

SECTION 3.9: BIOLOGICAL RESOURCES

This section analyzes potential impacts to non-listed species and habitats with the potential to occur in the DMC Unit project area. To avoid redundancy and the potential for conflicts across documents, potential impacts to federal or state listed or federal candidate fish, plant, and wildlife species are addressed in separate documents, including the Delta-Mendota Canal Unit Biological Assessment (Reclamation 2003a).

The study area is located in the San Joaquin Valley and includes portions of San Joaquin, Stanislaus, Merced, and Fresno Counties and the service areas of the 20 DMC Unit contractors. It is reasonable to initially assume that a variety of vegetation types and wildlife resources in the study area could potentially be affected by the long-term water service contract renewals.

Baseline information on biological resources in the DMC Unit project area was compiled primarily from existing literature and information gathered from water district general managers and staff. Data sources included the CVPIA Draft PEIS (Reclamation 1997a), Draft EA for Eastside/Westside Water Transfer/Exchange (Tetra Tech 2000), Draft Biological Opinion on Operation of the CVP and Implementation of the CVPIA (Reclamation and Service 2000), A Guide to Wildlife Habitats of California (Mayer and Laudenslayer 1988), vegetation categories derived from CALVEG data (Matyas and Parker 1980), the CDFG California Natural Diversity Database, and the California Native Plant Society's Inventory of Rare and Endangered Vascular Plants of California.

DOCUMENTS ADDRESSING POTENTIAL IMPACTS TO LISTED SPECIES ASSOCIATED WITH DELIVERIES TO THE DELTA-MENDOTA CANAL UNIT

Reclamation and DWR are currently cooperating in conducting endangered species consultations to address the combined long-term operations of the CVP and SWP. Reclamation is the lead federal agency and DWR is the lead state agency for these consultations. Reclamation is consulting with the Service and NOAA Fisheries regarding potential operational impacts to species listed pursuant to the federal Endangered Species Act. DWR is consulting with CDFG regarding potential operational impacts to species listed pursuant to the California Endangered Species Act. The OCAP is a detailed analysis and explanation of the criteria and procedures for conducting combined CVP and SWP operations.

The OCAP biological assessment for fisheries (Reclamation 2004a) and the OCAP biological assessments for terrestrial (plant and wildlife) species (Reclamation 2004b, 2004c) address the potential environmental consequences of continuing CVP and SWP

operations on listed species and analyze the effects of proposed operations through 2030. The OCAP biological assessments include descriptions of the actions, the biology of the listed species, and the modeling of present and future conditions resulting from continuing operations. The OCAP biological assessment for fisheries (Reclamation 2004a) addresses the continued CVP and SWP operations on fishery resources including winter-run and spring-run chinook salmon, Central Valley steelhead, and delta smelt. It also recommends ongoing actions to reduce impacts to federal and state listed species. The modeling used in the preparation of these documents accounts for several considerations, including the appropriate levels of development, and operations associated with legal decisions and related water facilities and projects, including those in the West San Joaquin Division. The OCAP biological assessment for terrestrial species (Reclamation 2004b) addresses the effects of continued CVP and SWP operations on wildlife and plant species that are listed or proposed for listed under the federal Endangered Species Act, including the bald eagle, California clapper rail, salt marsh harvest mouse, riparian brush rabbit, riparian woodrat, California red-legged frog, giant garter snake, valley elderberry longhorn beetle, Suisun thistle, and soft bird's beak. The OCAP terrestrial species biological assessment (Reclamation 2004c) also covers wildlife and plant species that are listed or proposed for listing under the California Endangered Species Act, including bank swallow, Swainson's hawk, and western yellow-billed cuckoo.

The OCAP biological opinion (NOAA Fisheries 2004) concurs with the determination made in the OCAP biological assessments (fisheries and terrestrial) (Reclamation 2004a, 2004b, 2004c) that the effects of the action of long-term operation of the CVP and SWP are not likely to adversely affect the listed species covered by the consultation (as listed above). The OCAP biological opinion covers formal and early consultation for the operations of the CVP and SWP; it includes two separate effects sections, one for formal consultation and one for early consultation, as well as an incidental take statement for formal consultation and a preliminary incidental take statement for early consultation.

Early consultations are intended to reduce the potential for conflicts between listed species or critical habitat and proposed actions. Early consultation is an optional process that occurs before a prospective applicant files an application for a federal permit or license. Early consultation results in a preliminary biological opinion, except that the incidental take statement provided does not constitute authority to take listed species. When actions have been completed, the Service formalizes the early consultation portion of the biological opinion if the project description and effects are the same as those in the preliminary biological opinion. If there are additional effects resulting from project elements, consultation on the biological opinion will be reinitiated.

