# Operations Criteria and Plan
# Biological Assessment
# Technical Appendix G

# Long-term Central Valley Project and State Water Project Operations Criteria and Plan Biological Assessment for Terrestrial Species

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Prepared for

**Bureau of Reclamation**

February 2004

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# Introduction

The Bureau of Reclamation (Reclamation) and the California Department of Water Resources (DWR) propose to operate the Central Valley Project (CVP) and State Water Project (SWP) to divert, store, and convey CVP and SWP water consistent with applicable law. The CVP and the SWP are two major inter-basin water storage and delivery systems that divert water from the southern portion of the Sacramento-San Joaquin Delta (Delta). Both projects include major reservoirs north of the Delta and transport water via natural watercourses and canal systems to areas south and west of the Delta. The CVP also includes facilities and operations on the Stanislaus and San Joaquin Rivers.

Reclamation has prepared a Biological Assessment (Long-term Central Valley Project Operations Criteria and Plan [CVP-OCAP] Biological Assessment) addressing the effects of operating the CVP and SWP on listed fish species (Winter-run chinook salmon, Spring-run chinook salmon, Central Valley steelhead, delta smelt, and coho salmon). This component of the Biological Assessment (BA) evaluates the potential effects of continued operations of the CVP and SWP on plant and wildlife species that are listed or proposed for listing under the federal Endangered Species Act (ESA).

## Description of the Action Considered

Reclamation's proposed action is to continue to operate the CVP and SWP in the future as described in the CVP-OCAP. The CVP-OCAP provides a comprehensive description of the proposed action. A summary of the proposed action is provided in Chapter 1 of the Long-term CVP-OCAP Biological Assessment that addresses effects to listed fish species.

## Other Actions Not Included in the Proposed Action

The proposed action is limited to Reclamation's and DWR's operation of CVP and SWP facilities for the purpose of diverting, storing, and conveying project water. The proposed action does not include diversion of water through non-CVP or non-SWP facilities nor use of diverted water. Further, the proposed action does not include maintenance activities associated with CVP and SWP facilities. Reclamation has an operations and maintenance manual for its facilities that meets the requirements of the ESA.

## Action Area

The action area consists of CVP/SWP waterways and adjacent habitats that are dependent on or influenced by the hydrologic or water quality conditions of the CVP/SWP waterways. Figure 1-1 of the Long-term Central Valley Project OCAP Biological Assessment shows the CVP and SWP facilities.

## Threatened and Endangered Species Considered

On June 13, 2003, the United States Fish and Wildlife Service (Service) provided Reclamation with a list of special-status species that may occur in the area affected by implementation of the CVP-OCAP. This list was reviewed to identify species that would not be affected by implementation of CVP-OCAP and those that could be affected. Species identified as potentially affected by implementation of CVP-OCAP were retained for evaluation in this BA.

Reclamation's and DWR's action is to implement CVP-OCAP which consists of operating CVP and SWP facilities primarily to:

- Deliver water to diversion points
- Provide flood control
- Release water to meet instream flow and water quality requirements.

The proposed action does not include the actual diversion of water (i.e., direct effects of diversion) or use of diverted water. Potential effects of the proposed action, therefore, consist of

- Changes in flows in streams downstream of CVP and SWP facilities
- Changes in water surface elevations in CVP and SWP reservoirs
- Changes in water quality of CVP and SWP waterways.

Because the potential effects of the proposed action are limited to hydrologic and water quality changes, species potentially affected by the action are limited to species that are aquatic or require the resources of supported by CVP/SWP waterways. The list of species provided by the Service was reviewed to identify species potentially affected by hydrologic or water quality conditions in CVP/SWP waterways. Species for which the proposed action was determined to have no effect are listed in Table 1 along with a brief indication of why the species was considered not to be affected. Species identified as potentially affected by implementation of CVP-OCAP are listed in Table 2. These species are further addressed in this BA.

TABLE 1
Species determined not to be affected by implementation of long-term CVP-OCAP

| Common Name | Scientific Name | Reason for No Effect |
|---|---|---|
| **MAMMALS** | | |
| Buena Vista Lake shrew | *Sorex ornatus relictus* | Does not inhabit action area |
| Fresno kangaroo rat | *Dipodomys nitratoides exilis* | Associated with grassland and scrub habitat |
| San Joaquin kit fox | *Vulpes macrotis mutica* | Associated with grassland and scrub habitat |
| Sierra Nevada bighorn sheep | *Orvis canadensis californiana* | Associated with scrub habitat |
| Tipton kangaroo rat | *Dipodomys mitratoides nitratoides* | Associated with grassland and scrub habitat |

TABLE 1
Species determined not to be affected by implementation of long-term CVP-OCAP

| Common Name | Scientific Name | Reason for No Effect |
|---|---|---|
| Giant kangaroo rat | *Dipodomys ingens* | Associated with grassland and scrub habitat |
| **BIRDS** | | |
| California brown pelican | *Pelecanus occidentails californicus* | Does not inhabit action area; associated coastal areas |
| California condor | *Gymnogyps californianus* | Does not inhabit action area; associated with upland |
| California least tern | *Sterna antillarum browni* | Does not inhabit action area; associated with coastal areas |
| Least Bell's vireo | *Vireo bellii pusillus* | Does inhabit action area |
| Marbled murrelet | *Brachyramphus marmoratus* | Associated with conifer forest habitat and marine habitat |
| Mountain plover | *Charadius montanus* | Associated with upland habitat |
| Northern spotted owl | *Strix occidentalis caurina* | Associated with conifer forest habitat |
| Southwestern willow flycatcher | *Empidonx traillii extimus* | Does not inhabit action area |
| Western snowy plover | *Charadrius alexandrinus nivosus* | Does not inhabit action area; associated with coastal areas |
| **REPTILES** | | |
| Alameda whipsnake | *Masticophis lateralis euryxanthus* | Associated with chaparral and scrub habitats |
| San Francisco garter snake | *Thamnophis sirtalis tetrataenia* | Does not occur in association with CVP/SWP waterways |
| Blunt-nosed leopard lizard | *Gambelia sila* | Associated with desert habitat |
| Desert tortoise | *Gopherus agassizii* | Associated with desert habitat |
| **AMPHIBIANS** | | |
| California tiger salamander | *Ambystoma californiense* | Associated with vernal pools and surrounding upland habitat |
| **INVERTEBRATES** | | |
| Conservancy fairy shrimp | *Branchinecta conservatio* | Associated with vernal pools |
| Kern primrose sphinx moth | *Euproserpinus euterpe* | Does not occur in action area; associated with upland plant species |
| Lange's metalmark butterfly | *Apodemia mormo langei* | Associated with dunes |
| Shasta crayfish | *Pacifastacus fortis* | Occurs in waterways upstream of CVP/SWP facilities |

TABLE 1
Species determined not to be affected by implementation of long-term CVP-OCAP

| Common Name | Scientific Name | Reason for No Effect |
|---|---|---|
| Bay checkerspot butterfly | *Euphydryas editha bayensis* | Associated with grassland habitat |
| Callippe silverspot butterfly | *Speyeria callippe callippe* | Associated with grassland habitat |
| Delta green ground beetle | *Elaphrus viridis* | Associated with grassland-playa habitat |
| Longhorn fairy shrimp | *Branchinecta longiantenna* | Associated with vernal pools |
| Vernal pool fairy shrimp | *Branchinecta lynchi* | Associated with vernal pools |
| Vernal pool tadpole shrimp | *Lepidurus packardi* | Associated with vernal pools |
| **PLANTS** | | |
| Antioch Dunes evening-primrose | *Oenothera deltoides ssp. howellii* | Associated with dunes |
| Bakersfield cactus | *Opuntia treleasei* | Associated with scrub habitat |
| Butte County meadowfoam | *Limnanthese floccosa ssp. californica* | Associated with vernal pools and ephemeral streams |
| California jewelflower | *Caulanthus californicus* | Associated with scrub habitats |
| California sea blite | *Suaeda californica* | Does not occur in action area |
| Colusa grass | *Neostapfia colusana* | Associated with vernal pools |
| Contra Costa goldfields | *Lasthenia conjugens* | Associated with vernal pools |
| Contra Costa wallflower | *Erysimum capitatum ssp. angustatum* | Associated with dunes |
| Coyote ceanothus | *Ceanothus ferrisae* | Associated with chapparal habitat |
| Greene’s tuctoria | *Tuctoria greenei* | Associated with vernal pools |
| Hairy Orcutt grass | *Orcuttia piliosa* | Associated with vernal pools |
| Hatweg’s golden sunburst | *Pseudobahia bahiifolia* | Associated with grassland and oak woodland habitat |
| Hoover’s eriastrum | *Eriastrum hooveri* | Associated with upland habitat |
| Hoover’s spurge | *Chamaesyce hooveri* | Associated with vernal pools |
| Keck’s checker-mallow | *Sidalcea keckii* | Associated with grassland habitat |
| Kern mallow | *Eremalche kernensis* | Associated with saltbush scrub habitat |
| Large-flowered fiddleneck | *Amsinckia grandiflora* | Associated with upland areas |
| Layne’s butterweed | *Senecio layneae* | Associated with gabbro and serpentine soils |
| Mariposa pussy-paws | *Calyptridium pulchellum* | Associated with grassland and woodland habitats |
| McDonald’s rock-cress | *Arabis macdonaldiana* | Associated with upland habitat |

TABLE 1
Species determined not to be affected by implementation of long-term CVP-OCAP

| Common Name | Scientific Name | Reason for No Effect |
|---|---|---|
| Metcalf Canyon jewelflower | *Streptanthus albidus ssp. albidus* | Associated with upland habitat |
| Pallid manzanita | *Arctostaphylos pallida* | Associated with chapparal habitat |
| Palmate-bracted bird's-beak | *Cordylanthus palmatus* | Associated with seasonally inundated alkali sink habitats but in action area only found in managed wetlands not dependent on river hydrology |
| Presidio clarkia | *Clarkia franciscana* | Associated with grassland habitat |
| Robust spineflower | *Chorizanthe robusta var. sobusta* | Associated with upland habitat |
| Sacramento orcutt grass | *Orcuttia viscida* | Associated with vernal pools |
| San Benito evening-primrose | *Camissonia benitensis* | Associated with serpentine terraces; does not occur in action area |
| San Joaquin Valley Orcutt grass | *Orcuttia inaequalis* | Associated with vernal pools |
| San Joaquin adobe sunburst | *Pseudobahia peirsonii* | Associated with upland habitat |
| San Joaquin woolly-threads | *Monolopia congdonii* | Associated with grassland and scrub habitats |
| Santa Clara Valley dudleya | *Dudleya setchellii* | Associated with upland habitat |
| Santa Cruz tarplant | *Holocarpha macradenia* | Associated with grassland habitat |
| Showy Indian clover | *Trifolium amoenum* | Associated with grassland habitat |
| Slender Orcutt grass | *Orcuttia tenuis* | Associated with vernal pools |
| Solano grass | *Tuctoria mucronata* | Associated with vernal pools |
| Springville clarkia | *Clarkia springvillensis* | Associated with oak woodland habitat |
| Succulent owl's-clover | *Castilleja campestris ssp. succulenta* | Associated with vernal pools |
| Tiburon paintbrush | *Castilleja ssp. neglecta* | Associated with upland habitat |

TABLE 2
Listed species potentially affected by implementation of CVP-OCAP

| Common Name | Scientific Name | Status | Critical Habitat |
|---|---|---|---|
| **MAMMALS** | | | |
| Riparian brush rabbit | *Sylvilagus bachmani riparius* | E | No |
| Riparian woodrat | *Neotoma fuscipes riparia* | E | No |
| Salt marsh harvest mouse | *Reithrodontomys raviventris* | E | No |
| **BIRDS** | | | |
| Bald eagle | *Haliaeetus leucocephalus* | T | No |
| California clapper rail | *Rallus longirostris obsoletus* | E | No |
| **REPTILES** | | | |
| Giant garter snake | *Thamnophis gigas* | T | No |
| **AMPHIBIANS** | | | |
| California red-legged frog | *Rana aurora draytonii* | T | No |
| **INVERTEBRATES** | | | |
| Valley elderberry longhorn beetle | *Desmocercus californicus dimporphus* | T | Yes |
| **PLANTS** | | | |
| Soft bird's beak | *Cordylanthus mollis ssp. mollis* | E | No |
| Suisun thistle | *Cirsium hydrophilum var. hydrophilum* | E | No |

# Study Period

This BA evaluates the future effects of continued operation of the CVP and SWP in accordance with CVP-OCAP. The study period encompasses the current (circa 2001) level of development through a projected future level of development expected in approximately 2020.

# Consultations to Date

Reclamation consulted with the Service on the effects of implementing the long-term operations criteria and plan for the CVP and SWP on listed species in 1993 (Service 1993). The resulting Biological Opinion (Service 1993), concluded that implementation of CVP-OCAP would not jeopardize the continued existence of the bald eagle, salt marsh harvest mouse or California clapper rail. No critical habitat had been designated for these species at the time of the consultation and therefore the proposed action was not found to have an adverse effect on critical habitat.

# Species Accounts

The following describes the life history and habitat requirements of the species evaluated in this BA. These species accounts were largely derived from species accounts prepared by the Service or California Department of Fish and Game (CDFG) and available at http://sacramento.fws.gov, http://ventura.fws.gov, http://arnica.csustan.edu/esrpp/eslist.htm and http://www.dfg.ca.gov/hcpb/species/t_e_spp/tespp.shtml.

## Bald Eagle

Bald eagles occur as year-round and winter residents in California. They are almost always associated with large waterbodies. In California, nesting territories usually are found in mixed conifer and ponderosa pine forests and are always associated with a lake, river, or other large body of water. Nests are typically a platform structure constructed in dominant or co-dominant trees within 1 mile of water with unobstructed views of the water body. Snags and dead-topped trees provide perch and roost sites for the nesting birds. Individuals usually nest in the same territories each year and often reuse the same nest. Breeding occurs from January through July, with peak activity from March to June. Bald eagles are monogamous, and both the male and female tend the nests. A clutch size of two eggs is typical.

Bald eagles winter along rivers, lakes, or reservoirs with abundant prey and adjacent snags or mature trees for perch sites. Mature trees or snags with an open branching structure that are isolated from human disturbance are used for roosting during winter. Bald eagles often roost communally during the winter. The most important component of bald eagle wintering habitat is an adequate food source. Bald eagles predominantly forage on fish but also will prey on waterfowl.

Hundreds of migratory bald eagles from nesting areas in northwestern states and provinces spend the winter in California, arriving during fall and early winter. These wintering birds may remain until February or March, or even into April. In late winter, some adult bald eagles in California have already started nesting, while other eagles have not yet returned to their more nesting territories north or northeast. Some of the adults that winter here have been tracked to their nesting territories in north-central Canada 2,000 miles away.

## California Clapper Rail

The California clapper rail is a year-round resident, that is endemic to tidally influenced salt and brackish marshes in California. Areas used by California clapper rails are dominated by pickleweed (*Salicornia virginica*), cordgrass (*Spartina foliosa*) and salt grass in the lower tidal zone and taller pickleweed, gum plant (*Grindelia cuneifolia*), and wrack (the area where debris is deposited) in the upper tidal zone. They also can occupy habitats with other vegetative components, including bulrush (*Scirpus americanus* and *S. maritimus*), cattails (*Typha spp*.), and Baltic rush (*Juncus balticus*). Shrubby areas adjacent to or within the marsh may be important for predator avoidance during high tides. Nesting also occurs in this habitat.

Clapper rails are most active in early morning and late evening, when they forage in marsh vegetation in and along creeks and mudflat edges. They are highly opportunistic feeders; principal prey includes eating crabs, mussels, spiders, clams, snails, aquatic insects, isopods, pickleweed and Pacific cordgrass vegetation, seeds, and small fish. They often roost at high tide during the day.

The breeding season begins by February. Nesting starts in mid-March and extends into August. The end of the breeding season is typically defined as the end of August, which corresponds with the time when eggs laid during re-nesting attempts have hatched and young are mobile. Clutch sizes range from 5 to 14 eggs. Both parents share in incubation and rearing. Nests are placed to avoid flooding by tides, yet in dense enough cover to be hidden from predators, generally on raised ground near tidal sloughs in low marsh habitats. The young are semiprecocial, incapable of moving from the nest for at least 1 hour after hatching and are brooded by the adults for several days. The young follow the adults during foraging and are able to forage independently on small prey soon after hatching.

## Salt Marsh Harvest Mouse

The salt marsh harvest mouse is endemic to the salt and brackish marshes of the San Francisco Bay area and adjacent tidally influenced areas. Salt marsh harvest mice are critically dependent on dense cover and their preferred habitat is pickleweed. However, harvest mice can use a broader source of food and cover, including salt grass (*Distichlis spicata*) and other vegetation typically found in the salt and brackish marshes of the region. Harvest mice are seldom found in cordgrass or alkali bulrush. In marshes with an upper zone of peripheral halophytes (salt-tolerant plants), mice use this vegetation to escape the higher tides, and may even spend a considerable portion of their lives there. Mice also move into the adjoining grasslands during the highest winter tides. During the spring and summer months, some individuals will move from pickleweed marsh to bordering grasslands.

Breeding occurs from March through November. The salt marsh harvest mouse does little nest building, and nest structures are generally composed of a loose arrangement of grass. One or two litters may be produced annually with three to four young per litter.

## Riparian Brush Rabbit

The riparian brush rabbit is a small cottontail that is secretive by nature. Riparian brush rabbits prefer dense, brushy areas of valley riparian forests, marked by extensive thickets of wild rose (*Rosa* spp.), blackberries (*Rubus* spp.), and willows (*Salix* spp.). For the most part, riparian brush rabbits remain hidden under protective shrub cover. They seldom venture more than a few feet from cover. A typical response to danger is to retreat back into cover rather than to be pursued in open areas.

Riparian brush rabbits feed at the edges of shrub cover rather than in large openings. Their diet consists of herbaceous vegetation, such as grasses, sedges, clover, forbs, and buds, bark, and leaves of woody plants. They consume herbaceous plants found along trails, fire breaks, or at the edge of brushy areas, and they eat the leaves, bark, and buds of many types of woody shrubs and vines within and at the edges of thickets.

The approximate breeding season of riparian brush rabbits occurs from January to May. Although males are capable of breeding all year long, females are only receptive during this period. In favorable years, females may produce 3 or 4 litters. The young are born in a shallow burrow or cavity lined with grasses and fur and covered by a plug of dried vegetation. Although these rabbits have a high reproductive rate five out of six rabbits typically do not survive to the next breeding season.

## Riparian Woodrat

Riparian woodrats are most numerous where shrub cover is dense and least abundant in open areas. In riparian areas, highest densities of woodrats and their houses are often encountered in willow thickets with an oak overstory. They are common where there are deciduous valley oaks, but few live oaks. Mostly active at night, the woodrat's diet is diverse and principally herbivorous, with leaves, fruits, terminal shoots of twigs, flowers, nuts, and fungi. They are most numerous where shrub cover is dense and least abundant in open areas.

Woodrats are well known for their large terrestrial stick houses some of which can last for 20 or more years after being abandoned. At Caswell Memorial State Park, riparian woodrats make houses of sticks and other litter. Houses typically are placed on the ground against or straddling a log or exposed roots of a standing tree and are often located in dense brush. Nests also are placed in the crotches and cavities of trees and in hollow logs. Sometimes arboreal nests are constructed but this behavior seems to be more common in habitat with evergreen trees such as live oak. With their general dependence on terrestrial stick houses, riparian woodrats can be vulnerable to flooding.

Woodrats live in loosely-cooperative societies and have a matrilineal (mother-offspring associations; through the maternal line) social structure. Unlike males, adjacent females are usually closely related and, unlike females, males disperse away from their birth den and are highly territorial and aggressive, especially during the breeding season. Consequently, populations are typically female-biased and, because of pronounced polygyny (mating pattern in which a male mates with more than one female in a single breeding season), the effective population size (i.e., successful breeders) is generally much smaller than the actual population size. This breeding system in combination with the small size of the only known extant population suggests that the riparian woodrat could be at an increased risk of extinction because of inbreeding depression.

## California Red-legged Frog

The California red-legged frog is the largest native frog in the western United States. It is endemic to California and Baja California, Mexico. This species use a variety of habitat aquatic, riparian, and upland habitats including ephemeral ponds, intermittent streams, seasonal wetlands, springs, seeps, permanent ponds, perennial creeks, man-made aquatic features, marshes, dune ponds, lagoons, riparian corridors, blackberry thickets, annual grasslands, and oak savannas. The common factor in all habitats used by red-legged frogs is an association with a permanent water source.

Breeding sites have been documented in a wide variety of aquatic habitats. Larvae, juveniles and adults have been observed inhabiting streams, creeks, ponds, marshes, sag ponds, deep pools and backwaters within streams and creeks, dune ponds, lagoons, estuaries, and artificial impoundments such as stock ponds. Breeding has been documented in these habitat types irrespective of vegetative cover. Frogs often breed in artificial ponds with little or no emergent vegetation. The importance of riparian vegetation for this species is not well understood. It is thought that the riparian plant community may provide good foraging habitat and may facilitate dispersal in addition to providing pools and backwater aquatic areas for breeding.

Red-legged frogs disperse upstream and downstream of their breeding habitat to forage and seek shelter. Sheltering habitat for red-legged frogs potentially includes all aquatic, riparian, and upland areas within the range of the species and any landscape features that provide cover, such as existing animal burrows, boulders or rocks, organic debris such as downed trees and logs, and industrial debris. Agricultural features such as drains, watering troughs, spring boxes, abandoned sheds, or hay ricks may also be used.

California red-legged frogs breed from November through March with earlier breeding records occurring in southern localities. Individuals occurring in coastal drainages are active year-round, whereas those found in interior sites are normally less active during the cold season. Females attach egg masses to emergent vegetation such as tule stalks, grasses, or willow roots just below the water surface. Larvae hatch 6 to 14 days following fertilization and spend most of their time concealed in submergent vegetation or detritus. Most larvae metamorphose into juvenile frogs 4 to 7 months after hatching, generally between July and September.

The diet of California red-legged frogs is highly variable. Larvae probably eat algae. Invertebrates are the most common food items of adult frogs. Vertebrates, such as Pacific tree frogs (*Hyla regilla*) and California mice (*Peromyscus californicus*), are frequently eaten by larger frogs. Feeding activity likely occurs along the shoreline and on the surface of the water.

