operations will maintain the March–May average delta outflow that would occur with existing facilities and climate conditions under the operational criteria described in the 2008 USFWS BiOp and 2009 NMFS BiOp (U.S. Fish and Wildlife Service 2008; National Marine Fisheries Service 2009).<sup>38</sup></p> <p><b>Criteria</b> Consistent with description provided in the Section 5.3.2.3.2 <i>Effects of Spring Outflow</i> of the CWF 2081(b) ITP application (DWR-1036), March outflow targets are determined based on the Eight River Index and achieve the targets with export curtailments down to a minimum of 1,500-cfs exports; the March outflow target is capped at 44,500 cfs at an Eight River Index of 4,217 TAF and greater (Table 5.3-1 of the CWF 2081(b) ITP application and Table 6.1-4 of USFWS CWF BiOp). For Apr-May, the 2009 NMFS BiOp action IV.2.1 (San Joaquin River i-e ratio) will be used to constrain total Delta exports per current operational practices (National Marine Fisheries Service 2009), up to a maximum outflow target of 44,500 cfs.</p> <table border="1" data-bbox="615 822 1131 1300"> <thead> <tr> <th>March Eight River Index (TAF)</th> <th>March monthly NDOI target (cfs)</th> </tr> </thead> <tbody> <tr><td>0</td><td>0</td></tr> <tr><td>545</td><td>6,200</td></tr> <tr><td>1,488</td><td>8,800</td></tr> <tr><td>1,911</td><td>12,700</td></tr> <tr><td>2,140</td><td>17,100</td></tr> <tr><td>2,421</td><td>20,000</td></tr> <tr><td>2,575</td><td>25,200</td></tr> <tr><td>3,104</td><td>35,000</td></tr> <tr><td>3,492</td><td>43,700</td></tr> <tr><td>&gt;= 4,217</td><td>44,500</td></tr> </tbody> </table> <p><i>Note: NDOI targets are linearly interpolated for 8RI values falling between those shown in the table.</i></p>	March Eight River Index (TAF)	March monthly NDOI target (cfs)	0	0	545	6,200	1,488	8,800	1,911	12,700	2,140	17,100	2,421	20,000	2,575	25,200	3,104	35,000	3,492	43,700	>= 4,217	44,500	<p><i>DWR-1069 Table 1 pp. 8-9 and Table 6 p.21, SWRCB-108 p. 130</i></p> <ul style="list-style-type: none"> <li>• Same as the Adopted Project Criteria</li> </ul>
March Eight River Index (TAF)	March monthly NDOI target (cfs)																							
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PART 2	
Additional Permit Terms: USFWS BO, NMFS BO, CDFW ITP and Clarification Letter	Discussion
<ul style="list-style-type: none"> <li>• CDFW Incidental Take Permit for California WaterFix Condition of Approval 9.9.4.3; and, the clarification letter provided by CDFW to DWR dated Oct 18, 2017 (<a href="https://www.waterboards.ca.gov/waterissues/water_issues/programs/bay_delta/california_waterfix/exhibits/exhibit107/docs/20171018cdfw_clarificationmemo.pdf">https://www.waterboards.ca.gov/waterissues/water_issues/programs/bay_delta/california_waterfix/exhibits/exhibit107/docs/20171018cdfw_clarificationmemo.pdf</a>) included a revised <b>criteria</b> to meet the <b>same objective</b> noted in the Adopted Criteria (<i>SWRCB-107 pp.188-189</i>).</li> <li>• The spring outflow criteria included in the USFWS BiOp and NMFS BiOp is from the CDFW’s draft ITP. The criteria shown in both BiOps differ from each other, and differ from CDFW’s final ITP and the associated clarification letter. However, the stated objective in all three is the same as the Adopted Criteria. The USFWS BiOp and NMFS BiOp references to spring outflow permit condition can be found at SWRCB-105 p. 22, p. 27, pp. 33-34, SWRCB-106 Appendix A2 p. 3-86 pp.3-94 – 3-96.</li> </ul>	<ul style="list-style-type: none"> <li>• CDFW’s spring outflow criteria is expected to result in similar outflow conditions as the Adopted Criteria, given that the two sets of criteria are targeting a similar level of Delta outflow during March through May and, export curtailments would be the primary mechanism to achieve the outflow targets. Therefore, the revised spring outflow criteria from CDFW are not expected to result in any new effects beyond those disclosed for the CWF H3+. (<i>SWRCB-108 p.129</i>) DWR believes based on the NMFS analyses that the modeling is reflective of the biological opinion.</li> <li>• The spring outflow criteria outlined in the final ITP and the associated clarification letter would supersede the criteria included in both NMFS BiOp and USFWS BiOp, since NMFS and USFWS incorporated the spring outflow criteria from CDFW’s <b>draft</b> Incidental Take Permit. (<i>SWRCB-105 p. 22, p. 27, pp. 33-34, SWRCB-106 Appendix A2 p. 3-86 pp.3-94 – 3-96</i>)</li> </ul>

