Chapter 6

Cumulative Impacts

This chapter addresses the cumulative impacts of the proposed project (EDCP and Two-Year Komeen Trials) and other related projects in the Delta. Cumulative impacts are the direct and indirect impacts of a proposed project considered in combination with the impacts of past projects, other current projects and reasonably foreseeable future projects. CEQA provides some general guidelines for the assessment of cumulative impacts as follows:

> "Cumulative impacts refer to two or more individual impacts that, when considered together, are considerable or that compound or increase other environmental impacts. The cumulative impact of several projects is the change in environment that results from the incremental impact of the project when added to other, closely related past, present, or reasonably foreseeable, probable future projects. Cumulative impacts can result from individually minor but collectively significant projects taking place over a period of time." (Section 15355 of the CEQA Guidelines).

The assessment of cumulative impacts takes into account not only impacts identified as significant, but also those identified as less than significant. These less than significant impacts can become significant when considered in conjunction with similar impacts from other related projects.

Criteria for selecting related projects for the cumulative impact analysis are the following:

- The project must be sufficiently related to the proposed project either by location in the general Delta-Suisun Marsh project area, or by production of similar types of impacts on similar resources.
- The project must be reasonably foreseeable.
- The specifics of project design or operation must be known or predictable.

Projects that fit these criteria are the following:

- CALFED Bay-Delta Program
- South Delta Improvements Program
- South Delta Temporary Barriers Project
- Delta Wetlands Project
- Water Hyacinth Control Program

- Montezuma Wetlands Project
- Suisun Marsh Preservation Agreement Amendment Three.

This assessment utilizes information from EIRs and other documents regarding environmental effects of these projects, as well as material on the impacts of the proposed project previously presented in Chapters 3 through 5. A brief description of each program is provided, followed by a summary of the possible impacts associated with the project. A brief summary of the potential benefits of the EDCP and Two-Year Komeen Research Trials to the related projects is presented as well. Finally, a discussion of the potential cumulative impacts of all projects combined is presented.

6.1 Related Project Summaries

6.1.1 CALFED Bay-Delta Program

The CALFED Bay-Delta Program is a joint State-federal effort to develop long-term solutions to problems of the Sacramento/San Joaquin Bay-Delta system. The purpose of the Program is to develop and implement a long-term comprehensive plan that will restore ecological health and improve water management for beneficial uses of the Bay-Delta system (CALFED 1999). To achieve this purpose, CALFED will concurrently address problems of the Bay-Delta system within four critical resource categories: ecosystem quality, water quality, water supply reliability, and levee system integrity. The first phase of the program, development of a mission statement, guiding principles and alternatives, was completed in September 1996. In the second phase of the program, the preliminary alternatives were refined, a comprehensive programmatic environmental review was conducted and a draft Programmatic EIR/EIS was released in March 1998. The Draft Programmatic EIR/EIS was rewritten after a preferred program alternative was identified; the revised draft was released in June 1999. The second phase is expected to conclude in 2000 with a Record of Decision and Certification (ROD/CERT). The third and final phase will be implemented in stages over many years. This phase will include any necessary studies and a site-specific environmental review of individual components of the preferred alternative (CALFED 1999). Because of the size and complexity of the Program alternatives, implementation is likely to take place over a period of 20-30 years.

The program consists of eight elements (or programs) that form the foundation for overall improvement in the Bay-Delta system. The goal of the Ecosystem Restoration Program is to improve and increase aquatic and terrestrial habitats and improve ecological functions in the Bay-Delta system to support sustainable populations of diverse and valuable plant and animal species. The aim of the Water Quality Program is to achieve continuous improvement in the quality of the waters of the Bay-Delta system. The Levee System Integrity Program focuses on improving levee stability to benefit all users of Delta water and land. The Water Use Efficiency Program includes actions to assure efficient use of existing and any new water supplies developed by the Program. The Water Transfer Program proposes a framework of actions, policies, and processes that collectively will facilitate water transfers and the further development of a state-wide water transfer market. The Watershed Program provides financial and technical assistance to local watershed programs that benefit the Bay/Delta system. The focuses of the last two elements are options for storage and conveyance.

