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1 SECTION 7

² Summary and Conclusion

3 **7.1 OVERVIEW**

4 This section integrates current conditions described in the status of species and environmental baseline

5 sections of this BA with anticipated effects of the 2-Gates Project and expected cumulative effects of future 6 non-Federal actions. Its purpose is to develop a better understanding of the likely short-term and up to five

7 year effects to listed species and designated critical habitat within the Action Area, which includes the region

of influence (that area where gate operations can control hydrodynamic and water quality conditions in order

9 to reduce delta smelt movement toward the south Delta) and other Delta channels where flows may be

10 affected but not directly controlled. The geographic extent of the region of influence was determined by

11 hydraulic modeling, as described in Section 2.3.

12 7.2 SUMMARY OF SPECIES STATUS AND ENVIRONMENTAL BASELINE

13 As described in the status of species and environmental baseline sections of this BA, past and present

14 activities have caused significant habitat loss, fragmentation, and degradation within the Delta. In addition,

15 past and present operations of the Central Valley Pumps (CVP) and State Water Pump (SWP) pumping

16 facilities within the south Delta, along with other unscreened diversions, have resulted in significant

17 entrainment and loss of Endangered Species Act (ESA) listed aquatic species.

18 The functionality of aquatic, riparian, and floodplain habitat within the Action Area have all been

19 substantially degraded due to anthropogenic activities, such as alterations in Delta channel geometry, removal

20 of riparian vegetation and shallow water habitat, construction of armored levees, changes in Delta

21 hydrodynamics due to water export demands and water diversions, and the influx of contaminants from

stormwater and agricultural discharges. Introduction and spread of non-native invasive species of plants and

animals has significantly altered the habitat structure, community composition and food web dynamics in the

24 Delta. Past and present effects described in the environmental baseline are expected to continue through the

duration of the $\hat{5}$ -year operation planned for the 2-Gates Project and into the future.

26 7.3 SUMMARY OF EFFECTS OF THE 2-GATES PROJECT

The proposed 2-Gates Project, along with the interrelated and interdependent activities associated with it are expected to affect aquatic and terrestrial species and the value of their habitat for the 5-years covering Project installation and operation. For aquatic species, these effects are anticipated to extend throughout the Action Area. For terrestrial species, these effects are expected to be more localized primarily occurring only within the actual physical foot print of the gates and associated structures (i.e. boat ramps, access roads, staging

32 areas).

33 7.3.1 Aquatic Species

Listed aquatic species that could be affected by the 2-Gates Project include delta smelt, winter-run Chinook,

35 spring-run Chinook, Central Valley (CV) steelhead, Southern distict population segment (DPS) green

36 sturgeon, and longfin smelt. The Project effects would result from in-channel installation (September-October

2009), operation of the gate structures (annually December through June, 2009-2014), and removal of the
gates at the Project's conclusion in July 2014.

In-water site preparation and gate installation (dredging, foundation prep, sheet pile installation, barge 39 placement, etc.) is anticipated to occur during established in-water work windows to avoid adverse effects to 40 listed species. Southern DPS green sturgeon and CV steelhead adults may be present in the Action Area and 41 42 at the Project sites during installation. Construction effects include increased construction vessel activity with potential oil and gas contamination from spills; the installation of the sheet pile walls; dredging of peat 43 sediments and installation of a rock base for the barge, and installation of the gate and placement of rock to 44 45 lock in the barge. Construction activities would generate noise from construction vessels, sheet pile installation, dredging activity and rock placement that would disturb species in the immediate vicinity of the 46 Project sites. Dredging would remove about 7,500 cubic yards of channel bed in Old River and 5,000 cubic 47 yards of bed material in Connection Slough and replace that with a similar amount of rock. This activity 48 would increase local turbidity during the dredging and would replace approximately 1.5 acres of soft bottom 49 50 habitat with hard bottom substrate and the two barges. Green sturgeon are bottom-oriented fish and could be injured or killed by dredging, rock or barge placement, however, green sturgeon in the Delta are relatively 51 large and would be able to quickly move away from any threat. 52

