LOS OSOS HABITAT CONSERVATION PLAN
SPECIES ACCOUNTS
APPENDIX D

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Prepared For:
The Los Osos Community Services District

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June 4, 2004
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ANIMAL SPECIES ACCOUNTS

California tiger salamander
*Ambystoma californiense*

Class: Amphibia  
Order: Caudata  
Family: Ambystomatidae

Legal Status

**Federal:** Candidate species. The Sonoma County population been listed as endangered under the emergency listing process (*Federal Register* 67:47726; July 22, 2002). The Sonoma populations have also been proposed for regular listing as endangered after the end of the emergency listing period (*Federal Register* 67:47758; July 22, 2002). The Santa Barbara population has been listed as endangered. (*Federal Register* 65:57241; September 21, 2000).

**State:** Species of Special Concern

Species Description

The California tiger salamander has broad rounded snouts with small eyes. It has shiny black skin with rounded or irregular yellow spots. Their Bellies are a grayish color and may contain a few small dull yellow spots. These salamanders have 12 coital grooves on their sides (Petranka, 1998).

Habitat and Habitat Associations

The California tiger salamander is a lowland species restricted to grasslands and low foothill regions where long-lasting rain pools occur and are used as breeding habitat. Permanent aquatic sites are unlikely to be used for breeding unless they lack fish predators (Shaffer et al., 1993; Jennings and Hayes, 1994). Adults spend most of the year in subterranean refugee, especially burrows of California ground squirrels (*Spermophilus beecheyi*) and occasionally man-made structures (Stebbins, 1972; Shaffer et al., 1993). During breeding migrations, individuals are sometimes found under surface objects such as rocks and logs. Post metamorphic juveniles retreat to small-mammal burrows after spending a few hours or days in mud cracks near water or tunnels constructed in soft soil. Aquatic larvae seek cover in turbid water, clumps of vegetation, and other submerged debris (Petranka, 1998; Loredo et al., 1996).

Range

The range of California tiger salamander is restricted to California. The species persists in disjunct remnant vernal pool complexes in Sonoma and Santa Barbara counties, in vernal pool complexes and isolated ponds scattered mainly along narrow strips of rangeland on each side of the Central Valley from southern Colusa County south to northern Kern County, and in sag ponds and human-maintained stock ponds in the coast ranges from Suisun Bay south to the Temblor Range.
The California tiger salamander has been eliminated from an estimated 55 to 58 percent of its historic breeding sites and has lost an estimated 75 percent of its habitat. Although there are approximately 150 known local populations of California tiger salamanders, the species is currently protected only at Jepson Prairie Natural Preserve and Hickson Preserve (Shaffer et al., 1993).

The known elevation range of this species extends from near sea level to approximately 3,400 feet (Shaffer et al., 1993).

**Key Populations in LOHCP Plan Area**
There is a low probability that the California tiger salamander is in the LOHCP Plan Area. The CNDDB (2002) and existing literature have no record of known occurrence for the California tiger salamander within the LOHCP Plan Area.

**Biology**

**Diet:** Post metamorphic juveniles and adults of the closely related *A. tigrinum* appear to be "sit-and-wait" predators (Lindquist and Bachmann, 1980), feeding on earthworms, snails, insects, fish, and even small mammals (Stebbins, 1972). Larvae less than 2 cm (1 in) in length eat zooplankton almost exclusively, while larger individuals consume zooplankton, amphipods, mollusks, and insect larvae (Dodson and Dodson, 1971).

**Daily Activity:** Adults exist in subterranean refugia most of the year (Stebbins, 1972; Shaffer and Fisher, 1991; Jennings and Hayes, 1994). Before and after breeding, they emerge at night during rains. During breeding, some diurnal activity occurs. In late spring or early summer, post metamorphic juveniles disperse from breeding sites at night.

**Migration and Dispersal:** No information was found in the literature.

**Survival:** No information was found in the literature.

**Socio-Spatial Behavior:** No information was found in the literature.

**Reproduction:** Tiger salamanders breed and lay eggs primarily in vernal pools and other temporary rainwater ponds following relatively warm rains in November to February (Stebbins, 1972; Shaffer and Fisher, 1991; Jennings and Hayes, 1994). They sometimes use permanent human-made ponds if predatory fishes are absent and streams are rarely used for reproduction.

Eggs are laid singly or in clumps on both submerged and emergent vegetation and on submerged debris in shallow water (Stebbins, 1972; Shaffer and Fisher, 1991; Barry and Shaffer, 1994; Jennings and Hayes, 1994). They are distinguished by a pale yellow brown coloring and are about 2 mm in diameter (Petranka, 1998). The eggs hatch within 2-4 weeks (Petranka, 1998; Barry and Shaffer, 1994).
The larvae transform during late spring or early summer, usually by the first week of July. The salamander larvae are a yellowish gray color. They are similar to adults, except for large dorsal fins extending onto the back, and large feathery gills (Petranka, 1998). They disperse from the breeding sites after spending a few hours or days near the pond margin (Jennings and Hayes 1994). The juveniles migrate from these ponds to underground burrows in the spring during the rains. They are especially vulnerable to dehydration and heat stress during their overland movement (Petranka, 1998; Loredo et al., 1996; Holland et al., 1990). They are rarely seen because their breeding migrations are nocturnal and they live in burrows underground (Loredo et al., 1996).

**Threats**

The primary causes of the decline of California tiger salamander populations are the loss and fragmentation of habitat from human activities and the encroachment of nonnative predators. The salamander has lost an estimated 75 percent of its habitat due to human activities including urban and agricultural development, and land conversion. Development threatens to permanently reduce the amount of grassland and ground squirrel habitat available to California tiger salamanders, and to destroy natural ephemeral water bodies California tiger salamanders require. Automobiles and off-road vehicles kill a significant number of migrating or estivating California tiger salamanders each year (Petranka, 1998).

A strong negative association between bullfrogs and California tiger salamanders has been documented. Although bullfrogs are unable to establish permanent breeding populations in vernal pools, dispersing immature bullfrogs can take up residence and prey on salamanders in ephemeral pools if there is a permanent water source within two miles.

Introduced fishes including Louisiana swamp crayfish, mosquitofish, green sunfish, can reduce the survival of tiger salamander larvae in breeding ponds. Even temporary fish introductions are detrimental, as salamander populations can be eliminated within a few years (Stebbins, 1972; Shaffer and Fisher, 1991; Jennings and Hayes, 1994).

Ground squirrel controls programs, carried out on more than 10 million acres in California, are likely have an adverse effect on the California tiger salamander. Poison typically used on ground squirrels (fumigants) is likely to have a disproportionately adverse effect on California tiger salamanders, which are smaller and have more permeable skins. Use of insecticides, such as methoprene, in mosquito abatement may have an indirect adverse affect on the California tiger salamander by reducing the availability of prey. Contaminated runoff from roads, urban areas, and agriculture may also adversely affect the breeding, survival, or development of California tiger salamanders (Stebbins, 1972; Shaffer and Fisher, 1991; Jennings and Hayes, 1994).

Various non-native subspecies of the tiger salamander within the *Ambystoma tigrinum* complex have been imported into California for use as fish bait. The introduced salamanders may competitively exclude the California tiger salamanders, or interbreed with the natives to create hybrids that may be less adapted to the California climate or are not reproductively viable past.
the first or second generations (Stebbins, 1972; Shaffer and Fisher, 1991; Jennings and Hayes, 1994).

**Special Biological Considerations**
Rainfall is important to the formation and maintenance of breeding ponds. Most surface migrations and other movements by adults are associated with sustained rainfall, especially at night. California tiger salamanders are dependent on the integrity of large rain pool complexes (Jones, 1989; Jennings and Hayes, 1994).

**Conservation**
The California tiger salamander is a candidate for listing under the Act. On April 18, 1994, the Service determined that listing of the California tiger salamander was warranted but precluded by higher priority listing actions (59 FR 18353). At that time, 49 higher priority taxa were awaiting proposal or listing determination in central and northern California. The Service has since taken action on many of those 49 species. As the salamander is not listed or proposed at this time, no statutory critical habitat has been designated or proposed. No recovery activities have been completed to date, although the California tiger salamander is included in the developing draft Recovery Plan for Vernal Pool Species and may benefit to some degree from recovery actions specified in the plan (USFW, 1994).

Efforts should be made to keep tiger salamander breeding sites free of non-native predators (e.g., fish, bullfrogs, and crayfish). This may require coordination with agencies in charge of mosquito abatement to avoid the stocking of mosquitofish in these areas (Jennings and Hayes, 1994).
Literature Cited


California red-legged frog  
*Rana aurora draytonii*

**Class:** Amphibia  
**Order:** Anura  
**Family:** Ranidae

**Legal Status**  
- **Federal:** Threatened  
- **State:** Species of Special Concern

**Species Description**

The California red-legged frog reaches from 2 to 5.25 inches in length. It is reddish brown to gray and contains many poorly defined dark specks and blotches, which are absent on the back and top of its head. A light stripe on its jaw borders its dark mask. Folds are present on its back and sides, and the underside is yellow with red on the lower abdomen and hind legs. Its toes are not fully webbed. Females grow larger than males; however, males have enlarged forearms and swollen thumbs. They have thick, rough skin, light centered spots on its dorsal surface, and a larger build than other *Rana aurora* (Hayes, 1986; Thomas, 1993; USFW, 1996).

**Habitat and Habitat Associations**

The California red-legged frog inhabits lowland streams, wetlands, riparian woodlands, and livestock ponds (Hayes and Jennings, 1988; Jennings, 1988). Habitats with the highest densities of frogs are deep-water ponds with dense stands of overhanging willows (*Salix* sp.) and a fringe of cattails (*Typha latifolia*) between the willow roots and overhanging willow limbs (Jennings, 1988; Rathburn et al., 1993). The most secure aggregations of California red-legged frogs are found in aquatic sites that support substantial riparian and aquatic vegetation and lack non-native predators. Over-harvesting, habitat loss, non-native species introduction, and urban encroachment are the primary factors that have negatively affected the California red-legged frog throughout its range (Jennings and Hayes, 1985; Hayes and Jennings, 1988).

California red-legged frogs appear to be more closely tied to small drainage areas (<300km2) and their intermittent water flow as opposed to large drainage areas (>300km2) and their perennial water flow, due to restricted access by aquatic macrofaunal predators (Hayes and Jennings, 1988). California red-legged frogs have also been found in association with stock ponds and marsh habitat throughout its range. They can occur in ephemeral ponds or permanent streams and ponds; however populations probably cannot persist in ephemeral streams (Jennings and Hayes, 1985).

The species may also occur in uplands near breeding areas and along intermittent drainages connecting wetlands. The adults often use dense, shrubby or emergent riparian vegetation closely associated with deep (>0.7 meters), still or slow moving water (Hayes and Jennings, 1988). Red-legged frogs require cold-water pond habitats (including stream pools) with emergent and submergent vegetation (Storer, 1925).
Range
Historically, the California red-legged frog was known from 46 counties but the taxon is now extirpated from 24 of these (U.S. Fish and Wildlife Service, 1996). The California red-legged frog is now known only from isolated localities in the Sierra Nevada, northern Coast, and northern Transverse Ranges. It is believed to be nearly extirpated from the southern Transverse and Peninsular ranges. This species is still common in the San Francisco Bay area (including Marin County) and along the central coast (Natural Diversity Data Base, 2002; Jennings, 1998). It is still present in Baja California, Mexico.

The Central Coast Recovery Unit (Recovery Plan, Fish and Wildlife, 2002).
The central coast from San Francisco to Santa Barbara County supports the greatest number of currently occupied drainages. South of San Francisco, many California red-legged frogs occur in tributaries to Crystal Springs Reservoir and adjacent lands (San Mateo County) (Natural Diversity Database 2002). Most coastal streams and ponds (natural and artificial) from Pacifica south to Half Moon Bay (San Mateo County) support this species. Pescadero Marsh and Año Nuevo State Reserve (San Mateo County) support large numbers of California red-legged frogs; Pescadero Marsh is considered one of the few places, throughout the range, to support more than 350 adult frogs. California red-legged frogs occupy almost all coastal drainages from the Santa Cruz/San Mateo County line south to the city of Santa Cruz. Wilder Ranch State Park (Santa Cruz County) also supports this species. The frogs occur in the Carmel River watershed and most of its tributaries (Natural Diversity Database, 2002; EIP Associates, 1993); Rancho San Carlos, a private ranch on the upper portion of the Carmel River Valley is another locality where more than 350 adults have been observed (Jennings et al., 1992).

This species is widespread in Monterey County; nearly all-coastal drainages from Garrapata Creek south to Salmon Creek, including the Little and Big Sur drainages and the vicinity of Pfeiffer Beach, support frogs. In San Luis Obispo County, California red-legged frogs are found in many streams, stock ponds, dune ponds, and springs on the coastal plain and western slopes of the Santa Lucia Range from San Carpofooro Creek in the north to the Santa Maria River in the south. Sites include Pico, Little Pico, and Toro Creeks; Pico Pond; and San Simeon, Santa Rosa, Chorro, and Arroyo Grande Creeks. On Camp San Luis Obispo of the California National Guard, frogs occur in Whiskey Spring, tributaries to Chorro Creek and Chorro Reservoir, and other sites (Jennings et al., 1992; U.S. Fish and Wildlife Service, 1996).

The known elevational range of this species extends from near sea level to approximately 1,500 meters (Jennings, 1988).

Key Populations in LOHCP Plan Area
There is a moderate potential that the Red legged frog is in the LOHCP Plan Area. There is suitable habitat in the LOHCP Plan Area. The CNDDB (2002) and existing literature have no record of known occurrence for the Red legged frog within the LOHCP Plan Area.
The CNDDB has 3 records of occurrence near the Plan area. They are San Bernardo Creek; along Highway 1.6 miles northwest of San Luis Obispo and an unnamed tributary that empties into Morro Bay Estuary Natural Preserve.

**Biology**

**Diet:** The diet of California red-legged frogs is highly variable. Invertebrates are the most common food items, although vertebrates such as pacific tree frogs and California mice can constitute over half of the prey mass eaten by larger frogs. Feeding was observed during both day and night time for juveniles, but only at night for adults and sub-adults (Hayes and Tennant, 1985).

**Daily Activity:** California red-legged frogs found in coastal areas are rarely inactive (Jennings et. al., 1992), whereas those found at interior sites may hibernate (Storer, 1925). California red-legged frogs may estivate in small mammal burrows and moist leaf litter, and can be found up to 30 meters from water in adjacent dense riparian vegetation for up to 77 days (Rathburn et al., 1993). Adults are largely nocturnal, whereas juveniles can be active either diurnally or nocturnally. In addition, time of feeding does not differ from time of activity for either adults or juveniles, suggesting that juveniles have a broader range of activity and probably longer feeding periods than adults or sub-adults (Hayes and Tennant, 1985; Jennings, 1988).

**Migration and Dispersal:** According to USFWS 2000, red-legged frogs can be found living in streams away from breeding habitat and distances exceeding 2.9 km and have been found over 100 m away from water in dense riparian vegetation. During wet weather, some frogs make overland excursions over upland habitat, mostly at night. Movements ranging from 0.4 to over 3.2 km are known to occur without regard to topography or vegetation type. Frogs may or may not use riparian corridors for movements, instead they may move directly to their goal. Juveniles may disperse locally between July and September (USFWS, 2000).

**Survival:** Vegetation is often sufficiently dense to prevent the entry of predators such as birds and raccoons (*Procyon lotor*). Survival rates for red-legged frogs from hatching to metamorphosis range from one to less than five percent for frogs co-occurring with bullfrogs and 30 to 40 percent for those without bullfrogs (USFWS, 2000). Adults live 8 to 10 years (USFWS, 2000; Jennings et al., 1992).

**Socio-Spatial Behavior:** No information was found in the literature.

**Reproduction:** California red-legged frogs breed from November through April, with earlier breeding records occurring in southern localities (Storer, 1925). California red-legged frogs can only reproduce when conditions are optimal, and consequently, this taxon is an explosive breeder.

Within a narrow window (1-3 weeks) between late December and early April, females normally lay loose, oval, floating egg clusters of about 2,000-5,000 eggs in quite waters
Egg masses are generally attached to vertical emergent vegetation so that they are near the surface of the water (Hayes and Miyamoto, 1984). Eggs hatch in 6-14 days (Jennings, 1988), and metamorphosis occurs 3.5 to 7 months after hatching (Storer, 1925; Jennings and Hayes, 1990). There is no evidence to suggest that they lay more than one clutch per year like some eastern ranids (Emlen, 1977).

Developing eggs and embryos of this taxon are unable to survive salinities of >4.5 0/00 (Hayes and Jennings, 1988). Larvae require cold water (<18.3 degrees Celsius) to develop properly (Jennings, 1988); and likely experience the highest mortality rates, with less than 1 percent of eggs laid reaching metamorphosis (Jennings et al., 1992). Two years after metamorphosis, males reach sexual maturity, while females require three years to attain sexual maturity (Jennings and Hayes, 1985).

**Threats**
The rapid decline of the red-legged frog over most of its historic range has not been prevented by the California state protection provided since 1971. The California red-legged frog has sustained a 70 percent reduction in its geographic range in California as a result of habitat loss or alteration due to over-collecting, pesticides, herbicides, reservoir construction, stream channels development, urbanization, overgrazing, and drought (Jennings, 1988).

Livestock grazing, even in moderate levels, may have a severe impact on California red-legged frog habitat (Jennings 1988). Cattle can destroy crucial riparian vegetation, especially in drought years. Cattle also trample banks creating erosion leading to a wider and shallower stream channel and the filling of pools (Jennings 1988). A shallower stream channel raises water temperatures favoring a number of introduced predatory fish (Jennings, 1988; Jennings et al., 1993).

Predation by introduced fishes (Jennings, 1988; Moyle et al., 1986; Hayes and Jennings, 1986), bullfrogs (Jennings and Hayes, 1985; Hayes and Jennings, 1986), and crayfish, as well as disease (Jennings and Hayes, 1988), and parasites (Lefcort and Blaustein, 1995) all have been known to affect red-legged frog populations. California ranids have evolved under conditions of limited fish predation since California possesses only a small number of native fish species that prey on vertebrates (Miller, 1958; Moyle, 1976). A majority of the over 50 exotic and transplanted species are known to prey on frogs or their pre-metamorphic stages (Heman et al., 1969; Hayes and Jennings, 1986).

**Special Biological Considerations**
Immediate management considerations need to be applied to the California red-legged frog if the remaining or suspected populations are to remain viable. The goal of management should be to isolate the taxon from introduced predators (Hayes and Jennings, 1988). In addition, preservation of modal conditions for habitat variables identified as associated with the species is likely to promote isolation and would be a suitable interim strategy (Hayes and Jennings, 1988).

The recent USFWS critical habitat proposal states that critical habitat will provide breeding and non-breeding habitat for dispersal between the habitats and also allows for expansion of red-
legged frog populations. The proposal continues to state the primary constituent elements of critical habitats:

1. suitable aquatic habitat,
2. associated upland habitats; and
3. suitable dispersal habitat connecting suitable aquatic habitat.

Suitable aquatic habitat is defined as all natural or man-made still or slow-moving freshwater bodies that are void of non-native predators and are year-round. Suitable breeding water bodies must have a minimum water depth of 8 inches and maintain water levels from March through July at a minimum. There must be 2 or more breeding sites within 2 km. Suitable upland habitats include all upland habitats within 150 m of the edge of suitable aquatic habitat. Suitable dispersal habitat must be free of barriers and at least 150 m wide. Dispersal corridors include upland and wetland habitats that are free of barriers and connect suitable aquatic habitat within 2 km of one another. Dispersal barriers are defined as heavily traveled roads (more than 30 cars per hours), moderate to high-density urban or industrial developments, and large reservoirs. Agricultural lands and pastures are not barriers (USFWS, 2000).

**Conservation**

Literature Cited


Hayes, M. P., and M. R. Jennings. 1988. Habitat correlates of distribution of the California red-legged frog (Rana aurora draytonii) and the foothill yellow-legged frog (Rana boylii): Implications for management. Pages 144-158.


Jennings, M. R., M. P. Hayes, and D. C. Holland. 1992. A petition to the U.S. Fish and Wildlife Service to place the California red-legged frog (Rana aurora draytonii) and the western pond turtle (Clemmys marmorata) on the list of endangered and threatened wildlife and plants. 21 pp.


Cooper's hawk  
*Accipiter cooperii*  
Class: Aves  
Order: Falconiformes  
Family: Accipitridae

**Legal Status**  
**Federal:** None  
**State:** Species of Special Concern

**Species Description**  
The Cooper's hawk is a medium sized bird with a long, lean-body. Length of the male is 35 - 46 cm (or 14 - 19 inches) and length of the female is 42 - 50 cm (or 17 - 20 inches). The adult Cooper's hawk has a dark blackish crown that is noticeably set off from a lighter nape, where as the smaller (250 - 350 mm or 10 - 14 inches long) sharp-shinned hawk has a less distinctively delineated dark crown area and a more squared off (when slightly fanned) or even slightly notched (when closed) tail. The back is blue gray, and the tail, crossed by several dark bands, has a distinct white band at its tip. The eyes of this hawk, like most predatory birds, face forward, giving it good depth perception for hunting and catching prey while flying at high speeds. The hooked bill is well adapted to tearing the flesh of its prey. In flight the Cooper's hawk exhibits a long barred tail and rather short and rounded wings. A swift flyer, the Cooper's hawk has a rapid wingbeat and is able to negotiate its often heavily vegetated woodland habitats very well (Johnsgard, 1990).

**Habitat and Habitat Associations**  
It frequents landscapes where wooded areas occur in patches and groves and often uses patchy woodlands and edges with snags for perching (Beebe, 1974). Dense stands with moderate crown-depths are usually used for nesting (Zeiner et al., 1990). It hunts in broken woodland and habitat edges, catching predominantly avian prey in air, on the ground, and in vegetation. This species is seldom found in areas without dense tree stands or patchy woodland habitat (Zeiner et al., 1990). Within the range in California, it most frequently uses dense stands of live oak, riparian deciduous, or other forest habitats near water (Zeiner et al., 1990). The Cooper’s hawk tends to nest in stands with lower densities of taller and larger trees and a greater proportion of hardwood cover than conifer species when compared to other accipiters (Trexel et al., 1999).

The Cooper’s hawk is tolerant of human disturbance and habitat fragmentation and breeds in suburban and urban settings (Murphy, et al. 1988). The urban sites have included isolated trees in residential neighborhoods with commercial and recreational activities less than 150 meters distant and houses 20 to 30 meters distant. Typically, there is some forest edge habitat included within their home range even if nesting within an urban setting and this forest edge may serve as the primary hunting site (Rosenfield and Bielefeldt, 1993).
Range

The wintering range includes the area from Washington, Colorado, Nebraska, Iowa, southern Wisconsin, southern Minnesota, southern Michigan, southern Ontario, New York, southern Maine and Massachusetts south through the rest of the United States to Costa Rica (AOU, 1998; Terres, 1980).

In California, the Cooper’s hawk is a resident throughout most of the wooded portion of the state. It breeds in the southern Sierra Nevada foothills, New York Mountains, Owens Valley, and other local areas in southern California (Garrett and Dunn, 1981).

The known elevational range of this species extends from near sea level to approximately 2,700 m (0-9000 ft) (Garrett and Dunn, 1981).

Key Populations in LOHCP Plan Area
There is moderate potential that the Cooper’s hawk is within the LOHCP Plan Area. The CNDDB (2002) has one historical record of a nesting occurrence within the LOHCP Plan Area in Baywood. The existing literature regards the species as a resident of San Luis Obispo County, nesting and foraging in and near deciduous riparian areas.

Biology
Diet: In general, during breeding and non-breeding, the species catches small birds, especially young birds during the nesting season, and small mammals; it also takes reptiles and amphibians (Terres, 1980).

The Cooper’s hawk hunts in broken woodland and habitat edges; it catches prey in the air, on the ground, and in vegetation. Sometimes it runs prey down in dense thickets. It uses cover to hide, attack, and approach prey; it also soars and makes low, gliding search flights (Zeiner et al., 1990). It forages by dashing through the woods in a low, swift flight, around trees, through the brush and reaches out in the air or on the ground to catch avian prey with the talons (Terres, 1980). After catching its prey, the Cooper’s hawk may fly with the prey to a water source in order to drown it (Terres, 1980).

Daily Activity: The species is a yearlong, diurnally active bird (Zeiner et al., 1990).