The Preferred Program Alternative consists of a through-Delta conveyance approach, ecosystem restoration, water quality improvements, levee system improvements, increased water use efficiency, improved water transfer opportunities, watershed restoration, and an integrated storage program. The Revised EIR/EIS (1999) identifies the following as benefits of the Preferred Alternative:

- Modifying the timing and magnitude of flow to restore ecological processes and to improve conditions for fish, wildlife, and plants in the Bay-Delta system.
- Improving and increasing aquatic and terrestrial habitats.
- Modifying and eliminating fish passage barriers.
- Constructing fish screens that use the best available technology.
- Reducing the loads and impacts of bromide, total organic carbon, pathogens, nutrients, salinity, and turbidity.
- Reducing the impacts of pesticides.
- Reducing the impacts of trace metals, mercury, and selenium.
- Improving and maintaining the stability of Delta and Suisun Marsh levee system.
- Enhancing flood protection for key Delta islands.
- Expanding and implementing agricultural and urban conservation incentive programs.
- Implementing better water management for managed wetlands.
- Facilitating water transfers while protecting from third parties from potentially significant adverse impacts.
- Supporting local watershed restoration, maintenance, and conservation activities.
- Developing appropriate groundwater and surface storage in conjunction with specified water conservation, recycling, and water transfer program to provide water for the environment at times when it is needed most, and to improve water supply reliability.
- Modifying existing Delta conveyance systems for improved water supply reliability and water quality, improved ecosystem health, and reduced risk of supply disruption due to catastrophic breaching of Delta levees.

Potentially adverse environmental consequences of the preferred alternative, identified in the Revised EIR/EIS (CALFED 1999), include the following:

- *Water Supply*: Temporary local water supply interruptions due to turbidity of water during construction of facilities and habitat restoration activities.
- *Water Quality*: Increases in concentrations of bromide, salinity, total dissolved solids, and total organic carbon in the Delta; increased diversion of water from the Delta; releases of suspended solids or toxic substance into the water column; increased water temperatures and decreased dissolved oxygen concentration; potential decreased in-stream water quality from reduced in-stream flows associated with new storage facilities.
- *Groundwater*: Increased groundwater extractions, resulting in land subsidence; degradation of groundwater quality.
- *Fisheries and Aquatic Ecosystems*: Increased non-native species abundance and distribution; blocked access to habitat and potentially altered water quality and flow conditions from placement of barriers in the south Delta; altered natural ecosystem structure; removal of benthic communities and creation of conditions that may damage habitat for desired species from dredging activities; short-term disturbance of existing biological communities and species habitat, mobilized sediments, and input contaminants from construction activities; reduced streamflow and Delta outflow; changed seasonal flow, water temperature variability; and changes in salinity potentially resulting in reduced habitat abundance; impaired species movement; increased loss of fish to diversions and entrainment; increased predation; delayed migration and reduced spawning success for adult fish.
- *Vegetation and Wildlife*: Fragmentation of existing habitat corridors on small or ephemeral tributaries as a result of inundation by storage reservoirs; loss of habitat and direct impacts on special status species; loss of incidental wetlands and riparian habitats; temporary or permanent loss or disturbance of wetland or riparian communities, wintering waterfowl habitat, portions of rare natural communities and significant natural areas, and quantity or quality of forage for species of concern.
- *Agricultural Land and Water Use*: Conversion of prime, state wide important and unique farmland; conflicts with adjacent land uses; and conflicts with local government plans and policies.

- *Recreation Resources*: Temporary or permanent closure of some recreational areas or facilities; reduced access to recreation facilities; decreased recreation opportunities from changes in reservoir levels; reduced water-contact recreation quality from releases of reservoir cold water.
- *Flood Control*: Reduced levee stability and reductions in a channel's flow conveyance from barriers in the channel; increases in seepage, wind fetch and wave erosion on landside levee slopes; localized subsidence, resulting in levee slumping or cracking near levees.