<sup>38</sup>If best available science resulting from collaborative scientific research program shows that Longfin Smelt abundance can be maintained in the absence of spring outflow, and DFW concurs, an alternative operation for spring outflow could be developed to follow flow constraints established under D-1641. Any changes in the PA will be implemented consistent with the CWF AMP, including coordination with USFWS and NMFS

PART 1		
Key Existing Delta Criteria <sup>39</sup>		
Parameter	CWF Adopted Project Criteria	CWF H3+ CalSim II Assumptions
Delta Cross Channel Gates	<ul style="list-style-type: none"> <li>Operating criteria as required by NMFS (2009) BiOp Action IV.1 and D-1641, and DCC closure for downstream flood control will be based on Sacramento River flow at Freeport, upstream of the NDD facilities.</li> </ul>	<p><i>DWR-1142 Appendix 5A Section 5.A.5.2, DWR-1069 Table 1 pp. 5-6</i></p> <ul style="list-style-type: none"> <li>Static representation of D-1641 requirements (Oct: open, Nov: open for 20 days, Dec: open for 16 days, Jan: open for 11 days, Feb 1st – May 20th: closed, May 21st – Jun 30th: open for 26 days in June, Jul – Sep: open)</li> <li>Representation of NMFS Action IV.1 (Oct 1st – Dec 15th: Varies based on Wilkins SI flow, and Rock SI salinity, Dec 16th – Jan 31st: closed)</li> <li>Closed when SacR flow above DCC greater than 25,000 cfs in all months</li> </ul>
Fall Outflow	<ul style="list-style-type: none"> <li>No change. September, October, November: implement the USFWS 2008 BO Fall X2 requirements in wet (W) and above normal (AN) year types.</li> </ul>	<p><i>DWR-1142 Appendix 5A Section 5.A.5.2</i></p> <ul style="list-style-type: none"> <li>Same as the Adopted Project Criteria</li> </ul>
Winter and summer outflow	<ul style="list-style-type: none"> <li>No change. Flow constraints established under D- 1641 will be followed if not superseded by criteria listed above.</li> </ul>	<p><i>DWR-1142 Appendix 5A Section 5.A.5.2</i></p> <ul style="list-style-type: none"> <li>Same as the Adopted Project Criteria</li> </ul>
Rio Vista minimum flow standard <sup>40</sup>	<ul style="list-style-type: none"> <li>September through December: flows per D-1641</li> </ul>	<p><i>DWR-1142 Appendix 5A Section 5.A.5.2</i></p> <ul style="list-style-type: none"> <li>Same as Adopted Project Criteria with following additions</li> <li>Minimum flow requirement of 3,000 cfs from January to August</li> </ul>
Export to inflow ratio	<ul style="list-style-type: none"> <li>Operational criteria are the same as defined under D-1641, and applied as a maximum 3-day running average.</li> <li>The D-1641 export/inflow (E/I) ratio calculation was largely designed to protect fish from south Delta entrainment. For the PA, Reclamation and DWR propose that the NDD be excluded from the E/I ratio calculation. In other words, Sacramento River inflow is defined as flows downstream of the NDD and only south Delta exports are included for the export component of the criteria.</li> </ul>	<p><i>DWR-1142 Appendix 5A Section 5.A.5.2</i></p> <ul style="list-style-type: none"> <li>Same as the Adopted Project Criteria</li> </ul>

PART 2	
Additional Permit Terms: USFWS BO, NMFS BO, CDFW ITP and Clarification Letter	Discussion
<ul style="list-style-type: none"> <li>No additional permit terms</li> </ul>	
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<sup>39</sup> All the CALSIM II modeling assumptions are described in Appendix 5.A, *CALSIM Methods and Results*.

<sup>40</sup> Rio Vista minimum monthly average flow in cfs (7-day average flow not be less than 1,000 below monthly minimum), consistent with the SWRCB D-1641

**Table 3.3-2. Proposed North Delta Diversion Bypass Flow Requirements**

These criteria are included within the Certified Final EIR/EIS, NMFS and USFWS biological opinions, and CDFW Incidental Take Permit for California WaterFix (SWRCB-102 pp. 3-233 – 3-234, SWRCB-106 Appendix A2 pp. 3-88 – 3-91, SWRCB-105pp. 29 – 31, SWRCB-107 pp. 182 – 185). CalSim II assumptions included in DWR-1069 Table 2 and Sub-Table A and DWR-1142 Appendix 5A Section 5.A.5.2.