53 The gates will be operated to modulate flows in Old and Middle Rivers and thus manage distribution of 54 higher turbidity conditions that cue adult pre-spawning migration from extending into the south Delta. Adult 55 smelt begin moving inland from the western Delta when first flush flows increase turbidity (greater than or equal to 12 NTUs) and decrease salinity. During this period, typically December to February/March, gates 56 will be operated to reduce movement of fresher, more turbid water in the central Delta from extending into the 57 58 south Delta via Old and Middle Rivers. The Old River gate will be closed periodically depending on turbidity distributions. Typically, Old River gate closure of up to about an hour within a 25 hour tidal cycle will be 59 sufficient to achieve desired conditions. The Connection Slough gate will generally be closed. 60

Delta smelt spawning typically commences once Delta-wide average water temperatures reach 12 °C, 61 approximately February or March. Once this occurs, gates will be operated to protect larval and juvenile delta 62 smelt from entrainment into the south Delta, as informed by 20-mm surveys of larval distribution. The Old 63 River gate will be operated tidally: open on ebb tides and closed on flood tides, both lasting approximately 64 65 5-7 hours each within a 25 hour tidal cycle. The Connection Slough gate will be closed during ebb and flood tides, may be opened on slack tides (approximately an hour), and will be opened to allow boat navigation on 66 weekends and as needed. Gate operations will be coordinated with OCAP restrictions and QWEST. Gates 67 will also be open continuously during the Vernalis Adaptive Management Program (VAMP) periods 68 (mid-April to mid-May) and on weekends from Memorial Day through June. Gates will remain open from 69 July into December. 70

71 The gate structures and their operations would affect habitat conditions by affecting hydrodynamics in the region of influence. The Project will balance net flows in Old and Middle Rivers between the San Joaquin 72 River and Woodward Cut, but will increase reverse flows in Turner and Columbia cuts. These altered 73 74 hydrodynamics may affect delta smelt, winter-run and spring-run Chinook, CV steelhead, green sturgeon and 75 longfin smelt. All species of fish would be present in the Action Area during the operational period for adult delta smelt (December to February/March). All species except longfin smelt would be present during the 76 77 operational period for larval delta smelt (March-June). Results of the modeling studies indicate that there 78 would be a reduced risk of entrainment for delta smelt and other species within the Action Area during 79 operations. This relative change would benefit delta smelt since upstream-moving pre-spawning adults would 80 not move into the conveyance channels that lead to the pumping facilities. These changes would also benefit juvenile salmonids that are emigrating from the Sacramento River (winter-run and spring-run Chinook and 81 82 CV steelhead) and would not increase the risk of entrainment to CV steelhead juveniles emigrating from the 83 Mokelumne River. Project operations would not increase and may reduce entrainment risk for longfin smelt and juvenile green sturgeon. 84

85 Gate operations will not change local water quality conditions in the vicinity of the gates beyond the range of

natural variation experienced in the Delta. In Old River, changes in DO or turbidity are unlikely because of 86

the short periods of gate closure. In Connection Slough, where the gate will be closed for long durations, there 87

88 may be reduced DO levels in the slough west of the gate. However, these reductions are not likely to reach

- deleterious levels during the winter and early spring when Delta water temperatures are cool. Also, there will 89
- 90 be some water exchange through the leaky gate structures.

Gate closure may affect migration corridors for salmon and steelhead juveniles emigrating from the San 91

- Joaquin River by impeding movement during flood tides or diverting individuals to other routes through the 92
- 93 Delta. The consequence would be a delay in migration to the ocean, increased exposure to predators in the

Delta, or unsuccessful migration. However, the negative effects on CV steelhead from the San Joaquin River 94

would not be great because only some of the juveniles utilize the Old River route, gate closure occurs briefly 95

96 during flood tides, downstream movement by juveniles tends to occur during ebb tides, and the gates will remain open during peak outmigration through the Delta (VAMP period). Gate closure may benefit juvenile 97

Chinook and CV steelhead emigrating from the Sacramento River by reducing opportunities for diversion

- 98
- 99 down Old River toward the south Delta and the export facilities.

