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**CALIFORNIA DEPARTMENT OF WATER  
RESOURCES**

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7 Resources

8 **BEFORE THE CALIFORNIA STATE WATER RESOURCES CONTROL BOARD**

9  
10 **HEARING IN THE MATTER OF  
CALIFORNIA DEPARTMENT OF WATER  
11 RESOURCES AND UNITED STATES  
BUREAU OF RECLAMATION REQUEST  
12 FOR A CHANGE IN POINT OF  
13 DIVERSION FOR CALIFORNIA WATER  
FIX**

**CALIFORNIA DEPARTMENT OF  
WATER RESOURCES' MOTION FOR  
PROTECTIVE ORDER**

14  
15 California Department of Water Resources ("DWR") requests that the Hearing  
16 Officers issue an order pursuant to Government Code section 11450.30, subdivision (b)  
17 to protect it from the unreasonable and oppressive demands in the Notice to Appear filed  
18 by San Joaquin River Exchange Contractors Water Authority ("SJREC"). DWR requests  
19 that the Hearing Officers vacate SJREC's notice to appear or limit it as to avoid  
20 unnecessary questioning outside the scope of this hearing or knowledge of this  
21 employee.

22  
23 **I. STATEMENT OF FACTS**

24 On August 26, 2015, DWR and Reclamation filed a petition for a change to their  
25 water rights necessary to allow for the implementation of key components of the State's  
26 California Water Fix ("CWF") program. On October 30, 2015, the Board issued a Notice  
27  
28

1 of Petition and Notice of Public Hearing and Pre-Hearing Conference to consider the  
2 petition.

3 SJREC submitted its Notice of Intent to Appear (“NOI”) on January 4, 2016  
4 indicating that Christopher Neudeck would be one of its four witnesses and the subject  
5 of his proposed testimony would be:

6 Need for comprehensive agreements between SWP/CVP/local  
7 Reclamation Districts, and funding for maintenance, repair and  
8 improvement of levees and channels for conveyance and control of water  
9 across and through Sacramento/San Joaquin Delta to CVP and SWP  
pumps to prevent unreasonable salinity impairment of water quality; flow  
characteristics damaging to fish life[.]

10 On August 30, 2016, SJREC served a Notice to Appear demanding that DWR  
11 produce witnesses on the following topics:

- 12 1. Delta Risk Management Study (“DRMS”) Phase 2 Report: portions of  
13 Section Eight entitled “Building Block 1.6: Armored ‘Pathway’  
14 (Through-Delta Conveyance)” at pages 8-i through 8-13, and Tables T-  
15 1 through T-4, Figure 8-1; Section Nineteen entitled “Results and  
Observations” at pages 19-1 through 19-13 (SJRECWA-2).
- 16 2. The feasibility of the assumptions contained in the modeling of both  
17 Boundary 1 and Boundary 2 utilizing the H-3 Alternatives described in  
18 DWR Exhibit 515, Table 4 on page 2, and the “note” which describes  
19 the assumptions incorporated in Boundary 1 and 2 that states as  
20 follows: “SWRCB D-1641, pumping at the South Delta intakes are  
preferred during July through September months up to a total pumping  
of 3,000 cfs to minimize potential water quality degradation in the  
South Delta channels. No specific intake is assumed beyond 3,000  
cfs.”
- 21 3. The financial contributions to be made by the DWR, Bureau of  
22 Reclamation and local Reclamation Districts that would provide  
reasonable assurance that this dual pathway for water to reach CVP  
23 and SWP pumps would exist in the future.
- 24 4. Why the proposed CWF facilities do not provide for a means of DWR,  
25 DOI, Reclamation, and Reclamation Districts implementing the levee  
26 improvement projects and levee protection programs described in the  
DRMS Phase 2 report to assure the likelihood of the ability to maintain  
27 flows across the Delta as described in DWR-515 and models depicting  
28 Boundary 1 and 2 conditions.

1 In an attempt to meet, confer, and compromise regarding the Notice to Appear, a  
2 conference call between DWR and SJREC occurred on October 14, 2016. After a  
3 productive conversation, SJREC provided its "Possible Questions" to DWR on October  
4 25, 2016. (See Exhibit A.) SJREC's questions cover a range of topics, including  
5 modeling, operations, levee safety, and funding for levee programs. DWR offered to  
6 stipulate to some of the topics in the list of possible questions, but its offer was refused,  
7 because SJREC wants to include questions about the reasonableness of funding for  
8 levees and future occurrences of levee failures in the Delta. (See Exhibit B.)  
9

## 10 **II. ARGUMENT**

11 SJREC's possible questions fall into three categories, the presentation of which  
12 does not require participation from a DWR witness. The three categories are:  
13 (1) foundational questions about modeling (Exhibit A, Questions 1-1.2 at pages 1-2);  
14 (2) questions about the 2009 and 2011 Delta Risk Management Study (DRMS) Reports  
15 (Exhibit A, Questions 2-2.7 at pages 3-7 & Questions 4-4.2 at pages 10-12); and  
16 (3) opinions about the reasonableness of funding for levees and future occurrences of  
17 levee failures in the Delta (Exhibit A, Questions 3-3.4 at pages 7-10 & Questions 5-5.9 at  
18 pages 12-17).  
19

### 20 **A. Foundational questions about modeling were already covered.**

21 DWR's experts were available for cross-examination where parties used that  
22 opportunity to establish testimony for the record. It appears that SJREC failed to explore  
23 the topics on which it now seeks information. It is unreasonable for SJREC to now  
24 demand that DWR produce additional witnesses to present SJREC's case-in-chief,  
25 because it missed its opportunity to question the right witnesses on cross examination.  
26 SJREC's Questions 1-1.2 cover modeling and operations, topics on which DWR  
27  
28

1 provided panels of witnesses to testify.<sup>1</sup> SJREC already had the opportunity to ask the  
2 correct witnesses about these topics, and it is therefore unreasonable to call another  
3 DWR witness to testify on these topics.

4 **B. It is unnecessary for a DWR witness to testify about the 2009 and 2011**  
5 **DRMS reports.**

6 The 2009 and 2011 DRMS reports are in the public realm.<sup>2</sup> These are reports  
7 prepared by DWR, a public agency, of which the Board can take official notice or that  
8 can be submitted as exhibits to a party's case-in-chief. These reports are fully discussed  
9 in publicly available documents, including Chapter 6 in the 2013 Draft Environmental  
10 Impact Report/Environmental Impact Statement (DEIR/DEIS) and updated in the 2015  
11 Partially Recirculated Draft Environmental Impact Report/Supplemental Draft  
12 Environmental Impact Statement (RDEIR/SDEIS).<sup>3</sup> (See Exhibit C.) They are also  
13 discussed in the Delta Stewardship Council's (DSC's) January 2015 report entitled,  
14 "State Investments in Delta Levees, Key Issues for Updating Priorities."<sup>4</sup> (See Exhibit  
15 D.) It should also be noted that SJREC did, in fact, submit portions of the 2011 DRMS  
16 report as an exhibit to its Part 1B case-in-chief. The relevant information has already  
17 been submitted as part of SJREC's case-in-chief, and it is therefore unreasonable and  
18 oppressive for SJREC to require a DWR to attend and testify about the contents of these  
19 reports.  
20  
21  
22

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23 <sup>1</sup> The Operations panel testified on direct and was cross examined on August 10-12 and 18-19.  
24 The Modeling panel testified on direct and was cross examined on August 23-26. Transcripts of the  
25 hearing are available here:  
[http://www.waterboards.ca.gov/waterrights/water\\_issues/programs/bay\\_delta/california\\_waterfix/transcript  
s.shtml](http://www.waterboards.ca.gov/waterrights/water_issues/programs/bay_delta/california_waterfix/transcript_s.shtml).

26 <sup>2</sup> Available here: <http://www.water.ca.gov/floodsafe/fessro/levees/drms/>.

27 <sup>3</sup> Available here: [http://baydeltaconservationplan.com/RDEIRS/Ap\\_A\\_Rev\\_DEIR-  
S/06\\_SurfWater.pdf](http://baydeltaconservationplan.com/RDEIRS/Ap_A_Rev_DEIR-S/06_SurfWater.pdf).

28 <sup>4</sup> Available here: [http://deltacouncil.ca.gov/sites/default/files/2015/01/15-  
0109\\_Levee\\_Investment\\_Strategy\\_Issue\\_Paper.pdf](http://deltacouncil.ca.gov/sites/default/files/2015/01/15-0109_Levee_Investment_Strategy_Issue_Paper.pdf).

1 **C. Opinions about the reasonableness of funding for levees and future**  
2 **occurrences of levee failures in the Delta.**

3 SJREC's questions about levee safety and funding for levee programs, if they  
4 pertained to CWF, are covered in Chapter 6 of the 2013 DEIR/DEIS and 2015  
5 RDEIR/SDEIS. However, it appears that SJREC's questions apply to programs well  
6 outside of CWF. Similar to some of the other issues raised by Protestants, long term  
7 levee maintenance improvement and funding is a State issue, and is not limited to CWF  
8 or even DWR. The Delta Stewardship Council (DSC) is leading the Delta Levee  
9 Investment Strategy (DLIS) effort, specifically flood and levee long term planning and  
10 funding. Again the DSC programs are outside the scope of this hearing. Information  
11 about levee safety and funding is found in documents such as DSC's July 2014 DLIS  
12 Fact Sheet, DLIS FAQs, and March 24, 2016 DLIS Update and Contract Amendment.  
13 (Exhibits E, F & G.) In addition to the DSC's planning efforts regarding Delta levees, the  
14 Central Valley Flood Management Planning (CVFMP) Program sets forth a plan for  
15 sustainable flood management and investment to improve flood risk management in the  
16 Central Valley through use of the State Plan of Flood Control (SPFC) facilities.<sup>5</sup>

17  
18 Further, the engineering panel was cross examined for two full days and included  
19 questions about levee safety related to CWF.<sup>6</sup> SJREC could have had its questions  
20 about the reasonableness of funding for levees and future occurrences of levee failures  
21 in the Delta addressed at that time. SJREC has not shown that cross examination of  
22 DWR's Part 1 witnesses or the information in the publicly available documents are  
23 insufficient. It is therefore unreasonable for SJREC to demand an additional DWR  
24

25 \_\_\_\_\_  
26 <sup>5</sup> More information is available here: <http://www.water.ca.gov/cvfmp/>.

27 <sup>6</sup> The Engineering panel testified on direct and was cross examined on August 5 and 9.  
28 Transcripts of the hearing are available here:  
[http://www.waterboards.ca.gov/waterrights/water\\_issues/programs/bay\\_delta/california\\_waterfix/transcripts.shtml](http://www.waterboards.ca.gov/waterrights/water_issues/programs/bay_delta/california_waterfix/transcripts.shtml).

1 witness to testify on these topics, and it is inappropriate to ask a DWR employee to  
2 predict future funding of levee maintenance or improvements as this is a complex state  
3 wide policy level decision being led by the DSC and that ultimately depends on the  
4 legislature for long-term funding.

5 **III. CONCLUSION**

6 SJREC's possible questions do not require participation from a DWR witness and  
7 requiring a DWR witness to testify on these topics would be unreasonable and  
8 oppressive. DWR therefore requests that the Hearing Officers vacate SJREC's notice to  
9 appear or in the alternative limits the scope of the questioning to those that would not  
10 otherwise have been covered by other witnesses, go beyond the scope of Part 1B, or  
11 the witness's ability to predict future funding.  
12

13 Dated: October 27, 2016

CALIFORNIA DEPARTMENT OF WATER  
RESOURCES



Robin McGinnis  
Office of the Chief Counsel

1 October 25, 2016

2  
3 **SJREC's Possible Questions for DWR and DRMS Study Experts in Levee and**  
4 **Island Studies:**  
5  
6

7 1. You are aware that modeling has been done by employees and independent  
8 contractors of DWR and presented to the SWRCB as part of the proposed WaterFix  
9 Project to show how the WaterFix facilities and operations might affect both the quality  
10 of water from a salinity point of view and from the point of view of the quantities of  
11 water and the stage or elevation of water levels of legal users if the proposed WaterFix  
12 tunnels are installed and operated according to varying regimes.

13  
14 1.1 I show you DWR Exhibit 515, page 2, which has also been marked  
15 as SJRECWA-1, to focus our attention on the assumption. I ask you to accept that the  
16 testimony of the WaterFix modelers presented and their conclusions were based upon  
17 varying operating assumptions regarding the use of the tunnels and water conditions but

18 that for the purposes of modeling of all of H3, H4 or Boundary 1 or Boundary 2  
19 conditions:

20

21 “During July through September months up to a total  
22 pumping of 3,000 cfs to minimize potential water quality  
23 degradation in the South Delta channels. No specific intake  
24 preference is assumed beyond 3,000 cfs.”

25

26 1.2 Would you agree that pumping at the State and Federal pumps 3,000  
27 cfs minimum flow over 3 months is about 540,000 ac/ft, and therefore, the modelers who  
28 have testified had to assume that it is possible to maintain cross-Delta flows to the pumps  
29 and pumping of at least 3,000 cfs of water with appropriate water quality to maintain net  
30 Delta outflow requirement amounts under Order 1641 or any successive Order?

31

32           2.       With that focus of your testimony in mind, is it true that the Department of  
33 Water Resources has prepared with the help of private consulting firms at least two  
34 reports ordered to be prepared pursuant to an act of the Legislature Assembly Bill 1200  
35 (Laird 2005) to evaluate potential impacts on water supplies and operations within the  
36 Delta, one in 2009, and a second in 2011 known as DRMS or Delta Risk Management  
37 Strategy Reports I and II?

38

39           2.1       The first report was completed in 2009. Is it true that the report tried  
40 to describe the range, extent and possible costs of the risks of Delta levee failure and the  
41 impacts and recovery time and strategies from risks of earthquake, risks of higher sea  
42 level, and therefore tidal stages, and from likely inherent construction weakness or  
43 defects in the levees protecting areas (referred to as dry weather failure potential).

44

45           2.2       Is it correct that DWR and the consultant authors performed drillings

46 and soil samplings of levees protecting islands and land and attempted to assign a  
47 stability quotient to levees understanding that whether the destruction was by earthquake,  
48 liquefaction, sand stratas failing or floods overtopping the elevation of the levees, or  
49 some combination of causes, the effects would be to breach levees and flood the islands?

50

51                   2.3    Is it true that under the Department study for general areas of levees

52 and islands, once a breach occurred, you established a list of priorities for repairing the

53 levees and evacuating the flood waters that reflected their importance on a number of

54 criteria? One of the priorities was avoiding adverse effects on water quality at the CVP

55 and SWP pumps generally referred to as a “salinity priority.” The 2009 study ranked the

56 islands and levee systems from 1 to 6. Other factors were the potential of threats to

57 transportation and water and other utilities crossing the area, and later in an appendix, the

58 threat that Dissolved Organic Carbon would be released, raising water treatment costs or

59 preventing use for drinking water, was studied. Population or the threat of loss of life or

60 rescues and destruction of human or commercial habitation was another ranking criteria  
61 to be used to determine which levee systems might be prioritized in repair and  
62 improvements before breaches or overtopping.

63

64           2.4    The 2009 study then attempted to figure out whether there were  
65 barges, rock quarries and access problem constraints to equipment and manpower to  
66 remedy the breaches to weigh the likely costs of first closing the breaches, repairing the  
67 levees and pumping the islands out and the time of disruption. You attempted to create  
68 ways of thinking about this potential in terms of costs, time to accomplish repairs and  
69 pump out, and how to administer potential multiple levee failures.

70

71           2.5    Is it a correct statement that if any of the causes of earthquake,  
72 flooding or inherent weakness occurred, your study attempted to quantify the monies that  
73 would be required to repair the breaches and also to quantify the effects if more than one

74 breach occurs on more than one island and the time to perform the repair. It also  
75 assumed that there would be repair done, and the money to do the repair would be  
76 available, and the repairs and pump outs would be efficiently performed pursuant to a  
77 plan. Experience in the Jones Tract in 2004 was helpful.

78

79           2.6    The study determined that a single or multiple levee failure can  
80 result in greater salinity intrusion into Delta in the range of affecting the CVP and SWP  
81 pumps. Briefly describe how that effect occurs. Is the effect of breached islands to move  
82 salinity more Easterly or Southerly toward the pumps if levees fail in critical areas, then  
83 receive salinity, then as the tide recedes or cycles, to “pump or exhaust more salinity”  
84 into some regions of the Delta channels with low-salinity water? Did the 2009 study  
85 conclude that if levee breaches are in areas where Pumps are drawing water from, salinity  
86 could rise to 2 to 4 parts E.C., unusable for agriculture, and that the levees need to be  
87 repaired or massive amounts of fresh water sent into the Delta to try to reduce the effects

88 of salinity? The study modeled at least one scenario where three breaches occurred in  
89 July based on dry year conditions of 1992, and salinity would probably greatly limit, if  
90 not prevent, the CVP and SWP's use of water until those breaches were closed.

91

92           2.7    Is it correct that one cannot simply repair the breach? The water  
93 flooding an island has to be pumped out. Why?

94

95           3.    With all of this information about the construction, condition of the levees,  
96 locations, water forces and various mechanics by which levees fail, did the 2009 study try  
97 to report the probability of significant events within a 25 year term of a significant  
98 number of levee failures in the Delta? Did the 2009 report conclude that probability of  
99 multiple levee breaches and island flooding is very high? You know that if the tunnel  
100 point of diversions are approved, it is estimated to take 8 to 10 years to place the tunnels  
101 into operation, so part of the 25 years will be prior to an alternative method of moving

102 existing water.

103

104           3.1     Returning you to the assumption of DWR-515 page 2, then there is a  
105 very high probability that there will be levee failures, and multiple levee failures during  
106 the construction period and after completion. In order to maintain at least 3,000 cfs  
107 cross-Delta flow both before the tunnels are completed and after completion, you  
108 generally have to repair the breaches and levees and pump the islands out to make the  
109 assumptions of 3,000 cfs realistic.

110

111           3.2     Is it therefore correct that this plan to maintain at least 3,000 cfs of  
112 cross-Delta flow requires large amounts of money to make the assumption that 3,000 cfs  
113 of cross-Delta flow and 540,000 ac/ft can be pumped annually? This requires large sums  
114 of money, and these sums of money are more than the local Reclamation Districts have.  
115 Would you agree that as with most things, it is better to invest money in upgrading levees

116 in advance than spend monies to fix levees when they have failed, to the degree that is  
117 possible? Would you agree that a good plan would also fund an emergency fund to fix  
118 levee breaches as fast as possible? A proper plan would include local funding, CVP,  
119 SWP, and perhaps general taxpayer funding of the monies for those failure events.

120

121           3.2    The 2009 and 2011 reports tried to calculate the amounts of money  
122 involved and concluded that the costs to repair breaches and pump out islands goes up if  
123 there are multiple breaches in a short period because the scale of repairs becomes more  
124 complicated. If there are 10 breaches or more, 1.2 times the cost; if 20 failures, 1.6 times  
125 the cost per breach. Then there was an attempt to use the Jones Tract experience to  
126 estimate the cost. Roughly \$50 million per breach.

127

128           3.4    In a moment we'll get to what proactive measures could be taken,  
129 but do you agree that if a plan assumes that 3,000 cfs cross-Delta flow can be maintained,

130 the plan must try to fix breaches and pump water out of the flooded islands to maintain  
131 water quality in order to use the water pumped? This requires more money than local  
132 landowners can pay for work to reduce the risk and, if breaches occur, to promptly repair  
133 them. Would you agree that generally, money spent in advance is better spent than after  
134 breaches have occurred?

135

136 4. The 2009 report tried to estimate the time it would take to mobilize, obtain  
137 the equipment and rock, and depending on the locations of the breach or number of  
138 breaches, you could see circumstances where it might take a bread ranch. You now have  
139 a WAM module that if such an event occurs you can generally estimate the impact on  
140 water quality and the time it will take to do the repairs. A color depiction was included in  
141 the 2009 report of what happens to salinity near the pumps if 3 islands fail during water  
142 delivery operations such as operations in July 1992 and the failure is due to sunny day  
143 conditions. It shows water at the pumps goes to between 2 EC and 4 EC. At 4 EC no

144 agricultural crops can be grown.

145

146           4.1     Another interesting outcome of the 2009 study was that  
147 concentrations of dissolved organic carbon goes up if the islands fail, and then rise even  
148 more if the breach is closed and pump-out occurs. It was found that if organic carbon  
149 concentrations rose from about 3 ppb that treatment could be done up to 6 ppb, but the  
150 costs were astronomical and there is no existing capacity to treat above 6 ppb. Then the  
151 study charted out the period that pumps could not be utilized during repair and pump-out  
152 periods estimating the yield of Dissolved Organic Carbon.

153

154           4.2     The study ran various scenarios, but on page E-1 the study  
155 concluded that depending on the number of breaches from 1 to 46 among 36 islands, it  
156 would take between 1.6 to 6.6 years to fix the breaches and pump the water out, and that  
157 as salinity intrusion could affect agricultural viability, it would also interrupt water

158 pumping from 1 to 23 months, but that use of the water for domestic treatment and  
159 consumption could be interrupted for 0 to 30 months, and if the Dissolved Carbon is  
160 treatable, the treatment costs could be in tens of millions of dollars for that water which  
161 has low enough Dissolved Carbon to be treated without creating potential cancer causing  
162 residues.

163

164 5. Let's go to the 2011 report.

165

166 5.1 You have some expertise on what the Delta landowners and their  
167 Reclamation Districts can economically afford to contribute in regard to the island levees.

168

169 5.2 Under the 2011 plan, Building Block 2.2 proposed to upgrade Delta  
170 levees (764 levees to Public Law 99 standards, and 187 levees to Urban Project levee  
171 standards, 100-year flood standard). The work would anticipate small and medium sized

172 floods and reduce sunny day events. Is it fair to say that it is unclear how much  
173 improvement in an earthquake would be provided by Building Block 2.2? On page 19-10  
174 of the DRMSII study, the cost estimate of the Building Block 2.2 plan is \$10.5 billion  
175 with a cost benefit ratio of \$69 billion. Is it true that by its nature it would have to be  
176 implemented over a period of time? \$10.5 billion divided by 25 years amounts to about  
177 \$500 million per year with upward adjustments for Engineering News Record cost  
178 increases.

179

180                   5.3     Would you agree that one rational interpretation of the 2009 and  
181 2011 DRMS reports is that to maintain 3,000 cfs cross-Delta flow capacity in DWR  
182 Exhibit 515 page 2, to give the DWR modelers a reasonable chance of getting at least the  
183 3,000 cfs capacity cross-Delta flows they assumed and hypothesized, the State and  
184 Federal government who have taken responsibility for this plan need to organize the  
185 locals and themselves in order to invest large amounts annually to improve critical levees

186 in the range of \$250 million to \$500 million/year, with local interests paying what they  
187 are economically capable of.

188

189           5.4 Do you have an opinion that in addition to that upgrade program,  
190 there is necessity for a funding program to anticipate that perhaps there would be 5 or 10  
191 breaches at \$50 million per breach, and that unless there is such a fund to draw upon, the  
192 lack of funding reserves would mean that the water quality impacts would become  
193 permanent and that tunnel capacity would have to be dedicated to replacing this 3,000 cfs  
194 or 540,000 ac/ft/year they assumed?

195

196           5.5 Briefly, there was another Building Block alternative in the 2011  
197 report which was 15000 cfs isolated surface conveyance facility which included levee  
198 upgrades, transportation improvements, and barrier gates with a cost of \$14.8 billion with  
199 substantial risk reduction, but not perfect risk reduction.

200

201                   5.6    Scenario 4 was a Dual Conveyance facility with a cost estimate of  
202 \$17 billion.

203

204                   5.7    If even after the tunnels are completed, and at least during the 8 to  
205 10 year construction period, is it realistic to assume 3,000 cfs or more can be pumped at  
206 the State and Federal pumps without at least a fund to repair levee breaches and not  
207 simply abandon islands?

208

209                   5.8    Once the tunnels are completed, faced with 10 levee failures on 5  
210 islands and a cost of 1 billion dollar to repair and replace and up to 3 years to accomplish  
211 the repairs and to remedy the salinity and dissolved carbon problem, will the 3,000 cfs be  
212 pumped for those 3 months? If not, will there be capacity in the tunnels during that  
213 summer and fall period to pump the water not available? If the descisionmakers throw up

214 their hands and conclude that the islands and levees are not economic to repair, would  
215 you agree the Project Plan should have a contingency for failures such as this?

216

217                   5.9    In your view and based upon your knowledge, wouldn't good

218 planning (not perfect planning) of the levee and salinity and carbon problem require that

219 the Tunnel plan contemplate and include money to buttress the levees with local

220 subvention programs during the 8 to 10 years before the tunnels would be operational?

221 Wouldn't it be logical to condition the tunnel diversion upon payment of costs for some

222 part of the levee upgrading and improvement and some part of the response to levee

223 failures if we are going to model the impacts and assume 3,000 cfs will be pumped so

224 that 500,000 ac/ft will be available each July, August and September through the pumps?

225 Alternatively, should we assume that the 500,000 ac/ft or more in July/August/September

226 will fit through the 9,000 cfs tunnel (instead of an enlarged tunnel of 15,000 cfs capacity)

227 during periods when cross-Delta flow use is not possible because of salinity and carbon

228 which was not anticipated by the modelers?

## McGinnis, Robin C.@DWR

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**From:** McGinnis, Robin C.@DWR  
**Sent:** Thursday, October 27, 2016 2:09 PM  
**To:** 'Paul Minasian'  
**Cc:** Mizell, James@DWR  
**Subject:** RE: SJRECWA Notice to Appear

Hi Paul,

Thanks for checking in with me on this. Based on our conversation just now, you explained you don't think we will be able to agree on a stipulation because of the points you want to include regarding reasonableness of funding for levees and future occurrences of levee failures in the Delta. I confirmed I will be at the hearing tomorrow at 9am. I also want to let you know we plan to file a motion for protective order this afternoon.

Robin

**Robin McGinnis**  
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Department of Water Resources  
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**From:** McGinnis, Robin C.@DWR  
**Sent:** Thursday, October 27, 2016 11:55 AM  
**To:** 'Paul Minasian'  
**Cc:** Mizell, James@DWR  
**Subject:** RE: SJRECWA Notice to Appear

Hi Paul,

We've traded voicemails a couple times this morning. I believe your group is scheduled to present its case-in-chief tomorrow. Unfortunately, Mr. Mraz is not available to testify tomorrow, but next week should work. However, we would still like to work on a stipulation instead of having him testify. Thanks.

Robin

**Robin McGinnis**  
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**From:** Denise Dehart [<mailto:ddehart@minasianlaw.com>] **On Behalf Of** Paul Minasian  
**Sent:** Tuesday, October 25, 2016 6:15 PM

**To:** McGinnis, Robin [C.@DWR](mailto:C.@DWR); Mizell, James@DWR

**Cc:** Sandino, David@DWR; Paul Minasian; [schedester@sjrecwa.net](mailto:schedester@sjrecwa.net); [chase@hmr.d.net](mailto:chase@hmr.d.net); [Bryant\\_jeff@sbcglobal.net](mailto:Bryant_jeff@sbcglobal.net); [cwhite@ccidwater.org](mailto:cwhite@ccidwater.org); [rghecc@sbcglobal.net](mailto:rghecc@sbcglobal.net); [jwhite@sjrecwa.net](mailto:jwhite@sjrecwa.net); Anna Whitfield; Leah Janowski

**Subject:** RE: SJRECWA Notice to Appear

Ms. McGinnis and Mr. Mizell,

Thank you for your patience; attached is a file containing Paul Minasian's draft Possible Questions for DWR regarding 2009 and 2011 Levee and Island Studies on behalf of the Exchange Contractors in the WaterFix matter for your review and comment.

Thank you for your patience.

Denise M. Dehart

**Secretary to Paul R. Minasian, Esq.**

**Minasian, Meith, Soares, Sexton & Cooper, LLP**

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**From:** McGinnis, Robin [C.@DWR](mailto:C.@DWR) [<mailto:Robin.McGinnis@water.ca.gov>]

**Sent:** Monday, October 24, 2016 5:07 PM

**To:** Paul Minasian

**Cc:** Sandino, David@DWR; Mizell, James@DWR

**Subject:** RE: SJRECWA Notice to Appear

Hello,

Will you be able to send me your draft questions or a draft outline? Just checking in. Thanks.

Robin

**Robin McGinnis**

Attorney

Office of the Chief Counsel

Department of Water Resources

Direct: (916) 657-5400

[robin.mcginis@water.ca.gov](mailto:robin.mcginis@water.ca.gov)

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**From:** McGinnis, Robin [C.@DWR](mailto:C.@DWR)

**Sent:** Friday, October 14, 2016 4:19 PM

**To:** 'pminasian@minasianlaw.com'

**Cc:** Sandino, David@DWR; Mizell, James@DWR

**Subject:** RE: SJRECWA Notice to Appear

Hello again,

Thank you for the meet and confer this afternoon. You said you might be able to provide your questions in advance of oral testimony, and I am wondering if you could send me your draft questions or a draft outline by Monday morning. This will help us decide the best approach going forward (designating an appropriate witness, preparing a stipulation, etc.). Please let me know.

Robin

**Robin McGinnis**

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**From:** McGinnis, Robin [C.@DWR](mailto:C.@DWR)  
**Sent:** Friday, October 14, 2016 11:29 AM  
**To:** 'pminasian@minasianlaw.com'  
**Subject:** SJRECWA Notice to Appear

Hello Mr. Minasian,

Following up on my voicemail this morning, we are wondering if you have time this afternoon to meet and confer regarding San Joaquin River Exchange Contractors Water Authority's notice to appear. Please let me know. Thank you.

Robin

**Robin McGinnis**

Attorney  
Office of the Chief Counsel  
Department of Water Resources  
Direct: (916) 657-5400  
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## 6.3 Environmental Consequences

### 6.3.1 Methods for Analysis

The surface water analysis addresses changes to surface waters affected by changes in SWP/CVP operations in the Delta Region and Upstream of the Delta Region caused by implementation of BDCP conveyance facilities (CM1) and other conservation measures, especially tidal marsh habitat restoration. Consistent with previous modeling analyses conducted by DWR and Reclamation, including the 2008 Biological Assessment on the Continued Long-Term Operations of the Central Valley Project and State Water Project, the modeling analyses presented in this section assumed that the SWP and CVP were solely responsible for providing any needed water for BDCP implementation. The alternatives would not modify water deliveries to non-SWP and non-CVP water rights holders, SWP Feather River Water Rights Contractors, CVP Sacramento River Water Rights Settlement Contractors, or CVP San Joaquin River Exchange Contractors~~modify the operations of the SWP/CVP facilities but would not modify the operations of water resources facilities owned or operated by other water rights holders.~~ Therefore, surface water resources on ~~many of the~~ tributaries of the Sacramento River and San Joaquin River that are not affected by SWP and CVP operations would not be affected by implementation of the alternatives. The surface waters analyzed in this chapter include Sacramento River upstream of the Delta and downstream of Keswick Dam; Trinity River downstream of Lewiston Reservoir; Feather River downstream of Thermalito Dam; American River downstream of Nimbus Dam; surface water diversions into Yolo Bypass; representative Delta channels; and San Joaquin River upstream of the Delta. All alternatives assume the same operations of the CVP New Melones Reservoir; therefore, this chapter does not analyze changes on the Stanislaus River.

#### 6.3.1.2 Methods for Analysis of Flood Management along Major Rivers

As described above in Section 6.3.1, Methods for Analysis, the surface waters analyzed in this chapter include Sacramento River upstream of the Delta and downstream of Keswick Dam; Trinity River downstream of Lewiston Reservoir; Feather River downstream of Thermalito Dam; American River downstream of Nimbus Dam; surface water diversions into Yolo Bypass; representative Delta channels; and San Joaquin River upstream of the Delta. All alternatives assume the same operations of the CVP New Melones Reservoir; therefore, this chapter does not analyze changes on the Stanislaus River.