## Giant Garter Snake

The giant garter snake is one of the largest garter snakes of the genus *Thamnophis*, with a total length up to 4.5 feet or greater. This highly aquatic snake is endemic to the freshwater emergent wetlands of the Central Valley. The larger rivers of Central Valley probably provided suitable habitat for giant garter snakes at one time. However, with the removal of oxbows and backwater areas as a result of channelization for flood control, the larger rivers no longer support suitable habitat for giant garter snakes.

The giant garter snake occurs in a combination of permanent and seasonal freshwater habitats and conducts most of its activities within the immediate vicinity of water. The habitat components most important to giant garter snake survival are: (1) water, including permanent water that persists through the summer months; (2) emergent aquatic vegetation and vegetated banks for cover; and (3) an abundant food supply. The giant garter snake specializes in aquatic prey, including small fish and frogs, carp, mosquitofish, bullfrogs and treefrogs. Much of the historic wetlands of the Central Valley inhabited by giant garter snakes have been lost. However, the giant garter snake has been found to inhabit rice and waterways associated with agricultural production, such as irrigation and drainage canals.

Irrigation ditches and drains appear to provide valuable giant garter snake habitat as long as they have: (1) enough water during the active summer season to supply food and cover (minimum April - July; optimum March - October); (2) grassy banks for basking; (3) emergent vegetation for cover during the active season (March - October); and (4) nearby high ground or uplands that provide cover and refuge from flood waters during the dormant season (October - March). Giant garter snakes move around to find suitable habitat as conditions in the rice fields, marshes, and canals and ditches change, especially during the dry summer months. Thus, connectivity between canals and ditches in different areas and between these systems and other habitat types is extremely important for genetic interchange and ability to find summer habitat.

Giant garter snakes require suitable areas for basking near to water. Basking occurs on banks of canals and levees, on broken down tules in the water, in branches of willows or saltbush over water, on the ground at water's edge in concealing vegetation, and on dead snags. Basking sites need to be open to sunlight (not beneath heavy riparian vegetation) but ideally should have sufficient cover to escape from predators and allow for thermoregulation. Preferred basking sites are located adjacent to escape cover, including water or vegetation.

Giant garter snakes are active during the spring and summer (starting in March or April) but inactive in the winter. By the end of October, snakes begin entering their winter retreats which can include small mammal burrows on the sides of levees, ditches and drains, railroad embankments, and other upland habitats, as well as man-made structures, such as piles of large rocks or rip rap. Giant garter snakes have been found overwintering up to 200 yards from the shoreline of summer habitat. Burrows, vegetation, and other shelter from predators enhance the suitability of overwintering sites.

## Valley Elderberry Longhorn Beetle

The valley elderberry longhorn beetle (VELB) is endemic to the Central Valley of California. The VELB is entirely dependent on elderberry (*Sambucus* species) shrubs for reproduction and survival. Females lay their eggs on the bark. After hatching larvae burrow into the stems where they grow and develop for up to two years. At the end of the larval stage, the larvae exit the elderberry stem, enter the pupal stage and transform into adults. Adults are active from March to June, feeding and mating during this time.

This beetle is nearly always found on or close to its host plant. It appears that in order to serve as habitat, the elderberry shrub must have stems that are 1.0 inch or greater in diameter at ground level. Use of the plants by the animal is rarely apparent. Frequently, the only exterior evidence of the beetle is an exit hole created in the shrub by the larva just before the pupal stage. Field work along the Cosumnes River and in the Folsom Lake area suggests that larval galleries can be found in elderberry stems with no evidence of exit holes. The larvae either succumb before constructing an exit hole or are not far enough along in the developmental process to construct an exit hole.

Critical Habitat for VELB was designated in 1980 (45 FR 52803) and consists of two zones:

- Sacramento Zone. An area in the city of Sacramento enclosed on the north by the Route 160 Freeway, on the west and southwest by the Western Pacific railroad tracks, and on the east by Commerce Circle and its extension southward to the railroad tracks.
- American River Parkway Zone. An area of the American River Parkway on the south bank of the American River, bounded on the north by latitude 38 37'30" N, and on the South and east by Ambassador Drive and its extension north to latitude 38 37'30" N, Goethe Park, and that portion of the American River Parkway northeast of Goethe Park, west of the Jedediah Smith Memorial Bicycle Trail, and north to a line extended eastward from Palm Drive.

## Suisun Thistle

Suisun thistle is a perennial herb in the aster family (Asteraceae). It has slender, erect stems that are 3.0 to 4.5 feet tall and well branched above. Pale lavender-rose flower heads, 1 inch long, grow singly or in loose groups. Flowers appear between July and September. Suisun thistle grows in the upper reaches of tidal marshes of the San Francisco Bay/Estuary, where it is associated with narrowleaf cattail (*Typha angustifolia*), three-square or American bulrush (*Scirpus americanus*), Baltic rush (*Juncus balticus*) and saltgrass.

## Soft Bird's-beak

Soft bird's-beak is an annual herb of the snapdragon family (Scrophulariaceae). It grows 10 to 16 inches tall, branching sparingly from the middle and above. A floral bract (modified leaf) with two to three pairs of lobes occurs immediately below each inconspicuous white or yellowish-white flower. Flowers appear between July and September. Like other members of *Cordylanthus* and related genera, soft bird's-beak is partially parasitic on the roots of other plants. Soft bird's-beak is found predominantly in the upper reaches of salt grass/pickleweed marshes of the San Francisco Bay/Estuary at or near the limits of tidal action. It is associated with pickleweed or Virginia glasswort (*Salicornia virginica*), saltgrass, fleshy or marsh jaumea (*Jaumea carnosa*), alkali seaheath (*Frankenia salina*) and seaside arrowgrass (*Triglochin maritima*).

# Environmental Baseline and Status of the Species in the Action Area

The following describes the population status and distribution of each species throughout its range and in the action area. Information in this section was largely derived from information compiled by the Service and CDFG and available at http://sacramento.fws.gov, http://ventura.fws.gov, http://arnica.csustan.edu/esrpp/eslist.htm, and http://www.dfg.ca.gov/hcpb/species/t_e_spp/tespp.shtml.

## Bald Eagle

The bald eagle ranges over much of the northern portion of the American continent. During the 19th century, bald eagle populations declined in California and elsewhere from shooting, pesticides, and human encroachment leading to loss of habitat. Exposure to organochlorine pesticides after World War II led to decreased reproduction. Legal protection, the banning of DDT, and habitat management has resulted in an increasing breeding population in California and elsewhere in the United States. The following population status information for the bald eagle was obtained from http://www.dfg.ca.gov/hcpb/species/t_e_spp/tespp.shtml and associated links.

The breeding population of bald eagles in the lower 48 states has shown steady improvements since its federal listing. In 1963, the number of breeding pairs was reported as 417. In 1999, the number of nesting pairs in the lower 48 states was estimated at just over 6,000. The wintering population is considered to be stable or increasing.

Historically, bald eagles were widespread and abundant in California, but no historical information exists on population size. By the late 1960s and early 1970s, when the bald eagle was listed as an endangered species, fewer than 30 nesting pairs remained in California and were only in the northern third of the State. With protection under the ESA and the banning of DDT, the population of bald eagles began to increase in California as it did in other parts of its range. In 1999, there were 188 known territories of which 151 were occupied.

This population increase has been accompanied by an increase in the distribution of nesting eagles in the California. In 1977, bald eagles nested in only eight counties in the northern portion of the state. In recent years, bald eagles have been found nesting in 28 of the State's 58 counties. Most of the territories are still in the northern portion of the state. Productivity of the State's population has been good each year, averaging slightly more than 1.0 fledglings per nesting pair during the 1990s. In the action area, nesting territories occur at Shasta Reservoir, Claire Engle Reservoir, Whiskeytown Reservoir, Oroville Reservoir and at a few locations along the upper Sacramento River near the Shasta-Tehama county line. There are about 20 territories at Shasta Reservoir, 3 at Oroville Reservoir, 3 along the upper Sacramento River, 2 at Whiskeytown Reservoir and about 7 at Clair Engle Reservoir.

The annual, nationwide Midwinter Bald Eagle Survey indicates that the State's winter population exceeds 1,000 birds in some winters and appears to be at stable, although exact numbers vary from year to year. Typically, about half of the State's wintering bald eagles are found in the Klamath Basin along the California-Oregon border. This area supports the largest winter concentration of bald eagles in the lower 48 states. In addition, bald eagles winter at lakes, reservoirs, and along major river systems throughout most of central and northern California and in a few southern California localities. Small numbers of bald eagles are regularly observed during winter at Folsom and Oroville Reservoirs. Bald eagles occasionally are observed along the upper Sacramento River during winter.

## California Clapper Rail

The California clapper rail is endemic to California and was historically found in tidally influenced salt and brackish marshes in coastal central and northern California. Once found from Humboldt Bay, Humboldt County to Morrow Bay, San Luis Obispo County, California clapper rails are now restricted almost entirely to the marshes of the San Francisco estuary, where the only known breeding populations occur. Use of brackish marshes by clapper rails is largely restricted to major sloughs and rivers of San Pablo Bay and Suisun Marsh, and along Coyote Creek in south San Francisco Bay.

Suitable habitat for California clapper rails has been reduced by approximately 84 percent from historic levels in the San Francisco Bay area due to habitat conversions for urban and agricultural uses, and is a primary factor in the species' decline. Additional factors that have contributed to the decline in clapper rail populations include overharvesting, environmental contamination, and erosion or subsidence of habitat. Throughout the Bay, the remaining clapper rail population is at risk from mammal and bird predators. Several native and nonnative predator species are known to prey on the clapper rail or its eggs. Mercury accumulation in eggs is perhaps the most significant contaminant problem affecting clapper rails in San Francisco Bay.

A preliminary indication from the 1997-98 winter high tide counts in the eastern shore of the south San Francisco Bay is that the south bay population may have increased. Based on winter counts from 1996-97, the south bay population was estimated at 500 to 600 birds. The north bay population is believed to be similar in size (http://www.dfg.ca.gov/hcpb/species/t_e_spp/tespp.shtml).

## Salt Marsh Harvest Mouse

The historic range of the salt marsh harvest mouse included tidal marshes within the San Francisco and San Pablo Bay areas, east to the Collinsville-Antioch area. The northern subspecies (*R. r. halicoetes*) inhabited marshes fringing San Francisco, San Pablo and Suisun bays north from Gallinas Creek. The southern subspecies was found along both sides of San Francisco Bay in the central and south regions. At present, the distribution of the northern subspecies is along Suisun and San Pablo Bays north of Point Pinole in contra Costa County and Point Pedro in Marin County. The southern subspecies is currently found in marshes in Corte Madera, Richmond, and South San Francisco Bay, mostly south of the San Mateo Bridge.

Salt marsh harvest mouse populations have presumably declined with the loss of habitat. Only a small portion of the tidal marsh that bordered San Francisco Bay in the mid-1800s remains. The suitability of many marshes for salt marsh harvest mice is further limited, and in some cases precluded, by their small size, fragmentation, and lack other habitat features. Because salt marsh harvest mice live in a tidally influenced environment, oil from spills also poses a threat. Spilled oil can have a direct effect on these mice through ingestion or soiling of fur or indirect effects by modifying the salt-marsh environment in which they live. The effect of heavy metals in soils and plants on salt marsh harvest mice is unknown. Although information is available on the presence of harvest mice in various parts of its range, little data is available regarding harvest mice population size and spatial and temporal dynamics.

## Riparian Brush Rabbit

Historically, riparian brush rabbit are known to have occurred in riparian forests along the San Joaquin River and Stanislaus Rivers in Stanislaus and San Joaquin counties. They probably also occupied streamside communities along the other tributaries of the San Joaquin River on the Valley floor. One population estimate is that about 110,000 individuals occurred in this historic range.

The dramatic decline of the riparian brush rabbit began in the 1940s with the building of dams, constructed for irrigation and flood control, on the major rivers of the Central Valley. Protection from flooding resulted in conversion of floodplains to croplands and the consequent reduction and fragmentation of remaining riparian communities. The most serious problem, however has been the lack of suitable habitat above the level of regular floods where the animals can find food and cover for protection from weather and predators.

Today, the largest remaining fragment of habitat and only extant population are found along the Stanislaus River in Caswell Memorial State Park in San Joaquin County, California. No other sightings of riparian brush rabbits outside the Park have been reported in over 40 years. The last population estimate was 213 to 312 individuals at Caswell MSP in January 1993. Anecdotal information suggested that the population declined when more than 80 percent of the Park flooded in January 1997.

Aside from the periodic threats from flooding, wildfire poses a major threat due to long-term fire suppression in the Park and the consequent increase in fuel from dead leaves, woody debris, and decadent, flammable shrubs. Other factors that could affect this population are diseases common to rabbits in California, such as tularemia, plague, myxomatosis, silverwater, encephalitis, listeriosis, Q-fever, and brucellosis. Competition with desert cottontail potentially is another threat.

## Riparian Woodrat

The riparian woodrat is the only subspecies of woodrat found on the floor of the Central Valley. The type locality for the riparian woodrat is Kincaid's Ranch, about 2 miles northeast of Vernalis in Stanislaus County, California. Historically, it could have ranged as far as southern Merced County or northern Fresno County

The range of the riparian woodrat is far more restricted today than it was historically. The only population that has been verified is the single, known extant population restricted to about 250 acres of riparian forest on the Stanislaus River in Caswell Memorial State Park. In 1993, the estimated size of this population was 437 individuals.

The amount and extent of riparian habitat in the San Joaquin Valley has declined substantially and the loss and fragmentation of habitat are the principal reasons for the decline of the riparian woodrat. Much of this loss was the result of the construction of large dams and canals which diverted water for the irrigation of crops and permanently altered the hydrology of valley streams. More was lost through cultivation of the river bottoms. Historically, cattle also probably impacted riparian woodrat populations since the thick undergrowth, which is particularly important to woodrats, is sensitive to trampling and browsing and grazing by livestock.

## California Red-legged Frog

The historic range of the California red-legged frog extended along the coast from the vicinity of Point Reyes National Seashore, Marin County, California, and inland from the vicinity of Redding, Shasta County, California, southward to northwestern Baja California, Mexico. The species no longer occurs in approximately 75 percent of its former range. California red-legged frogs have been documented in 46 counties in California, but now remain in only 238 streams or drainages in 31 counties. They are still locally abundant along coastal California between the San Francisco Bay area and Ventura County. Within the remaining distribution of the species, only isolated populations have been documented in the Sierra Nevada, northern Coast, and northern Transverse ranges. The species is believed to be extirpated from the southern Transverse and Peninsular ranges, but is still present in Baja California, Mexico. California red-legged frogs population numbers are not precisely known, although the Service believes that many California red-legged frog populations are declining throughout the range of the subspecies.

In the action area, red-legged frogs have been extirpated from the floor of Central Valley and largely extirpated from the Sierra Nevada foothills. In the Sierra Foothills, Jack and Indian Creeks in Butte County and North Fork Weber Creek in El Dorado County still support red-legged frogs (Service 2000a). These creeks are upstream from CVP and SWP facilities. The species is nearly extirpated in the North Coast Range/West Sacramento Valley with the only potentially remaining population in the vicinity of Clear Lake. The North Coast/North San Francisco Bay area supports significant numbers of red-legged frogs in small coastal drainages, ponds, and man-made stock ponds in portions of Marin, Sonoma, Solano and Napa counties. The southern and eastern San Francisco Bay similarly appears to support relatively large numbers of red-legged frogs although the species appears to have been nearly extirpated from lowland portions of Contra Costa and Alameda counties.

Habitat loss and alteration, combined with over exploitation and introduction of exotic predators, were significant factors in the red-legged frog's decline in the early to mid-1900s. The California red-legged frog is threatened within its remaining range by a wide variety of human activities, many of which operate concurrently and cumulatively with each other and with natural disturbances (e.g., droughts and floods). Current factors associated with declining populations of the red-legged frog include degradation and loss of habitat through urbanization, mining, improper management of grazing, recreation, invasion of nonnative plants, impoundments, water diversions, degraded water quality, and introduced predators. Organophosphorus pesticides from agricultural areas on the San Joaquin Valley floor appear to be transported to the Sierra Nevada on prevailing summer winds, and also could be affecting populations of amphibians that breed in mountain ponds and streams. These factors have resulted in the isolation and fragmentation of habitats within many watersheds. The fragmentation of existing habitat, and the continued colonization of existing habitat by nonnative species, may represent the most significant current threats to California red-legged frogs.

## Giant Garter Snake

The following description of the current status and distribution of the giant garter snake was derived from the Service's (2002) Biological Opinion on Interim Water Contract Renewals, March 2, 2002 – February 29, 2004.

The giant garter snake is endemic to the Central Valley and historically, inhabited the estimated 4.1 million acres of flood basins, freshwater marshes, and small tributary streams along the length of the Central Valley. Surveys over the last two decades have located the giant garter snake as far north as the Butte Basin in the Sacramento Valley. Currently, the Service recognizes 13 separate populations of giant garter snakes, with each population representing a cluster of discrete locality records. The 13 extant population clusters largely coincide with historical riverine flood basins and tributary streams throughout the Central Valley: (1) Butte Basin, (2) Colusa Basin, (3) Sutter Basin, (4) American Basin, (5) Yolo Basin–Willow Slough, (6) Yolo Basin–Liberty Farms, (7) Sacramento Basin, (8) Badger Creek--Willow Creek, (9) Caldoni Marsh, (10) East Stockton--Diverting Canal and Duck Creek, (11) North and South Grasslands, (12) Mendota, and (13) Burrel/Lanare. These populations span the Central Valley from just southwest of Fresno (i.e., Burrel-Lanare) north to Chico (i.e., Hamilton Slough). The 11 counties where the giant garter snake is still presumed to occur are: Butte, Colusa, Glenn, Fresno, Merced, Sacramento, San Joaquin, Solano, Stanislaus, Sutter and Yolo. All 13 population clusters are isolated from each other with no protected dispersal corridors. Opportunities for recolonization of small populations which may become extirpated are unlikely given the isolation from larger populations and lack of dispersal corridors between them.

The current distribution and abundance of the giant garter snake are much reduced from former times. Agricultural and flood control activities have extirpated the giant garter snake from the southern one third of its range in former wetlands associated with the historic Buena Vista, Tulare, and Kern lake beds. These lake beds once supported vast expanses of giant garter snake habitat, consisting of cattail and bulrush dominated marshes. Extensive bulrush and cattail floodplain habitat also typified much of the Sacramento Valley historically. Prior to reclamation activities beginning in the mid to late 1800's, about 60 percent of the Sacramento Valley was subject to seasonal overflow flooding in broad, shallow flood basins that provided expansive areas of giant garter snake habitat. All natural habitats have been lost and an unquantifiable small percentage of semi-natural wetlands remain extant. Only a small percentage of these wetlands currently provide habitat suitable for the giant garter snake. Although some giant garter snake populations have persisted in artificial wetlands associated with agricultural and flood control activities, many of these altered wetlands are now threatened with urban development. Cities within the current range of the giant garter snake that are rapidly expanding include: (1) Chico, (2) Yuba City/Marysville, (3) Sacramento, (4) Galt, (5) Stockton, (6) Gustine, and (7) Los Banos.

San Joaquin Valley sub-populations of giant garter snakes have suffered severe declines and possible extirpations over the last two decades. Prior to 1980, several areas within the San Joaquin Valley supported populations of giant garter snakes. Until recently, there were no post-1980 sightings from Stockton, San Joaquin County, southward, despite several survey efforts. Surveys during 1995 and 1999 revealed as small number of snakes principally in the North Grasslands, in Los Banos Creek, Volta Wildlife Management Area, and Mendota Wildlife area. Snake abundance in the San Joaquin Valley seemed extremely low in comparison to study areas in the Sacramento Valley. The recent survey data indicate that giant garter snakes are still extant in two localities within the San Joaquin, but in extremely low to undetectable numbers.

Selenium contamination and impaired water quality could be a contributing factor in the decline of giant garter snake populations, particularly for the North and South Grasslands subpopulation (i.e., Kesterson NWR area). The bioaccumulative food chain threat of selenium contamination on fish, frogs, and fish-eating birds has been well documented. Though there is little data specifically addressing toxicity of selenium (Se), mercury (Hg), or metals to reptiles, it is expected that reptiles would have toxicity thresholds similar to those of fish and birds.

## Valley Elderberry Longhorn Beetle

The VELB is endemic to the Central Valley of California. It has been found as far north as the Shasta-Tehama County line and south to southern San Joaquin valley. Its east-west range extends into the foothills of the Sierra Nevada and the Coast Range up to an elevation of about 3,000 feet. The beetle appears to be patchily distributed, being locally common in some areas while absent in other areas of apparently suitable habitat.

Elderberry shrubs are a common component of riparian habitats in the Central Valley and occur throughout the action area in association with CVP/SWP waterways. Exit holes which are indicative of occupancy by VELB have been observed at many locations along project waterways, including the American River and Sacramento Rivers. The overall population status and trend however, is uncertain.

Extensive destruction of California's Central Valley riparian forests has occurred during the last 150 years due to agricultural and urban development. According to some estimates, riparian forest in the Central Valley declined by as much as 89 percent during that time period. The VELB is believed to have declined due to human activities that have resulted in widespread alteration and fragmentation of riparian habitats, and to a lesser extent, upland habitats, which support the beetle.

Among the threats to habitat for the VELB are:

- loss and alteration of habitat by agricultural conversion
- inappropriate grazing practices

- levee construction, stream and river channelization, removal of riparian vegetation and rip-rapping of shoreline
- nonnative animals such as the Argentine ant, which may eat the early phases of the beetle
- recreational, industrial and urban development.

Insecticide and herbicide use in agricultural areas and along road right-of-ways also could limit the beetle's occurrence in some areas.

## Suisun Thistle

The Suisun thistle is restricted to Suisun Marsh in Solano County. In Suisun Bay, most of the estimated 71,100 acres of tidal marshes that existed in 1850 were converted to agricultural land and then to diked seasonal wetlands used for waterfowl management. Only 9,340 acres within Suisun Marsh remain as tidal marsh. Most of the remaining tidal marshes are backed by steep levees, allowing for little or no transitional wetland habitat required by Suisun thistle. In 1975, the plant was reported as possibly extinct because it had not been collected for about 15 years. Extensive surveys, however, relocated the thistle. Collectively, the current occurrences of Suisun thistle total a few thousand plants. Two populations are on California Department of Fish and Game lands and a third occurrence is on Solano County Farmland and Open Space Foundation lands.