100 The gate structures would attract predatory fish, such as striped bass, which exploit situations where food is

abundant or where features exist that enhance feeding opportunities, such as turbulent flows. Species and life 101

stages at potential risk include delta smelt (adult and juvenile), salmonids (juvenile), and longfin smelt (adult). 102

103 This effect would be localized, however, and would not result in jeopardy for these species as a whole.

7.3.2 Effects on Designated Critical Habitat for Aquatic Species 104

Critical Habitat in the Action Area has been designated for delta smelt and Central Valley steelhead, and 105 proposed for Southern DPS Green sturgeon. The Action Area supports a variety of Primary Constituent 106

107 Elements (PCEs) of Critical Habitat for each species. For delta smelt, these include physical habitat (suitable

- spawning substrate and depth), water (suitable water quality, low entrainment risk), flow (cues for spawning 108
- 109 migrations and larval transport flows), and salinity (low salinity rearing habitat). For CV steelhead in the
- Delta, these include migration corridors for adults and juveniles that are free of barriers (unobstructed 110

passage) and entrainment risk. For green sturgeon in the Delta, these include migration corridors for adults 111

and juveniles, sediments free of contaminants, and rearing habitat for juveniles. Current conditions of aquatic 112

- habitat in the Delta overall are considered degraded. 113
- 114 The Project would adversely modify a small area proportion of critical habitat at the sites of the gates
- structures, and would have minor effect on critical habitat within the Action Area as a whole. Overall, the 115

Project would improve critical habitat for delta smelt within the larger Delta region through control of 116

- important habitat constituents, turbidity and salinity. The Project is designed to improve conditions for delta 117
- smelt by reducing entrainment risk. Installation of the gates will disturb approximately 1.5 acres of soft-118
- 119 bottom channel habitat and replace it with rock substrate and two barges. This would affect a relatively small
- area compared to the habitat that is available in Old River and Connection Slough, so overall effects on 120
- critical habitat would be discountable. Delta smelt are pelagic fish and Central Valley steelhead are surface-121 oriented, so alteration of the channel bottom would not be considered an adverse effect on critical habitat.
- 122 Green sturgeon are bottom-oriented, but the relatively small amount of habitat that is altered would not be 123
- considered to be an adverse modification of proposed critical habitat for foraging. Overall, the Project would 124
- 125 improve critical habitat for delta smelt by reducing entrainment risk and would not substantially degrade the
- functionality of critical habitat for CV steelhead and green sturgeon within the Action Area. 126

7.3.3 **Terrestrial Species** 127

128 Special-status terrestrial species that could be affected by the Project include Giant Garter Snake (GGS),

western pond turtle, Swainson's hawk, burrowing owl, California black rail, tricolored blackbird, and 129

loggerhead shrike. The effects would be due to construction activities, principally site disturbance during 130 construction (September-October 2009), and to a lesser degree, gate installation (November 2009) and 131

removal in 2014. Construction activities could affect GGS by trampling or crushing individuals if they are 132

present within the terrestrial Action Area. . Burrowing owls and western pond turtles could be killed or 133

- 134 injured during construction. Gate removal in 2014 would occur after nesting for sensitive bird species.Gate
- operations would not adversely affect GGS, Swainson's hawk, California black rail, tricolored blackbird, 135
- loggerhead shrike or western pond turtle. 136

7.3.4 Effects on Designated Critical Habitat of Terrestrial Species 137

The Project will not affect critical habitat for any terrestrial species, because none has been designated within 138 the Action Area for the Project. 139