Specific considerations for levee conditions are discussed in Chapter 9, Geology and Seismicity, and Chapter 10, Soils.

Stormwater management on the landside of the levees is discussed in Chapter 20, Public Services and Utilities, and Chapter 14, Agricultural Resources, including use of existing stormwater channels and drainage ditches to convey flows to the river.

1 Water quality changes due to changes in surface water flows are discussed in Chapter 7.  
2 Groundwater, and Chapter 8, Water Quality.

### 3 **Design Criteria Assumptions for Facilities along Levees and in Yolo Bypass**

4 As described in sections 6.1.5, Delta Flood Risks, and 6.2.2, State Plans, Policies, and Regulations, the  
5 CVFPB exercises jurisdiction over the State Plan of Flood Control, including Sacramento River Flood  
6 Control Project and flood control projects in the Sacramento River and San Joaquin River  
7 watersheds. Facilities constructed under each of the alternatives will be located within the facilities  
8 addressed in the State Plan of Flood Control, including the Yolo Bypass, levees along the Sacramento  
9 River between American River confluence and Decker Island, Sutter Slough, Steamboat Slough,  
10 Georgiana Slough, and San Joaquin River and Old River near the Head of Old River. As described in  
11 Section 3.6.1.1, North Delta Intakes, facilities to be constructed along the levees would be designed to  
12 provide flood neutrality during construction and operations. Facilities located along the levees,  
13 including coffer dams at the intake locations, would be designed to provide continued flood  
14 management at the same level of flood protection as the existing levees; or if applicable, to a higher  
15 standard for flood management engineering and permitting requirements if the standards are  
16 greater than the existing levee design. New facilities would be designed to withstand the applicable  
17 flood management standards through construction of flood protection embankments or  
18 construction on engineered fill to raise the facilities to an elevation above the design flood elevation  
19 for that specific location. The levee design criteria would consider the most recent criteria, including  
20 new guidelines for urban and rural levees (DWR 2013, 2014).

21 Within the Yolo Bypass, as described in Section 3.6.2.1, Yolo Bypass Fisheries Enhancement, any  
22 modifications to the Yolo Bypass or other flood management facilities would be required to be  
23 designed and implemented to maintain flood management standards. Activities in the Yolo Bypass  
24 would be designed, permitted, and operated in coordination with the USACE, DWR, CVFPB, and other  
25 local flood management agencies.

26 All construction activities that could result in a discharge of water or other materials to surface  
27 water would require development and implementation of a Stormwater Pollution Prevention Plan  
28 (SWPPP). The SWPPP would address risks of increased contamination in the receiving waters,  
29 including risks associated with discharge of sediments or increased sediment in the receiving waters  
30 due to soil erosion or scour, as discussed in Appendix 3B, Environmental Commitments. For  
31 example, velocity dissipation facilities, such as rock or grouted riprap, would be used to reduce  
32 velocity and energy and prevent scour where dewatering flows are discharged to the river, as  
33 discussed in Section 3.6.1, North Delta Intakes. Another example would be development and  
34 implementation of a Barge Operations Plan to minimize the effects of wakes from the barge  
35 impinging on the river banks or propeller wash causing bottom scour, as discussed in Appendix 3B,  
36 Environmental Commitments.

### 37 **Analysis of Potential Changes in Conditions that Could Affect Flood Management** 38 **along Major Rivers**

## 39 **6.3.2 Determination of Effects**

40 As described in Section 6.3.1.1, the potential for effects related to surface water resources was  
41 determined by considering direct changes in the environment as identified in CEQA guidelines.

1 Changes in water surface elevations and stream flows at certain locations in the Delta under Existing  
 2 Conditions, No Action Alternative, and action Alternatives are presented in Appendix 5A, BDCP  
 3 EIR/EIS Modeling Technical Appendix. Indirect effects of changes in water surface elevations and  
 4 stream flows in the Delta are addressed in other chapters addressing specific resources. Effects  
 5 associated with changes in velocities and water surface elevations related to riparian corridor  
 6 biological resources are addressed in Chapter 11, *Fish and Aquatic Resources*, and Chapter 12,  
 7 *Terrestrial Biological Resources*. Effects associated with changes in water surface hydrodynamics  
 8 related to availability of water for agricultural and community uses are addressed in Chapter 14,  
 9 *Agricultural Resources*, and Chapter 20, *Public Services and Utilities*, respectively. Effects associated  
 10 with changes in drainage conditions in agricultural areas and communities along the waterways are  
 11 addressed in Chapter 14, *Agricultural Resources*, and Chapter 20, *Public Services and Utilities*,  
 12 respectively. Effects associated with navigability issues are addressed in Chapter 19, *Transportation*.  
 13 Effects associated with erosion, accretion, and sedimentation are addressed in Chapter 9, *Geology*  
 14 and *Seismicity*.

15 As discussed in greater detail in Chapter 5, *Water Supply*, Section 5.3.2, the NEPA No Action  
 16 Alternative, which reflects an anticipated future condition in 2060, includes both sea level rise and  
 17 climate change (changed precipitation patterns), and also assumes, among many other programs,  
 18 projects, and policies, implementation of most of the required actions under both the December  
 19 2008 USFWS BiOp and the June 2009 NMFS BiOp (inclusion of these actions is discussed in  
 20 Appendix 3D, *Defining Existing Conditions, No Action Alternative, No Project Alternative, and*  
 21 *Cumulative Impact Conditions*, Section 3D.3.2.3.1). The NEPA effects analyses in this chapter reflect  
 22 these No Action Alternative assumptions.

23 ~~(described below for Surface Water Impacts 1–3). Section 6.3.2 describes t~~The potential for changes  
 24 in flood management operations described in this chapter as are determined through a qualitative  
 25 evaluation of CALSIM II model results (described below as Surface Water Impacts ~~4–71 and 2~~).

26 This effects analysis assumes that an action alternative would have an adverse effect under NEPA or  
 27 a significant impact under CEQA if implementation would result in one of the following conditions.

- 28 • An increase of more than 10% in number of months that the reservoir storage is close to the  
 29 flood storage capacity (within 10 TAF) compared to the No Action Alternative would be  
 30 interpreted as a consistently high storage condition that would reduce the flexibility for flood  
 31 operations. The value of 10% is used to provide consideration of uncertainties involved due to  
 32 differences of real-time flood operations and monthly model output due to simulation  
 33 techniques and assumptions used in this analysis (Impact SW-1).
- 34 • An increase in ~~peak-highest~~ monthly flows when flood potential is high in the Sacramento River  
 35 at Freeport, Sacramento River at Locations Upstream of Walnut Grove (downstream of north  
 36 Delta intakes), San Joaquin River at Vernalis, Feather River at Thermalito Dam, or Yolo Bypass at  
 37 Fremont Weir, that exceed flood capacity at these locations compared to river flows under the  
 38 No Action Alternative (which is used to avoid consideration of changes in river flows caused by  
 39 sea level rise and climate change). For the purposes of this analysis, a flood event is defined as  
 40 an over-bank event (Impact SW-2).
- 41 • ~~Flows-Monthly flows~~ simulated with CALSIM II do not exceed flood capacity. To assess the  
 42 increased risk of flooding, ~~the following methodology is used: a significance value of 10% is used~~  
 43 for analyzing changes in monthly storage volumes because the effects of climate change, as  
 44 determined through the comparison of storage volumes under Existing Conditions and No

Action Alternative conditions ranged up to 10%. Therefore, the potential for increased flood spills from the reservoirs due to the alternatives (not climate change) were defined as an increased average monthly storage in excess of the 10%. Similarly, a significance value of 1% is used for analyzing changes in average monthly flows in the Sacramento, Feather, and American River of was used because changes due to simulation techniques and logic in the CALSIM II model are generally about 1%. Therefore, the analysis used the following methodology:

- Average of flows with probability of exceedance of 10% or lower (top 10th percentile of flows) is calculated.
- Average of flows with probability of exceedance of 10% or lower under each Alternative is compared to the average of flows with probability of exceedance of 10% or lower under the Existing Conditions and the No Action Alternative (which is used to avoid consideration of changes in reservoir storage caused by sea level rise and climate change).
- The change in average of flows with probability of exceedance of 10% or lower with respect to the Existing conditions and the No Action Alternative is compared to the channel capacity (analysis done for each reach).
- An increase of 1% in highest flows simulated (flows with probability of exceedance of 10% or less) with respect to the channel capacity is considered significant (increase is calculated by comparing flows to Existing Conditions or No Action Alternative). The value of 1% is used to avoid consideration of minor fluctuations in model output due to simulation techniques and assumptions ~~(Impact SW-2)~~.

Potential for changes in reverse flow conditions in Old and Middle Rivers also is determined by an An-increase (more negative flow) of more than 1% in reverse flow conditions in Old and Middle River under the alternatives as compared to reverse flows under Existing Conditions and the No Action Alternative (which is used to avoid consideration of changes in reverse flows caused by sea level rise and climate change). The value of 1% is used to avoid consideration of minor fluctuations in model output due to simulation techniques and assumptions (Impact SW-3).

Substantially alter the existing drainage pattern of the site or area during construction of conveyance facilities, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or offsite (Impact SW-4).

Substantially alter the existing drainage pattern of the site or area during construction of habitat restoration areas, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or offsite (Impact SW-5).

Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff (Impact SW-6).

Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam (Impact SW-7).

Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the operation of habitat restoration areas (Impact SW-8).

1 Place within a 100-year flood hazard area structures that would impede or redirect flood flows, or  
2 be subject to inundation by mudflow (Impact SW-9).

3 ~~Changes in water surface elevations at certain locations in the Delta under Existing Conditions, No~~  
4 ~~Action Alternative, and action Alternatives are presented in Appendix 5A, BDCP EIR/EIS Modeling~~  
5 ~~Technical Appendix. Indirect effects of changes in water surface elevations in the Delta are~~  
6 ~~addressed in other chapters addressing specific resources. Effects associated with changes in~~  
7 ~~velocities and water surface elevations related to riparian corridor biological resources are~~  
8 ~~addressed in Chapter 11, Fish and Aquatic Resources, and Chapter 12, Terrestrial Biological~~  
9 ~~Resources. Effects associated with changes in water surface hydrodynamics related to availability of~~  
10 ~~water for agricultural uses are addressed in Chapter 14, Agricultural Resources. Effects associated~~  
11 ~~with changes in drainage conditions in agricultural areas and communities along the waterways are~~  
12 ~~addressed in Chapter 14, Agricultural Resources, and Chapter 20, Public Services and Utilities,~~  
13 ~~respectively. Effects associated with navigability issues are addressed in Chapter 19, Transportation.~~  
14 ~~Effects associated with erosion, accretion, and sedimentation are addressed in Chapter 9, Geology~~  
15 ~~and Seismicity.~~

16 ~~As discussed in greater detail in Chapter 5, Water Supply, Section 5.3.2, the NEPA No Action~~  
17 ~~Alternative, which reflects an anticipated future condition in 2060, includes both sea level rise and~~  
18 ~~climate change (changed precipitation patterns), and also assumes, among many other programs,~~  
19 ~~projects, and policies, implementation of most of the required actions under both the December~~  
20 ~~2008 USFWS BiOp and the June 2009 NFMS BiOp (inclusion of these actions is discussed in~~  
21 ~~Appendix 3D, Defining Existing Conditions, No Action Alternative, No Project Alternative, and~~  
22 ~~Cumulative Impact Conditions, Section 3D.3.2.3.1). The NEPA effects analyses in this chapter reflect~~  
23 ~~these No Action assumptions.~~

## 24 **6.3.3 Effects and Mitigation Approaches**

### 25 **6.3.3.1 No Action Alternative**

#### 26 **Reverse Flows in Old and Middle River**

##### 27 **Impact SW-3: Change in Reverse Flow Conditions in Old and Middle Rivers**

28 Reverse flow conditions for Old and Middle River flows on a long-term average basis under the No  
29 Action Alternative ~~at Year 2060 (LLT)~~ are ~~similar more positive as compared~~ to Existing Conditions,  
30 except in ~~July through November~~ April and May. In these months, Old and Middle River flows are less  
31 negative due to reduced south Delta exports because of the sea level rise and climate change,  
32 increased demands in north of the Delta, and operations to comply with Fall X2 (Figure 6-23).

33 **CEQA Conclusion:** There would be less reverse flows in Old and Middle Rivers under the No Action  
34 Alternative ~~at Year 2060 (LLT)~~ compared to Existing Conditions in June through March, due to  
35 reduced south Delta exports because of sea level rise and climate change, increased demands north  
36 of the Delta, and operations to comply with Fall X2. Reverse flows would become more negative in  
37 April and May under the No Action Alternative at Year 2060 (LLT) compared to Existing Conditions.

### 6.3.3.2 Alternative 1A—Dual Conveyance with Pipeline/Tunnel and Intakes 1–5 (15,000 cfs; Operational Scenario A)

#### Reverse Flows in Old and Middle River

##### Impact SW-3: Change in Reverse Flow Conditions in Old and Middle Rivers

**CEQA Conclusion:** Alternative 1A would provide positive changes related to reducing reverse flows in Old and Middle Rivers in June through March and negative changes in the form of increased reverse flow conditions in October, April and May, compared to Existing Conditions. Determination of the significance of this impact is related to impacts on water quality and aquatic resources. These impacts are considered significant because the increase (more negative) in reverse flow conditions in April and May is greater than 1%. The significance of the impact to beneficial use of the surface water for water supplies and aquatic resources, and appropriate Mitigation Measures for those impacts on beneficial uses, The significance of these impacts is are described in Chapter 8, *Water Quality*, and Chapter 11, *Fisheries and Aquatic Resources*.

##### Impact SW-4: Substantially Alter the Existing Drainage Pattern or Substantially Increase the Rate or Amount of Surface Runoff in a Manner That Would Result in Flooding during Construction of Conveyance Facilities

##### Mitigation Measure SW-4: Implement Measures to Reduce Runoff and Sedimentation

BDCP proponents will have to demonstrate no-net-increase in runoff due to construction activities during peak flows. To achieve this, proponents will implement measures to prevent an increase in runoff volume and rate from land-side construction areas and to prevent an increase in sedimentation in the runoff from the construction area as compared to Existing Conditions. To reduce the potential for adverse impacts from large amounts of runoff from paved and impervious surfaces during construction, operations, or maintenance, the proponents will design and implement onsite drainage systems in areas where construction drainage is required. Drainage studies will be prepared for each construction location to assess the need for, and to finalize, other drainage-related design measures, such as a new onsite drainage system or new cross drainage facilities. Based on study findings, if it is determined that onsite stormwater detention storage is required, detention facilities will be located within the existing construction area.

To avoid changes in the courses of waterbodies, the BDCP proponents will design measures to prevent a net increase in sediment discharge or accumulation in water-bodies compared to Existing Conditions to avoid substantially affecting river hydraulics during peak conditions. A detailed sediment transport study for all water-based facilities will be conducted and a sediment management plan will be prepared and implemented during construction. The sediment management plan will include periodic and long-term sediment removal actions.

Prior to use of existing stormwater channels, drainage ditches, or irrigation canals for conveyance of dewatering flows, a hydraulic analysis of the existing channels will be completed to determine available capacity for conveyance of anticipated dewatering flows. If the conveyance capacity is not adequate, new conveyance facilities or methods for discharge into the groundwater will be developed. In accordance with NPDES requirements and requirements

1 of the SWPPP, water quality analyses of the dewatering flows will be conducted to avoid water  
 2 quality contamination.

3 As described in Section 3.6.1.1, North Delta Intakes, facilities to be constructed along the levees  
 4 would be designed to provide flood neutrality during construction and operations. Facilities  
 5 located along the levees, including cofferdams at the intake locations, would be designed to  
 6 provide continued flood management at the same level of flood protection as the existing levees;  
 7 or if applicable, to a higher standard for flood management engineering and permitting  
 8 requirements if the standards are greater than the existing levee design. New facilities would be  
 9 designed to withstand the applicable flood management standards through construction of flood  
 10 protection embankments or construction on engineered fill to raise the facilities to an elevation  
 11 above the design flood elevation for that specific location. The levee design criteria would  
 12 consider the most recent criteria, including new guidelines for urban and rural levees (DWR  
 13 2013, 2014).

14 **Impact SW-7: Expose People or Structures to a Significant Risk of Loss, Injury, or Death**  
 15 **Involving Flooding Due to the Construction of New Conveyance Facilities**

16 As described under Impact SW-4, facilities under Alternative 1A would be designed to avoid  
 17 increased flood potential compared to Existing Conditions or the No Action Alternative in  
 18 accordance with the requirements of USACE, CVFPB, and DWR. As described under Impact SW-1,  
 19 Alternative 1A would not increase flood potential on the Sacramento River, San Joaquin River, or  
 20 Yolo Bypass.

21 USACE, CVFPB, and DWR would require that any construction that would disturb existing levees to  
 22 be designed in a manner that would not adversely affect existing flood protection. As described in  
 23 Section 3.6.1.1, North Delta Intakes, facilities to be constructed along the levees would be designed to  
 24 provide flood neutrality during construction and operations. Facilities located along the levees,  
 25 including cofferdams at the intake locations, would be designed to provide continued flood  
 26 management at the same level of flood protection as the existing levees; or if applicable, to a higher  
 27 standard for flood management engineering and permitting requirements if the standards are  
 28 greater than the existing levee design. The levee design criteria would consider the most recent  
 29 criteria, including new guidelines for urban and rural levees (DWR 2013, 2014). The design flood  
 30 elevation would need to consider sea level rise to reduce impacts.

31 Additionally, DWR would consult with local reclamation districts to ensure that construction  
 32 activities would not conflict with reclamation district flood protection measures. Facilities  
 33 construction would include temporary cofferdams, stability analyses, monitoring, and slope  
 34 remediation, as described in Chapter 3, *Description of Alternatives*. For the excavation of the existing  
 35 levee for the Sacramento River intake structures, sheet pile wall installation would minimize effects  
 36 on slope stability during construction. For excavation of the existing levee for the Byron Tract  
 37 Forebay, tie-back wall installation and dewatering to maintain slope stability and control seepage  
 38 would minimize effects on slope stability associated with construction of the forebay and approach  
 39 channel embankments. Providing tunnel shaft support would minimize the effects on slope stability  
 40 from excavation adjacent to Clifton Court Forebay during excavation of the main tunnel shaft  
 41 adjacent to the Clifton Court Forebay embankment. Dewatering inside the cofferdam or adjacent to  
 42 the existing levees would remove waterside slope resistance and lead to slope instability. Slopes  
 43 would be constructed in accordance with existing engineering standards, as described in Chapter 3,  
 44 *Description of Alternatives*.

1 Facilities constructed within the floodplain, including pumping plants, sedimentation basins,  
 2 substations, forebays, and conveyance facilities would be designed to be protected from flooding.  
 3 New facilities would be designed to withstand the applicable flood management standards through  
 4 construction of flood protection embankments or construction on engineered fill to raise the  
 5 facilities to an elevation above the design flood elevation for that specific location, as described in  
 6 Appendix 3C, Construction Assumptions for Water Conveyance Facilities. The design flood elevation  
 7 would need to consider sea level rise to reduce impacts.

8 Some project facilities could require rerouting of access roads and waterways that could be used  
 9 during times of evacuation or emergency response.

10 **NEPA Effects:** Alternative 1A would not result in increased exposure of people or structures to  
 11 flooding due to construction of the conveyance facilities because the BDCP proponents would be  
 12 required to comply with USACE, CVFPB, and DWR requirements to avoid increased flood potential  
 13 and levee failure due to construction and operation of the facilities, as described in Section 6.2.2.4.  
 14 Determination of design flood elevations would need to consider sea level rise to reduce impacts.

15 **CEQA Conclusion:** Alternative 1A would not result in an increase to exposure of people or structures  
 16 to flooding due to construction of the conveyance facilities because the BDCP proponents would be  
 17 required to comply with the requirements of USACE, CVFPB, and DWR to avoid increased flood  
 18 potential and levee failure due to construction and operation of the facilities, as described in Section  
 19 6.2.2.4. If the design flood elevations did not consider sea level rise to reduce impacts, these  
 20 impacts are considered less than significant. Mitigation Measure SW-57 would reduce this impact to  
 21 a less-than-significant level.

#### 22 **Mitigation Measure SW-7: Implement Measures to Reduce Flood Damage**

23 Determination of design flood elevation will consider the effects of sea level rise for the lifetime  
 24 of the project, as determined by USACE, CVFPB, and DWR. A 200-year level of flood protection  
 25 will be provided for all new facilities. For levee modifications, the level of flood protection will  
 26 be the same as required for the modified levee without the new facilities.

### 27 **6.3.3.3 Alternative 1B—Dual Conveyance with East Alignment and** 28 **Intakes 1–5 (15,000 cfs; Operational Scenario A)**

#### 29 **Reverse Flows in Old and Middle River**

##### 30 **Impact SW-3: Change in Reverse Flow Conditions in Old and Middle Rivers**

31 **NEPA Effects:** Effects on Old and Middle River flows under Alternative 1B would be identical to  
 32 those described for Impact SW-3 under Alternative 1A because the operations of the facilities would  
 33 be identical.

34 **CEQA Conclusion:** Alternative 1B would provide positive changes related to reducing reverse flows  
 35 in Old and Middle Rivers in June through March and negative changes related to increased reverse  
 36 flow conditions in April and May, compared to Existing Conditions. These impacts are considered  
 37 significant because the increase (more negative) in reverse flow conditions in April and May is  
 38 greater than 1%. The significance of the impact to beneficial use of the surface water for water  
 39 supplies and aquatic resources, and appropriate Mitigation Measures for those impacts on beneficial  
 40 uses. Determination of the significance of this effect is related to effects on water quality and aquatic

resources. Accordingly, the significance of these effects is are described in Chapter 8, *Water Quality*, and Chapter 11, *Fisheries and Aquatic Resources*.

### **Impact SW-7: Expose People or Structures to a Significant Risk of Loss, Injury, or Death Involving Flooding Due to the Construction of New Conveyance Facilities**

**NEPA Effects:** Increased exposure of people or structures to flood risks under Alternative 1B would be similar to those described for Impact SW-7 under Alternative 1A because provisions to avoid adverse effects related to flood potential would be the same, and the BDCP proponents would be required to comply with USACE, CVFPB, and DWR requirements to avoid increased flood potential and levee failure due to construction and operation of the facilities; as described in Section 6.2.2.4. Additionally, DWR would consult with local reclamation districts to ensure that construction activities would not conflict with reclamation district flood protection measures. Determination of design flood elevations would need to consider sea level rise to reduce impacts.

**CEQA Conclusion:** Alternative 1B would not result in increased exposure of people or structures to flooding due to construction of the conveyance facilities because the BDCP proponents would be required to comply with the requirements of USACE, CVFPB, and DWR to avoid increased flood potential and levee failure due to construction and operation of the facilities as described in Section 6.2.2.4. If the design flood elevations did not consider sea level rise to reduce impacts, these impacts are considered significant. Mitigation Measure SW-57 would reduce this impact to a less-than-significant level.

#### **Mitigation Measure SW-7: Implement Measures to Reduce Flood Damage**

Please see Mitigation Measure SW-7 under Impact SW-7 in the discussion of Alternative 1A.

### **6.3.3.4 Alternative 1C—Dual Conveyance with West Alignment and Intakes W1–W5 (15,000 cfs; Operational Scenario A)**

#### **Reverse Flows in Old and Middle River**

##### **Impact SW-3: Change in Reverse Flow Conditions in Old and Middle Rivers**

**NEPA Effects:** Effects on Old and Middle River flows under Alternative 1C would be identical to those described for Impact SW-3 under Alternative 1A because the operations of the facilities would be identical.

**CEQA Conclusion:** Alternative 1C would provide positive changes related to reducing reverse flows in Old and Middle Rivers in June through March and negative changes related to increased reverse flow conditions in April and May compared to Existing Conditions. These impacts are considered significant because the increase (more negative) in reverse flow conditions is greater than 1%. The significance of the impact to beneficial use of the surface water for water supplies and aquatic resources, and appropriate Mitigation Measures for those impacts on beneficial uses, Determination of the significance of this effect is related to effects on water quality and aquatic resources. Therefore, the significance of these effects is are described in Chapter 8, *Water Quality*, and Chapter 11, *Fisheries and Aquatic Resources*.

1 **Impact SW-7: Expose People or Structures to a Significant Risk of Loss, Injury, or Death**  
 2 **Involving Flooding Due to the Construction of New Conveyance Facilities**

3 **NEPA Effects:** Increased exposure of people or structures to flood risks under Alternative 1C would  
 4 be similar to those described for Impact SW-7 under Alternative 1A because provisions to avoid  
 5 adverse effects related to flood potential would be the same, and the BDCP proponents would be  
 6 required to comply with USACE, CVFPB, and DWR requirements to avoid increased flood potential  
 7 and levee failure due to construction and operation of the facilities as described in Section 6.2.2.4.  
 8 Additionally, DWR would consult with local reclamation districts to ensure that construction  
 9 activities would not conflict with reclamation district flood protection measures. Determination of  
 10 design flood elevations would need to consider sea level rise to reduce impacts.

11 **CEQA Conclusion:** Alternative 1C would not result in an increase to exposure of people or structures  
 12 to flooding due to construction of the conveyance facilities because the BDCP proponents would be  
 13 required to comply with the requirements of USACE, CVFPB, and DWR to avoid increased flood  
 14 potential and levee failure due to construction and operation of the facilities as described in Section  
 15 6.2.2.4. If the design flood elevations did not consider sea level rise to reduce impacts, these impacts  
 16 are considered significant. Mitigation Measure SW-57 would reduce this impact to a less-than-  
 17 significant level.

18 **Mitigation Measure SW-7: Implement Measures to Reduce Flood Damage**

19 Please see Mitigation Measure SW-7 under Impact SW-7 in the discussion of Alternative 1A.

20 **6.3.3.5 Alternative 2A—Dual Conveyance with Pipeline/Tunnel and Five**  
 21 **Intakes (15,000 cfs; Operational Scenario B)**

22 **Reverse Flows in Old and Middle River**

23 **Impact SW-3: Change in Reverse Flow Conditions in Old and Middle Rivers**

24 Reverse flow conditions for Old and Middle River flows would be reduced under Alternative 2A on a  
 25 long-term average basis except in April, as shown in Figure 6-23. Compared to flows under both  
 26 Existing Conditions and the No Action Alternative, Old and Middle River flows would be less positive  
 27 in April under Alternative 2A because Alternative 2A does not include inflow/export ratio criteria  
 28 for the San Joaquin River in those months. Therefore, Alternative 2A would result in reduced reverse  
 29 flow conditions in Old and Middle Rivers in May through March and increased reverse flow  
 30 conditions in April.

31 **NEPA Effects:** A comparison with reverse flow conditions under the No Action Alternative provides  
 32 an indication of the potential change due to Alternative 2A without the effects of sea level rise and  
 33 climate change and the results show that reverse flow conditions under Alternative 2A would be  
 34 reduced on a long-term average basis except in April as compared to No Action Alternative.

35 **CEQA Conclusion:** Alternative 2A would provide positive changes related to reducing reverse flows  
 36 in Old and Middle Rivers in May-June through March and negative changes in the form of less  
 37 positive flows in wetter years and increased reverse flow conditions in drier years during April and  
 38 May, compared to Existing Conditions. These impacts are considered significant because the  
 39 increase (more negative) in reverse flow conditions is greater than 1%. The significance of the  
 40 impact to beneficial use of the surface water for water supplies and aquatic resources, and

1 ~~appropriate Mitigation Measures for those impacts on beneficial uses, Determination of the~~  
 2 ~~significance of this impact is related to impacts on water quality and aquatic resources. The~~  
 3 ~~significance of these impacts are~~ described in Chapter 8, *Water Quality*, and Chapter 11, *Fisheries*  
 4 *and Aquatic Resources*.

### 5 **Impact SW-7: Expose People or Structures to a Significant Risk of Loss, Injury, or Death** 6 **Involving Flooding Due to the Construction of New Conveyance Facilities**

7 **NEPA Effects:** Effects associated with construction of conveyance facilities under Alternative 2A  
 8 would be identical to those described under Alternative 1A because the facilities would be identical.  
 9 Alternative 2A would not result in an increase to exposure of people or structures to flooding due to  
 10 construction of the conveyance facilities because the BDCP proponents would be required to comply  
 11 with the requirements of USACE, CVFPB, and DWR to avoid increased flood potential and levee  
 12 failure due to construction and operation of the facilities as described in Section 6.2.2.4 as described  
 13 in Section 6.2.2.4. Additionally, DWR would consult with local reclamation districts to ensure that  
 14 construction activities would not conflict with reclamation district flood protection measures.

15 Determination of design flood elevations would need to consider sea level rise to reduce impacts.

16 **CEQA Conclusion:** Alternative 2A would not result in an increase to exposure of people or structures  
 17 to flooding due to construction of the conveyance facilities because the BDCP proponents would be  
 18 required to comply with the requirements of USACE, CVFPB, and DWR to avoid increased flood  
 19 potential and levee failure due to construction and operation of the facilities as described in Section  
 20 6.2.2.4. If the design flood elevations did not consider sea level rise to reduce impacts, these impacts  
 21 are considered significant. Mitigation Measure SW-57 would reduce this impact to a less-than-  
 22 significant level.

### 23 Mitigation Measure SW-7: Implement Measures to Reduce Flood Damage

24 Please see Mitigation Measure SW-7 under Impact SW-7 in the discussion of Alternative 1A.

## 25 **6.3.3.6 Alternative 2B—Dual Conveyance with East Alignment and Five** 26 **Intakes (15,000 cfs; Operational Scenario B)**

### 27 **Reverse Flows in Old and Middle River**

#### 28 **Impact SW-3: Change in Reverse Flow Conditions in Old and Middle Rivers**

29 **NEPA Effects:** Effects on Old and Middle River flows under Alternative 2B would be identical to  
 30 those described for Impact SW-3 under Alternative 2A because the operations of the facilities would  
 31 be identical.

32 **CEQA Conclusion:** Alternative 2B would provide positive changes related to reducing reverse flows  
 33 in Old and Middle Rivers in May-June through March and negative changes in the form of less  
 34 positive flows in wetter years and increased reverse flow conditions in drier years during April and  
 35 May as compared to Existing Conditions. These impacts are considered significant because the  
 36 increase (more negative) in reverse flow conditions is greater than 1%. The significance of the  
 37 impact to beneficial use of the surface water for water supplies and aquatic resources, and  
 38 appropriate Mitigation Measures for those impacts on beneficial uses, Determination of the  
 39 significance of this effect is related to effects on water quality and aquatic resources. Therefore, the

1 ~~significance of these effects is are~~ described in Chapter 8, *Water Quality*, and Chapter 11, *Fisheries*  
2 *and Aquatic Resources*.

### 3 **Impact SW-7: Expose People or Structures to a Significant Risk of Loss, Injury, or Death** 4 **Involving Flooding Due to the Construction of New Conveyance Facilities**

5 **NEPA Effects:** Effects associated with construction of conveyance facilities under Alternative 2B  
6 would be identical to those described under Alternative 1B because the facilities would be identical.  
7 Alternative 2B would not result in an increase to exposure of people or structures to flooding due to  
8 construction of the conveyance facilities because the BDCP proponents would be required to comply  
9 with USACE, CVFPB, and DWR requirements to avoid increased flood potential and levee failure due  
10 to construction and operation of the facilities as described in Section 6.2.2.4. Additionally, DWR  
11 would consult with local reclamation districts to ensure that construction activities would not  
12 conflict with reclamation district flood protection measures. However, increased wind fetch near  
13 open water areas of habitat restoration could cause potential damage to adjacent levees.

14 **CEQA Conclusion:** Alternative 2B would not result in increased exposure of people or structures to  
15 flooding due to construction of the conveyance facilities because the BDCP proponents would be  
16 required to comply with the requirements of USACE, CVFPB, and DWR to avoid increased flood  
17 potential and levee failure due to construction and operation of the facilities as described in Section  
18 6.2.2.4. If the design flood elevations did not consider sea level rise to reduce impacts, these impacts  
19 are considered significant. Mitigation Measure SW-57 would reduce this impact to a less-than-  
20 significant level.

