

Aquatic Conservation Measures x Goals and Objectives Matrices

Note to Reviewers: This handout presents a proposed format for indicating the proposed conservation measures that contribute towards achieving each of the draft BDCP biological goals and objectives¹ for aquatic resources. Table 1 identifies conservation measures intended to achieve ecosystem-, natural community-, and general fish species-level goals and objectives. Table 2 identifies conservation measures intended to achieve covered fish species-specific goals and objectives. These tables will be populated in the next draft, which will serve as a basis for assessing the adequacy of the proposed conservation measures in achieving draft goals and objectives.

Table 1. Conservation Measures that Contribute Towards Achieving Ecosystem, Aquatic Natural Community, and General Fish Species Goals and Objectives.

Ecological Scale	Ecosystem										Natural communities							General covered species					
	Aquatic Goal										Aquatic Goal							Aquatic Goal					
Aquatic Objective	1. Mimic natural hydrodynamics					2. Increase Food	3. Reduce effects of non-natives	4. Reduce effects of contaminants	5. Improve amount, fxn, and connectivity of natural communities	1. Improve natural communities for fish							1. Reduce unnatural mortality	2. Reduce impacts of hatcheries					
Conservation Measure	1.1: Flow for downstream movement	1.2: Flow for upstream movement	1.3: Flow for habitat (LSZ)	1.4: Variable flows	1.5: Flows to increase connectivity	2.1: Increase aquatic invertebrates	3.1: Manage non-natives	3.2: Minimize future invasions	4.1: Reduce loads of contaminants	5.1: Improve amount, fxn, and connectivity of natural communities	1.1: Increase connectivity with floodplains	1.2: Increase tidal marsh	1.3: Increase riparian and scrub	1.4: Preserve ag land	1.5: Preserve grasslands	1.6: Preserve natural seasonal wetlands	1.7: Preserve non-tidal perennial aquatic	GECF1.1: Reduce entrainment at CVP/SWP	GECF1.2: Reduce entrainment at non-project diversions	GECF1.3: Reduce DO sags	GECF1.4: Minimize harvest effects	GECF2.1: Minimize hatchery effects	GECF2.2: Maintain or establish genetic refugia for delta smelt and longfin smelt
HRCM1: Floodplain-Vernalis-Mossdale																							
HRCM2: Floodplain-Mossdale-French Camp Slough																							
HRCM3: Floodplain-SD																							
HRCM4: Tidal marsh-Yolo/Cache																							
HRCM5: Tidal marsh-Cosumnes/Mokelumne																							
HRCM6: Tidal marsh-West Delta																							
HRCM7: Tidal marsh-South Delta																							
HRCM8: Tidal marsh-East Delta																							
HRCM9: Tidal marsh-Suisun																							
HRCM10: Levee improvements																							
HRCM11: Riparian on BDCP constructed levees																							
HRCM12: Channel Margin-Sutter/Steamboat																							
HRCM13: Channel margin-South Delta																							
HRCM14: Riparian restoration																							
OSCM1: Ammonia/um reduction																							
OSCM2: EDC reduction																							
OSCM3: MeHg reduction																							
OSCM4: Pesticide/herbicide reduction																							
OSCM5: Stormwater/urban pollution																							
OSCM6: Rapid response to toxics																							
OSCM7: DO in Stockton DWSC																							
OSCM8: DO in managed seasonal wetlands																							
OSCM9: Non-natives on commercial vessels																							
OSCM10: Non-natives on recreational vessels																							
OSCM11: Rapid response to non-natives																							
OSCM12: Zebra/Quagga mussels																							

¹ Based on the Working Draft BDCP HCP/NCCP Biological Goals and Objectives handout presented at the 4/17/09 Steering Committee meeting.