Migration and Dispersal: Although it is mostly a yearlong resident, some Cooper’s hawks from more northern areas, migrate into California. The Cooper’s hawk may also move downslope and south from areas of heavy snow and return to the general nesting area in the spring (Zeiner et al., 1990). The mean distance from the natal site to the breeding site is 12
kilometers for males and 14.4 kilometers for females. Adult birds frequently reoccupy nesting areas and breeding site fidelity is assumed (Rosenfield and Bielefeldt, 1993). The Cooper’s hawk may reuse the same nest site for multiple years (Call, 1978).

**Survival:** The maximum reported age is 12 years (Rosenfield and Bielefeldt, 1993). The yearly fledgling success is about 2 young/pair with nesting success of 57 percent to 93 percent (Craighead and Craighead, 1956; Rosenfield and Bielefeldt, 1993). Mortality rates have been estimated as 72 percent to 78 percent in the first year, 34 percent to 37 percent thereafter (Rosenfield and Bielefeldt, 1993).

**Socio-Spatial Behavior:** Nest sites within stands of oaks are located approximately 1.6 miles apart and thus are distributed widely but sparsely within woodland habitat (Zeiner et al., 1990). The seasonal home range size has been estimated at 784 hectares with the daily home range averaging 231 hectares (Murphy et al., 1988; Call, 1978).

**Reproduction:** Breeding occurs March to August, peaking May to July. Incubation lasts about 36 days, and young are independent eight weeks thereafter (Baicich and Harrison, 1997). Cooper’s hawk eggs are laid in February through June and the clutch size is 3 to 6 (Brown and Amadon, 1968). Mostly the female incubates the eggs for approximately 24 days (Terres, 1980).

The Cooper’s hawk breeds primarily in riparian areas and oak woodlands and apparently is most common in montane canyons (Garrett and Dunn, 1981; Hamilton and Willick, 1996). It usually nests in second-growth conifer stands, or in deciduous riparian areas, usually near streams. Nesting and foraging usually occur near open water or riparian vegetation (Zeiner et al., 1990). They also utilize eucalyptus groves to some degree and have been observed successfully fledging young in residential areas.

**Threats**

A serious decline occurred in the 1970s during the nesting season probably due to eggshell thinning resulting from pesticides (Terres, 1980; Henny and Wight, 1972). Habitat destruction, mainly in lowland riparian areas, due to urbanization and development is probably the main threat, although direct or indirect human disturbance at nest sites can be equally detrimental (Remsen, 1978; Boal and Mannan, 1998).

Timber harvests may alter the suitability of nesting or foraging habitats as well as the prey populations on a local or regional scale but the magnitude and seasonality of such impacts are uncertain. Breeding and nest site habitats are diverse and apparently not limiting in some areas (Rosenfield and Bielefeldt, 1993). Other threats to the species include illegal take of nestlings and to a less extent, the effects of pesticides.
Special Biological Considerations
It has been hypothesized that four factors affect the use of a stand of trees by nesting Cooper’s hawks: stand type, stand density, stand age, and degree of fragmentation (Ehrlich and Drickamer 1993).

The type of response and intensity of the Cooper’s hawk aggressive response to human intrusion near a nest site varies among individuals and probably also varies with the stage of nesting. Many breeding birds respond by remaining inconspicuous, neither vocalizing nor behaving aggressively in the presence of humans. Some individuals may leave the immediate vicinity of the nest, however, the human distance at which this behavior occurs has not been reported (Rosenfield et al., 1985).

Conservation
Livestock enclosures, reforestation, and other measures have been suggested for riparian nesting habitat in some regions however there is no documentation of the relative effect of such measures. Stands that have been thinned but not clearcut, if done during the non-breeding season are then reoccupied the next season for breeding (Rosenfield and Bielefeldt, 1993).
**Literature Cited**


Sharp-shinned hawk  
*Accipiter striatus velox*  
Class: Aves  
Order: Falconiformes  
Family: Accipitridae  

**Federal Status**  
Federal: None  
State: Species of Special Concern  

**Species Description**  
Sharp-shinned hawks have short rounded wings similar to the Cooper's hawk. Adults have blue-gray upper parts with a reddish barred breast and belly. Juveniles have brown upper parts and wings and a puffy streaked breast and belly. The sharp-shinned hawk's tail is not as long as a Cooper's hawk's and appears squared off. The sharp-shinned hawk’s, middle tail feathers or deck feathers are nearly the same length as the outer tail feathers.

**Habitat and Habitat Associations**  
Sharp-shinned hawks nest in coniferous forests often within riparian areas or on north-facing slopes. Nest stands are typically dense patches of small-diameter trees that are cool, moist, well shaded, with little ground cover, and near water (Zeiner et al., 1990). These stands are often in close proximity to open areas.

Although they seem to prefer riparian habitats they are not restricted to them and are found in mid-elevation habitat such as pine forests, woodlands and mixed conifer forests. For nesting they occur in dense tree stands that are cool, moist, well shaded and usually near water. For hunting habitat, they often use openings at the edges of woodlands and also brushy pastures (Terres, 1980).

**Range**  
The sharp-shinned hawk breeds from Alaska southward throughout much of Canada, the northern lower 48 states, the Rocky Mountains and mountains of the far west, parts of the Gulf States, and the highlands of Mexico. The range of the sharp-shinned hawk for nesting is from northwestern Alaska, Yukon, Northern Saskatchewan, central Manitoba, northern Ontario, central Quebec, Newfoundland, south to California, Mexico, Texas, Louisiana, Tennessee, South Carolina, and Alabama (Terres, 1980).

In California, the Sharp-shinned hawk is a fairly common migrant and winter resident throughout California, except in areas with deep snow. Breeding distribution of the species is poorly documented. There are very few breeding records for the Cascades/Sierra Nevada. It probably breeds south in the Coast Ranges to about 35 degrees latitude, and at scattered locations in the Transverse and Peninsular Ranges. It may no longer breed in the southern Sierra Nevada. It is an uncommon winter migrant to the Channel Islands. Uncommon permanent resident and

**Key Populations in LOHCP Plan Area**

There is a moderate potential that the sharp-shinned hawk is within the LOHCP Plan Area. There is suitable wintering habitat present in the LOHCP Plan Area. The CNDDB (2002) and existing literature have no records of known occurrence for the sharp-shinned hawk within the LOHCP Plan Area.

**Biology**

**Diet:** It eats mostly small birds, usually no larger than jays; it also rarely takes small mammals, insects, reptiles, and amphibians (Brown and Amadon, 1968). Perches, and darts out in sudden flight to surprise prey; also cruise rapidly in search flights. Often the sharp-shinned hawk hunts as a harrier, in low, gliding flights. It often forages in openings at edges of woodlands, hedgerows, brushy pastures, and shorelines, especially where migrating birds are found (Zeiner, et al., 1990). North-facing slopes with prey plucking perches are a critical habitat requirement. These hawks choose avian prey opportunistically (Joy et al., 1994).

**Daily Activity:** The sharp-shinned hawk exhibits yearlong, diurnal activity (Zeiner et al., 1990).

**Migration and Dispersal:** Some individuals migrate into California for winter. Others migrate to mountains for summer and downslope to foothills and valleys for winter. The young first fly about 23 days after hatching (Brown and Amadon, 1968).

**Survival:** No information was found in the literature.

**Socio-Spatial Behavior:** Reynolds (1979) reported crude home range of 2,750 ha (6600 ac). The territory appears to be the same as the home range. Distances averaged 4.1 km (2.5 mi) between nests. The sharp-shinned hawk demonstrates very active nest defense. Breeding home ranges may be as large as approximately 800 hectares (Johnsgard, 1990).

**Reproduction:** The breeding season is April through August; peak late May to July. Clutch averages 4-5 eggs; range 3-8. The incubation period is 34-35 days that is done by both parents. The male brings food to female and semi-altricial young; fledging occurs at about 60 days (Call 1978). Among 11 pairs in Oregon, Reynolds (1975) reported 2.7 young/pair, and a hatching success of 70%. Egg loss was greater than nestling loss. Nests may be reused in later years.

The average distance between nests is 2.5 miles (Zeiner et al., 1990). The species usually nests in dense, pole and small-tree stands of conifers that are cool, moist, well shaded, with little groundcover and near water (Call, 1978). The sharp-shinned hawk tends to nest in forest stands with a greater percent cover of conifer trees that the Cooper’s hawk and also tends to place the nest within the canopy of the tree (Trexel, et al. 1999; Wiggers and Kritz, 1991).
Threats
The sharp-shinned hawks are still being shot in Latin American wintering grounds (Johnsgard, 1990). The total population breeding within California is very small, and thus vulnerable to impact from falconry; although at present falconers do not take this species to a significant extent. Logging and pesticides are other potential hazards (Remsen, 1978; Henny, 1987; Reynolds, 1989).

Special Biological Considerations
Although sharp-shinned hawks apparently demonstrate significant site fidelity in the short-term, pairs do not occupy a particular site for more than two consecutive years (Jones, 1979). North-facing slopes with prey plucking perches are a critical habitat requirement (Zeiner et al., 1990).

Conservation
Unknown.
**Literature Cited**


Burrowing owl
*Athene cunicularia*

Class: Aves  
Order: Strigiformes  
Family: Strigidae

**Legal Status**
- **Federal:** Species of Concern  
- **State:** Species of Special Concern

**Species Description**
The Burrowing owl resides primarily on the ground, has long lanky legs, a short tail, and it does not have any ear tufts. The average adult owl is between 8.5-11 inches tall and weighs about 4-6 oz. Unlike other owl species, the female burrowing owl is smaller than the male. The burrowing owl's body is generally brown with speckles of white. The owl's breast is a lighter color brown while its face is encircled in white, with tinges of sandy brown feathers. The owl has wings about the same size as its body, featherless legs, and round yellow eyes (Davis, 2000).

**Habitat and Habitat Associations**
Burrowing owls inhabit dry, sparse grasslands, desert scrub, and agricultural areas as a yearlong resident (Haug et al., 1993). They may also use golf courses, cemeteries, road allowances within cities, airports, vacant lots in residential areas and university campuses, fairgrounds, abandoned buildings, and irrigation ditches (Haug et al., 1993). They may also occur in forb and open shrub stages of pinyon-juniper and ponderosa pine habitats (Zeiner et al., 1990).

They require large open expanses of sparsely vegetated areas on gently rolling or level terrain with an abundance of active small mammal burrows. They require the use of rodent or other burrows for roosting and nesting cover (Unitt, 1984; Lehman, 1994). They may also dig their own burrow in soft, friable soil (as found in Florida) and may also use pipes, culverts, and nest boxes where burrows are scarce (Robertson, 1929). The mammal burrows are modified and enlarged. One burrow is typically selected for use as the nest, however, satellite burrows are usually found within the immediate vicinity of the nest burrow within the defended territory of the owl.

**Range**
In California, burrowing owls are restricted to the central valley extending from Redding south to the Grapevine, east through the Mojave Desert and west to San Jose, the San Francisco Bay area, the outer coastal foothills area which extend from Monterey south to San Diego and the Sonoran desert (Zeiner et al., 1990; Grinnell and Miller, 1944). It is a resident in the open areas of the lowlands over much of the southern California region (Garrett and Dunn, 1981).

The known elevational range of this species extends from 200 feet below sea level to 9,000 feet (Zeiner, et al., 1990).
Key Populations in LOHCP Plan Area

There is a low potential that the burrowing owl occurs within the LOHCP Plan Area. There is suitable nesting and foraging habitat present in the LOHCP Plan Area but the LOHCP Plan Area is outside of its known range. The CNDDB (2002) and existing literature have no record of known occurrence for the burrowing owl within the LOHCP Plan Area.

Biology

Diet: Burrowing owls tend to be opportunistic feeders. Large arthropods, mainly beetles and grasshoppers, comprise a large portion of their diet. Small mammals, especially mice, rats, gophers, and ground squirrels, are also important food items. Other prey animals include: reptiles and amphibians, scorpions, young cottontail rabbits, bats, and birds, such as sparrows and horned larks. Consumption of insects increases during the breeding season. The burrowing owl hovers while hunting, similar to an American kestrel (*Falco sparverius*), and after catching its prey it returns to a perch on a fence post or the ground. Burrowing owls are primarily crepuscular (active at dusk and dawn), but will hunt throughout a 24-hour period (Haug et al., 1993).

Daily Activity: The burrowing owl is primarily a diurnal species with crepuscular hunting habits (Thomsen 1971). They move the location of the perch to thermoregulate themselves. The perch is in open sunlight in early morning and moved to shade, or to burrow, when hot (Coulombe, 1971).

Migration and Dispersal: Individuals in northern parts of the range may winter to the south, as far as Central America, but are mostly resident in California. There may be some movement downslope in winter (Call, 1978). A total of 92 percent of 555 owls that were banded at a nesting area were never re-encountered after the year in which they were banded. The 8 percent that returned to the natal area after being banded, returned one or more years after banding and stayed in the natal area for 2 to 4 breeding seasons (Lutz and Plumpton, 1999). Returns of one-year-old owls were located 2.4 to 26.4 kilometers from the natal nest (Haug et al., 1993).

Survival: The minimum annual survival rates in Florida average 68 percent for adult males, 59 percent for adult females and 19 percent for one-year-old owls (Millsap and Bear, 1992). In southern California, the apparent survival rates are 30 percent for juveniles and 81 percent for adults (Thomsen, 1971). One banded bird survived to 8 years 8 months (Kennard, 1975). Collisions with autos may be a significant cause of mortality (Remsen, 1978).

Socio-Spatial Behavior: The home range may vary from 0.1 to 4 acres (mean is 2 acres) with an average distance between burrows of 436 feet (Thomsen, 1971; Martin, 1973). Territory size is directly proportional to the available habitat and burrow availability (Haug et al., 1993). The species is semi-colonial; it is probably the most gregarious owl in North America.
Reproduction: Breeding occurs from March through August, with a peak in April and May. Six to 11 eggs are laid; the average number of eggs is 7-9. Incubation lasts 28-30 days and is performed by only the female. The male performs the care of the young while still in the nest. At 14 days of age, the young may be seen roosting at the entrance to the burrow, waiting for the adults to return with food. The young leave the nest at about 44 days and begin chasing living insects when 49-56 days old (Bent, 1938; Zarn, 1974).

The burrowing owl usually nests in an old burrow of ground squirrel, or other small mammal, and may also use the burrow of badgers and marmots. It may dig its own burrow in soft soil. The Nest chamber is lined with excrement, pellets, debris, grass, and feathers; sometimes it is unlined. Pipes, culverts, and nest boxes are used where burrows are scarce (Robertson, 1929). The male gives a courtship display and notes in front of the burrow.

Threats
The number of burrowing owl breeding pairs in central western and southern California have drastically declined in the last 50 years; during the 1980's the decline was probably greater than 70 percent (DeSante and Ruhlen, 1995). The threats to the burrowing owl are conversion of grassland to agriculture, other habitat destruction, predators, collisions with vehicles, and pesticides/poisoning of ground squirrels (Grinnell and Miller, 1944; Zarn, 1974; Remsen, 1978). A ranking by the resource agencies of the most important threats to the species included loss of habitat, reduced burrow availability due to rodent control, and pesticides (James and Espie, 1997).

The pesticide Carbofuran has been demonstrated to have negative impacts; Sevin is likely a safer pesticide (Hjertaas et al., 1995; Blus, 1996). The loss of burrowing mammal colonies (due to poisoning or other means) and the crushing of burrows by heavy equipment and ground maintenance machinery remain problematical. This species is usually associated with flat or shallow slopes on loamy soils; these areas are also attractive to agriculture, as well as residential and industrial development. Shooting losses may be significant (Remsen, 1978).

Special Biological Considerations
The importance of retaining colonies must be stressed, as this species appears to have evolved as a colonial species in association with burrowing mammal communities (Dyer, 1987). While these owls appear to adapt fairly well to human presence in some cases, i.e., airport runways and other human modified open spaces, the continued presence of active mammal-created burrows is essential. In Oklahoma, the removal of prairie dogs allowed deterioration of burrows, making them unsuitable for nest burrows after one year (Butts, 1973). Rodent eradication programs may reduce the consistent availability of high and moderate function habitat. Artificial burrows likely have no long-term viability. The use of insecticides may reduce the availability of their primary prey. Pesticides may have secondary adverse effects through contamination. This is a colonial species; minimum viable colony size for this area is unknown. Remaining habitat is often roadside drainage ditches, increasing potential for significant losses to vehicle collisions (Remsen, 1978).
The burrowing owl was shown to choose moderately to heavily grazed grasslands for nesting and roosting and avoided cultivated fields. Where grassland patches were isolated in cultivation areas, the owls dispersed late, for shorter distances and less often. Mortality rate has been shown to be high in these systems. These changes from pasture to cultivation appear to be resulting in a decline of the species (Clayton and Schmutz, 1999). It is also important to determine what type and where within the region owls are selecting burrows before the area is disturbed and before it is decided to provision them with artificial burrows. Burrowing owls produced fewer young when occupying a new burrow, and when using burrows in disturbed areas. They produced more young when using artificial burrows but produced fewer fledglings than natural burrows, thus the actual productivity decreased for the artificial burrows (Botelho and Arrowood, 1998).

**Conservation**

The following have been suggested as management strategies: protection of burrowing mammal populations; wood or plastic nest boxes and tunnels; artificial perches which provide hunting and predator observation sites; vegetation management through fire or grazing; and relocation of owls (Green, 1983). Other management strategies include: reduce mortality on the breeding grounds, increase productivity, protect and manage the nesting habitat, monitor the populations, manage migration and wintering areas, conduct release programs, and develop public support (Hjertaas, 1997).
**Literature Cited**


Los Osos Habitat Conservation Plan – Species Accounts


Pacific Southwest Biological Services. 1991. Western Riverside County Multi-species Habitat Conservation Plan.


Golden eagle  
*Aquila chrysaetos canadensis*  
Class: Aves  
Order: Falconiformes  
Family: Accipitridae  

**Legal Status**  
**Federal:** None  
**State:** Species of Special Concern, Fully Protected Species

**Species Description**  
The golden eagle is North America's largest predatory bird. Its length averages 30-40 inches, and its wingspan ranges from 6.5 to 7.5 feet. The wings are large and rounded. Males and females are similar in appearance, except the female is much larger than the male. Adult plumage, gained at 4-6 years, is largely brown, darkening nearer to the wings. The tail is grayish brown. From below, the large flight feathers of the wings appear to be brownish gray, while the head, body and smaller feathers on the forepart of the spread wings are blackish. The feathers at the head and nape of its neck are golden brown, hence the name, but they are not conspicuous from a distance. The eyes of adults are dark brown. Its bill and claws are black, while the cere and feet are yellow. The legs are feathered all the way down to the toes. The juvenile appears similar to the adult, except for light patches on the tips of the wings, and a wide white tail band with a terminal band of black, which is therefore sometimes referred to as its "ringtail" plumage. (Reilly, 1968; Terres, 1980)

**Habitat and Habitat Associations**  
Habitat is typically rolling foothills, mountain areas, sage-juniper flats, and desert within this range in California (Zeiner, et al. 1990). Range-wide, golden eagles occur locally in open country (e.g., tundra, open coniferous forest, desert, barren areas), especially in hills and mountainous regions (AOU, 1998). Within southern California, the species “…favor grasslands, brushlands, deserts, oak savannas, open coniferous forests, and montane valleys. Uses rolling foothills and mountain terrain, wide arid plateaus deeply cut by streams and canyons, open mountain slopes, and cliffs and rock outcrops. Nesting is primarily restricted to rugged, mountainous country” (Garrett and Dunn, 1981). Secluded cliffs with overhanging ledges and large trees are used for cover (Zeiner et al., 1990).

**Range**  
The golden eagle has a holarctic distribution, extending as far south as north Africa, Arabia, and the Himalayas in the Old World, and Mexico in America. It is a partial migrant within this distribution, with the northern breeding birds migrating south in winter, while those of more temperate climates remain all the year round (Brown and Amadon, 1968). Golden eagles in North America breed locally from northern Alaska eastward to Labrador and southward to
northern Baja California, northern Mexico, and Maine. The species winters from southern Alaska and southern Canada southward through the breeding range.

The distribution of Golden eagles is uncommon but a permanent resident and migrant throughout California, except center of Central Valley. Perhaps it is more common in southern California than in north regions (Grinnell and Miller, 1944). Golden eagles are sparsely distributed throughout most of California, occupying primarily mountain and desert habitats. Approximately 500 breeding pairs are estimated to nest in California. They are mostly resident, but may move downslope for the winter or upslope after the breeding season. Some individuals migrate into California for the winter (Zeiner et al., 1990).

The known elevational range of this species extends from near sea level to approximately 3,833 m (11,500 ft) (Grinnell and Miller, 1944).

Key Populations in LOHCP Plan Area
There is a low Potential that the Golden eagle is within the LOHCP Plan Area. There is no suitable nesting habitat present in LOHCP Plan Area. The CNDDB (2002) and existing literature have no record of known occurrence for the Golden eagle within the LOHCP Plan Area.

Biology

**Diet:** The golden eagle primarily eats medium to large mammals and birds; secondarily, it feeds on reptiles, and some carrion (Olendorff, 1976; Johnsgard, 1990). The diet is most varied in the non-breeding season.

It needs open terrain for hunting; grasslands, deserts, savannahs, and early successional stages of forest and shrub habitats. It soars 30-90 m (98-297 ft) above the ground in search of prey, or makes low, quartering flights, often 7-8 m (23-26 ft) above ground. Occasionally it searches from a perch and flies directly to the prey (Carnie, 1954). Sometimes it pirates food from other predators. Hunting in pairs is apparently common. Foraging takes place over large areas of grassland and open chaparral or coastal sage scrub as well (Marzluff, 1997).

**Daily Activity:** Yearlong, diurnal activity (Zeiner et al., 1990). The eagle spends most of the day perched (78 to 85% of the day) and the rest of the day in flight (Collopy and Edwards, 1989).

**Migration and Dispersal:** Mostly resident, but may move downslope for winter, or upslope after breeding season. Some migrate into California for winter. After the young have flown, they remain in the vicinity of the nest for about two weeks and thereafter follow the parents away from the site. In some populations, they are thought to be dependent on parental assistance for about three months after learning to fly, and normally separate from the parents about October. The young often appear near the nest site in the early part of the following breeding season and immature golden eagles sometimes frequent a nest site for several years before they finally breed there. The site then used may be old or new or one that has been unoccupied for many years (Brown and Amadon, 1968).
**Survival:** The breeding success of undisturbed pairs, as estimated by Brown and Amadon (1968), may vary from 1.4 to 0.5 young per pair per year with an average of 1.4 in Montana. The young bird does not breed for about four years and the average expectation of life of adults in the wild, assuming a 75 percent loss of young before maturity, is approximately ten years (Brown and Amadon, 1968). In the wild, they likely live to at least 20 years (Brown and Amadon, 1968).

**Socio-Spatial Behavior:** Home range is probably the same as territory (Zeiner et al., 1990). The size of home range is related to prey density and availability, and the openness of terrain. Territory is estimated to average 57 sq. km (22 sq. mi) in Idaho (Beecham and Kocher, 1975), 171-192 sq. km (66-74 sq. mi) in Montana (McGahan, 1968), 23 sq. km (9 sq. mi) in Utah (Smith and Murphy, 1973), 93 sq. km (36 sq. mi) in southern California (Dixon 1937), and 124 sq. km (48 sq. mi) in northern California (Smith and Murphy, 1973). The territory size has been estimated for southern California to be 36 square miles (Dixon, 1937; Terres, 1980). Although total home range can be very large, individuals tend to focus on a smaller core area within the total home range (Marzluff, 1997).

**Reproduction:** It breeds from late January through August, with a peak in March through July. The clutch size is 1-3, usually 2 (McGahan, 1968). Eggs are laid in early February to mid-May. Incubation lasts 43-45 days, and the nestling period usually is 65-70 days (Beebe, 1974).

Nesting is primarily restricted to rugged, mountainous country, with nesting occurring within large trees or on cliffs (Garrett and Dunn, 1981; Johnsgard, 1990). Most of the nests are located on cliffs with some nests occurring in Douglas fir and others in pine trees (McGahan, 1968). Rugged, open habitats with canyons and escarpments are used most frequently for nesting. Pairs may build more than one nest and attend them prior to laying eggs (McGahan, 1968). Alternative nest sites are maintained, and old nests are reused. It builds a large platform nest, often 3 m (10 ft) across and 1 m (3 ft) high, of sticks, twigs, and greenery.

**Threats**
The golden eagle was formerly considered common within suitable habitats in California (Grinnell and Miller, 1944), the species was more recently judged to be uncommon throughout much of California (Garrett and Dunn 1981). As is intimated above, the golden eagle avoids settled areas and therefore has almost certainly declined in the study area and California as a whole within the past century due to loss of large unfragmented habitat areas (Grinnell and Miller, 1944). Additional threats to this species are human disturbance of nest areas, urbanization, poaching, and electrocution from high-tension wires (Remsen, 1978). It may desert its nest in early incubation if disturbed by humans (Thelander, 1974).

