

Draft Biological Objectives and Conservation Measures that Address Sacramento Splittail Stressors within the Planning Area and Suisun Marsh

Table 1. Stressor Importance/Predictability Ranking Key for Dots shown in Table 2

		Importance		
		Low (1,2)	Medium (3)	High (4)
Predictability	Low (1,2)	○	◐	◑
	Medium (3)	●	●	●
	High (4)	●	●	●

Source: Draft DRERIP Sacramento splittail conceptual model stressor table (Table 3) dated September 3, 2008

Table 2. Biological Objectives and Conservation Measures that Address Sacramento Splittail Stressors

Stressor	Life Stage Stressor Rankings ¹						Biological Objectives	Conservation Measures
		Egg/Embryo	Larvae	Juveniles	Adults			
				Pre-Spawn	Spawner	Post-Spawn		
Entrainment								
SWP/CVP		●	●				GECF1.2 GECF1.3 WOCM1: North Delta Facilities Construction, Preferential Operation, and Bypass Flows. WOCM12: South Delta Diversions.	
Small Ag		●	●				GECF1.1 OSCM21: Screen, Remove, Relocate, Consolidate, Modify and/or Alter Timing of Non-Project Diversions to Reduce Entrainment of Covered Fish Species at within the Delta.	
Power Plants			●				GECF1.1 OSCM21: Screen, Remove, Relocate, Consolidate, Modify and/or Alter Timing of Non-Project Diversions to Reduce Entrainment of Covered Fish Species at within the Delta.	
Stranding	●	●	●			●	ECSY1.1 NACO1.1 NACO1.2 WOCM2b: Fremont Weir Operations. WOCM3b: DWSC Bypass Operations.	

Stressor	Life Stage Stressor Rankings ¹						Biological Objectives	Conservation Measures
	Egg/Embryo	Larvae	Juveniles	Adults Pre-Spawn	Spawner	Post-Spawn		
							<p>HRCM1: Restore floodplain habitat along __ miles of the San Joaquin River from Vernalis to Mossdale.</p> <p>HRCM2: Restore floodplain habitat along __ miles of the San Joaquin River from Mossdale to French Camp Slough.</p> <p>HRCM3: Restore between __ and __ acres of inundated floodplain habitat in the South Delta Restoration Opportunity Area.</p>	
Toxics								
Selenium	○	○	○	○	○	○		
Mercury	○	○	○	○	○	○	ECSY4.3 OSCM3: Reduce the Load of Methylmercury Entering Delta Waterways.	
Endocrine disrupters	○	○	○	○	○	○	ECSY4.1 OSCM2: Reduce the Load of Endocrine Disrupting Compounds in Effluent Discharged from Wastewater Treatment Plants into Delta Waterways if Warranted Based on Research.	
Pyrethroids	○	○	○	○	○	○	ECSY4.4 OSCM4: Reduce the Load of Pesticides and Herbicides Entering Delta Waterways from In-Delta Sources that are Believed to be Toxic to Covered Fish Species.	
Non-native Predation			○				<p>ECSY3.1 OSCM14: Increase the Harvest of Non-Native Predatory Fish to Decrease their Abundance.</p> <p>ECSY3.3 OSCM9: Reduce the Risk of Future Introductions of Non-Native Aquatic Organisms from Commercial Watercraft.</p> <p>OSCM10: Reduce the Risk for Future Introductions of Non-Native Aquatic Organisms from Recreational Watercraft.</p> <p>OSCM11: Provide for Rapid Detection of and Response to New Introductions of Non-Native Species into Delta Waterways.</p>	
Harvest			○	○	○	○	GECF1.5 OSCM17: Reduce Adverse Effects of Harvest on Sacramento Splittail Abundance.	
Food Availability	●	●	●		●	●	<p>ECSY1.3 WOCM1: North Delta Facilities Operations and Bypass Flows.</p> <p>ECSY2.1 WOCM12: South Delta Diversions.</p> <p>ECSY3.1</p>	

Stressor	Life Stage Stressor Rankings ¹						Biological Objectives	Conservation Measures
				Adults				
	Egg/Embryo	Larvae	Juveniles	Pre-Spawn	Spawner	Post-Spawn		
							<p>ECSY3.2</p> <p>ECSY3.3</p> <p>ECSY4.1</p> <p>ECSY4.2</p> <p>ECSY4.4</p> <p>NACO1.1</p> <p>NACO1.2</p> <p>NACO1.3</p> <p>NACO1.4</p> <p>NACO1.5</p>	<p>WOCM2b: Fremont Weir Operations.</p> <p>WOCM3b: DWSC Bypass Operations.</p> <p>HRCM1: Restore floodplain habitat along __ miles of the San Joaquin River from Vernalis to Mossdale.</p> <p>HRCM2: Restore floodplain habitat along __ miles of the San Joaquin River from Mossdale to French Camp Slough.</p> <p>HRCM3: Restore between __ and __ acres of inundated floodplain habitat in the South Delta Restoration Opportunity Area.</p> <p>HRCM4: Restore a mosaic of __ to __ acres of freshwater intertidal marsh, shallow subtidal aquatic, and transitional grassland habitat within the Yolo Bypass/Cache Slough Complex ROA.</p> <p>HRCM5: Restore a mosaic of __ to __ acres of freshwater intertidal marsh, shallow subtidal aquatic, and transitional habitat within the Cosumnes/Mokelumne ROA.</p> <p>HRCM6: Restore a mosaic of __ to __ acres of intertidal marsh and shallow subtidal aquatic habitat within the West Delta ROA.</p> <p>HRCM7: Restore a mosaic of __ to __ acres of intertidal marsh, shallow subtidal aquatic, and transitional grassland habitat within the South Delta ROA.</p> <p>HRCM8: Restore a mosaic of __ to __ acres of intertidal marsh, shallow subtidal aquatic, and transitional grassland habitat within the East Delta Restoration Opportunity Area.</p> <p>HRCM9: Restore a mosaic of __ to __ acres of brackish intertidal marsh, shallow subtidal aquatic, and transitional grassland habitat within the Suisun Marsh Restoration Opportunity Area.</p> <p>HRCM10: Support development and implementation of levee construction and maintenance designs that incorporate aquatic and riparian habitat features.</p> <p>HRCM11: Design levees constructed under the BDCP to incorporate design features that</p>