6.1.2 South Delta Improvements Program (SDIP)

The purpose of the South Delta Improvements Program (SDIP) is to improve the reliability of the existing State Water Project facilities and operations within the South Delta, while ensuring that water of adequate quantity and quality is available for diversion to beneficial uses within the South Delta Water Agency's service area; and to contribute to restoring the ecological health of aquatic resources in the lower San Joaquin River and South Delta (DWR 1999). Long term program components include flow control structures, a fish control structure, enlargement of Clifton Court Forebay and dredging of Old River. The two flow control structures, one each at Middle River and Old River will have radial gates that raise during the flood tide and drop during the ebb tide to prevent water levels upstream of the structures from receding. Both flow control structures will allow flows to pass freely during the periods of natural or regulated high flow, when water levels are maintained without the need for flow control. The operation of the flow control structures will vary over the course of the irrigation season. The proposed Old River fish control structure would be located at the confluence of the head of Old River and the San Joaquin River. The fish flow structure would be operated from October through November and from April 16 through May of each year except during periods of high San Joaquin River flows. The operations during the during the fall would be aimed toward improving the dissolved oxygen levels along the portion of the San Joaquin River from its confluence with the head of Old River downstream to the Port of Stockton. The operations during the spring would be aimed at enhancing the survival of emigrating San Joaquin River salmon smolts by lessening the chances of exposure to the influence of project and local diversions, which occur in the south Delta during this time. Dredging of Old River from the Western Canal to the confluence of Old River and north Victoria Canal is necessary to allow the full pumping capability of Banks Pumping Plant while avoiding sediment movement and scouring during peak diversion periods. Approximately 1.25 million cubic

yards of material would be dredged from a 4.9 mile reach of Old River to increase the channel capacity north of the new intake. The dredging operation period would last approximately 36 months with dredging only taking place between August and October, to minimize impacts to fish. (Need to describe enlargement of CCFB).

Potentially significant impacts associated with this project are described in Entrix (1996) and include the following:

- *Water Quality*: Changes in salinity patterns in the Delta; slight increase in trihalomethane formation potential in export water; \ temporary increase in trihalomethane formation potential in dredge disposal area due to mobilization of undissolved organic matter in soils; temporary increases in turbidity during construction of barriers.
- *Habitat*: Loss of freshwater marsh, shallow water and terrestrial habitat due to construction of the proposed facilities; smothering and loss of habitat due to dredging of Old River; negative flows in channels leading to the south Delta due to operation of the barriers.
- *Fisheries*: Impacts to chinook salmon, steelhead, white and green sturgeon, American shad, striped bass, delta smelt and splittail due to project-related factors including increased risk of straying for upmigrating adults and juveniles, increased risk of entrainment, increased risk of blocked passage, diversion and predation due to the barriers, increased transport of eggs and larvae to diversions.
- *Wildlife*: Impacts to Swainson's hawk nest and foraging habitat, heron rookery sites. Loss of giant garter snakes, western pond turtles and their habitat.
- *Vegetation*: Impacts to sensitive plant species such as Delta tule pea, Mason's Lilaeopsis, rose mallow and brittlescale habitat.

6.1.3 South Delta Temporary Barriers Project (TBP)

A temporary measure associated with SDIP is the South Delta Temporary Barriers Project. Objectives of this program are (1) to increase water levels, circulation patterns, and water quality in the south Delta area for local agricultural diversions; and (2) to improve operational flexibility of the State Water Project to help reduce fishery impacts and improve fishery conditions (DWR 1999). The Temporary Barriers Project was initiated to better determine the effects of installing permanent barriers in the south Delta. A five-year project began in 1991 to test a facsimile of the proposed south Delta barriers. However, because of the varying hydrological conditions and varying hydrodynamic patterns, as well as concerns for endangered

species, the actual number of barriers installed and the installation schedule have been different each year of the program. The TBP is being monitored to document and analyze trends with fish and vegetation in the area during the program and to help verify computer-modeling efforts for the south Delta.