**Special Biological Considerations**
Golden eagles are typically not found in heavily forested areas or on the immediate coast and are almost never detected in urbanized environments (Grinnell and Miller, 1944; Garrett and Dunn,
1981). The species requires a large expanse for foraging and suitable nest sites in the form of cliffs or large trees.

A principal component reveals that the golden eagle selects the most inaccessible cliffs (higher and further away from tracks, roads, and villages). The search for inaccessibility for the eagle depends on the amount of human disturbance in the area. Site orientation only contributes to the nest site selection when there is adverse weather (Fernandez, 1993).

Conservation
Unknown.
**Literature Cited**


**Ferruginous hawk**  
*Buteo regalis*  
Class: Aves  
Order: Falconiformes  
Family: Accipitridae

**Legal Status**  
**Federal:** None  
**State:** Species of Special Concern

**Species Description**  
Ferruginous hawks are usually between 50-66cm (20-26 in.) in length, have an average wingspan of 134-152cm (53-60 in.) and weigh 980-2030g (2.2-4.5 lb.). It is the largest hawk in North America, and is sexually dimorphic. The female hawk may be up to one-and-a half times larger than the male. Adults have a rusty color on their back and shoulders, which extends downward onto the legs. The under-part is a whitish color spotted with rufous. A view of the bird in flight will show that the leg feathers form a V shape against the belly of the hawk. When perched, the gray tips of the hawk's long and broad wings often reach the tip of their white, rust, and gray colored tail. Juvenile Ferruginous hawks lack the rust colored legs and have less color on their backs (Malik, 1987; Clark, 1987).

**Habitat and Habitat Associations**  
The ferruginous hawk is an occupant of open dry country and will perch on badger mounds or hillocks when trees or posts are not available. It requires large, open tracts of grasslands, sparse shrub, or desert habitats with elevated structures for nesting. Its wintering habitat is similar in being open and it may also occur in areas of mixed grassy glades and pineries (Grinnell and Miller, 1944; Brown and Amadon, 1968).

It searches for prey from low flights over open, treeless areas, and glides to intercept prey on the ground. It also hovers, and hunts from high mound perches. It roosts in open areas, usually in a lone tree or utility pole (Zeiner, et al. 1990).

**Range**  
The Ferruginous hawk breeds from British Columbia locally eastward to southwestern Manitoba generally southward to Nevada and Texas. The species winters from central and southern parts of the breeding range southward to Baja California and northern mainland Mexico (AOU, 1998).

It does not breed in southern California but winters there in interior and coastal areas (Garrett and Dunn, 1981).
Key Populations in LOHCP Plan Area

There is moderate Potential that the ferruginous hawk is in the LOHCP Plan Area. There is suitable wintering and foraging habitat present in the LOHCP Plan Area. The CNDDB (2002) and existing literature have no record of known occurrence for the ferruginous hawk within the LOHCP Plan Area.

Biology

Diet: Cooperative hunting and ground pursuit of prey have been observed. The species searches for prey from low flights over open, treeless areas, and glides to intercept prey on the ground. The species also hovers and hunts from high mound perches. It mostly eats lagomorphs, ground squirrels, and mice; it also takes birds, reptiles, and amphibians. Population trends may follow lagomorph population cycles. Ground squirrels, jackrabbits or cottontail rabbits may be an important component of this species’ diet (Grinnell and Miller, 1944; Bechard and Schmutz, 1995).

Daily Activity: It roosts in open areas usually in a lone tree or utility pole (Zeiner et al., 1990). When prey is abundant, hunting occurs from daybreak to mid-morning, then again from late afternoon and evening (Bechard and Schmutz, 1995). In winter, these hawks spend most of the day perched (Bechard and Schmutz, 1995; Plumpton and Andersen, 1997). In hot weather, it often hunts only in early morning and late afternoon (Zeiner et al., 1990).

Migration and Dispersal: It is migratory and generally arrives in California in September and departs by mid-April (Palmer, 1988). Arrives in northern breeding range (South Dakota) by March-early April, in Utah and Colorado mostly in late February-early March; yearlings arrive later. Adults depart northern end of breeding range by late October; young depart in August (Schmutz and Fyfe, 1987).

Survival: No literature was found on Ferruginous hawk survival.

Socio-Spatial Behavior: The average nearest-neighbor distances for several U.S. sites were 13.4 km. In winter, several birds may perch within 50 meters of each other. Home ranges for the species were estimated at 5.9 km2 and 7.6 km2, with the latter area for breeding males (Bechard and Schmutz, 1995). The average home range was 90.3 square kilometers in Washington, and the variability in home range was significantly related to distance from the nest to the nearest irrigated agricultural field (Leary et al. 1998). It is hypothesized that an area of up to 21.7 square kilometers is required for one pair for hunting in Idaho (Wakeley 1978).

Reproduction: It nests in foothills or prairies; on low cliffs, buttes, cut banks, shrubs, trees, or in other elevated structures, natural or human-made (Bent, 1937; Olendorff, 1973; Call, 1978). The nest tree is often isolated, or in a transition zone to an adjacent community (Smith and Murphy, 1973). Sticks up to 2.5 cm (1 in) are used to construct the nest; dried manure may also be used (Olendorff, 1973; Call, 1978). Ferruginous hawks are monogamous. Average clutch size ranges from 2 to 4 but can range from 1 to 8 depending on prey
abundance, with a mean number of fledglings per breeding pair per year at 2.9 (Bechard and Schmutz 1995). Egg laying begins in April (Weston, 1969; Olendorff, 1973). It incubates about 28 days. The young fledge at 38-50 days (Olendorff, 1973; Smith and Murphy, 1973).

**Threats**
Cultivation of habitat is thought to be the major threat to the species with lesser threats being grazing, poisoning and controlling small mammals, mining and fire habitat destruction and fragmentation (Bechard and Schmutz, 1995; Hamilton and Willick, 1996).

**Special Biological Considerations**
Artificial disturbances, created to mimic land development, caused 33% of disturbed nests to be deserted and fledgling success to be significantly lower compared to undisturbed nests. A minimum buffer zone of 0.25 km around nests should be sufficient to prevent nest desertion if intermittent or brief human disturbance is necessary (White and Thurow, 1985).

**Conservation**
Unknown.
Literature Cited


Western snowy plover  
*Charadrius alexandrinus nivosus*
Class: Aves  
Order: Charadriiformes  
Family: Charadriidae

**Federal Status**
- **Federal**: Federally Threatened  
  *(Federal Register 58:12874; March 5, 1993)*  
- **State**: Species of Special Concern  
  
**Species Description**
Snowy Plovers are one of the smallest plovers, but they have proportionally longer legs. Plumage varies throughout the world with the American Snowy Plover being the palest. The upper parts of the body are pale in color. Breeding males have a small white forehead, black fore-crown band, and a slightly reddish colored hind-crown. There is also a black eye band below a slim white brow. Male Snowy Plovers display a black shoulder patch and a complete white collar. Under parts of the bird are wholly white. Female Snowy Plovers have the same pattern as the male, but brown areas replace the black areas. In both sexes, the legs are dark gray, the eyes are large and black, and the bill is black and slender. Snowy Plovers can be distinguished in flight by their narrow white wing stripe and a partial dark bar at the tip of their tail.

**Habitat and Habitat Associations**
The western snowy plover nests, feeds, and takes cover on sandy or gravelly beaches along the coast, on estuarine salt ponds, alkali lakes, and at the Salton Sea (Zeiner et al., 1990). On the Pacific coast, it nests on barren to sparsely vegetated sand beaches, dry salt flats in lagoons, dredge spoils deposited on beach or dune habitat, levees and flats at salt-evaporation ponds, and river bars (Page et al., 1995).

In California, most of the breeding activity occurs on dune-backed beaches, barrier beaches, and salt evaporation ponds and it infrequently occurs on bluff-backed beaches (Page and Stenzel, 1981). The inland population breeds up to 3,048 meters on barren to sparsely vegetated ground at alkaline or saline lakes, reservoirs, and pond; on riverine sandbars; and at sewage, salt-evaporation, and agricultural wastewater ponds (Page et al., 1995). The habitat for the wintering range is primarily coastal: beaches, tidal flats, lagoon margins, and salt-evaporation ponds with the inland population regularly wintering at agricultural wastewater ponds in the San Joaquin Valley and at desert saline lakes in southern California (Page et al., 1986; Shuford et al., 1995). Other habitat use areas for the wintering population of inland birds includes the Salton Sea and playa lakes in the deserts regions of Arizona and New Mexico (Shuford et al., 1995).

The snowy plover foraging habitat includes the shores of lakes, reservoirs, ponds, braided river channels, and playas. Most of the feeding habitat is in shallow water or on wet mud or sand. On playas, the snowy plover forages on dry flats (Page et al., 1995).  

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Range
The western snowy plover breeds on the Pacific coast from southern Washington to southern Baja California, Mexico, and in interior areas of Oregon, California, Nevada, Utah, New Mexico, Colorado, Kansas, Oklahoma and north-central Texas, as well as coastal areas of extreme southern Texas, and possibly extreme northeastern Mexico (USFWS, 1993). During the breeding season, from April through August, the species occurs locally on sandy marine and estuarine shores, at salt ponds, and rarely at the Salton Sea as well as on salt pond levees (Cogswell, 1977). The species occurs in inland areas during the breeding season at the Salton Sea, Mono Lake, and at isolated sites on the shores of alkali lakes in northeastern California, in the Central Valley, and southeastern deserts (Jurek and Leach 1973, Page, et al. 1979, 1983, Garrett and Dunn 1981).

Beginning in July and August, the species may move from northwest Oregon to as far as Baja California, remaining on the wintering grounds from September through March (Zeiner, 1990). For the interior population, the period of winter residency for the snowy plover is primarily November through February (Shuford et al., 1995). During the fall and winter, the western snowy plover is common on sandy marine and estuarine shores; it is relatively uncommon at salt ponds, and rare at the Salton Sea (Zeiner, 1990). The Pacific coast population winters locally from southern Washington to Mexico along both coasts of Baja California, rarely from Guatemala to Panama and from southwestern Ecuador to Chile (Page et al., 1995). The inland population appears to winter predominantly along the Pacific coast and in the Gulf of California (Page et al., 1997). The inland population also winters regularly in small numbers at the Salton Sea, Tulare Lake Basin in Kings and Tulare Counties, and interior lakes in southern California (Shuford et al., 1995). It also remains year-round in smaller numbers at the Salton Sea and at salt ponds on San Francisco Bay (Cogswell, 1977).

Key Populations in LOHCP Plan Area
There is a low potential that the western snowy plover occurs within the LOHCP Plan Area. There is no suitable nesting or foraging habitat present in the LOHCP Plan Area and the LOHCP Plan Area is outside of its known range. The CNDDDB (2002) and existing literature have no record of known occurrence for the western snowy plover within the LOHCP Plan Area.

Biology
**Diet:** The western snowy plover gleans insects and amphipods from the dry sand of upper beaches along the coast. Occasionally it forages in wet sand for young sand crabs. At salt ponds and alkali lakes, it feeds primarily on brine flies (Cogswell, 1977).

**Daily Activity:** The snowy plover shows yearlong, diurnal activity (Zeiner et al., 1990).

**Migration and Dispersal:** Beginning in July and August, may move from northwest Oregon to as far as Baja California. Remains on wintering grounds from September through March. Smaller numbers remain year-round at the Salton Sea and at salt ponds on San Francisco Bay (Cogswell, 1977).
There is little information on dispersal from the natal site. Some young do not disperse but become year-round residents whereas others disperse as early as one month after the first flight to the wintering areas. Some young return to the natal site, whereas others disperse to areas according to their population status that is the coastal population disperses to breed along the coast, while the inland population disperses to breed within the inland areas. The adult snowy plover shows a high degree of breeding site fidelity (Page et al., 1995).

**Survival:** Flooding and predation have been identified as the major causes of egg loss for the interior population of the snowy plover throughout the breeding range (Koenen et al., 1996). The mean life span of the snowy plover has been estimated as 2.7 years. Paton estimated the annual adult survival rates as ranging from 0.578 to 0.880 over a four-year period (Paton, 1994).

**Socio-Spatial Behavior:** During the breeding season, the snowy plover adult generally does not wander far from the nest (Page et al., 1977). At Mono Lake, the breeding adult feeds at freshwater seeps up to 1.5 km (0.94 mi) away from the nest site (Page et al., 1983). Nesting density and territorial defense appear to depend on predators and the predation pressure exerted at the nesting site (Zeiner et al., 1990). Nesting density has been calculated as 1 nest/6 hectares (15 acres) at Mono Lake, where predatory pressure was high, while density was determined to be 20 nests/6 hectares (15 acres) at Monterey Bay, where predators were infrequent (Page et al., 1983).

**Reproduction:** The western snowy plover is present at its nesting sites from April through August. It is a solitary nester producing one or more clutches per year (Page et al., 1995). The clutch size varies from 2 to 6 with the average equal to 3 eggs. Mostly the male does incubation of the eggs and the incubation period lasts approximately 24 days. The young snowy plovers are precocial, following the adults to feeding areas within 1 day after hatching. The young are agile and able to avoid predators within 2 days after hatching. Fledgling age is reported as 29-47 days (Warriner et al., 1986; Ehrlich et al., 1988).

The western snowy plover nests locally along sandy marine shores, estuarine shores, and salt ponds from April through August and a major nesting habitat now appear to be on salt pond levees (Cogswell, 1977). Inland nesting areas of the western snowy plover occur at the Salton Sea, Mono Lake, and at isolated sites on the shores of alkali lakes in northeastern California, in the Central Valley, and southeastern deserts (Jurek and Leach, 1973; Page et al., 1979, 1983; Garrett and Dunn, 1981).

The western snowy plover requires a sandy, gravelly or friable soil substrate for nesting. The nests are shallow depressions in the sand or soil, sometimes lined with small pebbles, glass fragments, or gravel (Hunter, 1990). It frequently locates the nest near or under objects such as driftwood, rocks, or defoliated bushes. Snowy plover nests also may be on barren ground with no nearby cover (Bent, 1929; Jurek and Leach, 1973).
Threats
Degradation of habitat appears to be the primary threat to the western snowy plover for both the coastal and inland populations (Page et al., 1995). For the coastal race, inlet stabilization, which may include dredging sand flats, may cause direct habitat loss, especially for foraging. Conflicts with increasing recreational uses of beaches have resulted in poor reproductive success for this species (Hunter, 1990).

Gulls, ravens, coyotes, and skunks are important predators of adults, eggs, and young at Mono Lake (Page et al., 1983). The predation appears to be higher for the clutches placed near objects on the nesting area compared to those placed in the open. Clutches on a sand-gravel substrate also were less successful than those on alkaline areas (Page et al. 1985).

Human harassment and direct destruction of nest sites and breeding habitat are reasons for its decline. Wherever these birds are left undisturbed in suitable habitat, such as on the Channel Islands, they prosper. The recent Point Reyes Bird Observatory survey found that almost every beach with suitable nesting habitat, no matter how remote, showed signs of dune buggy use. An instance of deliberate harassment by dune buggy enthusiasts was recorded. The chicks have a tendency to crouch in vehicle tracks in the sand for cover. (PRBO Newsletter, op. cit.).

Special Biological Considerations
Predation, nest abandonment, and weather have been identified as the primary causes of nest failure for the snowy plover. The effectiveness of predator exclosures has currently been judged to be not significant. Previous conclusions of the effectiveness of the exclosure method were determined to be confounded by including non-random assignment of exclosures, unbalanced sample sizes between protected and unprotected nests, data pooling across years, and inappropriate statistical analyses (Mabee and Estelle, 2000).

Habitat creation for nesting for the coastal population of the snowy plover has been conducted and monitored at a site at Batiquitos Lagoon, San Diego County, California. The creation of nesting habitat from dredged materials has been a popular component of habitat restoration and it partially compensates for the wetland loss in the region. The number of nesting attempts by snowy plovers was 5 in 1994 and 38 in 1997 with varying fledge rates which have declined after the initial creation of the nesting area (Powell and Collier 2000).

Conservation
Literature Cited


Northern harrier
*Circus cyaneus*
Class: Aves
Order: Falconiformes
Family: Accipitridae

**Legal Status**
- **Federal:** None
- **State:** Species of Special Concern

**Species Description**
The Northern harrier has specialized feathers around their face in the shape of a disk, which focuses sound into their ears. Their wings form a dihedral (V shape) when in gliding flight, and they have a distinctive white rump patch that is obvious during flight. Adult harriers have yellow eyes. Adult males are gray on their dorsal side. Ventrally they are white except for spots on their chest and black wingtips. Adult females are a brown color all over their body, except for underneath their wings where there are white stripes. Immature males and females resemble the adult female but they have a darker shade of brown covering the dorsal side, and a brownish rusty color underneath. Immature harriers have brown eyes. The length of adult males varies between 41 and 45 cm (16 to 18 in). The length of adult females varies between 45 and 50 cm (18 to 20 in). Typically the wingspan of adult males varies between 97 and 109 cm (38 to 43 in). The wingspan of adult females varies between 111 and 122 cm (44 to 48 in). The weight of adult males is approximately 290 to 390 grams (1/2 to 1 lb). The average weight of adult females is approximately 390 to 600 grams (1 to 1.3 lbs) (Wheeler and Clark, 1995; Weidensaul, 1996; Ryser, 1985; Wheeler and Clark, 1987).

**Habitat and Habitat Associations**
The northern harrier frequents open wetlands, wet and lightly grazed pastures, old fields, dry uplands, upland prairies, mesic grasslands, drained marshlands, croplands, shrub-steppe, meadows, grasslands, open rangelands, desert sinks, fresh and saltwater emergent wetlands; it is seldom found in wooded areas (Bent, 1937; MacWhirter and Bildstein, 1996). It uses tall grasses and forbs in wetlands, or at wetland/field borders, for cover; it roosts on ground (Bent, 1937).

The home range usually includes fresh water. It is mostly found in flat, or hummocky, open areas of tall, dense grasses, moist or dry shrubs, and edges for nesting, cover, and feeding (Bent, 1937). While it seems to prefer to nest in the vicinity of marshes, rivers, or ponds, it may be found nesting in grassy valleys or on grass and sagebrush flats many miles from the nearest water (Call, 1978). And in general, it prefers saltwater marshes, wet meadows, sloughs, and bogs for its nesting and foraging habitat and if these are absent, it hunts open fields and is frequently observed hunting over agricultural areas (Call, 1978).

The California population has decreased in recent decades (Grinnell and Miller, 1944; Remsen, 1978), but can be locally abundant where suitable habitat remains free of disturbance, especially
from intensive agriculture. In both wetland and upland areas, the densest populations typically are associated with large tracts of undisturbed habitats dominated by thick vegetation growth (MacWhirter and Bildstein, 1996).

Range
The northern harrier occurs as a breeding bird across the northern United States and Canada, throughout most of California and the central portion of the United States south to Texas. It is absent from desert regions and the southeastern parts of the United States (Bildstein, 1988). During the winter, the northern harrier occurs throughout southern Canada and all of the United States (Bildstein, 1988). The southern limit for wintering is Panama (MacWhirter and Bildstein, 1996).

In California, the northern harrier occurs from annual grassland up to lodgepole pine and alpine meadow habitats, as high as 3,000 m (10,000 ft). It breeds from sea level to 1,700 m (0-5700 ft) in the Central Valley and Sierra Nevada, and up to 800 m (3600 ft) in northeastern California. It is a permanent resident of the northeastern plateau and coastal areas; it is a less common resident of the Central Valley. It is a widespread winter resident and migrant in suitable habitat. Some individuals migrate into California; others migrate through to Central America or northern South America (Garrett and Dunn, 1981).

Key Populations in LOHCP Plan Area
There is a low probability that the northern harrier is in the LOHCP Plan Area. There is no suitable nesting habitat and moderately suitable foraging habitat. The CNDDB (2002) and existing literature have no record of known occurrence for the northern harrier within the LOHCP Plan Area.

Biology

Diet: The northern harrier feeds mostly on small and medium sized mammals, primarily rodents, birds, frogs, small reptiles, crustaceans, insects, and, rarely on fish (Terres, 1980). It makes low, quartering flights 1-9 m (3-30 ft) above open ground. Areas of short vegetation such as heavily grazed pasture and harvested fields are underused, whereas idle and abandoned fields with vegetative cover are used more than expected (Bildstein, 1988). It dives from a flight or a hover; it rarely perches and pounces on prey (Zeiner et al., 1990).


Migration and Dispersal: Some individuals migrate into California; others migrate through to Central America or northern South America. There appears to be virtually no fidelity by the offspring to their natal area (MacWhirter and Bildstein, 1996).

Survival: The annual reproductive success of all nests averaged 1.8 offspring fledged per pair (MacWhirter and Bildstein, 1996). Among 114-banded birds, the mean age at death was 16.6 months with the longest life span reported as 16 years 5 months (MacWhirter and
Bildstein, 1996; Bildstein, 1988). The pre-1950s mortality rates have been estimated as 59 percent in the first year and 30 percent among adults (Bildstein, 1988).

**Socio-Spatial Behavior:** In Utah, 5 breeding home ranges averaged 429 hectares (1060 ac), and varied from 363-518 hectares (896-1280 ac). In Michigan, individuals flew 1.6 to 8.8 km (1 to 5.5 mi) daily from a communal roost to foraging areas. Daily foraging areas varied from 12-16 hectares (30-40 ac) to 259 hectares (640 ac). Also in Michigan, 15 breeding home ranges averaged 405 hectares (1000 ac), and varied from 98-770 hectares (243-1920 ac). In Wisconsin, the breeding home range of 1 radio-tagged pair included an area 2 x 4.4 km (1.25 x 2.75 mi), or 890 ha (2200 ac) (Hamerstrom and Wilde, 1973).

**Reproduction:** It breeds in April to September, with a peak of activity in June through July. It is single-brooded; the clutch averages 5 eggs, with a range from 3-12 (Harrison, 1978). The female incubates while the male provides food. The nesting period lasts about 53 days (Craighead and Craighead, 1956). Breeding pairs and juveniles may roost communally in late autumn and winter (Smith and Murphy, 1973).

It nests on the ground in shrubby vegetation or patches of dense vegetation, usually at the marsh edge (Brown and Amadon, 1968; Toland, 1987). The nest is a relatively flimsy structure built of a large mound of sticks, straws, or grasses on wet areas, and a smaller cup of grasses on dry sites (Call, 1978).

**Threats**
The destruction of wetland habitat, native grassland, and moist meadows, and burning and plowing of nesting areas during early stages of the breeding cycle, is major reasons for the decline (Remsen, 1978). The continued widespread destruction of freshwater and estuarine wetlands in the United States poses a threat to the breeding and wintering populations. Conversion of native grassland prairies for monotypic farming has contributed to local population declines. In upland areas, mechanized agriculture and early mowing have increased the threat of nest destruction. Overgrazing of pastures, and the advent of larger crop fields and fewer fencerows, together with the widespread use of insecticides and rodenticides, have reduced prey availability and thus the amount of appropriate habitat for the species (MacWhirter and Bildstein, 1996).

**Special Biological Considerations**
Population estimates and estimates of reproductive success may be difficult to make for the northern harrier. This is due to its ground-nesting behavior that makes it difficult to census. Additionally, the harrier tends to not flush from the nest until the observer is within 2 m of the nest (Lehman et al., 1998).

The population size may increase with some agricultural practices (e.g., grain crops), provided that cover and nesting habitat is preserved or enhanced. The population may also increase in response to the prey population size due to nomadic movements from one area to another (MacWhirter and Bildstein, 1996). Nesting success was higher in pairs nesting in idled sections.
of a park in Idaho than in managed sections (Toland, 1987). Nest site selection may be a compromise between the availability of a wet nest site, the close proximity to optimum foraging habitat, and access to a mate with a high food provisioning rate (Simmons and Smith, 1985). Locally, the nesting numbers and reproductive success are affected by prey availability, predation, nest-site quality, and weather (MacWhirter and Bildstein 1996).

**Conservation**

Unknown.
Literature Cited


MacWhirter, R. B., and K. L. Bildstein. 1996. Northern Harrier (Circus cyaneus). In The Birds of


Yellow warbler  
*Dendroica petechia brewsteri*

Class: Aves  
Order: Passeriformes  
Family: Emberizidae

**Legal Status**  
**Federal:** None  
**State:** Species of Special Concern

**Species Description**  
The Yellow warbler is the only warbler that is so extensively yellow with golden yellow plumage and rusty streaks on the breast. The Yellow warbler males and females are similar with golden yellow upper parts tinged with olive, yellow under parts, and thin pointed beaks, however the male is brighter. Yellow warblers reach an average size of 10-18 cm in length (Perrins and Middleton, 1985).