#### 21 **Mitigation Measure SW-7: Implement Measures to Reduce Flood Damage**

22 Please see Mitigation Measure SW-7 under Impact SW-7 in the discussion of Alternative 1A.

### 23 **6.3.3.7 Alternative 2C—Dual Conveyance with West Alignment and** 24 **Intakes W1–W5 (15,000 cfs; Operational Scenario B)**

#### 25 **Reverse Flows in Old and Middle River**

#### 26 **Impact SW-3: Change in Reverse Flow Conditions in Old and Middle Rivers**

27 **NEPA Effects:** Effects on Old and Middle River flows under Alternative 2C would be identical to  
28 those described for Impact SW-3 under Alternative 2A because the operations of the facilities would  
29 be identical.

30 **CEQA Conclusion:** Alternative 2C would provide positive changes related to reducing reverse flows  
31 in Old and Middle Rivers in May-June through March and negative changes in the form of less  
32 positive flows in wetter years and increased reverse flow conditions in drier years during April and  
33 May as compared to Existing Conditions. These impacts are considered significant because the  
34 increase (more negative) in reverse flow conditions is greater than 1%. The significance of the  
35 impact to beneficial use of the surface water for water supplies and aquatic resources, and  
36 appropriate Mitigation Measures for those impacts on beneficial uses, Determination of the  
37 significance of this effect is related to effects on water quality and aquatic resources. Therefore, the  
38 significance of these effects is are described in Chapter 8, *Water Quality*, and Chapter 11, *Fisheries*  
39 *and Aquatic Resources*.

1 **Impact SW-7: Expose People or Structures to a Significant Risk of Loss, Injury, or Death**  
 2 **Involving Flooding Due to the Construction of New Conveyance Facilities**

3 **NEPA Effects:** Effects associated with construction of conveyance facilities under Alternative 2C  
 4 would be identical to those described under Alternative 1C because the facilities would be identical.  
 5 Alternative 2C would not result in increased exposure of people or structures to flooding due to  
 6 construction of the conveyance facilities because the BDCP proponents would be required to comply  
 7 with USACE, CVFPB, and DWR requirements to avoid increased flood potential and levee failure due  
 8 to construction and operation of the facilities as described in Section 6.2.2.4. Additionally, DWR  
 9 would consult with local reclamation districts to ensure that construction activities would not  
 10 conflict with reclamation district flood protection measures. Determination of design flood  
 11 elevations would need to consider sea level rise to reduce impacts.

12 **CEQA Conclusion:** Alternative 2C would not result in an increase to exposure of people or structures  
 13 to flooding due to construction of the conveyance facilities because the BDCP proponents would be  
 14 required to comply with the requirements of USACE, CVFPB, and DWR to avoid increased flood  
 15 potential and levee failure due to construction and operation of the facilities as described in Section  
 16 6.2.2.4. If the design flood elevations did not consider sea level rise to reduce impacts, these impacts  
 17 are considered significant. Mitigation Measure SW-57 would reduce this impact to a less-than-  
 18 significant level.

19 **Mitigation Measure SW-7: Implement Measures to Reduce Flood Damage**

20 Please see Mitigation Measure SW-7 under Impact SW-7 in the discussion of Alternative 1A.

21 **6.3.3.8 Alternative 3—Dual Conveyance with Pipeline/Tunnel and**  
 22 **Intakes 1 and 2 (6,000 cfs; Operational Scenario A)**

23 **Reverse Flows in Old and Middle River**

24 **Impact SW-3: Change in Reverse Flow Conditions in Old and Middle Rivers**

25 Reverse flow conditions for Old and Middle River flows would be reduced under Alternative 3 on a  
 26 long-term average basis except in April and May; and October, compared to reverse flows under  
 27 both Existing Conditions and the No Action Alternative, as shown in Figure 6-23. Compared to flows  
 28 under the No Action Alternative, Old and Middle River flows would be less positive in April and May  
 29 under Alternative 3 because Alternative 3 does not include inflow/export ratio criteria for the San  
 30 Joaquin River in those months; and it would be less positive in October because Alternative 3 does  
 31 not include Fall X2. Therefore, Alternative 3 would result in reduced reverse flow conditions in Old  
 32 and Middle Rivers in November through March and June through September and increased reverse  
 33 flow conditions in April, May, and October.

34 **NEPA Effects:** A comparison with reverse flow conditions under the No Action Alternative provides  
 35 an indication of the potential change due to Alternative 3 without the effects of sea level rise and  
 36 climate change and the results show that reverse flow conditions under Alternative 3 would be  
 37 reduced on a long-term average basis except in October, April, and May as compared to No Action  
 38 Alternative.

39 **CEQA Conclusion:** Alternative 3 would provide positive changes related to reducing reverse flows in  
 40 Old and Middle Rivers in June through March and negative changes in the form of increased reverse

1 flow conditions in April and May, compared to Existing Conditions. These impacts are considered  
 2 significant because the increase (more negative) in reverse flow conditions is greater than 1%. The  
 3 significance of the impact to beneficial use of the surface water for water supplies and aquatic  
 4 resources, and appropriate Mitigation Measures for those impacts on beneficial uses. Determination  
 5 of the significance of this impact is related to impacts on water quality and aquatic resources. The  
 6 significance of these impacts is are described in Chapter 8, *Water Quality*, and Chapter 11, *Fisheries*  
 7 *and Aquatic Resources*.

### 8 **Impact SW-7: Expose People or Structures to a Significant Risk of Loss, Injury, or Death** 9 **Involving Flooding Due to the Construction of New Conveyance Facilities**

10 **NEPA Effects:** Effects associated with construction of conveyance facilities under Alternative 3  
 11 would be similar to those described under Alternative 1A because the facilities would be similar  
 12 with the exception of three fewer intakes, pumping plants, and associated conveyance facilities.  
 13 Therefore, potential for effects would be less than described under Alternative 1A. However, the  
 14 measures included in Alternative 1A to avoid adverse effects would be included in Alternative 3.  
 15 Therefore, Alternative 3 would not result in an increase to exposure of people or structures to  
 16 flooding due to construction of the conveyance facilities because the BDCP proponents would be  
 17 required to comply with USACE, CVFPB, and DWR requirements to avoid increased flood potential  
 18 and levee failure due to construction and operation of the facilities as described in Section 6.2.2.4.  
 19 Additionally, DWR would consult with local reclamation districts to ensure that construction  
 20 activities would not conflict with reclamation district flood protection measures. Determination of  
 21 design flood elevations would need to consider sea level rise to reduce impacts.

22 **CEQA Conclusion:** Alternative 3 would not result in an increase to exposure of people or structures  
 23 to flooding due to construction of the conveyance facilities because the BDCP proponents would be  
 24 required to comply with the requirements of USACE, CVFPB, and DWR to avoid increased flood  
 25 potential and levee failure due to construction and operation of the facilities as described in Section  
 26 6.2.2.4. If the design flood elevations did not consider sea level rise to reduce impacts, these impacts  
 27 are considered significant. Mitigation Measure SW-57 would reduce this impact to a less-than-  
 28 significant level.

#### 29 **Mitigation Measure SW-7: Implement Measures to Reduce Flood Damage**

30 Please see Mitigation Measure SW-7 under Impact SW-7 in the discussion of Alternative 1A.

### 31 **6.3.3.9 Alternative 4—Dual Conveyance with Modified Pipeline/Tunnel** 32 **and Intakes 2, 3, and 5 (9,000 cfs; Operational Scenario H)**

33 Facilities construction under Alternative 4 would include construction of three intakes. be similar to  
 34 those described under Alternative 2A with only three intakes. The facilities at the intake locations  
 35 would not include pump; however, the facilities would include fish screens and sediment removal as  
 36 included in Alternative 2A. The intermediate forebay also would be smaller than under Alternative  
 37 2A.

38 Alternative 4 water conveyance operations would be based on Alternative 2A, with the exception  
 39 that a range of possible operations for the additional spring and fall Delta outflow requirements that  
 40 are considered to be equally likely would be evaluated. This range of operations comprises four  
 41 separate scenarios as described in detail in Section 3.6.4.2 in Chapter 3, *Description of Alternatives*,

1 and in Appendix 5A, BDCP EIR/EIS Modeling Technical Appendix. These four scenarios vary  
 2 depending on assumptions for Delta outflow requirements in spring and fall.

- 3 • Alternative 4 Operational Scenario H1 (Alternative 4 H1) does not include enhanced spring  
 4 outflow requirements or Fall X2,
- 5 • Alternative 4 Operational Scenario H2 (Alternative 4 H2) includes enhanced spring outflow  
 6 requirements but not Fall X2,
- 7 • Alternative 4 Operational Scenario H3 (Alternative 4 H3) does not include enhanced spring  
 8 outflow requirements but includes Fall X2 (similar to Alternative 2A), and
- 9 • Alternative 4 Operational Scenario H4 (Alternative 4 H4) includes both enhanced spring outflow  
 10 requirements and Fall X2.

11 Model results discussed for this Alternative are summarized in Tables 6-2 through 6-7.

## 12 **SWP/CVP Reservoir Storage and Related Changes to Flood Potential**

### 13 **Impact SW-1: Changes in SWP or CVP Reservoir Flood Storage Capacity**

14 Reservoir storage in Shasta Lake, Folsom Lake, and Lake Oroville during the October through June  
 15 period is compared to the flood storage capacity of each reservoir to identify the number of months  
 16 where the reservoir storage is close to the flood storage capacity.

17 **NEPA Effects:** Under Alternative 4 scenarios, the number of months where the reservoir storage is  
 18 close to the flood storage capacity in Shasta Lake, Folsom Lake, and Lake Oroville would be similar  
 19 (or show no more than 10% increase) under the No Action Alternative, as shown in Tables 6-2  
 20 through 6-7.

21 A comparison with storage conditions under the No Action Alternative provides an indication of the  
 22 potential change due to Alternative 4 without the effects of sea level rise and climate change and the  
 23 results show that reservoir storages would not be consistently high during October through June  
 24 under Alternative 4 as compared to the conditions under the No Action Alternative. Therefore,  
 25 Alternative 4 would not result in adverse effects on reservoir flood storage capacity as compared to  
 26 the conditions without the project.

27 **CEQA Conclusion:** Under Alternative 4 scenarios, the number of months where the reservoir storage  
 28 is close to the flood storage capacity in Shasta Lake, Folsom Lake, and Lake Oroville would be less  
 29 than under Existing Conditions, as shown in Tables 6-2 through 6-7. These differences represent  
 30 changes under Alternative 4, increased demands from Existing Conditions to No Action Alternative,  
 31 and changes due to sea level rise and climate change. Alternative 4 would not cause consistently  
 32 higher storages in the upper Sacramento River watershed during the October through June period.  
 33 Accordingly, Alternative 4 would result in a less-than-significant impact on flood management. No  
 34 mitigation is required.

## ~~Peak Monthly Flows~~ **Highest Monthly Flows** in Sacramento and San Joaquin Rivers and Related Changes to Flood Potential

### **Impact SW-2: Changes in Sacramento and San Joaquin River Flood Flows**

#### **Sacramento River at Bend Bridge**

~~Peak monthly flows~~ **Highest monthly flows** that occur in Sacramento River at Bend Bridge are shown in Figures 6-8 and 6-9 during wet years and over the long-term average.

Average of highest flows simulated (flows with probability of exceedance of 10% or less) under Alternative 4 would remain similar (in scenarios H3 and H4) or increase by no more than 1% (in scenarios H1 and H2) of the channel capacity (100,000 cfs) as compared to the flows under the No Action Alternative, as shown in Tables 6-2 through 6-4.

Average of highest flows simulated (flows with probability of exceedance of 10% or less) under Alternative 4 would increase by 2% (in scenarios H3 and H4) to 3% (in scenarios H1 and H2) of the channel capacity (100,000 cfs) as compared to the flows under Existing Conditions, as shown in Tables 6-2 through 6-4. The increase primarily would occur due to sea level rise, climate change, and increased north of Delta demands.

A comparison with flow conditions under the No Action Alternative provides an indication of the potential change due to Alternative 4 without the effects of sea level rise and climate change and the results show that there would not be a consistent increase in high flow conditions under Alternative 4 as compared to the No Action Alternative. Therefore, Alternative 4 would not result in adverse impacts on flow conditions in the Sacramento River at Bend Bridge as compared to the conditions without the project.

#### **Sacramento River at Freeport**

~~Peak monthly flows~~ **Highest monthly flows** that occur in Sacramento River at Freeport are shown in Figures 6-10 and 6-11 during wet years and over the long-term average.

Average of highest flows simulated (flows with probability of exceedance of 10% or less) under all Alternative 4 scenarios would decrease by 1% of the channel capacity (110,000 cfs) as compared to the flows under the No Action Alternative, as shown in Tables 6-2 through 6-4.

Average of highest flows simulated (flows with probability of exceedance of 10% or less) under Alternative 4 would remain similar (in scenarios H3 and H4) or increase by no more than 1% (in scenarios H1 and H2) of the channel capacity (110,000 cfs) as compared to the flows under Existing Conditions, as shown in Tables 6-2 through 6-4. The increase primarily would occur due to sea level rise, climate change, and increased north of Delta demands.

A comparison with flow conditions under the No Action Alternative provides an indication of the potential change due to Alternative 4 without the effects of sea level rise and climate change and the results show that there would not be a consistent increase in high flow conditions under Alternative 4 as compared to the No Action Alternative. Therefore, Alternative 4 would not result in adverse impacts on flow conditions in the Sacramento River at Freeport as compared to the conditions without the project.

### 1 **San Joaquin River at Vernalis**

2 ~~Peak monthly flows~~Highest monthly flows that occur in San Joaquin River at Vernalis are shown in  
3 Figures 6-12 and 6-13 during wet years and over the long-term average.

4 Average of highest flows simulated (flows with probability of exceedance of 10% or less) under all  
5 Alternative 4 scenarios would remain similar to (or show less than 1% change with respect to the  
6 channel capacity: 52,000 cfs) as compared to the flows under the No Action Alternative, as shown in  
7 Tables 6-2 through 6-4.

8 Average of highest flows simulated (flows with probability of exceedance of 10% or less) under all  
9 Alternative 4 scenarios would remain similar (or show less than 1% change with respect to the  
10 channel capacity: 110,000 cfs) as compared to the flows under Existing Conditions, as shown in  
11 Tables 6-2 through 6-4.

12 A comparison with flow conditions under the No Action Alternative provides an indication of the  
13 potential change due to Alternative 4 without the effects of sea level rise and climate change and the  
14 results show that there would not be a consistent increase in high flow conditions under Alternative  
15 4 as compared to the No Action Alternative. Therefore, Alternative 4 would not result in adverse  
16 impacts on flow conditions in the San Joaquin River at Vernalis as compared to the conditions  
17 without the project.

### 18 **Sacramento River at Locations Upstream of Walnut Grove (downstream of north Delta intakes)**

19 ~~Peak monthly flows~~Highest monthly flows that occur in the n the Sacramento River upstream of  
20 Walnut Grove are shown in Figures 6-14 and 6-15 during wet years and over the long-term average.

21 Average of highest flows simulated (flows with probability of exceedance of 10% or less) under  
22 Alternative 4 would decrease by 8% (in scenarios H1 and H2) to 9% (in scenarios H3 and H4) of the  
23 channel capacity (110,000 cfs) as compared to the flows under the No Action Alternative, as shown  
24 in Tables 6-2 through 6-4.

25 Average of highest flows simulated (flows with probability of exceedance of 10% or less) under  
26 Alternative 4 would decrease by 7% (in scenarios H1 and H2) to 8% (in scenarios H3 and H4) of the  
27 channel capacity (110,000 cfs) as compared to the flows under Existing Conditions, as shown in  
28 Tables 6-2 through 6-4. This decrease primarily would occur due to sea level rise, climate change,  
29 and increased north of Delta demands.

30 A comparison with flow conditions under the No Action Alternative provides an indication of the  
31 potential change due to Alternative 4 without the effects of sea level rise and climate change and the  
32 results show that there would not be a consistent increase in high flow conditions under Alternative  
33 4 as compared to the No Action Alternative. Therefore, Alternative 4 would not result in adverse  
34 impacts on flow conditions in the Sacramento River upstream of Walnut Grove as compared to the  
35 conditions without the project.

### 36 **Trinity River Downstream of Lewiston Dam**

37 ~~Peak monthly flows~~Highest monthly flows that occur in the Trinity River downstream of Lewiston  
38 Lake are shown in Figures 6-16 and 6-17 during wet years and over the long-term average.

39 Average of highest flows simulated (flows with probability of exceedance of 10% or less) under  
40 Alternative 4 would remain similar (in scenarios H3 and H4) or increase by no more than 1% (in

1 scenarios H1 and H2) of the channel capacity (6,000 cfs) as compared to the flows under the No  
2 Action Alternative, as shown in Tables 6-2 through 6-4.

3 Average of highest flows simulated (flows with probability of exceedance of 10% or less) under  
4 Alternative 4 would increase by 4% (in scenarios H3 and H4) to 5% (in scenarios H1 and H2) of the  
5 channel capacity (6,000 cfs) as compared to the flows under Existing Conditions, as shown in Tables  
6 6-2 through 6-4. This increase primarily would occur due to sea level rise, climate change, and  
7 increased north of Delta demands.

8 A comparison with flow conditions under the No Action Alternative provides an indication of the  
9 potential change due to Alternative 4 without the effects of sea level rise and climate change and the  
10 results show that there would not be a consistent increase in high flow conditions under Alternative  
11 4 as compared to the No Action Alternative. Therefore, Alternative 4 would not result in adverse  
12 impacts on flow conditions in the Trinity River downstream of Lewiston Lake as compared to the  
13 conditions without the project.

#### 14 **American River Downstream of Nimbus Dam**

15 ~~Peak monthly flows~~Highest monthly flows that occur in the American River at Nimbus Dam are  
16 shown in Figures 6-18 and 6-19 during wet years and over the long-term average.

17 Average of highest flows simulated (flows with probability of exceedance of 10% or less) under all  
18 Alternative 4 scenarios would remain similar to (or show less than 1% change with respect to the  
19 channel capacity: 115,000 cfs) as compared to the flows under the No Action Alternative, as shown  
20 in Tables 6-2 through 6-4.

21 Average of highest flows simulated (flows with probability of exceedance of 10% or less) under all  
22 Alternative 4 scenarios would increase by no more than 1% of the channel capacity (115,000 cfs) as  
23 compared to the flows under Existing Conditions, as shown in Tables 6-2 through 6-4. This increase  
24 primarily would occur due to sea level rise, climate change, and increased north of Delta demands.

25 A comparison with flow conditions under the No Action Alternative provides an indication of the  
26 potential change due to Alternative 4 without the effects of sea level rise and climate change and the  
27 results show that there would not be a consistent increase in high flow conditions under Alternative  
28 4 as compared to the No Action Alternative. Therefore, Alternative 4 would not result in adverse  
29 impacts on flow conditions in the American River at Nimbus Dam as compared to the conditions  
30 without the project.

#### 31 **Feather River Downstream of Thermalito Dam**

32 ~~Peak monthly flows~~Highest monthly flows that occur in the Feather River downstream of  
33 Thermalito Dam are shown in Figures 6-20 and 6-21 during wet years and over the long-term  
34 average.

35 Average of highest flows simulated (flows with probability of exceedance of 10% or less) under  
36 Alternative 4 would remain similar (in scenarios H1 and H3) or increase by no more than 1% (in  
37 scenarios H2 and H4) of the channel capacity (210,000 cfs) as compared to the flows under the No  
38 Action Alternative, as shown in Tables 6-2 through 6-4.

39 Average of highest flows simulated (flows with probability of exceedance of 10% or less) under  
40 Alternative 4 would remain similar (in scenario H3) or increase by no more than 1% (in scenarios  
41 H1, H2, and H4) of the channel capacity (210,000 cfs) as compared to the flows under Existing

1 Conditions, as shown in Tables 6-2 through 6-4. The increase primarily would occur due to sea level  
2 rise, climate change, and increased north of Delta demands.

3 A comparison with flow conditions under the No Action Alternative provides an indication of the  
4 potential change due to Alternative 4 without the effects of sea level rise and climate change and the  
5 results show that there would not be a consistent increase in high flow conditions under Alternative  
6 4 as compared to the No Action Alternative. Therefore, Alternative 4 would not result in adverse  
7 impacts on flow conditions in the Feather River at Thermalito Dam as compared to the conditions  
8 without the project.

### 9 **Yolo Bypass at Fremont Weir**

10 ~~Peak monthly spills~~Highest monthly spills into the Yolo Bypass at Fremont Weir occur in February  
11 during wet years, as shown in Figure 6-22.

12 Average of highest spills simulated (flows with probability of exceedance of 10% or less) under  
13 Alternative 4 (in all four Alternative 4 scenarios) would increase no more than 1% of the channel  
14 capacity as compared to the flows under the No Action Alternative, as shown in Tables 6-2 through  
15 6-4.

16 Average of highest spills simulated (flows with probability of exceedance of 10% or less) under  
17 Alternative 4 would increase by no more than 1% (in scenario H3) to 2% (in scenarios H1, H2, and  
18 H4) of the channel capacity (343,000 cfs) as compared to the flows under Existing Conditions, as  
19 shown in Tables 6-2 through 6-4. This increase primarily would occur due to sea level rise, climate  
20 change, and increased north of Delta demands.

21 A comparison with flow conditions under the No Action Alternative provides an indication of the  
22 potential change due to Alternative 4 without the effects of sea level rise and climate change and the  
23 results show that there would not be a consistent increase in high flow conditions under Alternative  
24 4 as compared to the No Action Alternative. Therefore, Alternative 4 would not result in adverse  
25 impacts on flow conditions in the Yolo Bypass at Fremont Weir as compared to the conditions  
26 without the project.

27 **NEPA Effects:** Overall, Alternative 4 would not result in an increase in potential risk for flood  
28 management compared to the No Action Alternative. ~~Peak monthly flows~~Highest monthly flows  
29 under Alternative 4 in the locations considered in this analysis either were similar to or less than  
30 ~~peak monthly flows~~highest monthly flows that would occur under the No Action Alternative; or the  
31 increase in ~~peak monthly flows~~highest monthly flows would be less than the flood capacity for the  
32 channels at these locations.

33 Average of highest flows simulated (flows with probability of exceedance of 10% or less) would  
34 increase no more than 1% of the channel capacity as compared to the flows under the No Action  
35 Alternative.

36 Increased frequency of spills due to the proposed notch under Alternative 4 would not cause any  
37 significant adverse effect in conveying flood flows, because the maximum capacity of the notch is  
38 6,000 cfs (less than 2% of the channel capacity); and the notch is closed (no additional flow) when  
39 the River stage reaches the weir crest elevation. Therefore, even if the notch enables spills before  
40 the River stage reaches the crest elevation, these spills would be minor relative to the capacity of the  
41 Bypass. Velocity in the Bypass would increase as the spills occur over the crest; therefore the inertia

1 due to earlier spills through the notch would decrease and would not be significant by the time the  
2 Bypass reaches full capacity.

3 Therefore, Alternative 4 would not result in adverse effects on flood management.

4 **CEQA Conclusion:** Alternative 4 would not result in an increase in potential risk for flood  
5 management compared to Existing Conditions when the changes due to sea level rise and climate  
6 change are eliminated from the analysis. ~~Peak monthly flows~~Highest monthly flows under  
7 Alternative 4 in the locations considered in this analysis either were similar to or less than those  
8 that would occur under Existing Conditions without the changes in sea level rise and climate change;  
9 or the increased ~~peak monthly flows~~highest monthly flows would not exceed the flood capacity of  
10 the channels at these locations. Accordingly, Alternative 4 would result in a less-than-significant  
11 impact on flood management. No mitigation is required.

## 12 Reverse Flows in Old and Middle River

### 13 Impact SW-3: Change in Reverse Flow Conditions in Old and Middle Rivers

14 Reverse flow conditions for Old and Middle River flows would be reduced under Alternative 4 on a  
15 long-term average basis except in May in scenarios H2 and H4 and in April and May in scenarios H1  
16 and H3, compared to reverse flows under both Existing Conditions and the No Action Alternative, as  
17 shown in Figure 6-23. Compared to flows under the No Action Alternative, Old and Middle River  
18 flows would be less positive in April and May under scenarios H1 and H3 because these scenarios do  
19 not include inflow/export ratio criteria for the San Joaquin River in those months, although there  
20 are other criteria for Old and Middle River flows assumed in these scenarios. This effect is only seen  
21 in May in scenarios H2 and H4 because these two scenarios include enhanced spring outflow  
22 requirements. Therefore, Alternative 4 would result in reduced reverse flow conditions in Old and  
23 Middle Rivers in June through March and increased reverse flow conditions in April (in scenarios H1  
24 and H3) and May (in all four Alternative 4 scenarios).

25 **NEPA Effects:** A comparison with reverse flow conditions under the No Action Alternative provides  
26 an indication of the potential change due to Alternative 4 without the effects of sea level rise and  
27 climate change and the results show that reverse flow conditions under Alternative 4 would be  
28 reduced on a long-term average basis except in April and May as compared to No Action Alternative.

29 **CEQA Conclusion:** Alternative 4 would provide positive changes related to reducing reverse flows in  
30 Old and Middle Rivers in June through March and negative changes in the form of increased reverse  
31 flow conditions in April and May, compared to Existing Conditions. These impacts are considered  
32 significant because the increase (more negative) in reverse flow conditions is greater than 1%. The  
33 significance of the impact to beneficial use of the surface water for water supplies and aquatic  
34 resources, and appropriate Mitigation Measures for those impacts on beneficial uses. Determination  
35 of the significance of this impact is related to impacts on water quality and aquatic resources. The  
36 significance of these impacts is are described in Chapter 8, Water Quality, and Chapter 11, Fisheries  
37 and Aquatic Resources.

1 **Impact SW-4: Substantially Alter the Existing Drainage Pattern or Substantially Increase the**  
 2 **Rate or Amount of Surface Runoff in a Manner That Would Result in Flooding during**  
 3 **Construction of Conveyance Facilities**

4 **NEPA Effects:** Effects associated with construction and operations of facilities under Alternative 4  
 5 would be similar to those described under Alternative 1A ~~with the exception of three two fewer~~  
 6 ~~intakes, elimination of the pumps at the intake locations, and reduction of the intermediate forebay~~  
 7 ~~acreage. Additional pumps would be constructed near Clifton Court Forebay under Alternative 4 as~~  
 8 ~~compared to Alternative 1A. bB~~ Because similar construction methods and similar features would be  
 9 used as under Alternative 1A, ~~the types of effects would be similar. However, the~~ ~~Accordingly,~~  
 10 potential for effects would be less than described under Alternative 1A. However, the measures  
 11 included in Alternative 1A to avoid adverse effects would be included in Alternative 4.

12 Alternative 4 would involve excavation, grading, stockpiling, soil compaction, and dewatering that  
 13 would result in temporary and long-term changes to drainage patterns, drainage paths, and facilities  
 14 that would in turn, cause changes in drainage flow rates, directions, and velocities. Construction of  
 15 cofferdams ~~would could~~ impede river flows, cause hydraulic effects, and increase water surface  
 16 elevations upstream. Potential adverse effects could occur due to increased stormwater runoff from  
 17 paved areas that could increase flows in local drainages; and changes in sediment accumulation near  
 18 the intakes. Mitigation Measure SW-4 is available to address effects of runoff and sedimentation.

19 **CEQA Conclusion:** Alternative 4 ~~would could~~ result in alterations to drainage patterns, stream  
 20 courses, and runoff; and potential for increased surface water elevations in the rivers and streams  
 21 during construction and operations of facilities located within the waterway. Potential impacts could  
 22 occur due to increased stormwater runoff from paved areas that could increase flows in local  
 23 drainages, and from changes in sediment accumulation near the intakes. These impacts are  
 24 considered significant. Mitigation Measure SW-4 would reduce this impact to a less-than-significant  
 25 level

26 **Mitigation Measure SW-4: Implement Measures to Reduce Runoff and Sedimentation**

27 Please see Mitigation Measure SW-4 under Impact SW-4 in the discussion of Alternative 1A.

28 **Impact SW-5: Substantially Alter the Existing Drainage Pattern or Substantially Increase the**  
 29 **Rate or Amount of Surface Runoff in a Manner That Would Result in Flooding during**  
 30 **Construction of Habitat Restoration Area Facilities**

31 **NEPA Effects:** Effects of alternating existing drainage patterns under Alternative 4 would be the  
 32 same as those described for Impact SW-5 under Alternative 1A because the habitat restoration areas  
 33 would be identical and provisions to avoid adverse effects on drainage patterns would be the same.

34 **CEQA Conclusion:** Please see Impact SW-5 conclusion in Alternative 1A.

35 **Mitigation Measure SW-4: Implement Measures to Reduce Runoff and Sedimentation**

36 Please see Mitigation Measure SW-4 under Impact SW-4 in the discussion of Alternative 1A.

1 **Impact SW-6: Create or Contribute Runoff Water Which Would Exceed the Capacity of**  
 2 **Existing or Planned Stormwater Drainage Systems or Provide Substantial Additional Sources**  
 3 **of Polluted Runoff**

4 Effects associated with construction and operations of facilities under Alternative 4 would be similar  
 5 to those described under Alternative 1A with the exception of three fewer intakes, elimination of  
 6 the pumps at the intake locations, and reduction of the intermediate forebay acreage. Additional  
 7 pumps would be constructed near Clifton Court Forebay under Alternative 4 as compared to  
 8 Alternative 1A. ~~Because similar construction methods and similar features would be used as under~~  
 9 ~~Alternative 1A, the types of effects would be similar. However, the~~ ~~Accordingly,~~ potential for effects  
 10 would be less than described under Alternative 1A.

11 **NEPA Effects:** Paving, soil compaction, and other activities would increase runoff during facilities  
 12 construction and operations. Construction and operation of dewatering facilities and associated  
 13 discharge of water would result in localized increases in flows and water surface elevations in  
 14 receiving channels. These activities could result in adverse effects if the runoff volume exceeds the  
 15 capacities of local drainages. Compliance with permit design requirements would avoid adverse  
 16 effects on surface water quality and flows from dewatering activities. The use of dispersion facilities  
 17 would reduce the potential for channel erosion. Mitigation Measure SW-4 is available to address  
 18 adverse effects.

19 **CEQA Conclusion:** Alternative 4 actions would include installation of dewatering facilities in  
 20 accordance with permits issued by the Regional Water Quality Control Board, USACE, and CVFPB  
 21 (See Section 6.2.2.4). Alternative 4 would include provisions to design the dewatering system in  
 22 accordance with these permits to avoid significant impacts on surface water quality and flows. As an  
 23 example, the project would be designed to meet USACE requirements for hydraulic neutrality and  
 24 CVFPB requirements for access for maintenance and flood-fighting purposes. However, increased  
 25 runoff could occur from facilities sites during construction or operations and could result in  
 26 significant impacts if the runoff volume exceeds the capacities of local drainages. These impacts are  
 27 considered significant. Mitigation Measure SW-4 would reduce this potential impact to a less-than-  
 28 significant level.

29 **Mitigation Measure SW-4: Implement Measures to Reduce Runoff and Sedimentation**

30 Please see Mitigation Measure SW-4 under Impact SW-4 in the discussion of Alternative 1A.

31 **Impact SW-7: Expose People or Structures to a Significant Risk of Loss, Injury, or Death**  
 32 **Involving Flooding Due to the Construction of New Conveyance Facilities**

33 **NEPA Effects:** Effects associated with construction of conveyance facilities under Alternative 4  
 34 would be identical those described under Alternative 1A with the exception of three fewer  
 35 intakes, elimination of the pumps at the intake locations, and reduction of the intermediate forebay  
 36 acreage. Additional pumps would be constructed near Clifton Court Forebay under Alternative 4 as  
 37 compared to Alternative 1A. ~~Because similar construction methods and similar features would be~~  
 38 ~~used as under Alternative 1A, the types of effects would be similar. However, the~~ ~~Therefore,~~  
 39 potential for effects would be less than described under Alternative 1A. However, the measures  
 40 included in Alternative 1A to avoid adverse effects would be included in Alternative 4.