Indirect effects from urban development, mosquito abatement activities, competition and potential hybridization with nonnative plants, water pollution, upstream withdrawals of fresh water and projects that alter natural tidal regime threaten Suisun thistle. Its highly restricted distribution increases its susceptibility to random catastrophic events such as disease or pest outbreak, severe drought, oil spills or other natural or human caused disasters.

## Soft Bird’s-beak

Soft bird’s-beak is restricted to tidal marshes of the San Francisco Bay area. There are 19 confirmed locations of soft-bird’s beak. Five sites have been extirpated by habitat loss or modification. Five other sites surveyed in 1993 no longer supported the plant, although potential habitat still existed. The remaining nine sites are presumed to be extant. These occupied sites are widely scattered throughout coastal salt or brackish tidal marshes fringing San Pablo and Suisun Bays, in Contra Costa, Napa, and Solano counties. Of the extant population sites, one (McAvoy) has only 23 plants and three sites (Point Pinole, Rush Ranch and Joice Island Bridge) have very limited habitat, covering less than 1 acre each. The population at Fagan Slough covers approximately 3 acres and the two largest populations at Hill Slough and at Concord Naval Weapons Station, each cover about 10 acres.

Habitat conversion, water pollution, increases in salinity of tidal marshes due to upstream withdrawals of fresh water, habitat fragmentation, indirect effects of urbanization, competition with nonnative vegetation, insect predation, projects that alter natural tidal regime, mosquito abatement activities (including off-road vehicle use), erosion, and naturally occurring events variously threaten the remaining occurrences of soft bird's-beak.

# Effects of the Proposed Action

## Bald Eagle

In the action area, bald eagles nest at Shasta, Clair Engle, Whiskeytown, and Oroville reservoirs as well as at several locations along the upper Sacramento River. At Shasta Reservoir, Reclamation reported a long-term positive correlation between bald eagle productivity (number of young produced per occupied nest) and the average water surface elevation during April through June in the 1992 BA for CVP-OCAP (Reclamation 1992). To support the evaluation for this BA, the relationship between nesting productivity of eagles at Shasta Reservoir and lake levels was re-evaluated with inclusion of the most recent data for eagles at Shasta Reservoir. Statistically significant relationships were found between several measures of bald eagle reproduction (number of young fledged, number of successful nests, and number of active nests) and average water surface elevation during April through June. The best fit relationship was between the number of active nests and average water surface elevation ($p = 0.0007$, $r^2 = 0.375$, $n = 27$) and was the following

$$\# \text{ active nests} = 0.05*(\text{water surface elevation in feet msl}) - 40.766$$

This linear relationship was used to estimate potential effects to bald eagles from changes in the water surface elevation at Shasta Reservoir from implementation of CVP-OCAP between the current and future level of development.

With implementation of the proposed action, the average water surface elevation at Shasta Reservoir during April through June would decline slightly at the future level of development (Figure 1). Based on the relationship between the number of active nests and water surface elevation, the proposed action could result in a very slight decline in the number of active nests (Figure 2). On average, the relationship between the number of active nests and water surface elevation predicts a reduction of 0.1 active nests with a maximum reduction in one year of 0.7 nests. This small potential change would not substantially adversely affect bald eagles.

The relationship between lake levels and bald eagle nesting attempts or productivity have not been investigated at the other CVP and SWP reservoirs where bald eagles nest. For this analysis, bald eagle productivity is assumed to be correlated with average surface elevation during April through June at these other reservoirs as is the case at Shasta Reservoir. At the future level of development the average, surface elevations at Clair Engle, Whiskeytown and Oroville reservoirs would show only small changes from the current level of development (Figures 3, 4, 5). These small changes would not be expected to adversely affect the number or reproductive success of bald eagles nesting at these reservoirs.

## California Clapper Rail

California clapper rails are endemic to salt and brackish marshes of San Francisco Bay. The amount of freshwater inflow to the Bay can influence the extent and characteristics of salt and brackish marshes as well as affect the concentrations and residency times of various contaminants discharged to the Bay (Service 1993). In particular, if freshwater inflows to the Bay are reduced, the extent of salt and brackish marshes could be reduced and/or clapper rails could be exposed to higher concentrations of contaminants such as silver, copper, mercury, and selenium. These contaminants can have toxicological effects in birds (Service 2000b).

Predicted Delta inflow, Delta outflow and the location of the 2 parts per thousand isohaline (X2) in the San Francisco Bay/Estuary were used to assess effects of implementation of CVP-OCAP at the future level of development relative to current level of development. Figures 6 and 7 show the predicted exceedance probabilities of total Delta outflow and total Delta inflow, respectively for the current and future level of development. Figures 8 through 12 show the predicted average monthly start position of X2 for the current and future level of development in several water year types. These figures show only very small differences in Delta inflow, Delta outflow and X2 between the current and future level of development indicating that implementation of the proposed action would not substantially change hydrologic conditions in the Delta and Bay. Because hydrologic conditions in the Delta would be substantially similar under the future level of development, the extent of salt and brackish marsh would not be affected and the risk of exposure of clapper rails to harmful levels of contaminants would not change.

## Salt Marsh Harvest Mouse

The salt marsh harvest mouse is endemic to the salt and brackish marshes of the San Francisco Bay area and adjacent tidally influenced areas. The extent and characteristics of salt and brackish marshes in the San Francisco Bay area are influenced by the amount of freshwater inflow. Freshwater inflow also can influence the concentration and residency time of various contaminants discharged to the Bay. The degree of exposure to contaminants and risk of toxicological effects to salt marsh harvest mice has not been determined.

Delta inflow, Delta outflow and the location of X2 were used to assess potential effects of the proposed action on salt marsh harvest mouse. As described for the California clapper rail, the future level of development is predicted to have only very small effects on these parameters. Thus, no substantial changes in the extent or characteristics of habitat for salt marsh harvest mouse or in potential exposure to contaminants are expected under the proposed action.

## Riparian Brush Rabbit

Currently, the only known population of riparian brush rabbits is at Caswell Memorial State Park on Stanislaus River. Flooding is considered the greatest current threat to this population because of the limited amount of habitat that occurs above the regular high water level. The proposed action could affect brush rabbits through changes in flows in the Stanislaus River that increase the frequency that the park is flooded or through long term hydrologic changes that could influence the extent and structure of riparian vegetation.

Flows in the Stanislaus River at the mouth were used to evaluate the potential effects of the proposed action on riparian brush rabbits. The proposed action would result in very small differences in Stanislaus River flows between the current level of development and the future level of development (Figure 13). These very small differences would not be expected to affect the extent or characteristics of riparian habitat at Caswell Memorial State Park. Peak flows would not differ between the current and future levels of development and therefore, the proposed action would not change the risk of the brush rabbit population at Caswell Memorial State Park to flooding.

## Riparian Woodrat

The only known population of riparian woodrats is at Caswell Memorial State Park on the Stanislaus River. This species inhabits riparian areas of dense shrub cover. Although they may be more capable of escaping flood waters than riparian brush because or their ability to climb shrubs and trees, riparian woodrats also can be adversely affected by long-term flooding similar to riparian brush rabbits. Woodrats live in terrestrial stick houses. With the limited availability of suitable habitat above the regular high water level at Caswell Memorial State Park, riparian woodrats could be adversely affected by prolonged flooding.

As explained for the riparian brush rabbit, the proposed action would result in very small differences in Stanislaus River flows at the mouth between the current level of development and the future level of development (Figure 13). These very small differences would not be expected to affect the extent or characteristics of riparian habitat at Caswell Memorial State Park or alter the frequency or extent of flooding at the park.

## California Red-legged Frog

The California red-legged frog can inhabit a wide range of terrestrial and aquatic habitats, but is always found in association with water. Historically, red-legged frogs occurred throughout the Central Valley, the Sierra Nevada foothills, and Coast Range. Currently, it has been extirpated from the valley floor and is nearly extirpated from the Sierra Nevada foothills. The only remaining occurrences of red-legged frogs in the Sierra Nevada foothill are in Jack, Indian and North Fork Weber creeks. These location are upstream of CVP/SWP facilities and therefore would not be affected by CVP/SWP operations.

## Giant Garter Snake

Giant garter snakes inhabit freshwater wetlands, rice fields, and agricultural canals and ditches. The rivers of the project area generally do not provide suitable habitat for giant garter snakes because of the presence of shaded conditions created by woody riparian vegetation, absence of emergent vegetation and occurrence of predatory fish. As a result, the small changes in flows in CVP/SWP waterways under the proposed action are not likely to adversely affect giant garter snakes.

## Valley Elderberry Longhorn Beetle

The valley elderberry longhorn beetle is dependent on elderberry shrubs. In the Central Valley, elderberry shrubs are a common component of riparian habitats. The proposed action has the potential to influence valley elderberry longhorn beetle through hydrologic changes that influence the distribution and persistence of elderberry shrubs.

Changes in flows on the American, Feather, Stanislaus, Sacramento, and San Joaquin Rivers were used to evaluate potential effects to valley elderberry longhorn beetle. The hydrologic modeling predicts that flows in these CVP/SWP waterways would not change substantially between the current level of development and future level of development. The following summarizes the changes predicted on each river.

- Predicted average Sacramento River flows as represented by Keswick release would decline slightly in nearly every month (Figure 14)
- Average Feather River flows as represented by Thermolito Afterbay release would increase slightly in summer months (June through August) and decrease slightly in other months. (Figure 15)
- Average American River flows as represented by Nimbus release are predicted to decline slightly in every month (Figure 16)
- Average Stanislaus River flows as represented by Tulloch release are predicted to be nearly identical under current and future levels of development (Figure 17)
- Average San Joaquin River flows at Vernalis are predicted to be nearly identical under current and future levels of development (Figure 18)

Although elderberry shrubs are often found in riparian areas in the Central Valley, they are considered have a high tolerance to drought and to have low moisture requirements relative to other plants in the region (USDA NRCS 2002). Considering these moisture requirements and tolerances, the small changes in flows in CVP/SWP waterways as a result of the proposed project would not be expected to adversely affect elderberry shrubs and correspondingly valley elderberry longhorn beetles. Similarly, no adverse effects to designated critical habitat would occur.

## Suisun Thistle

The Suisun thistle grows in the upper reaches of tidal marshes and is currently restricted to Suisun Marsh. As a tidal marsh associated plant, this species is sensitive to changes in hydrology (i.e., changes in the timing and duration of inundation) and salinity. Figures 6 and 7 show minimal differences in Delta outflow and Delta inflow between the current and future level of development. These small differences would not be expected to materially affect the hydrology of Suisun Marsh. X2 provides an index to assess effects of the proposed action on salinity levels in Suisun Marsh. As shown in Figures 8 through 12, only very small differences in the location of X2 between the current and future level of development are predicted. These small differences would not be expected to adversely affect Suisun thistle.

## Soft Bird’s-beak

Soft bird’s beak is plants found in the upper reaches of salt grass/pickleweed marshes. The proposed action could affect this species through hydrologic or salinity changes that influence the extent or characteristics of tidal marshes in the San Francisco Bay/Estuary. Delta outflow and Delta inflow would not change materially under the proposed action between the current and future level of development (Figures 6 and 7). Likewise, salinity levels as represented by X2 would change only slightly under the current and future level of development (Figures 8 through 12). These small differences in flow and salinity would not be expected to adversely affect soft bird’s beak.

# Cumulative Effects

Cumulative effects are those effects of future State, local, or private actions on endangered and threatened species or critical habitat that are reasonably certain to occur in the action area. Future Federal actions that are unrelated to the proposed action are not considered in this section because they will be subject to separate consultations pursuant to section 7 of the ESA.

Numerous activities continue to affect the amount, distribution and quality of habitat for listed and proposed threatened and endangered species in the Central Valley and San Francisco Bay/Estuary. Habitat loss and degradation affecting both animals and plants continues as a result of urbanization, oil and gas development, road and utility right-of-way management, flood control projects, overgrazing by livestock, and continuing agricultural expansion. Listed and proposed animal species also are affected by poisoning, shooting, increased predation associated with human development, and reduction of food sources. All of these nonfederal activities are expected to continue to adversely affect listed and proposed species in the Central Valley and San Francisco Bay/Estuary.

## Bald Eagle

Bald eagles continue to be cumulatively affected by water management, recreational activities, fisheries management and pesticides and other contaminants. These factors can influence reproductive success, population size and distribution. DDT was a primary contributor to the decline in bald eagles in the United States. Although this pesticide is no longer in use in the United States, because of its long-term persistence in the environment, eagles can still be exposed to this chemical. Eagles also can accumulate heavy metals and other pollutants which can similarly influence reproductive success.

In California, most eagles nest at reservoirs managed for multiple purposes and that attract substantial recreational activities. Human activity near nests can disturb nesting pairs and potentially influence reproductive success. Impacts from recreation could increase as the human population increases in California.

## California Clapper Rail and Salt Marsh Harvest Mouse

The California clapper rail and salt marsh harvest mouse are dependent on tidal marshes of the San Francisco Bay/Estuary. Suitable habitat for these species has been reduced by about 84 percent from historic levels in the San Francisco Bay area as a result of habitat conversions for urban and agricultural uses, and is a primary factor in the species' decline. A number of factors influence the remaining tidal marshes and limit their habitat value.

Much of the East Bay shoreline from San Leandro to Calaveras Point is rapidly eroding. Many marshes around South San Francisco Bay are undergoing vegetational changes because of land subsidence caused by groundwater pumping. In addition, an estimated 600 acres of former salt marsh along Coyote Creek, Alviso Slough, and Guadalupe Slough are currently dominated by fresh- and brackish-water vegetation due to continuing freshwater discharge from South Bay wastewater facilities and are of lower quality for California clapper rails and salt marsh harvest mice. However, in San Pablo and Suisun Bays in general, average salinities have increased as a result of upstream diversions which as contributed to reduced habitat quality for these species. Intertidal a marsh habitats also can be degraded or destroyed by a variety of development and maintenance activities conducted by private organizations, state agencies, or local governments. Predation by a variety of native and non-native predators also is a concern for both species.

## Riparian Brush Rabbit and Riparian Woodrat

A substantial reduction in California's Central Valley riparian forests has occurred during the last 150 years. Riparian forest in the Central Valley possibly declined by as much as 89 percent during that time period. Factors contributing to the loss of riparian forest include: (1) conversion to agriculture and urban development; (2) levee construction and maintenance; (3) bank erosion; (4) grazing by livestock; (5) use of riprap for bank protection; (6) groundwater extraction; (7) flow regulation; (8) continuing development of land along the riparian corridor, and (9) competition and invasion by exotic plant species such as Chinese tree-of-heaven (*Ailanthus altissima*) and black locust (*Robinia pseudoacacia*). Riparian brush rabbits and riparian woodrat populations probably declined as riparian habitats declined.

Limited habitat and periodic flooding continue to threaten the persistence of these species. Riparian brush rabbits also are susceptible to diseases common to rabbits in California and competition with desert cottontail could pose a threat to this species. Both species are at risk to inbreeding and stochastic events given their extremely limited distribution and small population size.

## California Red-legged Frog

Habitat loss and alteration, combined with over exploitation and introduction of exotic predators, were significant factors in the red-legged frog’s decline in the early to mid-1900s. The California red-legged frog continues to be threatened in its remaining range by a wide variety of human activities, many of which operate concurrently and cumulatively with each other and with natural disturbances (e.g., droughts and floods). Current factors associated with declining populations of the red-legged frog include degradation and loss of habitat through urbanization, mining, improper management of grazing, recreation, invasion of nonnative plants, impoundments, water diversions, degraded water quality, and introduced predators. Organophosphorus pesticides from agricultural areas of the San Joaquin Valley floor appear to be transported to the Sierra Nevada on prevailing summer winds, and also could be affecting populations of amphibians that breed in mountain ponds and streams. Cumulatively, these factors have resulted in the isolation and fragmentation of red-legged frog populations. The fragmentation of existing habitat and populations, and the continued colonization of existing habitat by nonnative species, are significant current threats to California red-legged frogs.

## Giant Garter Snake

Historically, vast marshes in the Central Valley provided extensive habitat for giant garter snakes. Urban and agricultural development as well as associated flood control and water supply projects have resulted in the loss of the historic marshes. Activities that continue to cumulatively affect giant garter snakes throughout their range include: (1) conversion of agricultural areas to urban land uses; (2) fluctuations in aquatic habitat from water management, (3) dredging and clearing of vegetation from irrigation canals, (4) discing, mowing, ornamental cultivation and routine grounds maintenance of upland habitat; (5) vehicular traffic on access roads adjacent aquatic habitat, (6) use of burrow fumigants on levess and other potential upland refugia; (7) contaminated run off from agriculture and urbanization ; and (8) predation by feral animals and pets. These factors continue to influence the size, distribution and persistence of giant garter snakes in the Central Valley.

## Valley Elderberry Longhorn Beetle

Valley elderberry longhorn beetle are believed to have declined with the general decline in riparian habitat and other native habitats in the Central Valley. Removal of elderberry shrubs continue to affect the valley elderberry longhorn beetle throughout its range. Elderberry shrubs can be lost as a result of urban development, construction and maintenance of flood control measures (e.g., levee construction and maintenance), and construction and maintenance activities associated with water supply and drainage. In addition to direct removal, competition from invasive exotic plants, grazing and herbicide use can negatively affect elderberries. Pesticide use and Argentine fire ants can directly impact valley elderberry longhorn beetles.

## Suisun Thistle and Soft Bird's-beak

Suisun thistle and soft bird's-beak are associated with tidal marshes of the San Francisco Bay/Estuary. Suitable conditions for these species have decline substantially as a result of habitat conversions for urban and agricultural uses. Upstream diversions have altered the hydrologic regime of the San Francisco Bay/Estuary and have contributed to reduced suitability of conditions for these two plants. At a local level, a variety of development and maintenance activities conducted by private organizations or state or local governments can directly remove plants or alter the hydrologic or water quality conditions that create suitable conditions.

Non-native plants contribute to adverse cumulative effects to Suisun thistle and soft bird's beak by competing for light, space and nutrients. The lack of natural populations controls for non-natives can allow these species to outcompete native species and form a monoculture of an introduced species. Species such as the yellow star thistle (*Centaurea solstitialis*), barb goatgrass (*Aegilops triuncialis*) and medusahead (*Taeniatherum caputmedusae*) have out-competed native species in some areas.

Both species also can be impacted by vandalism or horticultural collecting. While both species are susceptible to a variety of catastrophic events,. the Suisun thistle's highly restricted distribution increases its risk of extinction from events such as disease or pest outbreak, severe drought, oil spills or other natural or human caused disasters.

# Conclusions and Determinations

## Bald Eagle

Under the future level of development, the proposed action would result in slightly lower water surface elevations at Shasta, Clair Engle, Whiskeytown and Oroville Reservoirs. These small changes may affect, but are not likely to adversely affect bald eagles.

## California Clapper Rail

The proposed action would result in only very small changes in Delta inflow, Delta outflow and X2. Thus, no substantial changes in the extent of salt and brackish marsh or in the risk of toxicological effects from exposure to contaminants are expected. Based on the very small changes predicted between the current and future level of development, the proposed action may affect, but is not likely to adversely affect California clapper rail.

## Salt Marsh Harvest Mouse

The proposed action would result in only very small changes in Delta inflow, Delta outflow and X2. Thus, no substantial changes in the extent of salt and brackish marsh or in the risk of toxicological effects from exposure to contaminants are expected. Based on the very small changes predicted between the current and future level of development, the proposed action may affect, but is not likely to adversely affect salt marsh harvest mouse.

## Riparian Brush Rabbit

Very small changes in flow levels in the Stanislaus River are predicted between the current and future level of development. No change in the maximum flow level is predicted. These small changes would not be expected to change the amount of characteristics of riparian habitat or change the flooding frequency of Caswell Memorial State Park. Thus, the proposed action would have no effect on the riparian brush rabbit.

## Riparian Woodrat

Changes in flow levels in the Stanislaus River between the current and future level of development are predicted to be very small and no change in the maximum flow is projected. The small changes would not be expected to change the amount of characteristics of riparian habitat or change the flooding frequency of Caswell Memorial State Park. Therefore, the proposed action would have no effect on the riparian woodrat.

## California Red-legged Frog

California red-legged frogs no longer inhabit waterways downstream of CVP/SWP facilities where operations of these facilities could affect this species or its habitat. Therefore, the proposed action would have no effect on the California red-legged frog.

## Giant Garter Snake

The proposed action would result in only small changes in flows in CVP/SWP waterways. Because the rivers affected by CVP/SWP operations generally do not provide suitable habitat conditions for giant garter snakes, the small changes in flows may affect, but are not likely to adversely affect giant garter snakes.

## Valley Elderberry Longhorn Beetle

The proposed action would result in small reductions in flows in several CVP/SWP waterways. These small changes are not likely to affect the distribution or persistence of elderberry shrubs and accordingly, the proposed action may affect, but is not likely to adversely affect valley elderberry longhorn beetle.

## Suisun Thistle

The proposed action would result in only very small changes in Delta inflow, Delta outflow and X2. Thus, no substantial changes the hydrology or salinity regime of Suisun Marsh are expected. Based on the very small changes predicted between the current and future level of development, the proposed action may affect, but is not likely to adversely affect Suisun thistle.

## Soft Bird's-beak

The proposed action would result in only very small changes in Delta inflow, Delta outflow and X2. Thus, no substantial changes the hydrology or salinity regime of tidal marshes of the San Francisco Bay Estuary are expected. Based on the very small changes predicted between the current and future level of development, the proposed action may affect, but is not likely to adversely affect soft bird's beak.