The formal consultation in the OCAP biological opinion covers proposed 2020 operations of the CVP including the Trinity River Mainstem Record of Decision, flows on the Trinity River, increased water demands on the American River, delivery of CVP water to the proposed Freeport Regional Water Project, water transfers, long-term EWA, operation of the TFCF, and operation of the SWP-CVP intertie. The formal consultation in the biological opinion also covered the effects of operations of the SWP including water transfers and the operations of the North Bay Aqueduct, Suisun Marsh Salinity Control Gates, and the John E. Skinner Delta Fish Protective Facility.

Early consultation effects include the operation of components of the South Delta Improvement Program, including pumping of 8,500 cfs at the SWP Banks Pumping Plant, permanent barrier operations in the South Delta, the long-term EWA, water transfers, and CVP and SWP operational integration. When these actions have been completed, the Service will formalize the early consultation portion of the biological opinion by either finalizing the effects in the preliminary biological opinion or reinitiating consultation on the biological opinion. Many of these projects are discussed in more detail in Chapter 1, Purpose and Need.

Since listed fishery and terrestrial species and habitat affected by CVP (and SWP) operations that serve to deliver water to the DMC Unit have been evaluated extensively in the OCAP biological assessments (Reclamation 2004a, 2004b, 2004c) and corresponding OCAP biological opinion (NOAA Fisheries 2004), this EA will not address the potential impacts of long-term contract renewals to listed fishery or terrestrial resources outside the DMC Unit service area. In addition, listed fishery and terrestrial species and habitat have been extensively analyzed in the DMC Unit biological assessment, presented under separate cover (Reclamation 2003). The DMC Unit biological assessment was submitted to the Service in July 2003 and a biological opinion is pending. In summary, impact evaluations of those listed species requiring consultation under the federal ESA are addressed one of the three OCAP biological assessments (Reclamation 2004a, 2004b, 2004c), all of which are available under separate cover.

AFFECTED ENVIRONMENT

The analysis of fisheries and terrestrial impacts in this EA is limited to impacts to non-listed species that could occur within or affected by deliveries to the DMC Unit service area.

Historically, the region surrounding the DMC Unit contained a diverse and productive patchwork of aquatic, wetland, riparian forest, and terrestrial habitats that supported abundant populations of resident and migratory species of wildlife (Tetra Tech 2000). Huge herds of pronghorn antelope, tule elk, and mule deer grazed the prairies, and large

flocks of waterfowl used the extensive wetlands. The major natural plant communities included grasslands, vernal pools, marshes, and riparian forests. Agricultural development and the conversion of natural habitat to agricultural uses began in the early to mid-1800s and intensified in the later 1800s, when the railroads provided the means to transport agricultural products to much larger markets.

Land uses in the region include agricultural, residential, and M&I uses. Over the years, land has been converted from native habitats to cultivated fields, pastures, residences, water impoundments, flood control structures, and other developments. Agricultural land comprises the majority of the DMC Unit project area and includes row crops, pastures, orchards, and vineyards. Almost half of the irrigated acreage in the San Joaquin region is planted with grains, hay, and pasture (Reclamation 1997a). Orchards are planted on about one-third of the irrigated acres, with cotton and row crops grown on most of the remaining lands.

As a result of this historical conversion of native habitats, many species have been displaced or extirpated from the region. Most of the species that occurred historically are now restricted to habitat patches that are fragmented and isolated, making it difficult for viable populations to exist. Some species have adapted to portions of the new landscape and are able to maintain populations. However, as a result of the largely fragmented habitats, the potential for expansion or growth of these populations is greatly reduced. Because of the reduction in habitat available to these species, remnants of habitats such as wetlands and riparian forests are increasingly valuable and important to resident and migratory wildlife species.

FISHERIES

On the arid west side of the San Joaquin River basin, relatively small intermittent streams drain the Coast Ranges but rarely reach the San Joaquin River. On the east side, numerous streams and three major rivers drain the western Sierra Nevada and provide flow to the San Joaquin River. The lower San Joaquin River is located within the DMC Unit beginning at the Mendota Pool. Mud and Salt Sloughs are tributaries to the San Joaquin River that receive drainage (including tile water and tailwater) from the northern districts, as well as other drainage from their watersheds.

Historical fishery resources within the project area were different from the fishery resources present today (Reclamation 1997a). Many native species have declined in abundance and distribution, and several introduced species have become well established. The major factors producing changes in aquatic habitat within the project area are habitat modification, species introduction, and over-fishing of fishery resources that originate in

the project area. These factors and anthropogenic activities within the project area have adversely affected the fisheries resources in the area.

The San Joaquin River in the vicinity of the DMC Unit is characterized as a warm-water, Deep-Bodied Fishes Zone composed of a variety of habitats, ranging from slow-moving backwaters with emergent vegetation to the shallow tule beds and deep pools of slow-moving water in the main river (Moyle 1976). The environment is dominated by a warm-water habitat, but also supports anadromous, cold-water chinook salmon. The natural habitat and water quality of the river and Mud and Salt Sloughs have been highly modified by the addition of canals, agricultural drainwater, and seasonal regulation of main stem river flows.