41 Alternative 4 would not result in an increase to exposure of people or structures to flooding due to  
 42 construction of the conveyance facilities because the BDCP proponents would be required to comply

1 with USACE, CVFPB, and DWR requirements to avoid increased flood potential and levee failure due  
 2 to construction and operation of the facilities as described in Section 6.2.2.4. Additionally, DWR  
 3 would consult with local reclamation districts to ensure that construction activities would not  
 4 conflict with reclamation district flood protection measures. Determination of design flood  
 5 elevations would need to consider sea level rise to reduce impacts.

6 **CEQA Conclusion:** Alternative 4 would not result in an increase to exposure of people or structures  
 7 to flooding due to construction of the conveyance facilities because the BDCP proponents would be  
 8 required to comply with the requirements of USACE, CVFPB, and DWR to avoid increased flood  
 9 potential and levee failure due to construction and operation of the facilities as described in Section  
 10 6.2.2.4. If the design flood elevations did not consider sea level rise to reduce impacts, these impacts  
 11 are considered significant. Mitigation Measure SW-57 would reduce this impact to a less-than-  
 12 significant level.

### 13 **Mitigation Measure SW-7: Implement Measures to Reduce Flood Damage**

14 Please see Mitigation Measure SW-7 under Impact SW-7 in the discussion of Alternative 1A.

### 15 **Impact SW-8: Expose People or Structures to a Significant Risk of Loss, Injury, or Death** 16 **Involving Flooding Due to Habitat Restoration**

17 **NEPA Effects:** Effects of operation of habitat restoration areas on levees under Alternative 4 would  
 18 be the same as those described for Impact SW-8 under Alternative 1A because the habitat  
 19 restoration areas would be identical and provisions to avoid adverse effects on drainage patterns  
 20 would be the same.

21 **CEQA Conclusion:** Please see Impact SW-8 conclusion in Alternative 1A.

### 22 **Mitigation Measure SW-8: Implement Measures to Address Potential Wind Fetch Issues**

23 Please see Mitigation Measure SW-8 under Impact SW-8 in the discussion of Alternative 1A.

### 24 **Impact SW-9: Place within a 100-Year Flood Hazard Area Structures Which Would Impede or** 25 **Redirect Flood Flows, or Be Subject to Inundation by Mudflow**

26 Effects associated with construction and operations of facilities under Alternative 4 would be  
 27 identical those described under Alternative 1A with the exception of three fewer intakes,  
 28 elimination of the pumps at the intake locations, and reduction of the intermediate forebay acreage.  
 29 Additional pumps would be constructed near Clifton Court Forebay under Alternative 4 as  
 30 compared to Alternative 1A. ~~B~~Because similar construction methods and similar features would be  
 31 used as under Alternative 1A, the types of effects would be similar. ~~Therefore~~ However, the potential  
 32 for effects would be less than described under Alternative 1A. However, ~~t~~The measures included in  
 33 Alternative 1A to avoid adverse effects would be included in Alternative 4. As described under  
 34 Impact SW-1, Alternative 4 would not increase flood potential on the Sacramento River, San Joaquin  
 35 River, Trinity River, American River, or Feather River, or Yolo Bypass, as described under Impact  
 36 SW-2. Alternative 4 would include measures to address issues associated with alterations to  
 37 drainage patterns, stream courses, and runoff and potential for increased surface water elevations in  
 38 the rivers and streams during construction and operations of facilities.

1 **NEPA Effects:** Potential adverse effects could occur due to increased stormwater runoff from paved  
 2 areas that could increase flows in local drainages; and changes in sediment accumulation near the  
 3 intakes. These effects are considered adverse. Mitigation Measure SW-4 is available to address these  
 4 potential effects.

5 **CEQA Conclusion:** Alternative 4 would not result in an impedance or redirection of flood flows or  
 6 conditions that would cause inundation by mudflow due to construction or operations of the  
 7 conveyance facilities or construction of the habitat restoration facilities because the BDCP  
 8 proponents would be required to comply with the requirements of USACE, CVFPB, and DWR to  
 9 avoid increased flood potential as described in Section 6.2.2.4. Potential adverse impacts could occur  
 10 due to increased stormwater runoff from paved areas that could increase flows in local drainages, as  
 11 well as changes in sediment accumulation near the intakes. These impacts are considered  
 12 significant. Mitigation Measure SW-4 would reduce this potential impact to a less-than-significant  
 13 level.

#### 14 **Mitigation Measure SW-4: Implement Measures to Reduce Runoff and Sedimentation**

15 Please see Mitigation Measure SW-4 under Impact SW-4 in the discussion of Alternative 1A.

### 16 **6.3.3.10 Alternative 5—Dual Conveyance with Pipeline/Tunnel and** 17 **Intake 1 (3,000 cfs; Operational Scenario C)**

#### 18 **Reverse Flows in Old and Middle River**

##### 19 **Impact SW-3: Change in Reverse Flow Conditions in Old and Middle Rivers**

20 Reverse flow conditions for Old and Middle River flows would be reduced under Alternative 5 on a  
 21 long-term average basis except in April and May compared to reverse flows under both Existing  
 22 Conditions and the No Action Alternative, as shown in Figure 6-23. Therefore, Alternative 5 would  
 23 result in reduced reverse flow conditions in Old and Middle Rivers in June through March and  
 24 increased reverse flow conditions in April and May.

25 **NEPA Effects:** A comparison with reverse flow conditions under the No Action Alternative provides  
 26 an indication of the potential change due to Alternative 5 without the effects of sea level rise and  
 27 climate change and the results show that reverse flow conditions under Alternative 5 would be  
 28 reduced on a long-term average basis except in October, April, and May as compared to No Action  
 29 Alternative.

30 **CEQA Conclusion:** Alternative 5 would provide positive changes related to reducing reverse flows in  
 31 Old and Middle Rivers in June through March and negative changes in the form of increased reverse  
 32 flow conditions in April and May, compared to Existing Conditions. These impacts are considered  
 33 significant because the increase (more negative) in reverse flow conditions is greater than 1%. The  
 34 significance of the impact to beneficial use of the surface water for water supplies and aquatic  
 35 resources, and appropriate Mitigation Measures for those impacts on beneficial uses. Determination  
 36 of the significance of this impact is related to impacts on water quality and aquatic resources. The  
 37 significance of these impacts is are described in Chapter 8, *Water Quality*, and Chapter 11, *Fisheries*  
 38 *and Aquatic Resources*.

1 **Impact SW-7: Expose People or Structures to a Significant Risk of Loss, Injury, or Death**  
 2 **Involving Flooding Due to the Construction of New Conveyance Facilities**

3 *NEPA Effects:* Effects associated with construction of conveyance facilities under Alternative 5  
 4 would be similar those described under Alternative 1A because the facilities would be similar with  
 5 the exception of four fewer intakes, pumping plants, associated conveyance facilities. Therefore,  
 6 potential for effects would be less than described under Alternative 1A. However, the measures  
 7 included in Alternative 1A to avoid adverse effects would be included in Alternative 5. Therefore,  
 8 Alternative 5 would not result in an increase to exposure of people or structures to flooding due to  
 9 construction of the conveyance facilities because the BDCP proponents would be required to comply  
 10 with USACE, CVFPB, and DWR requirements to avoid increased flood potential and levee failure due  
 11 to construction and operation of the facilities as described in Section 6.2.2.4. Additionally, DWR  
 12 would consult with local reclamation districts to ensure that construction activities would not  
 13 conflict with reclamation district flood protection measures. Determination of design flood  
 14 elevations would need to consider sea level rise to reduce impacts.

15 *CEQA Conclusion:* Alternative 5 would not result in an increase to exposure of people or structures  
 16 to flooding due to construction of the conveyance facilities because the BDCP proponents would be  
 17 required to comply with the requirements of USACE, CVFPB, and DWR to avoid increased flood  
 18 potential and levee failure due to construction and operation of the facilities as described in Section  
 19 6.2.2.4. If the design flood elevations did not consider sea level rise to reduce impacts, these impacts  
 20 are considered significant. Mitigation Measure SW-57 would reduce this impact to a less-than-  
 21 significant level.

22 **Mitigation Measure SW-7: Implement Measures to Reduce Flood Damage**

23 Please see Mitigation Measure SW-7 under Impact SW-7 in the discussion of Alternative 1A.

24 **6.3.3.11 Alternative 6A—Isolated Conveyance with Pipeline/Tunnel and**  
 25 **Intakes 1–5 (15,000 cfs; Operational Scenario D)**

26 **Reverse Flows in Old and Middle River**

27 **Impact SW-7: Expose People or Structures to a Significant Risk of Loss, Injury, or Death**  
 28 **Involving Flooding Due to the Construction of New Conveyance Facilities**

29 *NEPA Effects:* Effects associated with construction of conveyance facilities under Alternative 6A  
 30 would be identical to those described under Alternative 1A because the facilities would be identical.  
 31 Alternative 6A would not result in an increase to exposure of people or structures to flooding due to  
 32 construction of the conveyance facilities because the BDCP proponents would be required to comply  
 33 with USACE, CVFPB, and DWR to avoid increased flood potential and levee failure due to  
 34 construction and operation of the facilities as described in Section 6.2.2.4. Additionally, DWR would  
 35 consult with local reclamation districts to ensure that construction activities would not conflict with  
 36 reclamation district flood protection measures. Determination of design flood elevations would need  
 37 to consider sea level rise to reduce impacts.

38 *CEQA Conclusion:* Alternative 6A would not result in an increase to exposure of people or structures  
 39 to flooding due to construction of the conveyance facilities because the BDCP proponents would be  
 40 required to comply with the requirements of USACE, CVFPB, and DWR to avoid increased flood

1 potential [and levee failure due to construction and operation of the facilities](#) as described in Section  
 2 6.2.2.4. [If the design flood elevations did not consider sea level rise to reduce impacts, these impacts](#)  
 3 [are considered significant. Mitigation Measure SW-57 would reduce this impact to a less-than-](#)  
 4 [significant level.](#)

5 **[Mitigation Measure SW-7: Implement Measures to Reduce Flood Damage](#)**

6 [Please see Mitigation Measure SW-7 under Impact SW-7 in the discussion of Alternative 1A.](#)

7 **6.3.3.12 Alternative 6B—Isolated Conveyance with East Alignment and**  
 8 **Intakes 1–5 (15,000 cfs; Operational Scenario D)**

9 **Reverse Flows in Old and Middle River**

10 **Impact SW-7: Expose People or Structures to a Significant Risk of Loss, Injury, or Death**  
 11 **Involving Flooding Due to the Construction of New Conveyance Facilities**

12 *NEPA Effects:* Effects associated with construction of conveyance facilities under Alternative 6B  
 13 would be identical to those described under Alternative 1B because the facilities would be identical.  
 14 Alternative 6B would not result in an increase to exposure of people or structures to flooding due to  
 15 construction of the conveyance facilities because the BDCP proponents would be required to comply  
 16 with USACE, CVFPB, and DWR requirements to avoid increased flood potential [and levee failure due](#)  
 17 [to construction and operation of the facilities](#) as described in Section 6.2.2.4. Additionally, DWR  
 18 would consult with local reclamation districts to ensure that construction activities would not  
 19 conflict with reclamation district flood protection measures. [Determination of design flood](#)  
 20 [elevations would need to consider sea level rise to reduce impacts.](#)

21 *CEQA Conclusion:* Alternative 6B would not result in an increase to exposure of people or structures  
 22 to flooding due to construction of the conveyance facilities because the BDCP proponents would be  
 23 required to comply with the requirements of USACE, CVFPB, and DWR to avoid increased flood  
 24 potential [and levee failure due to construction and operation of the facilities](#) as described in Section  
 25 6.2.2.4. [If the design flood elevations did not consider sea level rise to reduce impacts, these impacts](#)  
 26 [are considered significant. Mitigation Measure SW-57 would reduce this impact to a less-than-](#)  
 27 [significant level.](#)

28 **[Mitigation Measure SW-7: Implement Measures to Reduce Flood Damage](#)**

29 [Please see Mitigation Measure SW-7 under Impact SW-7 in the discussion of Alternative 1A.](#)

30 **6.3.3.13 Alternative 6C—Isolated Conveyance with West Alignment and**  
 31 **Intakes W1–W5 (15,000 cfs; Operational Scenario D)**

32 **Reverse Flows in Old and Middle River**

33 **Impact SW-7: Expose People or Structures to a Significant Risk of Loss, Injury, or Death**  
 34 **Involving Flooding Due to the Construction of New Conveyance Facilities**

35 *NEPA Effects:* Effects associated with construction of conveyance facilities under Alternative 6C  
 36 would be identical to those described under Alternative 1C because the facilities would be identical.  
 37 Alternative 6B would not result in an increase to exposure of people or structures to flooding due to

1 construction of the conveyance facilities because the BDCP proponents would be required to comply  
 2 with USACE, CVFPB, and DWR requirements to avoid increased flood potential and levee failure due  
 3 to construction and operation of the facilities as described in Section 6.2.2.4. Additionally, DWR  
 4 would consult with local reclamation districts to ensure that construction activities would not  
 5 conflict with reclamation district flood protection measures. Determination of design flood  
 6 elevations would need to consider sea level rise to reduce impacts.

7 **CEQA Conclusion:** Alternative 6C would not result in an increase to exposure of people or structures  
 8 to flooding due to construction of the conveyance facilities because the BDCP proponents would be  
 9 required to comply with requirements of the USACE, CVFPB, and DWR to avoid increased flood  
 10 potential and levee failure due to construction and operation of the facilities as described in Section  
 11 6.2.2.4. If the design flood elevations did not consider sea level rise to reduce impacts, these impacts  
 12 are considered significant. Mitigation Measure SW-57 would reduce this impact to a less-than-  
 13 significant level.

#### 14 **Mitigation Measure SW-7: Implement Measures to Reduce Flood Damage**

15 Please see Mitigation Measure SW-7 under Impact SW-7 in the discussion of Alternative 1A.

### 16 **6.3.3.14 Alternative 7—Dual Conveyance with Pipeline/Tunnel, Intakes 2,** 17 **3, and 5, and Enhanced Aquatic Conservation (9,000 cfs;** 18 **Operational Scenario E)**

#### 19 **Reverse Flows in Old and Middle River**

#### 20 **Impact SW-7: Expose People or Structures to a Significant Risk of Loss, Injury, or Death** 21 **Involving Flooding Due to the Construction of New Conveyance Facilities**

22 **NEPA Effects:** Effects associated with construction of conveyance facilities under Alternative 7  
 23 would be similar to those described under Alternative 1A because the facilities would be similar  
 24 with the exception of two fewer intakes, pumping plants, and associated conveyance facilities.  
 25 Therefore, potential for effects would be less than described under Alternative 1A. However, the  
 26 measures included in Alternative 1A to avoid adverse effects would be included in Alternative 7.  
 27 Therefore, Alternative 3 would not result in an increase to exposure of people or structures to  
 28 flooding due to construction of the conveyance facilities because the BDCP proponents would be  
 29 required to comply with USACE, CVFPB, and DWR requirements to avoid increased flood potential  
 30 and levee failure due to construction and operation of the facilities as described in Section 6.2.2.4.  
 31 Additionally, DWR would consult with local reclamation districts to ensure that construction  
 32 activities would not conflict with reclamation district flood protection measures. Determination of  
 33 design flood elevations would need to consider sea level rise to reduce impacts.

34 **CEQA Conclusion:** Alternative 7 would not result in an increase to exposure of people or structures  
 35 to flooding due to construction of the conveyance facilities because the BDCP proponents would be  
 36 required to comply with the requirements of USACE, CVFPB, and DWR to avoid increased flood  
 37 potential and levee failure due to construction and operation of the facilities as described in Section  
 38 6.2.2.4. If the design flood elevations did not consider sea level rise to reduce impacts, these impacts  
 39 are considered significant. Mitigation Measure SW-57 would reduce this impact to a less-than-  
 40 significant level.

1 **Mitigation Measure SW-7: Implement Measures to Reduce Flood Damage**

2 Please see Mitigation Measure SW-7 under Impact SW-7 in the discussion of Alternative 1A.

3 **6.3.3.15 Alternative 8—Dual Conveyance with Pipeline/Tunnel, Intakes 2,**  
 4 **3, and 5, and Increased Delta Outflow (9,000 cfs; Operational**  
 5 **Scenario F)**

6 **Reverse Flows in Old and Middle River**

7 **Impact SW-7: Expose People or Structures to a Significant Risk of Loss, Injury, or Death**  
 8 **Involving Flooding Due to the Construction of New Conveyance Facilities**

9 *NEPA Effects:* Effects associated with construction of conveyance facilities under Alternative 8  
 10 would be similar to those described under Alternative 1A because the facilities would be similar  
 11 with the exception of two fewer intakes, pumping plants, and associated conveyance facilities.  
 12 Therefore, potential for effects would be less than described under Alternative 1A. However, the  
 13 measures included in Alternative 1A to avoid adverse effects would be included in Alternative 8.  
 14 Therefore, Alternative 8 would not result in an increase to exposure of people or structures to  
 15 flooding due to construction of the conveyance facilities because the facilities would be required to  
 16 comply with USACE, CVFPB, and DWR requirements to avoid increased flood potential and levee  
 17 failure due to construction and operation of the facilities as described in Section 6.2.2.4.

18 Additionally, DWR would consult with local reclamation districts to ensure that construction  
 19 activities would not conflict with reclamation district flood protection measures. Determination of  
 20 design flood elevations would need to consider sea level rise to reduce impacts.

21 *CEQA Conclusion:* Alternative 8 would not result in an increase to exposure of people or structures  
 22 to flooding due to construction of the conveyance facilities because the facilities would be required  
 23 to comply with USACE, CVFPB, and DWR requirement to avoid increased flood potential and levee  
 24 failure due to construction and operation of the facilities as described in Section 6.2.2.4. If the design  
 25 flood elevations did not consider sea level rise to reduce impacts, these impacts are considered  
 26 significant. Mitigation Measure SW-57 would reduce this impact to a less-than-significant level.

27 **Mitigation Measure SW-7: Implement Measures to Reduce Flood Damage**

28 Please see Mitigation Measure SW-7 under Impact SW-7 in the discussion of Alternative 1A.

29 **6.3.3.16 Alternative 9—Through Delta/Separate Corridors (15,000 cfs;**  
 30 **Operational Scenario G)**

31 **Reverse Flows in Old and Middle River**

32 **Impact SW-3: Change in Reverse Flow Conditions in Old and Middle Rivers**

33 Old and Middle River flow criteria in Alternative 9 is only applied to flows in the Middle River.

34 Reverse flow conditions for Old and Middle River flows would be reduced under Alternative 9 on a  
 35 long-term average basis only June compared to conditions under the No Action Alternative, as  
 36 shown in Figure 6-23. Therefore, Alternative 9 would result in adverse impacts in the form of  
 37 increased reverse flow conditions in almost all months.

1 Reverse flow conditions for Old and Middle River flows would be reduced under Alternative 9 on a  
 2 long-term average basis in months June through November compared to reverse flows under  
 3 Existing Conditions, as shown in Figure 6-23. However, these differences represent changes under  
 4 Alternative 9, increased demands from Existing Conditions to No Action Alternative, and changes  
 5 due to sea level rise and climate change.

6 **NEPA Effects:** A comparison with reverse flow conditions under the No Action Alternative provides  
 7 an indication of the potential change due to Alternative 9 without the effects of sea level rise and  
 8 climate change and the results show that reverse flow conditions under Alternative 9 would be  
 9 more likely to occur on a long-term average basis except in June as compared to No Action  
 10 Alternative.

11 **CEQA Conclusion:** Alternative 9 would provide negative changes in the form of increased reverse  
 12 flow conditions in all months except June, compared to Existing Conditions. These impacts are  
 13 considered significant because the increase (more negative) in reverse flow conditions is greater  
 14 than 1%. The significance of the impact to beneficial use of the surface water for water supplies and  
 15 aquatic resources, and appropriate Mitigation Measures for those impacts on beneficial uses,  
 16 Determination of the significance of this impact is related to impacts on water quality and aquatic  
 17 resources. The significance of these impacts is are described in Chapter 8, *Water Quality*, and  
 18 Chapter 11, *Fisheries and Aquatic Resources*.

#### 19 **Impact SW-7: Expose People or Structures to a Significant Risk of Loss, Injury, or Death** 20 **Involving Flooding Due to the Construction of New Conveyance Facilities**

21 As described under Impact SW-4, facilities under Alternative 9 would be designed to avoid increased  
 22 flood potential as compared to Existing Conditions or the No Action Alternative in accordance with  
 23 the requirements of USACE, CVFPB, and DWR. As described under Impact SW-1, Alternative 9 would  
 24 not increase flood potential on the Sacramento River, San Joaquin River, or Yolo Bypass.

25 USACE, CVFPB, and DWR would require facilities constructed under Alternative 9 that would disturb  
 26 existing levees to be designed in a manner that would not adversely affect existing flood protection.  
 27 Facilities construction would include temporary cofferdams, stability analyses, monitoring, and  
 28 slope remediation, as described in Chapter 3, *Description of Alternatives*. For the excavation of  
 29 existing levees for installation of fish screens and operable barriers, sheet pile wall installation  
 30 would minimize effects on slope stability during construction. Dewatering inside the cofferdams or  
 31 adjacent to the existing levees would remove waterside slope resistance and lead to slope instability.  
 32 Slopes would be constructed in accordance with existing engineering standards, as described in  
 33 Chapter 3, *Description of Alternatives*.

34 Some project facilities could require rerouting of access roads and waterways that could be used  
 35 during times of evacuation or emergency response.

36 Alternative 9 would be designed to avoid increased flood potential compared to Existing Conditions  
 37 or the No Action Alternative, in accordance with the requirements of USACE, CVFPB, and DWR.

38 **NEPA Effects:** Alternative 9 would not result in an increased exposure of people or structures to  
 39 flooding due to construction of the conveyance facilities because the BDCP proponents would be  
 40 required to comply with USACE, CVFPB, and DWR requirements to avoid increased flood potential  
 41 and levee failure due to construction and operation of the facilities as described in Section 6.2.2.4.  
 42 Additionally, DWR would consult with local reclamation districts to ensure that construction

1 activities would not conflict with reclamation district flood protection measures. Determination of  
2 design flood elevations would need to consider sea level rise to reduce impacts.

3 **CEQA Conclusion:** Alternative 9 would not result in increased exposure of people or structures to  
4 flooding due to construction of the conveyance facilities because the BDCP proponents would be  
5 required to comply with the requirements of USACE, CVFPB, and DWR to avoid increased flood  
6 potential and levee failure due to construction and operation of the facilities as described in Section  
7 6.2.2.4. If the design flood elevations did not consider sea level rise to reduce impacts, these impacts  
8 are considered significant. Mitigation Measure SW-57 would reduce this impact to a less-than-  
9 significant level.

### 10 Mitigation Measure SW-7: Implement Measures to Reduce Flood Damage

11 Please see Mitigation Measure SW-7 under Impact SW-7 in the discussion of Alternative 1A.

## 12 **6.3.4 Cumulative Analysis**

### 13 *Action Alternatives*

#### 14 **Impact SW-13: Cumulative Impact - Reverse Flow Conditions in Old and Middle Rivers**

15 **NEPA Effects:** Implementing the projects listed in Table 6-9 in combination with any of Alternatives  
16 1A through 9 would not result in cumulative adverse effects on Old and Middle River flows.

17 San Joaquin River Restoration Program would include recirculation of the water released from  
18 Friant Dam; however the increased south Delta exports would not cause increase in reverse OMR  
19 flows as they would be subject to the same OMR regulations. In addition, Alternatives 1A through 5  
20 and 9 would increase the occurrence of more negative OMR flows, especially in April and May;  
21 however, Alternatives 6 through 8 would include north Delta diversion facility that would help  
22 reduce south Delta pumping eliminate negative OMR flows in April and May.

23 Therefore, implementing these Because the cumulative projects would be required to convey water  
24 across the Delta in accordance with the BDCP alternative assumptions, implementation of the  
25 cumulative projects in combination with any of BDCP Alternatives 1A through 9 would not result in  
26 cumulative adverse effects in addition to the impacts described above for implementation of each  
27 alternative.

28 **CEQA Conclusion:** Because the cumulative projects would be required to convey water across the  
29 Delta in accordance with the BDCP alternative assumptions, implementation of the cumulative  
30 projects in combination with any of BDCP Alternatives 1A through 9 would not result in cumulative  
31 adverse effects in addition to the impacts described above for implementation of each alternative.  
32 Implementing these projects in combination with any of BDCP Alternatives 1A through 9 would not  
33 result in a significant cumulative impact. These impacts are considered significant for cumulative  
34 projects that would include Alternatives 1A through 5 or Alternative 9 because the increase (more  
35 negative) in reverse flow conditions is greater than 1%. The significance of the impact to beneficial  
36 use of the surface water for water supplies and aquatic resources, and appropriate Mitigation  
37 Measures for those impacts on beneficial uses is described in Chapter 8, *Water Quality*, and  
38 Chapter 11, *Fisheries and Aquatic Resources*. Implementation of cumulative projects with  
39 Alternatives 6 through 8 would result in less than significant impacts.

1 **6.4 References**

2 **6.4.1 Printed References**

3 [California Department of Water Resources. 2013. Urban Level of Flood Protection Criteria,](#)  
4 [FloodSAFE California. November.](#)

5 [California Department of Water Resources. 2014. Rural Levee Repair Guidelines, FloodSAFE](#)  
6 [California. March.](#)  
7

# State Investments in Delta Levees



## *Key Issues For Updating Priorities*

January 2015

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*“The Legislature further finds and declares that the leveed islands and tracts of the delta and portions of its uplands are floodprone areas of critical statewide significance due to the public safety risks and the costs of public emergency responses to floods, and that improvement and ongoing maintenance of the levee system is a matter of continuing urgency to protect farmlands, population centers, the state's water quality, and significant natural resource and habitat areas of the delta. The Legislature further finds that improvements and continuing maintenance of the levee system will not resolve all flood risks and that the delta is inherently a floodprone area wherein the most appropriate land uses are agriculture, wildlife habitat, and, where specifically provided, recreational activities, and that most of the existing levee systems are degraded and in need of restoration, improvement, and continuing management.”*

**Public Resources Code section 29704**

*“The Council envisions a future in which risks of flooding in the Delta are reduced, despite an increase in sea levels and altered runoff patterns. The Council sees a future where Delta residents, local governments, and business are better prepared to respond when floods threaten. The Council envisions a future where bypasses are expanded; channels are improved; and strong, well-maintained levees protect local communities-but also protect State interests in a more reliable water supply for California, and a protected and restored Delta ecosystem. These improvements will include new or expanded floodways and bypasses, maintaining and improving levees, and floodproofing new development.*

*The Council envisions that rural areas and the Delta’s legacy communities will also be protected from flood risks by careful land use planning that discourages urban development in flood-threatened areas. The Council envisions that local agencies will be better financed and protected through a locally controlled emergency response and flood protection district, with fee assessment authority. State funds for desired projects will be focused at State interests in the Delta, but some of that activity will protect local interests as well. Eliminating flood risks will be impossible, but prudent planning, reasonable land development, and improved flood management will significant reduce risk, and serve the coequal goals of a more reliable water supply, and a protected and restored Delta ecosystem.”*

**Delta Stewardship Council Delta Plan 2013**

# 1 Introduction and Problem Statement

2  
3 The Sacramento-San Joaquin Delta (Delta) is an intersection of multiple interests and dependencies. A  
4 common thread that holds these interests together is an extensive system of over 1,100 miles of levees.  
5 However, “the number of levees in the system, their general condition, the practices used to maintain  
6 and rehabilitate them, and the level of investment are simply not adequate to counter the number,  
7 severity, and likelihood of risks they currently face” (Delta Stewardship Council 2010a).

8  
9 California began providing funds to maintain the Delta levee system in 1973 and prepared its first plan  
10 for Delta levees in 1975 (DWR 1975). An estimated \$700 million of State funds has been invested in  
11 Delta levee maintenance and improvement since then. This includes \$274 million of bond funds that are  
12 encumbered for future Delta levee projects. Significant risks remain, despite these expenditures. For  
13 example, 15 years after the CALFED Bay-Delta program set a goal of bringing all Delta levees up to the  
14 standards of the U.S. Army Corps of Engineers’ (USACE) PL 84-99 program, the levee systems protecting  
15 69 percent of the Delta’s land do not meet this standard (Delta Stewardship Council 2013). Demands for  
16 future levee improvements are significant. Recent estimates for Delta levee improvements range from  
17 \$1.3 billion to nearly \$3 billion, adjusted for inflation.

18  
19 **Table 1**  
20 Estimates for Delta levee improvements Adjusted For Inflation

	Low Cost Estimate for Levee Improvement (2014 dollars using ENR CCI)	High Cost Estimate for Levee Improvement (2014 dollars using ENR CCI)
2012 Central Valley Flood Protection Plan (Delta North + Delta South)	\$2.49 B	\$2.97 B
2011 DRMS estimate to improve 764 miles to PL 84-99	\$1.31 B	\$1.31 B

21 Source: DWR 2012 Central Valley Flood Protection Plan Table 3-5 lists the total costs of implementing  
22 recommendations for the State Plan of Flood Control in the Delta regions to be between \$2.35 billion and \$2.80  
23 billion. DWR 2011 Delta Risk Management Strategy Phase 2 Table 4-2 lists the costs of improving Delta levees to PL  
24 84-99 Standard as \$1.2 billion. These values were adjusted to 2014 amounts using the annual average ENR  
25 Construction Cost Index for 2011 and 2012 along with the September 2014 index.

26  
27 The Delta Reform Act requires that the Delta Plan promote strategic levee investments that attempt to  
28 reduce risks to people, property, and state interests in the Delta (Water Code section 85305) and  
29 recommend priorities for state investment in levee operation, maintenance, and improvements in the  
30 Delta (Water Code section 85306). In addition, the Delta Plan may identify actions to be taken outside of  
31 the Delta, if those actions are determined to significantly reduce flood risks in the Delta and may include  
32 local plans of flood protection (Water Code section 85307(a-b)).

33  
34 Payments through the Delta Levee Maintenance Subventions Program must “reflect the priorities of,  
35 and be consistent with, the Delta Plan” (Water Code section 12986(c)). The legislative staff analysis of  
36 the Delta Reform Act noted that “these recommendations, in combination with the Council’s authority  
37 to assure that State agencies act consistently with the Delta Plan, will ensure that levee spending by the  
38 Department of Water Resources (DWR) and the Central Valley Flood Protection Board (CVFPB) reflects  
39 the Delta Plan’s priorities. The Legislature generally does not appropriate funding to specific Delta levee  
40 projects, and has not succeeded in imposing priorities on state levee spending in the Delta. Instead, the  
41 State budget leaves the discretion to DWR and the CVFPB to determine how to spend state money on  
42 both levees in the State Plan of Flood control and non-project levees. These priorities will affect both the

1 Delta levee subventions program (non-project levees) and the special projects program (levees with a  
2 State interest)” (California State Senate 2009).

3  
4 Agreeing on priorities for State investments in Delta levees during the Delta Plan’s development,  
5 however, was difficult because of the complexity of the Delta’s flood control systems (see Figure 1) and  
6 disagreements about the level of protection that State-funded levees should attain, including which  
7 islands and tracts should be priorities for levee investments. Therefore, the Delta Plan’s regulatory  
8 policies include interim priorities to be used until a comprehensive investment methodology could be  
9 developed (RR P1).

10  
11 Table 2 below lists the interim priorities that are to guide budget and funding allocation strategies for  
12 levee improvements. These State priorities for investment are but one element of the Delta Plan’s  
13 comprehensive risk reduction plan for the Delta, in addition to strategies such as improving residential  
14 flood protection or expanding floodways and bypasses.