**Habitat and Habitat Associations**  
Yellow warblers in California breed in lowland and foothill riparian woodlands dominated by cottonwoods, alders, or willows and other small trees and shrubs typical of low, open-canopy riparian woodland (Garrett and Dunn, 1981; Unitt, 1984; Lehman, 1994). During migration, they occur in lowland and foothill woodland habitats such as desert oases, riparian woodlands, oak woodlands, mixed deciduous-coniferous woodlands, suburban and urban gardens and parks, groves of exotic trees, farmyard windbreaks, and orchards (Small, 1994). It also breeds in montane chaparral, open ponderosa pine and mixed conifer habitats with substantial amounts of brush (Zeiner et al., 1990). Breeding in montane shrubs and conifers is perhaps a recent phenomenon (Gaines, 1977b).

**Range**  
The Yellow warbler occurs in riparian areas throughout Alaska, Canada, the United States, and parts of Mexico. A tropical subspecies occurs in Central and South America. The Yellow warbler prefers wetlands and mature riparian woodlands dominated by cottonwoods, alders, and willows. It also uses well watered, second growth woodlands and gardens. The Yellow warbler winters south to the Bahamas, Central America and South America to Peru, Bolivia, and Brazil.

The species breeds throughout the United States and Canada. The population is fluctuating in North America: declining in some areas and increasing in others. It was once a common to locally abundant summer resident in riparian areas throughout California. Currently, populations are reduced and locally extirpated (e.g., Sacramento Valley and San Joaquin Valley). Once a common resident in San Francisco, there are no recent breeding records for this area. Breeding populations in Marin County have declined, but the species is still common in Santa Cruz County. Numbers have also declined in Siskiyou County, but are steady in some areas of the Sierra Nevada. Yellow warblers are common along streams below about 8,000 feet in the eastern
Sierra. The yellow warbler has declined significantly as a breeding bird in the coastal lowlands of southern California and is believed to be extirpated from the Colorado River (AOU, 1998; McCaskie et al., 1979; Garrett and Dunn, 1981; Zeiner et al., 1990).

**Key Populations in LOHCP Plan Area**
There is a low potential of the yellow warbler in the LOHCP Plan Area. The LOHCP Plan Area is outside of its known range and the LOHCP Plan Area has no suitable habitat. The CNDDB (2002) and existing literature have no record of known occurrence for the yellow warbler within the LOHCP Plan Area.

**Biology**

**Diet:** The yellow warbler forages for insects and spiders in the upper canopy of deciduous trees and shrubs. It gleans and hovers in the upper canopy of deciduous trees and shrubs. Occasionally it hawks insects from air, or eats berries (Bent, 1953; Ehrlich et al., 1988).

**Daily Activity:** The yellow warbler exhibits yearlong, diurnal activity. It is a nocturnal migrant (Zeiner et al., 1990).

**Migration and Dispersal:** The Yellow warbler typically arrives from their wintering areas from late March to May. It tends to nest in locations of intermediate height and shrub density. Apparently there is a post-breeding, upslope movement mostly to middle elevations (Beedy, 1975); it is scarce at elevations above 2,500 m (8000 ft) (Gaines, 1977b).

**Survival:** Nest predation was found to be the major cause of nest failure in a group of species in Alaskan wetlands including yellow warblers (Rodgers, 1995). The maximum recorded age of a wild Yellow Warbler is 8 years, 11 months (Klimkiewicz et al., 1983).

**Socio-Spatial Behavior:** The species tends to have relatively small territories and home ranges, varying from 0.08 to 0.5 acre (Ficken and Ficken, 1966; Beer et al., 1956). Peak densities measured in southeast Arizona reached 48 birds per hectare (Skagen et al., 1998). The home range was recorded as less than 0.2 hectares (0.5 ac) in New York (Ficken and Ficken, 1966), and 0.16 hectares (0.4 ac) in Iowa (Kendeigh, 1941a). Kendeigh observed individuals regularly moving up to 488 meters (1,600 ft) to a willow-marsh edge to feed. The territory varied from 0.03 hectares (0.08 ac) on small islands in Minnesota (Beer et al., 1956), to 0.36 hectares (0.9 ac) in a swamp thicket in Illinois.

**Reproduction:** It breeds from mid-April into early August with peak activity in June. The pair breeds solitarily. It lays 3-6 eggs (usually 4 or 5); the female incubates the eggs for 11 days. Both parents tend the altricial young until fledging at 9-12 days (Harrison, 1978). The young breed the following year. The territory often includes tall trees for singing and foraging and a heavy brush understory for nesting (Ficken and Ficken, 1966).

The preferred nest trees are willows, alders, and cottonwoods. Yellow warblers have been identified using a tamarisk (*Tamarix ramosissima*) community at Glen Canyon Dam where
creation of this habitat mimicked native habitat and enhanced breeding habitat for this and ten other species (Brown and Trosset, 1989). The nest is an open cup placed 0.6 to 5 m (2-16 ft) above ground in a deciduous sapling or shrub.

**Threats**
Major continuing threats to the species include riparian habitat destruction and fragmentation and brood-parasitism by brown-headed cowbirds (*Molothrus ater*) (Garrett and Dunn, 1981).

**Special Biological Considerations**
This species has increased dramatically within the Prado Basin during the course of 14 years of cowbird management and habitat conservation efforts there. The number of breeding territories has increased from approximately 5 in 1986 to over 250 in 1998 (Hays, 1998).

**Conservation**
Protect riparian habitats throughout California, especially in the San Joaquin and Colorado River valleys. Initiate cowbird removal programs at a local level on an experimental basis.
**Literature Cited**


**White-tailed kite**  
_Elanus leucurus majusculus_  
Class: Aves  
Order: Falconiformes  
Family: Accipitridae  

**Legal Status**  
**Federal:** None  
**State:** Fully Protected Species  
Source: www.rain.org

**Species Description**  
White-tailed kites are 14.5 inches in length and have a wingspan of 40 inches (Robbins et al., 1966). They have long, pointed wings, a long, squared-off tail, a short, dark, hooked beak, yellow legs, and red eyes. The upper parts are gray with black shoulders and primaries. Black upper-wing coverts appear as a black shoulder while perched. Adults have a white head, chin, throat, chest, belly, and under-wing coverts. Adults also have a small black wrist mark on their under-primary coverts, a white tail, a pale gray back, and upper-wings with flight feathers darkening towards the outer wings. Immature birds have a brown head, nape, and back, a white face, a white breast with brown streaks, dark upper-wings with pale tips to the covert, and a dark band at the tip of their white tail (Gough et al., 1998).

**Habitat and Habitat Associations**  
White-tailed kites inhabit herbaceous and open stages of most lowland habitats with variable tree growth and dense population of voles (Waian and Stendell, 1970). Kites are rarely found away from agricultural areas. They use trees with dense canopies for cover. In southern California, they also roost in saltgrass and Bermudagrass. Substantial groves of dense, broad-leafed deciduous trees are used for nesting and roosting (Polite, 1990). Precipitation is highly variable among kite habitats, though kites are uncommon in areas with extensive winter freezes (Moore, 2000).

White-tailed kites breed in lowland grasslands, agriculture, wetlands, oak-woodland, and savannah habitats, and riparian areas associated with open areas (Moore, 2000). Erichsen (1995) found summer habitat preferences to include riparian zones, dry pastures, alfalfa, orchards, and rice stubble fields. Plowed fields were avoided in both winter and summer. Nest trees range from a single isolated tree to a tree within a large stand (Dunk, 1995). Erichsen (1995) found that riparian corridors represent preferred nesting sites for kites. Vicinity to adequate foraging habitat may be important for nest sites (Moore, 2000).

Kites forage in dry grass savannas, undisturbed, open grasslands, meadows, farmlands and emergent wetlands (Polite, 1990). They favor foraging habitats with high prey populations, such as un-grazed or little grazed grasslands, agriculture, and grass-dominated wetlands (Moore 2000). Alfalfa and sugarbeets support the highest vole populations, relative to other agricultural crops (Moore 2000). In the winter, Erichsen (1995) found uplands, wetlands, riparian zones,
fallow, and natural vegetation, and sugarbeet crops to be preferred habitat. Preferences of cropland-habitat also differ in the spring and winter (Moore, 2000).

**Range**

Although threatened with extinction in North America during the early twentieth century, the white-tailed kite has recovered since then, expanding its range in the United States from small portions of California, Texas, and Florida to Oregon and Washington, as well as into Middle America (Eisenmann, 1971). Prior to the 1960s, this species occurred in low numbers across much of its range. Population decreases appeared to be common during this time, especially in Mexico and Central America, however, since 1960, the population status and range of this raptor in North America have improved markedly. And it has also rapidly colonized habitats throughout much of Central America in regions uninhabitable previously (Eisenmann, 1971).

The breeding range stronghold in North America is California, with nearly all areas up to the western Sierra Nevada foothills and southeast deserts occupied (Small, 1994; Dunk, 1995). It is common in the Central Valley of California and along the entire length of the coast; breeding has been documented regularly in the far west counties of Oregon, and breeding have also been documented recently in southwest Washington. It is a common breeder in southern Texas. A small breeding population has been established in southern Florida since at least 1986 with scattered reports elsewhere in the peninsula and in the eastern panhandle (Dunk, 1995). Its breeding range continues south along the coast in Mexico, into Central America and in South America in Colombia south to Buenos Aires (Dunk, 1995).

In California, the white-tailed kite is a yearlong resident in coastal and valley lowlands; rarely found away from agricultural areas (Grinnell and Miller, 1944). It inhabits herbaceous and open stages of most habitats mostly in cismontane California. It has extended its range and increased numbers in California in recent decades (Eisenmann, 1971).

**Key Populations in LOHCP Plan Area**

There is a moderate potential that the white-tailed kite is in the LOHCP Plan Area. There is suitable nesting and foraging habitat present in the LOHCP Plan Area. The CNDDB (2002) and existing literature have no record of known occurrence for the white-tailed kite within the LOHCP Plan Area.

**Biology**

**Diet:** The white-tailed kite preys mostly on voles and other small, diurnal mammals, occasionally on birds, insects, reptiles, and amphibians. It takes small mammal prey approximately 95 percent of the time and can be considered a small mammal specialist. It forages in undisturbed, open grasslands, meadows, farmlands and emergent wetlands, ungrazed grasslands, fencerows and irrigation ditches adjacent to grazed lands (Dunk, 1995). The activity patterns are generally similar throughout its range, with hunting success approximately 40 to 50 percent (Mendelsohn and Jacsis, 1989).
It soars, glides, and hovers less than 30 m (100 ft) above the ground in search of prey. It hunts almost exclusively by hovering from 5 to 25 meters in height. The hovering bouts last from 1 to 60 seconds during which time it scans the ground beneath and periodically looks from side to side, apparently for potential competitors or predators. It slowly descends vertically upon prey with wings held high, and legs extended; it rarely dives into tall cover (Thompson 1975).

**Daily Activity:** The kite exhibits yearlong diurnal, and crepuscular activity (Zeiner et al., 1990).

**Migration and Dispersal:** Although probably resident through most of its breeding range, white-tailed kites disperse during the non-breeding season, leading to range expansion that includes most of California (Small, 1994; Dunk, 1995; Sauer et al., 1999). Binford (1979) found some movements in coastal California. Stendell (1972) believed it to be resident, becoming nomadic during periods of low prey abundance.

Little information exists on juvenile dispersal of white-tailed kites (Moore, 2000). A few banded nestlings have been re-reported at 1.6-160 kilometers from their natal sites (Dixon et al., 1957; Stendell, 1972). One individual juvenile established a territory adjacent to its natal site within two months of fledging (Dunk, 1995).

**Survival:** The San Francisco Bay population, it was found that 1.6 young were fledged per active nest and 2.9 were fledged per successful nest (Dunk, 1995). The maximum life span recorded is 5 years and 11 months (Clapp et al., 1982).

**Socio-Spatial Behavior:** It forages from a central perch over areas as large as 3 square km (1.9 square miles) (Warner and Rudd, 1975). It seldom hunts more than 0.8 km (0.5 mi) from the nest when breeding (Hawbecker, 1942). Generally it is not territorial, but the nest site may be defended against crows, other hawks, and eagles (Pickwell, 1930; Dixon et al., 1957). It has defended foraging territories of about 0.10 square km (0.04 square miles) in winter from red-tailed hawks and northern harriers (Bammann, 1975). The estimated prey abundance and the competitor abundance were inversely correlated with kite territory size and it was hypothesized that kite territory size is proximately regulated by competitor abundance and ultimately regulated by prey abundance (Dunk and Cooper, 1994). Communal roosts are used in non-breeding seasons (Waian and Stendell, 1970).

**Reproduction:** It is monogamous; it breeds from February to October, with a peak from May to August. The average clutch is 4-5 eggs, with a range of 3-6. The female only incubates for about 28 days. The young fledge in 35-40 days. During the incubation and nestling period, the male feeds the female, and supplies her with food to feed the young. It is usually single brooded; occasionally may have 2 broods (Dunk and Cooper, 1994; Dunk, 1995).
The pairs are found together year-round but more individuals are paired from December through August (Dunk, 1995). It makes a nest of loosely piled sticks and twigs that are lined with grass, straw, or rootlets. The nest is placed near the top of a dense oak, willow, or other tree stand; usually 6-20 m (20-100 ft) above ground in trees that vary from 3 to 50 meters in height (Dixon, et al. 1957). The nest is located near an open foraging area.

**Threats**

Historically, the white-tailed kite may have been widespread throughout the lowlands of California, but during the early 1900s, the population severely declined and its range was reduced to western California, from the Sacramento Valley to San Diego (May, 1935). Causes of this decline were probably related to habitat loss, shooting, and possible egg collecting (Pickwell, 1930; Waian and Stendell, 1970). Pickwell (1930) predicted white kites would become extinct in California. However, from the 1940s to the 1970s, the populations and distribution of white-tailed kites increased (Fry, 1966; Waian and Stendall, 1970; Eisenmann, 1971). This increase was probably due to the added protection from shooting and a rise in agricultural development, which may have increased rodent habitat (Eisenmann, 1971; Small, 1994; Dunk, 1995).

According to Sauer et al. (1999), populations have been decreasing in some areas since the 1980s, including the Central valley, southern California grasslands and southern Pacific rainforests. Possible declines may be due to increased interspecific nest-site competition, human disturbance at nests, and conversion of agricultural lands to urban areas and clean farming techniques that reduce prey populations (Dunk, 1995). The conversion of agricultural lands to urban development reduces foraging habitat and nesting opportunities. With the loss of preferred nesting sites (e.g. riparian corridors and woodlands, wetlands, and woody grasslands), kites must compete with larger raptors for nesting sites in the remaining habitat (Moore 2000). Nest site competitors include great horned owls, red-tailed hawks, red-shouldered hawks, and Swainson’s hawks (Moore 2000).

Other threats include the robbing of nests by jays, crows, yellow-billed magpies, raccoons, and opossums and the predation by great horned owls (Polite, 1990). Dunk (1995) found the disturbance of communal roosting sites to cause abandonment.

**Special Biological Considerations**

It appears that the primary factor known to regulate the population is prey availability. The availability of nesting and roosting sites becomes important in areas where prey is not limiting (Dunk and Cooper, 1994). Within a 0.8-kilometer radius circle centered on the nest site, successful nests were surrounded by more natural vegetation and non-urban human development than failed nests (Erichsen et al., 1996).

**Conservation**

In northern California, the California Department of Fish and Game purchased previously grazed grasslands and largely removed them from grazing. These areas now support large populations of voles and high densities of wintering white-tailed kites, approximately 10 times the raptor density they supported prior to the purchase (Dunk, 1995).
Riparian corridors represent preferred habitat for white-tailed kites in both the breeding and non-breeding season (Erichsen, 1995). California has lost over 90% of its original riparian and wetland habitats, the remaining of which may be highly competed for by several species (Moore, 2000). Land-use and agricultural practices supporting abundant prey populations may benefit kites, while those that reduce prey populations may represent habitat loss to kites. Similarly, land use practices that remove nest trees may be detrimental to kite reproduction (Moore, 2000).
**Literature Cited**


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Pickwell. 1930. The white-tailed kite. Condor 32: 221-239.


Southwestern willow flycatcher
*Empidonax traillii extimus*

Class: Aves  
Order: Passeriformes  
Family: Tyrannidae

**Legal Status**  
**Federal:** Endangered (Federal Register 60: 10715, February 27, 1995)  
**State:** Endangered, 1991

**Species Description**  
They are very small, gray-green to olive-brown bird with prominent light wingbars with whitish to pale olive to yellowish below. They have a faint to no pale eye-ring with a lower bill light yellow to orange. They are distinguishable from Alder Flycatcher only by voice, breeding habitat, and nest. Other western Empidonax flycatchers have more conspicuous eye ring or are grayer above.

**Habitat and Habitat Associations**  
The southwestern willow flycatcher is a neotropical migrant that breeds in low-elevation riparian habitats. Occupied sites are highly localized and variable in vegetation structure, making it difficult to readily see what microhabitat features are being selected. One common denominator appears to be the presence of perennial or near-perennial water. Whitfield and Enos (1996) measured the vegetative characteristics of willow flycatcher breeding sites on the Kern River and found that all nesting territories had high vegetative volume in the lower strata and high canopy density.

The southwestern willow flycatcher is restricted to riparian woodlands along streams and rivers with mature, dense stands of willows (*Salix spp.*), cottonwoods (*Populus spp.*) or smaller spring fed or boggy areas with willows or alders (*Alnus spp.*). Riparian habitat provides both breeding and foraging habitat for the species. The southwestern willow flycatcher nests from zero to 13 feet above ground in thickets of trees and shrubs approximately 13 to 23 feet tall with a high percentage of canopy cover and dense foliage. The nest site plant community is typically even-aged, structurally homogeneous and dense (Brown, 1988; Whitfield, 1990; Sedgewick and Knopf, 1992). This species usually nests in the upright fork of a shrub but occasionally nests on horizontal limbs within trees and shrubs (Terres, 1980).

**Range**  
The general breeding range of the southwestern willow flycatcher includes: southern California, Arizona, New Mexico, extreme southern portions of Nevada and Utah, far western Texas, southwestern Colorado, and extreme northwestern Mexico (USFWS, 1993). The breeding range for this species includes: Owens Valley, south fork of the Kern River, the Los Angeles Basin (Unitt, 1987; Zeiner et al., 1990), the Santa Ynez River near Buellton, the Prado Basin riparian...
forest in Riverside County, the Santa Margarita and San Luis Rey Rivers in San Diego County, Middle Peak in the Cuyamaca Mountains, and near Imperial Beach (Small, 1994). Breeding populations also exist in southern Nevada, Arizona, and New Mexico (Garrett and Dunn, 1981). Additionally, this taxon overwinters in Mexico (USFWS, 1995). Important stopovers along the Rio Grande provide important refueling sites for flycatchers as they migrate between their breeding and wintering grounds (Yong and Finch, 1997).

Key Populations in LOHCP Plan Area
There is a low potential that the southwestern willow flycatcher within the LOHCP Plan Area. The LOHCP Plan Area is outside known range. The CNDDB (2002) and existing literature have no record of known occurrence for the southwestern willow flycatcher within the LOHCP Plan Area.

Biology

Diet: The southwestern willow flycatcher is an insectivore that forages within and above dense riparian vegetation, taking insects on the wing or gleaning them from foliage (USFWS, 1993). This species also forages in areas adjacent to nest sites that may be more open (USFWS, 1995). No information is available on specific prey species (USFWS, 1993).

Daily Activity: The willow flycatcher is a diurnally active species that begins singing at a predawn hour while within the territory (San Diego Natural History Museum, 1995).

Migration and Dispersal: The migration routes and destination of the southwestern willow flycatcher are not well understood. The species has been reported to sing and defend winter territories in Mexico and Central America. The southwestern willow flycatcher most likely winters in Mexico, Central America, and perhaps northern South America, however, the habitats it uses on the wintering grounds are unknown (USFWS, 1993).

The Southwestern willow flycatcher fledgling leaves the nest at age 12-15 days in early July (USFWS, 1993) and disperses from the natal territory at age 26-30 days minimum. About 25% of adults return to their territory from the previous year; at least 20% of juveniles return to the natal area, which are usually two to four kilometers from the natal territory. Adults usually depart from their breeding territory between 12 August and 4 September (San Diego Natural History Museum, 1995).

Survival: The nest success of the southwestern willow flycatcher on the south Fork Kern River is calculated at 61 percent with 20 out of 29 active nests successful. Predation rate at the same site is calculated to be 27.6 percent (Whitfield, 1996).

Socio-Spatial Behavior: The southwestern willow flycatcher has a home range that is larger than the defended territory. This species initiates territorial defense in late May. The territory size varies from 0.24 to 0.45 hectares. The species may pack a maximum number of territories in suitable habitat. The documented maximum is six females and five males in 4.4 hectares (San Diego Natural History Museum, 1995). Sogge, et al. (1993) as reported in
USFWS (1995) found territorial flycatchers in habitat patches ranging from 0.5 to 1.2 hectares (1.23 to 2.96 acres). Two habitat patches of 0.5 and 0.9 hectares each supported two territories in this study.

**Reproduction:** Southwestern willow flycatchers typically raise one brood per year (USFWS, 1993). The clutch size ranges from two to five; the average clutch size is 3.4 eggs in coastal southern California. The species usually has a monogamous mating system within one nesting season although not all territorial males are mated (San Diego Natural History Museum, 1995).

Although nesting willow flycatchers of all subspecies prefer areas with surface water nearby (Harris et al., 1986), the southwestern willow flycatchers in Prado Basin virtually always nest near surface water or saturated soil (The Nature Conservancy, 1994). The female southern willow flycatcher performs nest construction lasting approximately three to eight days (San Diego Natural History Museum, 1995). The willow flycatcher nests zero to 13 feet high in thickets of trees and shrubs approximately 13 to 23 feet tall with a high percentage of canopy cover and dense foliage. The nest site plant community is typically even-aged, structurally homogeneous and dense (Brown, 1988; Whitfield, 1990; Sedgewick and Knopf, 1992).

**Threats**

The major threats to the species can be summarized as follows: the current or future destruction, modification, or curtailment of its habitat and the nest parasitism by the brown-headed cowbird that affects its productivity (USFWS, 1995):

Changes in riparian plant communities, as summarized in the following from USFWS (1995), have resulted in the reduction, degradation, and elimination of nesting habitat for the willow flycatcher, which has curtailed the range, distribution, and population size of this species. Loss and modification of southwestern riparian habitats have occurred from urban and agricultural development, water diversion and impoundment, channelization, livestock grazing, off-road vehicle and other recreational uses, and hydrological changes resulting from these and other land uses. It is estimated that 91 percent of historic riparian habitat has been lost in California due to widespread destruction. Overuse by livestock has been a major factor in the degradation and modification of riparian habitats in the region. These effects include changes in the plant community structure and species composition and in the relative abundance of the species and plant density. Livestock grazing in riparian areas typically results in the reduction of plant species diversity and density.

Another likely factor in the loss and modification of the willow flycatcher habitat is the invasion by the exotic tamarisk (*Tamarix* sp.) and giant reed (*Arundo donax*). This non-native species has spread rapidly along the watercourses in the southwestern region, typically at the expense of native riparian vegetation, especially cottonwood and willow plant communities (USFWS, 1995).

Brood parasitism by the brown-headed cowbird also threatens the southwestern willow
flycatcher (USFWS, 1995). Cowbirds lay their eggs in the nests of other songbirds. The cowbird often removes a number of the host’s eggs and replaces them with an equal number of cowbird eggs. Cowbird eggs require a relatively short incubation period; thus, the young cowbird hatches earlier than the remaining host’s eggs. The effects of parasitism include reducing nest success rate and egg-to-fledged rate and delaying successful fledging. A common response to parasitism is abandonment of the nest. The success rate of renesting is often reduced and there may be inadequate time to prepare for migration. In California, parasitism rates range from 50 percent to 80 percent, which is considered to be a high parasitism rate (USFWS, 1995).

**Special Biological Considerations**
The willow flycatcher is more abundant in the continuous mesic shrub association than in other streamside vegetation structures including herbaceous xeric shrub or discontinuous mesic shrub (Sanders and Edge, 1998). This species almost exclusively depends on hydrophytic shrub thickets for nesting in the semiarid western United States and is especially threatened by the elimination or simplification of continuous associations of mesic shrub vegetation. The investigators recommend that continuous associations of mesic shrub vegetation be maintained or restored where possible because this vegetation structure is associated with avian abundance, species richness, riparian-associated bird species abundance, and landscape-level biological diversity (Sanders and Edge, 1998).