The fish community in the area is dominated by introduced species and reduced populations of the remaining native warm-water species. Historically, the upper reaches of the San Joaquin River and its tributaries have provided habitat for chinook salmon and steelhead trout. Spring-run chinook historically used the upper reaches of the San Joaquin River, but was extirpated when Friant Dam was completed in 1949. Spring-run chinook was probably eliminated by 1930 from the Stanislaus, Tuolumne, and Merced Rivers as a result of the construction of water storage facilities. Both fall-run chinook salmon and steelhead trout continue to use these tributaries; their returns have been low for a number of years. The Merced River Fish Hatchery, operated by CDFG, produces fall-run chinook salmon. This facility is the only salmon production facility located within the San Joaquin River basin.

Little information exists about fishery resources in water bodies located within the DMC Unit study area. The intermittent streams located within the study area are not known to support anadromous fish and are unlikely to support populations of resident fish because of their hydrologic conditions, which are often characterized by low flows, increased temperatures, and reduced water quality. The numerous water conveyance facilities and water supply and drainage canals could support warm-water fish, such as bass, crappie, sunfish, catfish, and shad.

Laboratory and field research has demonstrated that elevated waterborne and/or dietary concentrations of several trace elements in the San Joaquin Valley drainwaters are toxic to fish and wildlife. Selenium is the most toxic of these elements; other constituents include arsenic, boron, chromium, mercury, molybdenum, and salts (SJVDP 1990). Elevated selenium levels have been detected in a wide variety of fish in the San Luis Unit area, including chinook salmon and striped bass (Hamilton et al. 1986; Saiki and Palawski 1990). The bio-accumulative food chain threat of selenium contamination on fish and aquatic birds has also been well documented.

VEGETATION AND WILDLIFE

This section discusses land use and land cover types within the DMC Unit. The categories discussed below correspond to the land use and land cover types displayed on the figures in Section 3.1, Contractor Service Area Descriptions. It also includes a discussion of vegetation types, plants, and animals located in and adjacent to the DMC Unit project area. Lists of common and scientific names of plants and animals are provided in Appendix B.

Natural Communities

Wetlands

Available wetland habitats in the two-mile buffer area around the project area include both riparian corridors and the more classic wetland habitat with emergent vegetation associated with the San Joaquin River.

Palustrine Wetlands. Palustrine wetlands include any nontidal wetlands not classified as lacustrine, estuarine or riverine and have no deepwater habitat associations. In the San Joaquin Valley, this classification includes both permanent and seasonal fresh emergent wetlands.

Permanent Fresh Emergent Wetlands. In the San Joaquin Valley, the topography is generally level or gently rolling. Wetlands follow basin contours or occur in conjunction with riverine or lacustrine environments. Subtypes of permanent emergent wetlands are generally classified by species presence and/or their association with specific terrestrial habitats. Because emergent wetlands are typically inundated for most of the year, the roots of vegetation have evolved to thrive in an anaerobic environment. Characteristic floral species are erect, rooted hydrophytes dominated by perennial monocots such as the common tule, cattail, various sedges, and spike rushes. Permanent wetland habitat can occur on virtually any slope or exposure that provides a saturated depression.

Seasonal Fresh Emergent Wetlands. In the San Joaquin Valley, seasonal fresh emergent wetlands most often occurred in grassland and saltbush areas. A broad description of a seasonal wetland would include any area that ponds water during the wet season. Vegetation may vary from Italian rye grass in the driest areas to spike rush in the wettest. Cattail species are conspicuously absent from seasonal wetlands as they are indicative of permanent wetlands. These wetlands were historically composed of vast areas that, although inundated only periodically, provided crucial seasonal habitat for many wildlife species, most conspicuously for waterfowl and other migrants. They can occur as a subtype in almost any community.

Vernal Pools. Prior to the era of the plow in the Central Valley, two forms of vernal pool were historically widespread in the grassland and saltbush regions of the San Joaquin River basin. The “valley” pool was typically found in areas with saline or alkaline soils such as basins or low-lying plains. “Terrace” pools were common in the neutral or slightly acidic soils of the more upland grasslands of the California prairie.

Vernal pools are seasonal wetlands that form in shallow depressions underlain by a substrate near the surface that restricts the percolation of water. They are characterized by a barrier to overland flow that causes water to collect and pond. These depressions fill with rainwater and runoff from adjacent areas during the winter and may remain inundated until spring or early summer, sometimes filling and emptying during the wet season.

Vernal pools undergo four distinct annual phases: wetting, inundation, drying and drought. Each phase can be crucial to the life cycle of the species of plant and animal that have evolved in a given pool type. Although the vegetation composition of vernal pools varies with pool type, land use practices, annual rainfall and temperature variation, the vegetation in relatively undisturbed vernal pools is typically characterized by native annual species, many of which are endemic to vernal pools or vernal pool-swale systems and many of which are obligate symbiotes. Annual grasses are conspicuously absent as a descriptive species of vernal pools.

