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

Prepared for

Bureau of Reclamation

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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

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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

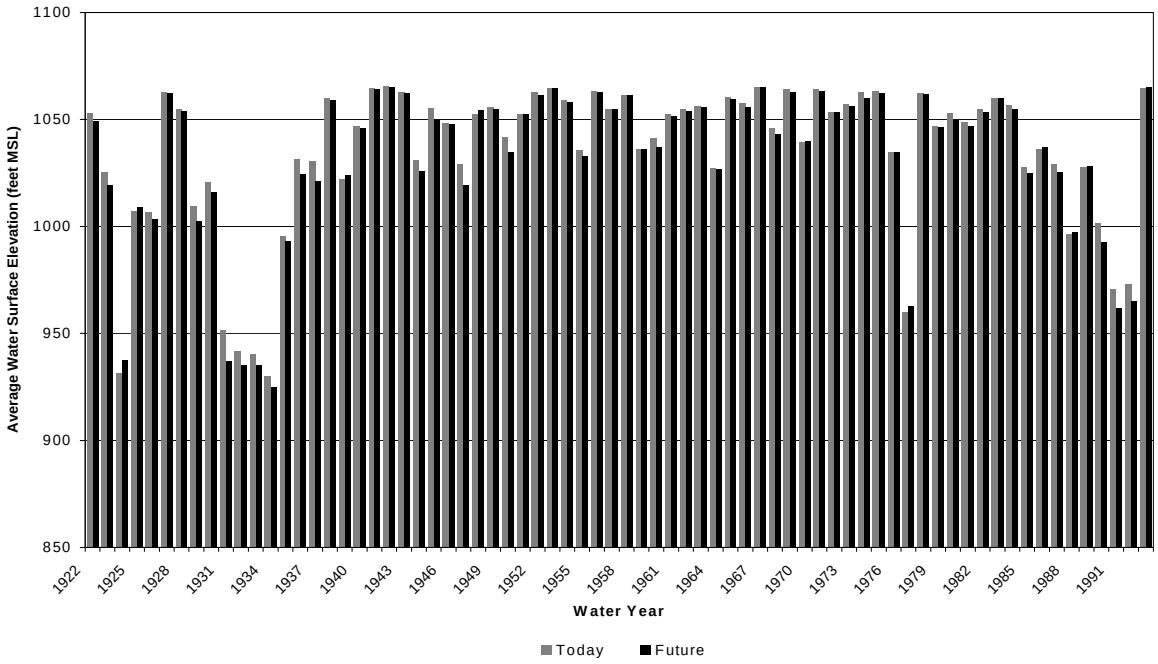

Figure 1 Average Water Surface Elevation during April through June at Shasta Reservoir Under Current and Future Level of Development

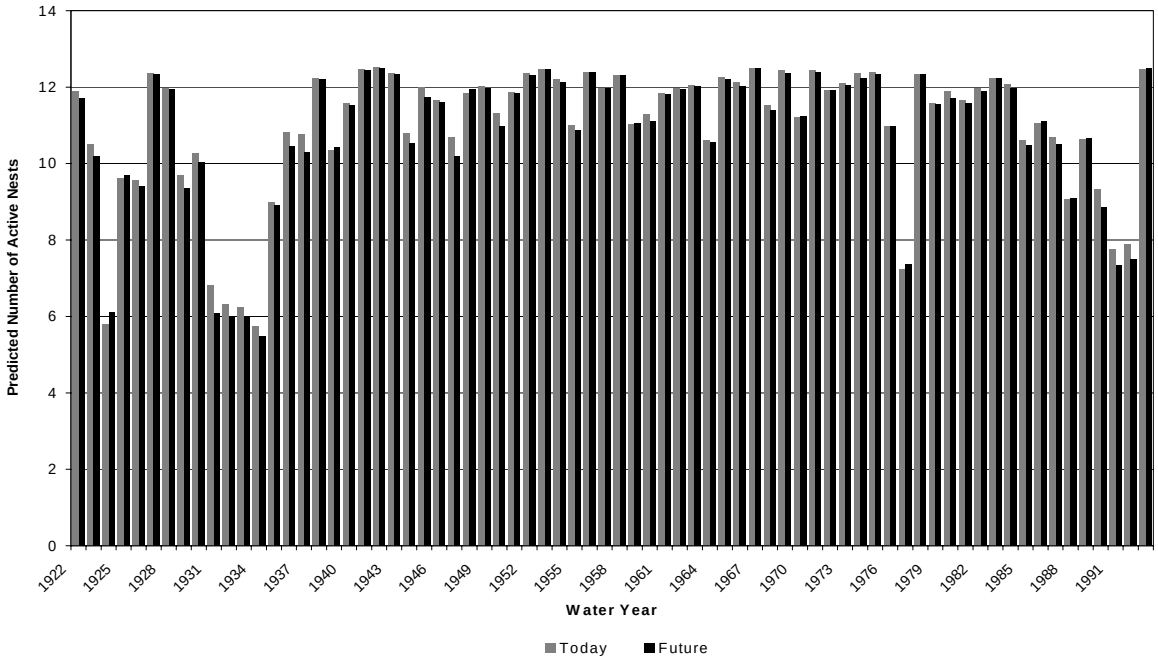

Figure 2 Predicted number of Active Bald Eagle Nests at Shasta Reservoir Under Current and Future Level of Development