15  
16 **Table 2.**  
17 **Priorities for State Investment in Delta Integrated Flood Management Categories of Benefit Analysis**

<b>Goals</b>	<b>Localized Flood Protection</b>	<b>Levee Network</b>	<b>Ecosystem Conservation</b>
<b>1</b>	Protect existing urban and adjacent urbanizing areas by providing 200-year flood protection.	Protect water quality and water supply conveyance in the Delta, especially levees that protect freshwater aqueducts and the primary channels that carry fresh water through the Delta.	Protect existing and provide for a net increase in channel-margin habitat.
<b>2</b>	Protect small communities and critical infrastructure of statewide importance (located outside of urban areas).	Protect floodwater conveyance in and through the Delta to a level consistent with the State Plan of Flood Control for project levees.	Protect existing and provide for net enhancement of floodplain habitat.
<b>3</b>	Protect agriculture and local working landscapes.	Protect cultural, historic, aesthetic, and recreational resources (Delta as Place).	Protect existing and provide for net enhancement of wetlands.

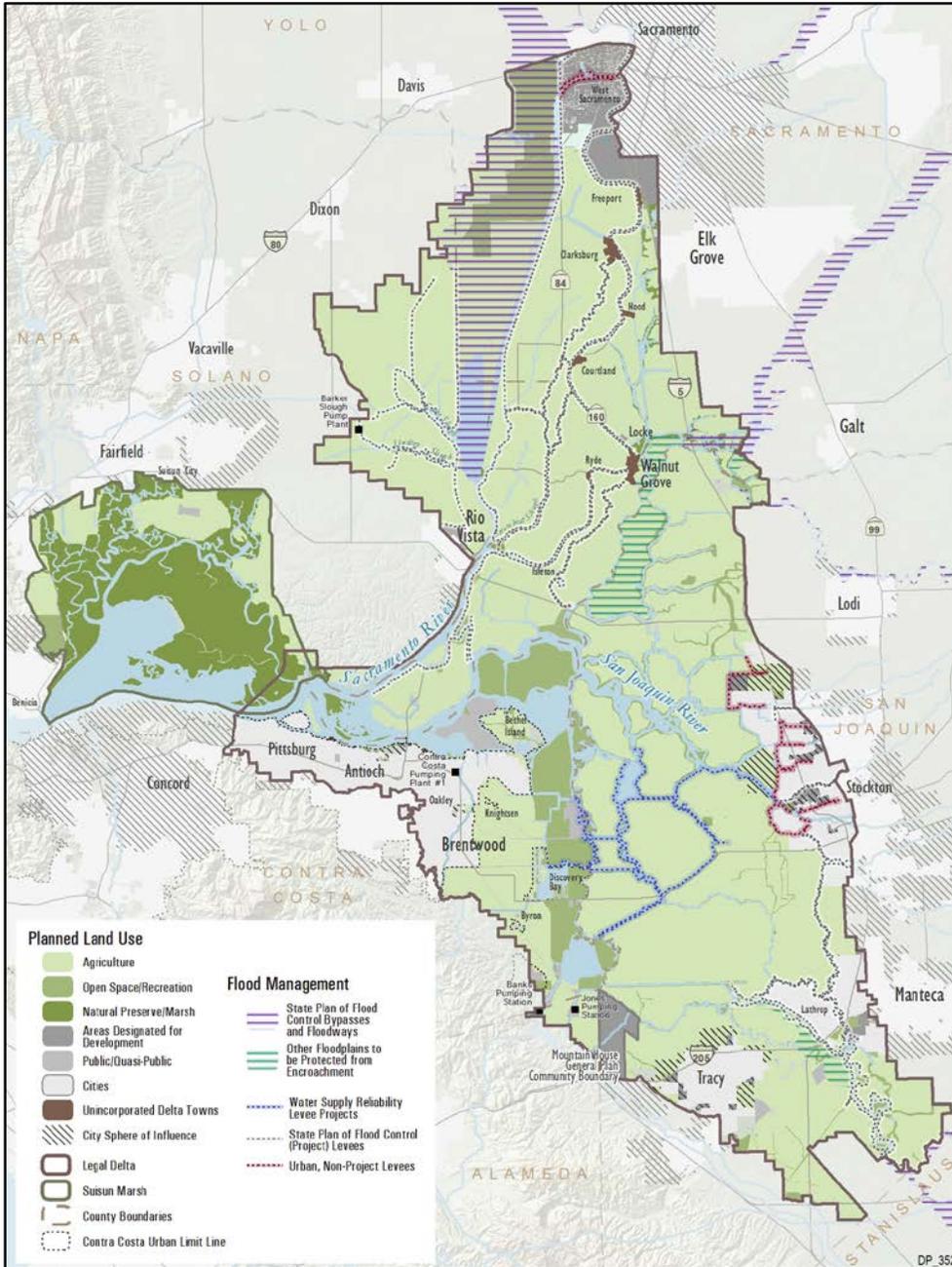
18 Source: Delta Stewardship Council, Delta Plan, 2013

19 The Delta Plan’s policy RR P1 notes that these goals for Delta levee funding priorities are all important  
20 and that it is expected that over time, the DWR must balance achievement of these goals.

21  
22 The Delta Plan indicates that the Council would act promptly to update these interim priorities, working  
23 in consultation with DWR, the Central Valley Flood Protection Board (CVFPB), the Delta Protection  
24 Commission (DPC), local agencies, and the California Water Commission (Delta Plan 2013 - RR R4). The  
25 Plan notes that “currently, no comprehensive method exists to prioritize State investments in Delta  
26 levee operations, maintenance, and improvement projects. Without a prioritization methodology, the  
27 apportionment of public resources into levees may not occur in a manner that reflects a broader, long-  
28 term approach.” The plan outlines factors to be considered when the priorities are updated (Delta  
29 Stewardship Council 2013).

30

1 **Figure 1.**  
 2 Delta Flood Management Facilities



3  
4

1 Others are awaiting these updated priorities. The *California Water Action Plan* includes updating these  
2 Delta levee priorities as a key action to be undertaken to increase flood protection (Natural Resources  
3 Agency 2014a). The Legislature limited the duration of its recent reauthorization of a key state Delta  
4 levee funding program, noting that the extension was sufficient only to support levee maintenance  
5 while "the State reassesses the direction it will pursue in protecting the Delta" (California State Senate  
6 2010).

7  
8

## 9 **The Council’s 2014-16 Delta Levee Priorities Update**

10

11 A new approach for investing State funds in Delta levees must be developed. This new approach should  
12 guide the ongoing investment of State funds in a way that considers the interconnection of assets  
13 protected by levees, the exposure of these assets to different risk factors, the beneficiaries of levee  
14 protection and the appropriate cost-share allocation for this protection. It must recognize that assets  
15 such as water supply, ecosystem health, and the unique values of the Delta are not only valuable to the  
16 State of California and residents of the Delta, but to a range of beneficiaries.

17

18 The Council recently embarked on the development of this new approach, working together with other  
19 affected State and local agencies, Delta residents, a wide variety of Delta stakeholders, and consultants  
20 at ARCADIS, the Rand Corporation, and ESA. The Delta Levees Investment Strategy will be developed  
21 using a comprehensive methodology that considers the assets protected by Delta levees, the threats to  
22 Delta levees, the multiple beneficiaries of Delta levee investments, and both structural and non-  
23 structural approaches for reducing risk. The outcome of the project will include a final report that  
24 proposes a Delta levee investment and risk reduction strategy, and that outlines a suite of investments  
25 that best addresses State goals and priorities. The strategy is expected ultimately to result in proposed  
26 revisions to the Delta Plan’s flood risk reduction regulatory policies, recommendations, and narrative.  
27 The proposed strategy may also be submitted to the California Legislature to help guide its future  
28 decisions about funding for Delta levees. The Council's new approach will be used to guide existing (or  
29 new) Delta levee programs and shall be consistent with the State law that applies to these programs or  
30 as modified by future Legislative actions.

31

32

## 33 **Key Issues for Consideration in**

### 34 **Updating Priorities for State Delta Levee Investment**

35

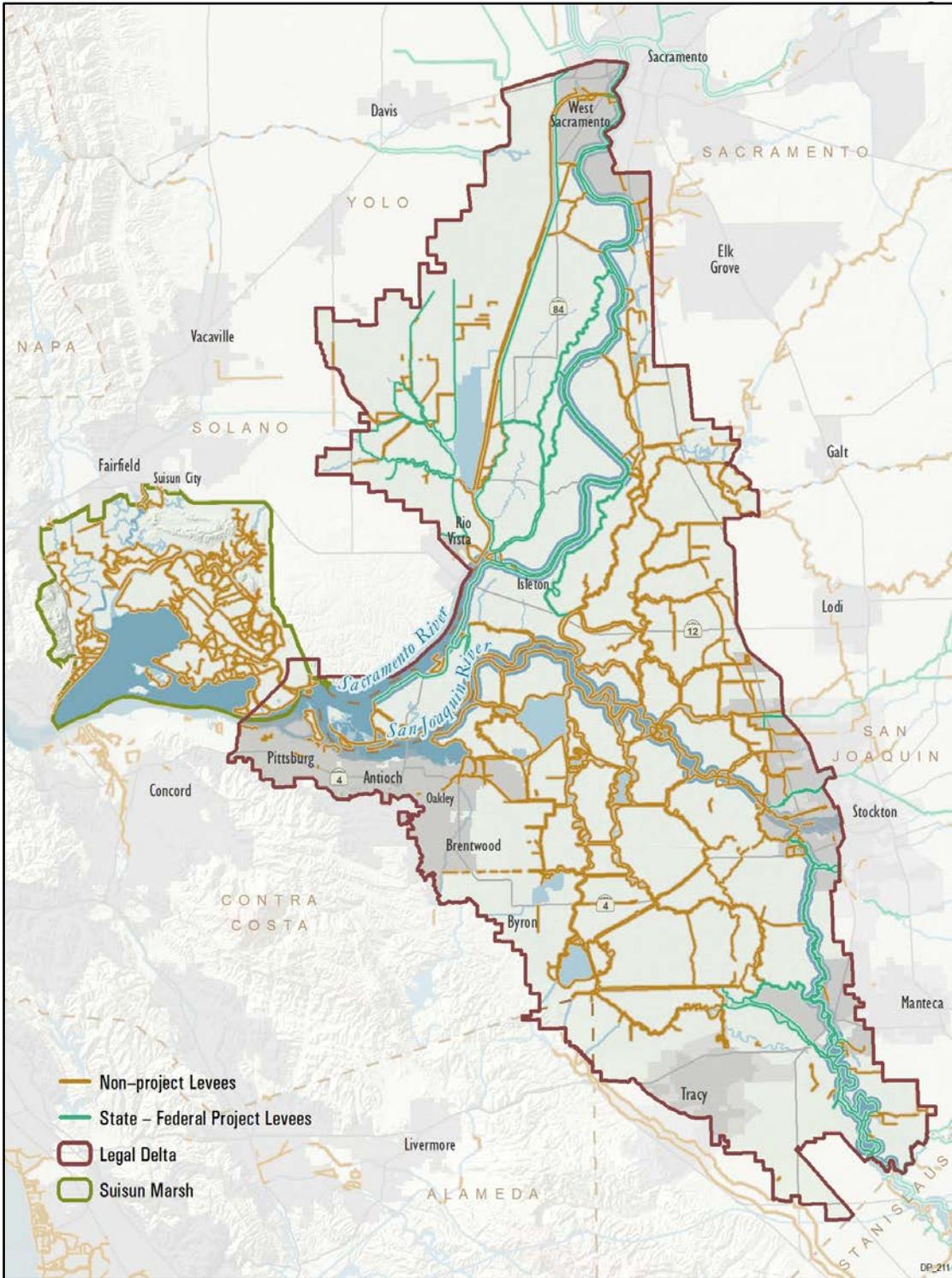
36 This paper outlines 15 issues that will need to be considered as the Council updates the Delta Plan’s  
37 provisions regarding State investment in the Delta’s levees. It summarizes background information  
38 about these issues, provides references for further information, and highlights key points that will need  
39 to be addressed over the coming months.

40

#### 41 **1. What are the Delta’s Levees?**

42 The Delta Reform Act calls for the Delta Plan to include recommendations for Delta levees that are part  
43 of the State Plan of Flood Control (“project levees”) and for the Delta’s private, non-project levees  
44 (Water Code section 85306). There are more than 1,100 miles of those levees in the Delta (including  
45 Suisun Marsh). Figure 2 depicts the delineation of these two categories of levees within the Delta.

- 1 **Figure 2.**
- 2 Project and Non-project Levees within the Delta



Source: Delta Stewardship Council, Delta Plan, 2013

1 “Project” levees are part of the State Plan of Flood Control and are identified by the CVFPB, with whom  
2 the Council is consulting in developing levee priorities. Roughly one-third of the Delta’s levees, or about  
3 380 miles, are “project levees”. “Non-project” Delta levees are identified in DWR’s *Delta Atlas* (1995)  
4 (Water Code section 12980) and comprise the remaining two-thirds of the Delta’s levees.  
5

6 An issue that requires resolution is the extent of potential State investment in levees in Suisun Marsh.  
7 Some of these levees are important to the Delta’s ecosystem and others contribute to the unique values  
8 of the Delta as a place, especially recreation. In 1996, the Delta Levee Special Projects Program was  
9 expanded to include approximately 12 miles of Suisun Marsh levees on islands bordering northern  
10 Suisun Bay from Van Sickle Island westerly to Montezuma Slough (Water Code section 12311(a); Lobato  
11 2014). The *Suisun Marsh Plan* (U.S. Bureau of Reclamation 2012) identifies a need to expand public  
12 funding for Suisun Marsh levees beyond its current limit.  
13

## 14 **2. What Goals and Objectives Should State Investments in Delta Levees Further?**

15 The Delta Reform Act sets objectives for the Delta Plan’s provisions to reduce risk and guide levee  
16 investments.  
17

18 The Delta Plan shall attempt to ***reduce risks to people, property, and state interests in the Delta*** by  
19 promoting effective emergency preparedness, appropriate land uses, and strategic levee investments  
20 (Water Code section 85305(a)).  
21

22 The State’s coequal goals for the Delta also warrant consideration as priorities for levee investment are  
23 set.  
24

25 The basic goals of the State for the Delta are the following:  
26

27 (a) Achieve the two coequal goals of providing ***a more reliable water supply for California and***  
28 ***protecting, restoring, and enhancing the Delta ecosystem***. The coequal goals shall be  
29 achieved in a manner that protects and enhances ***the unique cultural, recreational, natural***  
30 ***resource, and agricultural values of the Delta as an evolving place***.

31 (b) ***Protect, maintain, and, where possible, enhance and restore the overall quality of the***  
32 ***Delta environment, including, but not limited to, agriculture, wildlife habitat, and***  
33 ***recreational activities***.

34 (c) ***Ensure orderly, balanced conservation and development of Delta land resources***.

35 (d) Improve flood protection by structural and nonstructural means to ***ensure an increased***  
36 ***level of public health and safety*** [emphasis added](Public Resources Code section 29702).  
37

38 Legislative declarations in the Delta Protection Act, including Public Resources Code section 29704,  
39 affirm these goals and objectives. The Delta Protection Act also provides direction for resolving potential  
40 conflicts among Legislative directions.  
41

42 To the extent of any conflict or inconsistency between this division and any provision of the Water  
43 Code, the provisions of the Water Code shall prevail (Public Resources Code section 29715)  
44

1 **3. What are the State’s interests in the Delta?**

2 The Delta Reform Act provides that the Delta Plan should “attempt to reduce risks to people, property,  
3 and state interests in the Delta” (Water Code section 85305(a)). This direction to attempt to reduce risks  
4 to people and property is clear. The Delta Plan reports that 570,000 people reside in the Delta and about  
5 116,000 residential structures are located in the 100-year floodplain of the Delta, mostly near  
6 Sacramento, West Sacramento, and Stockton. The 8,000 residences below the elevation of typical tides  
7 (mean higher high water) are especially vulnerable (DWR 2008). Protecting these lives and property is  
8 important. During flood events, Delta levees convey flood water from the Sacramento River, San  
9 Joaquin, Cosumnes, Mokelumne, Calaveras, and Stanislaus rivers through the Delta to protect lives and  
10 property and minimize damage.

11  
12 But what are the other “State interests in the Delta”? The Delta Reform Act, other Legislative provisions,  
13 and the Delta Plan provide guidance. These interests are shared with many federal, local, and private  
14 stakeholders.

- 15  
16 • **A more reliable water supply for California.** The Delta provides water for in-Delta users, including  
17 local municipalities such as Stockton, the Contra Costa Water District, and Antioch and agricultural  
18 users, and for export through the State Water Project and the Central Valley Project. All these uses  
19 rely upon the quality of the Delta’s waters, governed by objectives established in the State Water  
20 Resources Control Board’s (SWRCB) Bay Delta Water Quality Control Plan to protect beneficial uses  
21 of Delta water. Delta levees affect the quality of water on which these users rely because they  
22 influence the hydrodynamics of the Delta and the mixing of brackish and fresh water and other  
23 constituents.

24  
25 Select Delta levees also are important to the conveyance of water from the Sacramento River  
26 through the Delta for export by State Water Project and the Central Valley Project. In the south  
27 Delta, levees on Roberts Island and Jones Tract, and adjoining islands protect East Bay Municipal  
28 Utility District’s aqueduct that conveys water from the Mokelumne River to the East Bay.

29  
30 Failure or alterations of levees that result in degraded water quality can also harm water supplies,  
31 too, by requiring the release of large amounts of water from storage to flush out or repulse brackish  
32 water, and so reducing supplies otherwise available to water users. Some studies have shown,  
33 however, that pre-flooding sets of Delta islands could reduce the possibility that a large volume of  
34 saltwater would be drawn into the Delta after levee failures and would, therefore, reduce the  
35 duration of disruptions to water exports (DWR 2011a).

36  
37 DWR’s *Delta Risk Management Strategy Phase 2* (2011a) found that, from the perspective of the  
38 statewide economic impacts, levee improvements that reduce the risk to fresh-water exports from  
39 the Delta have the highest benefits to California as a whole. This is in comparison to reducing other  
40 significant impacts such as the loss of transportation and utility services and in-Delta losses (e.g.,  
41 businesses, population at risk, and ecosystems).

- 42  
43 • **Delta ecosystem.** The Delta’s aquatic ecosystem, including its anadromous fish, Delta smelt, longfin  
44 smelt, and other aquatic life, depends on the quality of Delta waters. Attainment of the SWRCB’s  
45 Bay Delta Water Quality Plan’s objectives that protect ecosystem values relies on the levee system,  
46 which influences ecosystem water quality in the same ways that levees affect municipal,  
47 agricultural, and export water supplies. In Suisun Marsh, the levee system, along with special

1 features like the Suisun Marsh Salinity Control Gates and leveed freshwater distribution systems at  
2 Roaring River and Morrow Island, are crucial to maintaining water quality and controlling water  
3 levels for waterfowl habitats. The Delta also provides habitat for numerous listed and special status  
4 terrestrial species including Swainson’s Hawk, Giant Garter Snake, Riparian Brush Rabbit, Western  
5 Burrowing Owl, Pacific Pond Turtle, and wintering Sand Hill Cranes. Some leveed floodways, such as  
6 the Yolo Bypass, also provide habitats of special value to fish and wildlife. A new bypass on the San  
7 Joaquin River near Paradise Cut, as recommended in the Delta Plan (RR R5), may also provide fish  
8 and wildlife habitat, depending on its ultimate design.

9  
10 Restoring the Delta ecosystem will entail creating additional habitat, possibly by altering or even  
11 removing some levees. A recent report by the San Francisco Estuary Institute-Aquatic Science Center  
12 estimates that “98% of the freshwater emergent marsh in the Delta has been lost (from  
13 approximately 190,000 hectares to just over 4,000 hectares)” (SFEI-ASC 2014). The Delta Plan calls  
14 for setting levees back from their current alignment, where feasible, to improve migratory corridors  
15 for anadromous fish and songbirds along the Sacramento River between Freeport and Walnut  
16 Grove, the San Joaquin River from the Delta boundary to Mossdale; and the north and south forks of  
17 the Mokelumne River, Paradise Cut, Steamboat Slough, and Sutter Slough (ER P4). When levees  
18 cannot be set back, it may be possible sometimes to incorporate woody debris, vegetation, or other  
19 features in and adjoining levees to create more natural channel habitat. Restoring the 8,000 acres of  
20 tidal marsh referenced in the Delta Plan performance measures or the larger area of tidal and  
21 freshwater marsh envisioned in the draft Bay Delta Conservation Plan (BDCP) will also entail altering  
22 or even removing some levees within the designated restoration opportunity areas (ER R2).

23  
24 Vegetation on levees and adjoining berms, where it remains, also contributes to the Delta  
25 ecosystem by providing habitat for birds and shade that cools adjoining waters. Protection and  
26 management of levee vegetation is a persistent challenge, partly because of Army Corps of  
27 Engineers (USACE) regulations that require its clearance from levees. The Delta Plan recommends  
28 that the USACE should exempt Delta levees from its levee vegetation policy, where appropriate. The  
29 Water Resources Reform and Development Act of 2014 requires the USACE to revise its vegetation  
30 management policy for levees to take into consideration and incorporate regional characteristics,  
31 habitat for species of concern, and levee performance. While there is no new policy yet, the USACE  
32 will no longer disqualify a levee system from its Rehabilitation Program (PL-84-99) due solely to  
33 vegetation issues. (Personal communication with CVFPB staff.)

34  
35 Local levee-maintaining agencies sometimes suggest that pursuing ecosystem-related goals and  
36 objectives redirects funds that would otherwise be available to improve levees to protect lives and  
37 property or secure a more reliable water supply.

- 38  
39 • **Delta as place.** The Delta Plan and legislative provisions identify unique values of the Delta as a  
40 place. These are inherent in the coequal goals that underlie the State’s interest in the Delta.

41  
42 The Delta’s geography of low-lying islands and tracts, shaped by rivers, sloughs, and shipping  
43 channels, is defined by the region’s levees.

44  
45 Agriculture in the Delta, which is central to the region’s rural economy, depends on levees, which  
46 protect farms from flooding, enable their drainage, and incorporate irrigation and water control  
47 facilities.

1 Infrastructure important to the economy of the Delta and State is protected by levees. This includes,  
2 in addition to water management facilities, interstate and state highways and local roads, railroads  
3 (Burlington Northern Santa Fe and Union Pacific) and the navigation channels that support the ports  
4 at Stockton and West Sacramento; energy facilities, including electric transmission lines (Western  
5 Area Power Administration; Pacific Gas and Electric), pipelines, gas storage facilities, and local  
6 distribution systems; and telecommunications infrastructure.

7  
8 Recreation, including waterfowl and upland game hunting, is provided on some Delta lands  
9 protected by levees. Resorts and marinas are often found adjacent to levees. Some levees provide  
10 recreation such as riverside biking or walking trails, view points, and bankfishing access. Scenic roads  
11 atop and adjoining some Delta levees are popular for recreational motorists. Access to Delta levees  
12 for recreation is a persistent issue, because most Delta levees are private property where  
13 trespassing is prohibited.

14  
15 The Delta’s legacy communities are protected by levees from flood damage.

16  
17 The Delta Plan and other legislative provisions anticipate that these values of the Delta will not  
18 remain unchanged, but rather call for protection of the Delta “as an evolving place”. The Delta Plan  
19 says that this means accepting that change will not stop but that fundamental characteristics and  
20 values that contribute to the Delta’s special qualities and that distinguish it from other places can be  
21 preserved and enhanced.

22  
23 In its authorization of State funding for the Delta Levee Maintenance Subvention Program, the  
24 Legislature also acknowledged that some change was inevitable, providing: “The physical  
25 characteristics of the Delta should be preserved essentially in their present form; and that the key to  
26 preserving the Delta’s physical characteristics is the system of levees defining the waterways and  
27 producing the adjacent islands. However, the Legislature recognizes that it may not be economically  
28 justifiable to maintain all Delta islands” (Water Code section 12981).

#### 30 **4. What Threatens Delta Levees?**

31 Many of the levees in the Delta originally were constructed more than a century ago. These early levees  
32 were not built to any recognized standard; they were built with available materials and knowledge to  
33 reclaim “swamp and overflow” lands<sup>1</sup>. There have been over 140 levee failures in the last century. The  
34 most recent failure, on Upper Jones Tract on June 3, 2004, inundated 12,000 acres of farmland with  
35 approximately 160,000 acre-feet of water (DWR 2005).

36  
37 Four geologic and hydrologic forces threaten the Delta levee system with steadily increasing rates and  
38 consequences of levee failure: land subsidence, changing inflows, sea-level rise, and earthquakes. Many  
39 Delta levees have significantly subsided over the years due to their foundations being set in soft, organic  
40 soils. The issue of levee subsidence will only be exacerbated in the coming decades by rising sea levels  
41 and the risk of earthquakes that affect levees (Public Policy Institute of California 2008). Other factors  
42 that threaten Delta levees may include boat wakes, rodents, wind fetch, and ongoing normal  
43 deterioration.

---

<sup>1</sup> A more extensive description of the history of the Delta’s levee system is available in other documents such as the Delta Plan, Public Policy Institute of California’s *Comparing Futures for the Sacramento-San Joaquin Delta* or the Delta Protection Commission’s *Economic Sustainability Plan for the Sacramento-San Joaquin Delta*.

1 **5. Who is Responsible for the Delta’s Levees?**

2 The Delta Plan’s priorities for State investment in Delta levees will affect a complex mix of private  
3 landowners and State and local agencies that share responsibilities for the Delta’s levees. Because so  
4 many interests are involved, agreement on priorities can be difficult and responsibility for progress is  
5 diffused.

6  
7 The Delta Plan can guide these myriad interests towards more coordinated action. Priorities  
8 incorporated in the Plan’s regulatory policies will affect projects in the Delta carried out, funded or  
9 approved by State or local agencies (Water Code section 85225). In addition, State and local levee  
10 agencies are responsible for coordinating their actions pursuant to the Delta Plan with the Council and  
11 other relevant agencies (Water Code section 85204). In particular, DWR’s Delta Levee Maintenance  
12 Subvention Program, which subsidizes maintenance of Delta levees, must reflect the priorities of, and be  
13 consistent with, the Delta Plan (Water Code section 12986(c)).

- 14  
15 • **Private landowners.** Most Delta levees, whether project levees or non-project levees, are private  
16 property, over which flood control or drainage agencies have only an easement authorizing the  
17 levees’ construction and maintenance.
- 18  
19 • **Local maintaining agencies.** Almost all Delta levees are maintained by local agencies, usually  
20 reclamation districts. Nearly 100 local agencies are involved. Reclamation districts are controlled by  
21 their landowners, who are allotted votes based on the assessed value or acreage of their ownership  
22 (Water Code section 50704). At Bethel Island, levees are maintained by a municipal improvement  
23 district. Metropolitan flood control agencies are well funded and staffed, but many local agencies  
24 have small budgets and few staff.
- 25  
26 • **Central Valley Flood Protection Board (CVFPB).** The CVFPB has a diverse set of duties enabling it to  
27 oversee planning and improvement of both the Delta’s project and its non-project levees. For  
28 project levees, the CVFPB is responsible for approving and overseeing the Central Valley Flood  
29 Protection Plan which, in cooperation with the USACE project authorizations, is the State’s flood  
30 management plan for lands along the Sacramento and San Joaquin rivers and their tributaries.  
31 Through agreements with USACE, the CVFPB fulfills the State’s cost-sharing responsibilities to the  
32 federal government for federally-authorized improvements to facilities of the State Plan of Flood  
33 Control for these rivers and their tributaries, providing lands, easements, rights-of-way, relocations,  
34 and cash payments for USACE-constructed or cost-shared flood control projects. When a project is  
35 completed and assurance agreements are secured from local maintaining agencies, the CVFPB  
36 accepts responsibility for the project and transfers it to the local agency to operate and maintain.  
37 The CVFPB also regulates encroachments within this State-federal system and some other Board-  
38 designated floodways.

39  
40 Finally, for both project and non-project levees, the CVFPB approves costs allocated or reimbursed  
41 through the DWR’s Delta Levee Maintenance Subvention Program (Water Code section 12986(a)(6))  
42 and local plans for maintenance and improvement of project and non-project levees eligible for  
43 reimbursement through the subventions program (Water Code section 12897). Local agencies are  
44 required to enter into agreements with the CVFPB to perform the maintenance and improvement  
45 work specified in these plans. If sufficient State funds for the subventions program are unavailable,  
46 it is the responsibility of the CVFPB to apportion them among the levees or levee segments that are

1 more critical and beneficial, in response to recommendations from DWR (Water Code section  
2 12897(f)).

3  
4 In practice, CVFPB activities are primarily focused on its duties related to the State Plan of Flood  
5 Control. Few resources are available to support its duties related to other Delta levees.

- 6  
7 • **Department of Water Resources.** DWR guides many flood management activities across the State.  
8 Its broad view, engineering and environmental science skills, multiple programs, and size contribute  
9 to its role as the leading State flood management agency.

10  
11 For project levees, DWR develops and recommends the Central Valley Flood Protection Plan to the  
12 CVFPB. Pursuant to State law, on the Sacramento River DWR maintains at its expense many  
13 bypasses and a few levees of the State Plan of Flood Control, including in the Delta the west levee of  
14 the Yolo Bypass above Putah Creek and Putah Creek's levees (Water Code section 8361).

15  
16 For non-project levees DWR administers two key programs. The first is the Delta Levee Maintenance  
17 Subvention Program, which cost shares local agencies' maintenance of Delta levees (Water Code  
18 sections 12980 through 12995). The other is the Delta Levees Special Flood Control Projects Program  
19 which funds improvements to levees and levee-related wildlife and fish habitats that have discrete  
20 and identifiable public benefits, including the protection of public highways and roads, utility lines  
21 and conduits, and other public facilities, and the protection of urbanized areas, water quality,  
22 recreation, navigation, fish and wildlife habitats, and other public benefits (Water Code sections  
23 12300-12314). In the past, DWR has prepared plans for the Delta levee system (DWR 1975; DWR  
24 1982; DWR 1992; DWR 2011a). It recommends criteria for maintenance and improvement of non-  
25 project levees to the CVFPB (Water Code section 12984), and inspects completed projects funded  
26 through the Delta Levee Maintenance Subventions Program, reporting its findings to the CVFPB  
27 (Water Code section 12988).

- 28  
29 • **California Water Commission (Commission).** When requested by DWR, the Commission is  
30 responsible for reviewing and approving a list prepared by DWR of Delta areas where flood control  
31 work through the Delta Levees Special Flood Control Projects Program is needed (Water Code  
32 section 12313). This was last done in 1990, when DWR submitted and the Commission approved a  
33 list of priorities (DWR 1990). The Commission also presents to Congressional committees its view on  
34 flood control projects being planned or constructed by the USACE.

- 35  
36 • **Department of Fish and Wildlife (DFW).** In addition to its many other responsibilities to protect fish  
37 and wildlife, DFW has special duties that affect improvement of levees funded through the Delta  
38 Levee Maintenance Subventions Program and the Delta Levees Special Flood Control Projects  
39 Program. It reviews projects to make sure they have no net long-term habitat loss and have a net  
40 benefit for aquatic species in the Delta (Water Code section 78543).

## 41 42 43 **6. What plans guide the State's investment in Delta levees?**

44 For many years, the State has prepared plans to guide investment in Delta levees.

1 For project levees, guidance is provided by the aforementioned *Central Valley Flood Protection Plan*  
2 (2012). It proposes a system-wide investment approach to flood management in areas protected by the  
3 State Plan of Flood Control, including the Delta’s project levees.