Riparian Habitat

The Central Valley’s riparian habitats are dominated by cottonwood and willow near watercourses. Sycamore, box elder, and valley oak dominate the less frequently flooded higher terraces. Floodplain habitats above the riparian zone typically do not support wetland vegetation, but are hydrologically connected to rivers and riparian forests by periodic flooding and can be considered with them as an ecological unit. Streams historically flooded during the winter rainy season sometimes dry up partially or completely during summer droughts.

Riparian vegetation occurs in valleys and bottomlands bordered by gently sloping alluvial fans and dissected terraces and coastal plains. Riparian vegetation generally consists of woodlands or forests of broad-leaved deciduous hardwood trees as the overstory, with a variety of shrubs and vines composing the midstory, and a few grass and forb species and vines composing the understory. The floodplains of riparian communities are usually well-developed. Fluvial processes such as flooding, with its resulting sediment deposition and bank erosion, create three characteristic riparian landforms: gravel point bars, low terraces, and high terraces. Each landform has a different hydrology because of its physical relationship to the aquifer and flooding.

Grassland/Herbaceous and Unknown Rangeland

Grasslands in the Central Valley were originally dominated by native perennial grasses such as needlegrass and alkali sacaton. Currently, grassland vegetation is characterized by a predominance of annual or perennial grasses in an area with few or no trees and shrubs. Annual grasses found in grassland vegetation include wild oats, soft chess, ripgut grass, medusa head, wild barley, red brome, and slender fescue. Perennial grasses found in grassland vegetation are purple needlegrass, Idaho fescue, and California oatgrass. Forbs commonly encountered in grassland vegetation include long-beaked filaree, redstem filaree, dove weed, clovers, Mariposa lilies, popcornflower, and California poppy. Vernal pools found in small depressions with an underlying impermeable layer are isolated wetlands within grassland vegetation.

Rangeland communities are composed of similar grasses, grass-like plants, forbs, or shrubs, which are grazed by livestock. Forbs commonly encountered in grassland vegetation include long-beaked filaree, redstem filaree, dove weed, clovers, Mariposa lily, popcornflower, and California poppy. Most of the grasslands in California are dominated by naturalized annual grasses with perennial grasses existing in relict prairie communities or on sites with soil or water conditions unfavorable for annual grasses, such as on serpentine. Grassland vegetation occurs from sea level to about 3,900 feet in elevation. Grassland communities as a whole have relatively high species diversity when compared to other California plant communities.

Grassland habitats are important foraging areas for black-shouldered kite, red-tailed hawk, Swainson's hawk, northern harrier, American kestrel, yellow-billed magpie, loggerhead shrike, savannah sparrow, American pipit, mourning dove, Brewer's blackbird, red-winged blackbird, and a variety of swallows. Birds such as killdeer, ring-necked pheasant, western kingbird, western meadowlark, and horned lark nest in grassland habitats. Grasslands also provide important foraging habitat for the coyote and badger because this habitat supports large populations of small prey species, such as the deer mouse, California vole, pocket gopher, and California ground squirrel. Common reptiles and amphibians of grassland habitats include western fence lizard, common kingsnake, western rattlesnake, gopher snake, common garter snake, western toad, and western spadefoot toad.

Agricultural Communities

Agricultural communities within the project area are very diversified, and almost half of the irrigated acreage in the San Joaquin region is planted with grains, hay, and pasture (Reclamation 1997a). Orchards are planted on about one-third of the irrigated acres, with cotton and row crops grown on most of the remaining lands.

Although natural communities provide the highest value for wildlife, many of these historic natural habitats have been largely replaced by agricultural habitats with varying degrees of benefits to wildlife. The intensive management of agricultural lands, including soil preparation activities, crop rotation, grazing, and the use of chemicals, effectively reduces the value of these habitats for wildlife. However, many wildlife species have adapted to some degree to particular crop types and now use them for foraging and nesting. Orchards, vineyards, and cotton fields generally provide relatively low-quality wildlife habitat because the frequent disturbance results in limited foraging opportunities and a general lack of cover. Pasture and row crops provide a moderate-quality habitat with some limited cover and foraging opportunities.

