Draft Ecosystem Quality Objectives for the Sacramento River Ecological Zone
(Riparian Habitat Committee revised draft 1/6/97)

MISSION:

The mission of the CALFED Bay-Delta Program is to develop a long-term comprehensive plan that will restore ecological health and improve water management for beneficial uses of the Bay-Delta system.

GOAL:

Improve and increase aquatic and terrestrial habitats and improve ecological functions in the Bay-Delta to support sustainable populations of diverse and valuable plant and animal species.

OBJECTIVES:

A. Improve and increase Aquatic Habitats so that they can support sustainable production and survival of native and other desirable estuarine and anadromous fish in the estuary.

1. Increase amount of high quality shallow riverine habitat to allow sustainable fish spawning and early rearing.

a. Increase amount of quality riverine edge habitat to allow spawning and rearing by sustainable populations of native fish species.

Implementation Objective: Maintain high quality holding, spawning, rearing and migration habitat for key aquatic species.

Target: Provide sufficient flow to transport sediment and distribute new spawning gravels.

Target: Increase gravel supplies and recruitment to the main stem river.

Target: Restore degraded channel sections.

Target: Control excessive silt discharges to protect spawning gravels in the mainstem by protecting watersheds in the Sacramento River Basin.

D-023028

Implementation Objective: Provide high quality water in sufficient quantities to maintain important holding, spawning, rearing, and migration habitats for key aquatic species.

Target: Implement a river flow regulation plan that balances carryover storage needs with instream flow needs based on runoff and storage conditions.

Implementation Objective: Maintain water temperatures at levels to sustain all life stages of anadromous and native fish species, and other species dependent on the aquatic environment.

Target: Attain the following target temperatures for salmon

Juvenile rearing - 65°F
Holding of prespawning adults - 60°F
Egg incubation - 56°F

Implementation Objective: Maintain and restore opportunities for natural processes of channel meander, sediment transport, and gravel recruitment.

Target: Develop and implement a plan to protect all natural sources of spawning gravel in the high water channels and along the flood plains of the Sacramento River and its tributaries.

b. Increase amount of quality shallow shoal habitat within the main channels of the Delta and upper Bay to allow shallow foraging by sustainable populations of juvenile estuarine fish.

2. Increase amount of high quality shaded riverine habitat to allow the growth and survival of sustainable populations of estuarine resident and anadromous fish in the estuary.

a. Increase amount of quality riparian woodland habitat to allow production of terrestrial food sufficient to support sustainable populations of resident and anadromous fish.

D-023029

Implementation Objective: Maintain and where feasible reestablish a continuous riparian corridor along the Sacramento River between Keswick Dam and Sacramento.

Target: In coordination with the Upper Sacramento Advisory Council, support development of a Sacramento River Conservation Area Handbook and a Sacramento River Conservation Association.

Target: Establish a Sacramento River Riparian Conservation Area from Verona to Keswick.

Target: Maintain and restore opportunities for natural riparian successional process to occur along major rivers.

Target: Protect and restore riparian corridors along tributary streams.

b. Increase amount of large, woody debris along Delta levees to allow juvenile and adult feeding and refuge for sustainable populations of fish.

c. Increase amount of shaded riverine habitat to provide for localized temperature reduction.

Implementation Objective: Maintain and restore a viable continuous riparian ecosystem that provides a near continuous corridor of streamside vegetation.

Target: Evaluate and implement opportunities to incorporate flows to restore riparian vegetation from Keswick Dam to Sacramento that are consistent with the overall river regulation plan.

Target: Preserve and restore riparian habitats and meander belts along the Sacramento River between Keswick Dam and Colusa.

3. Increase amount of quality tidal slough habitat containing emergent and submerged vegetation to support fish production capacity of the Delta.

a. Increase amount of dead-end slough habitat allow spawning and rearing of sustained populations of some resident species.

b. Reduce water hyacinth populations in tidal slough habitats to improve habitat quality for sustainable populations of some resident species.

c. Increase amount of high quality tidal slough habitat to allow increased primary biological production.

4. Increase amount of high quality estuary entrapment/null zone habitat to support sustainable fish population in the Bay-Delta system.

a. Reduce saltwater intrusion into Suisun Bay to increase the nursery area for sustainable populations of plants and animals.

b. Expand the geographic extent of low salinity habitat in Suisun Bay.

c. Increase the occurrence of brackish water habitat in San Pablo Bay during the winter and spring to support sustainable populations of Bay species.