4 The plan identifies some priorities for State investment but it also caveats its programmatic nature: “The  
5 CVFPP is a descriptive document. It is not a system wide feasibility study of sufficient detail to support  
6 project-specific actions such as authorizing legislation, design, and construction. It is intended to provide  
7 a foundation for prioritizing Central Valley flood risk reduction and ecosystem restoration investments,  
8 including feasibility studies on appropriate scales – from valley wide to project-specific” (DWR 2012).  
9

10 For the Delta, the plan’s actions include, but are not limited to, urban flood protection in metropolitan  
11 Sacramento and Stockton and the City of West Sacramento; small community flood protection including  
12 structural (e.g., ring levees, training levees, or floodwalls) and non-structural improvements (e.g., flood  
13 proofing, willing seller purchases/relocation); and rural-agricultural area flood protection including  
14 maintaining levee crown elevations, providing all-weather access roads, levee improvements to resolve  
15 known performance issues and conservation easements to preserve agriculture while preventing  
16 urbanization in these areas. Potential system improvements the plan identifies in the Delta include  
17 expanding the lower end of the Yolo Bypass upstream from Rio Vista by setting back levees and  
18 evaluating a new bypass in the South Delta through expansion of Paradise Cut or other waterways.  
19 According to the CVFPP, ecosystem restoration opportunities will be integrated with flood risk reduction  
20 projects.

21  
22 A State plan for non-project levees, DWR’s *Bulletin 192 Plan for Improvement of Delta Levees*, was first  
23 prepared by DWR in 1975 as State funding for Delta levees began. It was endorsed by the Legislature as  
24 a conceptual plan to guide the formulation of projects to preserve the levee system’s integrity (Water  
25 Code section 12225). It was updated in 1982’s *Bulletin 192-82: Delta Levees Investigation*. Local agencies  
26 plans for improving non-project levees must be compatible with Bulletin 192-82 to be eligible for  
27 reimbursement through the State’s Delta levee subventions program (Water Code section 12987(b)).  
28 DWR’s *Actions and Priorities Delta Flood Protection Act – Eight Western Delta Islands* (1990) provides a  
29 list of priority projects in response to Water Code section 12313. More recent plans include the CALFED  
30 Bay-Delta Program’s *Levee System Integrity Program Plan* (2000) and the *Delta Risk Management Study*  
31 (DWR 2009; DWR 2011a).  
32

33 Table 3 shows a chronology of significant events related to the Delta levees along with related  
34 responses that were taken by the State and others. A more extensive chronology of events affecting the  
35 Delta is included in Appendix A.

36  
37 **Table 3**  
38 Chronology of Significant Delta Events and Related Responses

Year	Event	Response
1972	San Joaquin River levee breaks flooding Brannan and Andrus Islands and the town of Isleton.	The Way Bill is passed and begins the DWR Delta Levees Maintenance Subvention Program.  DWR publishes Bulletin 192 which analyzes the feasibility of providing flood control, recreation, wildlife habitat, and environmental enhancement by improving Delta levees.

<b>1982</b>	June 1982, California voters reject Proposition 9, also known as the Peripheral Canal Act	Bulletin 192-82 is published and establishes levee geometry requirements for the DWR Delta Levees Maintenance Subvention Program.
<b>1983</b>	Extremely wet conditions, brought on by El Niño weather conditions, coupled with voluminous Sierra runoff led to very high river stages throughout the system and caused extensive damage to the flood management system of the Sacramento Valley.  The levee at Venice Island breached and flooded 3,220 acres of farmland.	The Flood Hazard Mitigation Plan for the Sacramento-San Joaquin Delta is published and establishes the HMP levee geometry to be used as a short-term compliance for FEMA assistance.
<b>1986</b>	The floods of 1986 caused extensive damage to the flood management system of the Sacramento Valley.	The Delta Flood Protection Act of 1988 establishes the DWR Special Projects Program to provide State financial assistance for Delta levees to \$12 million per fiscal year for the eight western islands and for the towns of Thornton and Walnut Grove.
<b>1997</b>	Storms caused one of the worst floods of the century over the New Year holiday. McCormack-Williamson Tract and Dead Horse Island levees failed. High flows in the San Joaquin River led to failure of a levee at Mossdale, flooding that area and Stewart Tract, and the nearby Paradise Cut levee breach flooded the Pescadero District.  Fourteen levee breaches occurred on the San Joaquin River between Fresno and the Chowchilla Bypass. Flood releases from Don Pedro Dam exceed downstream channel capacities.	CALFED Programmatic Record of Decision was certified, including adoption of the Delta-specific PL 84-99 design as the base level of protection for the Delta levee system.
<b>2004</b>	Lower Jones Tract levee failed	The Central Valley Flood Protection Act directs DWR to prepare and CVFPB to adopt a Central Valley Flood Protection Plan (CVFPP) by 2012.
<b>2005</b>	Hurricane Katrina devastates New Orleans	Delta Risk Management Strategy Phase 1 & 2 are developed to assess the performance of Delta and Suisun Marsh levees under various stressors along with the consequences of levee failure and also to develop risk reduction strategies.  Central Valley Flood Protection Plan is completed and establishes a system wide approach to improving flood management in the areas currently receiving some amount of flood

protection from the existing facilities of the State Plan of Flood Control.

Table 4 summarizes levee improvement costs. Though investments have been made in Delta levees for around 40 years, each study has shown that there is significant work still to be done to improve levees to acceptable levels. It should be noted that the earlier studies looked at levees mostly within the central portion of the Delta whereas the Delta Risk Management Strategy (DRMS) evaluated the majority of non-project levees throughout the Delta. The Council has also heard from stakeholders in the Delta that estimates for levee improvements published in earlier reports are too pessimistic and that funding made available through Propositions 1E and 84 has helped significantly with levee improvements in recent years.

**Table 4**  
Levee Improvement Cost Estimates from Prior State Delta Levee Plans

	Miles needed of Improvement	Estimates of Recommended Improvements	Per Mile Cost of Recommended Levee Improvements
Bulletin 192 (1975)	310	\$115 M	\$370,968
Bulletin 192-82 (1982)	500	\$930 M	\$1,860,000
CALFED (2000)	521	\$1,000 M	\$1,919,386
DRMS Total (2009)	951	\$1,950 M	
<i>DRMS (PL 84-99 standard)</i>	<i>764</i>	<i>\$1,200 M</i>	<i>\$1,570,681</i>
<i>DRMS (Urban Project Levee standard)</i>	<i>187</i>	<i>\$750 M</i>	<i>\$4,010,695</i>

Additional reports, by the State and other entities, also include recommendations relevant to the Delta’s levees.

- Delta Protection Commission (DPC).** The Delta Protection Commission’s *Economic Sustainability Plan for the Sacramento-San Joaquin River Delta* (2012) concluded that large investments in strengthening all of the Delta’s levees are a cost-effective approach to improving water supply reliability, economic sustainability, and reliable energy, transportation, and water infrastructure. The report states that “the levee system is the foundation on which the entire Delta economy is built”. The Economic Sustainability Plan included several specific proposals regarding investments in the Delta’s levee system included in Table 5.

The DPC will soon award a contract to study the feasibility of the Delta levee assessment district which its Economic Sustainability Plan (and the Council’s Delta Plan) recommends.

1 **Table 5**  
 2 Delta Levee Recommendations of Delta Protection Commission’s Economic Sustainability Plan

Topic	Recommendations for Economic Sustainability
<b>Levees and Public Safety Recommendations</b>	1. Improve and maintain all non-project levees to at least the Delta-specific PL 84-99 standard. 2. Improve most "lowland" levees and selected other levees to a higher Delta-specific standard that more fully addresses the risks due to earthquakes, extreme floods, and sea-level rise, allows for improved flood fighting and emergency response, provides improved protection for legacy communities, and allows for growth of vegetation on the water side of levees to improve habitat. 3. The Delta Levee Subventions and Special Projects Program should continue to be supported. 4. Transfer to a regional agency with fee assessment authority on levee beneficiaries responsibility for allocating funds for the longer-term improvement of Delta levees and the maintenance of regional emergency preparedness, response, and recovery systems developed jointly with the Delta counties and State and federal governments.
<b>Recommendations for Infrastructure</b>	1. Planning of levee investments must fully consider the economic value of infrastructure services along with all other benefits.

3 Source: Delta Stewardship Council. 2012. The Delta Protection Commission’s Proposal to Protect the Delta as an  
 4 Evolving Place (February, 2012)

- 5  
6  
7
- 8 • **Suisun Marsh.** The Suisun Marsh Habitat Management, Preservation, and Restoration Plan (U.S. Bureau of Reclamation 2012) recommends that public funding for Suisun Marsh levees needs to be expanded beyond its current limit to address maintenance and improvement activities for exterior levees (levees exposed to tidal action). In addition, the Suisun Marsh Plan notes that as tidal marshes are restored there, some levees will require reinforcement, more maintenance, and in some instances, significant upgrades.
  - 13
  - 14 • **Public Policy Institute of California (PPIC).** PPIC’s 2008 report, *Comparing Futures for the Sacramento-San Joaquin Delta*, recommended moving away from levees as the primary means of managing Delta land and water. They suggested that California prepare for island failures and provide major State levee investments only for those Delta islands that have a cost-effective statewide interest. Also, the report stated that California should devise mitigation strategies for land owners on other islands.
  - 19
  - 20
  - 21 • **Coalition to Support Delta Projects.** In 2012, the Coalition to Support Delta Projects, a group of diverse Delta stakeholders that included the Planning and Conservation League, Metropolitan Water District of Southern California, San Joaquin County, and other stakeholders, wrote Governor Brown recommending that State funding be used to improve levees to protect the Delta’s publicly-owned western islands, Victoria and Woodward Islands and Jones Tract to protect water and transportation infrastructure, and critical islands such as Bethel and Bradford Islands and Hotchkiss Tract. The
  - 26

1 levee funding recommendation was part of a larger proposal that also sought funds for various  
2 water supply reliability and ecosystem enhancement projects.

- 3  
4 • **Regional Flood Control Agencies.** As a result of the Central Valley Flood Protection Plan in 2012,  
5 DWR has been coordinating with local flood management groups to prepare Regional Flood  
6 Management Plans throughout the Central Valley. The intent is for these plans to be locally  
7 developed to provide DWR information on the local visions for flood management for use in future  
8 DWR studies such as the State basin-wide feasibility studies scheduled for completion by 2017 (DWR  
9 2012). Two regional plans are being developed that will look at the northern and southern regions of  
10 the Delta. These are the *Lower Sacramento River-Delta North Regional Flood Management Plan* and  
11 the *Lower San Joaquin River and Delta South Regional Flood Management Plan*.

## 12 13 14 **7. How are Delta levee maintenance, operation, and improvement funded now?**

15 The estimated costs of upgrading Delta levees are substantial, ranging from \$1.3 billion to nearly \$3.0  
16 billion, adjusted for inflation (see Table 1). The CALFED Bay-Delta Program, for example, estimated  
17 preliminarily in 2000 that its recommended improvements to the Delta’s non-project levees would cost  
18 \$1.43 billion. The DPC estimated in 2012 that its recommended levee improvements would cost an  
19 additional \$500 million to \$1.5 billion.<sup>2</sup> Estimated costs to implement the Central Valley Flood Protection  
20 Plan’s recommendations for the State Plan of Flood Control in its Delta regions are \$2.35 billion to \$2.8  
21 billion, about 17 percent of the plan’s estimated total cost (CVFPB 2012). These costs, however, are only  
22 a small part of California’s large flood management needs. Statewide, DWR estimates that more than  
23 \$100 billion in capital investment is needed throughout the State for flood management projects,  
24 including \$50 billion for currently identified projects (DWR 2013a).

25  
26 The State has provided and continues to provide the majority of investments in the Delta levee system.  
27 Since the 1970s the State has committed approximately \$700 million to levee operations, maintenance  
28 and improvement (Delta Stewardship Council, Delta Plan, 2013).

29  
30 DWR administers the key State programs that provide large Delta levee investments: the Delta Levees  
31 Maintenance Subventions Program, Delta Levees Special Flood Control Projects, and a variety of other  
32 programs funded by voter-passed Propositions 84 and 1E.

33  
34 DWR’s Delta Levee Maintenance Subventions Program provides technical and financial assistance to  
35 local levee maintaining agencies in the Delta for the maintenance and rehabilitation of Delta levees. It  
36 pays up to 75 percent of levee maintenance and improvement costs after a minimum cost threshold has  
37 been paid by that district (DWR 2013), an increase that occurred in 1988 from the 50 percent State cost  
38 share when the program was established in 1973. While the Subventions Program is primarily for non-  
39 project levees, project levees qualify if more than 50 percent of the island acreage is within the Delta  
40 primary zone. In the secondary zone, project levees are not eligible for Delta Levees Maintenance  
41 Subventions funding.

42  
43 DWR’s Delta Levees Special Flood Control Projects program provides financial assistance to local levee  
44 maintaining agencies for improvement or rehabilitation of levees in the Delta. It can fund up to 100  
45 percent of project costs. The program has provided more than \$350 million to the Delta’s local agencies

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<sup>2</sup> DPC estimated that its recommended levee improvements would cost \$1-\$2 billion more than the cost of improving all Delta levees to the PL 84-99 standard. CALFED’s estimate of the cost of improving all levees to PL 84-99, its base standard, was \$1 billion.

1 for flood control and related habitat projects since its inception (DWR 2014; Lobato 2014). The program  
 2 serves the entire Delta and portions of Suisun Marsh (approximately 12 miles of levees on islands  
 3 bordering Suisun Bay from Van Sickle Island westerly to Montezuma Slough) as well as the towns of  
 4 Thornton and Walnut Grove (Water Code section 12311). This service area was expanded in 1996 from  
 5 the program’s initial focus on only the eight western Delta Islands—Bethel, Bradford, Holland, Hotchkiss,  
 6 Jersey, Sherman, Twitchell and Webb Islands—and Thornton and Walnut Grove. Today, any project or  
 7 non-project levee in the Delta’s primary zone or a non-project levee in the secondary zone is eligible for  
 8 Special Projects funding.

9  
 10 In September 2013, DWR drafted its report *FloodSAFE - A Framework for Department of Water  
 11 Resources Integrated Flood Management Investments in the Delta and Suisun Marsh*. The report  
 12 provides a framework that guides DWR flood management investments in the Delta and authorized  
 13 portions of Suisun Marsh, with a focus on multiple benefit projects. The priorities shown in Table 6 guide  
 14 DWR’s funding and work planning for Delta Integrated Flood Management (IFM) based on categories of  
 15 benefit. The priorities are consistent with the Delta Plan. The report says “funding source and associated  
 16 legislation will be used to determine exactly how the priorities are used during decision-making.”  
 17

18 **Table 6**  
 19 DWR Priorities for Delta Integrated Flood Management

DWR Investment Priority for Delta IFM	Categories of Benefit		
	Localized IFM Projects	Generalized IFM Projects	Ecosystem Conservation Projects
First	Urban/Urbanizing Flood Protection	Water Quality, Water Supply Reliability, and Conveyance	Protect Existing and Provide for Net Increase of Channel- Margin Habitat
Second	Small Community Protection and Delta as a Place	Flood Water Conveyance and Protection of Infrastructure of Statewide Interest, (i.e., Transportation Assets, Major Utility Corridors)	Protect Existing and Provide for Net Increase of Wetland and Floodplain Habitat
Third	Protection of Agriculture and Local Working Landscapes	Public Recreation Resources	Habitat Protection and Net Habitat Increase

20 Source: Table 1-1. DWR Priorities for Delta IFM on page 17 of Department of Water Resources. 2013b. *FloodSAFE A  
 21 Framework for Department of Water Resources Integrated Flood Management Investments in the Delta and Suisun  
 22 Marsh (Draft V9)*. September 2013.

23  
 24 Note: The priorities reflected in this table represent the best thinking at the time of its publication. These priorities  
 25 may be altered by DWR in response to future large-scale planning efforts affecting the Delta over the long-term  
 26 (DWR 2013b).  
 27

1 Recent Statewide voter-approved propositions, such as Propositions 84 and 1E, are providing large sums  
 2 of money for Delta levee maintenance, repair, and improvements. As of March 2012, the State has  
 3 expended about \$218 million of bond funds authorized by these propositions in the Delta, including  
 4 \$110 million for the Subventions Program and Special Projects. Table 7 reports data from the Council’s  
 5 records on the committed and expended funds for Delta levees, by work task, as of September 2012, the  
 6 most recent full report available.

7  
 8 Local maintaining agencies provide a lesser but still significant portion of investment in Delta levees.  
 9 Local agencies’ ability to provide the matching funds required by the State’s Delta levee programs is  
 10 affected by the provisions of Proposition 218, approved by California voters in 1996. Proposition 218  
 11 requires voter approval for fees and assessments for “property-related” flood protection. Anything not  
 12 qualifying as a fee is a tax, which may require a two-thirds supermajority of local voters under  
 13 Proposition 13. A further constitutional reform, Proposition 26 passed in 2010, restricts the definition of  
 14 other, non-property-related fees, potentially further hampering funding of flood system improvements  
 15 that include ecosystem improvements. These provisions make it harder for local agencies to investment  
 16 in levee system improvements that integrate risk reduction goals with other objectives (PPIC 2014).

17  
 18 **Table 7**  
 19 Propositions 84 and 1E Delta Expenditure Report to March 2012

<b>Tasks</b>	<b>Committed \$ Millions</b>	<b>Expended \$ Millions</b>
<b>Subventions Program</b>	79	50
<b>Special Projects</b>	214	60
<b>Five-Year Plans</b>	5	2
<b>Contracts</b>	13	10
<b>Program Delivery</b>	20	20
<b>Emergency</b>	110	25
<b>Urban Levee Evaluation</b>	13	13
<b>Non-Urban Levee Evaluation</b>	7	7
<b>Sac Bank</b>	6	6
<b>Bond Servicing Cost</b>	25	25
<b>Total</b>	<b>492</b>	<b>218</b>

20 Source: “Table 4-2 Propositions 84 and 1E Delta Expenditure Report to March 2012” on page 42 of Department of  
 21 Water Resources. 2013b. FloodSAFE A Framework for Department of Water Resources Integrated Flood  
 22 Management Investments in the Delta and Suisun Marsh (Draft V9). September 2013

- 23  
 24 Notes:
- 25 1. The amounts shown in this table are approximate and cover expenditures beginning with FY 2007/08.
  - 26 2. Contracts amount includes the interagency contract with DFW and work on LiDAR, USGS, and DRMS.
  - 27 3. Project expenditures are shown on the Bond Accountability website.
  - 28 4. Bond Servicing Cost is based on 3.5 percent of maximum available funds to the Delta programs.
  - 29 5. Subventions Program commitments are based on approved plans by the CVFPB.
  - 30 6. Special Projects commitments cover expenditures starting with FY 2008/09.
  - 31 7. Expenditures beyond March 2012 are not included in this table

1 **8. What level of Delta levee improvement is warranted?**

2 The Delta Reform Act and other legislation recognize that levee improvements cannot eliminate flood  
3 risks. The Legislature has found that “improvements and continuing maintenance of the levee system  
4 will not resolve all flood risks” (Public Resources Code section 29704) and calls for the Delta Plan to  
5 include provisions that *attempt* to reduce risks (Water Code section 85305). The Delta Plan  
6 acknowledges that eliminating flood risks is impossible, but that they can be significantly reduced by  
7 improved flood management, prudent planning, and reasonable land development. The Delta Plan’s  
8 interim policy governing Delta levee improvements (RR P1) resulted from the difficulty in resolving  
9 disagreement about the level of improvement to be recommended for Delta levees, as embodied in  
10 differing standards for Delta levees proposed by Council staff, the DWR, the DPC, and local levee  
11 maintaining agencies.

12  
13 A variety of criteria can help guide judgments about the level of levee improvements for different areas  
14 of the Delta. For property, a common judgment is that the costs of protection should not exceed the  
15 value of the assets protected (Water Code sections 12582.7(a)(2)). When economic measures may be  
16 poor criteria, planners often seek the least costly protection alternative. Least cost alternatives are often  
17 used to evaluate measures to protect lives or the environment or cultural resources. For example, in  
18 rural areas, elevating residences and improving flood warning systems and evacuation measures may be  
19 a more cost-effective way to protect people’s lives than expensive levee improvements. For important  
20 infrastructure, the effects of service interruptions can be considered. The Federal Highway  
21 Administration’s design standards, for example, tolerate flooding of interstate and federal highways  
22 once every 50 years. Sometimes it is more cost-effective to provide redundancy in infrastructure, such  
23 as the ability to transmit electric power through multiple power transmission lines, than to provide risk-  
24 free protection for each infrastructure component.

25  
26 The levels of protection provided by Delta levees must also consider flows from upstream areas that are  
27 discharged past a levee as well as effects on downstream areas. For example, at the McCormack-  
28 Williamson Tract on the Cosumnes River, a court order limits levee improvements so that its levees do  
29 not cause floodwaters to overflow levees on other islands or back up floodwater discharging from  
30 upstream. It is especially important to consider the improvements proposed by the Central Valley Flood  
31 Protection Plan, which governs the project levees and floodways that discharge to the Delta.

32  
33 Inadequate funding of maintenance or improvement can also entail expenses if levees fail. These costs  
34 can include emergency response to remove flood debris and to offset hazards mitigated by the failed  
35 levees, or to repurpose flooded areas for wildlife and fish habitat or other uses.

36  
37 Various plans for the Delta have proposed differing levels of flood protection, often tied to the assets  
38 protected.

- 39  
40 • **200-year urban levees.** The Central Valley Flood Protection Plan and related statutes propose that  
41 project levees provide 200-year protection for urban and urbanizing areas that will attain  
42 populations of 10,000 or more (Government Code section 65865.5(a)(3)). This standard goes beyond  
43 criteria for levee height and geometric design to include requirements for freeboard, slope stability,  
44 seepage/underseepage, erosion, settlement, and seismic stability. It protects against a flood that  
45 has a 0.5 percent chance of being equaled or exceeded in any given year. Plans for improvements to  
46 this level are under development and improvements are underway in Sacramento, West

1 Sacramento, and Stockton. Under State law, development may be limited in areas that cannot show  
2 substantial progress towards this standard.

- 3
- 4 • **Federal Emergency Management Agency (FEMA) 100-year levees.** The Central Valley Flood  
5 Protection Plan recommends this standard for small communities when benefits exceed costs. This  
6 “insurance” standard, often called the “1 percent annual chance flood” level of protection, protects  
7 against flooding that is the basis for FEMA’s flood insurance rate maps. The standard provides crown  
8 heights 3 feet above the 100-year flood and 16 feet wide, with side slopes of 2 to 1. Few Delta  
9 levees outside of cities meet this standard, and many urban levees need improvement to meet it.  
10 Where levees meet this standard, new developments are not required to meet federal  
11 floodproofing standards. For property-owners, a benefit of attaining the 100-year standard is relief  
12 from the cost of purchasing flood insurance that is required for properties with federally-guaranteed  
13 mortgages. For rural areas protected by project levees, attaining this level of protection is often  
14 difficult to justify economically.

- 15
- 16 • **Public Law 84-99 (PL 84-99).** The CALFED Bay-Delta Program’s Levee System Program Plan proposed  
17 attaining levels of protection for non-project levees consistent with the USACE’s PL 84-99 program.  
18 The PL 84-99 standard provides for levees 1.5 feet above the 100-year flood elevation and side  
19 slopes of 2 to 1. The PL 84-99 standard is a minimum requirement established by USACE for levees  
20 that participate in its Rehabilitation and Inspection Program. Delta islands or tracts that meet this  
21 standard are eligible for USACE funding for levee rehabilitation and island restoration after flooding,  
22 if the benefits exceed the cost.

23

24 Sufficient funds to attain this standard were not provided through the CALFED Bay-Delta Program.  
25 Twenty-five Delta reclamation districts, protecting about 31 percent of the legal Delta’s land behind  
26 about 516 miles of levees, are at or above this standard (Delta Stewardship Council 2013).

27

28 The DPC’s *Economic Sustainability Plan* also proposed raising all Delta levees to the USACE’s PL 84-  
29 99 standard, with additional improvements, such as wide berms to improve levee stability, for  
30 levees that protect essential infrastructure.

- 31
- 32 • **Bulletin 192 standard.** The plan for Delta levee improvements proposed by DWR when State  
33 funding for Delta levees began, Bulletin 192 (DWR 1975), proposed two levels of improvement: 100  
34 year protection roughly equivalent to the FEMA 100 year standard described above for levees  
35 protecting areas with urban centers – Brannan, Andrus, and Bethel Islands and Hotchkiss, Shima,  
36 Wright-Elmwood, Walnut Grove, and Sargent Barnhart Tracts. Levee improvements on other islands  
37 used primarily for agriculture were to provide 50 year protection roughly equivalent to the PL 84-99  
38 standard. The plan anticipated that on a few islands, levee improvements would be uneconomical, a  
39 conclusion with which the Legislature concurred (Water Code section 128981(b)). Bulletin 192 is  
40 endorsed as a conceptual plan to guide the formulation of projects to preserve the Delta levee  
41 system (Water Code section 12225). Bulletin 192-82, its update, provides guidance for the Delta  
42 Levee Maintenance Subventions Program (Water Code section 12987).

- 43
- 44 • **Hazard Mitigation Plan (HMP).** The standard first developed for FEMA’s Hazard Mitigation Program  
45 (HMP) provides for levees with crowns 1 foot above 100-year flood heights and 16 feet wide, with  
46 side slopes of 1.5 to 1. Fifty-three of the Delta’s reclamation districts, protecting more than 47  
47 percent of the legal Delta’s acreage, fall below this standard, as do 139 miles of Delta levees (Delta  
48 Stewardship Council 2013). The HMP guidance, negotiated between DWR and FEMA in 1983 and

1 1987, was intended as an interim guidance. Until recently, local communities that met the HMP  
2 guidance were eligible for FEMA disaster assistance if levees fail or islands flood. FEMA’s recent  
3 cancelation of its agreement with the State about Delta levees makes this commitment uncertain.  
4 The Delta Plan’s policy on State investments in Delta levees (RR P1) provides that improvement of  
5 non-project levees to the HMP standard may be funded without justification, but that higher levels  
6 of protection should be provided “as befits the benefits to be provided.”  
7

- 8 • **Suisun Marsh.** Standards for levees in Suisun Marsh are established in the 1980 *Suisun Marsh Local*  
9 *Plan of Protection*, and are approved by the San Francisco Bay Conservation and Development  
10 Commission. The crowns of exterior levees are to be 2 feet above expected high water levels. Where  
11 wave action is expected, the freeboard must be at least 3 feet. The more recent *Suisun Marsh Plan*  
12 (Bureau of Reclamation 2012) also proposes habitat levees -- low, wide, gently sloping vegetated  
13 levees, which may be overtopped during storm surges with nominal eroding or destabilizing. Habitat  
14 levees would include benches or berms that provide wind- and wave-action protection as well as  
15 opportunities for high marsh/upland transition habitat.  
16  
17

## 18 **9. How should levee maintenance and improvement costs be allocated?**

19 ‘Who pays what’ is a key to financing for all public works. The Delta Plan endorses the principles that  
20 “beneficiaries pay” and “stressors pay.” In practice, however, almost all funds for Delta levee  
21 maintenance and improvement are derived from two sources – landowners through property taxes on  
22 lands protected by the levee systems and by the State’s general fund, both through direct appropriation  
23 and through the repayment of general obligation bonds, such as Proposition 1E, authorized for flood  
24 protection. The reliance on general fund reflects in part a proper allocation to the State of costs to  
25 provide protection of broad-based public benefits such as protecting public safety, enhancing fish and  
26 wildlife habitat or safeguarding water quality. Without another way to collect funds from State and  
27 federal water project customers, highway users, or utility customers, the general fund may approximate  
28 these broad-based classes of beneficiaries.  
29

30 Property owners’ contributions to levee maintenance reflect the historic origins of the Delta’s islands  
31 under the 1850 federal Swamp Land Act, under which California received unpatented federal swamp  
32 lands to be sold to private owners who were required to reclaim and drain them to broaden the  
33 economy of the fledgling state. The Delta Reform Act provides “that property ownership and the  
34 exercise of associated rights, continue to depend on the landowners’ maintenance of those non-project  
35 levees and do not include any right to State funding of levee maintenance and repair” (Water Code  
36 section 85003).  
37

38 Most project levees are maintained without State support by local agencies or State-imposed  
39 maintenance areas funded by local landowners. The west levee of the Yolo Bypass above Putah Creek  
40 and Putah Creek’s levees are maintained by the State at its expense (Water Code section 8361).  
41

42 Cost sharing for improving project levees usually includes federal participation. The federal government  
43 pays between 50 and 75 percent of the total costs of flood control projects authorized by Congress, with  
44 the non-federal costs typically shared by State (70 percent) and local entities (30 percent) (Water Code  
45 section 12310-12318). The cost sharing ratio varies with the kind of benefits provided. For example,  
46 federal cost-share for ecosystem restoration projects can be as much as 65 percent in urban flood risk  
47 reduction projects. Water supply, recreation, and other benefits included in flood risk reduction projects

1 can further modify federal cost sharing. The State share of nonfederal costs also depends on the mix of  
2 benefits.

3  
4 The Delta Levees Maintenance Subventions Program is “a cost share program that provides technical  
5 and financial assistance to local agencies in the Sacramento – San Joaquin Delta for the maintenance  
6 and rehabilitation of nonproject and eligible project levees” (DWR 2011c). The Subventions Program is  
7 authorized by California Water Code sections 12980-12995. The program pays up to 75 percent of local  
8 costs above \$1,000 per levee mile. Reimbursements are limited by the funding available to the program  
9 and they are administered according to the priorities established in the *Delta Levees Maintenance*  
10 *Subventions Program Guidelines: Procedures and Criteria* approved by the Central Valley Flood  
11 Protection Board (DWR 2011c). Subventions to defray levee maintenance costs are not available in  
12 Suisun Marsh.

13  
14 Eligible projects which meet requirements established by the Department of Water Resources, as  
15 published in periodic Proposal Solicitation Packages (PSP), including Improvements of non-project  
16 levees, may be funded through the Delta Levees Special Flood Control Projects Program. This program  
17 pays a variable percentage of costs, depending on how a specific project meets requirements of the PSP.  
18 Payments are typically between 75 and 100 percent of eligible costs, including costs for approved  
19 habitat improvements.

20  
21 State funding for non-project Delta levees is generous in comparison to other areas of the Central Valley  
22 and State. Usually, State funds for routine levee maintenance are unavailable outside the Delta. State  
23 funds occasionally provide a State cost share for major repairs of project levees, such as repair of high  
24 risk erosion damage. Local cost shares for these major repair projects are typically 10 percent, with the  
25 State paying for 25 percent and the USACE paying for 65 percent. State funds for levee improvements  
26 outside the Delta are available only for federally authorized projects, including the State Plan of Flood  
27 Control. For these State-federal projects, a minimum local share of 10 percent is typically required with  
28 the State paying for 25 percent and the USACE paying for 65 percent. (See the section below for more  
29 detail regarding the Federal role in flood management).

30  
31 Local maintenance funds are limited, with many budgeting less than \$50,000 to \$100,000 annually for  
32 levee maintenance, according to testimony to the Council.

33  
34 DWR, in cooperation with the CVFPB, is required to seek information about local agencies’ ability to pay  
35 for levee maintenance and consider it when determining the amount of subventions to be paid to  
36 particular maintenance agencies (Water Code section 12986(a)(3)). Information about local agencies’  
37 ability to pay, however, has been collected for only a few districts in the western Delta (Camp Dresser &  
38 McKee 1992).

39  
40 Earlier Delta levee studies proposed creating a revolving fund to make loans to local agencies that were  
41 unable to fund the local share of levee improvements, but this has not occurred.

42  
43 Delta levees benefit many interests, including owners and users of water, power, telecommunications  
44 and transportation systems. Securing funds from these beneficiaries, however, depends on establishing  
45 the Delta flood risk management assessment district recommended by the Delta Plan (RR R2). The  
46 Council will coordinate with the DPC as it assesses the feasibility of such a district.