The willow flycatcher exhibits vegetation preferences at three scales of vegetation measurement: microplot (central willow and four adjacent shrubs); mesoplot (0.07 hectare); and macroplot (flycatcher territory size) (Sedgwick and Knopf, 1992). Nest sites were distinguished by high willow density and low variability in willow patch size and bush height. Large central shrubs, low central shrub vigor, and high variability in shrub size characterized song perch sites. Greater distances between willows and willow patches, less willow coverage, characterized unused sites and a smaller riparian zone width than either nest or song perch sites.

**Conservation**
Unknown.
**Literature Cited**


Merlin
Falco columbarius
Class: Aves
Order: Falconiformes
Family: Falconidae

Legal Status
 Federal: None
 State: Species of Special Concern; Fully Protected Species

Species Description
The male Merlin has upperparts that are slaty blue, purplish, or dark amber-brown streaked with black from the crown to shoulders and back. The tail is barred by dark umber-brown or blackish bands and is tipped in white. The underparts are cream to a rich buff with heavy longitudinally streaks of dark umber-brown or black coloration, except for the throat which is an unmarked white. The sides of the head are bluff with fine darker streakings. The forehead and line above the eye is white. The beak is bluish horn; the cere and feet are chromo yellow; the claws are black; and the iris is deep brown.

The female and young Merlin's are similar to males in markings, the distinction from the male sex lays within the coloration. The upperparts are dark brown and the neck is streaked with lighter brown and the tail is banded in yellow bars with a white tip.

Habitat and Habitat Associations
The merlin uses a wide variety of habitats. Range-wide, the merlin breed in open country (e.g., open coniferous woodland, prairie) and winter in open woodland, grasslands, cultivated fields, marshes, estuaries and coastlines (AOU, 1998; Zeiner et al., 1990). It ranges from annual grasslands to ponderosa pine and montane hardwood-conifer habitats. Dense tree stands may be used for cover and frequently are close to bodies of water. They may nest in small groves of deciduous trees adjacent to open areas for foraging. They frequently occur in areas with undulating topography (Sodhi et al., 1993). Within southern California, birds are often found in these same habitats and are rarely found in heavily wooded areas or over open deserts (Garrett and Dunn, 1981).

Range
Merlin breed locally in North America from Alaska south through most of Canada, eastward to Newfoundland and southward to Washington and Maine. The species winters from the large majority of the breeding range southward to northern South America (AOU, 1998; Sodhi et al., 1993).

There are no documented reports of the Merlin breeding in California. This species used to be a fairly common winter visitant and migrant in California (Willett, 1912; Grinnell and Miller,
1944), but has declined drastically in the last two decades. The total number of winter reports in recent years has dropped to only six to ten birds in southern California (McCaskie 1973c, 1974c, 1975b, 1976c, 1977a) and 20-30 in northern California (Stallcup and Winter 1975b; Stallcup and Winter 1976b); extremely low totals in comparison to those of earlier years. The Merlin occurs as a transient throughout most of California, but wintering birds are concentrated along the coast and in the Central Valley (Zeiner et al., 1990).

The known elevational range for the western half of the state for this species extends from near sea level to approximately 1,500-m (3,900-ft) (Zeiner et al., 1990).

**Key Populations in LOHCP Plan Area**

There is a low potential that the Merlin is in the LOHCP Plan Area. There is no suitable breeding habitat in the LOHCP Plan Area. It may be a wintering visitor but presence is unlikely in the LOHCP Plan Area. The CNDDB (2002) and existing literature have no record of known occurrence for the merlin within the LOHCP Plan Area.

**Biology**

**Diet:** The Merlin feeds primarily on small birds usually weighing less than 50 grams; it also feeds on small mammals, reptiles, and insects (Sodhi et al., 1993). Most studies report a specialization on one or two locally abundant species of small birds. The principal prey species is characterized as one of the most abundant species in the area; often is foraging away from cover making it more vulnerable to predation; and is in the 20 to 40 gram weight range (Sodhi and Oliphant, 1993). It frequents shorelines in winter and catches shorebirds. It searches while flying at low levels; attacks with a short dive, or dash from above. It may capture prey on ground or in air, after direct pursuit. The young may rely upon insects while developing predatory skills (Zeiner et al., 1990).

**Daily Activity:** The Merlin exhibits yearlong, diurnal activity (Zeiner et al., 1990).

**Migration and Dispersal:** Fledglings disperse from nest sites between July and August in Montana (Becker and Sieg, 1985). More males than females return to breed in the natal areas. The mean natal dispersal distance is 4.1 kilometers for females and 3.0 kilometers for males (Sodhi et al., 1993). The distances moved between successive breeding seasons varies greatly (Wiklund, 1996). Fidelity to the breeding site was higher in males than females and females dispersed nearly three times as far as males. For both genders, low reproductive success was associated with long dispersal distances (Wiklund, 1996).

**Survival:** Most individuals have a short life span, with a maximum life span seldom exceeding eight years (Sodhi et al., 1993). First year mortality is approximately 70 percent (Fox, 1964).

**Socio-Spatial Behavior:** The Merlin defends nest sites during the breeding season and intra-specific nest intruders are aggressively chased off (Sodhi, 1991). The nearest neighbor distances range from 161 to 4,669 meters in some areas (Sodhi et al., 1992). The Merlin is
not rigidly territorial in the non-breeding season, but is intra-specifically aggressive (Zeiner et al., 1990).

**Reproduction:** The Merlin does not breed in California; it breeds in Alaska and Canada. It uses an abandoned stick nest from a crow or magpie usually in a conifer but also in a deciduous tree. Occasionally it nests in cavities, cliffs, in a deserted building on the ground, or in an old nest of another bird (Craighead and Craighead, 1956; Brown and Amadon, 1968). The clutch of 4-5 eggs is laid from late May into June. It incubates 28-32 days, and chicks fledge at about 24 days (Trimble, 1972).

**Threats**
Although a population decline may have been partially the result of the alteration of suitable open habitats, the expressed effects of environmental contaminants on a raptor species cannot be dismissed as a causative factor because it feeds mostly on birds (Remsen, 1978). Most Merlin populations are no longer affected by pesticide contamination and appear to be reproducing well. The loss of suitable habitat may be the major factor affecting Merlin numbers (Cade, 1982).

**Special Biological Considerations**
The continued presence of environmental contaminants in the Merlin is a cause of concern but at present does not appear to be a major factor controlling population size. The expansion of populations into urban habitats helps to maintain numbers and is an optimistic reflection of the health of these urban environments and the adaptability of the species. Merlin's can be successfully bred in captivity and are currently being produced by a number of private breeders for falconry (Sodhi et al., 1993).

**Conservation**
This species may be a candidate for the Federal endangered species list, in light of the similarity in trends between the Merlin and the Peregrine Falcon and the recent findings concerning massive reproductive failure of Merlins in Canada (Fox, 1971).

Maintain restrictions on use of persistent pesticides in United States. Encourage federal government to work through diplomatic channels to seek ban on persistent pesticide use on wintering areas in Central and South America. Conduct survey to determine current status of this species in California and consider moratorium on take for falconry pending determination of status (CDFG, 2002).
**Literature Cited**


Prairie falcon  
*Falco mexicanus*  
Class: Aves  
Order: Falconiformes  
Family: Falconidae  

**Legal Status**  
Federal: None  
State: Species of Special Concern  

**Species Description**  
A crow-sized falcon similar to the peregrine falcon, but decidedly paler and sandy brown above, rather than dark slate or blackish. Head with whitish line over eye and dark brown mustache (malar) streak. Upper parts brown, feathers margined and incompletely barred with tawny; pale band across back of neck. Throat white, rest of underparts streaked with dark brown. Total length 43-51 cm. Female slightly larger than male (Godfrey, 1986).

**Habitat and Habitat Associations**  
Habitat use of the prairie falcon includes annual grasslands to alpine meadows, but they are also associated primarily with perennial grasslands, savannahs, rangeland, some agricultural fields, and desert scrub areas, typically dry environments of western North American where there are cliffs or bluffs for nest sites (Brown and Amadon, 1968). The species requires sheltered cliff ledges for cover and nesting which may range in height from low rock outcrops of thirty feet to vertical, 400 feet high (or more) cliffs and typically overlook some treeless country for hunting (Call, 1978). They capture prey most often in areas of low (less than 30 centimeters), sparse vegetation (Steenhof, 1998). They winter mostly in the great plains and great basin and most winter recovery locations of individuals banded in Canada were in grassland habitats, mainly in the Great Plains (Schmutz et al. 1991).

The known elevational range for the western half of the state for this species extends from near sea level to approximately 3,350 meters (Steenhof, 1998).

**Range**  
The breeding range of the prairie falcon includes southern central British Columbia, southern Alberta, and southernmost Saskatchewan, east to the badlands and plains of western North Dakota and extreme western Nebraska south to Chihuahua, Coahuila, central Durango, and San Luis Potosi, Mexico (Steenhof, 1998). The species winters east to Minnesota, northwestern Iowa, east-central Missouri, central Oklahoma, and most of Texas, to Vancouver, British Columbia, the coasts of Washington, Oregon, and California, all of Baja California and as far south as central Mexico (Steenhof 1998).
In California, the prairie falcon is an uncommon permanent resident and migrant that ranges from southeastern deserts northwest along the inner Coast Ranges and Sierra Nevada (Garrett and Dunn, 1981). It is distributed from annual grasslands to alpine meadows within this region. It is not found in the northern coastal fog belt, or along the coastline. Migrants from northern areas winter in California. Some residents wander upslope in summer and downslope for winter (Zeiner et al. 1990).

**Key Populations in LOHCP Plan Area**
There is a low potential that the prairie falcon is in the LOHCP Plan Area. There is suitable foraging habitat present in the LOHCP Plan Area but the LOHCP Plan Area is out of its known range. The CNDDB (2002) and existing literature have no record of known occurrence for the prairie falcon within the LOHCP Plan Area.

**Biology**

**Diet:** The prairie falcon’s diet consists mostly small mammals, some small birds, and reptiles (Zeiner et al., 1990). Ground squirrels are a key prey item during the breeding season in most areas and horned larks and western meadow larks are secondary prey species in most breeding areas (Steenhof, 1998). Birds, however, are a principal prey of nesting prairie falcons in California (Fowler, 1931). It catches prey in air and on ground in open areas. It dives from a perch with rapid pursuit, or dives from searching flight 15-90 m (50-300 ft) above ground. The prey is frequently cached and then retrieved at a later time, which presumably maximizes food intake and dampens fluctuations in prey availability (Holthuijzen, 1990).

**Daily Activity:** It forages mostly in the early morning and late afternoon except when feeding nestlings or prey is scarce (Zeiner et al., 1990). Much of its time is spent perching near eyrie (Zeiner et al. 1990).

**Migration and Dispersal:** The dispersal period from the natal territory and emigration from the breeding area may be significantly lengthened if there is low ground squirrel abundance and the prairie falcon adults are forced to switch to alternate prey sources to feed the young (McFadzen and Marzluff, 1996b). Prairie falcons appear to leave their natal territories immediately after the nesting season and apparently use widely separated nesting, post-nesting and wintering areas and then show a tendency to return to breed in the general area where they were hatched (Steenhof et al., 1984).

Seasonal movements reflect responses to changing food availability throughout the year and band recoveries suggest eastward as well as southward movements. They migrate from north winter in California. Some residents wander upslope in summer and downslope for winter (Steenhof et al., 1984; Schmutz et al., 1991).

**Survival:** The survival of Prairie falcon nestlings has been observed to be relatively consistent even when the prey abundance varies: mortality in two different years was
determined to be 28 and 34 percent (McFadzen and Marzluff, 1996a). They may live as long as 13-20 yr (Enderson 1969, Denton 1975). The lifetime reproductive output was estimated as 12.3 young for males and 9.8 young for females (Steenhof, 1998). Estimates of adult survival rates range from 65 to 81 percent (Denton, 1975).

**Socio-Spatial Behavior:** The territory and home range are probably the same, and males and females differ little in their use of space (Marzluff et al., 1997). The Prairie falcon intensively defends its territory. Active nests have been recorded within 200 m (636 ft) of one another (Enderson, 1964; Garrett and Mitchell, 1973), in sites where individuals did not confront or see each other regularly. Thus, relative orientation of potential nest site is probably more important than the actual distance from another potential site.

**Reproduction:** It breeds from mid-February through mid-September, with a peak in April to early August. It establishes the nesting territory in late February through March in most of the breeding range and egg laying begins as early as March in some areas (Steenhof, 1998). The clutch size is 3-6 eggs, with an average of 5. The mean laying date for 280 records from 1900-1977 was April 4-11 (Walton, 1977). Fledging success over 5 years for 135 nests averaged 3.2 young, ranging from 0-5; 19% of the nests had 5 young (Walton, 1977). The young begin to disperse in June and July. Successful pairs range over smaller areas than non-nesters and unsuccessful pairs (Marzluff et al., 1997).

It usually nests in a scrape on a sheltered ledge of a cliff overlooking a large, open area, and may nest in a crevice or hole in a cliff, a pothole or larger cave (Call, 1978). It sometimes nests on an old raven or eagle stick nest on a cliff, bluff, or rock outcrop but they never would build a stick nest (Craighead and Craighead, 1956). Although, usually the nest is located in the scrape and abandoned stick nests as described, they have been documented to nest in stick nests on electrical power transmission towers (Bunnell et al., 1997). Usually the nests are on south-facing cliffs that may be advantageous when temperatures are low during incubation and brood rearing in the northern parts of the breeding range (Enderson, 1964).

**Threats**
The prairie falcon is harvested legally in 19 states for falconry and although the harvests probably do not affect the population size, it may affect some local population parameters adversely such as territory fidelity (Steenhof, 1998). They are vulnerable to DDE poisoning and are more sensitive to DDE than the Peregrine falcon and Merlin (Remsen, 1978). Because the Prairie falcon eats more mammals and fewer birds than the Peregrine falcon and Merlin, it is less exposed to organochlorine pesticides and did not experience severe population declines, as did the other two species (Steenhof, 1998).

Population levels of the prairie falcon, especially because the numbers are relatively small, are vulnerable to habitat change that could reduce their prey populations (Kirk and Hyslop, 1998). They are susceptible to habitat loss on breeding areas because the nesting distribution is closely tied to cliffs. Because the number of nest sites is finite and nonrenewable, pairs cannot move to...
other undisturbed areas when nest sites or foraging habitats adjacent to cliffs are destroyed (Steenhof, 1998).

**Special Biological Considerations**
Overall prairie falcon reproductive rates are tied closely to annual indices of ground squirrel abundance. This precipitation before and during the breeding season was related inversely to some measures of reproduction (Steenhof, et al. 1999). The prairie falcon was observed to range over a large area (approximately 300 square kilometers) and increased their foraging ranges in response to declining ground squirrels. They were observed to switch their prey to reptiles and birds when squirrels were rare (Marzluff et al., 1997).

The prairie falcon was determined to be scarce on plots within Colorado that included significant amounts of urban habitat with a critical landscape threshold at about 5 to 7 percent urbanization (Berry et al., 1998).

**Conservation**
Management of the species has involved four general strategies including maintaining and enhancing availability of nest sites; managing foraging areas to provide habitat for prey; providing protection from human disturbance; and restoring populations in areas where the species has been reduced or extirpated. Construction of artificial nest sites has been effective in cliff areas where nest sites are limited. Limiting the types and levels of human activity near nests has been a common management strategy throughout the prairie falcon’s range, including restricting activities within one kilometer of the nest site although some activities, such as blasting are apparently acceptable within 125 meters of a nest (Steenhof 1998).
**Literature Cited**


McFadzen, M. E. And J. M. Marzluff. 1996b. Behavior of prairie falcons (Falco mexicanus)
during the nesting and fledging-dependence periods under fluctuating prey conditions. Bird Behavior 11: 81-89.


American peregrine falcon
*Falco peregrinus anatum*
Class: Aves
Order: Falconiformes
Family: Falconidae

Legal Status
**Federal:** Endangered, 1970; Delisted, 1999.
**State:** Endangered; Fully Protected Species

Species description
The peregrine falcon is a crow-sized raptor. Adult peregrines are slate gray above and light below, and the dark cap of the head extends to the cheeks. The wingspan exceeds three feet.

Habitat and Habitat Associations
Peregrines are found in a large variety of open habitats, including tundra, marshes, seacoasts, savannahs and high mountains (AOU, 1998; Brown, 1999). The species breeds mostly in woodland, forest, and coastal habitats (Brown 1999). Riparian areas and coastal and inland wetlands are important habitats year-round, especially in non-breeding seasons. During migration, the peregrine falcon may be found near marshes, lakes, and ponds with high concentrations of waterfowl, shorebirds, and other birds. And, like many other migratory birds of prey, during migration, peregrine falcons often travel along mountain ridges on both eastern and western coastlines (Brown, 1999).

Range
Peregrine falcons were formerly widespread in the continental United States; the subspecies American peregrine falcon historically nested from the North American boreal forest south into Mexico. In California, the species breeds and winters throughout the state, with the exception of desert areas (Zeiner, et al., 1990). The peregrine is a very uncommon breeding resident and uncommon as a migrant or as winter resident. Active nesting sites of this species within California are known from along the coast north of Santa Barbara, in the Sierra Nevada, and other mountains of northern California. Some of the individuals that breed farther north migrate into California for the winter months. Spring and fall migrants occur along the coast and in the western Sierra Nevada Mountains (Brown, 1999).

Key Populations in LOHCP Plan Area
There is a low potential that the peregrine falcon is in the LOHCP Plan Area. There is suitable foraging habitat present in the LOHCP Plan Area but the only breeding pair near the LOHCP Plan Area is at Morro Rock, Morro Bay. The CNDDB (2002) and existing literature have no record of known occurrence for the peregrine falcon within the LOHCP Plan Area.
**Biology**

**Diet:** The peregrine typically hunts its prey in air and prey is either struck to the ground or killed outright by a blow from the talons. They will also pursue prey in a low, fast flight, or attack passing birds from a perch. Some pairs hunt cooperatively with the larger female diving for the prey first and then if successful, eating first from the prey item (Brown, 1999; Zeiner, et al. 1990). The species may fly 10 to 12 miles from their nest in search of prey, which are usually hunted over open habitat types such as waterways, fields and wetland areas such as swamps and marshes (USFWS 2/91).

The peregrine falcon will primarily eat pigeon-size birds but may feed on large numbers of lemmings and voles when present (Brown, 1999). The diet of this species includes jays, flickers, meadowlarks, pigeons, starlings, shorebirds, waterfowl and other readily available species. Due to their larger size, the females may take larger prey items (Zeiner et al., 1990).

Areas within 10 miles of the nesting cliff that supply the major portion of the food source (birds) to the peregrine falcon. Other habitats within 10 to 20 miles of the nesting cliff also may be important hunting areas, but they are often so interspersed or widespread that it is difficult to specifically delineate them. This does not imply that all lands within 10 miles of an eyrie site are to be considered essential habitat.

**Daily Activity:** It typically is a diurnally active predator that also migrates during the daytime.

**Migration and Dispersal:** Resident as a breeder; other individuals breeding farther north migrate into California for the winter. Little is known of post-breeding movements of adults or immatures (USFWS, 1984). Within the Midwest, dispersal from hack or natal sites has a large variation, however the mean dispersal distance of females, at 320 kilometers, is about twice that of males, at 176 kilometers. Fidelity to the territory is strong, but territorial shifts do occur (Tordoff and Redig, 1997).

**Survival:** The hatching success of the species in the wild is about 75 percent. An average of one young reaches fledging per laying pair. The juvenile birds continue to be particularly vulnerable during their first year of life as they learn to hunt and develop flying skills (USFWS, 2/91). The mean life expectancy for those young that fledge is approximately four years. The maximum life span of the peregrine is in excess of 13 years. It is possible that a few individuals may reach 20 years of age. Due to the long average life expectancy and the population dynamics, a sudden, drastic change in the number of breeding adults should not be expected, even when reproduction is as low as it currently is. Similarly, successful management operations will not likely provide quick population recovery (USFWS, 1984).

**Socio-Spatial Behavior:** In the Rocky Mountains, the home range includes the area encompassed by a radius up to 23 km (14 mi) from cliff nests (Zeiner et al., 1990). Cade (1960) found a minimum territory of about 96 meters (300 ft) radius around peregrine nests in Alaska. White and Cade (1971) reported that the mean spacing between nests was 9.7
kilometers (6 mi) along Alaska Rivers. In some parts of California, the home range averages 125 square miles and territories are spaced approximately 3 - 7 miles apart (Zeiner et al., 1990). The species is most likely to be found where prey concentrates. In resident birds, pair bonds remain established year-round (Brown, 1999).

**Reproduction:** Breeding occurs from early March to late August. The clutch size varies from three to seven eggs with incubation at 28 to 35 days performed by both parents. The young typically fledge from the nest between 25 and 42 days. The young are not independent of the parents for several months. If the first eggs are removed or destroyed early in the season, a second clutch is possible (Brown, 1999).

Breeding requires cliffs or suitable surrogates (e.g., buildings) that are close to preferred foraging areas. They have been known to nest in trees and on small outcrops in other portions of their range. The nest site usually provides a panoramic view of open country, often overlooking water and is always associated with an abundance of passerine, waterfowl, or shorebird prey, even in an urban setting. A cliff nest site may be used for many years (Brown, 1999). The nest site (eyrie) usually consists of a rounded depression, or scrape, with accumulated debris that is occasionally lined with grass (Call, 1978). Higher quality nest sites tend to confer greater protection from adverse weather and show greater breeding success (Olsen and Olsen, 1989).

**Threats**
Prior to World War II, an expanding human population contributed to a gradual decline in this subspecies within the United States. Following World War II, organochlorine pesticides, such as DDT, were implicated as the major cause of peregrine population declines. The use of organochlorines can affect peregrines by either direct mortality or by adversely affecting reproduction. Reproductive failure includes eggshell thinning and breakage, addling, hatching failures and abnormal reproductive behaviors by parents (Jarman et al., 1993). Restrictions on the use of DDT and intensive intervention to augment natural reproduction have restored peregrines in many parts of their historical range, including some areas of California. However, peregrines along the central California coast are still experiencing elevated concentrations of DDE and PCB (Jarman et al., 1993) and exhibiting eggshell thinning problems. Current reproduction supports an expanding population despite high organochlorine residue concentrations and associated eggshell thinning.

Other mortality factors that could affect populations include shooting, falconry, collision with transmission lines, electrocutions, contaminated prey species, and disturbance at nest sites. Peregrines are particularly sensitive to disturbance at the nest site during the breeding season. Human disturbance such as rock climbing, blasting, shooting, timber harvest, road construction, or aerial disturbance can cause peregrines to abandon nest sites. Olendorff and Lehman (1986) report peregrine falcon collisions with transmission lines to have a mortality rate of 83 percent. The swift flight of peregrines is thought to be a contributing factor in fatal collisions.
Special Biological Considerations
Unknown.

Conservation
Protective measures have been outlined within the peregrine falcon Recovery Plan (USFWS 1984). These include the following measures. Prohibit land-use practices and/or development that will adversely alter or eliminate existing habitat within one mile of the nesting cliff or site. Prohibit all human activities within one-half mile distance of the nesting cliff between February 1 and September 1 of each year. Retain suitable nesting habitats in public ownership. Prohibit land-use practices and/or developments that could alter or eliminate the character of the hunting habitat or food source. Prohibit the use of harmful pesticides and other detrimental environmental pollutants that would accumulate in the peregrine or its food source. Sites suitable for occupancy and/or expansion should be protected and managed accordingly to ensure that the quality of the habitat is not altered or eliminated.
Literature Cited


Willett, G. 1933. Revised list of the birds of southwestern California. Pacific Coast Avifauna No. 21.


Loggerhead shrike  
*Lanius ludovicianus gambeli*

Class: Aves  
Order: Passeriformes  
Family: Laniidae

**Legal Status**  
**Federal:** None  
**State:** Species of Special Concern

**Species Description**
This Loggerhead has grayish back and black wings are evident against its white breast and other body areas. Most prominent, however, is the Loggerhead's black mask that extends around the eyes and down into the forehead. They also have a slightly hooked beak somewhat similar to that of a falcon's beak that is used for impaling its prey though unlike many birds of prey lacks talon or claws. It is eight to ten inches long and has a wingspan of approximately 12 inches. The male and female of the species are similar in appearance.