Cropland and Pasture. Pasture habitat can consist of both irrigated and unirrigated lands dominated by perennial grasses and various legumes. The composition and height of the vegetation, which varies with management practices, also affects the wildlife species composition and relative abundance. Irrigated pastures may offer some species habitats that are similar to those of both seasonal wetlands and unirrigated pastures. The frequent harvesting required, which reduces the overall habitat quality for ground-nesting wildlife, effectively reduces the value of the habitat. Irrigated pastures provide both foraging and roosting opportunities for many shorebirds and wading birds, including black-bellied plover, killdeer, long-billed curlew, and white-faced ibis. Unirrigated pastures, if lightly grazed, can provide forage for seed-eating birds and small mammals. Ground-nesting birds, such as ring-necked pheasant, waterfowl, and western meadowlark, can nest in pastures if adequate vegetation is present. Small mammals occupying pasture habitat include California voles, Botta's pocket gophers, and California ground squirrels. Raptors including red-tailed hawks, white-tailed kites, and prairie falcons prey upon the available rodents. In areas where alfalfa or wild oats have been recently harvested, the large rodent populations can provide high-quality foraging habitat for raptors.

The habitat value in cropland is essentially regulated by the crop production cycle. Most crops in California are annual species and are managed with a crop rotation system. During the year, several different crops may be produced on a given parcel of land. Many species of rodents and birds have adapted to croplands, which often requires that the species be controlled to prevent extensive crop losses. This may require intensive management and often the use of various pesticides. Rodent species that are known to forage in row crops include the California vole, deer mouse, and the California ground squirrel. These rodent populations are preyed upon by Swainson's hawks, red-tailed hawks, and black-shouldered kites.

Orchards and Vineyards. Orchard-vineyard habitat consists of cultivated fruit or nut-bearing trees or grapevines. Orchards are typically open, single-species, tree-dominated

habitats and are planted in a uniform pattern and intensively managed. Understory vegetation is usually sparse; however, in some areas, grasses or forbs are allowed to grow between vineyard and orchard rows to reduce erosion. In vineyards, the rows under the vines are often sprayed with herbicides to prevent the growth of herbaceous plants.

Wildlife species associated with vineyards include the deer mouse, California quail, opossum, raccoon, mourning dove, and black-tailed hare. Nut crops provide food for American crows, scrub jay, northern flicker, Lewis' woodpecker, and California ground squirrel. Fruit crops provide additional food supplies for yellow-billed magpies, American robin, northern mockingbird, black-headed grosbeak, California quail, gray squirrel, raccoon, and mule deer. Loss of fruit to grazers often results in species management programs designed to force these species away from the orchards.

Idle or Retired Farmland. Lands of this category are similar to abandoned farmlands in the ruderal or unknown rangeland category, but with less time out of agricultural production. Similarly, the habitat value of these lands may vary with land management practices.

AREAS NOT AFFECTED BY USE OF CVP WATER

Four natural areas in the vicinity of the project area that are managed as uplands do not receive water from the Delta-Mendota Canal (Wilbur 2000). These areas include the Little Panoche, Lower Cottonwood Creek, O'Neill Forebay, and Upper Cottonwood Creek Wildlife Management Areas. The Upper and Lower Cottonwood Creek Wildlife Management Areas are located adjacent to San Luis Reservoir. The O'Neill Forebay Wildlife Management Area is located adjacent to O'Neill Forebay. The Little Panoche Wildlife Management Area is located on Little Panoche Creek in the hills approximately 10 miles southwest of the Eagle Field Water District.

AREAS AFFECTED BY USE OF CVP WATER

Each of the DMC Unit contractors and several Significant Natural Areas in the area of the DMC Unit study area use CVP water. The individual contractors are described in Section 3.1. The following sections describes several of the larger Significant Natural Areas affected by CVP water.

Significant Natural Areas

The 77 Significant Natural Areas¹ in the San Joaquin Valley, while scattered throughout the region, are also concentrated in the grasslands of the San Joaquin Valley in freshwater marsh, valley sink scrub, and grassland vernal pool habitats. These areas are important to waterfowl and shorebirds that winter and nest in the San Joaquin Valley, as well as for several special-status species, including the giant garter snake, Swainson's hawk, tricolored blackbird, colusa grass, delta button celery, San Joaquin woollythreads, and soft birds-beak. Historically, the San Joaquin River basin was a large floodplain of the San Joaquin River that supported vast expanses of permanent and seasonal marshes, lakes, and riparian areas. Almost 70 percent of the basin has been converted to irrigated agriculture, with wetland acreage estimated to have been reduced to approximately 120,300 acres. In combination with the adjacent uplands, the wetland complex is referred to as "the Grasslands" and consists of approximately 160,000 acres of private and public lands. Approximately 53,300 acres of the Grasslands are permanently protected in state or federal wildlife refuges or in federal conservation easements.

Several Significant Natural Areas are present in the project area or are located nearby. Significant Natural Areas present in the project area include the Lower and Upper Cottonwood Creek Wildlife Management Areas, Mendota Wildlife Management Area, and O'Neill Forebay.² Significant Natural Areas present near the project area include Los Banos Wildlife Management Area, Little Panoche Wildlife Management Area, Merced National Wildlife Refuge, North Grasslands Wildlife Management Area, San Joaquin River National Wildlife Refuge, San Luis National Wildlife Refuge, and Volta Wildlife Management Area.