5. Provide sufficient transport flows at the proper times to move eggs, larvae, and juvenile fish from spawning habitats to nursery habitats in the Delta and Bay.

a. Increase the transport of young fish from the Delta to Suisun Bay nursery areas to support sustainable populations of estuarine and anadromous fish species.

b. Increases the transport of young fish through the Delta to the ocean to support sustainable populations of estuarine and anadromous fish species.

c. Reduce the transport of young fish from North to South across the Delta and the entrainment of fish in the Delta to increase the survival and abundance of estuarine and anadromous species.

d. Reduce the blockage of and alterations to transport flows by local structures.

6. Reestablish appropriate upstream and downstream movement of anadromous and estuarine fish.

a. Enhance upstream migrations of adult salmonids through the Delta.

b. Increase successful outmigration of juvenile fish through the Delta and River spawning areas.

Implementation Objectives: Increase monitoring of fish outmigration and flows in tributary streams.

Target: Real time assessment of outmigration conditions.

D-023031

c. Enhance upstream migration of adult estuarine fish into the Delta and river spawning areas.

Implementation Objectives: Maintain or improve connectivity of upstream holding and spawning habitats on tributaries to the mainstem Sacramento River.

Target: Unimpaired outmigration for all anadronous species.

7. Improve the productivity of the Bay-Delta aquatic habitat food web to support sustainable populations of desirable fish (and other) species.

a. Reduce entrainment of biological productivity throughout the aquatic food web.

b. Reduce concentrations of toxicants in the water column and in sediments.

c. Reduce the effects of introduced species on ecosystem productivity and in competing with desirable species for habitat.

d. Increase the residence time of water in Delta channels to increase plankton productivity and reduce undesirable algal-mat growth in the Delta.

e. Increase the input of nutrients from wetland and riparian habitats to aquatic habitats.

Implementation Objective: Maintain or restore natural input to nutrient/carbon cycle.

Target: Maintain and restore healthy riparian ecosystems along the Sacramento River and its tributaries.

Target: Maintain and restore connectivity between the river and stream channels to their flood plains through overbank flooding.

f. Reduce salinity levels in delta aquatic habitats.

g. Increase flows of freshwater into the estuary.

8. Reduce concentrations of toxic constituents and their bioaccumulation to eliminate their adverse effects on populations of fish and wildlife species.

D-023032

a. Reduce the concentrations of pesticide residues in Bay-Delta system water and sediments.

Implementation Objective: Reduce loss of juvenile anadromous and resident fish and other aquatic organisms due to organic compounds.

Target: Reduce the loss of aquatic organisms to toxic chemicals.

b. Reduce the concentrations of hydrocarbons, heavy metals, and other pollutants in Bay-Delta system water and sediments.

Implementation Objective: Reduce loss of juvenile anadromous and resident fish and other aquatic organisms due to inorganic compounds.

Target: Reduce the loss of aquatic organisms to toxic chemicals.

B. Improve and increase important wetland habitats so that they can support the sustainable production and survival of wildlife species.

1. Increase the amount of high quality brackish tidal marsh habitat in the Bay-Delta system to better support sustainable populations of native wildlife species.

a. Modify salinity levels in brackish tidal marshes to improve their vegetation composition.

b. Increase the areal extent of brackish tidal marsh habitats.

c. Improve the connectivity between brackish tidal marsh habitats and their supporting habitats such as aquatic habitats and riparian woodlands and adjacent uplands.

2. Increase the amount of high quality freshwater marsh habitat to better support sustainable populations of native wildlife species in the Delta.

a. Restore appropriate salinity levels in freshwater marsh habitat in the Delta to enhance forage productivity and habitat suitability for some native species.

b. Increase the areal extent of freshwater marsh habitats.

D-023033

Implementation Objective: Increase the quality and quantity of wetland habitats adjacent to mainstem rivers.

Target: Allow for the natural process of river meandering which creates oxbows and other wetland features along mainstem rivers.

c. Improve the connectivity among freshwater marsh habitats to provide corridors for population movement and genetic exchange for dependent species.

d. Reduce the vulnerability of existing freshwater marshes to levee failure.

3. Increase the amount of high quality riparian woodland habitat in the Delta to better support sustainable native wildlife populations.

a. Increase amounts of riparian habitat structure for nesting near foraging area for some native bird species.

b. Reduce the fragmentation of riparian woodland habitat patches to provide corridors for population movement and genetic exchange for dependent species.

c. Increase areal extent of riparian woodland habitats.

d. Improve the connectivity between riparian woodlands and their supporting habitats such as aquatic habitats and brackish marsh habitats.

