

Table A-1. Tidal Perennial Aquatic Communities: Potential CALFED Effects and Conservation Measures

Summary Effect of Implementing CALFED Actions with Conservation Measures on Tidal Perennial Aquatic Communities: Restoration of up to 8,500 acres of shallow tidal perennial aquatic habitat in the Delta and Bay Regions, and potential for restoration or enhancement of tidal perennial aquatic habitat in the Delta and Bay Regions incidental to restoration of flows, floodplains, and tidal slough habitats. Potential for short-term loss or degradation of existing habitat area and potential for long-term increase in habitat area with implementation of conservation measures to compensate for CALFED impacts.

Associated Evaluated Species: California least tern, western snowy plover, American peregrine falcon, American peregrine falcon critical habitat, bald eagle, Aleutian Canada goose, California brown pelican, Central Coast Steelhead Evolutionarily Significant Unit (ESU), Central Valley Steelhead ESU, delta smelt, delta smelt critical habitat, winter-run chinook salmon, winter-run chinook salmon critical habitat, tidewater goby, California freshwater shrimp, Sacramento splittail, Central Valley fall-run chinook salmon, Central Valley spring-run chinook salmon, California gull, long-billed curlew, osprey, Sacramento perch, longfin smelt, and green sturgeon.

Summary Programmatic Action Outcomes	Applicable Programmatic Actions	Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into the Program	Overall Effect of Summary Programmatic Action Outcomes with Conservation Measures
Delta Region					
<p>Associated Evaluated Species: California least tern, American peregrine falcon, bald eagle, Aleutian Canada goose, Central Valley Steelhead ESU, delta smelt, delta smelt critical habitat, winter-run chinook salmon, winter-run chinook salmon critical habitat, Sacramento splittail, Central Valley fall-run chinook salmon, Central Valley spring-run chinook salmon, California gull, long-billed curlew, osprey, Sacramento perch, longfin smelt, and green sturgeon.</p>					
<p>Summary Programmatic Action Outcomes E11, E13a, E16a, E17, E18a, E19, T1, and M1 are likely to have no discernable effect on tidal perennial aquatic communities in the Delta Region.</p>					

Table A-1. Continued

Summary Programmatic Action Outcomes	Applicable Programmatic Actions	Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into the Program	Overall Effect of Summary Programmatic Action Outcomes with Conservation Measures
Ecosystem Restoration Program					
E1. Provide for more natural riverflows and Bay-Delta freshwater inflow peaks in fall, winter, and spring of all but critical years.	E010101, E010102, E010103, E010104	More natural riverflows and Bay-Delta freshwater inflow would increase organic carbon and other nutrients, improve flushing of contaminants and wastes, and provide higher seasonal water levels. This would provide evaluated fish species with improved habitat and potentially greater transport to such habitat from upstream spawning areas (BE1).	Likely to be no discernable adverse effects on existing habitat areas and associated evaluation species (N/E).	None.	Tidal perennial aquatic habitat and associated evaluated fish species would benefit from seasonal increases in freshwater inflow.
E4. Provide more natural Delta hydraulic conditions (internal flow and velocity patterns) by altering channel configurations (e.g., setback levees) and physical barriers to channel flow.	E010601, E010602, E010603, E010604, E010605, E010606, E010607	Alteration of Delta hydraulic conditions and structural configurations could increase available habitat and benefit associated species (BE2).	N/E	None.	Likely increase in habitat availability and quality for evaluated fish species and increases in survival and population levels of those species would be expected.
E5a. Restoration of up to 7,500 acres of tidal shallow-water habitat.	E010401, E010402, E010403, E010404, E010405, E010406, E010407, E010901, E010902, E010903, E010904, E010905, E010906, E015201, E015202	Substantial increase in shallow-water tidal perennial aquatic habitat area as a result of restoring tidal aquatic habitats (BE3).	Potential for temporary increase in turbidity resulting from construction activities (AE1).	To the extent practicable, restore habitat using construction methods that would minimize the release of sediment resulting from construction activities or subsequent erosion (M1).	Increase in habitat availability and quality for evaluated fish and other associated species and increases in survival and population levels of associated species would be expected.