Particular elements of the monitoring include the following:

- Fish Community Sampling to determine whether the barriers affect the various fish species inhabiting the channels by increasing the potential for predation and/or impacting water quality parameters.
- Adult salmon migration monitoring to verify whether the barriers impede the upstream migration of adult fall-run salmon during the fall months.
- Evaluation of San Joaquin River juvenile chinook salmon.

Potential project related impacts include:

- *Water Quality*: Changes in salinity patterns in the Delta; slight increase in trihalomethane formation potential in export water; temporary increases in turbidity during construction of barriers.
- *Hydrology*: Changes in water surface elevations in southern Delta channels; negative flows in channels leading to the south Delta due to operation of the barriers.
- Habitat: Impacts to freshwater marsh and shallow water habitat during construction of the barriers; increased risk of channel bank erosion due to inundation; increase in habitat favorable to predatory fish.
- *Fisheries*: Impacts to chinook salmon, steelhead, white and green sturgeon, American shad, striped bass, delta smelt and splittail due to increased risk of straying for upmigrating adults and juveniles, blocked passage, predation, entrainment and transport of eggs and larvae to diversions (Entrix 1996).
- *Vegetation*: Impacts to sensitive plant species such as Mason's Lilaeopsis through changes in water surface elevations.

6.1.4 Delta Wetlands Project

The Delta Wetlands Project (DW) involves diverting and storing water on two Sacramento-San Joaquin Delta islands (Bacon Island and Webb Tract, termed "reservoir islands") for later discharge for export sales or to meet outflow requirements for the San Francisco Bay/Sacramento-San Joaquin Delta estuary (Jones and Stokes 1995). During periods of nonstorage, shallow water would be managed within an inner levee system on the

reservoir. The project also involves seasonally diverting water to create and enhance wetlands and to manage wildlife habitat on two Delta islands (Bouldin Island and Holland Tract, referred to as "habitat islands"). These islands would be operated to support wetlands and wildlife habitat. Further, recreation facilities would be constructed along the perimeter levees on all four DW islands. To operate the project, DW would improve and strengthen levees on the four islands and install additional siphons and water pumps on the perimeters of the reservoir islands.

The initial water storage capacity of the reservoir islands would be 238 TAF and increase to 260 TAF in 50 years due to soil subsidence. The mean annual diversion and discharge is estimated to be 222-225 TAF and 180-202 TAF, respectively. Both reservoir islands could be filled and emptied in approximately one month. The Delta Wetlands diversion could occur in any month but would occur only when the volume of allowable water for export is greater than the permitted pumping rate of the export pumps.

Potential project-related impacts are described in Jones and Stokes (1995) and include the following:

- *Hydrodynamics*: changes in local channel velocities and stages.
- *Water Quality*: increases in salinity, DOC, THM concentrations and changes in other water quality variables; increase in pollutant loading in Delta channels.
- *Flood Control*: impacts to long-term levee stability on Reservoir Islands.
- *Fisheries*: alteration of habitat; impacts to chinook salmon, delta smelt, longfin smelt, striped bass due to indirect effects of project diversions and discharges on flows, entrainment, reduction in downstream transport, and changes in temperature and salinity.
- *Vegetation and Wetlands*: loss of riparian and permanent pond habitat; loss of jurisdictional wetlands on Reservoir Islands; loss of special status plant species; loss of upland habitat.
- *Agriculture*: Direct conversion of agricultural land; inconsistency with general plan regarding land use.