**Habitat and Habitat Associations**
The loggerhead shrike was once widely distributed and common over most of North America, occupying an exclusive breeding range with no other shrikes (Cade and Woods, 1997). Although it occurs in a wide variety of plant associations, this shrike is generally found in landscapes characterized by widely spaced shrubs and low trees interspersed with short grasses, forbs, and bare ground, habitat conditions which are currently being developed (Cade and Woods, 1997).

The loggerhead shrike is known to forage over open ground within areas of short vegetation, pastures with fence rows, old orchards, mowed roadsides, cemeteries, golf courses, riparian areas, open woodland, agricultural fields, desert washes, desert scrub, grassland, broken chaparral and beach with scattered shrubs (Unitt, 1984; Yosef, 1996). Individuals like to perch on posts, utility lines and often use the edges of denser habitats (Zeiner et al., 1990). The highest density of shrikes occurs in open-canopied valley foothill hardwood, valley foothill hardwood-conifer, valley foothill riparian, pinyon-juniper, juniper, desert riparian, and Joshua tree habitats. It occurs only rarely in heavily urbanized areas, but is often found in open cropland (Zeiner et al., 1990).

**Range**
The species nests from southern Canada through the Great Basin and California, to Baja California, Mexico and the Gulf coast (Terres, 1980). Winter grounds are found in the southern portion of the breeding range and further south into Mexico (Terres, 1980). The northern populations are migratory and most winter from northern California, northern Nevada, northern Utah, central Colorado, southern and eastern Kansas, western Missouri, northern Kentucky, and...
northern Virginia south through the southern United States and in Mexico south throughout the breeding range (Yosef, 1996).

In California, the species is found throughout the foothills and lowlands of California as a resident (Zeiner et al., 1990). Winter migrants are found coastally, north of Mendocino County (Zeiner et al., 1990). The loggerhead shrike seems to have always been most abundant in the southern and western portions of its range (Cade and Woods, 1997).

**Key Populations in LOHCP Plan Area**

There is a moderate potential that the loggerhead shrike is in the LOHCP Plan Area. There is suitable foraging habitat present in the LOHCP Plan Area. The CNDDB (2002) has no record of known occurrence for the loggerhead shrike within the LOHCP Plan Area.

**Biology**

**Diet:** Their foraging habitat includes open landscapes characterized by well-spaced, often spiny, shrubs and low trees, usually interspersed with short grasses, forbs, and bare ground, scrub lands, steppes, deserts, savannas, prairies, agricultural lands and some suburban areas (Yosef, 1996). For foraging habitat, they appear to favor areas with fence lines and utility lines and poles for perching (Yosef, 1996). In suboptimal foraging habitat areas, where grass is tall and dense, their foraging success is not affected, however their foraging methods are altered and include more hovering, more flights, and frequent changes in perches, generally more energetically expensive behaviors and thus larger prey items are taken (Yosef and Grubb, 1993).

Individuals perch to search for prey that includes large insects, small mammals, amphibians, reptiles, fish and invertebrates and use impaling as a means of handling prey (Zeiner et al., 1990). Shrikes primarily subsist on large ground-dwelling insects and do not seem to require water (Miller and Stebbins, 1964). Shrikes have been shown to be able to consume toxic insects by impaling and allowing them to “age” which apparently rids the then dead prey of the toxic chemical (Yosef and Whitman, 1992).

**Daily Activity:** The loggerhead shrike is a yearlong, diurnally active species (Zeiner et al., 1990)

**Migration and Dispersal:** A large portion of population in Great Basin, south to Inyo County, departs for winter. In areas of residence, winter numbers augmented by visitors from north, and species is even more widespread than when breeding. Juvenile dispersal has been measured at around 12 to 14.7 km from the natal site with adults dispersing a mean distance of 2.7 km (Yosef, 1996; Collister and De Smet, 1997). Movement patterns of the shrike indicate that they disperse preferentially along connecting corridors of vegetation rather than between equally sized isolated patches of habitat (Haas, 1995).

**Survival:** The average nesting success, measured as the percent of nests in which at least one young fledge, is 56 percent (Yosef, 1996). The large clutch size and relatively high rate of
hatching success, potentially enables the loggerhead shrike to produce large numbers of offspring, although many young are lost through brood reduction and predation (Yosef, 1996). Predation has been calculated to account for 52 percent of all nest failures and adverse weather accounts for 33 percent (Porter et al., 1975).

**Socio-Spatial Behavior:** In those geographic locations where the species is a year-round resident, the species usually lives in pairs on permanent territories (Yosef, 1996). For populations that are migratory, a territory is defended through the non-breeding season (Miller, 1931; Smith, 1973). Some pairs spend the entire year on a single territory and outside the breeding season, the mates may defend neighboring territories, which are coalesced at the beginning of the nesting season (Yosef, 1996). Miller and Stebbins (1964) observed large territories of 30-40 acres while Yosef (1996) cites a mean territory size of 8.5 hectares. Pairs jointly defend territories in California during the breeding season, but during the fall these pairs disband and defend separate, although often adjacent, winter territories (Yosef, 1996).

**Reproduction:** In California, the shrike lays eggs from March into May, and young become independent in July or August. A monogamous, solitary nester; clutch size 4-8 (Porter et al., 1975). May be double-brooded, (Harrison, 1978), but among 77 nests in Colorado, (Porter et al., 1975) found no second broods. Incubation lasts 14-15 days. Altricial young tended by both parents and leave nest at 18-19 days. Young may be driven off parents' territory 2-3 mo later (Miller, 1931). Probably breeds first at 1 yr (Harrison, 1978).

Nesting occurs in branches up to 4.5 meters above the ground frequently in a shrub with thorns or with tangled branching habits (Zeiner et al., 1990; Yosef, 1996). Nests or nest materials are often reused in subsequent years (Yosef, 1996). Height of nest shrubs average 162 centimeters and the mean height of nests was 79 centimeters although success of the nesting attempt did not appear to be related to the location of the nest but was more related to stochastic events such as predation and weather (Woods and Cade, 1996).

The parent shrikes may induce the young to fledge from the nest earlier than normal in order to avoid predation (Woods, 1993). This may be due to the high predation rate on loggerhead shrike nestlings.

**Threats**

Despite its wide distribution, the loggerhead shrike is one of the few North American passerines whose populations have declined continent wide in the recent decades (Yosef, 1996). Terres (1980) sites that shrike are often killed by automobiles early in the morning. Pesticide use (organochlorines, DDE, etc.) may have potentially reduced eggshell thickness and altered development (Yosef, 1996). Displacement of habitat through urban development, the spraying of biocides, and competition with species that are more tolerant of human-induced changes may be resulting in population declines (Yosef 1996). The loggerhead shrike is thought to be generally tolerant to human harassment, although it will abandon nesting attempts if disturbed (Yosef, 1996).
Recently, Christmas bird count data and Breeding Bird Survey data have revealed an overall downward trend across the continent that appears to be related to alterations in habitat structure and loss of habitat as well as loss of pasture lands and increase in intensive row-crop agriculture (Cade and Woods, 1997; Prescott and Collister, 1993; Telfer, 1992; Gawlik and Bildstein, 1993; Smith and Kruse, 1992).

**Special Biological Considerations**

Smyth and Coulombe (1971) report that the species does not drink water up to ambient air temperatures of 40°C. Additionally, it has an extended thermoneutral zone from approximately 24 to over 36 degrees C (Weathers et al., 1984). Cunningham (1979) concluded that as an animal that is a sit and wait predator, it benefits from having a reduced basal metabolic rate. The most metabolically expensive behavior of the bird is flight (Weathers et al., 1984), which it uses rarely: it spends approximately 80% of its day perched but will spend more time in flight in suboptimal foraging habitat areas (Yosef and Grubb, 1993).

In addition to using barbed wire for impaling food items, the loggerhead shrike has been observed using barbed wire to anchor and tear nest-lining materials (Burton, 1999). Effects of protective fencing were found to result in higher abundance and species richness of birds, including the loggerhead shrike for which nesting was also found to be more frequent inside the fenced area. This increase in abundance may be related to an increase in abundance of seed and invertebrate food sources, and particularly for the shrike, an increase in reptile prey species (Brooks, 1999).

**Conservation**

Key management priorities include: determine migration routes, stopover and wintering areas and the susceptibility to human disturbance at these locations; evaluate dietary needs and how weather, season, land use, and biocides influence food availability; determine mortality rates of fledged juveniles and adults throughout the annual cycle in different habitats; determine degree of niche overlap between the loggerhead shrike and potential competitors to see whether shrike productivity is correlated with the presence or absence of these species (Yosef, 1996).
**Literature Cited**


California black rail
Laterallus jamaicensis coturniculus
Class: Aves
Order: Gruiformes
Family: Rallidae

Legal Status
   Federal: Species of Concern
   State: Threatened; Fullt Protected Species

Source: Peter LaTourette, California Academy of Sciences

Species Description
The California black rail has a tiny blackish rail with a small black bill; about the size of a small sparrow. The nape is deep chestnut.

Habitat and Habitat Associations
The California black rail occurs most commonly in tidal emergent wetlands dominated by pickleweed, or in brackish marshes supporting bulrushes in association with pickleweed. Usually found in immediate vicinity of tidal sloughs in bulrushes, cattails, and saltgrass (Manolis, 1977). During extreme high tides, may depend on upper wetland zone and adjoining upland or freshwater wetland vegetation for cover.

Range
The Historic breeding range of the California black rail is from Tomales Bay and San Francisco Bay area (including Sacramento/San Joaquin Delta) south along coast to northern Baja California, San Bernardino/Riverside area, Salton Sea, and along lower Colorado River north of Yuma in Arizona and California; wintered in breeding range (CDFG, 1990).

As of the late 1980s, the bulk of the population was confined to the northern reaches of the San Francisco Bay estuary, especially the tidal marshland of San Pablo Bay and associated rivers; several small, fragment subpopulations still existed at Tomales Bay, Bolinas Lagoon, Morro Bay, and in southeastern California and western Arizona (Evens et al., 1991). Near the Salton Sea, southern California occurs in the Whitewater River delta and near Salt Creek (Biosystems Analysis, 1989).

Key Populations in LOCHP Plan Area
The California black rail is known to occur in the LOHCP Plan Area. The CNDDDB (2002) has a record of known occurrence for the California black rail within the LOHCP Plan Area at Sweet Springs Preserve, adjacent to Cuesta-by-the-Sea.

Biology
   Diet: Ground foraging insectivores that feed primarily on insects and secondarily on crustaceans and aquatic plant seeds (Ehrlich et. al, 1988).
**Daily Activity:** Active and vocal on moonlit nights (Stiles and Skutch, 1989).

**Migration and Dispersal:** Adult birds are for the most part nonmigratory, although records exist of both adults and juveniles as far as 20 miles from the nearest breeding habitat (Eddleman and Evens, 1994). The California population apparently is resident. Occasionally found away from wetlands in late summer and autumn, suggesting some post-breeding movement. May winter in locations where it does not breed (CDFG, 1999). Juveniles may disperse several miles from breeding grounds in autumn or winter (Eddleman and Evens, 1994).

**Survival:** Dependent upon upper zones of saline emergent wetlands, especially with pickleweed, and brackish fresh emergent wetlands.

**Socio-Spatial Behavior:** Species occurs in scattered, disjunct populations (Ehrlich et. al, 1988; Grinnell & Miller, 1986).

**Reproduction:** The California Black Rail breeds between March and June and has an average clutch size of six (3 - 8). They have precocial young (Ehrlich et. al., 1988). Nests with eggs reported from 12 March to 4 June. Single-brooded. They have been reported to abandon nest if disturbed before completing clutch (Huey, 1916; Heaton, 1937; CDFG, 1999). Incubation, by both sexes, lasts probably 16-20 days (Eddleman et al., 1994).

They Nest in or along edge of marsh, usually in site hidden in marsh grass or at base of Salicornia, sometimes on damp ground but usually on mat of previous year's dead grasses. Nest concealed in dense vegetation, often pickleweed, near upper limits of tidal flooding (Stephens, 1909). Builds a deep, loose cup, at ground level or elevated several inches.

**Threats**
Humans pose the principle threat to the California black rail through the rapid destruction of primary habitat and inland freshwater marshes (Ehrlich et. al, 1988). Loss of higher wetland around San Francisco Bay apparently has eliminated breeding in the south bay area. Eddleman et al. (1988) stated that threats include marsh subsidence caused by groundwater removal, diking of salt marshes, water level fluctuation, and wildfires. They are sensitive to disturbances such as grazing and agriculture (Eddleman et al., 1994). The loss of habitat attributed to water-management practices for agriculture, salt production in coastal wetlands, filling for urban development, and loss of upland habitat (used for escape and cover during high water) are causes to their decline.

Introduced mammals and common household pets pose serious threats to the California black rail as exhibited by the introduction of the mongoose which wiped out locally breeding populations in Puerto Rico and Jamaica (CDFG, 1999).

**Special Biological Considerations**
Unknown.
Conservation
Unknown.
Literature Cited


California brown pelican  
*Pelecanus occidentalis californicus*  
Class: Aves  
Order: Pelecaniformes  
Family: Pelecanidae  

**Legal Status**  
**Federal:** Endangered  
**State:** Endangered; Fully Protected Species  

**Species Description**  
Brown pelicans are distinguished by their large size and brown color. Adults weigh approximately 9 pounds, and have a wingspan of over 6 feet. They have long, dark bills with big pouches for catching and holding fish. The brown pelican is easily distinguished from the American white pelican, the only other pelican in its range, which is white with black primary and secondary flight feathers (Garrett and Dunn, 1981).

**Habitat and Habitat Associations**  
The California brown pelican is almost exclusively a bird of marine habitats. The brown pelican is found in estuarine, marine subtidal, and marine pelagic waters along the California coast. Specifically, they are found on rocky shores and cliffs, in sloughs, and coastal river deltas. You may see them on breakwaters, jetties, pilings, and sandbars at harbors. They are occasionally seen on inland lakes (Garrett and Dunn, 1981).

**Range**  
The California brown pelican is found only near the ocean, along the entire central and southern California coast and in Baja California, Mexico (Garrett and Dunn, 1981). The California Brown Pelican ranges along the coast from British Columbia in the north, south to Central America. Historically, breeding colonies were found at Pt. Lobos in Monterey County up until 1959, and from the Channel Islands south to Baja and the Gulf of California.

Today, the California Brown Pelican is still found in its original range, but breeding colonies in California, located in the Channel Islands National Park at West Anacapa Island and the Santa Barbara Islands continue to decline. In southern California, common along coast from June to October, especially within 30 km (19 mi) of shore, but regularly out to 175 km (109 mi) (Briggs et al., 1981).

**Key Populations in LOHCP Plan Area**  
There is a low potential that the California brown pelican is in the LOHCP Plan Area. There is not suitable foraging or breeding habitat present in the LOHCP Plan Area. The CNDDB (2002) and existing literature have no record of known occurrence for the California brown pelican within the LOHCP Plan Area.
Biology

**Diet:** Forages mainly in early morning or late afternoon or when tide is rising. Feeds almost entirely on fish, caught by diving from 6-12 m (20-40 ft) in the air, and occasionally from up to 20 m (66 ft). May completely, or only partially, submerge and water may be shallow or deep. Occasionally feeds on crustaceans, carrion, and young of its own species (Palmer, 1962).

**Daily Activity:** Yearlong, diurnal activity.

**Migration and Dispersal:** After breeding, beginning as early as mid-May, individuals leave colonies in the Channel Islands and in Mexico, and disperse along the entire California coast. Small numbers visit the Salton Sea and Colorado River reservoirs. Most return to breeding colonies by March or April (Briggs et al., 1981).

**Survival:** No information was found in the literature.

**Socio-Spatial Behavior:** Usually rests on water or inaccessible rocks (either offshore or on mainland), but also uses mudflats, sandy beaches, wharfs, and jetties. Evidently does not roost overnight on water, but concentrates at a few traditional roosts on mainland or islands (Briggs et al., 1981).

**Reproduction:** Breeds on Channel Islands: Anacapa, Santa Barbara, and Santa Cruz (Garrett and Dunn, 1981) from March to early August and are most numerous then within 20 km (12 mi) of those islands (Briggs et al., 1981). Clutch size usually 3 eggs; single-brooded. Incubation lasts about 4 weeks. Young are altricial and tended by both parents; first fly at 9 weeks, and are independent sometime later. Young breed first at about 2-3 years. The nest is a small mound of sticks or debris on rocky, or low, brushy slopes of undisturbed islands (Cogswell, 1977); usually on the ground, but less often in bushes (Palmer 1962).

**Threats**

The primary threats to brown pelicans are the continued, although dwindling, presence of organochlorine pesticides (e.g., DDT) in the marine food chain, and depleted food resources due to commercial harvesting of fish such as anchovies. Pelicans are dependent on northern anchovies and Pacific sardines, which have declined due to over-fishing by humans (Garrett and Dunn 1981).

Pelicans are also threatened by the possibility of oil spills from tanker traffic in the Santa Barbara Channel, disturbance at post-breeding roosts on the central California coast, entanglement with hooks and fishing line, and disease outbreaks resulting from overcrowding in harbors. Breeding populations and nesting productivity vary dramatically from year to year depending on El Niño events and other climatic changes. Gulls and vultures are typical nest predators, and eggs and nestlings sometimes are lost in storms (Palmer 1962).
**Special Biological Considerations**

Brown pelican numbers have increased substantially in the last twenty years. This increase has largely been attributed to a decline in near-shore DDT levels. Brown pelicans are dependent on resources that come from the marine environment and on the key locations where they nest.

**Conservation**

Unknown.
Literature Cited


California clapper rail  
*Rallus longirostris obsoletus*  
Class: Aves  
Order: Gruiformes  
Family: Rallidae

**Legal Status**  
**Federal:** Endangered, October 13, 1970  
**State:** Endangered, June 27, 1971; Fully Protected Species

**Species Description**  
The California clapper rail is the size of a coot and is slightly larger and grayer than the two southern subspecies. Adult rails are 33 to 48 centimeters in length with a bill length of at least 5 centimeters. The California clapper rail is generally gray-brown above and buffy-cinnamon below, with brownish-gray cheeks and black-and-white barred flanks. Their bill is long, slightly down-curved, and somewhat orange in color. The species has a short neck and a short tail cocked upward, revealing a white patch (CDFG, 2000).

**Habitat and Habitat Associations**  
California clapper rails inhabit tidal salt and brackish marshes of the greater San Francisco Bay (CDFG, 2000). They prefer emergent wetlands dominated by pickleweed (*Salicornia virginica*) and Pacific cordgrass (*Spartina foliosa*) at lower elevations, tall stands of pickleweed, gumplant (*Grindelia* spp.), and saltgrass (*Distichlis spicata*), alkali heath (*Frankenia grandifolia*), and jaumea (*Jaumea carnosa*) for high marsh cover, and pickleweed, cordgrass, and bulrush (*Scirpus* spp.) in the north bay (Grinnell et al., 1918; DeGroot, 1927; Harvey, 1988; Collins et al., 1994).

California clapper rails prefer habitats containing marshes supporting tidal sloughs that provide direct tidal circulation throughout the area. They also require shallow water and mudflats with sparse vegetation and abundant invertebrate populations for foraging habitat, and escape routes from predators (Zembal and Massey, 1983; Foerster et al., 1990). Higher elevation marshes are utilized for nesting habitat and refuge from high tides (DeGroot, 1927; Harvey, 1988; Foerster et al., 1990; Evens and Collins, 1992; Collins et al., 1994).

Local population densities of California clapper rails are greater in habitat that is at least 100 hectares in size. Locations of the marsh in relation to other marshes, buffer areas between marsh and upland areas, marsh elevation, and hydrology also affect densities of rails (Collins et al., 1994; Albertson, 1995; Garcia, 1995). In addition, Evens and Collins (1992) found rail densities to be lower in more brackish habitats brought forth by freshwater outflows; this lower density was possibly due to the resulting change in vegetation. In the San Francisco Bay area, breeding season density was 0.3 to 1.6 per hectare (0.1 to 0.6 per acre). Density in non-breeding seasons varied from 0.1 to 1.1 per hectare (0.04 to 0.4 per acre) (Gill, 1979).
Range
The historic range of the California clapper rail extended within the coastal California tidal marshes from Humboldt Bay southward to Elkhorn Slough and Morro Bay, and estuarine marshes of San Francisco Bay and San Pablo Bay to the Carquinez Straight. Historically, the highest densities of California clapper rails existed in South San Francisco Bay (Dedrick, 1989).

Today, resident clapper rail populations are currently limited to San Francisco Bay, San Pablo Bay, Suisun Bay, and tidal marshes associated with estuarine sloughs draining into these bays. When first considered an endangered species, populations of California clapper rails were estimated at 4,200 to 6,000 individuals (Gill, 1979). Based on winter high tide counts from 1996-97, the South and North Bay populations have been reduced to an estimated 500-600 birds each (CDFG, 2000).

Key Populations in LOCHP Plan Area
There is a low potential that the California clapper rail is in the LOHCP Plan Area. The LOHCP Plan Area is near its historical range but is now out of its known range. The CNDDB (2002) and existing literature have no record of known occurrence for the California clapper rail within the LOHCP Plan Area.

Biology
Diet: California clapper rails forage in higher marsh vegetation, along the vegetation and mudflat interface, and along tidal creeks. They feed by gleaning, pecking, probing, and scavenging from the surface (Harvey, 1990). Clapper rails often feed by walking a few steps, thrusting their beaks into the mud up to eye level, then walking a few more steps, and then repeating the probing (Wilbur and Tomlinson 1976). Along the coast, clapper rails prey on crabs, mussels, clams, snails, insects, spiders, and worms (Harvey, 1990). California clapper rails also eat mice during high tides, and may scavenge dead fish (Zembal and Massey, 1983). In a study by Moffitt (1941), the volumetric content of California clapper rail stomachs averaged over 85% animal matter and 14.5% vegetable matter.


Migration and Dispersal: California clapper rails are not migratory, but post-breeding dispersal has been recorded in late fall and early winter (Orr, 1939; Wilber and Tomlinson, 1976). However, dispersing juveniles recorded in freshwater wetlands in late summer and autumn (Tomlinson and Todd, 1973).

Survival: These vocalizations are used by clapper rails to defend their nesting territories (Albertson, 1995).

Socio-Spatial Behavior: No information was found in the literature.
Reproduction: In the San Francisco Bay area, California clapper rails breed from mid-March through July, with peaks observed in early May and late June (Gill, 1973; Harvey, 1980). Clutch size averaged 7.6 in northern California and hatching success is approximately 38% in the San Francisco Bay area (Harvey, 1980). Both the male and female incubate the eggs for approximately 18-29 days.

In saline emergent wetlands, California clapper rails nest mostly in lower zones near tidal sloughs and where cordgrass (*Spartina foliosa*) is abundant (Harvey, 1980; Zembal and Massey, 1983). Clapper rails build a platform concealed by a canopy of woven cordgrass stems or pickleweed and gumweed (Harvey 1990). Nests are constructed only as high as necessary to prevent inundation while preserving a natural cover of vegetation. Clapper rail nests are described as a mass or heap of vegetation, deeply cupped and securely woven to the surrounding vegetation that allows for flotation during extreme tidal inundations. Zucca (1954) discovered that although the nests are somewhat buoyant, they do not remain intact through a series of high tides. Clapper rails also use dead drift vegetation as a platform (Harvey, 1990). The vegetation used to construct clapper rail nests is partly determined by the time of the nesting and the tidal influence (Zucca, 1954).

Threats
Sport and market hunting reduced population numbers in the late 19th and early 20th centuries, until 1913, when the Migratory Bird Treaty Act prohibited clapper rail hunting. Since then, loss and alteration of tidal marshes for salt ponds, agricultural land, and bayfill, have been the major causes of their population decline. Of the 193,800 acres of tidal marsh that bordered San Francisco Bay in 1850, only about 30,100 acres remain, which amounts to an 84% reduction from historical conditions (Dedrick, 1989). Although the loss of tidal marsh habitat through filling and diking has largely been curtailed, other current factors associated with declining populations of the California clapper rail include the conversion of salt marshes to brackish marshes due to freshwater discharges from sewage treatment plants, a progressive rise in sea level, invasion of non-native cordgrass, and pollution from urban runoff, industrial discharges, and sewage effluent (Williams, 1985; Moffatt and Nichol et al., 1987; Ohlendorf and Fleming, 1988; Ohlendorf et al., 1989; Harvey, 1990; Lonzarich et al., 1990; Foerster and Takekawa, 1991; Leipsic-Baron, 1992; CDFG, 2000).