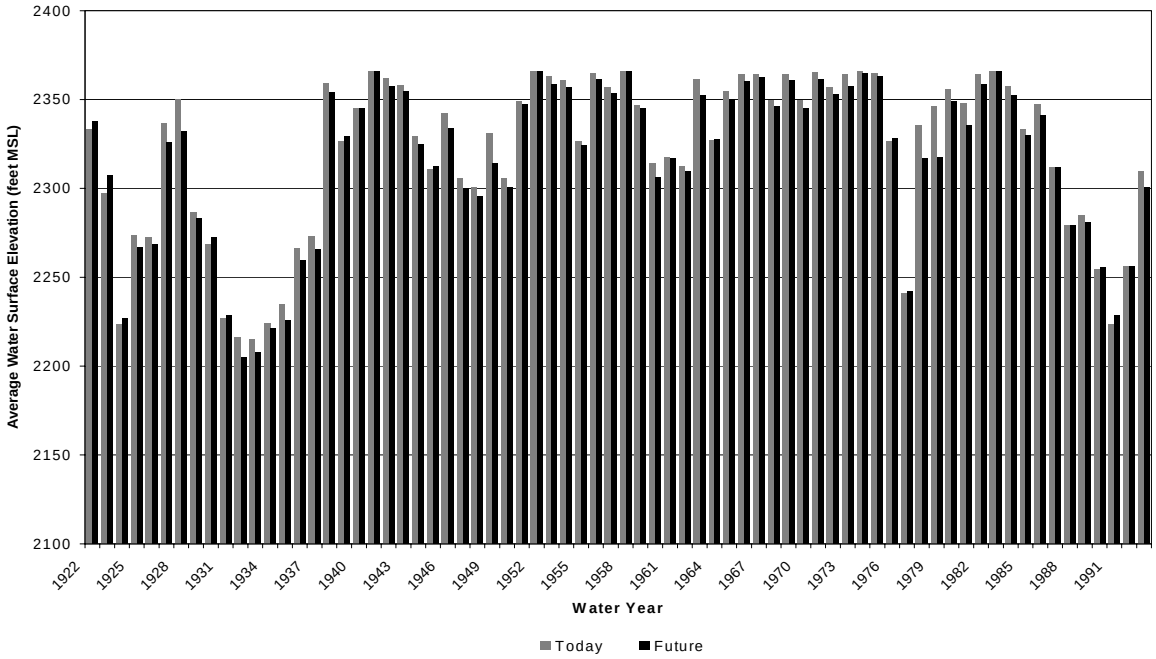

Figure 3 Average Water Surface Elevation during April through June at Clair Engle Reservoir Under Current and Future Level of Development

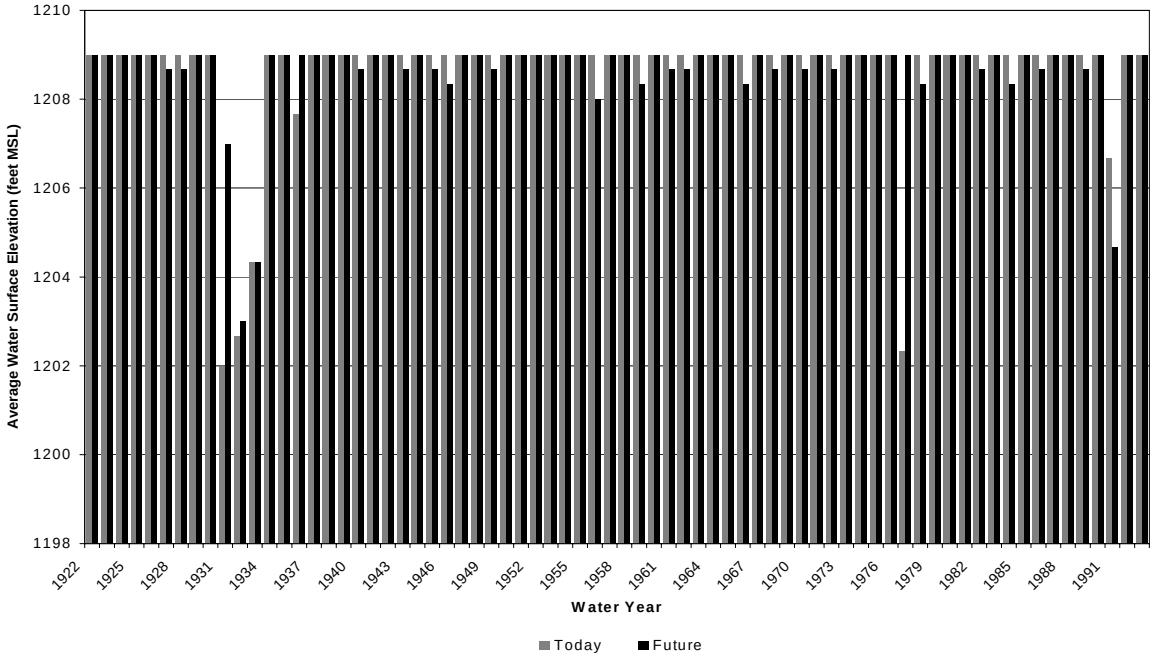

Figure 4 Average Water Surface Elevation during April through June at Whiskeytown Reservoir Under Current and Future Level of Development