Table A-1. Continued

Summary Programmatic Action Outcomes	Applicable Programmatic Actions	Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into the Program	Overall Effect of Summary Programmatic Action Outcomes with Conservation Measures
			Construction-related activities associated with implementing actions could result in take of evaluated species (AE2).	To the extent practicable, avoid construction activities during periods when evaluated species are present and could be affected by the actions (M2).	
E8. Restoration of 30,000 to 45,000 acres of tidal fresh emergent wetland.	E010401, E010402, E010404, E010405, E010407, E010606, E011101, E011102, E011201, E011202, E011401, E011402, E011403, E011404, E011405, E015202	Substantial increase in tidal perennial aquatic habitat area as a result of restoring tidal exchange with leveed or diked lands (BE4).	AE1. AE2.	M1. M2.	Increase in habitat availability and quality for evaluated fish and other associated species and increases in survival and population levels of those species would be expected.
E9. Maintenance of existing and restoration of 200-800 acres of channel islands and associated habitats.	E011201, E011202, E015002, E016001, E016002	Restoration of channel islands could improve the quality of tidal perennial aquatic habitat in the area of the islands and benefit associated species (BE5).	AE1. AE2.	M1. M2.	Potential for improvement in the quality of tidal perennial aquatic habitat near channel islands.
E10a. Restoration of 85-190 miles of tidal sloughs.	E015201, E015202, E011101, E011102	BE3.	AE1. AE2.	M1. M2.	Increase in habitat area and quality for evaluated fish and other associated species and increases in survival and population levels of these species would be expected.

Table A-1. Continued

Summary Programmatic Action Outcomes	Applicable Programmatic Actions	Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into the Program	Overall Effect of Summary Programmatic Action Outcomes with Conservation Measures
E15a. Restoration of 48-85 miles of riparian habitat along channels, restoration of riparian habitat in association with setback levees, protection of 500 acres of existing riparian forest, and reduction of current invasive riparian plants by 50%.	E010501, E010502, E010606, E011101, E011102, E011201, E011202, E011601, E011602, E011603, E011604, E011605, E011606, E011607, E011608, E011609, E014901, E015301, E015302, E015303	Restoration of habitat adjacent to tidal perennial aquatic habitat could increase nutrient inputs to tidal waters and increase habitat values and foodweb productivity for species associated with the aquatic habitat (BE6).	AE1. AE2.	M1. M2.	Potential for increase in habitat quality for evaluated fish species and increases in survival and population levels of these species would be expected.
E20. Reduction in the adverse effects of dredging on estuarine aquatic habitats.	E015001, E015002, E015003, E015004	Reducing adverse effects of dredging in the Delta would improve quality of tidal perennial aquatic habitat and would have benefits to species associated with aquatic habitat (BE7).	N/E	None.	Potential for improvement in habitat quality for native aquatic species.
E21. Reduction in the probability of introduction and establishment of non-native aquatic species into the Bay-Delta.	E015401, E015402, E015403	Reduction in the likelihood for introductions of non-native species into the Bay-Delta estuary will reduce the potential for future adverse effects of such introductions on tidal perennial aquatic communities and evaluated species (BE8).	N/E	None.	Reduction in the potential for future degradation of tidal perennial aquatic communities that could occur with introductions of invasive non-native species.
E22. Reduction in the adverse effects of diversions on fish.	E014701, E014702, E014703	Reducing diversions of freshwater from the Delta could improve habitat conditions for associated native aquatic species (BE9).	N/E	None.	Potential for improvement in habitat quality for native aquatic species.