6.1.5 Water Hyacinth Control Program

The Department of Boating and Waterways has conducted an ongoing water hyacinth control program using chemical treatment methods since 1985. The objective of the chemical control is to lower the overall quantity of water hyacinth in the Delta to below problem levels. An ongoing water quality monitoring program has been conducted in conjunction with the chemical spraying. This program consists of three fixed station monitoring points at strategic locations in the Delta and also point of application monitoring. Most of the samples contain no herbicide residue. Any residue that has been found has been well below potable water requirements established by the Federal Government. The success of the water hyacinth control program has been demonstrated by the elimination of the water hyacinth masses at many locations in the Delta. There are now very few problems associated with the water hyacinth plant in the recreation or agricultural industry in the Delta. Most marinas are hyacinth-free and water hyacinth mats no longer impact irrigation pumps.

Potential impacts resulting from this project include the following:

- *Water Quality*: impacts to water quality due to low level residual concentrations of herbicides in the water column; decreases in dissolved oxygen due to decaying plant material.
- *Biological Resources*: potential impacts to benthic organisms due to the low-level accumulation of herbicides in the sediments.
- *Wetlands and Shallow Water Habitat*: temporary impacts due to drift of herbicide spray on to wetland vegetation and low level residual concentrations of herbicides in the water column.
- *Sediments*: potential impacts due to the low-level accumulation of herbicides in the sediments.
- *Agriculture*: potential impacts due to the potential for herbicide drift or contamination of irrigation water.

6.1.6 Montezuma Wetlands Project

The Montezuma Wetlands Project (MWP) proposes to restore approximately 1,800 acres of tidal and seasonal wetlands in San Francisco Bay near the mouth of the Sacramento river by using some 20 million cubic yards of non-hazardous sediment to be dredged from the Bay's shipping channels and ports (ACOE 1994). After filling the subsided baylands, the levees would be breached to enable tides to ebb and flow over the constructed foundation of tidal channels and low marsh plains. The marsh design includes high marsh

and marsh ponds that would seldom be reached by tides. The project also includes the construction of a barge offloading and sediment distribution facility, a sediment rehandling facility, internal levees to contain dredged sediment slurry pumped to the site, a main and branch tidal channel system, a sub-drainage system, ancillary facilities, and repairs to the outer levee.

The project would restore 1,822 acres of tidal wetlands on the bayland site. Project construction is proposed to be in four phases to minimize temporary losses of wetlands during construction and to facilitate engineered placement of the dredged materials. The 1,800 acre MWP site occupies the eastern side of the Suisun Marsh, next to Montezuma Slough and the Sacramento River and between Birds Landing and Collinsville in Solano County. Although used mostly for grazing, with some recreational and industrial activities, about 1,500 acres of MWP are designated for marsh protection. The additional 300 acres are currently designated by BCDC for industry; these areas will be permanently removed from potential industrial use and restored as wetlands. The project proposes to transport dredge sediment to the site via barge, then pump the sediment as a slurry to the placement area. Once the sediment is in place, wetland restoration will begin. Soil and water quality data indicate that MWP will not affect groundwater resources and initial modeling results indicate that MWP will not affect surface water salinity in the Suisun Marsh. The MWP will benefit fish and wildlife resources by restoring wetland habitat and enhance water quality, since wetlands function as a natural purification mechanism. The project would also provide significant capacity for disposal of sediments dredged from Bay area ports or navigation channels.

Potential project related impacts are described in ACOE (1994) and include:

- *Biological Resources*: release of contaminants into the aquatic and terrestrial environment through placement of sediment, resulting in plant uptake of contaminants and impacts to fish and wildlife; impacts to special status terrestrial species, including the salt marsh harvest mouse, and special status plant species and their habitats.
- *Wetlands*: loss of established seasonal wetlands and some marsh habitat functions; potential impacts from delayed or defective marsh restoration.
- *Air Quality*: emissions from operation-phase activities would air quality standards for ozone precursors.