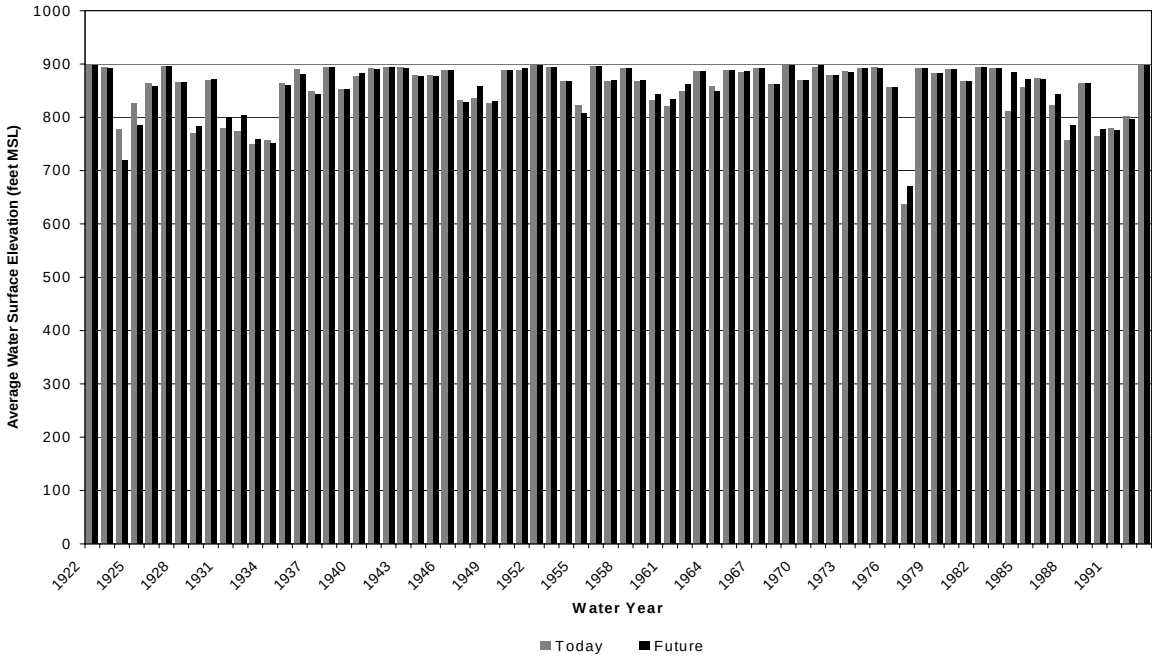

Figure 5 Average Water Surface Elevation during April through June at Oroville Reservoir Under Current and Future Level of Development

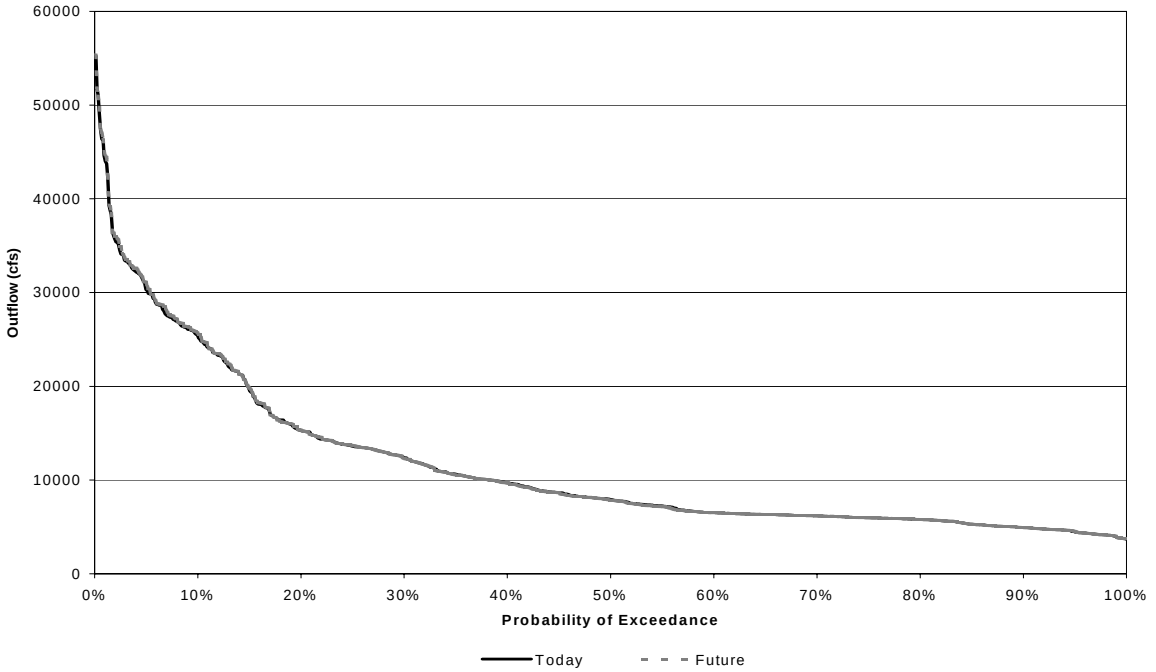

Figure 6 Total Annual Delta Outflow Exceedance under Current and Future Level of Development

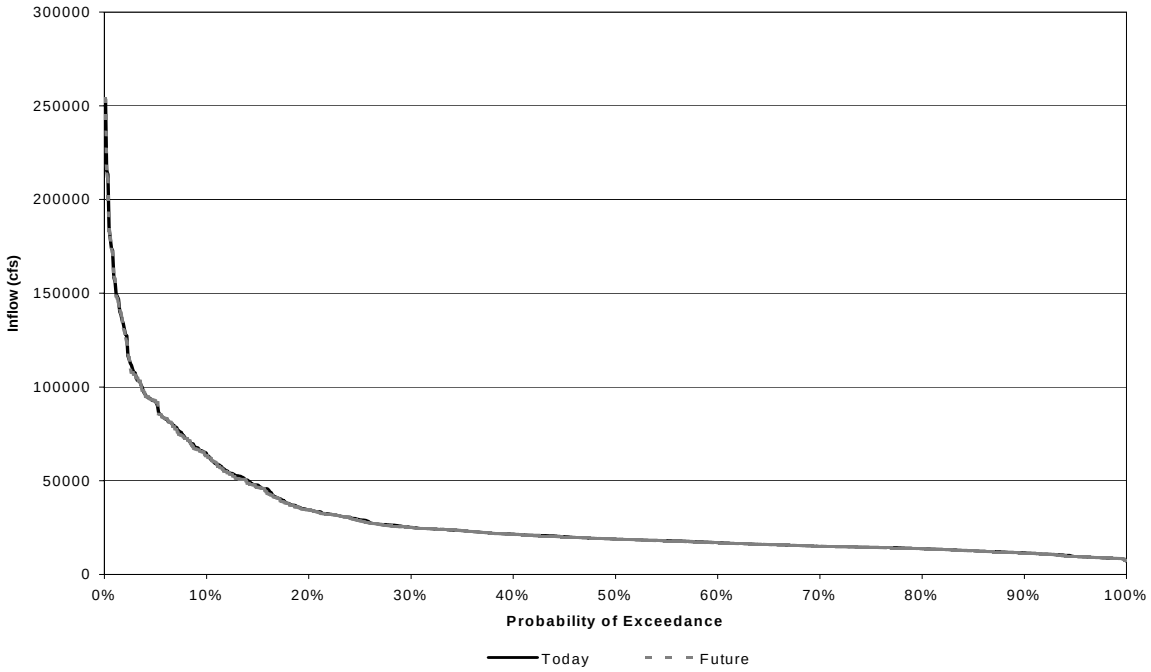

Figure 7 Total Annual Delta Inflow Exceedance under Current and Future Level of Development