Table A-1. Continued

Summary Programmatic Action Outcomes	Applicable Programmatic Actions	Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into the Program	Overall Effect of Summary Programmatic Action Outcomes with Conservation Measures
E24. Reduction in levels of predation on juvenile anadromous fish.	E013202	Potential for increased populations of anadromous fish and other native aquatic species as a result of increased recruitment (BE10).	N/E	None.	Potential for increased populations of anadromous fish other native aquatic species.
E25. Reduction in the adverse effects of harvest on fish and wildlife populations.	E015801, E015802, E015803	Potential for increased populations of anadromous fish and other native aquatic species as a result of increased recruitment (BE11).	N/E	None.	Potential for increased populations of native fish species.
E27a. Reduction in the concentrations and loadings of contaminants in the aquatic environment by 25%-50%.	E015701, E015702	Reduction in contaminant loadings in tidal perennial aquatic habitats could improve the survivability of some species and increase aquatic invertebrate populations that are adversely effected by toxic agents (BE12).	N/E	None.	Implementation of the proposed actions would most likely have no discernable effect on the evaluated species' numbers or distribution.
E28. Reduction in the adverse effects of boat wakes on shoreline habitats and wildlife in sensitive habitat areas.	E016001, E016002, E016003, E016004, E016005, E016006	Reducing erosion of shorelines would improve aquatic habitat by reducing turbidity and improving the quality of shoreline vegetation (BE13).	N/E	None.	Localized improvement and long-term maintenance of tidal perennial aquatic habitats.

Table A-1. Continued

Summary Programmatic Action Outcomes	Applicable Programmatic Actions	Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into the Program	Overall Effect of Summary Programmatic Action Outcomes with Conservation Measures
Q1. Reduction of oxygen-depleting substances in the aquatic environment.	Q010101, Q010102, Q010103, Q010104	BE12.	N/E	None.	Implementation of the proposed actions would most likely have no discernable effect on the evaluated species' numbers or distribution.
Q2. Maintain pathogen loadings at or below mandated levels and reduce levels of total organic carbon, bromide, and total dissolved solids to increase the availability of water for beneficial uses.	Q010201, Q010202, Q010203, Q010204, Q010205, Q010206	BE12.	N/E	None.	Implementation of the proposed actions would most likely have no discernable effect on the evaluated species' numbers or distribution.
Q4. Reduction of pesticide loadings in the aquatic environment.	Q010501	BE12.	N/E	None.	Implementation of the proposed actions would most likely have no discernable effect on the evaluated species' numbers or distribution.
Q7. Reduction of cadmium, copper, and zinc loadings to levels that do not adversely affect Bay-Delta species or beneficial uses of water.	Q010801	BE12.	N/E	None.	Implementation of the proposed actions would most likely have no discernable effect on the evaluated species' numbers or distribution.

Table A-1. Continued

Summary Programmatic Action Outcomes	Applicable Programmatic Actions	Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into the Program	Overall Effect of Summary Programmatic Action Outcomes with Conservation Measures
Conveyance Facilities					
C1. Construct and operate modifications to existing south-Delta conveyance features.	C010101, C010102, C010103, C010104, C010105, C010106, C010107, C010108	Likely to be no discernable beneficial effects on existing habitat areas and associated evaluation species (N/E).	Construction of interties and supporting infrastructure between existing conveyance facilities and export pumps could result in the loss or degradation of habitat areas (AE4). AE2.	M1. M4. To the extent consistent with program objectives, design conveyance facilities to incorporate restoration of shallow-water aquatic tidal habitat (M5). M2. To the extent practicable, design and operate conveyance facilities to avoid entrapping or entraining evaluation species (M6).	Potential for short-term loss of habitat. Some long-term increase in habitat area as a result of implementing conservation measures.