4. Increase the amount of breeding waterfowl habitat to better support sustainable populations of dabbling ducks.

a. Increase the amount of high quality brood habitat near nesting habitat for dabbling ducks.

b. Increase the amount of high quality nesting habitat near brood habitat for dabbling ducks.

5. Increase the amount of wintering wildlife habitat for foraging and resting to better support sustainable populations of wintering waterfowl.

a. Increase supplies of suitable forage such as waste grain on agricultural lands.

b. Increase the amount of resting areas near foraging areas for wintering wildlife.

c. Increase the amount of high quality foraging areas (e.g. freshwater marsh and brackish water marsh) for wintering wildlife.

d. Reduce the vulnerability of some existing wintering wildlife habitats to levee failures.

6. Increase the amount of managed permanent pasture habitat to better support wintering crane populations.

a. Increase the amount of foraging habitat in proximity to roosting habitat.

b. Increase the amount of roosting habitat in proximity to foraging habitat.

7. Increase flood plains and associated riparian habitat to improve diversity and abundance of fish and wildlife.

a. Increase suitable flood plains to improve the availability of temporary flooded spawning habitat for fish.

Implementation Objective: Maintain or restore connectivity of upstream holding, spawning, and rearing habitats with the mainstem Sacramento River.

Implementation Objective: Maintain or restore hydrologic connectivity between flood plains and tributary and mainstem channels.

Implementation Objective: Maintain and restore a continuous viable riparian ecosystem adjacent to mainstem channels and major tributaries.

Target: Revegetate denuded areas.

Target: Obtain streambank or riparian zone conservation easements.

Target: Avoid any loss or additional fragmentation of the riparian habitat in acreage, lineal coverage, or habitat value.

Target: Preserve and restore riparian habitats and meander belts along the Sacramento River between Keswick Dam and Colusa.

b. Improve narrow restricted channels to reduce the risk of catastrophic losses of wildlife habitat from levee failure.

C. Increase population health and populations size of Delta species to levels that assure sustained survival.

1. Contribute to the recovery of threatened, endangered or species of special concern.

Implementation Objective: Restore and maintain splittail at levels which will fully utilize existing habitat.

Target: Maintain a population growth rate greater than 1.0.

Implementation Objective: Improve the survival of juvenile winter-run chinook salmon in their rearing and emigration habitats.

Target: Install positive barrier fish screens to screen 50% (by volume) of the water diverted from the Sacramento River.

Implementation Objective: Improve the survival of juvenile steelhead in their rearing and emigration habitats.

Target: Install positive barrier fish screens to screen 50% (by volume) of the water diverted from the Sacramento River.

2. Increase populations of economically important species.

Implementation Objective: Restore and maintain green sturgeon at levels which will fully utilize existing habitat.

Target: Maintain a population growth rate greater than 1.0.

Implementation Objective: Restore and maintain white sturgeon at levels which will fully utilize existing habitat.

Target: Maintain a population growth rate greater than 1.0.

Implementation Objective: Restore and maintain striped bass at levels which will fully utilize existing habitat.

Target: Maintain a population growth rate greater than 1.0.

Implementation Objective: Restore and maintain American shad at levels which will fully utilize existing habitat.

Target: Maintain a population growth rate greater than 1.0.

Implementation Objective: Improve the survival of economically important juvenile fish in their rearing and emigration habitats.

Target: Install positive barrier fish screens to screen 50% (by volume) of the water diverted from the Sacramento River.

3. Increase populations of prey or food species.

Implementation Objective: Restore and maintain native fish communities.

Target: Maintain existing species diversity and abundance levels.

Implementation Objective: Restore and maintain native amphibian populations.

Target: Maintain existing species diversity and abundance levels.

Implementation Objective: Restore and maintain lower trophic organisms such as invertebrate, bacterial, and algal species.

Target: Maintain existing species diversity and abundance levels.

Implementation Objective: Restore and maintain Pacific lamprey at levels which will fully utilize existing habitat.

Target: Maintain a population growth rate greater than 1.0.

Implementation Objective: Reduce loss of adult fish due to straying.

Target: Provide positive outflow for Big Chico Creek. Refer to Implementation Objectives and targets for Big Chico Creek Ecological Unit.

Implementation Objective: Reduce degradation of aquatic habitat due to erosion and sediment input.

D-023037

Target: Control excessive silt discharges to protect spawning gravels in the mainstem by protecting watersheds in the Sacramento River Basin.

Implementation Objective: Reduce loss of juvenile anadromous and resident fish and other aquatic organisms due to predation.