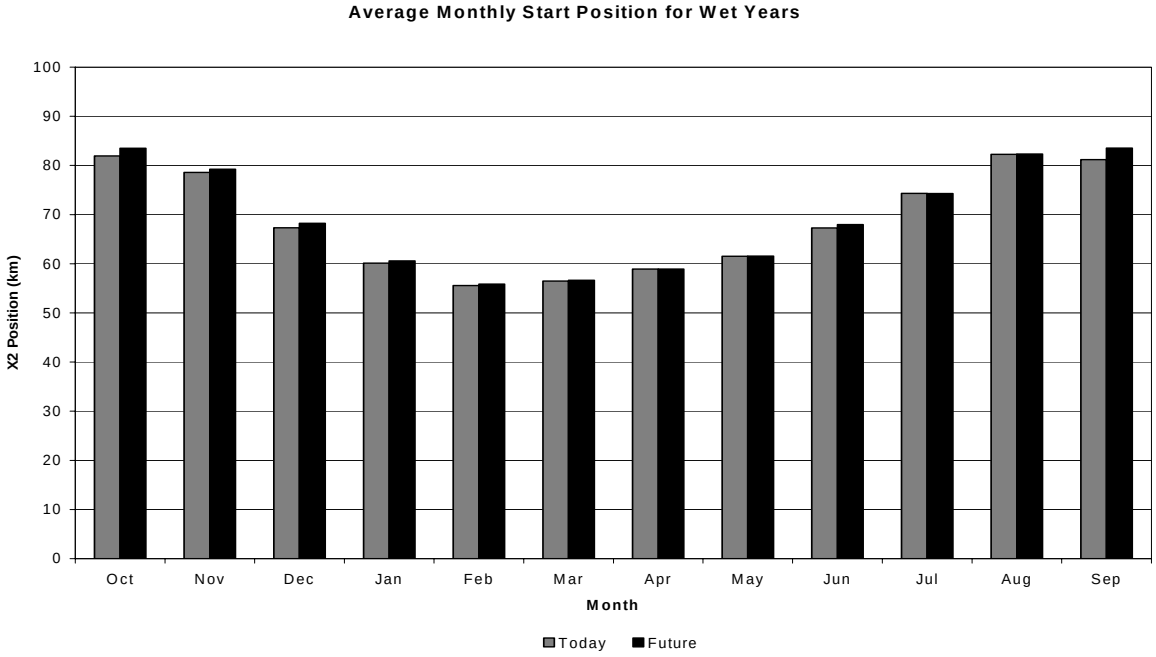

Figure 8 Wet Year Average Monthly X2 Start Position under Current and Future Level of Development

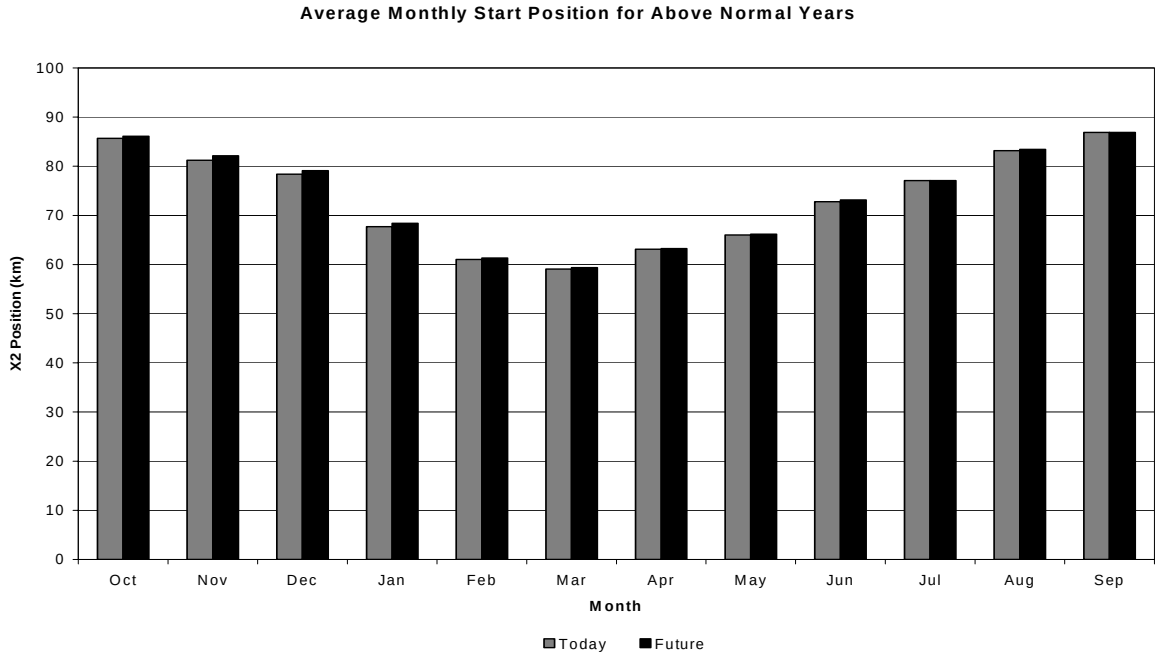

Figure 9 Above Normal Year Average Monthly X2 Start Position under Current and Future Level of Development