# Figures

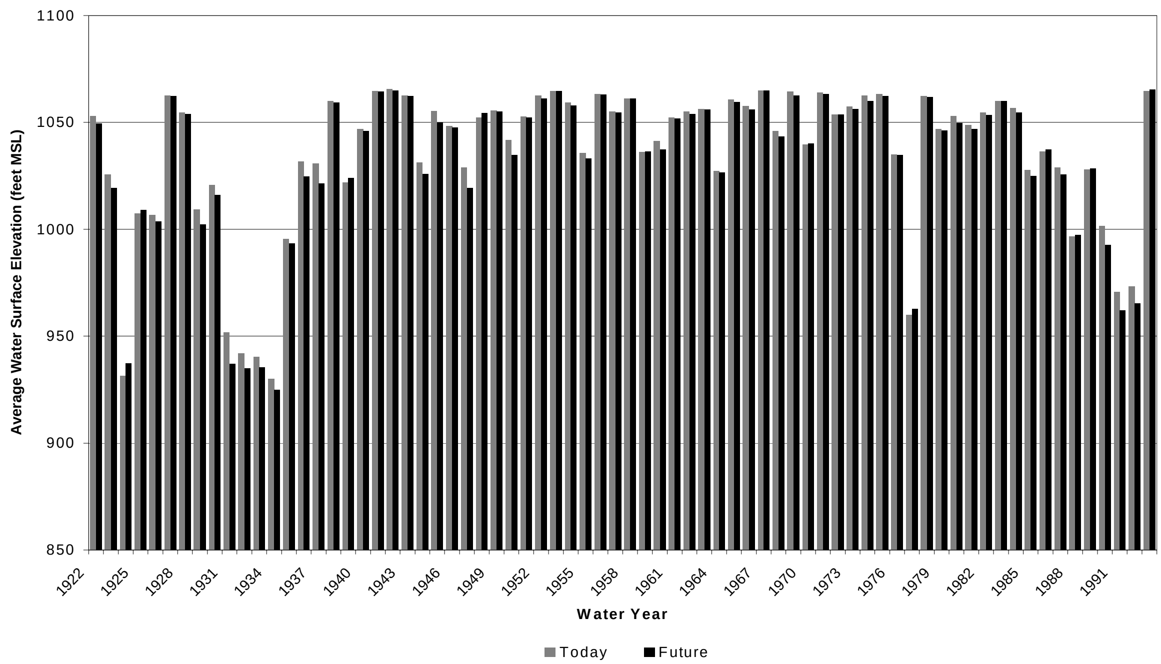


Figure 1 Average Water Surface Elevation during April through June at Shasta Reservoir Under Current and Future Level of Development

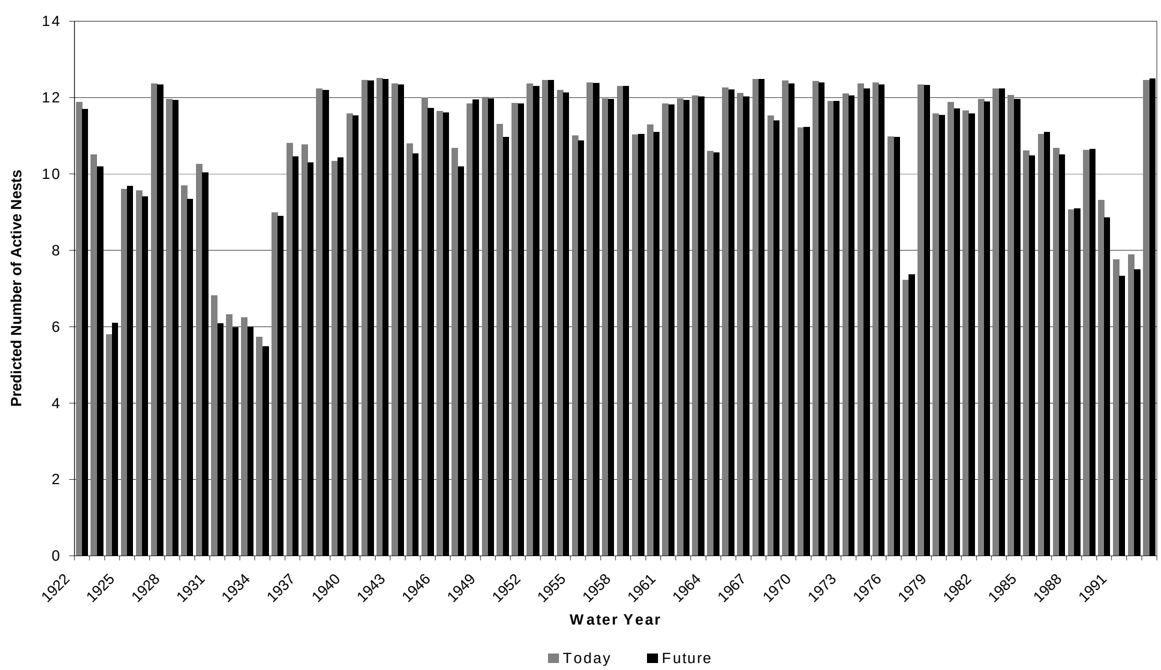


Figure 2 Predicted number of Active Bald Eagle Nests at Shasta Reservoir Under Current and Future Level of Development

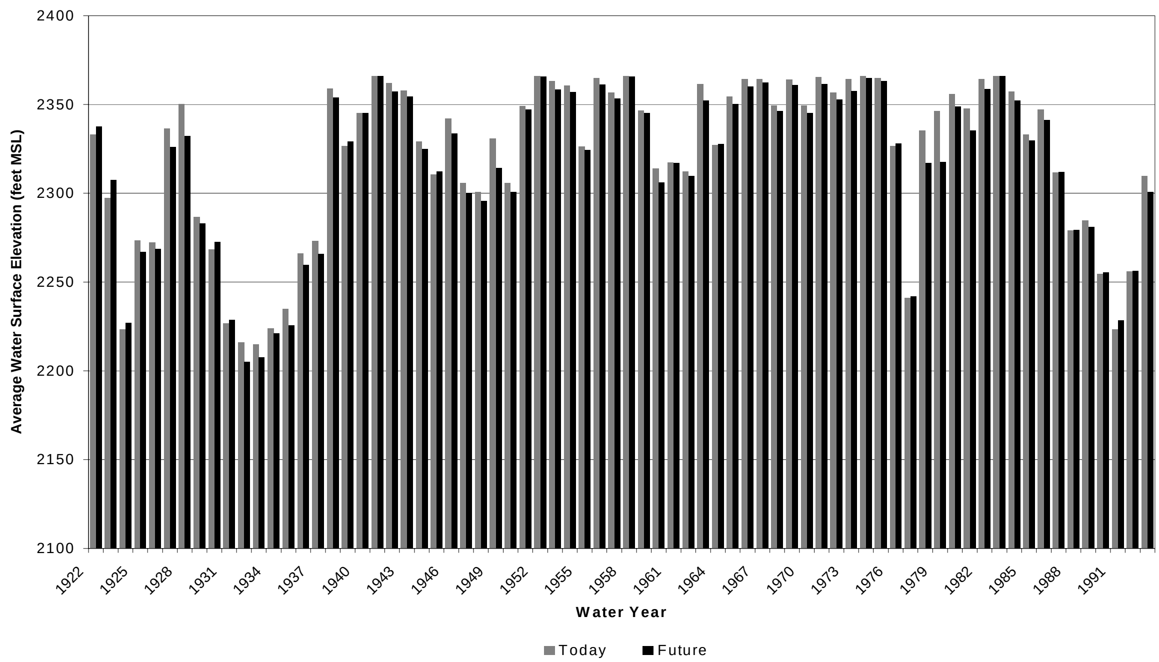


Figure 3 Average Water Surface Elevation during April through June at Clair Engle Reservoir Under Current and Future Level of Development

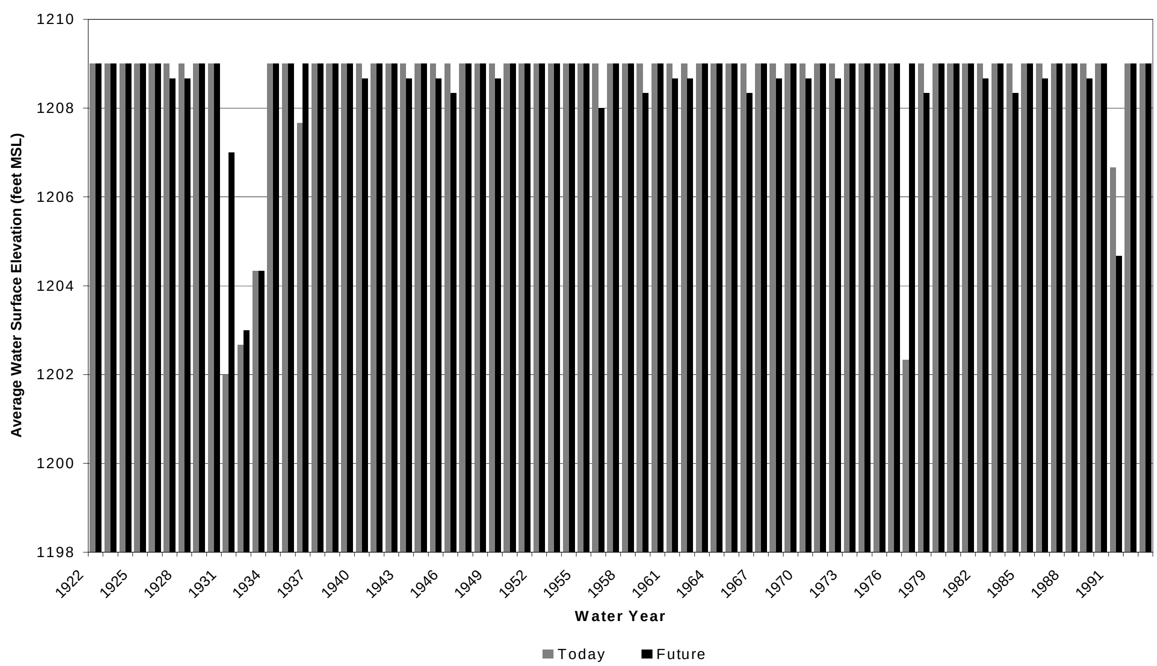


Figure 4 Average Water Surface Elevation during April through June at Whiskeytown Reservoir Under Current and Future Level of Development

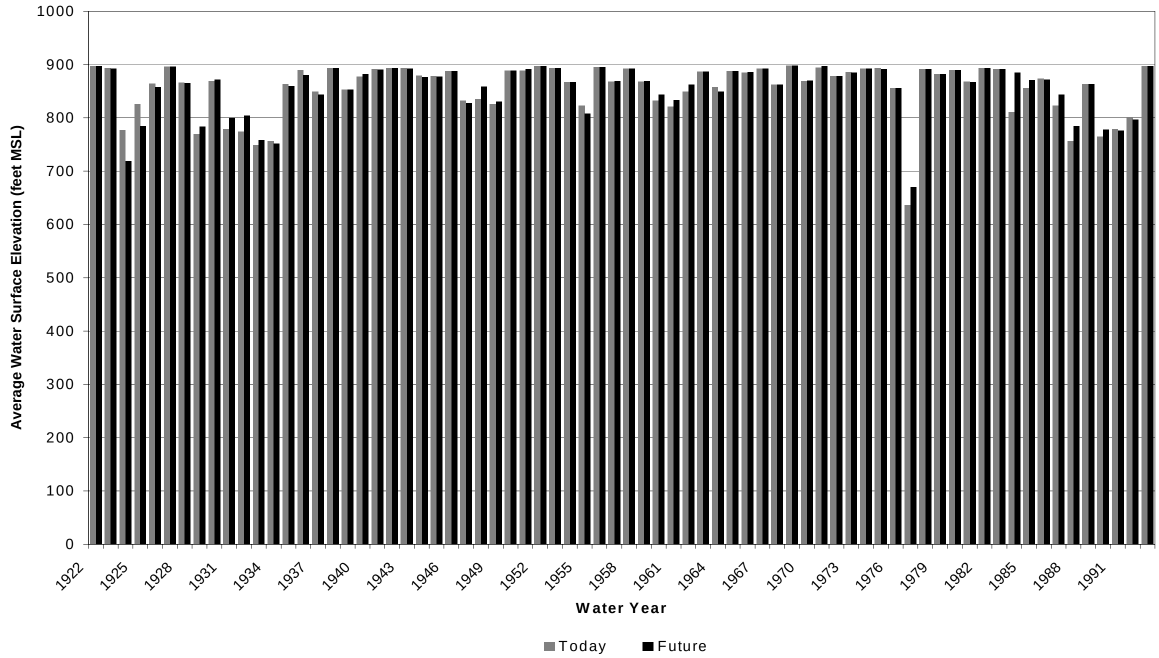


Figure 5 Average Water Surface Elevation during April through June at Oroville Reservoir Under Current and Future Level of Development

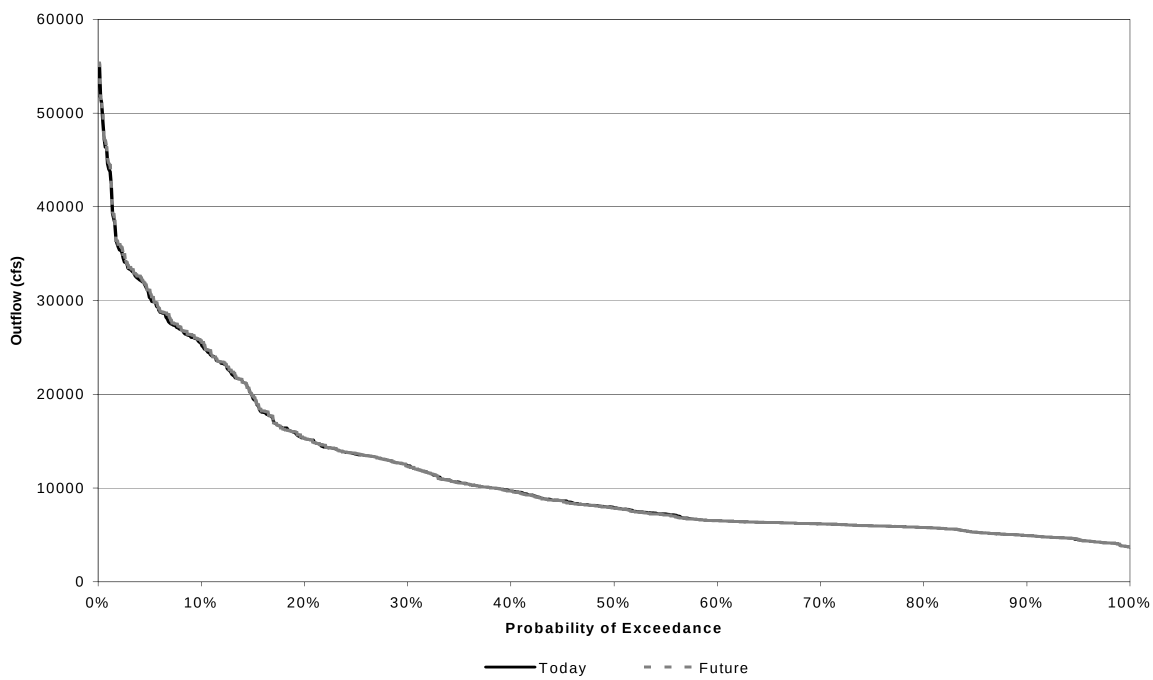


Figure 6 Total Annual Delta Outflow Exceedance under Current and Future Level of Development

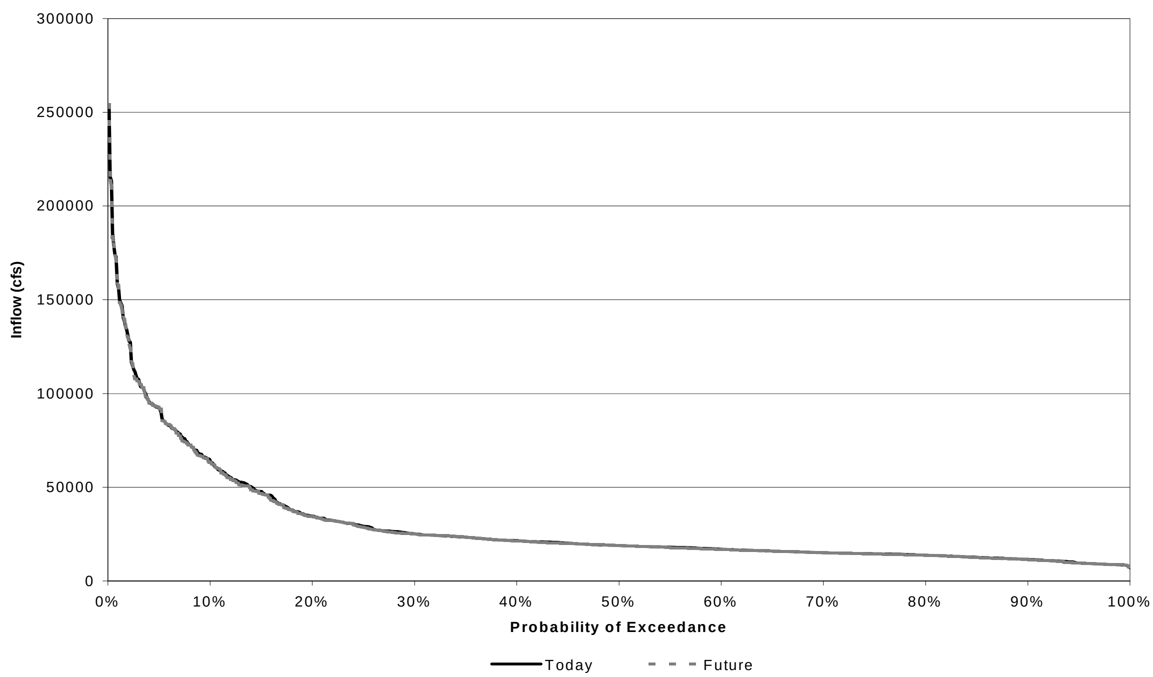


Figure 7 Total Annual Delta Inflow Exceedance under Current and Future Level of Development

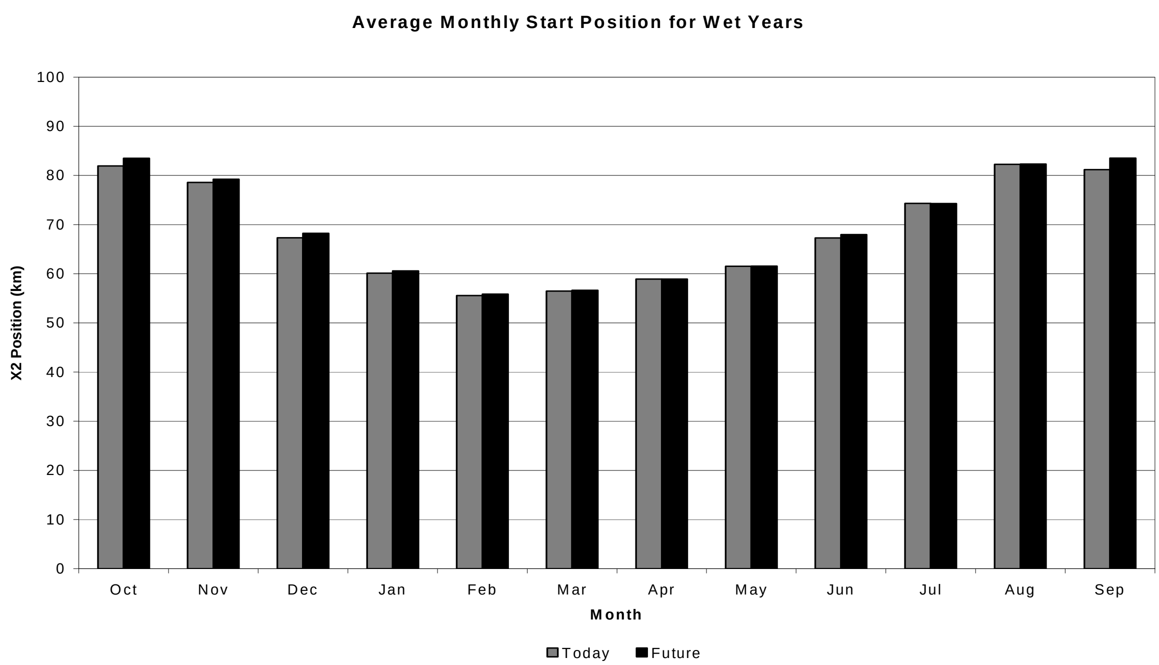


Figure 8 Wet Year Average Monthly X2 Start Position under Current and Future Level of Development

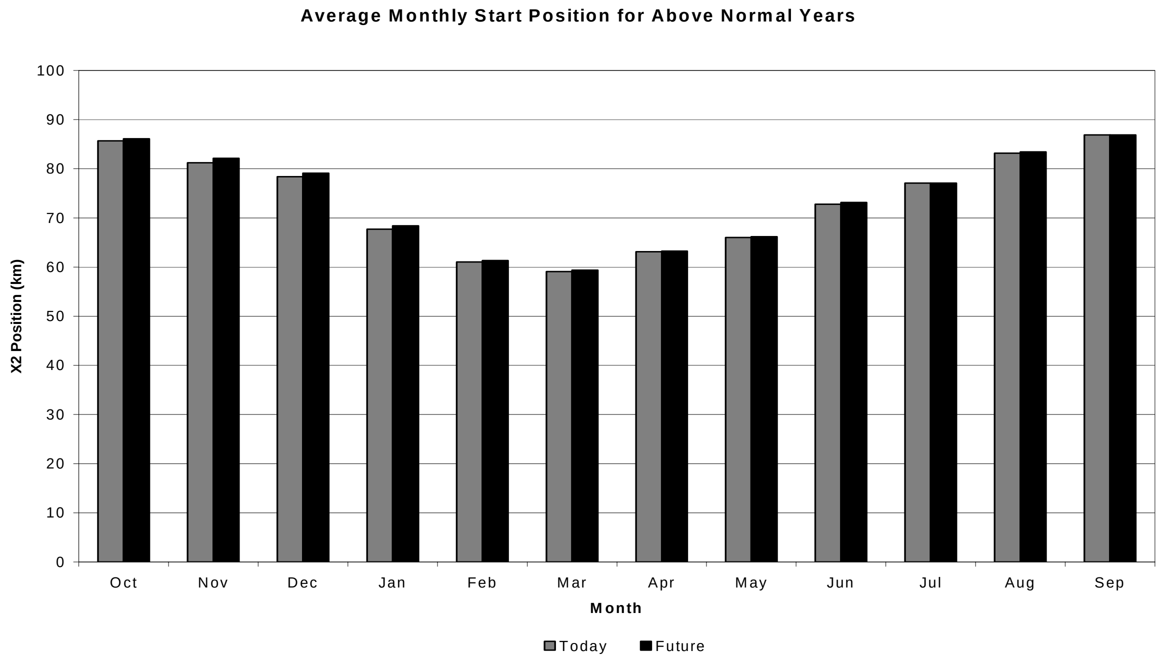


Figure 9 Above Normal Year Average Monthly X2 Start Position under Current and Future Level of Development