Ecological Scale		Ecosystem										Natural communities							General covered species					
Aquatic Goal		1. Mimic natural hydrodynamics					2. Increase Food	3. Reduce effects of non-natives		4. Reduce effects of contaminants	5. Improve amount, fxn, and connectivity of natural communities		1. Improve natural communities for fish							1. Reduce unnatural mortality			2. Reduce impacts of hatcheries	
Aquatic Objective		1.1: Flow for downstream movement	1.2: Flow for upstream movement	1.3: Flow for habitat (LSZ)	1.4: Variable flows	1.5: Flows to increase connectivity	2.1: Increase aquatic invertebrates	3.1: Manage non-natives	3.2: Minimize future invasions	4.1: Reduce loads of contaminants	5.1: Improve amount, fxn, and connectivity of natural communities	1.1: Increase connectivity with floodplains	1.2: Increase tidal marsh	1.3: Increase riparian and scrub	1.4: Preserve ag land	1.5: Preserve grasslands	1.6: Preserve natural seasonal wetlands	1.7: Preserve non-tidal perennial aquatic	GECF1.1: Reduce entrainment at CVP/SWP	GECF1.2: Reduce entrainment at non-project diversions	GECF1.3: Reduce DO sags	GECF1.4: Minimize harvest effects	GECF2.1: Minimize hatchery effects	GECF2.2: Maintain or establish genetic refugia for delta smelt and longfin smelt
Conservation Measure																								
OSCM13: SAV/FAV removal																								
OSCM14: Harvest of non-natives																								
OSCM15: Salvage mortality																								
OSCM16: Reduce illegal harvest																								
OSCM17: Splittail harvest																								
OSCM18: HGMPs																								
OSCM19: Mark hatchery fish																								
OSCM20: Artificial propagation of smelt																								
OSCM21: Non-project diversions																								
OSCM22: No wake zones																								
WOCM1: North Delta diversion																								
WOCM2: Yolo Bypass																								
WOCM3: DWSC Bypass																								
WOCM4: Sutter/Steamboat flows																								
WOCM5: DCC																								
WOCM6: Rio Vista flows																								
WOCM7: 3-Mile Slough																								
WOCM8: 2-gates																								
WOCM9: Delta Outflow																								
WOCM10: West Delta salinity																								
WOCM11: SMSCG																								
WOCM12: South Delta diversions																								
WOCM13: OMR flows																								
WOCM14: Delta salinity standards																								

Table 2. Conservation Measures that Contribute Towards Achieving Covered Fish Species Goals and Objectives.

Species	Delta smelt	Longfin smelt	Chinook salmon							Steelhead				Sacramento Splittail				Green Sturgeon	White Sturgeon			River Lamprey	Pacific Lamprey
Aquatic Goal	1. Create conditions to support self-sustainable populations	1. Create conditions to support self-sustainable populations	1. Increase survival of juveniles	2. Increase growth of juveniles	3. Increase life history diversity	4. Increase adult migration	1. Increase survival of juveniles	2. Increase growth of juveniles	3. Increase life history diversity	4. Increase adult migration	1. Create conditions to support self-sustainable populations	1. Increase # of up and downstream migrants	2. Increase spatial distribution of juveniles	1. Increase # of up and downstream migrants	2. Increase spatial distribution of juveniles	3. Maintain multiple spawning cohorts	1. Maintain conditions to support self-sustainable populations	1. Maintain conditions to support self-sustainable populations					
Aquatic Objective	1.1: Increase abundance 1.2: Increase growth rates	1.1: Increase abundance 1.2: Increase growth rates	1.1: Increase survival of Sac salmon 1.2: Increase survival of SJ salmon 1.3: Increase survival of SJ Spring-run	2.1: Increase size of Sac salmon 2.2: Increase size of SJ salmon	3.1: Increase survival across temporal distribution		1.1: Increase survival of Sac steelhead 1.2: Increase survival of SJ steelhead	2.1: Increase size of Sac steelhead 2.2: Increase size of SJ steelhead	3.1: Increase survival across temporal distribution		1.1: Increase abundance 1.2: Maintain distribution 1.3: Increase connectivity w/ Napa/Petaluma river populations 1.4: Maintain multiple spawning cohorts												
Conservation Measure																							
HRCM1: Floodplain-Vernalis-Mossdale																							
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Aquatic Goal	1. Create conditions to support self-sustainable populations		1. Create conditions to support self-sustainable populations		1. Increase survival of juveniles		2. Increase growth of juveniles		3. Increase life history diversity	4. Increase adult migration	1. Increase survival of juveniles		2. Increase growth of juveniles		3. Increase life history diversity	4. Increase adult migration	1. Create conditions to support self-sustainable populations				1. Increase # of up and downstream migrants	2. Increase spatial distribution of juveniles	1. Increase # of up and downstream migrants	2. Increase spatial distribution of juveniles	3. Maintain multiple spawning cohorts	1. Maintain conditions to support self-sustainable populations	1. Maintain conditions to support self-sustainable populations	
Aquatic Objective	1.1: Increase abundance	1.2: Increase growth rates	1.1: Increase abundance	1.2: Increase growth rates	1.1: Increase survival of Sac salmon	1.2: Increase survival of SJ salmon	1.3: Increase survival of SJ Spring-run	2.1: Increase size of Sac salmon	2.2: Increase size of SJ salmon	3.1: Increase survival across temporal distribution	1.1: Increase survival of Sac steelhead	1.2: Increase survival of SJ steelhead	2.1: Increase size of Sac steelhead	2.2: Increase size of SJ steelhead	3.1: Increase survival across temporal distribution	1.1: Increase abundance	1.2: Maintain distribution	1.3: Increase connectivity w/ Napa/Petaluma river populations	1.4: Maintain multiple spawning cohorts									
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