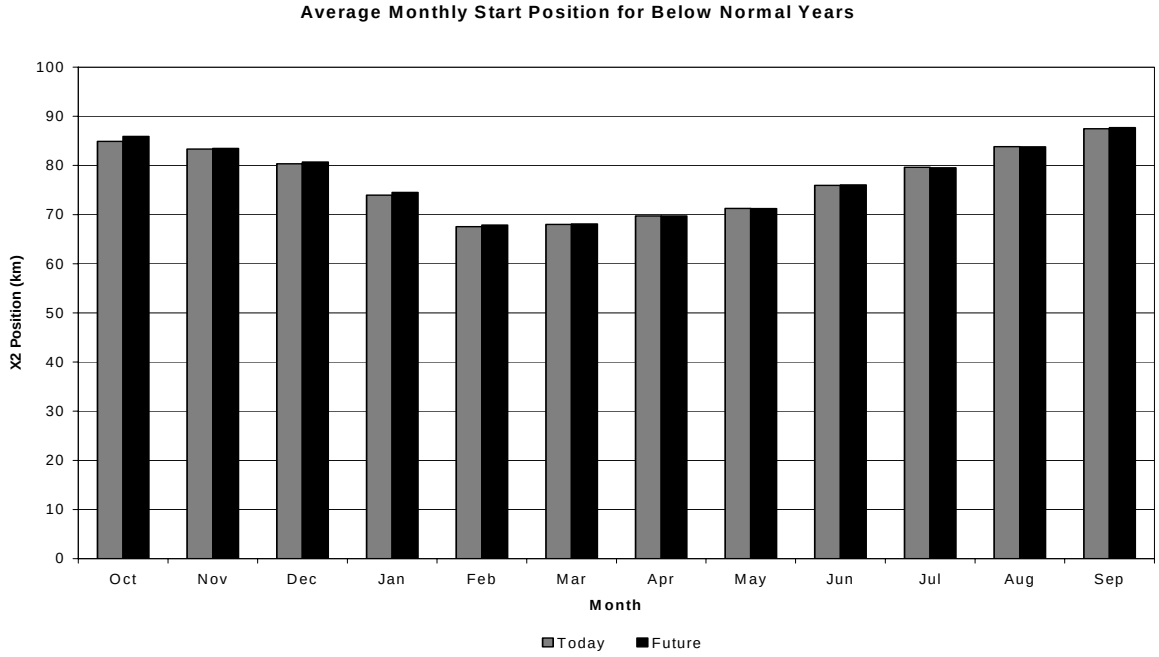

Figure 10 Below Normal Year Average Monthly X2 Start Position under Current and Future Level of Development

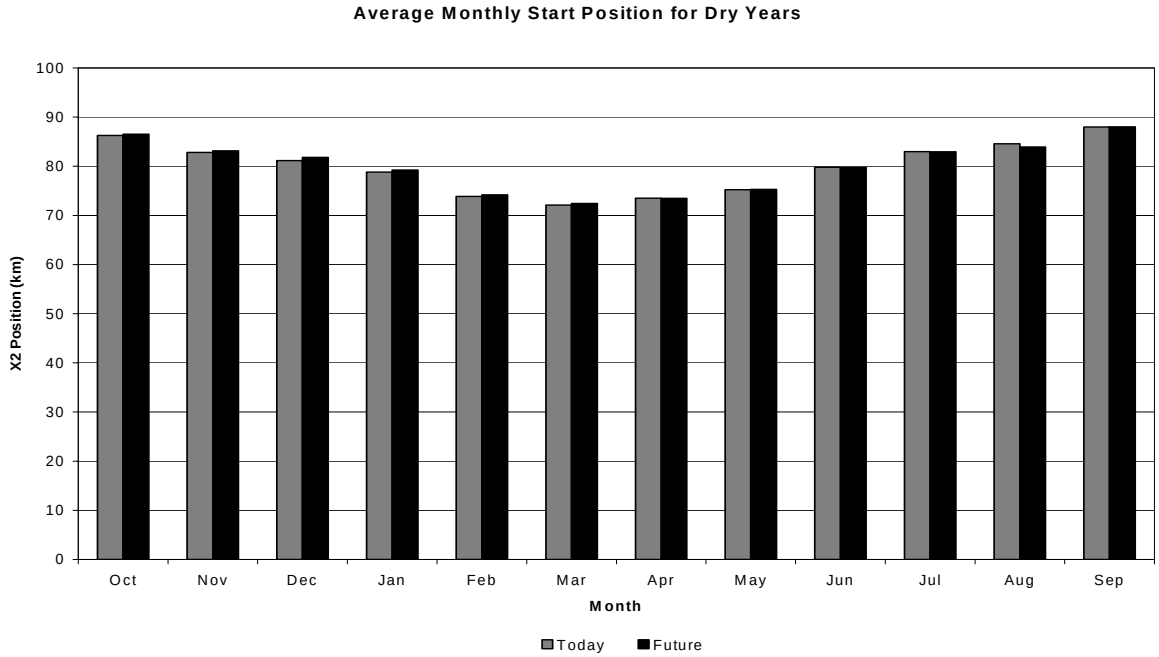

Figure 11 Dry Year Average Monthly X2 Start Position under Current and Future Level of Development