Stressor	Life Stage Stressor Rankings ¹	Adults					Biological Objectives	Conservation Measures
		Egg/Embryo	Larvae	Juveniles	Pre-Spawn	Spawner		
								<p>support and enhance covered species habitats.</p> <p>HRCM12: Enhance channel margin habitats along [] to [] miles of Steamboat and Sutter</p> <p>HRCM13: Restore between [] and [] acres of riparian forest and scrub communities as a component of restored floodplain, freshwater intertidal marsh, and channel margin habitats.</p> <p>OSCM14: Increase the Harvest of Non-Native Predatory Fish to Decrease their Abundance.</p> <p>OSCM13: Remove Non-Native Submerged and Floating Aquatic Vegetation from Delta Waterways</p> <p>OSCM9: Reduce the Risk of Future Introductions of Non-Native Aquatic Organisms from Commercial Watercraft.</p> <p>OSCM10: Reduce the Risk for Future Introductions of Non-Native Aquatic Organisms from Recreational Watercraft.</p> <p>OSCM11: Provide for Rapid Detection of and Response to New Introductions of Non-Native Species into Delta Waterways.</p> <p>OSCM12: Reduce the Risk for Establishment of Zebra Mussel and Quagga Mussel in Delta Waterways.</p> <p>OSCM1: Reduce the Load of Ammonia in Effluent Discharged from the Sacramento Regional County Sanitation District into the Sacramento River if Warranted Based on Research.</p> <p>OSCM5: Reduce the Loads of Toxic Contaminants in Stormwater Pollution and Urban Runoff by Working with Existing Efforts in the Delta.</p> <p>OSCM4: Reduce the Load of Pesticides and Herbicides Entering Delta Waterways from In-Delta Sources that are Believed to be Toxic to Covered Fish Species.</p>
Habitat Loss	●	●	●	○	●	○	<p>NACO1.1 NACO1.2 NACO1.3 NACO1.4</p> <p>WOCM2b: Fremont Weir Operations.</p> <p>WOCM3b: DWSC Bypass Operations.</p> <p>HRCM1: Restore floodplain habitat along ___ miles of the San Joaquin River from Vernalis</p>	

Stressor	Life Stage Stressor Rankings ¹						Biological Objectives	Conservation Measures
				Adults				
	Egg/Embryo	Larvae	Juveniles	Pre-Spawn	Spawner	Post-Spawn		
							<p>NACO1.5 to Mossdale.</p> <p>HRCM2: Restore floodplain habitat along __ miles of the San Joaquin River from Mossdale to French Camp Slough.</p> <p>HRCM3: Restore between __ and __ acres of inundated floodplain habitat in the South Delta Restoration Opportunity Area.</p> <p>HRCM4: Restore a mosaic of __ to __ acres of freshwater intertidal marsh, shallow subtidal aquatic, and transitional grassland habitat within the Yolo Bypass/Cache Slough Complex ROA.</p> <p>HRCM5: Restore a mosaic of __ to __ acres of freshwater intertidal marsh, shallow subtidal aquatic, and transitional habitat within the Cosumnes/Mokelumne ROA.</p> <p>HRCM6: Restore a mosaic of __ to __ acres of intertidal marsh and shallow subtidal aquatic habitat within the West Delta ROA.</p> <p>HRCM7: Restore a mosaic of __ to __ acres of intertidal marsh, shallow subtidal aquatic, and transitional grassland habitat within the South Delta ROA.</p> <p>HRCM8: Restore a mosaic of __ to __ acres of intertidal marsh, shallow subtidal aquatic, and transitional grassland habitat within the East Delta Restoration Opportunity Area.</p> <p>HRCM9: Restore a mosaic of __ to __ acres of brackish intertidal marsh, shallow subtidal aquatic, and transitional grassland habitat within the Suisun Marsh Restoration Opportunity Area.</p> <p>HRCM10: Support development and implementation of levee construction and maintenance designs that incorporate aquatic and riparian habitat features.</p> <p>HRCM11: Design levees constructed under the BDCP to incorporate design features that support and enhance covered species habitats.</p> <p>HRCM12: Enhance channel margin habitats along [] to [] miles of Steamboat and Sutter</p> <p>HRCM13: Restore between [] and [] acres of riparian forest and scrub communities as a</p>	

Stressor	Life Stage Stressor Rankings ¹						Biological Objectives	Conservation Measures
	Egg/Embryo	Larvae	Juveniles	Adults Pre-Spawn	Spawner	Post-Spawn		
							component of restored floodplain, freshwater intertidal marsh, and channel margin habitats.	
Barriers		●	●	●	●	●	ECSY1.2 NACO1.1 NACO1.2 WOCM2a: Fremont Weir Operations. HRCM1: Restore floodplain habitat along __ miles of the San Joaquin River from Vernalis to Mossdale. HRCM2: Restore floodplain habitat along __ miles of the San Joaquin River from Mossdale to French Camp Slough. HRCM3: Restore between __ and __ acres of inundated floodplain habitat in the South Delta Restoration Opportunity Area.	
Operations	●	●	●	●	●		NACO1.1 WOCM2b: Fremont Weir Operations. WOCM3b: DWSC Bypass Operations.	

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