Table A-1. Continued

Summary Programmatic Action Outcomes	Applicable Programmatic Actions	Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into the Program	Overall Effect of Summary Programmatic Action Outcomes with Conservation Measures
<p>C2. Construct and operate modifications to existing north-Delta conveyance features.</p>	<p>C020101, C020102, C020103</p>	<p>Depending on the design of conveyance channels, construction of conveyance channels could result in increasing the area of tidal shallow-water aquatic habitat area (BE15).</p>	<p>Construction of conveyance facilities and associated infrastructure could result in loss or degradation of habitat (AE5).</p> <p>AE2.</p>	<p>M1.</p> <p>M4.</p> <p>M5.</p> <p>M2.</p> <p>M6.</p>	<p>Potential for increase in habitat area associated with conveyance features.</p> <p>Potential for short-term loss of habitat. Some long-term increase in habitat area as a result of implementing conservation measures.</p>
<p>C3 Construct and operate an isolated conveyance facility from the Sacramento River along the east side of the Delta to Clifton Court Forebay.</p>	<p>C030101</p>	<p>BE15.</p>	<p>AE5.</p> <p>AE2.</p>	<p>M1.</p> <p>M4.</p> <p>M5.</p> <p>M2.</p> <p>M6.</p>	<p>Potential for increase in habitat area associated with conveyance features.</p> <p>Potential for short-term loss of habitat. Some long-term increase in habitat area as a result of implementing conservation measures.</p>

Table A-1. Continued

Summary Programmatic Action Outcomes	Applicable Programmatic Actions	Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into the Program	Overall Effect of Summary Programmatic Action Outcomes with Conservation Measures
Storage Facilities					
S1. Construct and operate enlarged or new surface storage facilities.	None.	N/E	AE1. AE2. AE3.	M1. M2. M3. M4.	Potential for short-term loss or degradation of habitat as a result of implementing levee improvements on storage islands. Some long-term increase in habitat area as a result of implementing conservation measures.
Water Operations					
01. Implement operating criteria needed to improve water management for beneficial uses.	None.	N/A	N/A		Potential program effects cannot be evaluated.
02. Implement an Environmental Water Account to provide operational flexibility to achieve environmental benefits.	None.	N/A	N/A		Potential program effects cannot be evaluated.

Table A-1. Continued

Summary Programmatic Action Outcomes	Applicable Programmatic Actions	Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into the Program	Overall Effect of Summary Programmatic Action Outcomes with Conservation Measures
Bay Region					
Associated Evaluated Species: California least tern, western snowy plover, American peregrine falcon, American peregrine falcon critical habitat, bald eagle, Aleutian Canada goose, California brown pelican, Central Coast Steelhead ESU, Central Valley Steelhead ESU, delta smelt, winter-run chinook salmon critical habitat, tidewater goby, California freshwater shrimp, Sacramento splittail, Central Valley fall-run chinook salmon, Central Valley spring-run chinook salmon, California gull, long-billed curlew, osprey, longfin smelt, and green sturgeon					
Summary Programmatic Action Outcomes E12, E13b, E14, E16b, E30, W1-4, T1, and M1 are likely to have no discernable effect on tidal perennial aquatic communities in the Bay Region.					
Ecosystem Restoration Program					
E1. Provide for more natural riverflows and Bay-Delta freshwater inflow peaks in fall, winter, and spring of all but critical years.	E020101	BE1.	N/E	None.	Tidal perennial aquatic habitat and associated evaluated fish species would benefit from seasonal increases in freshwater inflow.
E5b. Restoration of at least 1,500 acres of tidal shallow-water habitat.	E020401, E020901, E021101, E025201	BE3.	AE1.	M1.	Increase in habitat availability and quality for evaluated fish and other associated species and increases in survival and population levels of these species would be expected.
			AE2.	M2.	
E7. Protection of 6,200 existing acres and restoration of 7,500-12,000 additional acres of tidal saline emergent wetland.	E020401, E020901, E021101, E027301, E027302, E027303, E023904, E023903, E023904, E027401, E027501, E027601, E025201	BE4.	AE1.	M1.	Increase in habitat availability and quality for evaluated fish and other associated species and increases in survival and population levels of these species would be expected.
			AE2.	M2.	