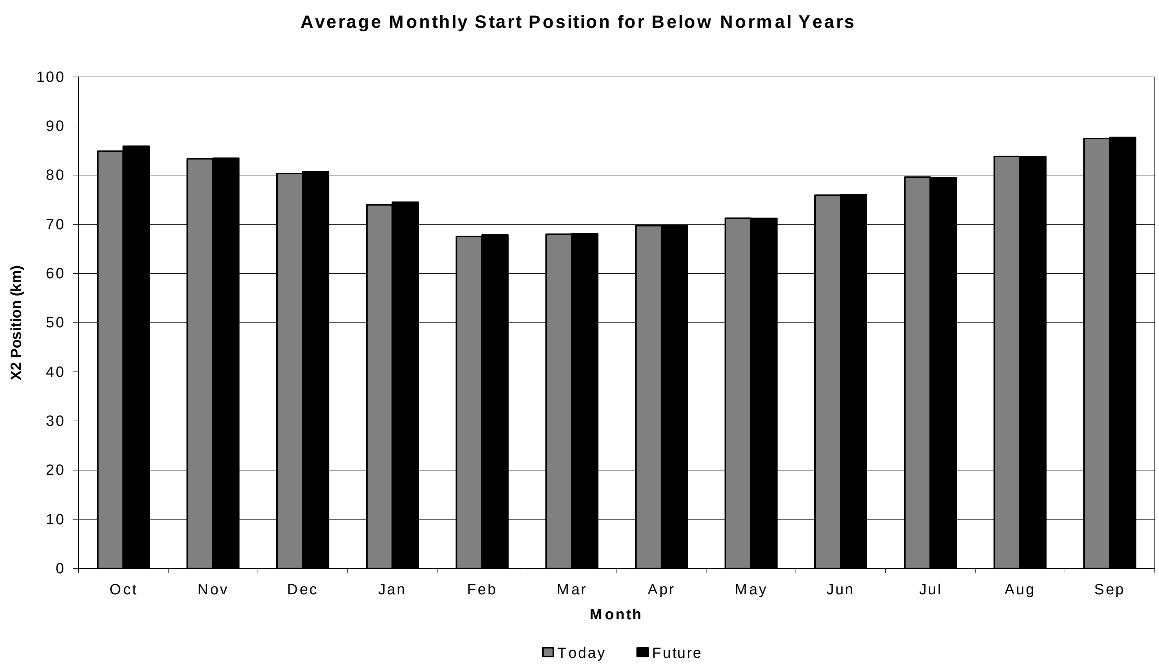


Figure 10 Below Normal Year Average Monthly X2 Start Position under Current and Future Level of Development

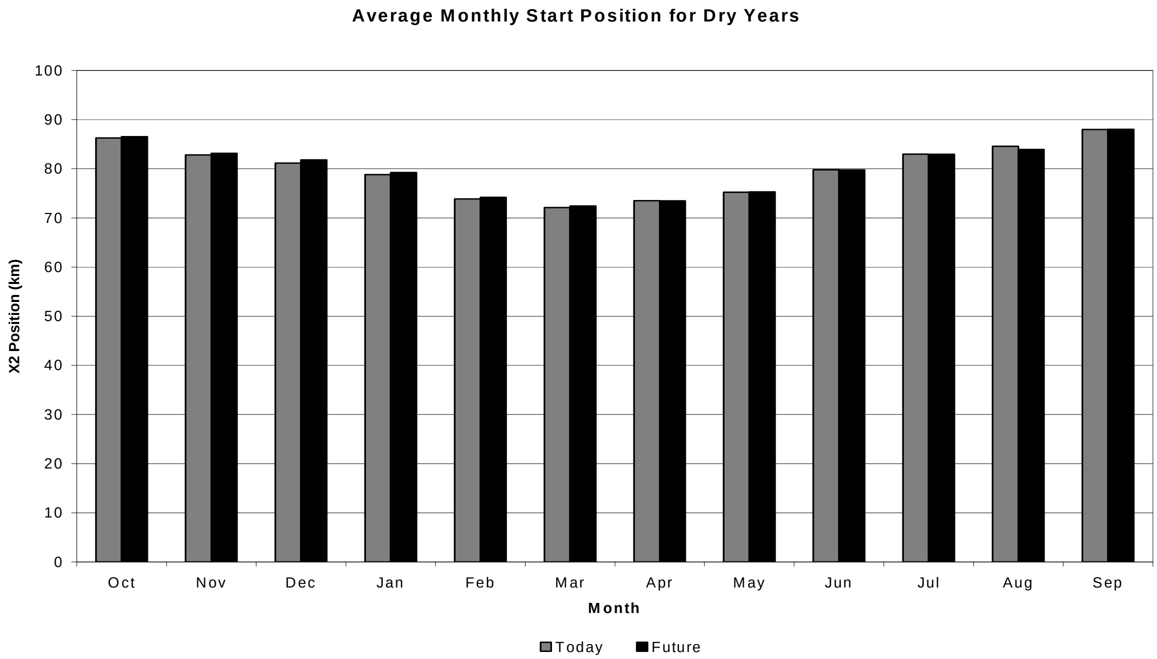


Figure 11 Dry Year Average Monthly X2 Start Position under Current and Future Level of Development

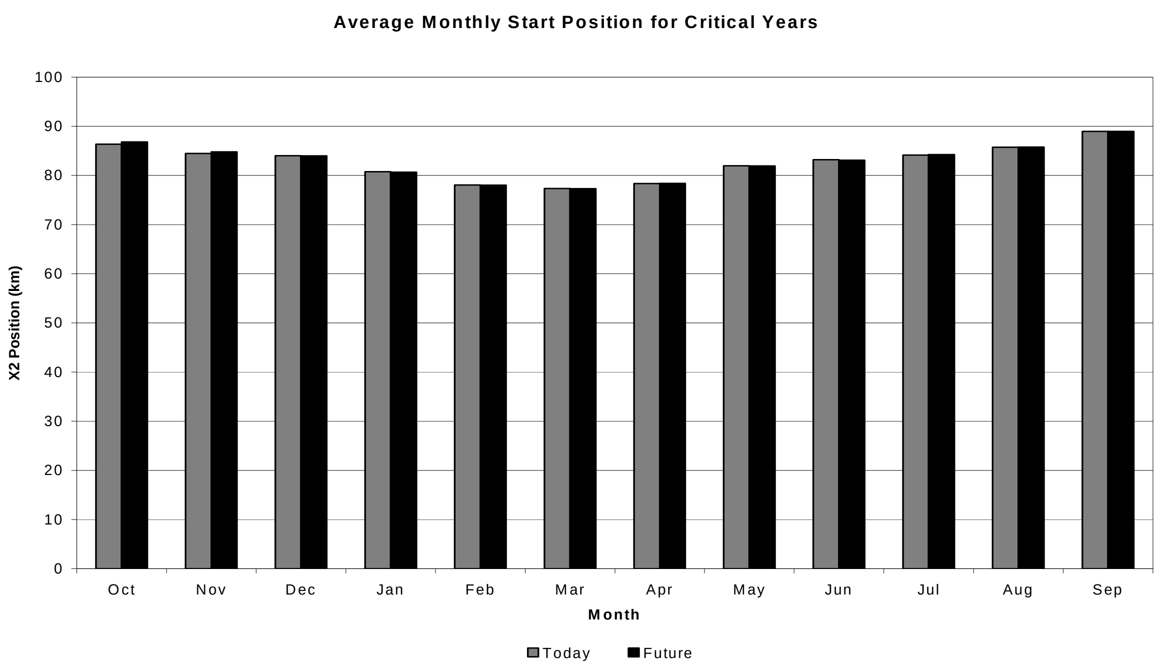


Figure 12 Critical Year Average Monthly X2 Start Position under Current and Future Level of Development

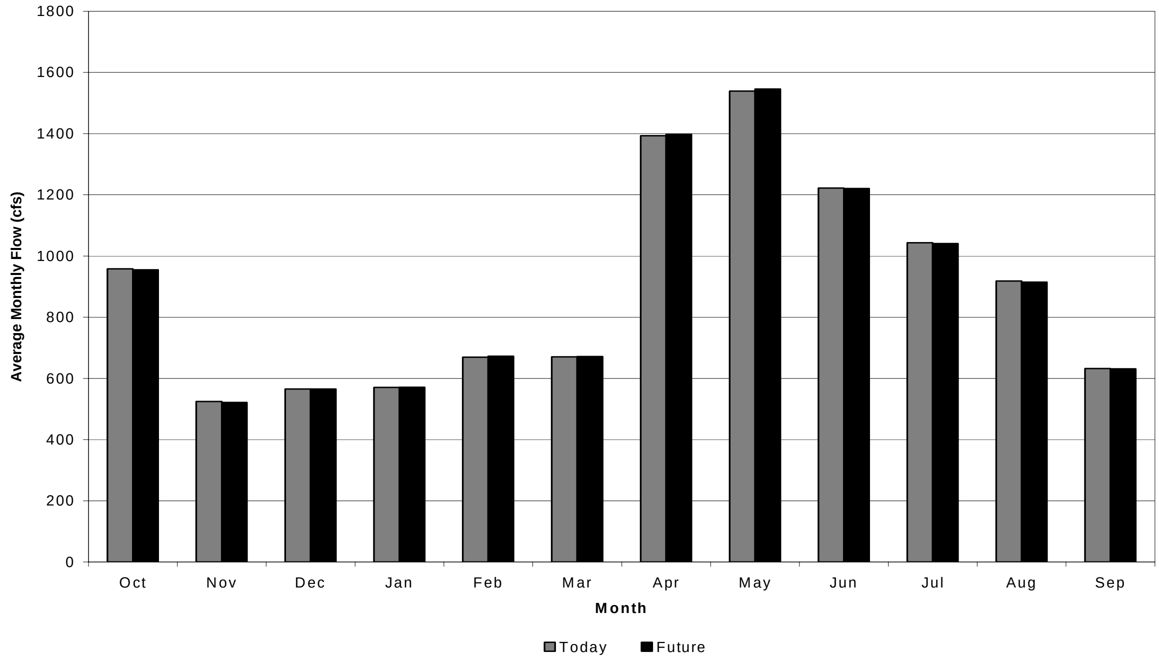


Figure 13 Average Monthly Stanislaus River Flows at the Mouth under Current and Future Level of Development

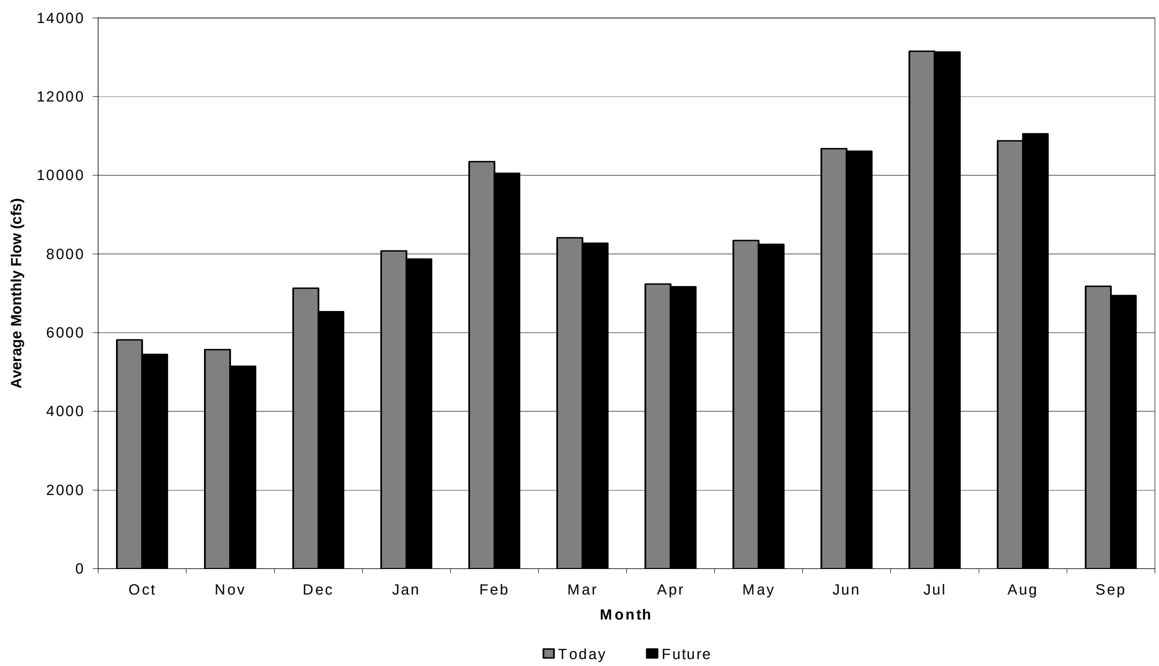


Figure 14 Average Monthly Keswick Release under Current and Future Level of Development

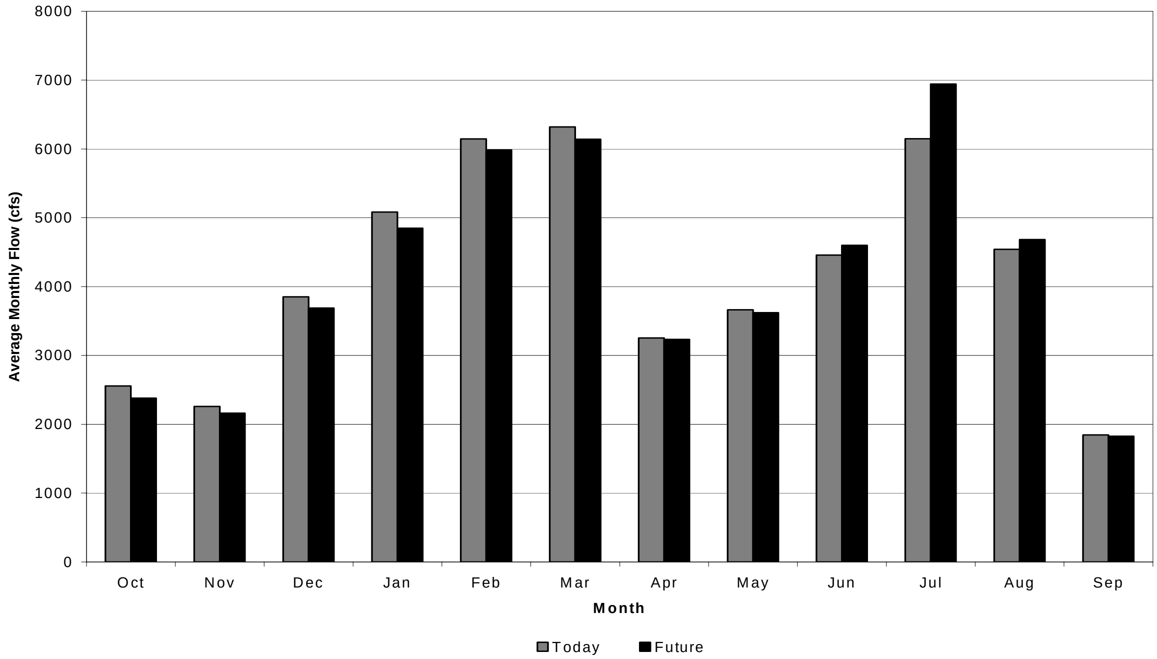


Figure 15 Average Monthly Thermalito Release under Current and Future Level of Development

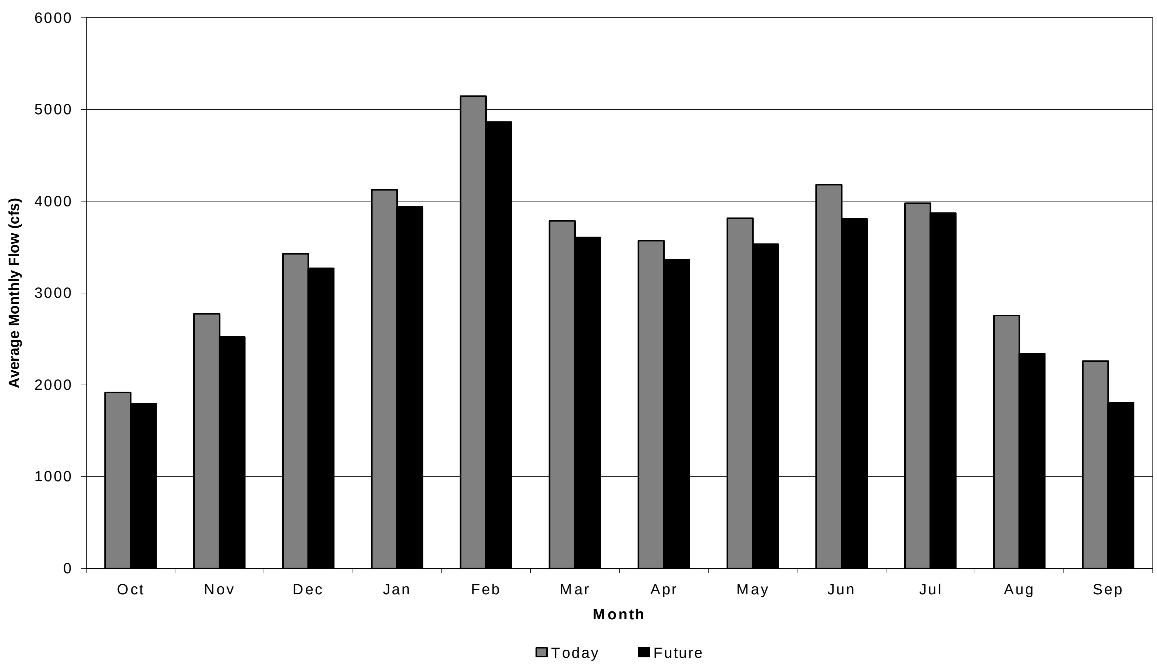


Figure 16 Average Monthly Nimbus Release under Current and Future Level of Development

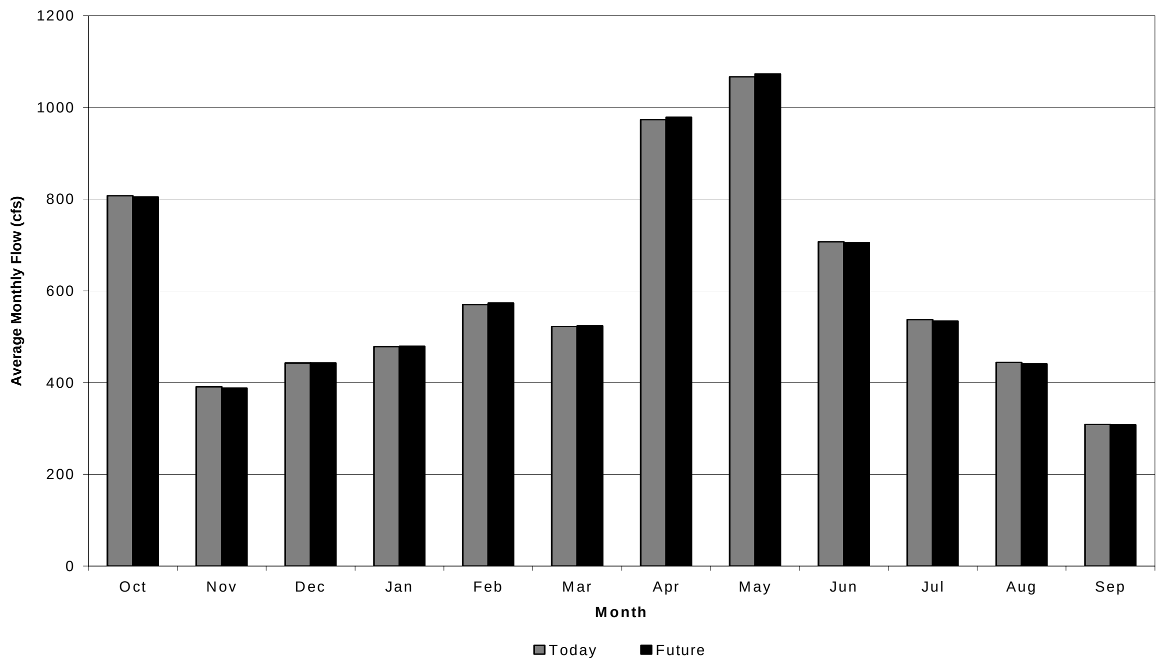


Figure 17 Average Monthly Tulloch Release under Current and Future Level of Development

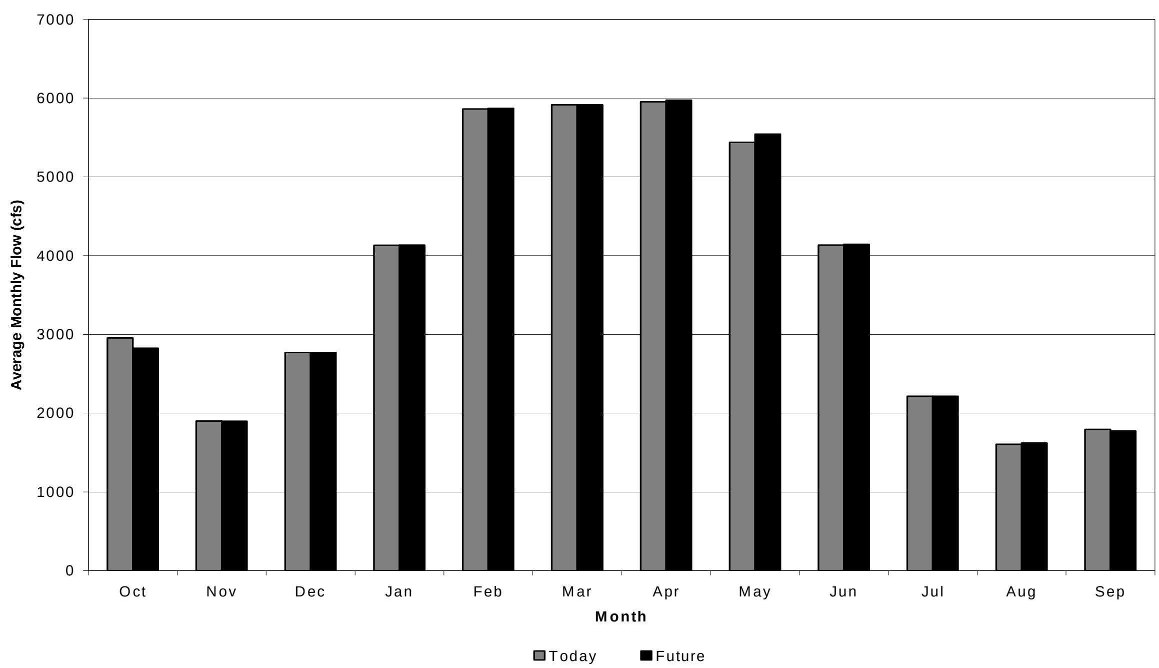


Figure 18 Average Monthly San Joaquin River Flows at Vernalis under Current and Future Level of Development

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# Long-term Central Valley Project and State Water Project Operations Criteria and Plan Biological Assessment

# Long-Term

# Central Valley Project and State Water Project

# Operations Criteria and Plan

# Biological Assessment


**U.S. Department of the Interior**

**Bureau of Reclamation**

**Mid-Pacific Region**

**Sacramento, California**


**March 22, 2004**

# Mission Statement

The mission of the Bureau of Reclamation is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public.