7.4 SUMMARY OF CUMULATIVE EFFECTS 140

141 The anticipated effects described in the cumulative effects section of this BA are expected to occur with or without the Project. Adverse affects resulting from non-Federal actions to both aquatic and terrestrial species 142 are anticipated and may further diminish the functional value of critical habitat within the Action Area. 143 144 Planning efforts such as the BDCP and the Governor's Delta Vision process are anticipated to have both adverse and beneficial effects to listed species as a result of planned actions in the long-term but not likely 145 within the 5-year time frame of the 2-Gates Project. In addition, these efforts are expected to have a federal 146 nexus and will be the subject of future State and Federal ESA consultations. 147

7.5 CONCLUSION 148

149 In conclusion, the 2-Gates Project, when combined with past and present effects and those anticipated as a result of future non-Federal actions within the Action Area, would benefit delta smelt. The Project would not 150 jeopardize and may benefit other listed aquatic species. The Project would have minimal or no effect on 151 152 special status terrestrial species within the Action Area, and would not jeopardize the existence of these species. 153

The presence and operations of the gates is intended to complement actions by fishery managers to protect 154 threatened delta smelt. The intent is to operate the gates in concert with the protective requirements already 155 established in the OCAP BOs from USFWS (USFWS 2008) and NMFS (NMFS 2004 and 2008a). These 156 measures would affect hydrodynamic and water quality (turbidity and salinity) conditions, which would result 157 in decreased entrainment of delta smelt at the CVP and SWP Delta export pumping facilities in the south 158 Delta. The proposed installation and operation of the 2-Gates Project is not expected to appreciably reduce the 159 160 functionality of the PCEs of designated critical habitat for delta smelt within the Delta as a whole. While there may be some adverse effects in the immediate vicinity of the gate structures themselves, these effects would 161 be transitory and localized and would be more than offset by the benefits of reduced entrainment at the CVP 162 and SWP pumping facilities. The result is an expected increase in the overall survival and recovery of delta 163 smelt. Irreversible effects to delta smelt will be avoided by the short-term nature of the Project (5-years) and 164 165 the ability to quickly remove the structures if deemed necessary.

166 Migrating adult and emigrating juvenile (smolt) life stages of Winter-run and spring-run Chinook salmon and 167 CV steelhead could be affected by the Project during both installation and operation of the gate structures and 168

associated components. Reduced reverse flows in both Connection Slough and Old River between the gate

- 169 locations and areas to the north and west are generally expected to improve flow conditions for outmigrating
- ivenile salmonids and consequently reduce entrainment at the export facilities. Furthermore, since the
- 171 2-Gates Project will be operated in accordance with current OCAP Operating requirements (USFWS 2008,
- NMFS 2004), it is anticipated that no additional "take" of listed salmonids will occur at the CVP and SWP
- pumping facilities as a result of the Project. Therefore, the 2-Gates Project will not adversely affect listedsalmonids.
- 175 Migration delays (adults and juveniles) would be negligible since gate operations would result in Old River
- gate closures on flood tides. Juveniles may experience increased predation at the gate structures, but these
- 177 effects would be localized and would not jeopardize the species' survival.
- 178 Green sturgeon are expected to be exposed to the effects of the 2-Gates Project during both construction and
- operations periods. However, because there are no reliable estimates of the number of individual green
- 180 sturgeon occupying the Delta, and the Action Area, population level effects are unknown. Any green sturgeon
- 181 individuals present in the area may experience temporary and localized disturbance and possibly injury from
- 182 construction and installation activities. As with salmonids, gate closures would temporarily impede movement
- of any green sturgeon in the vicinity during flood tides. The 2-Gates Project will also be operated in
- accordance with current OCAP Operating requirements (USFWS 2008, NMFS 2004), so no additional "take"
- 185 of listed green sturgeon will occur at the CVP and SWP pumping facilities as a result of the Project.