Table A-1. Continued

Summary Programmatic Action Outcomes	Applicable Programmatic Actions	Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into the Program	Overall Effect of Summary Programmatic Action Outcomes with Conservation Measures
E10b. Restoration of 35-70 miles of tidal sloughs.	E021101	BE3.	AE1. AE2.	M1. M2.	Increase in habitat area and quality for evaluated fish and other associated species and increases in survival and population levels of these species would be expected.
E15b. Restoration of 50-75 miles of riparian habitat along channels and reduction of populations of invasive non-native riparian plants by 50%.	E021601, E025301, E025302	BE6.	AE1. AE2.	M1. M2.	Potential for increase in habitat quality for evaluated fish species and increases in survival and population levels of these fish species would be expected.
E21. Reduction in the probability of introduction and establishment of non-native aquatic species into the Bay-Delta.	E025401, E025402	BE8.	N/E	None.	Reduction in the potential for future degradation of tidal perennial aquatic communities that could occur with introductions of invasive non-native species.
E22. Reduction in the adverse effects of diversions on fish.	E024701	BE9.	N/E	None.	Potential for improvement in habitat quality for native aquatic species.
E24. Reduction in levels of predation on juvenile anadromous fish.	E025601	BE10.	N/E	None.	Potential for increased populations of anadromous fish other native aquatic species.
E25. Reduction in the adverse effects of harvest on fish and wildlife populations.	E025801, E025802, E025803	BE11.	N/E	None.	Potential for increased populations of native fish species.

Table A-1. Continued

Summary Programmatic Action Outcomes	Applicable Programmatic Actions	Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into the Program	Overall Effect of Summary Programmatic Action Outcomes with Conservation Measures
E28. Reduction in the adverse effects of boat wakes on shoreline habitats and wildlife in sensitive habitat areas.	E026001, E026002, E026003	BE13.	N/E	None.	Localized improvement and long-term maintenance of tidal perennial aquatic habitats.
Levee System Integrity Program					
L3. Enhancement of the level of flood protection provided by Suisun Marsh levees.	None.	BE14.	AE1. AE2. AE3.	M1. M2. M3. M4.	Potential for increase in tidal shallow-water habitat area and increased populations of associated native aquatic species.
Water Quality Program					
Q2. Maintain pathogen loadings at or below mandated levels and reduce levels of total organic carbon, bromide, and total dissolved solids to increase the availability of water for beneficial uses.	Q020201, Q020202, Q020203, Q020204	BE12.	N/E	None.	Implementation of the proposed actions would most likely have no discernable effect on the evaluated species' numbers or distribution.
Q4. Reduction of pesticide loadings in the aquatic environment.	Q020501	BE12.	N/E	None.	Implementation of the proposed actions would most likely have no discernable effect on the evaluated species' numbers or distribution.

Table A-1. Continued

Summary Programmatic Action Outcomes	Applicable Programmatic Actions	Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into the Program	Overall Effect of Summary Programmatic Action Outcomes with Conservation Measures
Q7. Reduction of cadmium, copper, and zinc loadings to levels that do not adversely affect Bay-Delta species or beneficial uses of water.	Q020801	BE12.	N/E	None.	Implementation of the proposed actions would most likely have no discernable effect on the evaluated species' numbers or distribution.
Q8. Reduction of sediment loadings to levels that do not adversely affect beneficial uses of surface water.	Q020901	BE12.	N/E	None.	Implementation of the proposed actions would most likely have no discernable effect on the evaluated species' numbers or distribution.
Sacramento River Region					
CALFED actions proposed for the Sacramento River Region would not affect tidal perennial aquatic communities.					
San Joaquin River Region					
CALFED actions proposed for the San Joaquin River Region would not affect tidal perennial aquatic communities.					

Contributors to the development of this table: Tom Cannon, Pete Rawlings, and Gerrit Platenkamp of Jones & Stokes Associates.