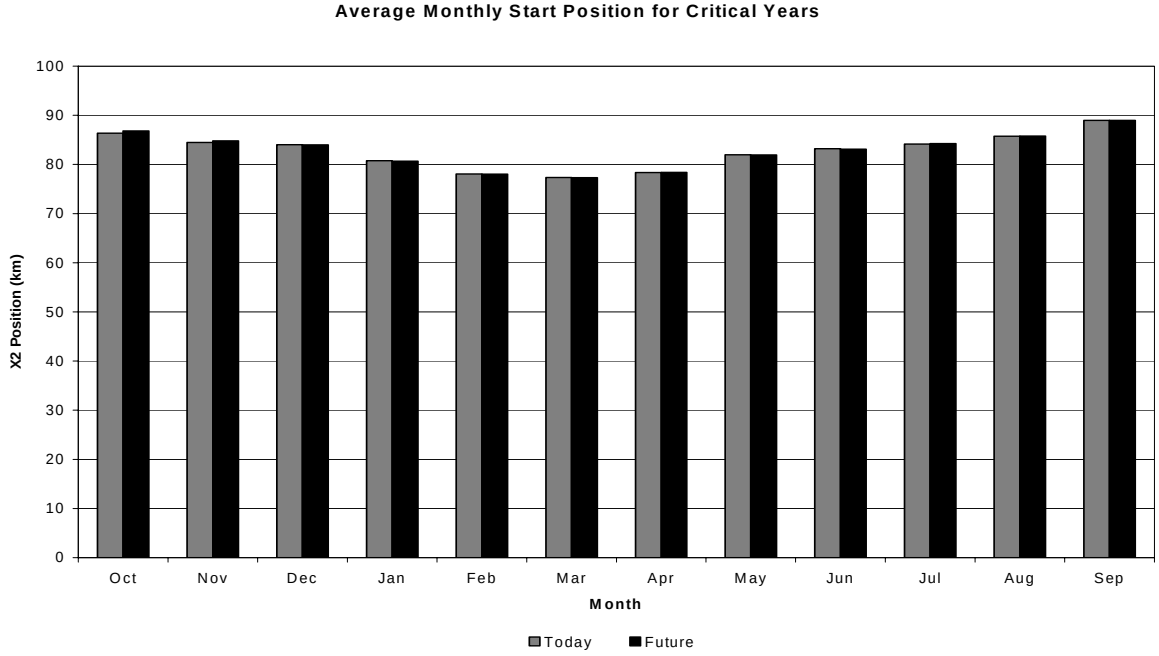

Figure 12 Critical Year Average Monthly X2 Start Position under Current and Future Level of Development

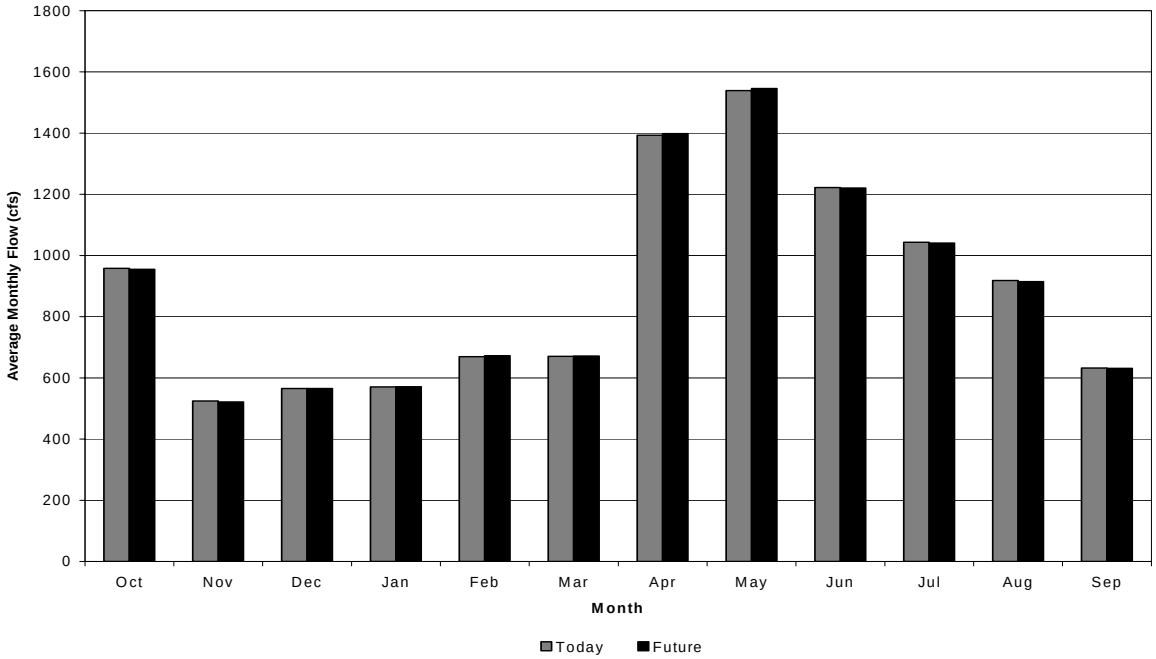

Figure 13 Average Monthly Stanislaus River Flows at the Mouth under Current and Future Level of Development