California clapper rails are subject to heavy predation from nonnative species such as red fox (*Vulpes fulva*), feral cat (*Felis domestica*), and Norway rat (*Rattus norvegicus*) as well as various native mammals and raptors (Foerster et al., 1990; Albertson, 1995; CDFG, 2000). The fragmentation of habitat has increased predation of clapper rails because terrestrial predators utilize dikes and levees as corridors to access those habitats where clapper rails reside (Foerster et al., 1990; Burkett and Lewis, 1992). Urban development adjacent to marshland habitat has increased predation by native predators such as raccoons, which thrive in urban areas, and raptors, which utilize electric power transmission lines as hunting perches (USFWS, 1999). Shoreline riprap favors populations of Norway rats, which in turn could increase their take of clapper rail eggs in certain marshes (DeGroot, 1927; Harvey, 1988; Foerster et al., 1990; USFWS, 1999). Non-native red foxes may pose as the most serious threat to clapper rail...
populations (Foerster et al., 1990; Foerster and Takekawa, 1991; Zembal, 1992; Albertson, 1995).

**Special Biological Considerations**

Evens and Collins (1992) found clapper rail densities to be positively related to the extent of saline habitat, with breeding distributions restricted to areas that are not at least marginally saline. The same study also showed that rail densities decrease with distance upstream from the Golden Gate.

**Conservation**

The California clapper rail was listed as a California State Endangered Species on June 27, 1971 (CCR Title 14, Section 670.5) and Federally on October 13, 1970 Endangered (Federal Register 35 - 1604).
Literature Cited


CDFG (California Department of Fish and Game). 2000. The status of rare, threatened, and endangered animals and plants in California, California clapper rail. California Department of Fish and Game, Sacramento, California.


Orr, R.T. 1939. Fall wanderings of clapper rails. Condor 41: 151-152.


Northern spotted owl
*Strix occidentalis occidentalis*
Class: Aves  
Order: Strigiformes  
Family: Strigidae

**Status**  
Federal: None  
State: Species of Special Concern  

**Species Description**
The average length of a Spotted Owl is 45 cm, with a wingspan of 114.3 cm. The average length of the left and right ear openings is 17.5 mm and 22 mm, respectively. Weight ranges from 518 to 760 grams. Females are generally larger than males, and have a higher pitched call. These owls are medium-sized with dark brown plumage, a round head, and large dark eyes. The head and hind neck have white spots, along with white mottling on the breast and abdomen. Depending on how thick the plumage is, the amount of coloration and white spotting varies. Birds from the humid climate of the coastal range are darkest, while those from the mountain ranges in Arizona and Mexico are the lightest with the whitest spots. This difference in appearance is assumed to be an evolutionary adaptation to climate variation.

**Habitat and Habitat Associations**
In northern California it resides in dense, old growth, multi-layered mixed conifer, redwood, and Douglas-fir habitats. In southern California, the Northern spotted owl occurs at low elevations (sea level to 1,000 m), and occupies habitats dominated by hardwoods, primarily oak and oak-conifer woodlands (Garrett and Dunn, 1981). At higher elevations, they inhabit areas dominated by conifers (Gutiérrez et al., 1995).  

A critical element of this complex forest structure is the presence of large trees greater than 90 centimeters diameter at breast height. In areas where logging has occurred, many large trees are of advanced age, indicating that a residual old growth element is usually present in the breeding and roosting habitat (Gutiérrez et al., 1995). In the Sierra Nevada, the owls did not nest where this residual old-growth component was absent. The foraging habitat appears to be more variable and includes both intermediate-aged and older forested habitats within a home range (Gutiérrez et al., 1995). The forests occupied by the Northern subspecies are less fragmented than random forest areas (Moen, 1994). The species uses dense, multi-layered canopy cover for roost seclusion. The habitats selectively chosen by the Northern spotted owl are live oak/bigcone Douglas-fir forests (41 percent), riparian/hardwood forests (32 percent), and mixed conifer forests (26 percent) (Verner et al., 1992).  

Roost selection appears to be related closely to thermoregulatory needs; the species is intolerant of high temperatures. It roosts in dense overhead canopy on north-facing slopes in the summer.
In winter, it roosts in oak habitats. In northern regions of the state, daytime roosts averaged 165 m (549 ft) from water; in southern regions, daytime roosts averaged only 51 m (173 ft) from water (Barrows and Barrows, 1978; Barrows, 1981).

Range
Northern spotted owls are an uncommon, permanent resident that range from the south Cascade Range and northern Sierra Nevada from near Burney (Pit River), Shasta County, California south through the remainder of the western Sierra Nevada and Tehachapi Mountains to Lebec, Kern County.

They are found locally east of the Sierra Nevada crest. It may move downslope in winter along the eastern and western slopes of the Sierra Nevada, and in other areas within its distribution (Zeiner et al., 1990). They occur in the California coastal ranges from Monterey County south to Santa Barbara County, then in the Transverse Ranges and Peninsular Ranges south to Sierra San Pedro Martin in northern Baja California (Gutierrez et al., 1995).

The known elevational range of this species extends from near sea level to approximately 7,600 ft feet (2,300 m) (Gutierrez et al., 1995).

Key Populations in LOCHP Plan Area
There is a low Potential that the Northern spotted owl is in the LOHCP Plan Area. The LOHCP Plan Area is outside of its known range. The CNDDB (2002) and existing literature have no record of known occurrence for the Northern spotted owl within the LOHCP Plan Area. It is noted as an uncommon resident of San Luis Obispo County (Edell et al., 1985).

Biology
Diet: The spotted owl feeds in forest habitats upon a variety of small mammals, including flying squirrels, woodrats, mice and voles, and a few rabbits. It also eats small birds, bats, and large arthropods (Gutiérrez et al., 1995). It usually searches from a perch and swoops or pounces on prey in vegetation or on the ground. It may cache excess food. It forages in late seral stage forests significantly more often than in younger ages stands. Stand attributes include large diameter trees, multiple vegetation strata, and high live-conifer basal area (Gutiérrez et al., 1995).

Daily Activity: The Northern spotted owl exhibits yearlong, nocturnal activity (Forsman, 1976).

Migration and Dispersal: Not migratory, although Northern spotted owls are known to migrate altitudinally due to heavy snow pack (Zeiner et al., 1990). Juveniles disperse from the natal areas in September and October; the species has a strong fidelity to the nest site (Gutiérrez et al., 1995).
Survival: The juvenile survival is low and adult survival is relatively high for the Northern spotted owl (LaHaye et al., 1992). It requires blocks of 40-240 ha (100-600 ac) of mature forest with permanent water and suitable nesting trees and snags (Forsman, 1976).

Socio-Spatial Behavior: Forsman et al. (1977) found home ranges in mature Douglas-fir/hemlock forests in Oregon of 120-240 hectares (300-600 ac), with a mean of 180 hectares (450 ac). Gould reported a similar home range size in the Sierra Nevada. Individuals are spaced 1.6 to 3.2 km (1-2 mi) apart in suitable habitat (Marshall, 1942; Gould, 1974). Gould (1974) found that the territory in conifer forests in the Sierra Nevada varied from 40-138 hectares (100-340 ac), with a mean of 93 hectares (230 ac). In the San Bernardino Mountains, home ranges for three owls were 804 acres, 2,232 acres and 4,611 acres (Gutierrez and LaHaye, 1988).

Reproduction: The spotted owl breeds from early March through June, with a peak in April and May. It has one brood per year. The clutch size is 1-4 eggs, usually 2. The female incubates and broods the young; the male feeds the female and the young. It may not be mature sexually until 3 years old. The pair may use the same breeding site for 5-10 years, but may not breed every year (Forsman, 1976).

It usually nests in a tree or snag cavity or in a broken top of a large tree. It may also nest in a large mistletoe clump, abandoned raptor or raven nest, cave or crevice, on a cliff or on the ground (Zeiner et al., 1990; Call, 1978). Mature, multi-layered forest stands are required for breeding (Remsen, 1978). The nest is usually placed 9-55 m (30-180 ft) above the ground. The habitats are generally complex in structure with high canopy closure (Gutiérrez et al., 1995).

Threats
The loss and degradation of habitat have been the primary threats to the spotted owl. Secondary losses of habitat include urban and suburban expansion, water development in riparian corridors, agricultural development, fuel wood/oak harvest, reservoir development and mining (Gutiérrez et al., 1995). The USFS identified a major threat to the species as the loss of habitat by wildfire. Much of the forest area has not burned since the advent of fire suppression at the turn of the century.

Special Biological Considerations
This subspecies was declared Federal Threatened in June 1990. The species requires blocks of 100 to 600 acres of mature forest with permanent water and suitable nesting trees and snags (Forsman, 1976). The Northern spotted owl requires mature forest stands with large trees and snags.

Evidence exists that owls can reoccupy forests that have been selectively logged in the past relatively soon (40 to 100 years) if residual forest elements (e.g., snags, coarse woody debris, large trees with cavities) are present (Gutiérrez et al., 1995).
Habitat use patterns have been studied for the Northern spotted owl for radio-tagged birds and summarized as follows: The foraging owls selected microhabitats composed of larger trees (>52 cm dbh) with canopy closure of 40% and greater. Owls use forests composed of medium trees (28 to 52 cm dbh) and habitats with less than 40% canopy closure less frequently than expected. Fewer than 2% of telemetry locations occurred in clearcut/shrub/plantation habitat, which represented 30% of available habitat. Foraging owls used microhabitats that were characterized by multiple vegetative strata, large tree size classes, high tree basal areas and woody debris. The mean home range for foraging birds has been determined to be 1,439 hectares (Call et al., 1992).

**Conservation**
Unknown.
Literature Cited


**Tidewater goby**  
*Eucyclogobius newberryi*  
Class: Actinopterygii  
Order: Perciformes  
Family: Gobiidae

**Legal Status**  
**Federal:** Endangered, 1994  
**State:** Species of Special Concern  

**Source:** Guadalupe Dune Center

**Species Description**  
This is a relatively small goby that rarely exceeds 50 mm SL. Its body shape is elongate and somewhat dorso-ventrally flattened, especially anteriorly. The head is blunt and the mouth terminal, oblique, and large, with the maxillary extending to the posterior margin of the eye. Eyes are near dorsal in location. Pelvic fins are fused to form a ventral disc, another characteristic of gobiid species. Pectoral fins are large and the caudal fin elongate and rounded. There are 6-7 spines in the first dorsal fin and 9-13 rays in the second dorsal fin; 99% of individuals have 11-12 dorsal fin rays. The anal fin usually has 10-11 elements, rarely 9 or 12. Gill rakers number from 8-10. Scales are small and cycloid and are absent on the head; the chest, belly and nape are usually naked. Scales are often lacking on the anterior 20-25% of the body, even mid-laterally. There are 65-80 lateral scales. Body coloration is a dark olive, with darker mottling along the sides, back, and dorsal fin. Fish of all sizes have the first dorsal fin distinctively colored a prominent cream or orange, with the distal one-third to one-half transparent. The pelvic fins are yellow or dusky, and the anal fin is dusky (Swift et al., 1989).

**Habitat and Habitat Associations**  
The tidewater goby is a benthic species that inhabits shallow lagoons and the lower reaches of coastal streams, and "is almost unique among fishes along the U.S. Pacific coast in its restriction to low-salinity waters in California's coastal wetlands" (Federal Register Vol. 57, No. 239, Dec. 11, 1992). It differs from other species of gobies in California in that it is able to complete its entire life cycle in fresh or brackish water (Wang, 1982; Irwin and Soltz, 1984; Swift et al., 1989). This goby appears to be mainly an annual species (Swift, 1980b; Wang, 1982, 1986; Irwin and Soltz, 1984; Swift et al., 1989), although according to Swift (1980b), individuals in the northern part of the range live up to 3 years. Irwin and Soltz (1984) found that there is a marked decrease in the number of adults in the population during winter.

Tidewater gobies are found in shallow lagoons and lower stream reaches where the water is brackish (salinities usually <10 ppt) to fresh (Miller and Lea, 1972; Moyle, 1976; Swift, 1980b; Wang, 1982; Irwin and Soltz, 1984) and slow-moving or fairly still, but not stagnant (Irwin and Soltz, 1984). They avoid open areas were there is strong wave action or strong currents. Particularly important for their persistence in the lagoons is the presence of backwater, marshy habitats where they can avoid winter flood flows. Thus, many small lagoons with backwater
areas have maintained goby populations, while larger lagoons with no backwater areas have lost their populations (Swift et al. 1989).

Tidewater gobies are capable of living in saline water ranging from 0 to over 50 ppt salinity and at temperatures of 8-23 C (Swift et al. 1989). Suitable water conditions for nesting have been reported as 5-10 ppt salinities and 18-22 C temperatures (Federal Register, 1992). Water depth in tidewater goby habitat ranges from 25-100 cm and dissolved oxygen is fairly high (Irwin and Soltz, 1984). Gobies sometimes can persist, however, under anoxic conditions that eliminate other fish species. They have been observed to come up and gulp air at the water surface, and they probably breathe air like Gillichthys mirabilis. The substrate usually consists of sand and mud, with abundant emergent and submerged vegetation (Moyle, 1976). Severe salinity changes and tidal or flow fluctuations have a detrimental effect on the survival of tidewater gobies, resulting in population declines (Irwin and Soltz, 1984).

**Range**

Historically, the tidewater goby occurred in at least 110 California coastal lagoons from Tillas Slough near the Oregon border to Agua Hedionda Lagoon in northern San Diego County. The tidewater goby is endemic to California and is distributed in brackish-water habitats along the California coast, from the Agua Hedionda Lagoon, San Diego County, in the south to the mouth of the Smith River (Tillas Slough), Del Norte County, in the north (Swift, 1980b; Swift et al., 1989). Three sections of coastline in California, characterized by precipitous topography, lack lagoons at stream mouths and therefore form gaps in the distribution of the tidewater goby. These areas are (1) Humboldt Bay to Ten Mile River, (2) Point Arena to Salmon Creek, and (3) Monterey Bay to Arroyo del Oso (Federal Register, 1992). Tidewater gobies normally are found in lagoons, but they have been reported from ponded freshwater habitats up to 8 km upstream from San Antonio lagoon in Santa Barbara County (Irwin and Soltz, 1984).

Swift et al. (1989) estimated that of 94 localities from which specimens of tidewater gobies have been collected, the gobies have been extirpated from, or are likely to be extirpated from, soon, 53 (56%) of the localities. They probably also occurred at, but are now gone from, a minimum of 46 other localities that once had suitable habitat. They were presumably once common in formerly brackish habitats in San Francisco Bay, Monterey Bay, Santa Monica Bay, the Los Angeles Harbor area, Anaheim Bay, the mouth of the Santa Ana River, and Newport Bay. Swift et al. (1989) recorded their presence at 63 localities in 1984, only 11 of them north of San Francisco Bay. However, their populations are now declining, especially since 1950, and since 1900 they have disappeared from 74% of the coastal lagoons south of Morro Bay (Swift et al. 1989). They are known to have occurred in Morro Bay, but populations there have not been seen for several years. In San Francisco Bay and its associated streams, nine of ten previously identified populations have disappeared (Wang, 1982), and a survey of streams of the Bay drainage by Leidy (1984) failed to record any populations. There are 15 remaining populations south of Point Conception (Swift et al., 1989). Only three populations currently exist south of Ventura County (Federal Register, 1992).

According to the Federal Register (1992), only six populations are large enough and relatively
free from habitat degradation to be considered safe for the immediate future. This may be an underestimate. On the central coast, Pescadero and San Gregorio Creek lagoons (San Mateo County) appear to have large and secure populations, as do the lagoons of Baldwin, Wilder, Moore's and Scott creeks and the Pajaro River (Santa Cruz County). Most of these populations are located in state parks.

**Key Populations in LOCHP Plan Area**

There is a low potential that the tidewater goby is within the LOHCP Plan Area. There is no suitable habitat present in the LOHCP Plan area. The CNDDB has three records of known occurrence near the LOHCP Plan Area. They are Chorro Creek, from mouth to 2.0 miles upstream; approximately 0.25 miles offshore of Point Buchon, 0.5 miles from Montana de Oro State Park southern boundary; Morro Bay Main Channel, 0.4 mile south of White Point to the power plant and 0.5 miles east of Morro Rock in Morro Bay.

**Biology**

**Diet:** The diet consists mostly of small crustaceans (i.e., mysid shrimp, ostracods, amphipods), aquatic insects (i.e., chironomid larvae, diptera larvae), and molluscs (Swift, 1980b; Wang, 1982, 1986; Irwin and Soltz, 1984; Swift et al., 1989). Inorganic material consistently found in the guts indicates a benthic foraging mode, complementing its benthic life-style. Small tidewater gobies (four to eight mm SL) probably feed on unicellular phytoplankton or zooplankton similar to many other early stage larval fishes (Swenson and McCray, 1996).

**Daily Activity:** No information was found in the literature.

**Migration and Dispersal:** No information was found in the literature.

**Survival:** No information was found in the literature.

**Socio-Spatial Behavior:** No information was found in the literature.

**Reproduction:** Reproduction peaks from late April or May to July and can continue into November or December depending on the seasonal temperature and rainfall. Males begin the breeding ritual by digging burrows (75 to 100 mm deep) in clean course sand. Females then deposit eggs into the burrows, an average of 400 eggs per spawning effort (Swenson, 1998). Males remain in the burrows to guard the eggs. Males frequently forgo feeding during this period, possibly contributing to the mid-summer mortality noted in some populations. Within nine to ten days larvae emerge at approximately five to seven mm SL. The larvae live in vegetated areas within the lagoon until they are 15 to 18 mm SL, when they become substrate oriented, spending the majority of time on the bottom rather than in the water column. Both males and females can breed more than once in a season, with a lifetime reproductive potential of 3 to 12 spawning events (Swenson and McCray, 1996).
**Threats**

Coastal development projects that result in the loss of coastal saltmarsh habitat are currently the major factor adversely affecting the tidewater goby. Coastal marsh habitats have been drained and reclaimed for residential and industrial developments. Waterways have been dredged for navigation and harbors resulting in permanent and direct losses of wetland habitats, as well as indirect losses due to associated changes in salinity.

Furthermore, upstream water diversions adversely affect the tidewater goby by altering downstream flows, thereby diminishing the extent of marsh habitats that occurred historically at the mouths of most rivers and creeks in California. Alterations of flows upstream of coastal lagoons have already changed the distribution of downstream salinity regimes. Since the tidewater goby has relatively narrow salinity tolerances, changes in salinity distributions due to upstream water diversions may adversely affect both the size and distribution of goby populations (D. Holland, 1991).

**Special Biological Considerations**

The tidewater goby is primarily an annual species in central and southern California, although some variation has been observed. If reproductive output during a single season fails, few if any tidewater gobies survive into the next year. For this reason, populations are exceedingly sensitive to short-term adverse environmental conditions. In one notable case, a population estimated at between 10,000 and 30,000 individuals was extirpated after a single construction project (Swift and Holland, 1998). However, recent research suggests that tidewater gobies have adapted to climatically dynamic conditions and are adept at recolonizing sites from which they have been extirpated (Lafferty et al., 1999a).

**Conservation**

The tidewater goby was listed as an endangered species in 1994 at the end of an extended drought cycle. In June 1999, the Service proposed that the species be delisted because there were more populations in the northern portion of the range than at that time the species was listed; the threats to those populations were not as severe as previously believed; and the Service believed the tidewater goby had a greater ability to recolonize areas than was known when the species was listed.

Coastal lagoons should be surveyed at least once every five years to determine the status of each population, and steps should be taken to protect declining populations. Once restored, lagoons from which tidewater gobies have been eliminated should have gobies reintroduced from nearby locations, in order to reconstitute as closely as possible the genetic makeup of the extirpated populations. This procedure has already been tried successfully, when gobies from the Scott Creek lagoon were successfully transplanted to the nearby Waddell Creek lagoon. An effort should be made to maintain a number of tidewater goby populations within different areas of the geographical range to preserve the overall genetic diversity of the species (Swift et al., 1989).

Measures to reduce impacts to tidewater goby habitat have included adjusting the timing of projects to avoid disruption to breeding activities, the use of silt fencing to reduce sediment loads.
and as barricades around project sites, installing coffer dams above and below project sites and translocating individual tidewater gobies found within the exclosures prior to dewatering, minimization of project areas, and requiring qualified biologists to oversee project activities (Swift et al., 1989).
**Literature Cited**


Southern steelhead

*Oncorhynchus mykiss irideus*

Class: Osteichthyes  
Order: Salmoniforms  
Family: Salmonidae

Legal Status

**Federal:** Threatened, 1997 (South/Central coastal basins from the Pajaro River south to, but not including, the Santa Maria River)

**State:** Species of Special Concern

Species Description

Southern steelhead are anadromous (sea-run) forms of rainbow trout. The steelhead in California are classified as the coastal subspecies, *Oncorhynchus mykiss irideus* (Behnke, 1992). Steelhead and populations of other Pacific salmonids are further divided into Evolutionarily Significant Units. An Evolutionarily Significant Unit or ESU is a distinctive group of Pacific salmon, steelhead, or sea-run cutthroat trout (NOAA and NMFS, 2002). Within the Los Osos HCP plan area is the Central California Coast ESU.

Besides steelhead larger size at spawning, steelhead are nearly indistinguishable from the resident rainbow trout that also live in the same streams in which they spawn (Moyle, 1976). Steelhead are usually silver in color with black spots on the back, adipose fin, dorsal fin, and its slightly forked tail and a pink to red lateral band (Moyle, 2002). They also have pinkish colored cheeks, an iridescent blue to nearly brown back, and silver, white, or yellowish sides and belly. The mouth is large and usually has its maxillary extended to behind the eye and has teeth on the upper and lower jaws, the head and shaft of the vomer, the palatines, and on the tongue. Steelhead have a dorsal fin with 10-12 principal rays, an anal fin with 8-12 rays, two pelvic fins with 9-12 rays each, and two pectoral fins with 11-17 rays each. Approximately 16-22 gill rakers are on each arch and 9-13 branchiostegal rays. The scales have 110-160 pored scales along the lateral line, 18-35 scale rows above the lateral line, and 14-29 scale rows below the lateral line (Moyle, 2002).

Adults that have returned from the ocean can reach a length of approximately 23 inches (Leidy, 2000). Freshwater juveniles or smolts range between 13-25 centimeters in length (Moyle, 2002) and are similar in color to adults except that they have 8-13 parr marks centered on the lateral line, 5-10 dark marks on the back between the head and dorsal fin, white to orange tips on the dorsal and anal fins, and few or no black spots on the tail (McPhail and Lindsey, 1970). Steelhead at hatching are 14-15.5 millimeters total length, with alevins ranging between 23-26 millimeters in total length (Wang, 1986). Juveniles that remain in the freshwater as “smolts” are 13-25 centimeters in total length (Moyle 2002). Eggs are spherical to slightly irregular in shape, non-adhesive, demersal, and are 3-6 millimeters in length (Wang, 1986).
Habitat and Habitat Associations

Steelhead inhabit riparian, emergent, palustrine habitat (Leidy, 2000). Perennial streams usually characterize spawning and rearing habitat with clear, cool to cold, fast flowing water with high dissolved oxygen content and abundant gravels and riffles. Preferred water depth for spawning is 6-24 inches, for fry is 2-14 inches, and for parr is 10-20 inches (Bovee, 1978). Preferred water velocities for spawning is approximately 2 feet per second (range of 1-3.6 feet per second), although the optimal velocity depends in part on the size of the steelhead (i.e., larger steelhead will spawn in water with higher velocities) (Barnhart, 1986).

Steelhead use various mixtures of sand-gravel and gravel-cobble substrate for spawning, but the optimal substrate ranges from 0.2-4.0 inches in diameter (Bovee, 1978; Reiser and Bjornn, 1979). Optimal water temperatures for steelhead are 46-52 degrees Fahrenheit for adult migration, 39-52 degrees Fahrenheit for spawning, 48-52 degrees Fahrenheit for incubation and emergence, 45-60 degrees Fahrenheit for fry and juvenile rearing, and below 57 degrees Fahrenheit for smoltification (Bovee, 1978; Reiser and Bjornn, 1979; Bell, 1986). Although eggs can die at 56 degrees Fahrenheit and fish can experience difficulty in extracting oxygen from the water when temperatures exceed 70 degrees Fahrenheit (Hooper, 1973), steelhead are adapted to survive conditions where preferred temperatures are exceeded for long periods of time (McEwan and Jackson, 1996). Steelhead also prefer habitat with relatively good water quality that has low suspended sediment and contamination loads, and minimal pollution levels (Leidy, 2000). Steelhead also require sufficient flows and habitat characteristics for spawning, rearing, and migration, such as shallow riffles for spawning and deep pools with well-developed cover for rearing (Leidy, 2000).