Table A-2. Key to Table A-1 Potential Beneficial Effects, Potential Adverse Effects, and Conservation Measures Codes

Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into the Program
<p>More natural riverflows and Bay-Delta freshwater inflow would increase organic carbon and other nutrients, improve flushing of contaminants and wastes, and provide higher seasonal water levels. This would provide evaluated fish species with improved habitat and potentially greater transport to such habitat from upstream spawning areas (BE1).</p>	<p>Potential for temporary increase in turbidity resulting from construction activities (AE1).</p>	<p>To the extent practicable, restore habitat using construction methods that would minimize the release of sediment resulting from construction activities or subsequent erosion (M1).</p>
<p>Alteration of Delta hydraulic conditions and structural configurations could increase available habitat and benefit associated species (BE2).</p>	<p>Construction-related activities associated with implementing actions could result in take of evaluated species (AE2).</p>	<p>To the extent practicable, avoid construction activities during periods when evaluated species are present and could be affected by the actions (M2).</p>
<p>Substantial increase in shallow-water tidal perennial aquatic habitat area as a result of restoring tidal aquatic habitats (BE3).</p>	<p>Some levee improvements could result in a loss or degradation of existing aquatic habitat (AE3).</p>	<p>To the extent consistent with program objectives, design levee improvements to incorporate restoration of shallow-aquatic tidal habitat (M3).</p>
<p>Substantial increase in tidal perennial aquatic habitat area as a result of restoring tidal exchange with leveed or diked lands (BE4).</p>	<p>Construction of interties and supporting infrastructure between existing conveyance facilities and export pumps could result in the loss or degradation of habitat areas (AE4).</p>	<p>Restore or enhance 2-5 acres of additional in-kind habitat for every acre of affected habitat near affected areas (M4).</p>
<p>Restoration of channel islands could improve the quality of tidal perennial aquatic habitat in the area of the islands and benefit associated species (BE5).</p>	<p>Construction of conveyance facilities and associated infrastructure could result in loss or degradation of habitat (AE5).</p>	<p>To the extent consistent with program objectives, design conveyance facilities to incorporate restoration of shallow-water aquatic tidal habitat (M5).</p>
<p>Restoration of habitat adjacent to tidal perennial aquatic habitat could increase nutrient inputs to tidal waters and increase habitat values and foodweb productivity for species associated with the aquatic habitat (BE6).</p>	<p>Potential adverse effects of the program are not analyzed. The type and magnitude of potential adverse effects would depend on the type of specific program actions that are implemented (N/A).</p>	<p>To the extent practicable, design and operate conveyance facilities to avoid entrapping or entraining evaluation species (M6).</p>

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Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into the Program
<p>Reducing adverse effects of dredging in the Delta would improve quality of tidal perennial aquatic habitat and would have benefits to species associated with aquatic habitat (BE7).</p>	<p>Likely to be no discernable adverse effects on existing habitat areas and associated evaluation species (N/E).</p>	
<p>Reduction in the likelihood for introductions of non-native species into the Bay-Delta estuary will reduce the potential for future adverse effects of such introductions on tidal perennial aquatic communities and evaluated species (BE8).</p>		
<p>Reducing diversions of freshwater from the Delta could improve habitat conditions for associated native aquatic species (BE9).</p>		
<p>Potential for increased populations of anadromous fish and other native aquatic species as a result of increased recruitment (BE10).</p>		
<p>Potential for increased populations of anadromous fish and other native aquatic species as a result of increased recruitment (BE11).</p>		
<p>Reduction in contaminant loadings in tidal perennial aquatic habitats could improve the survivability of some species and increase aquatic invertebrate populations that are adversely effected by toxic agents (BE12).</p>		
<p>Reducing erosion of shorelines would improve aquatic habitat by reducing turbidity and improving the quality of shoreline vegetation (BE13).</p>		

Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into the Program
<p>Potential for increase in shallow-water habitat area if levee improvement designs include structural features that create shallow-water habitat and protect existing habitat that is dependent on levee protection (BE14).</p>		
<p>Depending on the design of conveyance channels, construction of conveyance channels could result in increasing the area of tidal shallow-water aquatic habitat area (BE15).</p>		
<p>Potential beneficial effects of the program are not analyzed. The type and magnitude of potential beneficial effects would depend on the type of specific program actions that are implemented (N/A).</p>		
<p>Likely to be no discernable beneficial effects on existing habitat areas and associated evaluation species (N/E).</p>		