<i>Dual Conveyance Scenario with 9,000 cfs North Delta Diversion (includes Intakes 2, 3 and 5 with a maximum diversion capacity of 3,000 cfs at each intake)</i>
<p><b>1. North Delta Diversion Bypass Flows</b></p> <p>These parameters define the criteria for modeling purposes and provide the real-time operational criteria levels as operations move between and among the levels. Actual operations will be based on real-time monitoring of hydrologic conditions and fish presence/movement as described in Section 3.3.3.1, <i>North Delta Diversions</i>.</p>
<p><u>Low-Level Pumping (Dec-Jun)</u></p> <p>Diversions of up to 6% of total Sacramento River flow such that bypass flow never falls below 5,000 cfs. No more than 300 cfs can be diverted at any one intake.</p>
<p><u>Initial Pulse Protection</u></p> <p>Low level pumping as described in Table 3.3-1 will be maintained through the initial pulse period. For modeling, the initiation of the pulse is defined by the following criteria: (1) Sacramento River flow at Wilkins Slough increasing by more than 45% within a five-day period and (2) flow on the fifth day greater than 12,000 cfs.</p> <p>The pulse (and low-level pumping) continues until either (1) Sacramento River flow at Wilkins Slough returns to pre-pulse flow level (flow on first day of pulse period), or (2) Sacramento River flow at Wilkins Slough decreases for 5 consecutive days, or (3) Sacramento River flow at Wilkins Slough is greater than 20,000 cfs for 10 consecutive days.</p> <p>After pulse period has ended, operations will return to the bypass flow table (Sub-Table A).</p> <p>If the initial pulse period begins and ends before Dec 1<sup>st</sup> in the modeling, then any second pulse that may occur before the end of June will receive the same protection, i.e., low level pumping as described in Table 3.3-1.</p>
<p><u>Post-Pulse Operations</u></p> <p>After initial pulse(s), allowable diversion will go to Level I Post-Pulse Operations (see Sub-Table A) until 15 total days of bypass flows above 20,000 cfs occur. Then allowable diversion will go to the Level II Post-Pulse Operations until 30 total days of bypass flows above 20,000 cfs occur. Then allowable diversion will go to the Level III Post-Pulse Operations.</p>
<p style="text-align: center;"><b>Sub-Table A. Post-Pulse Operations for North Delta Diversion Bypass Flows</b></p> <p>Implement following bypass flow requirements sufficient to minimize any increase in the 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 minimize any increase in upstream transport toward the proposed intakes or into Georgiana Slough.</p> <p>Allowable diversion will be greater of the low-level pumping or the diversion allowed by the following bypass flow rules.</p>



Level I Post-Pulse Operations			Level II Post-Pulse Operations			Level III Post Pulse Operations		
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...
<b>Dec–Apr</b>								
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	5,000 cfs	11,000 cfs	Flows remaining after constant low level pumping	5,000 cfs	9,000 cfs	Flows remaining after constant low level pumping
15,000 cfs	17,000 cfs	15,000 cfs plus 80% of the amount over 15,000 cfs	11,000 cfs	15,000 cfs	11,000 cfs plus 60% of the amount over 11,000 cfs	9,000 cfs	15,000 cfs	9,000 cfs plus 50% of the amount over 9,000 cfs
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 cfs plus 30% of the amount over 20,000 cfs	20,000 cfs	no limit	15,900 cfs plus 20% of the amount over 20,000 cfs	20,000 cfs	no limit	13,000 cfs plus 0% of the amount over 20,000 cfs
<b>May</b>								
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	5,000 cfs	11,000 cfs	Flows remaining after constant low level pumping	5,000 cfs	9,000 cfs	Flows remaining after constant low level pumping
15,000 cfs	17,000 cfs	15,000 cfs plus 70% of the amount over 15,000 cfs	11,000 cfs	15,000 cfs	11,000 cfs plus 50% of the amount over 11,000 cfs	9,000 cfs	15,000 cfs	9,000 cfs plus 40% of the amount over 9,000 cfs

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Level I Post-Pulse Operations			Level II Post-Pulse Operations			Level III Post Pulse Operations		
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...
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 cfs plus 20% of the amount over 20,000 cfs	20,000 cfs	no limit	14,750 cfs plus 20% of the amount over 20,000 cfs	20,000 cfs	no limit	12,400 cfs plus 0% of the amount over 20,000 cfs
<b>Jun</b>								
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	5,000 cfs	11,000 cfs	Flows remaining after constant low level pumping	5,000 cfs	9,000 cfs	Flows remaining after constant low level pumping
15,000 cfs	17,000 cfs	15,000 cfs plus 60% of the amount over 15,000 cfs	11,000 cfs	15,000 cfs	11,000 cfs plus 40% of the amount over 11,000 cfs	9,000 cfs	15,000 cfs	9,000 cfs plus 30% of the amount over 9,000 cfs
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	10,800 cfs plus 20% of the amount over 15,000 cfs
20,000 cfs	no limit	17,400 cfs plus 20% of the amount over 20,000 cfs	20,000 cfs	no limit	13,600 cfs plus 20% of the amount over 20,000 cfs	20,000 cfs	no limit	11,800 cfs plus 0% of the amount over 20,000 cfs

Level I Post-Pulse Operations			Level II Post-Pulse Operations			Level III Post Pulse Operations		
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...
<b>Bypass flow requirements in other months:</b>								
<b>If Sacramento River flow is over...</b>			<b>But not over...</b>			<b>The bypass is...</b>		
<b>Jul-Sep</b>								
0 cfs			5,000 cfs			100% of the amount over 0 cfs		
5,000 cfs			No limit			A minimum of 5,000 cfs		
<b>Oct-Nov</b>								
0 cfs			7,000 cfs			100% of the amount over 0 cfs		
7,000 cfs			No limit			A minimum of 7,000 cfs		