¹ The Significant Natural Areas Program is part of the CDFG's Wildlife and Habitat Data Analysis Branch. It was legislatively established in 1981 (Fish and Game Code Sections 1930–1933) and mandated to develop and maintain a data management system for natural resources; identify the most "significant natural areas" in California; ensure the recognition of these areas; seek the long-term perpetuation of these areas; and provide coordinating services for other public agencies and private organizations interested in protecting natural areas. The Significant Natural Areas Program analyzes data from the California Natural Diversity Database. The following biological criteria are used to identify Significant Natural Areas: areas supporting extremely rare species or natural communities and areas supporting associations or concentrations of rare species or communities. Significant Natural Area data have been used for bioregional conservation planning, environmental review, designation of special-status areas on public lands and land acquisition planning.

² All of the areas discussed, except Lower and Upper Cottonwood Creek Wildlife Management Areas and the San Joaquin River National Wildlife Refuge, receive CVP water supplies to meet Level 2 requirements, in accordance with the CVPIA.

Lower and Upper Cottonwood Creek Wildlife Management Areas

The Lower and Upper Cottonwood Creek Wildlife Management Areas are located in both Merced and Santa Clara Counties, approximately 36 miles east of the city of Gilroy. The Cottonwood Creek Wildlife Management Area consists of 6,315 acres of steep oak-grassland (upper unit) and steep hilly grassland (lower unit). The area is accessible only by foot. Wildlife in the area includes wild pigs, black-tailed deer, gray fox, and over 100 species of birds. Allowable recreational activities in the Cottonwood Creek Wildlife Management Areas include wildlife viewing, boat access (hand-carried only), fishing, hiking, and camping.

Mendota Wildlife Management Area

The 12,425-acre Mendota Wildlife Management Area is the largest publicly owned and managed wetland in the San Joaquin Valley (Reclamation 1997a). Established between 1954 and 1966, the refuge is located on a part of the Coelho Family Trust and is adjacent to the Fresno Slough Water District, the Tranquillity Public Utilities District, Reclamation District #1606, Tranquillity Irrigation District, and the 900-acre Alkali Sink Ecological Reserve. Approximately 8,300 acres of wetlands are maintained on the refuge, including almost 6,800 acres of seasonal wetlands, which are used by migratory ducks and shorebirds. To feed these animals, several crops, including corn, barley, milo, and safflower, are raised. Giant garter snakes have also been observed on the refuge. The water used to maintain these seasonal wetlands is purchased directly from the CVP (Huddleson 2000).

Los Banos Wildlife Management Area

Purchased in 1929, the Los Banos Wildlife Management Area was the first of a series of waterfowl refuges established in California to manage habitat for wintering waterfowl. Expanded from its original 3,000 acres, there are now 6,217 acres of wetland habitat, which includes lakes, sloughs, and managed marshes. The refuge provides habitat for western pond turtles, raccoons, striped skunks, beaver, muskrat, and over 200 varieties of bird species, including ducks, geese, shorebirds, coots, wading birds, and cranes. Pintail ducks and lesser snow geese are the most common waterfowl on the refuge. Swainson's hawks are known to nest near the refuge and to use the refuge for foraging. Other special-status species known to occur on the refuge include the giant garter snake and delta button celery (Reclamation 1997b).

Merced National Wildlife Refuge

The Merced National Wildlife Refuge was established in 1951 to alleviate crop depredation and provide waterfowl habitat (Reclamation 1997a). Originally a farm, the

original 2,562-acre refuge has expanded over the years. The refuge now totals 8,234 acres, including the 2,464 Arena Plains Unit. This refuge is one of the most important wintering areas in California, supporting snow and Ross' geese, sandhill cranes, and variety of shorebirds. Public use facilities at the refuge include observation platforms, interpretive panels, and a public hunting area, which is open during the hunting season. The Merced National Wildlife Refuge is located approximately 13 miles east of the Del Puerto Water District.

North Grasslands Wildlife Management Area

The North Grasslands Wildlife Management Area was purchased by the State of California in April 1990 and is managed by the CDFG (Reclamation 1997a). It is located within five miles of the Del Puerto Water District and includes three separate units. The China Island and Salt Slough units contain 5,556 acres of primarily agricultural land and pasture, but also have extensive river and slough channels with riparian edges. These two units receive water directly from the CVP (Wilbur 2000); however, the Salt Slough unit does not have a firm historical water supply. North Grasslands Wildlife Management Area provides habitat for a variety of wildlife species. Ducks are the most common waterbirds using the refuge, but sandhill cranes, shorebirds, and geese, including the Aleutian Canada goose, are also common. Agricultural crops irrigated with water from the Delta-Mendota Canal feed wintering migratory birds.