1

2 **10. What is the federal government’s role?**

3 No federal assistance is likely to be provided for improvements of non-project Delta levees, because the  
4 recent draft of the USACE’s *Delta Islands and Levees Feasibility Study* (2014) concludes that the USACE  
5 will not recommend federal funding of levee improvements. Nor is federal support provided for Delta  
6 levees’ maintenance. Prior plans for Delta levee improvements, including Bulletin 192, Bulletin 192-82,  
7 and the CALFED Levee System Integrity Program Plan presumed some level of assistance in funding  
8 improvements of non-project Delta levees would be available through the USACE. That no longer  
9 appears likely, removing almost \$500 million of anticipated federal support for Delta levee  
10 improvements.

11  
12 For the Delta’s non-project levees, the recent draft of the USACE’s *Delta Islands and Levees Feasibility*  
13 *Study* (2014) concludes that the USACE will not recommend federal funding of levee improvements,  
14 because the costs of improvements considered in the study exceed the identified economic benefits and  
15 because the ecosystem restoration benefits of those levee alterations were more expensive than other  
16 USACE ecosystem restoration priorities. The USACE’s conclusion that there is no federal interest in  
17 improving non-project Delta levees removes the expectation that the federal government might pay up  
18 to half the cost of these levees’ improvement. Benefits that levee improvements could provide to the  
19 reliability of water supplies delivered through the federal Central Valley Project were not considered in  
20 this study, as under federal policy this is a responsibility of the Bureau of Reclamation rather than the  
21 USACE.

22 For project levees in the Delta, especially to protect urban areas, continued federal assistance is  
23 authorized or likely.

24  
25 The federal government can also continue to play an important role in the Delta levee system through  
26 the disaster recovery programs of FEMA’s HMP and the USACE’s PL 84-99 program. These programs  
27 provide cost sharing for the reconstruction of levees after Presidentially-declared disasters. The  
28 programs are, in effect, an insurance policy providing assistance for post-disaster reconstruction of the  
29 levees. Aid is available, however, only to projects that meet the program’s eligibility requirements,  
30 including these federal programs’ standards for levee design, maintenance, and inspection. In addition,  
31 eligibility for assistance from the USACE is available only for projects whose economic benefits exceed  
32 the cost of post-disaster reconstruction. The standards applicable to these federal programs are in a  
33 state of flux, which impedes planning for levee improvements<sup>3</sup>.

34  
35 Post disaster federal aid to rebuild damaged levees is critically important. For example, of the estimated  
36 \$90 million total cost of levee repairs following the 2004 Jones Tract flood, \$60 million of claims were  
37 filed with the federal government, leaving approximately \$30 million for the flood fight, levee repair,  
38 and island pump out to be paid by the State (PPIC 2008). Landowners alone would be unlikely to repair  
39 levees damaged in a disaster on 18 to 23 Delta islands where the cost of repairs is likely to exceed the  
40 value of the islands’ property (Suddeth, et. al. 2010). Federal assistance in rebuilding these levees could  
41 significantly lower landowners’ repair costs, increasing the likelihood that damaged islands would be  
42 reclaimed. The lack of federal assistance shifts to the State the cost of aiding local agencies in levee

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<sup>3</sup> Testimony by representatives of the Office of Emergency Services (OES), FEMA, and USACE at the Council’s February 27, 2014 hearing disclosed considerable disagreement about these programs between the State and federal agencies. A memorandum of understanding between OES and FEMA that had governed the Delta HMP program has lapsed, so that conditions of FEMA funding are uncertain.

1 repairs, because State law provides that post-disaster levee repair claims not paid by federal agencies  
2 may be reimbursed by the State through DWR’s levee subventions program (Water Code section  
3 12993).

4  
5  
6 **11. What conditions should be attached to State funding of levees?**

7 State law requires that, in order to receive State funds, local agencies maintaining both project and non-  
8 project levees must agree to perform annual routine maintenance of their levees (Water Code section  
9 12987(f)) and agree to indemnify the State from liability for damages related to State-funded levee  
10 projects (Water Code section 12992). Local agencies, however, are not required to participate in FEMA  
11 or USACE’s levee rehabilitation and repair programs in order to be eligible for state funding. Local plans  
12 for improvement of project and non-project levees are supposed to include provisions to acquire  
13 easements along levees that will allow for the control and reversal of subsidence, where determined by  
14 DWR, by restricting land use to habitat, untilled crops, or other compatible uses depending on the needs  
15 of the State and priorities approved by the Central Valley Flood Protection Board (Water Code section  
16 12987(b)). Earlier proposals had suggested additional conditions of State funding, such as adequate local  
17 floodplain zoning of protected islands and tracts or the donation of easements for public recreation, but  
18 those requirements were not enacted in law.

19  
20  
21 **12. What provision should be made to improve habitat for fish and wildlife or provide public  
22 recreation?**

23 Fish and wildlife habitat and public recreation have been a concern during the development of each  
24 State plan for Delta levees. The Delta Plan includes these policies and recommendations providing for  
25 habitat improvement and public recreation that are relevant to levees:

- 26
- 27 • **Setback levees and channel margin enhancement.** The Delta Plan calls for setting back levees,  
28 where feasible, to improve migratory corridors for anadromous fish and songbirds along the  
29 Sacramento River between Freeport and Walnut Grove, the San Joaquin River from the Delta  
30 boundary to Mossdale; the north and south forks of the Mokelumne River, Paradise Cut, Steamboat  
31 Slough, and Sutter Slough. Other alternatives to increase riparian habitats and floodplains must also  
32 be considered and, when feasible, incorporated (ER P4). DWR, in conjunction with the CVFPB, DFW,  
33 and the Delta Conservancy, should develop criteria to define locations for future setback levees in  
34 the Delta and its watershed (RR R7).
  - 35
  - 36 • **Protecting restoration opportunities.** Within the Delta’s six priority habitat restoration areas,  
37 significant adverse impacts to future restoration opportunities are to be protected or mitigated (ER  
38 P3).
  - 39
  - 40 • **Vegetation on levees.** The USACE should exempt Delta levees from its vegetation policy (ER R4).
  - 41
  - 42 • **Recreation.** Public agencies owning land should increase opportunities where feasible, for bank  
43 fishing, hunting, levee-top trails, and environmental education (DP R16).
  - 44

45 Existing State law also addresses these issues. For project levees, the Central Valley Flood Protection  
46 Plan describes structural and nonstructural ways to promote natural dynamic hydrologic and

1 geomorphic processes, increase riparian, wetland, floodplain, and shaded riverine aquatic habitat, and  
2 promote the recovery and stability of native species (Water Code section 9616). A Central Valley Flood  
3 System Conservation Strategy is being drafted to provide a comprehensive approach for improving  
4 riverine and floodplain ecosystems consistent with the flood plan's implementation.

5  
6 State-funded projects to improve project and non-project Delta levees must also be consistent with a  
7 net-long term habitat improvement program and have a net benefit for aquatic species in the Delta, as  
8 determined by the Department of Fish and Wildlife (Water Code section 12987). State-funded levee  
9 improvements must protect fish and wildlife habitat, fully mitigate any damage to channel islands or  
10 berms with significant riparian habitat, and not result in net long term loss of riparian, fisheries, or  
11 wildlife habitat.

12  
13 Under the Delta Levee Maintenance Subventions and Special Flood Control Projects programs, the dual  
14 commitment to levees and fish and wildlife is the foundation for the collaboration between local levee  
15 maintaining agencies and DWR and DFW. As provided by Water Code section 12314 and 12987, DFW  
16 ensures that there is no net loss of fish and wildlife habitat and a long-term improvement of fish and  
17 wildlife habitat in conjunction with State sponsored levee work. Under an interagency agreement with  
18 DWR, DFW staff inspects both levee maintenance and improvement projects, and authorizes  
19 expenditures of funds for levee work after determining that full mitigation and net habitat improvement  
20 have been provided. DFW performs assessments of existing habitats, determines potential impacts of  
21 levee work, develops onsite and large-scale mitigation sites, assists with the planning of larger projects  
22 including designing and implementing habitat restoration and monitoring plans, and invasive plant  
23 control measures, and ensures that mitigation and enhancement sites are monitored and maintained in  
24 good condition in-perpetuity.

25  
26 Levee improvements are also supposed to take account of the most recent Natural Resources Agency's  
27 Delta Master Recreation Plan. An agreement between the Natural Resources Agency, DWR, DFW, and  
28 the CVFPB outlines procedures for fulfilling these requirements (DWR 1992). To comply with these  
29 provisions, the Delta Levees Special Projects Program has restored habitat and set back levees, for  
30 example. Some local levee maintaining agencies find these requirements of restoration and setback  
31 levees burdensome. How well Delta levee projects are attaining their ecosystem objectives is not  
32 known, because few are thoroughly monitored to ascertain their results.

### 33 34 35 **13. What if local agencies don't act?**

36 Many local levee maintaining agencies diligently maintain and improve their levee improvements.  
37 Others have made little progress. DWR is to annually inspect non-project levees that receive  
38 Subventions funding to ascertain progress towards standards for levee maintenance and improvement  
39 (Water Code section 12989). Budgets are inadequate for comprehensive inspections, however.

40  
41 When DWR finds that annual routine maintenance of non-project levees participating in its Subventions  
42 or Special Projects programs is not being performed, it may establish a maintenance area to perform the  
43 maintenance, with those maintenance costs allotted to the affected property owners. Establishing a  
44 maintenance area is cumbersome, and costs for State maintenance are high, in part because most  
45 levees are distant from DWR's levee maintenance yard in West Sacramento. As discussed below, State  
46 liabilities may increase when it performs levee maintenance. No maintenance area has ever been  
47 created for non-project levees. Although no maintenance area has been created for non-project levees,

1 there have been some created to fund state maintenance of project levees. One of these is located  
2 within the Delta in the Pocket neighborhood of Sacramento.

3  
4  
5 **14. How should the State’s levee priorities address the risk of State liability for levee failures?**

6 Concerns about the potential for State liability for Delta levee failures extend back for decades. In *Galli*  
7 *v. California*<sup>4</sup>, the State was excluded from liability for damages from a levee failure in 1972 that  
8 flooded Brannan-Andrus Island because the island’s levees were improved and maintained by a local  
9 district, not the State, the flood was caused by failure of a non-project levee, rather than a project levee,  
10 and State agencies were not responsible for reviewing or approving the local agency’s levee work. When  
11 the Delta levee programs were created, the Legislature declared ‘the State does not thereby assume any  
12 responsibility for the safety of any Delta levee against failure’ (Water Code section 12983). Enactment of  
13 the Delta Reform Act did not alter the State’s liability for flood protection in the Delta (Water Code  
14 section 85032(j)). Before State funds for Delta levee maintenance or improvement are approved, the  
15 local maintaining agency agrees to indemnify the State from liability, except for gross negligence,  
16 related to the State funding or approval of the local agency’s work (Water Code section 12992).

17  
18 For project levees, the most notable recent court decision on flood liability was the California Court of  
19 Appeal decision in *Paterno v. State of California* (2003) (113 Cal. App. 4th 998). The court found the State  
20 was liable for damages caused by the failure of a project levee on the Yuba River that the State did not  
21 design, build, or even directly maintain. This decision makes it possible that the State will ultimately be  
22 held responsible for the structural integrity of much of the state-federal flood control system in the Delta  
23 and Central Valley. The *Paterno v. State of California* decision will ultimately cost State taxpayers  
24 approximately \$464 million in awarded damages (Delta Stewardship Council 2013).

25  
26 It will be important, at a minimum, to retain these protections against State liability in updating levee  
27 priorities in the Delta Plan. The Delta Plan recommends a further step to limit State liability:  
28 constitutional and/or statutory changes to provide State agencies the same level of immunity from flood  
29 liability that federal agencies have under federal law (RR R10).

30  
31  
32 **15. What about climate change?**

33 Climate change, including rising seas and altered flood discharges, complicates the development of  
34 recommendations for State priorities for levee improvements. The Natural Resources Agency’s climate  
35 adaptation strategy (2014) calls for State agencies to identify climate risks to existing and new  
36 infrastructure projects. Better scientific assessments of potential climate change impacts are becoming  
37 available, enhancing considerations of climate change in setting funding priorities. In the short term,  
38 responses such as improving levees to account for increasing tidal and flood discharges may be  
39 appropriate. Longer term forecasts of increases in sea level of 55 inches or more suggest that protection  
40 of levees at some islands or tracts may someday become infeasible. Other low-lying areas in San  
41 Francisco Bay, Humboldt Bay, and other coastal areas are beginning to consider similar long term  
42 threats, so that approaches they consider may provide suggestions about how to proceed in the Delta. A  
43 balanced approach needs to consider both the risk of excessive investment in unsustainable  
44 infrastructure on the one hand or premature abandonment of important areas in the Delta on the other.

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<sup>4</sup> 98 Cal.App.3d 662 (2002).

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## Glossary (from the Delta Plan)

*"Adaptive management" means a framework and flexible decision-making process for ongoing knowledge acquisition, monitoring, and evaluation leading to continuous improvement in management planning and implementation of a project to achieve specified objectives.*

*"Base Flood" means the flood that has a 1-percent probability of being equaled or exceeded in any given year (also referred to as the 100-year flood).*

*"Base Flood Elevation" (BFE) means the water surface elevation associated with the base flood.*

*"Best available science" means the best scientific information and data for informing management and policy decisions. Best available science shall be consistent with the guidelines and criteria found in Appendix 1A.*

*"Central Valley Flood Protection Board" or "Board" means the Central Valley Flood Protection Board (formerly The Reclamation Board) of the Resources Agency of the State of California as provided in Water Code section 8521.*

*"Coequal goals" means the two goals of providing a more reliable water supply for California and protecting, restoring, and enhancing the Delta ecosystem. The coequal goals shall be achieved in a manner that protects and enhances the unique cultural, recreational, natural resource, and agricultural values of the Delta as an evolving place. In addition, "achievement" for the purpose of determining whether a plan, program, or project meets the definition of a "covered action" under section 5001(j) is further defined as follows:*

- (1) *"Achieving the coequal goal of providing a more reliable water supply for California" means all of the following:*
  - (A) *Better matching the state's demands for reasonable and beneficial uses of water to the available water supply. This will be done by promoting, improving, investing in, and implementing projects and programs that improve the resiliency of the state's water systems, increase water efficiency and conservation, increase water recycling and use of advanced water technologies, improve groundwater management, expand storage, and improve Delta conveyance and operations. The evaluation of progress toward improving reliability will take into account the inherent variability in water demands and supplies across California;*
  - (B) *Regions that use water from the Delta watershed will reduce their reliance on this water for reasonable and beneficial uses, and improve regional self-reliance, consistent with existing water rights and the State's area-of-origin statutes and Reasonable Use and Public Trust Doctrines. This will be done by improving, investing in, and implementing local and regional projects and programs that increase water conservation and efficiency, increase water recycling and use of advanced water technologies, expand storage, improve groundwater management, and enhance regional coordination of local and regional water supply development efforts; and*
  - (C) *Water exported from the Delta will more closely match water supplies available to be exported, based on water year type and consistent with the coequal goal of protecting, restoring, and enhancing the Delta ecosystem. This will be done by improving conveyance in the Delta and expanding groundwater and surface storage both north and south of the Delta to optimize diversions in wet years when more water is available and conflicts with the ecosystem are less likely, and limit diversions in dry years when conflicts with the ecosystem are more likely. Delta water that is stored in wet years will be available for water users during dry years, when the limited amount of available water must remain in the Delta, making water deliveries more predictable and reliable. In addition, these improvements will decrease the vulnerability of Delta water supplies to disruption by natural disasters, such as, earthquakes, floods, and levee failures.*
- (2) *"Achieving the coequal goal of protecting, restoring, and enhancing the Delta ecosystem" means successfully establishing a resilient, functioning estuary and surrounding terrestrial landscape capable of*

*supporting viable populations of native resident and migratory species with diverse and biologically appropriate habitats, functional corridors, and ecosystem processes.*

(3) *“Achieving the coequal goals in a manner that protects and enhances the unique cultural, recreational, natural resource, and agricultural values of the Delta as an evolving place” means accepting that change, including change associated with achieving the coequal goals, will not cease, but that the fundamental characteristics and values that contribute to the Delta’s special qualities and that distinguish it from other places can be preserved and enhanced while accommodating these changes. In this regard, the following are core strategies for protecting and enhancing the unique values that distinguish the Delta and make it a special region:*

- (A) Designate the Delta as a special place worthy of national and state attention;*
- (B) Plan to protect the Delta’s lands and communities;*
- (C) Maintain Delta agriculture as a primary land use, a food source, a key economic sector, and a way of life;*
- (D) Encourage recreation and tourism that allow visitors to enjoy and appreciate the Delta and that contribute to its economy;*
- (E) Sustain a vital Delta economy that includes a mix of agriculture, tourism, recreation, related industries and business, and vital components of state and regional infrastructure; and*
- (F) Reduce flood and other risks to people, property, and other interests in the Delta.*

*“Covered action” means a plan, program, or project that meets all of the following criteria (which are collectively referred to as covered action screening criteria):*

- (A) Is a “project,” as defined pursuant to section 21065 of the Public Resources Code;*
- (B) Will occur, in whole or in part, within the boundaries of the Delta or Suisun Marsh;*
- (C) Will be carried out, approved, or funded by the State or a local public agency;*
- (D) Will have a significant impact on achievement of one or both of the coequal goals or the implementation of government-sponsored flood control programs to reduce risks to people, property, and State interests in the Delta; and*
- (E) Is covered by one or more provisions of the Delta Plan, which for these purposes, means one or more of the regulatory policies contained in Article 3.*

*“Covered action” does not include any plan, program, or project that is exempted pursuant to Water Code section 85057.5(b).*

*A State or local public agency that proposes to carry out, approve, or fund a plan, program, or project that may be subject to this Chapter must determine whether that proposed plan, program, or project is a covered action. That determination, which is subject to judicial review, must be reasonable, made in good faith, and consistent with the Delta Reform Act and this Chapter.*

*Nothing in the application of the definition of a “covered action” shall be interpreted to authorize the abrogation of any vested right whether created by statute or by common law.*

*“Delta” means the Sacramento-San Joaquin Delta as defined in section 12220 of the Water Code and the Suisun Marsh, as defined in section 29101 of the Public Resources Code.*

*“Delta Plan” means the comprehensive, long-term management plan for the Delta to further the achievement of the coequal goals, as adopted by the Delta Stewardship Council in accordance with the Sacramento-San Joaquin Delta Reform Act of 2009.*

*“Designated Floodway” means those floodways, as defined in California Code of Regulations, Title 23, section 4(i), under the jurisdiction of the Central Valley Flood Protection Board.*

*“Encroachment” means any obstruction or physical intrusion by construction of works or devices, planting or removal of vegetation, or by any means for any purpose, into or otherwise affecting a floodway or floodplain.*

*“Enhancement” or “enhancing,” for purposes of section 5001(h)(2), means improving existing desirable habitat and natural processes. Enhancement may include, by way of example, flooding the Yolo Bypass more often to support native species or to expand or better connect existing habitat areas. Enhancement includes many fish and wildlife management practices, such as managing wetlands for waterfowl production or shorebird habitat, installing fish screens to reduce entrainment of fish at water diversions, or removing barriers that block migration of fish to upstream spawning habitats.*

*“Feasible” means capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, legal, social, and technological factors.*

*“Floodplain” means any land area susceptible to being inundated by flood waters from any source.*

*“Floodplain values and functions” has the same meaning as set forth in 33 Code of Federal Regulations section 320.4(l)(1).*

*“Floodproofing” means any combination of structural and nonstructural additions, changes, or adjustments appropriate for residential structures, which reduce or eliminate risk of flood damage to real estate, improved real property, or structures with their contents.*

*“Floodway” means the portion of the floodplain that is effective in carrying flow (that is, the channel of a river or other watercourse and the adjacent land areas that convey flood waters).*

*“Government-sponsored flood control program to reduce risks to people, property, and State interests in the Delta” means any State or federal strategy, project, approval, funding, or other effort that is intended to reduce the likelihood and/or consequences of flooding of real property and/or improvements, including risks to people, property, and State interests in the Delta, that is carried out pursuant to applicable law, including, but not limited to the following:*

- (1) State Water Resources Law of 1945, Water Code section 12570 et seq.;*
- (2) Sacramento-San Joaquin River Flood Control Projects (Flood Control Act of 1941, P.L. 77-228);*
- (3) Local Plans of Flood Protection prepared pursuant to the Local Flood Protection Planning Act (Water Code section 8200 et seq.), that are consistent with the Central Valley Flood Protection Plan pursuant to Water Code section 9612;*
- (4) Central Valley Flood Protection Plan (Water Code section 9600 et seq.);*
- (5) Subventions Program, Special Projects Program (Water Code section 12300 et seq.);*
- (6) Way Bill 1973-Subventions Program, Special Projects Program (Water Code section 12980 et seq.);*
- (7) Central Valley Flood Protection Board Authority (California Code of Regulations, Title 23, Division 1);*  
*and*
- (8) National Flood Insurance Program (National Flood Insurance Act of 1968, 42 U.S.C. 4001 et seq., P.L. 90-448).*

*“Nonproject levee” means a local levee owned or maintained by a local agency or private owner that is not a project facility under the State Water Resources Law of 1945, Chapter 1 (commencing with Water Code section 12570) and Chapter 2 (commencing with section 12639 of Part 6 of the Water Code).*

*“Project levee” means a federal flood control levee that is a project facility under the State Water Resources Law of 1945, Chapter 1 (commencing with Water Code section 12570) and Chapter 2 (commencing with section 12639 of Part 6 of the Water Code).*

*“Protection” or “protecting,” for purposes of section 5001(h)(2), means preventing harm to the ecosystem, which could include preventing the conversion of existing habitat, the degradation of water quality, irretrievable conversion of lands suitable for restoration, or the spread of invasive nonnative species.*

*“Regulated stream” means those streams identified in Table 8.1 of California Code of Regulations, Title 23, section 112, under the jurisdiction of the Board.*

*“Restoration” or “restoring,” for purposes of section 5001(h)(2), has the same meaning as in Water Code section 85066. Restoration actions may include restoring interconnected habitats within the Delta and its watershed, restoring more natural Delta flows, or improving ecosystem water quality.*

*“Setback levee” means a new levee constructed behind an existing levee which allows for removal of a portion of the existing levee and creation of additional floodplain connected to the stream. In the Delta, a “setback levee” may not necessarily result in removal of the existing levee.*

*“Significant impact” for the purpose of determining whether a project meets the definition of a “covered action” under section 5001(j)(1)(D) means a substantial positive or negative impact on the achievement of one or both of the coequal goals or the implementation of a government-sponsored flood control program to reduce risks to people, property, and State interests in the Delta, that is directly or indirectly caused by a project on its own or when the project’s incremental effect is considered together with the impacts of other closely related past, present, or reasonably foreseeable future projects. The following categories of projects will not have a significant impact for this purpose:*

- (1) “Ministerial” projects exempted from CEQA, pursuant to Public Resources Code section 21080(b)(1);*
- (2) “Emergency” projects exempted from CEQA, pursuant to Public Resources Code section 21080(b)(2) through (4);*
- (3) Temporary water transfers of up to one year in duration. This provision shall remain in effect only through December 31, 2016, and as of January 1, 2017, is repealed, unless the Council acts to extend the provision prior to that date. The Council contemplates that any extension would be based upon the California Department of Water Resources’ and the State Water Resources Control Board’s participation with stakeholders to recommend measures to reduce procedural and administrative impediments to water transfers and protect water rights and environmental resources by December 31, 2016. These recommendations should include measures to address potential issues with recurring transfers of up to 1 year in duration and improved public notification for proposed water transfers;*
- (4) Other projects exempted from CEQA, unless there are unusual circumstances indicating a reasonable possibility that the project will have a significant impact under Water Code section 85057.5(a)(4), as further defined by this section. Examples of unusual circumstances could arise in connection with, among other things:
  - (A) Local government general plan amendments for the purpose of achieving consistency with the Delta Protection Commission’s Land Use and Resource Management Plan; and,*
  - (B) Small-scale habitat restoration projects, as referred to in CEQA Guidelines, section 15333 of Title 14 of the California Code of Regulations, proposed in important restoration areas, but which are inconsistent with the Delta Plan’s policy related to appropriate habitat restoration for a given land elevation (section 5006 of this Chapter)**

*“Urban area” means a developed area in which there are 10,000 residents or more.*

*“Urbanizing area” means a developed area or an area outside of a developed area that is planned or anticipated to have 10,000 residents or more within the next 10 years.*

## Appendix A – Chronology of Sacramento-San Joaquin Delta Significant Events

This table of events has been compiled from the following sources:

- CALFED *Levee System Integrity Program Plan*
- DWR *FloodSAFE A Framework for Department of Water Resources Integrated Flood Management Investments in the Delta and Suisun Marsh (Draft V9)*
- DWR *California's Flood Future*

DATE	EVENT
1850	Congress passed the Federal Swamp and Overflow Act, which provided for the tide of wetlands to be transferred from the federal government to the states.
1861	The California Legislature authorized the State Reclamation District Act. As a result of state and federal legislation, swamp and overflow land was sold and reclaimed for agricultural use by construction of levees. The Delta was transformed from a large tidal marsh to a system of improved channels and levees by the early 1900s.
1884	Discharge of hydraulic mining debris into California rivers declared illegal.
1902	Congress passed the Reclamation Act for development of irrigated lands in the western United States.
1911	The Reclamation Board was created by the California Legislature.
1933	Congress authorized the Central Valley Water Project (CVP).  The Stockton Deep Water Ship Channel, which extends from the confluence of the Sacramento and San Joaquin Rivers to the City of Stockton, was completed.
1940	The Contra Costa Canal, which exports water from the south Delta to the Bay Area, was completed. This was first unit of the CVP that used existing channels to convey water through the Delta for export.
1944	Shasta Dam and Reservoir, a key feature of the CVP used to capture and store water, was completed. This project provided additional water to Delta channels during low-flow periods.
1951	The Delta-Mendota Canal, which exports water from the Delta via the Tracy Pumping Plant to the San-Joaquin Valley, was completed. This unit of the CVP increases exports from the Delta.
1959	Delta Protection Act – CWC §12200-12220. Established a boundary for the legal Delta. The act was oriented toward protecting water quality in the Delta and protecting holders of Delta water rights, in part by preventing excessive withdrawals, providing salinity control and integrating releases from storage into the Delta to the maximum extent possible in order to fulfill the objectives of the Act. It was oriented not only to protecting water uses within the legal Delta, but also for export to areas of water deficiency.
1960	Voters approved the State Water Resources Development Bond Act (also known as the Burns-Porter Act) to help finance the initial facilities of the State Water Project (SWP). These facilities included master levees, control structures, channel improvements, and appurtenant facilities in the Delta that are used for water

	conservation, water supply in the Delta, transferring water across the Delta, and flood and salinity control.
<b>1960</b>	Corps completion of the Sacramento River Flood Control Project, terminating at the mouth of the Delta, with the State as non-federal partner. This project incorporated and improved certain Delta levees to provide improved flood control for a portion of the Delta. These levees are commonly referred to as “project” levees.
<b>1963</b>	The Sacramento Deep Water Ship Channel, which extends from the confluence of the Sacramento and San Joaquin Rivers, was completed.
<b>1966</b>	Dedication of the Corps’ Lower San Joaquin River Flood Control Project, also progressing into and terminating within the Delta, with the State as non-federal partner
<b>1967</b>	Oroville Dam and Reservoir, which provides increased channel flows during low-flow periods, was completed. This is a key feature for the SWP and includes the Feather River Fish Hatchery to replace spawning areas lost as a result of the dam.
<b>1967</b>	The first stage of the Harvey O. Banks Delta Pumping Plant, another unit of the SWP, was completed along with the John E. Skinner Fish Facility. Diversions began from the Delta to the California and South Bay Aqueducts of the SWP.
<b>1967</b>	Construction of Clifton Court Forebay located in the south Delta began. This unit of the SWP facilitates export of water from the Delta.
<b>1969</b>	Delta levees break flooding Mildred and Sherman Islands.
<b>1969</b>	The California Legislature, under Senate Concurrent Resolution No. 151, requests the Department of Water Resources to study the problems relating to Delta levees and recommend a course of action to implement feasible solutions to the problems.
<b>1971</b>	The State Water Resources Control Board adopted Delta Water Rights Decision 1379, establishing Delta water quality standard to be met by the CVP and SWP.
<b>1972</b>	San Joaquin River levee breaks flooding Brannan and Andrus Islands and the town of Isleton.
<b>1973</b>	The Way Bill – CWC §12980-12991. Directed DWR (working with the Reclamation Board; now CVFPB) to reimburse eligible local public agencies for a portion (50 percent) of non-project levee maintenance and improvement costs after satisfaction of specific deductibles and with specific limits. This was the beginning of the Delta Levees Maintenance Subvention Program. The initial appropriation of \$300,000 was reduced by Governor Reagan to \$200,000.
<b>1975</b>	DWR publishes Bulletin 192 which analyzes the feasibility of providing flood control, recreation, wildlife habitat, and environmental enhancement by improving Delta levees.
<b>1976</b>	Nejedly-Mobley Delta Levees Act – CWC §12225-12227 and 12987. Adopted DWR Bulletin 192-75 as a conceptual plan for preserving the integrity of the Delta non-project levee system. Authorized DWR to prepare detailed plans and specifications for levee improvements and report recommendations to the Legislature. Authorized DWR to proceed immediately with a pilot project through an agreement with a local district, so long as the local district provided at least 20 percent of the costs. Appropriated \$150,000. Required maintenance projects (CWC §12987) to be compatible with Bulletin 192-75. Appropriated \$200,000 for FY 1976-77 for projects under Section 12980-12991.
<b>1982</b>	DWR issued Bulletin 192-82 “Delta Levee investigation” with alternative Delta

	levee plans. This bulletin was DWR’s report in response to the 1976 Act. The plans were developed cooperatively with USACE and cost estimates were provided. The USACE bare-bones plan (USACE, 1982) was indicated to have a 1982 cost of \$450 million, which would escalate to \$1.5 billion by completion. Recreation and wildlife enhancements were estimated to add 16 to 20 percent to these costs. The estimate for a complete rehabilitation of the Delta levee system was estimated to be \$930 million (cost in 1982 dollars) and escalate to \$3.4 billion by completion. The report preface highlights the major issue of “who pays” for legislative discussion and decision.
<b>1983</b> (February)	President Reagan determined that damage resulting from severe storms, flooding, high tides, and wave action in certain areas of California warranted a major disaster declaration under provision of the Federal Disaster Relief Act of 1974 (Public Law 93-288). <i>Source: Flood Hazard Mitigation Plan for the Sacramento-San Joaquin Delta.</i>
<b>1983</b>	DWR and Office of Emergency Services release the Flood Hazard Mitigation Plan for the Sacramento-San Joaquin Delta. The report establishes the HMP levee geometry to be used as short-term compliance for FEMA assistance
<b>1983</b>	Brought on by El Niño weather conditions, extremely wet conditions coupled with voluminous Sierra runoff led to very high river stages throughout the system and caused extensive damage to the flood management system of the Sacramento Valley.  The levee at Venice Island breached and flooded 3,220 acres of farmland.
	<b>1983, 1986, and 1987</b> – Negotiations (following major floods in 1983 and 1986) by DWR with FEMA adopting the Flood Hazard Mitigation Plan (HMP), including agreement on completion of the “short term levee rehabilitation plan” for non-project levees (implementation of the HMP geometry) by September 10, 1991. The HMP geometry was developed as an interim step – an improvement over the then-current condition of many levees, but not adequate for long-term reliability. The HMP geometry and deadline for compliance was applicable to the specific reclamation districts (RDs) that had received FEMA disaster assistance and, per RD engineers, the deadline was met by most of those RDs.
<b>1985</b>	CWC §12981(b) The Legislature further finds and declares that the delta’s uniqueness is particularly characterized by its hundreds of miles of meandering waterways and the many islands adjacent thereto; that, in order to preserve the delta’s invaluable resources, which include highly productive agriculture, recreational assets, fisheries, and wildlife environment, the physical characteristics of the delta should be preserved essentially in their present form; and that the key to preserving the delta’s physical characteristics is the system of levees defining the waterways and producing the adjacent islands. However, the Legislature recognizes that it may not be economically justifiable to maintain all delta islands.
<b>1986</b>	Congress passed the DWR and U.S. Bureau of Reclamation historic accord, the CVP-SWP Coordinated Operation Agreement
<b>1986</b>	The California Supreme Court confirmed the State Water Resources Control Board’s broad authority and discretion over water rights and water quality issues in the Bay/Delta system, including jurisdiction over the federal CVP.