Target: Eliminate predator habitat by redesigning bridge pilings and abutments, water diversion structures, and other structures along the banks of the Sacramento River.

D. Improve and maintain the health and integrity of Sacramento Valley resources that provide direct support to the Delta ecosystem.

1. Improve and increase aquatic habitats so they can support sustainable production and survival of fisheries in the Delta.

a. Increase the amount of high-quality riverine edge habitat to allow spawning and rearing by sustainable populations of native fish.

Implementation Objective: Maintain high quality holding, spawning, rearing and migration habitat for key aquatic species.

Target: Provide sufficient flow to transport sediment and distribute new spawning gravels.

Target: Increase gravel supplies and recruitment to the main stem river.

Target: Restore degraded channel sections.

Target: Control excessive silt discharges to protect spawning gravels in the mainstem by protecting watersheds in the Sacramento River Basin.

Implementation Objective: Provide high quality water in sufficient quantities to maintain important holding, spawning, rearing, and migration habitats for key aquatic species.

Target: Implement a river flow regulation plan that balances carryover storage needs with instream flow needs based on runoff and storage conditions.

D-023038

Implementation Objective: Maintain water temperatures at levels to sustain all life stages of anadromous and native fish species, and other species dependent on the aquatic environment.

Target: Attain the following target temperatures for salmon

Juvenile rearing - 65°F
Holding of prespawning adults - 60°F
Egg incubation - 56°F

Implementation Objective: Maintain and restore opportunities for natural processes of channel meander, sediment transport, and gravel recruitment.

Target: Develop and implement a plan to protect all natural sources of spawning gravel in the high water channels and along the flood plains of the Sacramento River and its tributaries.

b. Increase the amount of high quality shaded riverine aquatic habitat and riparian woodland habitat to provide localized temperature reduction and allow production of terrestrial food to maintain sustainable populations of Delta fisheries.

Implementation Objective: Maintain and restore a viable continuous riparian ecosystem that provides a near continuous corridor of streamside vegetation.

Target: Evaluate and implement opportunities to incorporate flows to restore riparian vegetation from Keswick Dam to Sacramento that are consistent with the overall river regulation plan.

Target: Preserve and restore riparian habitats and meander belts along the Sacramento River between Keswick Dam and Colusa.

Implementation Objective: Maintain or reestablish natural geomorphic and fluvial processes in artificially confined channel reaches.

Target: Evaluate opportunities to relocate, or modify artificial constrictions such as levees, bridges, and bank protection and implement changes where it is feasible to do so.

Target: Promote and support relocating water diversions and research alternate methodologies of supplying water from the Sacramento River that protect fish but also minimize conflict with maintaining dynamic fluvial river processes.

c. Reestablish or maintain appropriate upstream and downstream movement of anadromous fish in the tributaries.

Implementation Objectives: Increase monitoring of fish outmigration and flows in tributary streams.

Target: Real time assessment of outmigration conditions.

Implementation Objectives: Maintain or improve connectivity of upstream holding and spawning habitats on tributaries to the mainstem Sacramento River.

Target: Unimpaired outmigration for all anadromous species.

d. Improve the productivity of the foodweb to support sustainable native fish and wildlife populations by reducing the effects of nonnative species.

Implementation Objective: Reduce populations of harmful introduced plants.

Target: Reduce and systematically control populations of invasive exotic plant species that compete with the establishment and succession of native riparian vegetation.

e. Reduce concentrations of toxic constituents and other pollutants to eliminate their adverse effects on Delta populations of fish and wildlife species.

Implementation Objective: Reduce loss of juvenile anadromous and resident fish and other aquatic organisms due to inorganic compounds.

Target: Reduce the loss of aquatic organisms to toxic chemicals.

Implementation Objective: Reduce loss of juvenile anadromous and resident fish and other aquatic organisms due to organic compounds.

2. Increase the amount of high-quality riparian woodland habitat to reduce fragmentation and increase conductivity to better support sustainable native fish and wildlife population in the Delta.

Implementation Objective: Maintain and where feasible reestablish a continuous riparian corridor along the Sacramento River between Keswick Dam and Sacramento.

Target: In coordination with the Upper Sacramento Advisory Council, develop a Sacramento River Riparian Conservation Area Plan.

Target: Establish a Sacramento River Riparian Conservation Area from Verona to Keswick.

Target: Maintain and restore opportunities for natural riparian successional process to occur along major rivers.

Target: Protect and restore riparian corridor along tributary streams.

Implementation Objectives: Maintain or restore natural input to nutrient/carbon cycle.