San Luis National Wildlife Refuge Complex

The 26,609-acre San Luis National Wildlife Refuge Complex is located approximately six miles east of the Del Puerto Water District. The refuge is a mixture of managed seasonal and permanent wetlands, riparian habitat associated with three watercourses and native grasslands, alkali sinks and vernal pools. The San Luis National Wildlife Refuge buys water from the CVP to irrigate seasonal wetlands and cereal crops (Chouinard 2000). The refuge provides habitat for waterfowl, including ducks, geese, and shorebirds, as well as tule elk and other endangered species. The largest concentration of mallard-pintails and green-winged teal in the San Joaquin Valley is also found here. Major public use occurs in the refuge complex, including interpretive wildlife observation programs, hiking, fishing, waterfowl and pheasant hunting.

San Joaquin National Wildlife Refuge

The San Joaquin National Wildlife Refuge is located approximately 10 miles west of Modesto on Highway 132 and within the floodplain of the confluence of the San Joaquin, Stanislaus, and Tuolumne Rivers. Refuge lands consist of oak-cottonwood-willow riparian forest, pastures, agricultural fields, and wetlands. This refuge was established in 1987 with an original land base of 1,638 acres. Through recent land acquisitions, the refuge has

increased to 6,642 acres with an approved refuge boundary of 12,877 acres. The San Joaquin River National Wildlife Refuge played a key role in the recovery and March 2001 delisting of the Aleutian Canada goose by providing critical habitat for the species. The lands in the refuge form a mosaic of riparian habitat, wetlands, and agricultural fields. It is the primary wintering site of 98 percent of the Aleutian Canada geese that winter in the valley, plus it is a major wintering and migration area for lesser and greater sandhill cranes, cackling Canada geese, and white-fronted geese. Because the refuge is near large population centers, opportunities exist for future public use, including wildlife observation and nature interpretation and education.

Volta Wildlife Management Area

The 3,000-acre Volta Wildlife Management Area is located approximately five miles east of the Centinella Water District. The refuge maintains more than 1,800 acres of wetlands, including 1,400 acres of moist soil plants; 720 acres of alkali sink habitat are preserved on the refuge as a rare ecological community (Reclamation 1997a). The Volta Wildlife Management Area provides habitat for a variety of bird species, including ducks, geese, shorebirds, coots, and wading birds. Black-necked stilts, sandpipers, dunlins, and dowitchers dominate shorebird species.

CURRENT GENERAL PLAN PROTECTIVE AND MANAGEMENT MEASURES

Measures to mitigate or offset impacts to sensitive species and communities have been developed and implemented by the cities and counties in the project area as part of their general plans. Some of these goals and policies are currently being reviewed and modified by city and county agencies as part of the general plan environmental impact report process. The most current measures for the affected cities and counties in the project area are described below.

Stanislaus County

Documentation supporting the Conservation/Open Space Element of the Stanislaus County General Plan emphasizes the conservation and management of economically productive natural resources and conservation of open space lands (any parcel or area of land or water that is essentially unimproved). The element (1) promotes the protection, maintenance, and use of the county's natural resources, with special emphasis on scarce resources and those that require special control and management; (2) prevents wasteful exploitation, destruction, and neglect of natural resources; (3) recognizes the need for natural resources to be maintained for their ecological values as well as for their direct benefit to people; (4) preserves open space lands for outdoor recreation including scenic, historic, and cultural areas; and (5) preserves open space for public health and safety, including areas

subject to landslides, flooding, and high fire risk, and areas required for the protection of water and air quality.

Goal One encourages the protection and preservation of natural and scenic areas throughout the county by:

- Maintaining the natural environment in areas dedicated as parks and open space.
- Ensuring compatibility between natural areas and development.
- Protecting from development areas of sensitive wildlife habitat and plant life (e.g., vernal pools, riparian habitats, flyways, and other waterfowl habitats) including those habitats and plant species listed in the General Plan Support Documentation or by state or federal agencies.
- Protecting and enhancing oak woodlands and other native hardwood habitat.

San Joaquin County

Implementing the Natural Resources Regulations as identified in the Draft General Plan 2010 would protect important biotic resources within San Joaquin County. The county's policies and implementation measures related to the protection and management of biological resources include special-status species, sensitive natural communities, and fisheries.

The final environmental impact report on the San Joaquin County Comprehensive Planning Program (Baseline Environmental Consulting 1992) recommends that the county (1) develop an integrated vegetation management program for properties owned and maintained by the county and (2) protect habitat areas large enough to be minimally affected by urban development including maintaining connection of habitat and restoring and enhancing degraded ecosystems such as historic salmon runs on the Mokelumne and Calaveras Rivers.

City of Tracy

The City of Tracy plans to conserve natural resources through the protection and enhancement of permanently preserved open space. For actions associated with the policies listed below, refer to *City of Tracy General Plan: An Urban Management Plan* (City of Tracy and the Planning Center 1993).