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# List of Abbreviations/Acronyms

| | |
|---|---|
| **ACID** | **Anderson-Cottonwood Irrigation District** |
| **af** | **acre-feet** |
| **AFA** | **acre-feet per year** |
| **AFRP** | **Anadromous Fish Restoration Program** |
| **ALPI** | **aleutian low pressure index** |
| **ANN** | **artificial neutral network** |
| **ASIP** | **Action Specific Implementation Plan** |
| **BA** | **biological assessment** |
| **BO** | **biological opinion** |
| **BY** | **brood year** |
| **B2IT** | **CVPIA Section 3406(b)(2) Implementation Team** |
| **CA** | **California Aquaduct** |
| **Cal EPA** | **California Environmental Protection Agency** |
| **CALSIM** | **California Simulation computer model** |
| **CAMP** | **Comprehensive Assessment and Monitoring Program** |
| **CCC** | **Contra Costa Canal** |
| **CCF** | **Clifton Court Forebay** |
| **CCWD** | **Contra Costa Water District** |
| **CEQA** | **California Environmental Quality Act** |
| **CESA** | **California Endangered Species Act** |
| **CFC** | **California Fish Commission** |
| **cfs** | **cubic feet per second** |
| **CHO** | **constant head orifice** |
| **COA** | **Coordinated Operation Agreement** |
| **Corps** | **U.S. Army Corps of Engineers** |
| **cpm** | **catch per minute** |
| **cpue** | **catch per unit effort** |
| **CRR** | **cohort replacement rate** |
| **CVOO** | **Central Valley Operations Office** |
| **CVP** | **Central Valley Project** |
| **CVPA** | **Central Valley Project Act** |
| **CVPIA** | **Central Valley Project Improvement Act** |

| | |
|---|---|
| **CWA** | **Clean Water Act** |
| **CWT** | **coded wire tag** |
| **D-1485** | **SWRCB Decision 1485** |
| **DAT** | **Data Assessment Team** |
| **DBEEP** | **Delta-Bay Enhanced Enforcement Program** |
| **DCC** | **Delta Cross Channel** |
| **Delta** | **Sacramento-San Joaquin Delta** |
| **DFG** | **California Department of Fish and Game** |
| **DMC** | **Delta-Mendota Canal** |
| **DO** | **Dissolved Oxygen** |
| **DSM2** | **Delta Simulation Model 2** |
| **DWR** | **California Department of Water Resources** |
| **EBMUD** | **East Bay Municipal Utility District** |
| **EC** | **Electroconductivity** |
| **EFH** | **Essential Fish Habitat** |
| **E/I** | **export to inflow ratio** |
| **EID** | **El Dorado Irrigation District** |
| **EIR** | **Environmental Impact Report** |
| **EIS** | **Environmental Impact Statement** |
| **EPA** | **U.S. Environmental Protection Agency** |
| ERP | Ecosystem Restoration Program |
| **ESA** | **Federal Endangered Species Act** |
| **ESU** | **Evolutionarily Significant Unit** |
| **EWA** | **Environmental Water Account** |
| **EWAT** | **EWA Team** |
| **FERC** | **Federal Energy Regulatory Commission** |
| **FL** | **fork length** |
| **FMWT** | **Fall Midwater Trawl Survey** |
| **FPA** | **Federal Power Act** |
| **FRH** | **Feather River Hatchery** |
| **FRWA** | **Freeport Regional Water Authority** |
| **FRWP** | **Freeport Regional Water Project** |
| **FSD** | **Folsom South Canal** |
| **FWS** | **U.S. Fish and Wildlife Service** |
| **GCID** | **Glenn-Colusa Irrigation District** |
| **GLM** | **Generalized Linear Models** |
| **GS** | **Georgiana Slough** |

| | |
|---|---|
| HORB | Head of Old River Barrier |
| IEP | Interagency Ecological Program |
| IFIM | in stream flow incremental methodology |
| Interior | U.S. Department of the Interior |
| IPO | Interim Plan of Operations |
| JPE | Juvenile Production Estimate |
| JPOD | joint point of diversion |
| LFC | low flow channel |
| LOD | Level of Development |
| LP | linear programming |
| MAF | million acre-feet |
| Magnuson-Stevens Act | Magnuson-Stevens Fishery Conservation and Management Act |
| Management Agencies | FWS, NOAA Fisheries, and DFG for the EWA |
| M&I | municipal and industrial (e.g., M&I water supplies) |
| mg/L | milligrams per liter |
| MGD | millions of gallons per day |
| MIDS | Morrow Island Distribution System |
| MILP | mixed integer linear programming |
| MLR | multiple linear regression |
| MOA | Memorandum of Agreement |
| MOU | Memorandum of Understanding |
| mS/cm | microSiemens per centimeter |
| MSL | mean sea level |
| NBA | North Bay Aqueduct |
| NCCPA | Natural Community Conservation Planning Act |
| NEPA | National Environmental Policy Act |
| NMFS | National Marine Fisheries Service – Now NOAA Fisheries (NMFS is still used in references) |
| NMIPO | New Melones Interim Plan of Operation |
| NOAA Fisheries | National Marine Fisheries Service |
| NOD | North of Delta |
| NRC | National Research Council |
| OCAP | Operations Criteria and Plan |
| OFF | Operations and Fisheries Forum |
| OID | Oakdale Irrigation District |
| ONCC | Oregon/Northern California Coast |
| Ops Group | CALFED Operations Coordination Group |

| | |
|---|---|
| PCBs | polychlorinated biphenyls |
| PCWA | Placer County Water Agency |
| PEIS | Programmatic Environmental Impact Statement |
| PFMC | Pacific Fishery Management Council |
| PG&E | Pacific Gas and Electric |
| PHABSIM | physical habitat simulation |
| Project | CVP and SWP (as in CVP and SWP water rights) |
| Project Agencies | Reclamation and DWR for the EWA |
| PIP | (See Chapter 3/Page 1) |
| ppm | parts per million |
| ppt | parts per trillion |
| PSL | pre-screen loss |
| QWEST | (See Chapter 5/Page 39) |
| RBDD | Red Bluff Diversion Dam |
| Reclamation | U.S. Bureau of Reclamation |
| ROD | Record of Decision |
| RPA | reasonable and prudent alternative |
| RRDS | Roaring River Distribution System |
| RST | rotary screw trap |
| RWQCB | Regional Water Quality Control Board |
| SA | Settlement Agreement |
| SAFCA | Sacramento Area Flood Control Agency |
| SCE | Southern California Edison |
| SCWA | Sacramento County Water Agency |
| SDFF | South Delta Fish Facility Forum |
| SDIP | South Delta Improvement Project |
| SDTB | South Delta Temporary Barriers |
| SJRA | San Joaquin River Agreement |
| SJRWR | San Joaquin River Water Rights |
| SMPA | Suisun Marsh Preservation Agreement |
| SMSCG | Suisun Marsh Salinity Control Gates |
| SMUD | Sacramento Municipal Utility District |
| SOD | Safety of Dams (same as South of Delta) |
| SOD | South of Delta (same as Safety of Dams) |
| SPDP | Salmon Protection Decision Process |
| SRBS | Stanislaus River Basin Stakeholders |
| SRI | Sacramento River Index |

| | |
|---|---|
| **SRPP** | **Spring-run Chinook salmon Protection Plan** |
| **SRTTF** | **Sacramento River Temperature Task Force** |
| **SSJID** | **South San Joaquin Irrigation District** |
| **SWP** | **State Water Project** |
| **SWRCB** | **State Water Resources Control Board** |
| **TAF** | **thousand acre-feet** |
| **TCCA** | **Tehama-Colusa Canal Authority** |
| **TCD** | **Temperature Control Device** |
| **TDS** | **total dissolved solids** |
| **T&E** | **Threatened and Endangered** |
| **TFCF** | **Tracy Fish Collection Facility** |
| **TFFIP** | **Tracy Fish Facility Improvement Program** |
| **TL** | **(See Chapter 7/Page 6)** |
| **TNS** | **Townet Survey** |
| **TU** | **temperature unit** |
| **USGS** | **U.S. Geological Survey** |
| **VAMP** | **Vernalis Adaptive Management Program** |
| **Western** | **Western Area Power Administration** |
| **Westlands** | **Westlands Water District** |
| **WOMT** | **Water Operations Management Team** |
| **WQCP** | **Water Quality Control Plan** |
| **WRESL** | **Water Resources Engineering Simulation Language** |
| **WTP** | **Water Treatment Plant** |
| **WUA** | **weighted usable spawning area** |
| **WY** | **water year** |
| **YOY** | **young-of-the-year** |
| **1995 Bay-Delta Plan** | **San Francisco Bay/Sacramento-San Joaquin Delta Estuary** |

## Introduction

This biological assessment (BA) describes the proposed long-term operation of the Central Valley Project by the Bureau of Reclamation and the State Water Project by the California Department of Water Resources (collectively "Project Agencies"). Reclamation, on behalf of itself and the California Department of Water Resources, is submitting this biological assessment pursuant to Section 7(a)(2) of the Endangered Species Act to both the U.S. Fish and Wildlife Service and the National Marine Fisheries Service (collectively "Services") to ensure that the proposed action is not likely to jeopardize the continued existence of listed species.

## Purpose of the Biological Assessment

The purpose of a BA is to evaluate the potential effects of the proposed action on listed and proposed species and designated and proposed critical habitat and determine whether any such species or habitats are likely to be adversely affected by the proposed action. Further, the BA is used to determine whether formal consultation or a conference are necessary.

The Project Agencies' objective is to work with the Services toward developing a long-term operations plan that meets the Project Agencies' legal commitments with respect to the Central Valley Project and State Water Project in a manner that is consistent with the requirements of the Endangered Species Act. Reclamation and California Department of Water Resources prepared this biological assessment to describe and analyze the affects of the proposed long-term operations plan for the Central Valley Project and State Water Project on listed species.

# Chapter 1 Summary of Legal and Statutory Authorities, Water Rights, and other Obligations Relevant to the Action

## Introduction

The Bureau of Reclamation (Reclamation) and the California Department of Water Resources (DWR), propose to operate the Central Valley Project (CVP) and State Water Project (SWP) to divert, store and convey CVP and SWP (Project) water consistent with applicable law. These operations are summarized in this biological assessment (BA) and described in more detail in Chapter 2.

The CVP and the SWP are two major inter-basin water storage and delivery systems that divert water from the southern portion of the Sacramento-San Joaquin Delta (Delta). Both projects include major reservoirs north of the Delta, and transport water via natural watercourses and canal systems to areas south and west of the Delta. The CVP also includes facilities and operations on the Stanislaus and San Joaquin Rivers. The major facilities on these rivers are New Melones and Friant Dams respectively.

The projects are permitted by the California State Water Resources Control Board (SWRCB) to store water during wet periods, divert water that is surplus to the Delta, and re-divert Project water that has been stored in upstream reservoirs. Both projects operate pursuant to water rights issued by the SWRCB to appropriate unappropriated water by diverting to storage or by directly diverting to use and rediverting releases from storage later in the year. Unappropriated water is generally available during the winter and spring each year. As such, the SWRCB requires the projects to be jointly and separately responsible for meeting specific water quality, quantity, and operational criteria within the Delta. It is through SWRCB provisions that operations of the projects are closely coordinated.

The proposed action in this consultation includes activities undertaken by DWR in operating the SWP. As such DWR needs to consult with the California Department of Fish and Game (DFG), as may be appropriate, to address applicable requirements of the State Endangered Species Act. The final version of this BA will describe the mechanisms/methods whereby this consultation will be accomplished.

## Legal and Statutory Authorities

Legal and statutory authorities and obligations, water rights, and other obligations guide the Project agencies' proposed action. This section of the BA elaborates on those authorities, responsibilities, and obligations.

### CVP

The CVP is the largest Federal Reclamation project and was originally authorized by the Rivers and Harbors Act of 1935. The CVP was reauthorized by the Rivers and Harbors Act of 1937 for the purposes of “improving navigation, regulating the flow of the San Joaquin River and the Sacramento River, controlling floods, providing for storage and for the delivery of the stored waters thereof, for construction under the provisions of the Federal reclamation laws of such distribution systems as the Secretary of the Interior deems necessary in connection with lands for which said stored waters are to be delivered, for the reclamation of arid and semiarid lands and lands of Indian reservations, and other beneficial uses, and for the generation and sale of electric energy as a means of financially aiding and assisting such undertakings and in order to permit the full utilization of the works constructed.” This Act provided that the dams and reservoirs of the CVP “shall be used, first, for river regulation, improvement of navigation and flood control; second, for irrigation and domestic uses; and, third, for power.”

The CVP was reauthorized in 1992 through the Central Valley Project Improvement Act (CVPIA). CVPIA modified the 1937 Act and added mitigation, protection, and restoration of fish and wildlife as a project purpose. Further, CVPIA specified that the dams and reservoirs of the CVP should now be used “first, for river regulation, improvement of navigation, and flood control; second, for irrigation and domestic uses and fish and wildlife mitigation, protection and restoration purposes; and, third, for power and fish and wildlife enhancement.”

CVPIA Section 3406(b)(1)(B) articulates Congressional intent for (b)(2) water to be used in conjunction with modification of the CVP operations and water acquisitions under Section 3406(b)(3), along with other restoration activities, to meet the fishery restoration goals of the CVPIA. The mandates in Section 3406 (b)(1) are implemented through the Anadromous Fish Restoration Program (AFRP). The AFRP objectives, as they relate to operations, are explained below. The U.S. Department of the Interior’s (Interior) Decision on Implementation of Section 3406 (b)(2) of the CVPIA dated May 9, 2003, provides for the dedication and management of 800,000 af of CVP yield annually by implementing upstream and Delta actions.

Additionally, there have been several other statutes that have authorized the construction, operation and maintenance of various divisions of the CVP. In these authorizations, Congress has consistently included language directing the Secretary of the Interior to operate the CVP as a single, integrated project.

## SWP

DWR was established in 1956 as the successor to the Department of Public Works for authority over water resources and dams within California. DWR also succeeded to the Department of Finance's powers with respect to State application for the appropriation of water (Stats. 1956, First Ex. Sess., Ch. 52; see also Wat. Code Sec.123) and has permits for appropriation from the SWRCB for use by the SWP. DWR’s authority to construct State water facilities or projects is derived from the Central Valley Project Act (CVPA) (Wat. Code Sec. 11100 et seq.); the Burns-Porter Act (California Water Resources Development Bond Act) (Wat. Code Sec.12930-12944); the State Contract Act (Pub. Contract Code Sec. 10100 et seq.); the Davis-Dolwig Act (Wat. Code Sec. 11900-11925); and special acts of the State Legislature. Although the Federal government built certain facilities described in the CVPA, the Act authorizes DWR to build facilities described in the Act and to issue bonds. (Warne v. Harkness (1963) 60 Cal.2d 579.) The CVPA describes specific facilities that have been built by DWR, including the Feather River Project and California Aqueduct (Wat. Code Sec. 11260), Silverwood Lake (Wat. Code Sec. 11261), and the North Bay Aqueduct (Wat. Code Sec. 11270). The Act allows DWR to administratively add other units (Wat. Code Sec. 11290) and develop power facilities (Wat. Code Sec. 11295).

The Burns-Porter Act, approved by the voters in November 1960, (Wat. Code Sec. 12930-12944) authorizes issuance of bonds for construction of the SWP. The principal facilities of the SWP are Oroville and San Luis Dams, Delta facilities, the California Aqueduct, and the North and South Bay Aqueducts. The Burns-Porter Act incorporates the provisions of the CVPA.

DWR is required to plan for recreational and fish and wildlife uses of water in connection with State-constructed water projects and can acquire land for such uses (Wat. Code Sec. 233, 345, 346, 12582). The Davis-Dolwig Act (Wat. Code Sec. 11900-11925) establishes the policy that preservation (mitigation) of fish and wildlife is part of State costs to be paid by water supply contractors and recreation and enhancement of fish and wildlife are to be provided by appropriations from the General Fund.

# Water Rights

## CVP

Federal law provides that Reclamation obtain water rights for its projects and administer its projects pursuant to State law relating the control, appropriation, use or distribution of water used in irrigation, unless the State law is inconsistent with express or clearly implied Congressional directives,. 43 U.S.C. §383; California v. United States, 438 U.S. 645, 678 (1978); appeal on remand, 694 F.2d 117 (1982). Reclamation must operate the CVP in a manner that does not impair senior or prior water rights.

Reclamation was issued water rights to appropriate water by the SWRCB for the CVP. Many of the rights for the CVP were issued pursuant to SWRCB Decision 990, adopted in February 1961. Several other decisions and SWRCB actions cover the remaining rights for the CVP. These rights contain terms and conditions that must be complied with in the operation of the CVP. Over time, SWRCB has issued further decisions that modify the terms and conditions of CVP water rights. In August 1978, SWRCB adopted the Water Quality Control Plan (WQCP) for the Delta and Suisun Marsh, which established revised water quality objectives for flow and salinity in the Delta and Suisun Marsh. In D-1485, also adopted in August 1978, SWRCB required Reclamation and DWR to operate the CVP and SWP to meet all the 1978 WQCP objectives, except some of the salinity objectives in the southern Delta. In addition, the SWRCB, November 1983, Decision 1594 and February 1984 Order WR 84-2 defining Standard Permit Term 91 to protect CVP and SWP stored water from diversion by others. Permit terms and requirements, as they relate to operations, are discussed in the OCAP. In 1991, the SWRCB adopted a WQCP which superseded parts of the 1978 plan, but SWRCB did not revise the water rights of DWR and Reclamation to reflect the objectives in the 1991 plan.

On May 22, 1995, SWRCB adopted a WQCP for the San Francisco Bay/Sacramento-San Joaquin Delta (Bay-Delta) Estuary (1995 Bay-Delta Plan). The 1995 Bay-Delta Plan superseded both the 1978 and 1991 plans. On December 29, 1999, the SWRCB adopted (and then revised on March 15, 2000) Decision 1641, amending certain terms and conditions of the water rights of the SWP and CVP. D-1641 substituted certain objectives adopted in the 1995 Bay-Delta Plan for water quality objectives required to be met as terms and conditions of the water rights of the SWP and CVP. Permit terms and requirements, as they relate to operations, are discussed below.

### SWP

Under California law, diversions of appropriated water since 1914 require a permit from the SWRCB. DWR has SWRCB permits and licenses to appropriate water for the SWP. These permits have terms that must be followed by the DWR as the permit holder. The SWRCB has issued several decisions and orders that have modified DWR's permits, many of which are the same decisions and orders that affect Reclamation CVP operations, as described in CVP water rights above.

## Water Contracts

### CVP

As the divisions of the CVP became operational, Reclamation entered into long-term contracts with water districts, irrigation districts, and others for delivery of CVP water. There are approximately 250 contracts that provide for varying amounts of water. Most of these contracts were for a term of 40 years and are in the process of being renegotiated. As appropriate, Reclamation has executed interim water service contracts. Reclamation has an obligation to deliver water to the CVP contractors in accordance with contracts between Reclamation and the contractors.

Executing long-term contracts will be the subject of a separate Section 7 consultation and therefore is not included as part of the current proposed action.

### SWP

In the 1960s, DWR entered into long-term water supply contracts with 32 water districts or agencies to provide water from the SWP. Over the years, a few of these water agencies have been restructured and today DWR has long-term water supply contracts with 29 agencies and districts. These 29 contractors supply water to urban and agricultural water users in Northern California, the San Francisco Bay Area, the San Joaquin Valley, and Southern California. Of the contracted water supply, approximately two-thirds go to municipal and industrial (M&I) users and one-third goes to agricultural users. Through these contracts, the SWP provides a supplemental water supply to approximately two-thirds of California's population. The contracts are in effect for the longest of the following periods: the project repayment period which extends to the year 2035; 75 years from the date of the contract; or the period ending with the latest maturity date of any bond issued to finance project construction costs.

## Power contracts

### CVP

In 1967, the Secretary of the Interior entered into Contract 2948A with Pacific Gas and Electric (PG&E). ). The contract integrates the CVP generation resources with the PG&E generation system and in return PG&E provides, among other things, CVP load firming, CVP load following, and transmission/distribution of CVP energy to CVP loads. The contract is administered on behalf of the United States by the Western Area Power Administration (Western). Reclamation and Western are currently planning for changes in power marketing and management anticipating the expiration of the contract on December 31, 2004.

A second contract with PG&E (Contract 2207A) provides for transmission wheeling of CVP generation to the San Luis pumping plants. This contract expires in 2016.

### SWP

DWR has authority to include as part of SWP facilities the construction of such plants and works for generation of electric power and distribution and to enter into contracts for the sale, use and distribution of the power as DWR may determine to be necessary (Wat. Code Sec. 11295 and 11625). The SWP power plants generate about half of the energy it needs to move water within the State. Because the SWP consumes more power than it generates, it meets its remaining power needs by purchasing energy or making energy exchanges with other utilities.

## Federal Power Act

### SWP

DWR operates Oroville's facilities as a multipurpose water supply, flood management, power generation, recreation, fish and wildlife enhancement, and salinity control project. The Federal Power Act (FPA) requires that DWR have a license from the Federal Energy Regulatory Commission (FERC) to operate Oroville facilities. DWR operates Oroville facilities under a license issued by the Federal Power Commission, precursor to FERC, on February 11, 1957, for a term of 50 years. The operation license will expire on January 31, 2007. Under FPA and FERC, DWR must file an application for a new license (relicense) on or before January 31, 2005. DWR will be the lead agency for the preparation of an Environmental Impact Report (EIR) for California public agency approvals relating to environmental impacts associated with the proposed relicensing of Oroville's facilities power generation components.