<b>1986</b>	The floods of 1986 caused extensive damage to the flood management system of the Sacramento Valley. The storms caused nearly \$50 million in public and private property damage, excluding damage to roads and other infrastructure. In the northern Delta, 1,600 people were evacuated, and \$20 million in property damage occurred.
<b>1988</b>	SB 34 – The Delta Flood Protection Act of 1988 – CWC §12986 and following (amendments and additions) and CWC §12300 and following. Declared the Legislature’s intent to provide State financial assistance for Delta levees to \$12 million per fiscal year and established the Special Projects Program for the eight western islands and for the towns of Thornton and Walnut Grove. Annual appropriations were intended to be \$6 million for Subventions and \$6 million for Special Projects. Required that Subventions and Special Projects include provisions for protection of fish and wildlife habitat, as determined by the Department of Fish and Game, including “no net long-term loss of riparian, fisheries, or wildlife habitat.” Raised State cost sharing on Subventions Projects for non-project levees to 75 percent until January 1, 1999. Required that Subventions Projects be compatible with Bulletin 192-82. Allowed for advances of State funds. Required work agreements between State and local agency that indemnify the State. Required that the local agency apply for federal disaster assistance whenever eligible.
<b>1988</b>	Barker Slough Pumping Plant, which provides water from the northwest Delta for the North Bay aqueduct, was completed.
<b>1988</b>	Suisun Marsh salinity control gates, which aid in controlling water quality in the marsh for protection of waterfowl, were completed.
<b>1991</b>	SB 1065 – CWC §12306-12308 and Budget Act. Required cooperation among the Resources Agency, DWR, The Reclamation Board (now CVFPB), and Department of Fish and Game (now Wildlife) on habitat mitigation for Delta levee projects. Reaffirmed the “no net long-term loss” of habitat policy. Made various budget appropriations.
<b>1992</b>	SB 1866 – The Delta Protection Act of 1992– Public Resource Code (PRC) 29700 and following. Created the DPC. Affirmed the boundary of the legal Delta and established the Primary and Secondary zones. Many findings regarding uniqueness, statewide importance, need to preserve and protect the Delta and improve flood protection. Required development of a Resource Management Plan for the Primary Zone. Leaves land use authority over Secondary Zone in the hands of the counties and cities. The Legislature declares that it is a basic goal of the State to improve Delta flood protection to ensure an increased level of public health and safety.
<b>1992</b>	Congress passed the Central Valley Project Improvement Act (Public Law [PL] 102-575).
<b>1994</b>	SB 285 – PRC 29735, 2960 and following. Provided refinements to the Delta Protection Act, extending deadlines regarding the Resource Management Plan.
<b>1994</b>	State and federal agencies and representatives signed the Bay-Delta Accord.
<b>1995</b>	Assembly Joint Resolution No. 30 – Authorized CALFED. Delta levee integrity was one of CALFED’s four major objectives.
<b>1996</b>	AB 360 – CWC §12300 and following and CWC §12980 and following. Made substantial changes to the Delta Levee Maintenance Subventions Program and the Special Delta Flood Protection Projects Program. Reaffirmed intent to appropriate

	<p>\$6 million per year to each. Extended the Subventions Program to Project levees in the Primary Zone, and it extended Special Projects to “other locations in the Delta” and to approximately “12” miles of levees on islands bordering Northern Suisun Bay from Van Sickle Island westerly to Montezuma Slough (In fact, the distance in levee miles from Van Sickle to Montezuma Slough is more nearly 20 miles.), and contained a provision to sunset the Delta Flood Protection Fund on July 1, 2006. Reemphasized coordination with Department of Fish and Game to ensure no net long-term loss of habitat and initiated the requirement for habitat enhancement – expenditures must be “consistent with a net long-term habitat improvement program and have a net benefit for aquatic species in the Delta.” Required local public agencies to apply for federal disaster assistance whenever eligible. Extended a maximum of 75 percent State cost share on eligible Subventions cost reimbursement to July 1, 2006. Authorized emergency work with Delta Levee Program funds of up to \$50,000 per site and not exceeding \$200,000 per year, contingent on local cost sharing. Authorized DWR to “prepare and submit to the Board for adoption a Delta emergency response plan for levee failures.</p>
<b>1996</b>	<p>Proposition 204 – SB 900 – CWC §78500. Safe, Clean, Reliable Water Supply Act. Total general obligation water bonds of \$995 million, including \$193 million to the Delta Improvement Account, of which \$25 million was for Delta Levee Rehabilitation, \$10 million was for South Delta Barriers, \$2 million for recreation, \$3 million for CALFED costs, \$60 million for CALFED/Bay-Delta/ecosystem/non-flow Regional Board Water Quality requirements, and \$93 million to the Central Valley Project Improvement Act subaccount for State actions and cost sharing complementing CVPIA activities.</p>
<b>1997</b>	<p>Storms caused one of the worst floods of the century over the New Year holiday. McCormack-Williamson Tract and Dead Horse Island levees failed. High flows in the San Joaquin River led to failure of a levee at Mossdale, flooding that area and Stewart Tract, and the nearby Paradise Cut levee breach flooded the Pescadero District.</p> <p>Fourteen levee breaches occurred on the San Joaquin River between Fresno and the Chowchilla Bypass, inundating agricultural lands, including many vineyards north of the river. Inflows to Don Pedro Dam on the Tuolumne River peaked at over 100,000 cfs. Releases from the dam peaked at about half of this amount. However, the peak releases from the dam were about six times the downstream channel design capacity of 9,000 cfs.</p>
<b>1998</b>	<p>SB 1075 – Refinements to the Delta Protection Act –PRC Sections 29729 and following. Authorized the DPC to act as facilitating agency for implementation of any joint habitat restoration or enhancement program. Extended life of DPC until January 1, 2010 (but this sunset provision was repealed by AB 2930 in 2000, giving DPC a continuing existence).</p>
<b>2000</b>	<p>Proposition 13 (March Primary) – AB 1584 (1999) – Safe Drinking Water, Clean Water, Watershed Protection, and flood Protection Act. General obligation bonds of \$1.97 billion, including \$292 million for flood protection, of which \$30 million were for Delta levee rehabilitation.</p>
<b>2000</b>	<p>CALFED Programmatic Record of Decision was certified, including adoption of the</p>

(August)	Delta-specific PL 84-99 design as the base level of protection for the Delta levee system.
<b>2002</b>	Proposition 50 (November) – Voter Initiative – Water Security, Clean Drinking Water, Coastal and Beach Protection Act of 2002 – CWC §79500 and following. General obligation bonds totaling \$3.44 billion, including \$825 million to implement CALFED, of which \$70 million were allocated to Delta Levee Restoration.
<b>2002</b>	SB 1653 and AB 2683 – California Bay-Delta Authority Acts –CWC §79400 – and following. Established the California Bay-Delta Authority to implement the CALFED Programmatic Record of Decision.
<b>2004</b>	The Lower Jones Tract levee failed, inundating the 5,894-acre island.
<b>2005</b>	Hurricane Katrina caused severe destruction along the Gulf coast from central Florida to Texas. This causes heightened awareness of the California levee system conditions.
<b>2005</b>	AB 1200 – Required DWR to consider potential Delta impacts of subsidence, earthquakes, floods, changes in precipitation, temperature, and ocean levels and a combination of those impacts (CWC §139.2 et seq.). Required DWR and the Department of Fish and Game to identify, evaluate and comparatively rate the principal options for addressing those impacts.
<b>2005</b>	SB 264 – Extended Delta Flood Protection Fund to July 1, 2008.
<b>2005</b>	Yuba County Water Agency, USACE, the National Weather Service, and DWR initiated a two-phase development program for forecast-coordinated operations of New Bullards Bar Reservoir on the North Yuba River and Lake Oroville on the Feather River.
<b>2006</b>	AB 798 – Delta Levee Maintenance. Declared intention of Legislature to appropriate available bond funds beyond the previously indicated amount of \$12 million per year (combined total) for the Subventions and Special Projects Programs. Extended Delta Flood Protection Fund and Subventions maximum State cost share of 75 percent until July 1, 2010. Extended authority to advance funds until July 1, 2010.
<b>2006</b>	SB 1574 –Required Secretary of Resources to convene a multi-department committee to provide a Strategic Vision for a Sustainable Delta by December 31, 2008.
<b>2006</b>	Proposition 84 – Safe Drinking Water, Water Quality and Supply, Flood Control, River and Coastal Protection Bond Act of 2006. Provided nearly \$5.4 billion in bond funds for various resource management and water projects, including \$800 million for flood management of which \$275 million was for Delta projects for levee maintenance and improvements in emergency response preparedness.
<b>2006</b>	Proposition 1E – Disaster Preparedness and Flood Protection Bond Act of 2006. Provided nearly \$4.1 billion for flood-related planning and projects throughout the State, including \$3 billion for State-federal project levees and the Delta. The portion for the Delta has not been firmly set, although the Legislature has appropriated \$305 million for Delta flood-related projects so far. The “Bond Expenditure Plan” (DWR, 2007) allocated “a minimum of \$500 million to reduce the risks of levee failure in the Sacramento-San Joaquin Delta.”
<b>2007</b>	FloodSAFE – Legislation that pertains to DWR/FloodSAFE and CVFPB activity

and responsibilities in the Delta occurs in several contexts: 1) general (applicable to the whole State or the entire Central Valley), 2) specific to the State Plan of Flood Control (project levees), 3) specifically applicable to the whole Delta, and 4) specifically applicable to non-project levees in the Delta. The first two of these categories were significantly affected by the 2007 package of California Flood Legislation. The legislation that is more specific to the Delta was updated by the broad package of water legislation passed in 2009 and has also accumulated from more specific legislation over time. The summary for the Delta draws much detail from the current CWC. The following paragraphs address each of the four topics in turn:

1) **General FloodSAFE Legislation** – The 2007 flood legislation package consisted of five bills – SB 5 and 17 and AB 5, 70, and 156 – plus a sixth bill (AB 162). Present flood management work is also significantly influenced by Propositions 84 and 1E passed in 2006. This legislation established a substantially modified approach to flood management in general.

2) **State Plan of Flood Control** – The Central Valley Flood Protection Act of 2008 (enacted by SB 5) directs DWR to prepare and CVFPB to adopt a Central Valley Flood Protection Plan (CVFPP) by 2012. Per the DWR Summary, “The CVFPP is to establish a system wide approach to improving flood management in the areas currently receiving some amount of flood protection from the existing facilities of the State Plan of Flood Control. In addition, the CVFPP is to include a recommended list of both structural and nonstructural means for improving performance and eliminating the deficiencies of flood management facilities, while also addressing ecosystem and other water-related issues. DWR shall develop a recommended schedule and funding plan to implement the recommendations of the CVFPP. The flood legislation establishes the 200-year flood event (flood with a 1-in-200 chance of occurring in any year) as the minimum level of flood protection to be provided in urban and urbanizing areas. The flood legislation also limits the State’s liability for developing and adopting the CVFPP to that already associated with the existing State Plan of Flood Control.”

3) **The Delta as a Whole** – Recognizing the specific intent of Propositions 84 and 1E to address the needs of the flood management system including the Delta and DWR’s existing programs addressing the Delta, DWR has incorporated all its Delta flood management activities into FloodSAFE. Thus, funds for the Delta go beyond the State Plan of Flood Control to consider other needs, including vulnerable urban areas, vulnerable infrastructure, the reliability of water conveyance capabilities, as well as the needs of the Delta more broadly as a region.

4) **Non-Project Levees in the Delta** – The Delta Flood Protection Program (Subventions and Special Projects) is a FloodSAFE program and is specifically oriented toward maintenance and improvement of non-project and eligible project levees in the Delta based on CWC §12980 et seq. and §12310 et seq. The legislative direction for this program was developed in four principal bills described above.

<b>2008</b>	SB 27 – Sacramento-San Joaquin Delta Emergency Preparedness and Response Act of 2008 (CWC §12994.5). Requires that Cal EMA, in cooperation with DWR, DPC, and a representative of each of the five counties form a Sacramento-San Joaquin Delta Multi-Hazard Task Force, is to develop an interagency unified command structure, coordinate the development of a draft emergency preparedness and response strategy, and develop and conduct an all hazard emergency response exercise in the Delta. The period of performance for the Task Force was recently extended to January 1, 2013.
<b>2009</b>	The Delta Protection Act of 2009, SBX7 1, established the Delta Stewardship Council.
<b>2010</b>	SB 808 – Delta Levee Maintenance. The sunset on the 75 percent maximum State cost share for the Subventions Program reimbursement of eligible costs was extended to July 1, 2013. Similarly, the sunset on the authorization to advance funds on current projects was extended to July 1, 2013.
<b>2012</b>	SB 200 – extends the above to 2018.



# Delta Levee Investment Strategy

July 2014

**T**wo-hundred years ago most of the Delta was a vast wetland that was slightly above sea level. Early settlers built an intricate levee system to create dry “islands” suitable for farming. Since then many of the Delta soils have deeply subsided.

Today, many Delta tracts are well below the level of the water in adjacent channels, and a rising sea level will only worsen the differential. While the occasional levee break is a fact of Delta life, multiple failures could bring disaster to the Delta landscape, economy, ecosystem and infrastructure.

There are more than 1,000 miles of different kinds of levees in the Delta providing various levels of protection and in varying conditions. Since the 1970s the State has committed approximately \$700 million to levee operations, maintenance and improvement based on the objective of improving all levees to a single standard of protection.



The **Delta Reform Act of 2009** called on the Delta Stewardship Council to lead a multi-agency effort to rethink those efforts and instead suggest a long-term approach through which limited State funds are used for improvements critical to State interests.

The Levee Investment Strategy will integrate economics and engineering to identify state funding priorities for Delta levees. This will be developed over the next 18 months, working with state agencies, local Reclamation Districts, and with Delta landowners and stakeholders. The Strategy will use the best available data, research, and lessons learned from other state and local programs and planning efforts.

## Stay Involved!

For more information about the Delta Levee Investment Strategy and the Delta Stewardship Council’s role visit:  
<http://deltacouncil.ca.gov/leveestrategy>



*Home built above expected flood elevations survives the Walnut Grove flood, San Joaquin County, Winter 1997*

*Photo: CalOES*

## Objectives

1. **Create a comprehensive strategy for prioritizing limited state funding for Delta levees** to ensure that the state has a coordinated and systematic approach for targeting the improvement of public safety, ecosystem conditions, and economic sustainability in this region. Includes:
  - Extensive stakeholder and public engagement
  - Independent peer review of methods to ensure best available science
  - CEQA compliance
  - Recommendations for investment priorities and a planning tool that can be used for future planning/investment purposes as circumstances change.
2. **Recommend priorities for state investments in Delta levees** based on an island-by-island risk analysis that factors in state interests, assets, categories of beneficiaries, risks, environmental impacts, and stakeholder input.
3. **Identify appropriate level of flood protection** based on flood risk tolerance and guided by existing federal, state and local agency criteria, regulations and legislation, *e.g.*, FEMA recovery standards.
4. **Propose appropriate cost-allocation** among those who benefit from the protection provided by Delta levees. Develop this proposal in conjunction with the Delta Protection Commission’s Delta Risk Management Assessment District Feasibility Study.



## Investment strategy will be based on multi-faceted assessment

The State currently contributes massively to levee costs throughout the Delta, but on a not very systematic basis. The Council’s Delta Plan offers broad principles: Urban areas come first; special attention must be paid to levees guarding roads and energy facilities; the channels through which water flows toward export pumps require protection, as does the pipeline that brings Sierra water across the Delta for the East Bay Municipal Utility District. Levees on the western islands, whose failure could bring salinity deep into the Delta, are also of high concern.

The Levee Investment Strategy will build on these principles, as well as on earlier work done by the Department of Water Resources to assess risks to Delta levees. Together with its partners, the Council will assess, island by island, the state of levees, the degree of subsidence, the extent and value of assets to be protected, and the cost of long-term defense. The result will be a tiered priority list for State levee

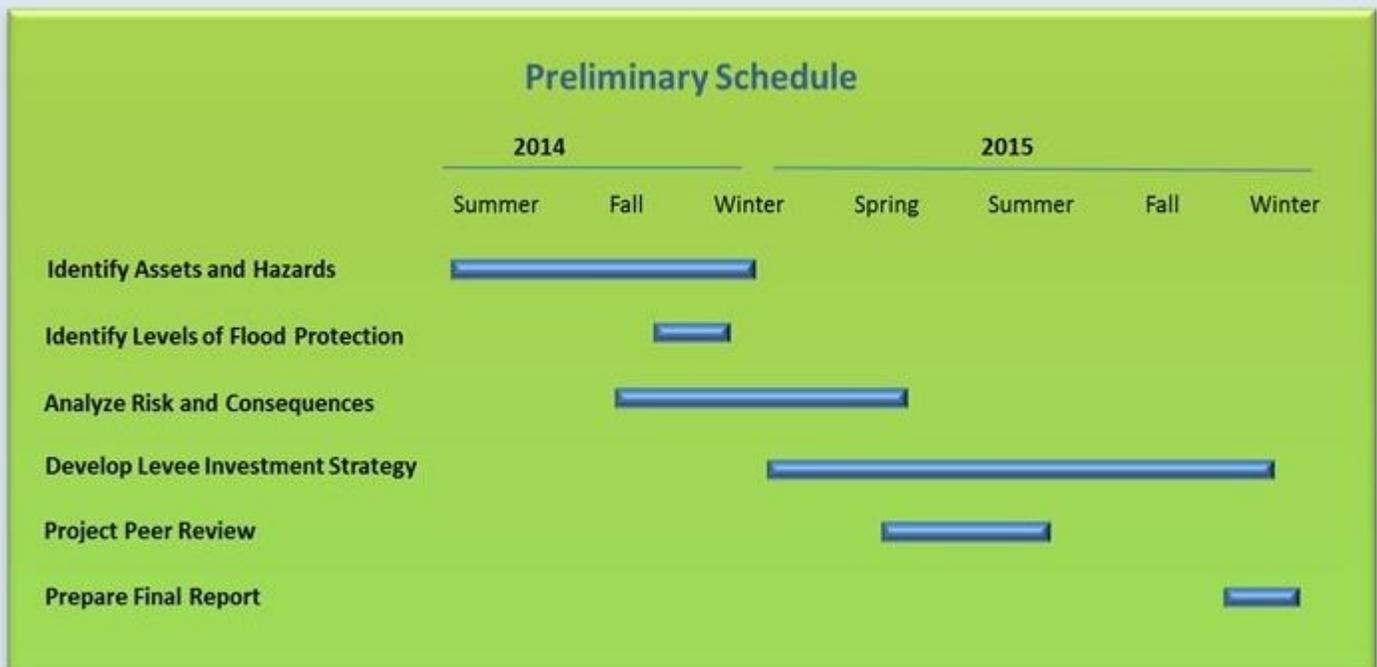
investments. The Strategy will also enhance the coordination of levee operations and maintenance to help make funding more certain.

### Why is this different?

The Levee Investment Strategy will give guidance for investing State funds in a manner that looks beyond the value of assets directly behind a levee and considers the interconnection of these assets not only to the Delta, but also to California’s water supply, transportation, electrical and gas transmission systems and the overall health of the environment.

### A partnership approach

Participants in the project include: the Delta Protection Commission, Reclamation Districts, local government agencies, the Central Valley Flood Protection Board, the California Department of Water Resources, and the California Water Commission.





## Frequently Asked Questions

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### 1. **What is the Delta?**

The Sacramento-San Joaquin Delta, formed by the confluence of the Sacramento and San Joaquin Rivers, is the largest estuary on the West Coast. The Delta, along with the Suisun Marsh, is a regional, state, and national treasure that is home to more than 515,000 people and 750 animal and plant species; supplies drinking water to 25 million Californians and irrigation water for the majority of California's agricultural industry; and attracts 12 million recreational visitors annually.

### 2. **What is a levee?**

A levee is a man-made bank of earth constructed to keep a river from overflowing its banks or to prevent ocean waves from washing into undesired areas. In the Delta, the levees continually constrain river flows and tidal action to provide protection from flooding.

### 3. **Why does the Delta need levees?**

Early settlers built an intricate levee system in the Delta wetlands to create dry "islands" suitable for farming. Today, these levees protect land assets, including residential and commercial structures, agricultural land, gas and water supply pipelines, roads, bridges, railroads, and animal habitats. They also protect water assets, including fresh water flows, salinity management, aquatic habitat and migration corridors, and shipping channels.

### 4. **What threatens the Delta levees?**

The Delta levees are vulnerable to damage caused by floods, wave action, seepage, subsidence, earthquakes, sea-level rise, and some human and wildlife activities.

### 5. **Who is responsible for the levees?**

Federal, State, regional, and local agencies each have a role in planning, overseeing, and implementing levee maintenance and improvements.

### 6. **Who benefits from the levees?**

The levees provide protection and benefits to residents, landowners, and businesses on the islands; owners and users of energy and transportation infrastructure (private companies, the State, and local government); water supply agencies and their customers; and the public (recreation and the environment).

### 7. **What would happen if the Delta levees fail?**

A catastrophic levee failure could cause injury to people or loss of life. It could also damage property, highways, energy utilities, water supply systems, and the Delta ecosystem, all of which could harm the regional and statewide economy and environment.



**8. What can be done to reduce risks in the Delta?**

A variety of actions can reduce the risks in the Delta, such as upgrading the current levees, building and improving channels that redirect flood waters, elevating houses to protect against floods, and improving emergency response preparation.

**9. What is the Delta Stewardship Council doing?**

The **Delta Reform Act of 2009** called on the Delta Stewardship Council to lead a multi-agency effort to establish priorities for State investments in the Delta levee system. The Council is collaborating with State agencies, local reclamation districts, Delta landowners, and many other involved stakeholders to prepare a Delta Levees Investment Strategy.

**10. What is the Delta Levees Investment Strategy?**

The Delta Levees Investment Strategy is an extensive, inclusive stakeholder research project that will identify State funding priorities and provide direction to assemble them into a comprehensive investment strategy for the Delta levees—based on the best available data, research, local knowledge, and lessons learned from other State and local programs and planning efforts.

**11. Why is an investment strategy needed?**

Since the 1970s, the State has committed more than \$700 million to operate, maintain, and improve Delta levees and reduce risks in the Delta. However, the State does not have a long-term strategy to guide future investments, and funding is limited.

**12. How is this different from past projects?**

The Delta Levees Investment Strategy will build on previous levee planning work and provide a **long-term** strategy for future State investments based on current conditions, information, and technologies. This strategy will use a **comprehensive** methodology that considers the Delta levee assets, threats and consequences, types of beneficiaries, costs, stakeholder input, and various risk-reduction measures.

**13. How is the Delta Levees Investment Strategy funded?**

The funding for the Delta Levees Investment Strategy is provided by Proposition 1E bond funds (2006).

**14. How will future risk-reduction measures be funded?**

Future funding for levee improvements and other risk-reduction strategies would likely come from a mix of sources, including the State and the landowners, businesses, and water users who benefit from the levees. The Delta Levees Investment Strategy will consider how costs should be allocated to the various beneficiaries.

**15. What are the expected project outcomes?**

This project will result in a report that outlines a suite of investments that best address the State's many goals and priorities. The strategy will recommend risk reduction actions for each island, tiered priorities for State investment, and a method for allocating costs to beneficiaries. Study results will include a computer-based tool that can be used in the future for investment planning as new information becomes available. The strategy will be submitted to the California



Legislature. The Delta Stewardship Council will use these results to update its regulations and recommendations that guide risk reduction in the Delta.

**16. What is the project schedule?**

The project began in July 2014 and is ongoing. The Delta Levees Investment Strategy will be developed over the following 18 to 24 months.

**17. How can the public get involved?**

The Council is committed to a robust, open process to develop the Delta Levees Investment Strategy. The project team will be meeting with the people and organizations working on levee issues and the Delta to obtain information and understand their priorities. The Delta Levees Investment Strategy's website (<http://deltacouncil.ca.gov/delta-levee-investment-strategy>) also provides updated project news, information, and ways to get involved.

## **ACTION ITEM**

### **Delta Levees Investment Strategy Update and Contract Amendment**

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**Summary:** This report provides an update on the Delta Stewardship Council's work to develop updated priorities for State investments in Delta levees (Water Code section 85306). Staff recommends the Council authorize the Executive Officer to amend the contract with Arcadis, the project's consultant, to add up to \$1,845,902 to complete work necessary to develop the Delta Levees Investment Strategy. Staff will brief the Council on the need for additional funding for items including data development, outreach activities, and the CEQA process. Staff will also provide a project update.

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#### **Requested Action**

Authorize the Executive Officer to increase the contract amount between the Delta Stewardship Council and Arcadis for work related to developing updated priorities for State investments in Delta levees by \$1,845,902 for a total contract amount of \$4,308,393.

#### **Background**

The Delta Reform Act requires that the Delta Plan promote strategic levee investments that attempt to reduce risks to people, property, and state interests in the Delta (Water Code section 85305) and recommend priorities for state investment in levee operation, maintenance, and improvements in the Delta (Water Code section 85306). In addition, the Delta Plan may identify actions to be taken outside of the Delta, if those actions are determined to significantly reduce flood risks in the Delta and may include local plans of flood protection (Water Code section 85307(a-b)). Payments through the Delta Levee Maintenance Subventions Program must "reflect the priorities of, and be consistent with, the Delta Plan" (Water Code section 12986(c)).

The Delta Plan's regulatory policies include interim priorities to be used until a more comprehensive investment methodology is developed (RR P1; 23 CCR 5012).

The Delta Plan indicates that the Council would act promptly to update these interim priorities, working in consultation with DWR, the Central Valley Flood Protection Board (CVFPB), the Delta Protection Commission (DPC), local agencies, and the California Water Commission (Delta Plan 2013 - RR R4). The Plan notes that "currently, no comprehensive method exists to prioritize State investments in Delta levee operations, maintenance, and improvement projects. Without a prioritization methodology, the apportionment of public resources into levees may not occur in a manner that reflects a broader, long-term approach."

In May 2014, the Council authorized the Executive Officer to execute a contract between the Delta Stewardship Council and Arcadis in the amount of \$1,981,491 for work related to developing updated recommendations for priorities for State investment in Delta levees. In June 2015, this contract was amended to add \$481,000 for work related to the development of conceptual levee designs, report writing, and project management. With this funding, Council staff and the Arcadis team have been developing the means to evaluate the probability of levee breaches and potential impacts to State interests with the use of an innovative decision-support tool. This tool, which allows users to explore scenarios based on the most up to date inventory of Delta asset and levee condition information available, will aid the Council in its development of recommendations for priorities for State investments. The project efforts have included gathering existing asset data, evaluating hazards and levee vulnerability, and developing metrics that would suitably represent the impacts of flooding on those identified State interests in the Delta. An independent scientific review panel was also convened to review the proposed methodology and this led to refinements being implemented in the decision-support tool.

Although much progress has been made, the additional work to refine the methodology along with extensive work needed to develop new inputs, based on feedback from our technical resource stakeholder group, the public, and the independent review panel, has led to increased project costs. Staff requests that the Council authorize the Executive Officer to amend the existing contract with Arcadis to add up to \$1,845,902 to complete work necessary to develop the Delta Levees Investment Strategy.

Additional funding above the original authorized amount will cover remaining work necessary to develop key input (in the form of investment scenarios) to the Delta Levee Investment Strategy planning tool to illustrate where improvements are needed and the extent and cost of these improvements. Developing the Delta Levees Investment Strategy is requiring significantly more effort than originally anticipated, especially to develop alternative investment concepts, meet Council and stakeholder expectations for public and agency involvement, and comply with the California Environmental Quality Act (CEQA). During development of the Request for Proposal (RFP), discussions with other State agencies that fund levee improvement projects indicated that information on anticipated levee projects was available in the RDs' five-year plans submitted to these other agencies. However, after the consultants collected the available data, only 25 useful projects were found in the reclamation district five-year plans. The quality and quantity of these projects did not adequately represent the geographic scope and level of improvements that may be needed in the Delta, hence more technical development is required.

Specifically, additional funding will be used to develop a set of levee improvement project concepts that address risks identified from existing tasks in the current contract. These concepts will be used, in lieu of actual project proposals, for evaluation of investments that can reduce risk to people, property and State interests in the Delta. This analysis will be completed using the Delta Levees Investment Strategy decision-support tool which identifies areas most at risk from these events and evaluates the potential investments that would reduce this risk including the cost effectiveness of these projects.

The conceptual levee designs will also be used as the basis for the CEQA evaluation of the proposed investment strategy and potential policy changes in the Delta Plan and associated regulations. A Programmatic Environmental Impact Report will be prepared to summarize possible actions and consequences so that the State will be able to rely on this report as a reference for future planning and implementation activities, creating additional value, rather than limiting the environmental review to the Council's work only.

In addition, since State funds are used to pay for levee improvements, it is necessary that all interested parties in the Delta are afforded the opportunity to provide information on their proposed project needs. If approved, this funding will also be used for additional stakeholder outreach efforts that have become necessary as a part of developing conceptual levee designs and projects. This stakeholder engagement will ensure conceptual projects are representative of the types of projects that would be proposed for levee improvements. This engagement will also ensure stakeholders from all regions of the Delta are consulted and their input incorporated into this project throughout the analysis and development of prioritization recommendations.

### **Recommendations and Next Steps**

In order to complete work on this project, staff recommends that the Council authorize the Executive Officer to amend the contract with Arcadis. Council authorization is required because the total amount of the contract exceeds the Executive Officer's \$500,000 delegated authority.

The term of the contract will be extended from June 2016 to May 2017 and all work paid for under this contract will be related to the investment prioritization task. If the Council authorizes the Executive Officer to amend this contract, the Council's Contracting Office will be notified immediately so that they may proceed with developing the contract amendment for the Executive Officer's approval. Staff anticipates the start date of this contract amendment will be in April 2016.

### **Fiscal Information**

Additional funding for this project will be provided through an amended Interagency Agreement with the Department of Water Resources.

### **List of Attachments**

No attachments.

### **Contact**

Dustin Jones  
Supervising Engineer

Phone: (916) 445-5891

**STATEMENT OF SERVICE**

**CALIFORNIA WATERFIX PETITION HEARING  
Department of Water Resources and U.S. Bureau of Reclamation (Petitioners)**

I hereby certify that I have this day submitted to the State Water Resources Control Board and caused a true and correct copy of the following document(s):

Motion for protective order

to be served **by Electronic Mail** (email) upon the parties listed in Table 1 of the **Current Service List** for the California WaterFix Petition Hearing, dated October 6, 2016, posted by the State Water Resources Control Board at

[http://www.waterboards.ca.gov/waterrights/water\\_issues/programs/bay\\_delta/california\\_waterfix/service\\_list.shtml](http://www.waterboards.ca.gov/waterrights/water_issues/programs/bay_delta/california_waterfix/service_list.shtml):

*Note: In the event that any emails to any parties on the Current Service List are undeliverable, you must attempt to effectuate service using another method of service, if necessary, and submit another statement of service that describes any changes to the date and method of service for those parties.*

**For Petitioners Only:**

	I caused a true and correct <b>hard copy</b> of the document(s) to be served by the following method of service to Suzanne Womack & Sheldon Moore, Clifton Court, L.P., 3619 Land Park Drive, Sacramento, CA 95818:  <b>Method of Service:</b> <u>U.S Postal</u>
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I certify that the foregoing is true and correct and that this document was executed on October 27, 2016  
Date

Signature: 

Name: Bobbie Randhawa

Title: Legal Secretary

Party/Affiliation: DWR

Address: 1416 Ninth Street 1104  
Sacramento, CA 95814