The City of Tracy will minimize impacts of development on waterways, riparian corridors, and adjacent buffer areas and will seek opportunities to preserve or establish wildlife

habitat, in conjunction with other uses and developments within the Tracy Urban Management Plan Area.

Fresno County

Policies in the Fresno County General Plan seek to protect riparian and wetland habitats while allowing compatible uses where appropriate. Related policies are included in Section LU-C, River Influence Areas; Section OS-A, Water Resources; Section OS-E, Fish and Wildlife Habitat; and Section OS-F, Vegetation.

- To conserve the function and values of wetland communities and related riparian areas throughout Fresno County while allowing compatible uses where appropriate. Protection of these resource functions positively affects aesthetics, water quality, floodplain management, ecological function, and recreation/tourism. Policies in this section seek to protect natural areas and to preserve the diversity of habitat in the county. Related policies are included in Water Resources, Forest Resources, Wetland and Riparian Areas, Vegetation, and River Influence Areas elements.
- To help protect, restore, and enhance habitats in Fresno County that support fish and wildlife species so that populations are maintained at viable levels. Policies in this section seek to protect native vegetation resources primarily on private land within the county.
- To preserve and protect the valuable vegetation resources of Fresno County.

For more detailed information on the direction of the goals listed below, refer to the Fresno County General Plan Background Report (County of Fresno 2000a).

Merced County

Merced County has the following goals and objectives regarding conservation of natural resources.

- Habitats that support rare, endangered, or threatened species are not substantially degraded. Rare and endangered species are protected from urban development and are recognized in rural areas.
- Local, state, and federal managed lands are recognized.

For more information on the policies developed for these goals and objectives, refer to the Merced County Year 2000 General Plan (Merced County 1990).

ENVIRONMENTAL CONSEQUENCES

Impacts to biological resources would be considered adverse if special-status species or their habitats, as designated by federal, state, or local agencies, were affected directly or indirectly by project-related activities. These potential impacts are evaluated in other documents, as previously described. In addition, impacts to biological resources would be considered significant if substantial loss, reduction, degradation, disturbance, or fragmentation occurred in native species habitats or in their populations. These impacts could be short- or long-term impacts. For example, short-term or temporary impacts may occur during project implementation, and long-term impacts may result from the loss or change of vegetation and thereby loss of the capacity of habitats to support wildlife populations.

NO-ACTION ALTERNATIVE

Requirements of the CVPIA biological opinion (Reclamation and Service 2000) would be met under the No-Action Alternative, including continuation of ongoing species conservation programs. The renewal of long-term contracts would not involve construction of new facilities or installation of structures that would alter current land uses. The renewal of CVP contracts for the project area would only continue water deliveries that accommodate current land uses. Implementation of the No-Action Alternative would not impact the production of agricultural crops or current land uses that support habitat. No habitat that supports species would be converted to agricultural or M&I use as a direct result of the renewal of long-term water service contracts. As a result, renewal of the water service contracts under the No-Action Alternative would not result in adverse effects on fish, vegetation, or wildlife resources located in the DMC Unit.

ALTERNATIVE 1

Similar to the discussion above for the No-Action Alternative, Alternative 1 would not result in adverse impacts on biological resources, including fish, vegetation, and wildlife, in the DMC Unit study area. The renewal of CVP contracts for the study area would only continue water deliveries that accommodate current land uses. Implementation of Alternative 1 would not substantially impact the production of agricultural crops or current land uses that support habitat. No habitat that supports species would be converted to agricultural or M&I use as a direct result of the renewal of long-term water service contracts. As a result, renewal of the water service contracts under Alternative 1 would not result in adverse effects on fish, vegetation, or wildlife resources located in the DMC Unit.

ALTERNATIVE 2

Similar to the discussion above for the No-Action Alternative, Alternative 2 would not result in adverse impacts on biological resources, including fish, vegetation, and wildlife, in the DMC Unit study area. The renewal of CVP contracts for the study area would only continue water deliveries that accommodate current land uses. Implementation of Alternative 2 would not substantially impact the production of agricultural crops or current land uses that support habitat. No habitat that supports species would be converted to agricultural or M&I use as a direct result of the renewal of long-term water service contracts. As a result, renewal of the water service contracts under Alternative 2 would not result in adverse effects on fish, vegetation, or wildlife resources located in the DMC Unit.

CUMULATIVE IMPACTS

Long-term contract renewals, when added to other past, present, and reasonably foreseeable future actions, would not cause a cumulative impact on the biological resources of the DMC Unit. Long-term contracts provide for the delivery of water for refuge habitat and will continue to be used in conjunction with and to the benefit of ongoing wetland and riparian habitat conservation programs, including the Central Valley Habitat Joint Venture and the San Joaquin River Riparian Habitat Restoration Program. The renewal of long-term contracts in the DMC Unit obligate the delivery of the same contractual amount of water to the same lands without the need for additional facility modifications or construction and will not incrementally contribute to any physical impacts to study area biological resources.