On September 20, 2002, DWR issued a Final National Environmental Policy Act (NEPA) Scoping Document and California Environmental Quality Act (CEQA) Notice of Preparation for the relicensing effort. In order to identify issues, plan studies, and consider potential protection, mitigation, and enhancement measures, DWR, State and Federal agencies, Indian Tribes, local government officials, and interested members of the public are actively participating in the relicensing process as the Collaborative Team. On March 25, 2003, DWR released NEPA Scoping Document 2/Amended CEQA Notice of Preparation which describes in greater detail the alternatives DWR intends to analyze as part of the environmental review process. The Collaborative Team adopted a process protocol that sets forth the structure and procedures for the relicensing procedures.

## Tribal Water Rights and Trust Resources

The Yurok and Hoopa Valley Tribes have fishing rights to take anadromous fish within their reservations.; Memorandum from the Solicitor to the Secretary, Fishing Rights of the Yurok and Hoopa Valley Tribes, M-36979 (October 4, 1993). These rights were secured to the Yurok and

Hoopa Valley Tribes through a series of nineteenth century executive orders. Their fishing rights "include the right to harvest quantities of fish on their reservations sufficient to support a moderate standard of living." Id. at 3.

The executive orders setting aside what are now the Yurok and Hoopa Valley Reservations also reserved rights to an in stream flow of water sufficient to protect the Tribes' rights to take fish within their reservations. See Colville Confederated Tribes v.Walton, 647 F.2d 42, 48 (9th Cir.), cert. Denied, 454 U.S. 1092 (1981). Although the Tribes' water rights are presently unquantified, there are rights vested at the latest in 1891 and perhaps as early as 1855. See, e.g., United States v. Adair, 723 F.2d 1394 (9th Cir. 1983).

# Other Agreements

## Coordinated Operations Agreement (COA)

The CVP and SWP use the Sacramento River and the Delta as common conveyance facilities. Reservoir releases and Delta exports must be coordinated to ensure that the projects operate to agreed upon procedures.

The coordinated operation agreement (COA) between the United States of America and the DWR to operate the CVP and the SWP was signed in November 1986. Under the COA, Reclamation and DWR agree to operate the CVP and SWP in a manner to meet Sacramento Valley and Delta needs while maintaining their respective annual water supplies as identified in the agreement. Coordination between the two projects is facilitated by implementing an accounting procedure based on the sharing principles outlined in the COA. Although the principles were intended to cover a broad range of conditions, changes introduced by past National Marine Fisheries Service (NOAA Fisheries) and U.S. Fish and Wildlife Service (FWS) biological opinions (BO) by the SWRCB D-1641, and by CVPIA were not specifically addressed by the COA. However, these variances have been addressed by Reclamation and DWR through mutual agreement. When water must be withdrawn from storage to meet Sacramento Valley and Delta requirements, 75 percent of the responsibility is borne by the CVP and 25 percent by the SWP. The COA also provides that when unstored water is available for export, 55 percent of the sum of stored water and the unstored export water is allocated to the CVP and 45 percent is allocated to the SWP. Some of the operational constraints introduced in past NOAA Fisheries and FWS biological opinions, by the SWRCB D-1641, and by CVPIA were not addressed by the COA; however, these variances have been addressed by Reclamation and DWR through mutual informal agreement.

## CALFED

In the August 28, 2000, CALFED Record of Decision (ROD), Reclamation and other State and Federal agencies committed to implementing a long-term plan to restore the Bay-Delta. This plan consists of many activities including storage, conveyance, ecosystem restoration, levee integrity, watersheds, water supply reliability, water use efficiency, water quality, water transfers, and science.

### *Coordinated Water Operations*

The Implementation Memorandum of Understanding (MOU), also signed on August 28, 2000, memorialized the operations decision-making process that had evolved through the CALFED Operations Coordination Group (Ops Group) process including an Operations Decision Making Process (Attachment D of the ROD). This process consists of staff, stakeholder, and policy level forums for addressing operational issues.

One of these forums, the Water Operations Management Team (WOMT), consists of managers of Reclamation, FWS, NOAA Fisheries, DFG, DWR and the U.S. Environmental Protection Agency (EPA). WOMT provides a weekly frequent opportunity for managers to discuss CVP/SWP operations and related fishery issues.

The Ops Group was established by the 1994 Framework Agreement. The Ops Group consisting of (DWR, DFG, SWRCB, Reclamation, FWS, NOAA Fisheries, and EPA) coordinate the operations of the Projects with fisheries protection and implementation of the CVPIA. Shortly after its formation, the Ops Group provided a forum for stakeholders to provide input into the operations decision process. The Ops Group also established three teams to facilitate the decision-making process, data exchange, and information dissemination. The CVPIA Section 3406(b)(2) Implementation Team (B2IT) assists the U.S. Department of the Interior (Interior) with implementation of CVPIA Section 3406(b)(2). The Data Assessment Team (DAT) is an agency-driven activity that includes participation by stakeholders to review biological data and provide input to Reclamation and DWR on actions to protect fish. The Operations and Fisheries Forum (OFF) is a stakeholder-driven forum to aid information dissemination and facilitate discussion regarding operation of the CVP and SWP and has been meeting since 1995.

The Ops Group developed and implements the Chinook Salmon Protection Decision Process. The process includes monitoring of environmental conditions and salmon movement, data assessment procedures, specific indicators that spring-run Chinook are entering the Delta from upstream or being entrained at the SWP or CVP export facilities, and operational responses to minimize the effects of SWP and CVP facilities on emigrating spring-run salmon. The Ops Group decision-making process is also used for protection of other Chinook salmon runs.

### *Environmental Water Account*

The Environmental Water Account (EWA) is a cooperative management program described in the CALFED ROD. The purpose of EWA is to provide protection to the fish of the Bay-Delta estuary through environmentally beneficial changes in SWP/CVP operations at no uncompensated water cost to the Project’s water users. The EWA is intended to provide sufficient water (beyond what is available through existing regulatory actions related to project operations), combined with the Ecosystem Restoration Program (ERP) and the regulatory baseline, to address the CALFED’s fishery protection and restoration/recovery needs for the first four years of Stage 1. Before the EWA expires (September 30, 2004) the management agencies and Project agencies will assess the success of EWA operations and analyze the potential impacts from new facilities and expanded conveyance capacity. The agencies will then determine the appropriate size and composition of an EWA, as well as the EWA’s sharing in the benefits from new facilities, in the fifth and future years. (CALFED ROD, Attachment 2, EWA Operating Principles Agreement)

The use of EWA assets has been included in the operations studies to reflect current operational flexibility to reduce incidental take of listed species and, as noted above, to provide for restoration and recovery of such species. Inclusion of the EWA in this description of present and also future actions for CVP and SWP operations does not represent a decision on the future implementation of EWA. Following an analysis of a future EWA or surrogate and a decision on long-term implementation of EWA, Reclamation and DWR will determine whether a new assessment of impacts to listed species under OCAP is warranted.

The modeling and biological assessments can only represent in a gross sense the annual and day-to-day use of the EWA in coordination with similar (b)(2) actions. Currently Reclamation and DWR must use forecasts of annual operations in concert with evaluations of annual (b)(2) and EWA assets to request Federal Endangered Species Act (ESA) commitments from the FWS, NOAA Fisheries, and DFG. This commitment is accomplished through the WOMT and Ops Group process to provide for daily management of operations and fishery. Based on this process, changes to the EWA resulting in unanalyzed impacts to listed species will result in re-initiation of OCAP consultation.

## Trinity

In December 2000, Interior signed the ROD on the Trinity River Main stem Fishery Restoration Environmental Impact Statement (EIS) and EIR. The ROD was the culmination of years of studies on the Trinity River. The ROD adopted the preferred alternative, a suite of actions which included a variable annual flow regime, mechanical channel rehabilitation, sediment management, watershed restoration, and adaptive management.

The EIS/EIR was challenged in Federal District Court and litigation is ongoing. The District Court has limited the flows available to the Trinity River until preparation of a supplemental environmental document is completed. As a result of ongoing litigation, the flows described in the ROD may not be implemented at this time; however, Reclamation is including the ROD flows as part of this proposed action on which Reclamation is consulting.

## San Joaquin River Agreement

The San Joaquin River Agreement (SJRA) includes a 12-year experimental program providing for increased flows and decreased Delta exports in the lower San Joaquin River during a 31-day pulse flow period during April-May. It also provides for the collection of experimental data during that time to further the understanding of the effects of flows, exports, and the Head of Old River Barrier on salmon survival. This experimental program is commonly referred to as the Vernalis Adaptive Management Program (VAMP). The SJRA also provides water for flows at other times on the Stanislaus, Merced, and lower San Joaquin Rivers. The SJRA established a management and technical committee to oversee, plan, and coordinate implementation of activities required under the agreement. Reclamation, DWR, FWS, DFG and NOAA Fisheries are signatories to the SJRA, other signatories include San Joaquin River water rights (SJRWR) holders, CVP and SWP water users, and other stakeholders. The signatory SJRWR holders formed the San Joaquin River Group Authority to coordinate implementation of their responsibilities under the SJRA. Up to 110,000 acre-feet (af) may be provided for VAMP during April-May and an additional 27,500 af is provided at other times. In certain “double-step” years, up to an additional 47,000 af may need to be acquired to fully meet VAMP flow objectives. This water would be provided under supplemental agreements separate from the SJRA.

## Sacramento Valley Water Management Program

In February 2003, Reclamation, FWS, DWR, DFG, State and Federal water-supply contractors, the Northern California Water Association and approximately 40 water districts and water users within the Sacramento River watershed signed a Settlement Agreement (SA) to resolve water right issues with respect to obligations to meet Delta water quality objectives. The SA establishes a collaborative process among the parties to promote better management of California's water resources and avoid prolonged litigation over water rights issues. The SA process calls for implementing multiple, short-term, ten-year, water management projects that will provide a source of new water to meet local water supply needs and to make water available during dry years to the SWP and CVP to assist in meeting SWRCB 1995 WQCP flow related objectives. The parties intend, through development of multiple groundwater projects and storage release projects, that the upstream water users will develop capacity to annually produce up to 185,000 af of water that would otherwise not be available in the Sacramento River. The parties are preparing environmental documents and obtaining funding to implement the short-term projects and expect that in the spring of 2005 the program will begin. The program will be phased in over three years with up to 50,000 af the first year, 100,000 af the second year, and 185,000 af the following years with the potential that these maximum amounts of water could be transferred south of the Delta if pumping capacity is available.

## Water Transfers

Water transfers relevant to this BA occur when a water user north of the Delta undertakes actions to make water available for transfer generally south of the Delta. Transfers requiring export from the Delta, such as North of Delta (NOD) transfers for dry-year transfer programs, EWA, etc., are done at times when pumping capacity at the Federal and State pumping plants is available to move the water. Reclamation and DWR will work to facilitate transfers and will complete them in accordance with all existing regulations and requirements.

# ESA

Federal agencies have an obligation to ensure that any discretionary action it authorizes, funds, or carries out is not likely to jeopardize the continued existence of any endangered or threatened species or destroy or adversely modify its critical habitat unless that activity is exempt pursuant to the Federal ESA 16 U.S.C. §1536 (a)(2); 50 CFR §402.03. Under Section 7(a)(2), a discretionary agency action jeopardizes the continued existence of a species if it "reasonably would be expected, directly or indirectly, to reduce appreciably the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of the species" 50 CFR §402.02.

Through this consultation, Reclamation will comply with its obligations under the Federal ESA, namely, to: 1) avoid any discretionary action that is likely to jeopardize continued existence of listed species or adversely affect designated critical habitat; 2) take listed species only as permitted by the relevant Service; 3) and use Reclamation's authorities to conserve listed species. Reclamation also is proposing actions to benefit the species under its existing authorities and consistent with its 7(a)(1) obligation to conserve and protect listed species. Section 7(a)(1) alone does not give Reclamation additional authority to undertake any particular action, regardless of its potential benefit for endangered species.

# The Proposed Action

The CVP is composed of some 20 reservoirs with a combined storage capacity of over 11 million af, 11 powerplants, and over 500 miles of major canals and aqueducts (see figure 2-1). These various facilities are generally operated as an integrated project, although they are authorized and categorized in divisions. Authorized project purposes include flood control; navigation; provision of water for irrigation and domestic uses; fish and wildlife protection, restoration, and enhancement; and power generation. However, not all facilities are operated to meet each of these purposes. For example, flood control is not an authorized purpose of the CVP's Trinity River Division. The primary CVP purpose was to provide water for irrigation throughout California's Central Valley. The CVPIA has amended CVP authorizations to include fish and wildlife mitigation, protection, and restoration as purposes equal in priority to irrigation and domestic uses, and fish and wildlife enhancement as a purpose equal in priority to power generation.

The SWP stores and distributes water for agricultural, and municipal, and industrial uses in the northern Central Valley, the San Francisco Bay area, the San Joaquin Valley, the Central Coast, and Southern California. Other project functions include flood control, water quality maintenance, power generation, recreation, and fish and wildlife enhancement.

The proposed action is to continue to operate the CVP and SWP. In addition to current day operations several future actions are to be included in this consultation. These actions are: increased flows in the Trinity system, increased pumping at Banks Pumping Plant (referred to as 8500 Banks), permanent barriers operated in the South Delta, an intertie between the California Aqueduct and the Delta-Mendota Canal, a long-term Environmental Water Account (EWA), Freeport Regional Water Project (FRWP), and various operational changes that are identified in this project description.

Although the actions listed in the previous paragraph are not being implemented at present, they are part of the future proposed action on which Reclamation is consulting. As such proposed activities only address the operations of the action; that is, the activities do not include construction of any facilities to implement the actions. All site-specific/localized activities of the actions such as construction/screening and any other site-specific effects will be addressed in a separate section 7 consultation.

Table 1–1 summarizes the proposed operational actions of the CVP covered by this consultation.

**Table 1–1 Proposed CVP operational actions for consultation.**

| Action | Requirement for Action |
|---|---|
| **I.Trinity River Division** | -SWRCB Permit Order 124 |

| Action | Requirement for Action |
|---|---|
| Trinity Lake operations | -Safety Of Dams Criteria |
| Lewiston Dam releases and Trinity River flows | -SWRCB permits for diversions from Trinity<br>-2000 Trinity ROD<br>-Westlands Water District (Westlands) et al., v. Interior (Trinity litigation) |
| Whiskeytown Dam releases to Clear Creek | -SWRCB permits for diversions from Trinity, Clear Creek (permits specify minimum downstream releases)<br>-1960 Memorandum of Agreement (MOA) with DFG (establishes minimum flows released to Clear Creek)<br>-1963 release schedule<br>-Consistent with Anadromous Fish Restoration Program (AFRP) objectives (Appendix A to the October 5, 1999 Decision on (b)(2) implementation) and (b)(2) availability<br>-Stability Criteria<br>-Thresholds of Trinity Storage |
| Townsend requirement | 2000 Agreement with FWS (b)(2) |
| Spring Creek Debris Dam operations | 1980 MOA with DFG, SWRCB |
| Diversions to Sacramento River | -SWRCB WR 90-5 (temperature control objectives), SWRCB WR 91-1 |
| Temperature Objectives | -SWRCB WR 90-5, SWRCB WR 91-1 |
| **II. Shasta Division** | -SWRCB WR 90-5 |
| Shasta Dam operations | - Regulating Criteria-Flood Control Act 1944<br>- CVPIA- TCD Operations |

| Action | Requirement for Action |
|---|---|
| Keswick Dam releases to Sacramento River<br><br>Minimum flows of 3,250 cubic feet per second (cfs) October through March | -1960 MOA with DFG: established flow objectives, minimum releases in dry, critical years<br>-1981 agreement with DFG: established normal year minimum releases September-February<br>-SWRCB WR 90-5: established year round minimum flows<br>-AFRP (Appendix A to the October 5, 1999 Decision on (b)(2) implementation) and (b)(2) availability<br>-Navigation flow requirement to Wilkins Slough<br>-CVPIA: ramping criteria consistent with 3406(b)(2) and 3406(b)(9) |
| **III. Sacramento River Division** | -SWRCB WR 90-5 |
| Red Bluff Diversion Dam operations<br>• Gates raised from September 15 to May 14 with flexibility to temporarily lower gates in excess of pumping capacity<br>• Future installation of additional pump | -1986 Agreement with NOAA Fisheries et al., gates raised in winter months for fish passage |
| Tehama Colusa Canal operations | -Temporary diversion from Black Butte Reservoir (SWRCB permit) |
| Sacramento River temperature objectives | -SWRCB WR 90-5:temperature objectives added to permits, modified 1960 MOUwith DFG regarding minimum flows<br>-SWRCB WR 91-1 (temperature objectives) |
| Sacramento-Trinity Water Quality Monitoring Network | -SWRCB WR 90-5, 91-1 |
| Sacramento River Temperature Task Group | -SWRCB WR 90-5, 91-1 |
| ACID Diversion Dam ops | Reclamation contract (water service and diversion) |

| Action | Requirement for Action |
| --- | --- |
| **IV. American River Division** | |
| Folsom Dam and Power Plant Operations | -U.S. Army Corps of Engineers (Corps) Flood Control Manual, Flood Control Diagram (regulating criteria)<br>-1996 Agreement with Sacramento Area Flood Control Agency (SAFCA) (modified flood control criteria)<br>- AFRP (Appendix A to the October 5, 1999 Decision on (b)(2) implementation) and (b)(2) availability<br>-Draft DFG criteria pursuant to CVPIA 3406(b)(9) (addressing flow fluctuations)<br>- CVP local municipal diversions |
| Nimbus Dam operations and Lower American River flows<br>• Includes year round temperature control | - AFRP and (b)(2) availability: minimum flows October-September, stability objectives<br>-Draft DFG criteria pursuant to CVPIA 3406(b)(9) (addressing flow fluctuations) |
| Folsom South Canal operations | -Contractual commitments |
| Freeport Regional Water Project | -Contract with EBMUD<br>-Sacramento County contract and water rights |
| **V. Eastside Division** | |

| Action | Requirement for Action |
|---|---|
| New Melones Dam and Reservoir operations and Lower Stanislaus River flows below Goodwin Dam | -Corps Flood Control Manual, Flood Control Diagram (New Melones and Tulloch)<br>-Oakdale Irrigation District (OID), South San Joaquin Irrigation District (SSJID) contract (Tri-dams agreement for afterbay storage)<br>-New Melones Interim Plan of Operation (NMIPO) (includes AFRP flows with (b)(2) water)<br>-1988 OID, SSJID Agreement and Stipulation (release of annual inflows for diversion)<br>-SWRCB D-1422 (release of 98,000 af for fish and wildlife purposes, dissolved oxygen (DO) standards at Ripon)<br>-1987 DFG Agreement (increased flows over SWRCB D-1422)<br>-1995 WQCP (minimum DO concentration)<br>-1999 SJRA flows and water supplies<br>-CVP Water Service contracts |
| Support of San Joaquin River requirements and objectives at Vernalis | -SWRCB D-1641 (Vernalis flow requirements February-June, Vernalis water quality objectives, SJRA implementation)<br>-CALFED ROD Regulatory Baseline (2:1 flow/export ratio met with (b)(2), EWA) |
| **VI. Delta Division** | -SWRCB D-1641 |
| Tracy Pumping plant<br>• Pumping curtailments supported with (b)(2) or EWA assets | -Salmon Tree Decision<br>-CVPIA<br>- CALFED ROD and EWA Operating Prinicples |
| Delta Cross Channel (DCC) Operation | -SWRCB D-1641(Delta Cross Channel closure: February-May, 14 days between May 21-June 15, 45 days between November-January)<br>-Salmon Decision Tree |

| Action | Requirement for Action |
|---|---|
| Contra Costa Canal (CCC) Operations | -CVPIA (Fish Screen Program)<br>-1993 Winter–run Chinook Salmon BO for Los Vaqueros<br>-1993 Delta Smelt BO for Los Vaqueros (requires Old River diversions January-August to extent possible, diversion reduced during dry conditions, reservoir refilling criteria, reservoir releases in spring) |
| Export/Inflow (EI) ratio | -SWRCB D-1641 |
| X2 | -SWRCB D-1641 |
| 31 Day export limit (April 15-May 15) | -SJRA- VAMP<br>-SWRCB D-1641 |
| Delta Outflow | -SWRCB D-1641 (minimum outflow July-January: 3000-8000cfs, habitat protection outflow February-June: 7,100-29,200cfs, February Salinity Starting Condition Determination) |
| Water Quality | -SWRCB D-1641 (M&I standards, agricultural standards for Western/Interior Delta and southern Delta, fish and wildlife standards for San Joaquin River and Suisun Marsh) |
| JPOD | -SWRCB D-1641 |
| Intertie | -CALFED ROD |
| **VII. Friant Division** | |
| Millerton Lake and Friant Dam operations, Friant-Kern Canal operations, and Madera Canal operations | Corps Flood Control Diagram, Mammoth Pool Operating Contract (with Southern California Edison (SCE), Water Deliveries (Class I, Class II, and Section 215 supply), SJRWR (flow at Gravelly Ford), Miller and Lux Water Rights exchange |
| **VIII. West San Joaquin Division** | |
| San Luis Reservoir, Gianelli Pumping and Generating Plant, San Luis Canal, O'Neill forebay operations, and Dos Amigos Pumping Plant | -1961 DWR/Reclamation Agreement (as amended)<br>- CVP Water Service Contracts and Deliveries |

| Action | Requirement for Action |
|---|---|
| **IX.San Felipe Division** | |
| Pacheco Pumping Plant, Santa Clara Pipeline, Hollister Conduit and Coyote Pumping Plant | - CVP Water Service Contracts and Deliveries for Santa Clara Valley Water District and San Benito County |
| **X. Other** | |
| Actions using (b)(1), (b)(2) | -CVPIA<br>-AFRP<br>-2003 Final Decision on (b)(2) Implementation. |
| EWA | -CALFED ROD and Programmatic BOs<br>-EWA Operating Principles<br>-CVPIA |

# Chapter 2 Project Description for the Central Valley Project and State Water Project

## Introduction

Reclamation and DWR propose to operate the Central Valley Project (CVP) and State Water Project (SWP) (collectively the Projects) to divert, store, and convey Project water consistent with applicable law. These operations are summarized in this Biological Assessment (BA) and are described in further detail in the CVP Operations Criteria and Plan (CVP-OCAP).