6.1.7 Suisun Marsh Preservation Agreement Amendment Three

The purpose of Amendment Three to the Suisun Marsh Preservation Agreement is to change the Agreement to provide equivalent protection to Suisun Marsh managed wetlands as intended under the Original Agreement, while recognizing the effects of increased Delta outflows and effective operation of the Suisun Marsh Salinity Control Gates (CDFG and others 1998). The Original Agreement, signed in 1987 by the US Bureau of Reclamation, California Department of Water Resources, California Department of Fish and Game and the Suisun Resource Conservation District, was developed to provide facilities that would protect the brackish water nature of the Marsh, while mitigating for the effect of operating the Central Valley Project and State Water Project on the managed wetlands of Suisun Marsh. Project operations mainly include reservoir operations and exports.

The Agreement has been amended on two separate occasions (1988 and 1994). In July 1995, the four parties named above agreed to open negotiations to amend the Agreement once more, so that it would better reflect changed conditions in the Marsh. The changes are namely that additional large scale facilities are now unnecessary for control of salinity in the Suisun Marsh because of: (1) the effectiveness of the Suisun Marsh Salinity Control Gates at controlling salinity; (2) increased outflows provided under the 1994 Principles of Agreement and the State Water Resources Control Board's 1995 Water Quality Control Plan. Amendment Three of the Suisun Marsh Preservation Agreement consists of management actions that would assist landowners of managed wetlands in achieving soil salinities for improved growth of forage for waterfowl and wildlife on managed wetlands and to meet the objectives of the Original Agreement. The specific actions in Amendment Three include:

- Making channel water salinity standards consistent with the 1995 Water Quality Control Plan.
- Converting water quality compliance stations S-35 and S-97 to monitoring stations.
- Establishing a Managed Wetlands Improvement Fund.
- Establishing a Drought Response Fund.
- Establishing criteria to operate the Suisun Marsh Salinity Control Gates in September, and operating and maintaining existing facilities.
- Funding updates to the Individual Ownership Management Plans.
- Funding a Water Manager Program.

- Funding a Joint-Use Facilities Program.
- Establishing a Portable Pumps Program for diversions and drainage.

Specific potential impacts are the following:

- *Wildlife*: Impacts to the endangered salt marsh harvest mouse (SMHM) and SMHM habitat; impacts to small burrowing animals due to coring of common levees.
- *Fisheries*: Impacts to anadromous fish migration due to September gate operations and use of portable pumps for diverting channel water.
- *Wetlands*: Impacts to wetland habitat due to actions proposed in Amendment Three.

6.2 Beneficial Interactions between Selected Projects and the Proposed Project

The EDCP and Two-Year Komeen Research Trials could benefit the projects described above in several ways. First, by controlling the growth and spread of Egeria in the Delta, the project would decrease the possibility that shallow water habitat newly created by the CALFED Ecosystem Restoration Program and the Montezuma Wetlands Project would be invaded by this introduced weed. Thus, the project would increase the likelihood that native plants would become established in these habitats. Further, impacts to recreation resulting from the CALFED Bay-Delta Program and the South Delta Improvement Program could be lessened due to the improvements in recreation resulting from the EDCP and Komeen Trials.

6.3 Cumulative Impacts

The proposed project (EDCP and Two-Year Komeen Research Trials) would create significant adverse cumulative impacts to the following resources: water quality, shallow water habitat, wetlands, special status fish species, special status plant species, special status wildlife species, aquatic invertebrates, and sediments. A brief explanation of each cumulative impact is provided below. **Exhibit 6-1**, on the following page, summarizes cumulative impacts of the proposed project and related projects.

6.3.1 Cumulative Impacts to Water Quality

The proposed project may degrade water quality by increasing the input of copper compounds into Delta water channels, increasing the amount of toxic matter (in the form of herbicides), increasing trihalomethane formation potential and decreasing dissolved oxygen in areas where a substantial amount of aquatic plants are decomposing. While avoidance and minimization measures are proposed to mitigate the potential for trihalomethane formation and low dissolved oxygen, no mitigation measures are available for the violation of water quality standards. Six of the seven related projects (all except the SMPA Amendment Three) have the potential to impact water quality in at least one of these ways (increasing toxic material, increasing trihalomethane formation potential or decreasing dissolved oxygen). Thus, the impact to water quality is considered to be a significant cumulative impact of the proposed project.

