- 1 The logic chain is intended to add specificity and clarity with respect to the relationships
- 2 between stressors affecting covered fish species, biological goals and objectives, the assumptions
- 3 underlying conservation approaches, the conservation measures and their projected outcomes,
- 4 and the appropriate metrics to monitor the success of the Conservation Strategy. Understanding
- 5 these key linkages helped to facilitate the evaluation of the Plan components and their likely
- effectiveness as they are implemented over time. As a result, the Conservation Strategy uses a
 comprehensive approach that accounts for the relationships between what the BDCP is trying to
- accomplish and how it intends to achieve its objectives.

9 3.2.3.2 Stressors Affecting Covered Fish Species

- 10 A key step in the development of the Conservation Strategy for aquatic resources was the
- 11 identification of significant environmental stressors on each of the covered fish species.
- 12 Biological objectives for the Conservation Strategy were developed on the basis of identified
- 13 stressors on covered fish species and their habitats. Conservation measures were developed to
- 14 address the biological goals and objectives. Table 3-3 identifies the primary stressors on covered
- 15 fish species and indicates those stressors that will be addressed by BDCP conservation measures
- 16 and those that will not.

No.	Applicable species	Stressors	Description	Biological objectives that Address the					
	Stressor								
1	Suessors on Covered Fish Species Addressed by DDCF Objectives								
1	CHSA	Habitat loss and	Changes in the extent access to and or quality of	CHSA1.1					
	STEE	modification	key natural in-Delta habitats for specific life	CHSA1.2					
	SASP		history stages, including habitat variability and	STEE1.1					
	GRST		food.	STEE1.2, SASP1.1					
	WHST			SASP1.2					
	RILA			GRST1.1					
	PALA			WHTST1.1					
				PALA1.1 RILA1.1					
2	SASP	Food limitation	Food availability and food web disruptions due to	SASP1.2					
			altered co-occurrence with prey or due to effects						
			of foraging by overbite clam.						
3	CHSA	Altered flows	Altered distribution due to diversions and gate	DESM1.4					
	STEE		operations; modifications to Delta inflow and	CHSA1.5					
	GRST		outflow rates and hydrodynamics resulting in	STEE1.4					
	WHST		deviations from migration pathways delays	GRST1.1					
	RILA		reduced survival and adult straying; rapid	WHST1.1					
	PALA		changes in flows and water levels affecting	PALA1.4					
			rearing habitat and outmigration success;	RILA1.4					
			directionality of flows thru the Delta (Note: It is						
			not known to what extent altered flows are a						
			stressor for splittail)						

Table 3-3. Stressors on Covered Fish Species and their Relationship to Biological Objectives

Table 3-3. Stressors on Covered Fish Species and their
Relationship to Biological Objectives (continued)

	Applicable			Biological objectives
No.	Applicable	Stressors	Description	that Address the
	species			Stressor ²
4	CHSA	Passage	Barriers to migration (upstream and	CHSA1.4
	STEE	impediments/	downstream); factors within the Planning Area	STEE1.3
	GRST	barriers	that reduce or eliminate access to key habitats.	GRST1.5
	WHST			WHST1.5
	RILA			PALA1.3
	PALA			RILA1.3
5	CHSA	Water quality	Effects of contaminants and toxic compounds on	DESM1.3
	STEE	(toxics DO	all life stages; effect of water temperature on	DESM1.4
	SASP	temperature).	productivity; effect of microcystis blooms on	LOSM1.2
	GRST		productivity; effect of water quality on	CHSA1.6
	WHST		distribution migration growth rate and	STEE1.5
	RILA		reproductive success and survival (including	GRST1.3
	PALA		predation).	GRST1.4
				WHTST1.3
				WHST1.4
				PALA1.5
				RILA1.5
6	CHSA	Entrainment	Direct mortality due to entrainment or	DESM1.4
	SASP		impingement at project and non-project	DESM1.5
	GRST		diversions.	LOSM1.4
	WHST			CHSA1.7
				STEE1.6
			· · · ·	SASP1.4
				GRST1.6
				WHST1.6
7	CHSA	Predators/non-	Predation losses including effects of structures	DESM1.1
	STEE	native invasive	and habitat alterations that promote predators	CHSA1.9
	SASP	species.	including population effects from predation by	STEE1.8
			introduced species (Note: this is a low impact	SASP1.5
			stressor – little information available for splittail);	
			Competition predation or alteration of habitat	
			characteristics from nonnative invasive species.	
8	CHSA	Illegal harvest	Direct mortality due to illegal harvest; population	CHSA1.8
	STEE		effects from illegal harvest.	GRST1.7
	SASP			STEE1.7
	GRST			WHST1.7
	WHST	W		

 $^{^{\}rm 8}$ See note at the bottom of this table for species abbreviations

Table 3-3. Stressors on Covered Fish Species and theirRelationship to Biological Objectives (continued)

No.	Applicable	Stressors	Description	Biological objectives that Address the			
	species			Stressor ²			
9	SASP	Stranding	Effects on productivity and abundance from	PALA1.2			
	RILA		incidences of stranding associated with water	RILA1.2			
	PALA		management activities. Splittail are floodplain	SASP1.1			
			spawners. Design of the restored floodplain may	SASP1.3			
			influence potential for stranding.				
10	GRST	Dredging	Disturbance of benthos and direct and indirect	GRST1.6			
	WHST		effects of physical disturbances of substrates used	WHST1.6			
			for rearing from dredging activities associated				
			with BDCP construction and maintenance				
			activities.				
	Stressors Not Addressed by BDCP biological Objectives ⁹						
11	CHSA	Access to	Barriers to historical spawning habitat are	NA			
	STEE	historical	predominately located outside of the BDCP				
		spawning habitat	planning area. In-delta migration and barriers				
			addressed in Stressor # 4 above.				
12	CHSA	Climate Change	Increases in ambient air temperatures resulting in	NA			
	STEE		increased water temperatures with negative				
			effects on habitat suitability. Effects of climate				
			change are considered but no specific objectives				
			proposed. Changes in water temperature as				
			applicable to BDCP covered activities are				
			addressed under stressor # 5 above.				
13	RILA	Disease	Disease may influence lamprey health with	NA			
	PALA		effects on reproduction and survival.				
14	RILA	Ocean conditions	Reductions in the availability of host/food species	NA			
	PALA		may be affecting lamprey survival and growth.				

¹ Species abbreviations are defined as follows:

Note: objectives for Delta Smelt and Longfin Smelt are not included

CHSA = Chinook salmon all runs

STEE = Central Valley steelhead

SASP = Sacramento splittail

GRST = Green sturgeon

WHST = White sturgeon

RILA = River Lamprey PALA = Pacific Lamprey

² Species-specific objectives are presented in Section 3.3, *Biological Goals and Objectives*.

1 **3.2.3.3 Water Facilities and Operations**

- 2 The BDCP Conservation Strategy includes conservation measures that provide for the
- 3 development and operation of new water conveyance infrastructure and the establishment of
- 4 operational parameters associated with both existing and new facilities. Central to the

⁹ Stressors not addressed by BDCP objectives are associated with conditions outside the Plan Area and/or not under the control of BDCP Authorized Entities