Target: Maintain and restore healthy riparian ecosystems along the Sacramento River and its tributaries.

Target: Maintain and restore connectivity between the river and stream channels to their floodplain through overbank flooding.

Implementation Objectives: Increase the quality and quantity of wetland habitats adjacent to mainstem rivers.

Target: Allow for the natural process of river meandering which creates oxbows and other wetland features along mainstem rivers.

Implementation Objective: Maintain and restore a continuous viable riparian ecosystem adjacent to mainstem channels and major tributaries.

Target: Revegetate denuded areas.

Target: Obtain streambank or riparian zone conservation easements.

D-023041

Target: Avoid any loss or additional fragmentation of the riparian habitat in acreage, lineal coverage, or habitat value.

Target: Preserve and restore riparian habitats and meanderbelts along the Sacramento River between Keswick Dam and Colusa.

Implementation Objective: Restore natural channel process to more closely approximate historic conditions in major tributaries.

Implementation Objective: Establish buffer zones around important habitat areas to protect these habitats from incompatible land uses.

Implementation Objective: Protect and increase the areal extent of riparian habitats and restore and enhance degraded habitat areas.

Implementation Objective: Protect and increase the areal extent of valley-oak woodland and enhance degraded valley-oak woodlands.

Implementation Objective: Increase the area of perennial grasslands.

3. Increase floodplains and associated riparian habitat to improve diversity and abundance of fish and wildlife.

Implementation Objective: Maintain or restore hydrologic connectivity between flood plains and tributary and mainstem channels.

Implementation Objectives: Restore natural floodplain configurations associated with rivers and tributaries.

Target: Preserve floodplain areas where natural sedimentation and vegetation succession can occur unimpeded, and as a source of riverine and estuarine nutrients and allochthonous material.

4. Contribute to the recovery of threatened and endangered species or species of special concern and also increase populations of economically important species in the Delta.

1. Contribute to the recovery of threatened, endangered or species of special concern.

Implementation Objectives: Restore and maintain splittail at levels which will fully utilize existing habitat.

Target: Maintain a population growth rate greater than 1.0.

Implementation Objective: Improve the survival of juvenile winter-run chinook salmon in their rearing and emigration habitats.

Target: Install positive barrier fish screens to screen 50% (by volume) of the water diverted from the Sacramento River.

Implementation Objective: Improve the survival of juvenile steelhead in their rearing and emigration habitats.

Target: Install positive barrier fish screens to screen 50% (by volume) of the water diverted from the Sacramento River.

2. Increase populations of economically important species.

Implementation Objective: Restore and maintain green sturgeon at levels which will fully utilize existing habitat.

Target: Maintain a population growth rate greater than 1.0.

Implementation Objective: Restore and maintain white sturgeon at levels which will fully utilize existing habitat.

Target: Maintain a population growth rate greater than 1.0.

Implementation Objective: Restore and maintain striped bass at levels which will fully utilize existing habitat.

Target: Maintain a population growth rate greater than 1.0.

Implementation Objective: Restore and maintain American shad at levels which will fully utilize existing habitat.

Target: Maintain a population growth rate greater than 1.0.

Implementation Objective: Improve the survival of economically important juvenile fish in their rearing and emigration habitats.

Target: Install positive barrier fish screens to screen 50% (by volume) of the water diverted from the Sacramento River.

3. Increase populations of prey or food species.

Implementation Objective: Restore and maintain native fish communities.

Target: Maintain existing species diversity and abundance levels.

Implementation Objective: Restore and maintain native amphibian populations.

Target: Maintain existing species diversity and abundance levels.

Implementation Objective: Restore and maintain lower trophic organisms such as invertebrate, bacterial, and algal species.

Target: Maintain existing species diversity and abundance levels.

Implementation Objective: Restore and maintain Pacific lamprey at levels which will fully utilize existing habitat.

Target: Maintain a population growth rate greater than 1.0.

Implementation Objective: Reduce loss of adult fish due to straying.

Target: Provide positive outflow for Big Chico Creek. Refer to Implementation Objectives and Targets for Big Chico Creek Ecological Unit.

Implementation Objective: Reduce degradation of aquatic habitat due to erosion and sediment input.

Target: Control excessive silt discharges to protect spawning gravels in the mainstem by protecting watersheds in the Sacramento River Basin.

Implementation Objective: Reduce loss of juvenile anadromous and resident fish and other aquatic organisms due to predation.

Target: Eliminate predator habitat by redesigning bridge pilings and abutments, water diversion structures, and other structures along the banks of the Sacramento River.