6.3.2 Cumulative Impacts to Shallow Water Habitat

The proposed project may impact shallow water habitat by removing native and non-native aquatic vegetation that may be utilized by fish and aquatic invertebrates as habitat. This may be considered a less than significant impact due to the relatively small acreage of the treatment areas and the low habitat quality of *Egeria* beds. However, the cumulative impact is significant, since five of the seven related programs (CALFED, SDIP, TBP, DW, WHCP) also could impact shallow water habitat.

6.3.3 Cumulative Impacts to Wetlands

The proposed project may result in impacts to wetlands if herbicide treated channel water inundates intertidal wetland plant communities during treatments. Mitigation measures would be undertaken to minimize this

EXHIBIT 6-1

Cumulative Impacts of the Proposed Project and Related Projects

Cummulative Impacts									
Resource Impacted	*Impacts*								
	1. Water Quality	*2. Shallow Water Habitat*	*3. Wetlands*	*4. Special Status Fish Species*	*5. Special Status Plant Species*	*6. Special Status Wildlife Species*	*7. Aquatic Invertebrates*	*8. Sediments*	*Number of Shared Impacts with EDCP*
Proposed Project - (EDCP + Komeen Trials)	X	X	X	X	X	X	X	X	8
CALFED Bay Delta Program	X	X	X	X	X	X	X		7
South Delta Improvements Program	X	X	X	X	X	X			6
Temporary Barriers Project	X	X	X	X	X				5
Delta Wetlands Project	X	X	X	X	X				5
Water Hyacinth Control Program	X	X	X					X	4
Montezuma Wetlands Projects	X		X	X	X	X	X	X	7
Suisun Marsh Preservation Agreement Amendment Three			X	X		X			3
Number of Projects with Particular Impact	7	6	8	7	6	4	3	3	

impact. However, since all seven of the related projects also have the potential to result in impacts to wetlands, this is considered a cumulative impact.

6.3.4 Cumulative Impacts to Special Status Fish Species

The proposed project may result in adverse effects to special status fish species through direct impacts due to mechanical harvesting or herbicide treatment, or indirect impacts, such as loss of habitat or removal of prey base. Likewise, all but one of the related projects (the WHCP) could result in impacts to special status fish species. This is considered a cumulative impact.

6.3.5 Cumulative Impacts to Special Status Plant Species

The proposed project may result in impacts to special status plant species that grow along channel banks if herbicide treated channel water inundates these areas during treatments. Five of the seven related projects (all but the WHCP and SMPA Amendment Three) also have the potential to impact special status plant species, thus this is considered a cumulative impact.

6.3.6 Cumulative Impacts to Special Status Wildlife Species

The proposed project may result in impacts to special status wildlife species (amphibians, reptiles, and birds) due to the toxicity of Komeen, and impacts to habitat from all control methods. Four of the seven related projects (CALFED, SDIP, MWP, and SMPA) also have the potential to impact special status wildlife species. Thus, this is considered a cumulative impact.

6.3.7 Cumulative Impacts to Aquatic Invertebrates

The proposed project may result in impacts to aquatic invertebrates due to the use of Komeen, Reward, and mechanical harvesting. Further, the potential increase in copper content of the sediments following treatment with Komeen could impact aquatic invertebrate habitat. Two of the related projects (CALFED and the MWP) could also result in impacts to aquatic invertebrates or their habitat. Thus, this is considered a cumulative impact.

6.3.8 Cumulative Impacts to Sediments

The proposed project may result in impacts to the sediments due to the probable increase in copper content following application of the copper-based herbicide Komeen. Two of the seven related projects (WHCP and the MWP) also have the potential to impact sediments. Impact to sediments is considered a cumulative impact.