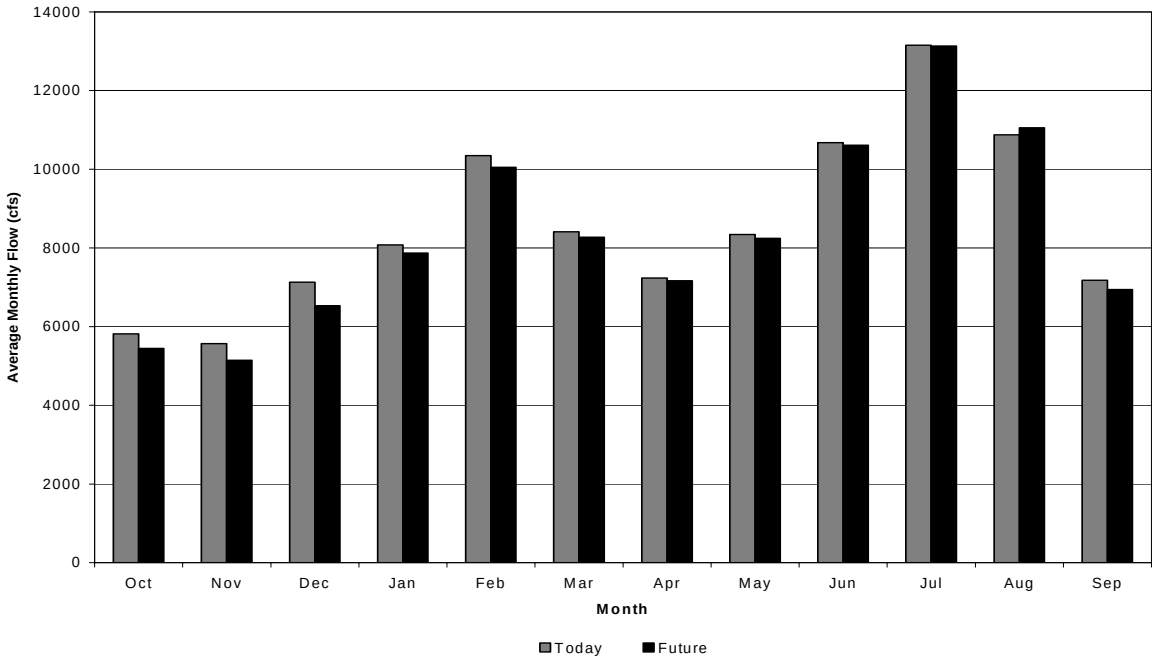

Figure 14 Average Monthly Keswick Release under Current and Future Level of Development

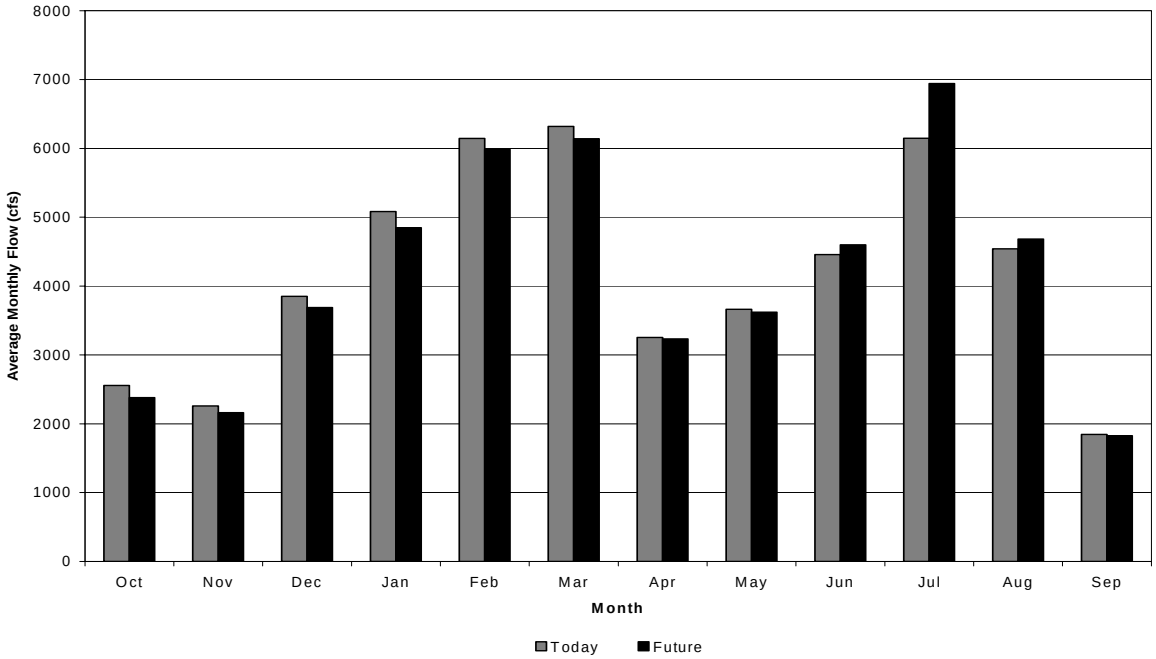

Figure 15 Average Monthly Thermalito Release under Current and Future Level of Development

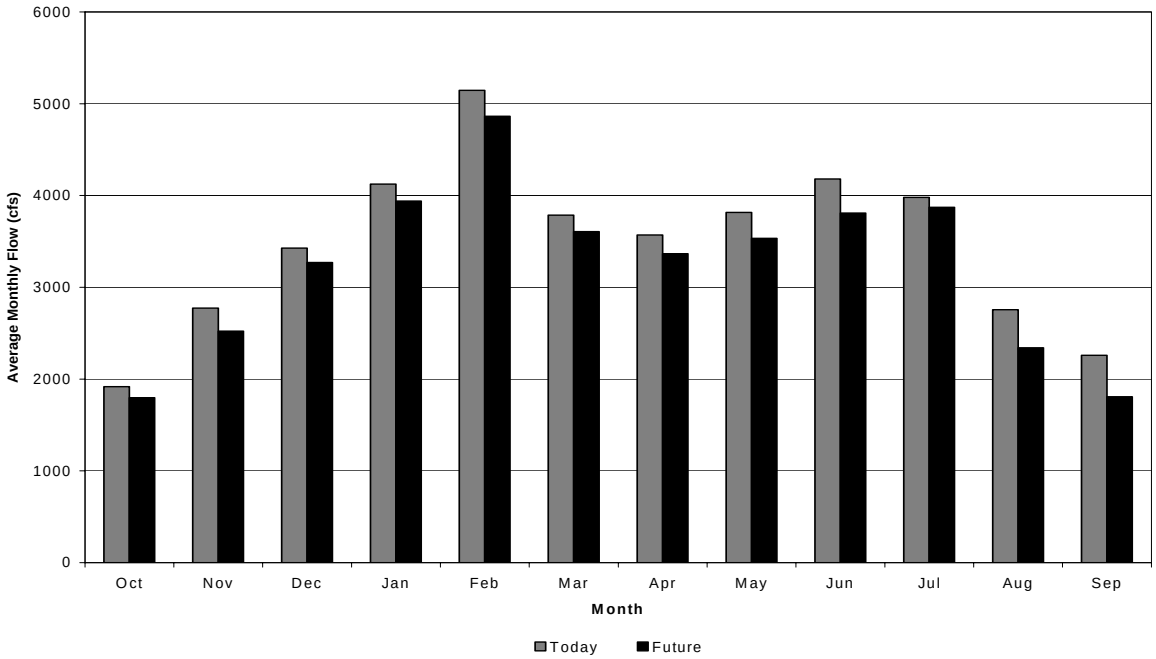

Figure 16 Average Monthly Nimbus Release under Current and Future Level of Development