## The Proposed Action

The proposed action is to continue to operate the CVP and SWP in a coordinated manner. In addition to current day operations, several future actions are to be included in this consultation. These actions are: (1) increased flows in the Trinity River, (2) increased pumping at Banks Pumping Plant (referred to as 8500 Banks), (3) permanent barriers operated in the South Delta, (4) an intertie between the California Aqueduct (CA) and the Delta-Mendota Canal (DMC), (5) a long-term Environmental Water Account (EWA), (6) Freeport Regional Water Project (FRWP), and (7) various operational changes that are identified in this project description. Some of these items will be part of early consultation including increased Banks Pumping to 8500 cfs, permanent barriers and the long-term EWA. These proposed actions will come online at various times in the future. Thus, the proposed action is continued operation of the CVP/SWP withou these actions, and operations as they come online.

The actions listed in the preceding paragraph are not being implemented at present; however, they are part of the future proposed action on which Reclamation is consulting. Only the operations associated with the proposed activities are addressed in this consultation; i.e., the activities do not include construction of any facilities to implement the actions. All site-specific/localized activities of the actions such as construction/screening and any other site-specific effects will be addressed in separate action specific section 7 consultations.

Table 2–1 summarizes the differences between current operational actions and future operational actions to be covered by this consultation.

**Table 2–1 Proposed future changes in operational actions for consultation.**

| Area of Project | Today 2004 | Future 2030 |
|---|---|---|
| Trinity & Whiskeytown | 368,600-452,600 af | 368,600- 815,000 af |
| Shasta/Sacramento River | RBDD eight months gates out | Same |
| Oroville and Feather River | Same | Same |
| Folsom and American River | Current Demands | Build out of demands and Freeport Regional Water Project |
| New Melones and Stanislaus River | Interim Plan of Operations Guidance | Same |
| Friant | Same | Same |
| Sacramento-San Joaquin Delta | 2001 Demands | 2020 Demands |
| Suisun March | Same | Same |
| WQCP | D-1641 | Same |
| COA | 1986 Guidance | Integrated Operations |
| CVPIA | May 9, 2003 Decision | Same |
| CALFED | EWA | Same |
| Banks | 6680 cfs & Temp Barriers | 8500 Banks and Permanent barriers |
| Tracy | Max of 4600 cfs in summer | Intertie |

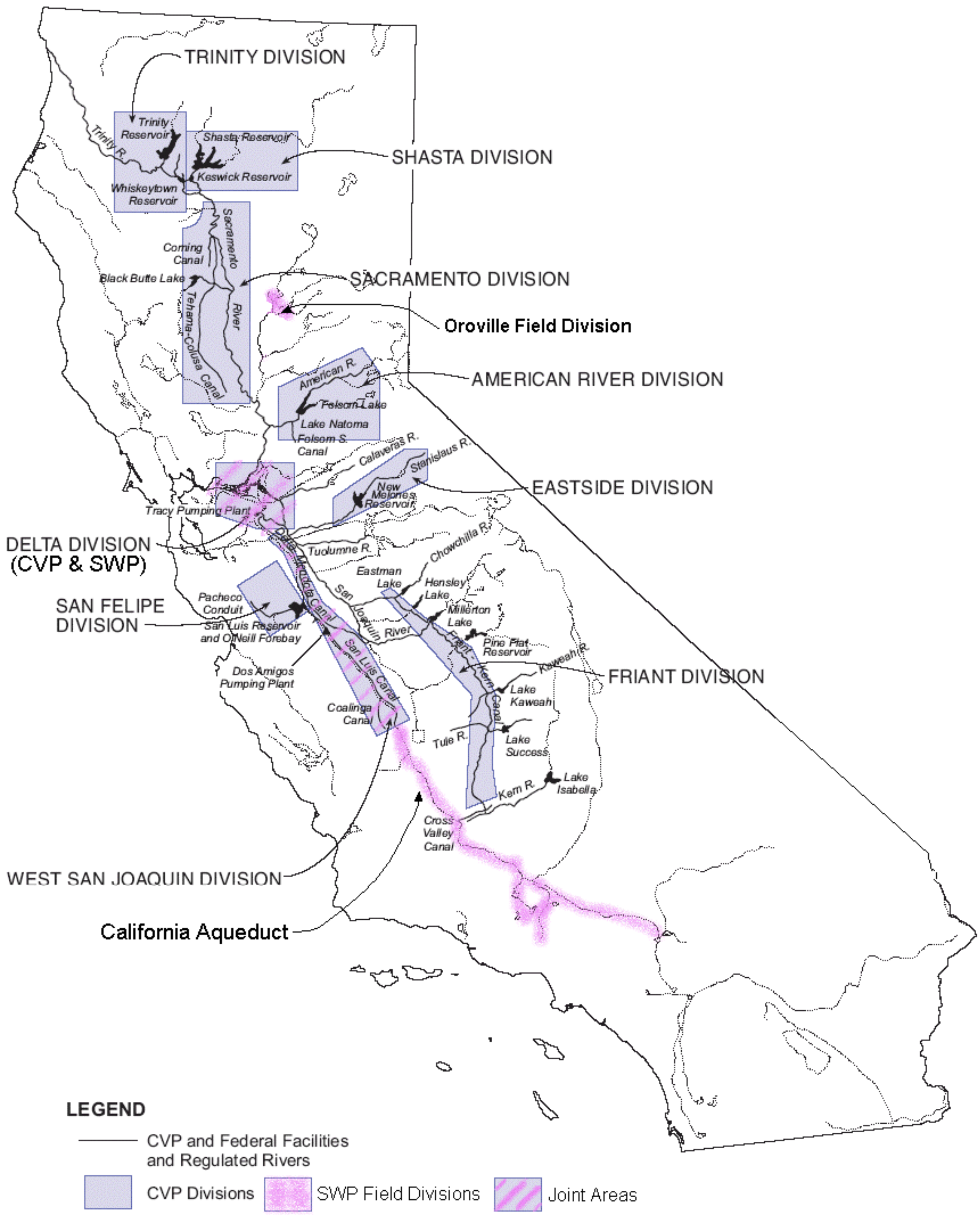


**Figure 2–1 CVP and SWP Service Areas (adapted from the draft Trinity SEIR/S)**

# Coordinated Operation of the CVP and SWP

The CVP and SWP utilize a common water supply in the Central Valley of California. The DWR and Reclamation (collectively referred to as Project Agencies) have built water conservation and water delivery facilities in the Central Valley in order to deliver water supplies to affected water rights holders as well as project contractors. The Project Agencies' water rights are conditioned by the SWRCB to protect the beneficial uses of water

within each respective project and jointly for the protection of beneficial uses in the Sacramento Valley and the Sacramento-San Joaquin Delta Estuary. The Project Agencies operate the CVP and SWP to meet these requirements through the Coordinated Operations Agreement (COA).

The COA defines the project facilities and their water supplies, sets forth procedures for coordination of operations, identifies formulas for sharing joint responsibilities for meeting Delta standards and other legal uses of water, identifies how unstored flow will be shared, sets up a framework for exchange of water and services between the Projects, and provides for periodic review every five years.

The CVP and the SWP use the Sacramento River and the Delta as common conveyance facilities. Reservoir releases and Delta exports must be coordinated to ensure each project achieves its share of benefit from shared water supplies and bears its share of joint obligations to protect beneficial uses.

## Implementing the COA

### *Obligations for In-basin Uses*

In-basin uses are defined in the COA as legal uses of water in the Sacramento Basin, including the water required under the SWRCB Decision 1485 (D-1485) Delta standards (D-1485 ordered the CVP and SWP to guarantee certain conditions for water quality protection for agricultural, municipal and industrial [M&I], and fish and wildlife use). Each project is obligated to ensure water is available for these uses, but the degree of obligation is dependent on several factors and changes throughout the year.

Balanced water conditions are defined in the COA as periods when it is agreed that releases from upstream reservoirs plus unregulated flows approximately equals the water supply needed to meet Sacramento Valley in-basin uses plus exports. Excess water conditions are periods when it is agreed that releases from upstream reservoirs plus unregulated flow exceed Sacramento Valley in-basin uses plus exports. Reclamation’s Central Valley Operations Office (CVOO) and DWR’s SWP Operations Control Office jointly decide when balanced or excess water conditions exist.

During excess water conditions, sufficient water is available to meet all beneficial needs, and the CVP and SWP are not required to supplement the supply with water from reservoir storage. Under Article 6(g), Reclamation and DWR have the responsibility (during excess water conditions) to store and export as much water as possible, within physical and contractual limits. In these cases, accountability is not required. However, during balanced water conditions, the Projects share the responsibility in meeting in-basin uses. Balanced water conditions are further defined according to whether water from upstream storage is required to meet Sacramento Valley in-basin use or unstored water is available for export.

When water must be withdrawn from reservoir storage to meet in-basin uses, 75 percent of the responsibility is borne by the CVP and 25 percent is borne by the SWP[1]. When unstored water is available for export (i.e., Delta exports exceed storage withdrawals while balanced water conditions exist), the sum of CVP stored water, SWP stored water, and the unstored water for export is allocated 55/45 to the CVP and SWP, respectively.

### *Accounting and Coordination of Operations*

Reclamation and DWR coordinate on a daily basis to determine target Delta outflow for water quality, reservoir release levels necessary to meet in-basin demands, schedules for joint use of the San Luis Unit facilities, and for the use of each other's facilities for pumping and wheeling.

During balanced water conditions, daily accounts are maintained of the CVP and SWP obligations. This accounting allows for flexibility in operations and avoids the necessity of daily changes in reservoir releases that originate several days travel time from the Delta. It also means adjustments can be made "after the fact" rather than by prediction for the variables of reservoir inflow, storage withdrawals, and in-basin uses.

The accounting language of the COA provides the mechanism for determining the responsibility of each project; however, real time operations dictate actions. For example, conditions in the Delta can change rapidly. Weather conditions combined with tidal action can quickly affect Delta salinity conditions, and therefore, the Delta outflow objective. If, in this circumstance, it is decided the reasonable course of action is to increase upstream reservoir releases, then the response will likely be to increase Folsom releases first. Lake Oroville water releases require about three days to reach the Delta, while water released from Lake Shasta requires five days to travel from Keswick to the Delta. As water from the other reservoirs arrives in the Delta, Folsom releases could be adjusted downward. Any imbalance in meeting each project's obligation would be captured by the COA accounting.

Reservoir release changes are one means of adjusting to changing in-basin conditions. s in Delta outflow can be also be immediately achieved by increasing or decreasing project exports. As with changes in reservoir releases, imbalances in meeting project obligations are counted in the COA accounting.

During periods of balanced water conditions, when real-time operations dictate project actions, an accounting procedure tracks the water obligations of the CVP and SWP. The Projects maintain a daily and accumulated accounting. The account represents the imbalance resulting from actual coordinated operations compared to the COA-defined sharing of obligations and supply. The project that is "owed" water (i.e., the project that provided more or exported less than its COA-defined share) may request the other project adjust its operations to reduce or eliminate the accumulated account within a reasonable time.

The duration of balanced water conditions varies from year to year. Some very wet years have had no periods of balanced conditions, while very dry years may have had long continuous periods of balanced conditions, and still other years may have had several periods of balanced conditions interspersed with excess water conditions. Account balances continue from one

[1] These percentages were derived from negotiations between Reclamation and DWR

balanced water condition through the excess water condition and into the next balanced water condition. When the project that is owed water enters into flood control operations, at Shasta or Oroville, the accounting is zeroed out for that respective project.

## Changes in Operations Coordination Environment since 1986

Implementation of the COA has evolved continually since 1986 as changes have occurred to CVP and SWP facilities, to project operations criteria, and to the overall physical and regulatory environment in which the operations coordination takes place. Since 1986, new facilities have been incorporated into the operations that were not part of the original COA. New water quality and flow standards (D-1641) have been imposed by the SWRCB; the Central Valley Project Impovement Act (CVPIA) has changed how the CVP is operated; and finally, the Federal Endangered Species Act (ESA) responsibilities have effected both the CVP and SWP operations. The following is a list of significant changes that have occurred since 1986. Included after each item is an explanation of how it relates to the COA and its general effect on the accomplishments of the CVP or SWP.

### *Sacramento River Temperature Control Operations*

Temperature operations have constrained the pattern of storage and withdrawal of storage at Shasta, Trinity, and Whiskeytown, for the purpose of improving temperature control. They have also constrained rates of flow, and changes in rates of flow below Keswick Dam in keeping with temperature requirements. Such constraints have reduced the CVP's capability to respond efficiently to changes in Delta export or outflow requirements. Periodically, temperature requirements have caused timing of the CVP releases to be mismatched with Delta export capability, resulting in loss of water supply. On occasion, and in accordance with Articles 6(h) and 6(i) of the COA, the SWP has been able to export water released by the CVP for temperature control in the Sacramento River.

### *Bay-Delta Accord, and Subsequent SWRCB Implementation of D-1641*

The December 1994 Accord committed the CVP and SWP to a set of Delta habitat protective objectives that were eventually incorporated into the 1995 Water Quality Control Plan (WQCP), and later, along with Vernalis Adaptive Management Program (VAMP), were implemented by D-1641. The actions taken by the CVP and SWP in implementing D-1641 significantly reduced the export water supply of both Projects. Article 11 of the COA describes the options available to the United States for responding to the establishment of new Delta standards.

The first option is to amend the COA to provide for continued implementation to accomplish the purposes of the 1986 Agreement. Although the CVP and SWP continue to be operated in coordination to meet D-1641, neither an amendment of the COA nor an evaluation of the new Delta standards (for consistency with Congressional directives) has been undertaken. Significant new elements in the D-1641 standards include: (1) the X2 standards, (2) export to inflow (E/I) ratios, (3) Real-time Delta Cross Channel (DCC) operation, (4) San Joaquin flow standards, and (5) recognition of the CALFED Operations (CALFED Ops) process for flexibility in applying or relaxing certain standards.

### Freeport Regional Water Project

The FRWP will be a new facility that will divert up to a maximum of about 300 cubic feet per second (cfs) from the Sacramento River near Freeport for Sacramento County and East Bay Municipal Utility District (EBMUD). EBMUD will divert water pursuant to its amended contract with Reclamation. The County will divert using its water rights and its CVP contract supply. This facility was not in the 1986 COA, and the diversions will result in some reduction in Delta export supply for both the CVP and SWP contractors. Pursuant to an agreement between Reclamation, DWR, and the CVP and SWP contractors in 2003, diversions to EBMUD will be treated as an export in the COA accounting and diversions to Sacramento County will be treated as an in-basin use.

### North Bay Aqueduct

North Bay Aqueduct is a SWP feature that can convey up to about 175 cfs diverted from the SWP's Barker Slough Pumping Plant. North Bay Aqueduct Diversions are conveyed to Napa and Solano Counties. Pursuant to an agreement between Reclamation, DWR, and the CVP and SWP contractors in 2003, a portion of the SWP diversions will be treated as an export in COA accounting.

### Loss of 195,000 af of D-1485 Condition 3 Replacement Pumping

The 1986 COA affirmed the SWP's commitment to provide replacement capacity to the CVP to make up for May and June pumping reductions imposed by SWRCB D-1485 in 1978. In the evolution of COA operations since 1986, D-1485 was superseded and SWP growth and other pumping constraints reduced available surplus capacity. The CVP has not received replacement pumping since 1993. Since then there have been (and in the current operations environment there will continue to be) many years in which the CVP will be limited by insufficient Delta export capacity to convey its water supply. The loss of the up to 195,000 af of replacement pumping has diminished the accomplishments anticipated by the CVP under the 1986 COA.

### Periodic Review of the COA

The language of the COA incorporates a provision for the periodic review of the Agreement. Article 14a of the COA specifies the parties to review operations every five years.

The Agreement proceeds to state that the parties shall:

- Compare the relative success each party has had in meeting its objectives.
- Review operation studies supporting the COA.
- Assess the influence of the factors and procedures of Article 6 in meeting each party's future objectives.

Article 14a further states, "The parties shall agree upon revisions, if any, of the factors and procedures in Article 6, Exhibits B and D, and the Operation Study used to develop Exhibit B."

Beginning in 1995, and continuing under SWRCB D-1641, the Projects have been operating to meet the revised Delta standards. The changes that have occurred to the CVP and SWP since 1986 suggest a COA review would be appropriate. The August 2000 CALFED Record of Decision (ROD) included as an "Implementation Commitment" that DWR and Reclamation intend to modify the 1986 COA in order to reflect the many changes in regulatory standards, operating conditions, and new project features such as EWA, that have evolved. Should that process indicate a change in the coordinated operation of the CVP and SWP, a review will be completed to determine the need to re-initiate consultation under Section 7 of the ESA.

# SWRCB D-1641

The California State Water Resources Control Board imposes a myriad of constraints upon the operations of the Central Valley Project and State Water Project in the Delta. With Water Rights Decision 1641, the SWRCB implements the objectives set forth in the SWRCB 1995 Bay-Delta Water Quality Control Plan and imposes flow and water quality objectives upon the Projects to assure protection of beneficial uses in the Delta. The SWRCB also grants conditional changes to points of diversion for each project with D-1641.

The various flow objectives and export restraints are designed to protect fisheries. These objectives include specific outflow requirements throughout the year, specific export restraints in the spring, and export limits based on a percentage of estuary inflow throughout the year. The water quality objectives are designed to protect agricultural, municipal and industrial, and fishery uses and vary throughout the year and by the wetness of the year.

Figure 2–2 and Figure 2–3 summarize the flow and quality objectives in the Delta and Suisun Marsh for the Projects from D1641. These objectives will remain in place until such time that the SWRCB revisits them per petition or as a consequence to revisions to the SWRCB Water Quality Plan for the Bay-Delta (which is to be revisited periodically.)

On December 29, 1999, SWRCB adopted and then revised (on March 15, 2000) Decision 1641, amending certain terms and conditions of the water rights of the SWP and CVP. Decision-1641 substituted certain objectives adopted in the 1995 Bay-Delta Plan for water quality objectives that had to be met under the water rights of the SWP and CVP. In effect, D-1641 obligates the SWP and CVP to comply with the objectives in the 1995 Bay-Delta Plan. The requirements in D-1641 address the standards for fish and wildlife protection, M&I water quality, agricultural water quality, and Suisun Marsh salinity. SWRCB D-1641 also authorizes SWP and CVP to jointly use each other’s points of diversion in the southern Delta, with conditional limitations and required response coordination plans. SWRCB D-1641 modified the Vernalis salinity standard under SWRCB Decision 1422 to the corresponding Vernalis salinity objective in the 1995 Bay-Delta Plan. The criteria imposed upon the CVP and SWP are summarized in Figure 2–2 (Summary Bay-Delta Standards) , Figure 2–3 (Footnotes for Summary Bay-Delta Standards), and Figure 2–4 (CVP/SWP Map).

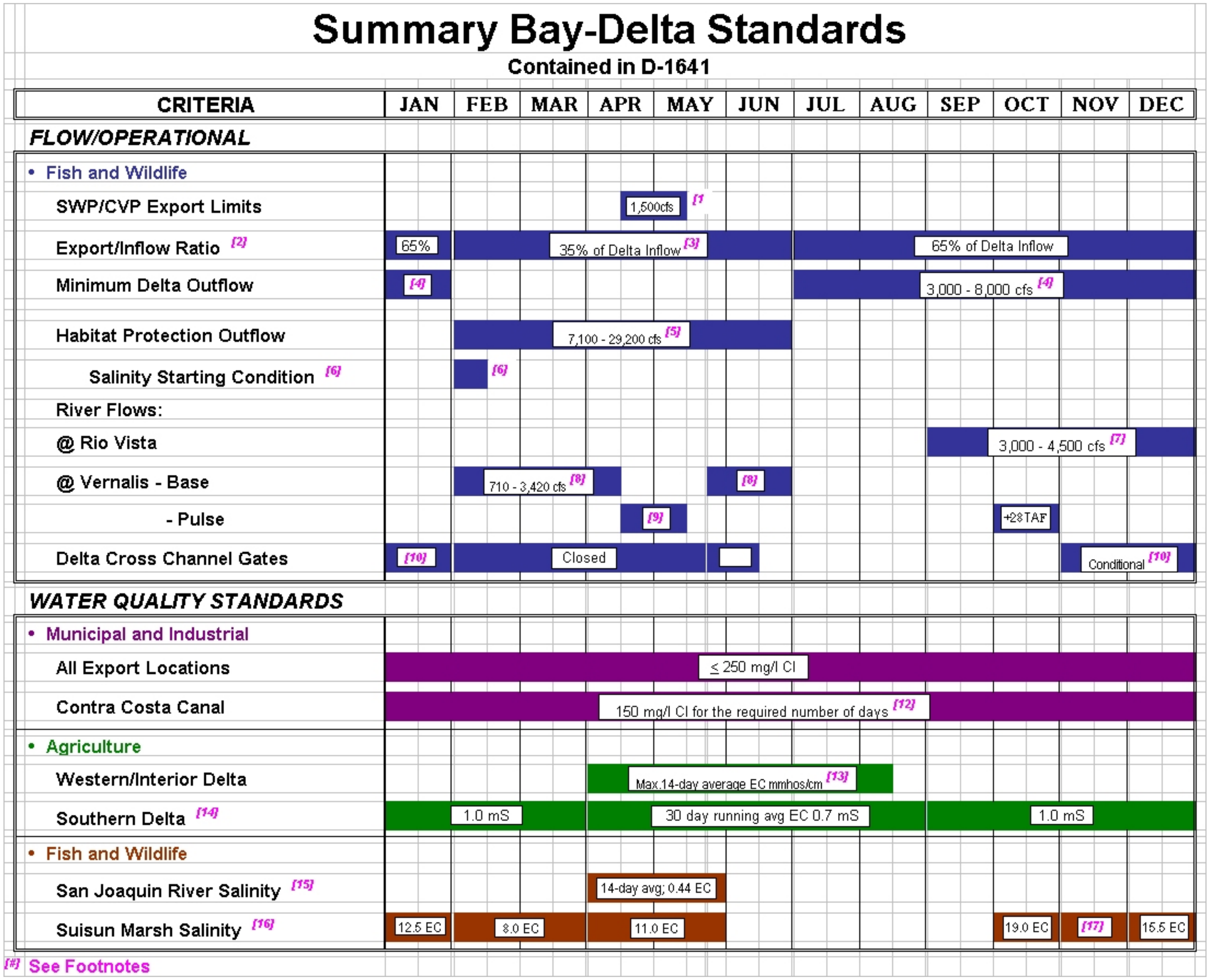


Figure 2–2 Summary Bay Delta Standards (See Footnotes in Figure 2–3)



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