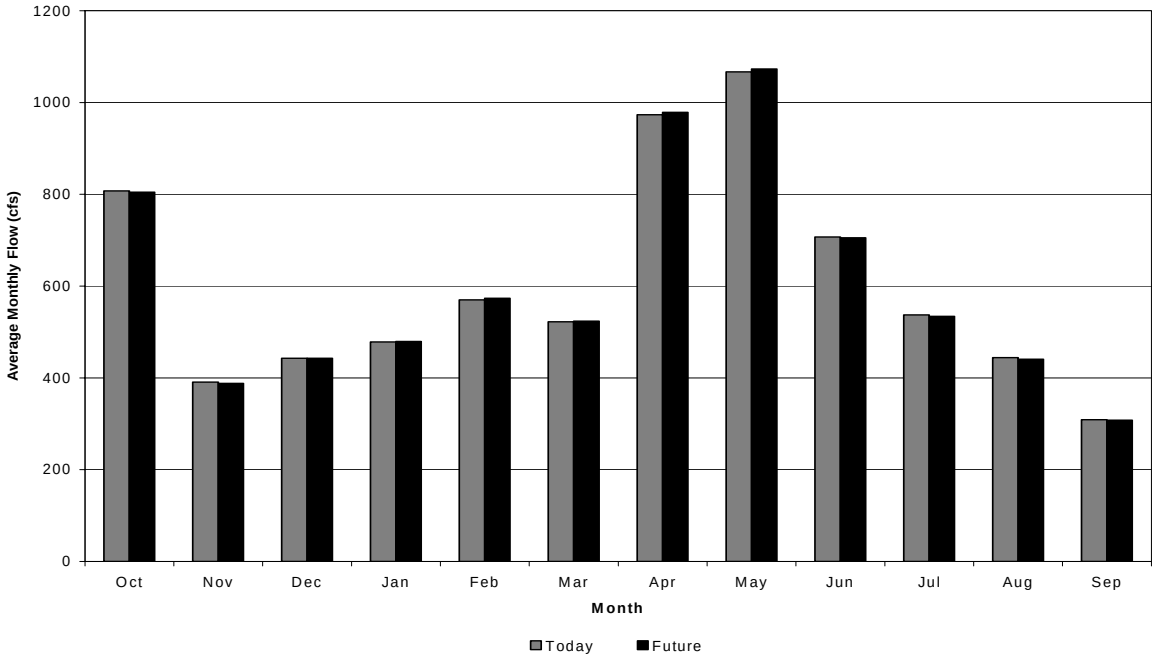

Figure 17 Average Monthly Tulloch Release under Current and Future Level of Development

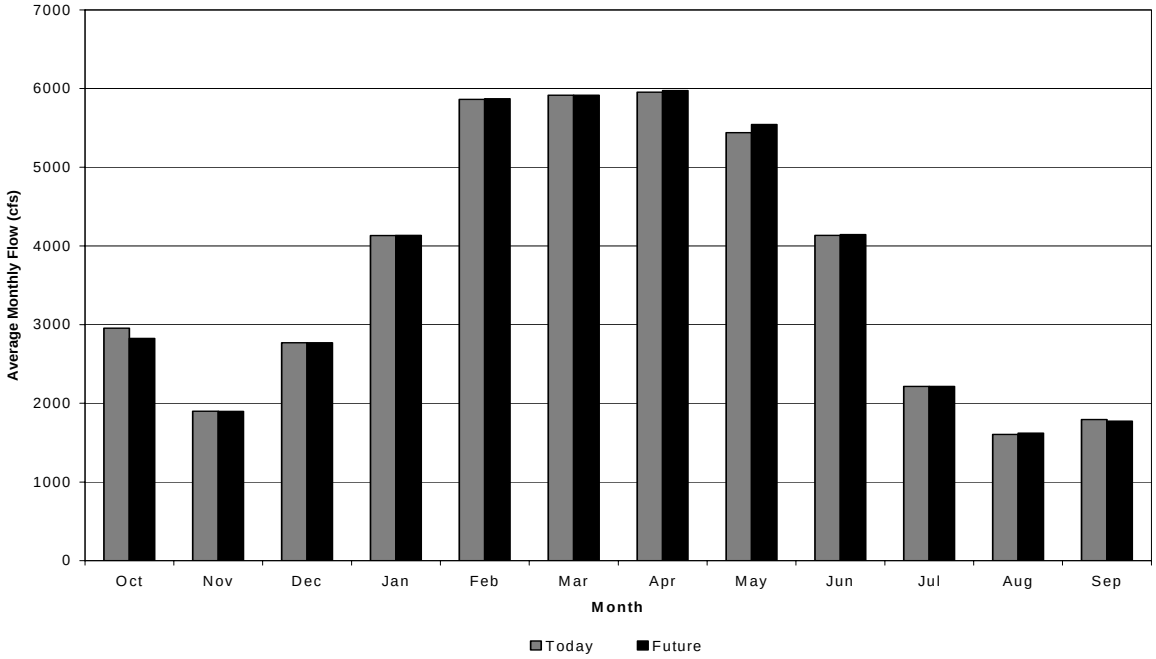

Figure 18 Average Monthly San Joaquin River Flows at Vernalis under Current and Future Level of Development

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