Range

Historically, winter-run southern steelhead or coastal rainbow trout moved up most coastal streams in central and southern California (Behnke, 1992), although spawning success south of the Los Angeles Basin may have been sporadic (Swift et al., 1993). Swift et al. (1993) state that at least a few southern steelhead have been found in virtually every coastal stream in Monterey, San Luis Obispo and Santa Barbara counties north of Point Conception within the last ten years. Southern steelhead evidently once utilized most of the major coastal streams in southern California as well.

Today they still occur in Malibu Creek, Ventura River, Santa Clara River, and Santa Ynez River, although in greatly reduced numbers. Swift et al. (1993) also report recent records for Mission and Atascadero creeks (Santa Barbara County) and Mulholland, Big Sycamore, and Topanga canyons (Los Angeles County). Steelhead have been extirpated from at least 11 southern California streams: San Luis Rey River, San Mateo Creek, Santa Margarita River, Rincon Creek, Maria Ygnacio River, Los Angeles River, San Gabriel River, Santa Ana River, San Onofre Creek, San Juan Creek, San Diego River, and Sweetwater River (Nehlson et al., 1991; Swift et al. 1993). Steelhead have been caught in the lower Tijuana River, bordering Mexico (Hubbs, 1946), and runs are known to have occurred historically in Baja California streams (Barnhart, 1986).
Key Populations in LOCHP Plan Area

There is a low potential that the southern steelhead is in the LOHCP Plan Area. The CNDDB (2002) and existing literature have no record of known occurrence for the southern steelhead in the LOHCP Plan Area creeks.

The CNDDB does list three records of known occurrence near the LOHCP Plan Area which are the Chorro Creek and its tributary between Morro Bay & San Luis Obispo, along Hwy 1 to Camp San Luis Obispo National Guard Reservation; Coon Creek, 4.5 miles south of the southern portion of Morro Bay, within Montana de Oro State Park; and Islay Creek, approximately 3 miles south of the southern portion of Morro Bay, within Montana de Oro State Park.

Biology

**Diet:** Steelhead are primarily drift feeders and may forage in open water of estuarine subtidal and riverine tidal wetland habitats (Leidy, 2000). The diet of juvenile steelhead includes emergent aquatic insects, aquatic insect larvae, snails, amphipods, opossum shrimp, and small fish (Moyle, 1976). Adults may also feed on newly emergent fry (Leidy, 2000). Steelhead usually do not eat when migrating upstream and therefore lose body weight (Pauley and Bortz, 1986).

**Daily Activity:** No information was found in the literature.

**Migration and Dispersal:** Central California Coast steelhead migrate to freshwater habitat in the fall and winter, where they spawn within a few weeks or months (McEwan and Jackson, 1996). Steelhead will migrate upstream after 1-4 growing seasons at sea (Burgner *et al.* 1992) and spawn between December and April (Leidy, 2000). After spawning, steelhead may return to the ocean and spawn the following year (Leidy, 2000). Within 1-4 years (usually 2 years), steelhead migrate downstream as “smolts.”

**Survival:** No information was found in the literature.

**Socio-Spatial Behavior:** No information was found in the literature.

**Reproduction:** Steelhead within the central coast region begin moving up coastal drainages following the first substantial rainfall of the fall season. Spawning typically occurs in the spring in riffle areas that consist of clean, coarse gravels (Moore, 1980). Deposited eggs incubate for approximately 3 to 4 weeks, with hatched fry rearing within the gravel interstices for an additional 2 to 3 weeks. Emergent fry rear at the stream margins near overhanging vegetation. Juveniles (smolts), after rearing for 1 to 3 years within freshwater and postspawning adults migrate out to the ocean from March to July, depending on streamflows.

Steelhead spawn in beds constructed by the female over a gravel and cobble substrate (Leidy, 2000). Eggs are layed by the females in these beds where they are then fertilized by the males. Depending on their size, female steelhead produce between 200 and 12,000 eggs each.
Los Osos Habitat Conservation Plan – Species Accounts

(Scott and Crossman, 1973; Moyle, 1976). Wales (1941) observed incubation lasting for 19 days with an average water temperature of 15.5 degrees Celsius, while Shapovalov and Taft (1954) estimated the incubation period at 25-35 days with emergence beginning 2-3 weeks following hatching. Within 1-4 years (usually two years), steelhead migrate downstream as “smolts” (juvenile fish which can survive the transition from fresh water to salt water). Juveniles may be able to reach smolt size at an earlier age when they inhabit warmer and more productive streams (Moyle et al., 1995). Steelhead may spend up to four years in the ocean, but most only survive to age two (Leidy, 2000).

Threats
The number of steelhead in California has declined by one half in the last 30 years from an estimated 500,000 to only 250,000 adults (McEwan and Jackson, 1996). Steelhead runs in San Francisco Bay tributaries is estimated to be below 10,000 fish (Leidy, 2000). Factors contributing to this population decline include barriers to passage during migration, water diversions, flow fluctuations, sub-optimal water temperatures for incubation and juvenile rearing, sedimentation of spawning habitat, and low summer flows for emigration (Leidy, 2000).

Other factors include habitat loss, including loss of water flows, and the failure to protect the runs due to inadequate regulatory measures have been the major, or at least the most conspicuous, causes of the decline of southern California steelhead. Land development, dams, and degradation of southern California estuaries have probably significantly decreased potential steelhead juvenile rearing areas. It is unknown to what extent other factors affect southern steelhead populations.

Special Biological Considerations
Unknown

Conservation
All populations of steelhead occurring within the South-Central California Coast Evolutionary Significant Unit (ESU) Region which is defined as that geographic region north of the Santa Maria River, northward to (and including) the Pajaro River (and it’s tributaries), Santa Cruz County were listed as Federally Threatened by the National Marine Fisheries Service (NMFS) in August 1997.

The primary considerations are the direct loss or modification of aquatic and riparian habitats, changes in water quality and quantity related to discharge of surface water from impervious surfaces and landscaped areas into streams, minimizing disturbance and habitat modifications during critical periods, and providing adequate passage by eliminating existing barriers and not creating new barriers to upstream of downstream movement.

Streams or segments of the streams and their associated riparian corridors within much of the County have been modified to increase conveyance for flood control, minimize bank erosion, and increase areas available for development and agricultural uses. These activities typically result in a change in the natural channel geometry (i.e., loss of complexity, meanders are lost),

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riparian vegetation is removed, large woody debris is lacking, and water temperatures increase. These activities eliminate or reduce the ability of the habitat to support steelhead. Large woody debris (tree trunks, large limbs) is considered important for steelhead and other anadromous fish because it provides overhead cover, creates calm or lower velocity waters for resting, and creates greater habitat complexity. Large woody debris is typically removed from streams because it can create flooding hazards, blocks flow through culverts or damage culverts and bridges, and increases bank erosion.

The effects of changes in water quality and quantity are often not as visually apparent as direct habitat modification. Urbanization alters the natural infiltration capability of the land and generates a host of pollutants that are associated with the activities of dense populations, thus causing an increase in storm water runoff volumes and pollutant loadings in storm water discharged to receiving water bodies. Urban development increases the amount of impervious surface in a watershed as farmland, forests, and meadowlands are converted into buildings with rooftops, driveways, sidewalks, roads, and parking lots with virtually no ability to absorb stormwater. Stormwater runoff washes over these impervious areas, picking up pollutants along the way while gaining speed and volume because of lack of dispersal and infiltration into the ground. The resulting storm water flows are higher in volume, pollutants, and temperature that the flows in less impervious areas, which have more natural vegetation and soil to filter the runoff (U.S. EPA, 2000). This can affect steelhead and other aquatic species within streams, rivers, and in downstream estuaries far removed from urban areas.

Natural and man-made barriers in streams can prevent adult steelhead from reaching suitable spawning habitats causing the fish to breed in sub-optimal habitats where survival of the young is unlikely or creating traps where predators have easier access to concentrations of fish. Barriers can be caused by drop structures in streams or flood control channels, under-sized or poorly designed culverts and bridges, and under-grounding of streams.
Literature Cited


Shapovalov, L. and A.C. Taft. 1954. The life histories of the steelhead rainbow trout (Salmo gairdneri gairdneri) and silver salmon (Oncorhynchus kisutch) with special reference to Waddell Creek, California, and recommendations regarding their management. California Department of Fish and Game, Fish Bulletin 98. 375 pp.
**Monarch butterfly**

*Danaus plexippus*

Class: Insecta  
Order: Lepidoptera  
Family: Danaidae

**Legal Status**

- **Federal:** None  
- **State:** Threatened Phenomenon

**Species Description**

The male Monarch butterfly upperside is bright orange with wide black borders and black veins; hindwing has a patch of scent scales. The female Monarch butterfly upperside is orange-brown with wide black borders and blurred black veins. Both sexes have white spots on borders and apex and a wingspan of 3 3/8 - 4 7/8 inches.

**Habitat and Habitat Associations**

In the spring and summer, the monarch butterfly's habitat is open fields with milkweed, meadows, weedy areas, marshes, and roadsides. Their winter habitat is in areas with lots of tree cover. At the Mexico wintering sites, butterflies roost in trees and form huge aggregations that may have millions of individuals.

**Range**

Southern Canada south through all of the United States, Central America, and most of South America. Also present in Australia, Hawaii, and other Pacific Islands (Urquhart, 1987).

**Key Populations in LOHCP Plan Area**

The CNDDB (2002) have three records of known occurrence for the Monarch Butterfly wintering sites within the LOHCP Plan Area. The records in the LOHCP Plan Area consist of a Eucalyptus grove in Skyline Grove, which is near the intersection of Doris Avenue and Rosina, West Woodland Ave at the end of Monarch Lane, and Sweet Springs Marsh, north of Ramona.

The CNDDB list other primary wintering sites including Montana de Oro State Park, Morro Bay State Park, and throughout the community of Morro Bay.

**Biology**

**Diet:** Monarch butterfly larva feed on Milkweeds including common milkweed (*Asclepius syriaca*), swamp milkweed (*A. incarnata*), and showy milkweed (*A. speciosa*); and milkweed vine in the tropics. Most milkweeds contain cardiac glycosides that are stored in the bodies of both the caterpillar and adult. These poisons are distasteful and emetic to birds and other vertebrate predators. After tasting a Monarch, a predator might associate the bright warning colors of the adult or caterpillar with an unpleasant meal, and avoid Monarchs in the future.
Monarch butterfly feed on nectar from all milkweeds. Early in the season before milkweeds bloom, Monarchs visit a variety of flowers including dogbane, lilac, red clover, lantana, and thistles. In the fall adults visit composites including goldenrods, blazing stars, ironweed, and tickseed sunflower (Boppre, n.d.; Lane, n.d.).

**Daily Activity:** Adults warm up by basking dorsally (with their wings open and toward the sun).

**Migration and Dispersal:** Adults make massive migrations from August-October, flying thousands of miles south to hibernate along the California coast and in central Mexico. A few overwinter along the Gulf coast or south Atlantic coast. Residents of tropical areas do not migrate but appear to make altitude changes during the dry season (Van Hook, n.d.).

**Survival:** The sap of the milkweed that they eat as a caterpillar contains a chemical that tastes terrible to most birds. Birds attempting to eat a monarch butterfly soon spit it out. A monarch's bright colors are a signal to predators of its bad taste.

**Socio-Spatial Behavior:** Monarchs migrate and roost together at night.

**Reproduction:** The mating period occurs in the spring, just prior to migration from the overwintering sites. The courtship of *D. plexippus* is fairly simple and less dependent on chemical pheromones in comparison with other species in its genus. Courtship is composed of two distinct stages, the aerial phase and the ground phase. During the aerial phase, the male pursues, nudges, and eventually takes down the female. Copulation occurs during the ground phase and involves the transfer of a spermatophore from the male to female. Along with sperm, the spermatophore is thought to provide the female with energy resources that aid her in carrying out reproduction and remigration. Once they reach their breeding grounds, the females lay their eggs on milkweed host plants. The egg and larval period is temperature dependent and lasts about 2 weeks. At the end of this period, the larva enter a period of pupation, and after 9 to 15 days an adult butterfly emerges (Boppre, n.d.; Lane, n.d.).

**Threats**

The largest threat to the monarch butterfly is human activities within their wintering grounds. While widespread on their summering grounds, the butterflies are highly concentrated and vulnerable to threats in wintering areas. Habitat destruction and changes caused by logging are a constant threat. The Sierra Madre wintering sites of the monarch are close to Mexico City in an area under heavy development pressure. Since 1986, the Mexican government has protected several of the sites occupied by the overwintering monarch butterfly, but even though they are supposed to be protected, some forested areas have been logged. Of the five protected areas, excessive logging has already seriously damaged one, and the monarchs do not seem to form their colonies there any more (Urquhart, 1987).

In California, where many western monarchs overwinter, the effects of tourism and poorly planned management and development are a problem, and at least seven of the 80 known
monarch sites have already been destroyed. Milkweed is widespread and abundant in Canada and the United States, and is often considered a weed. Some researchers have expressed concern that the spraying of pesticides for weed control are killing milkweed plants and may be endangering the habitat and food source of the beautiful monarch butterfly (Urquhart, 1987).

**Special Biological Considerations**
Unknown.

**Conservation**
The annual monarch migration is considered a "threatened phenomena" by the International Union for Conservation of Nature and Natural Resources. Steps have been taken by both the United States and Mexican government along with numerous private individuals and organizations to protect the overwintering sites of these butterflies.

Overwintering sites in California and Mexico should be protected and conserved. Develop conservation and management plans for all wintering sites, migration corridors, and principal breeding areas (Malcolm et al., 1993)
Literature Cited


Biology and Conservation of the Monarch Butterfly. Natural History Museum of Los Angeles County.


Morro Shoulderband Snail  
*Helminthoglypta walkeriana*  
Class: Gastropoda  
Order: Stylommatophora  
Family: Helminthoglyptidae

**Legal Status**  
**Federal:** Endangered  
**State:** None

**Species Description**  
The Morro shoulderband snail has a slightly translucent shell, globose (globe-shaped), with spiral grooves and a narrow dark-brown, spiral band on the shoulder. The Morro shoulderband snail has spiral striae (longitudinal ridges) as well as transverse striae giving it a "checkerboard" appearance. Further, there are raised papillae (bumps) at the intersections of some of the striae. The shell of the Big Sur shoulderband snail tends to be flatter and shinier, and rarely has spiral striae. It also has malleations (dents) and tends to be darker in color. The Morro shoulderband's spire is low-domed, and half or more of the umbilicus (the cavity in the center of the base of a spiral shell that is surrounded by the whorls) is covered by the apertural (small opening) lip (Roth, 1985). The brown garden snail (*Helix aspersa*) also occurs in Los Osos with the Morro shoulderband snail and has a marbled pattern on its shell, whereas the Morro shoulderband snail has one narrow dark brown spiral band on the shoulder. The Morro shoulderband snail is approximately 0.7 to 1.1 inches in diameter and 0.6 to 1 inch in height that is slightly smaller than a brown garden snail.

**Habitat and Habitat Associations**  
The Morro shoulderband snail inhabits the accumulated litter and undersides of low shrub branches in coastal dune scrub vegetation, particularly mock heather (*Ericameria ericoides*), golden yarrow (*Eriophyllum staechadifolium*), deerweed (*Lotus scoparius*), and dune almond (*Prunus fasciculate var. punctata*). The Morro shoulderband snail has within introduced iceplant (*Mesembryanthemum* ssp. and *Conicosia* spp.) and fig-marigold (*Carpobrotus edulis*). The species has been found most often in mock heather (Roth, 1985; Hill, 1974; Symonds, pers. comm. 1996). Morro shoulderband snails seem to prefer shrubs that exhibit dense, low growth with ample contact to the ground. Based on this observation, favorable microclimate for the species may depend on shrubs that provide partial shading and act as windbreaks to moderate temperatures and moisture loss within accumulated plant litter. Recent records from the Chorro Valley and City of San Luis Obispo suggest the snails can find adequate shelter and moisture under woody debris and in decaying vegetation under fennel (*Foeniculum vulgare*) and other shrubs.

Observations made in 1996 and 1997 by the USFWS and DFG staff (Kate Symonds, USFWS, and Deb Hillyard, DFG) indicates that the Morro shoulderband snail is more widespread than originally thought. They observed the Morro shoulderband snail on California sage-black sage,
dune lupine-goldenbush, Morro manzanita-California sagebrush, dune almond, and several other maritime chaparral and coastal sage scrub plant communities (Los Osos/Baywood Park Conservation Plan, 1998).

The 1997 to 2001 surveys found the Morro shoulderband snail habitat in the habitats listed below. This includes a far wider range of habitats than those described in the Recovery Plan and supports the observations discussed above that were made by the USFWS and DFG staff.

Coastal sage scrub: Plants occurring in coastal scrub communities are characterized as being aromatic, low growing and drought tolerant. Common plant species include: California sagebrush, coyote brush (Baccharis pilularis), monkeyflower (Mimulus spp.), poison-oak, California buckwheat (Eriogonum fasciculatum) and black sage (Salvia mellifera).

Central maritime chaparral: Maritime chaparral is found to form a mosaic with central dune scrub, coastal scrub, and coast live oak communities. Stiff, woody shrubs such as Arctostaphylos spp. and Ceanothus spp. dominate maritime chaparral communities. Other species frequently occurring as part of this community include: toyon (Heteromeles arbutifolia), coffeeberry (Rhamnus californica), black sage, chamise (Adenostoma fasciculatum), and poison-oak (Toxicodendron diversilobum).

Coast live oak woodlands: Coast live oak woodlands within the LOHCP Plan Area do not form a continuous belt, but rather, occur as a mosaic closely associated with communities such as coastal scrub and non-native grassland. Typical understory plant species occurring in areas where coast live oaks form dense canopies include: toyon, poison oak, bracken fern (Pteridium aquilinum), miner's lettuce (Claytonia perfoliata), bedstraw (Galium aparine), and coffeeberry.

Noxious Non-native Plants: Iceplant or sea fig (Carpobrotus edulis) is an invasive non-native species found throughout the sand dunes and bluffs along the coast. Veldt grass is an invasive non-native weed that is found throughout the LOHCP Plan Area.

The Morro shoulderband snail was not found in areas dominated by pampas grass, ornamental plantings or blue gum trees and areas nearly devoid of vegetation (Morro shoulderband snail surveys, 1998-2001).

Range
The recovery plan for the Morro shoulderband snail describes its current distribution as “areas south of Morro Bay, west of Los Osos Creek and north of Hazard Canyon”; the species occurs throughout the community of Los Osos (USFWS, 1998). At the time the recovery plan was written, the range of the Morro shoulderband snail was thought to be limited to the vicinity of Morro Bay and to be largely restricted to sandy soils of the coastal dune and coastal sage plant communities of the City of Morro Bay and the community of Los Osos. However, recent surveys have rediscovered the Morro shoulderband snail in inland areas, particularly the Chorro Valley.
and the City of San Luis Obispo (Morro Group, 2002). However, recent surveys have rediscovered the snail in inland areas, particularly the Chorro Valley and the City of San Luis Obispo (Morro Group, Inc., 2002). At these inland areas, the snail was found under rocks, woody debris, or in decaying vegetation under shrubs in localities with grassy swales, black clay, or serpentine rock outcrops (Tupen, pers. comm. 2002). In 1998, the species was rediscovered by USFWS staff on a coastal bluff between Morro Bay and Cayucos, where it had not been recorded since 1948 (Symonds, pers. comm. 1998).

Two other species in the genus *Helminthoglypta* inhabit areas adjacent to or overlapping the range of the Morro shoulderband snail. The Surf shoulderband snail (*H. fieldi*) inhabits coastal dunes from south of the San Luis Range in San Luis Obispo County to Point Arguello in Santa Barbara County. The Big Sur shoulderband snail (*H. umbilicata*) occurs from Monterey Bay, Monterey County, south to northern Santa Barbara County, and it has been found in the community of Los Osos.

**Key Populations in Planning Area**

The Morro shoulderband snail is known to occur in the Plan area. The CNDDB (2002) has two records of known occurrence for the Morro shoulderband snail in the Plan area. The records in the Plan area consist of coastal scrub areas south of Highland Drive Between Roderson Ave and Bayview Drive, and south of Pecho Valley Road in the Los Osos Oaks State Reserve.

The CNDDB also lists other records in Montana de Oro State Park, Morro Bay State Parks, and scattered areas throughout the community of Morro Bay.

From 1997 to 2001, the Morro Group and Jones and Stokes Associates have completed the most recent Morro shoulderband snail surveys for 117 parcels. The results of the surveys documented that live snails, live snails and shells, and shells only were found throughout the plan area on different parcels with different vegetation types. Of the 117 surveys conducted, the results show that thirty-five surveys (30 percent) found live snails (live or live/shells) and 29 (25 percent) found shells only (See Figure 12). In addition, as the aerial photos (see Figures 5 to 9 above) illustrate, even though Baywood Park and much of central Los Osos has experienced significant human disturbance and a grid-like street pattern for over 50 years, the snail has persisted in these heavily disturbed areas.

The data presented in Table 1 combines the results of the surveys conducted and the parcel sizes. The Morro shoulderband snails are found on all lot sizes throughout Los Osos, however, based on the surveys, there is a higher probability that the Morro shoulderband snails will be found on larger (>5 acres) parcels.
### Table 1: Morro Shoulderband Snail Survey Data by Parcel Size

<table>
<thead>
<tr>
<th>Acres</th>
<th>Parcel Count</th>
<th>Live Snails and Snail Shells</th>
<th>Snail Shells Only</th>
<th>No Snail Presence</th>
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<td>6</td>
<td>2</td>
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<td>6</td>
<td>7</td>
<td>8</td>
<td></td>
</tr>
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<td>2</td>
<td>4</td>
<td></td>
</tr>
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<td>2</td>
<td>2</td>
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</tr>
<tr>
<td>TOTAL</td>
<td>45</td>
<td>30</td>
<td>52</td>
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</tr>
</tbody>
</table>

Biology

**Diet:** The feeding behaviors of the Morro shoulderband snail has not been studied or documented by observations. Hill (1974) speculates that the snail feeds on the fungal mycelia (webs or mats of non-reproductive fungal strands) growing on decaying plant litter.

**Daily Activity:** No information was found in the literature.

**Migration and Dispersal:** No information was found in the literature.

**Survival:** The snail buries itself in leaf litter to prevent desiccation (Roth, 1985).

**Socio-Spatial Behavior:** No information was found in the literature.

**Reproduction:** As with most snail species that live in a Mediterranean climate, the Morro shoulderband snail is most active and reproduces in the rainy season while estivating during the dry season (Roth, 1985).

Threats

The predominant threat to the existence of the Morro shoulderband snail is the destruction of its habitat. Increased urban and industrial development, mowing, grading, off-road vehicles, fire suppression, and invasive non-native species such as veldt grass play a major role in the degradation of the snail's habitat. Natural factors that contribute to the snail's mortality include drought and severe heat that can destroy the eggs. Sarcophagid flies, which parasitize the Morro shoulderband snail, are suggested to have a significant impact on the snail's population as well (Hill, 1974). Various encroaching threats on the snail's habitat included expanding housing developments, off-road vehicular traffic, prescribed burns for habitat management of the endangered Morro Bay kangaroo rat, predatory rodents, invasion of nonnative plant species (e.g., veldt grass (*Ehrharta calycina*)), and the maturation of the Coastal Dune Scrub community.

In addition to the known threats, possible threats to the snail include the competition for resources with the nonnative brown garden snail (although no assessment has been made of possible dietary overlap between the species); the small and isolated nature of the remaining populations; the use of pesticides (including snail and slug baits); and the introduction of nonnative predatory snails, such as *Oxycheilus sp.* (Roth, 1985).

It has been documented by Hill, Roth, and Touneh that the Sarcophagid fly (family of flies that rely on a host to complete its life cycle) parasitize the Morro shoulderband snail by finding empty snail shells containing empty puparia ("cases" left behind by adult flies emerging from pupae). Hill and Roth suggested that mortality from infestations of larvae of this parasitic fly often occur before the snails reach reproductive maturity (Hill, 1974; Roth, 1985; and Kim Touneh, Service, pers. comm. 1997). The flies may have a significant impact on the population of the snail (Roth, 1985). Roth also believes that seasonal drought and/or heat may contribute to the snail's egg mortality (Roth, 1985).
Special Biological Considerations
Unknown.

Conservation
The Morro shoulderband snail was added to the List of Endangered and Threatened Wildlife on December 15, 1994 (59 FR 64613). The Recovery Plan for the Morro Bay shoulderband snail and Four Plants from Western San Luis Obispo County, California was approved by the U.S. Fish and Wildlife Service in September 1998. The Final Determination of Critical Habitat for the Morro Shoulderband Snail (*Helminthoglypta walkeriana*) was approved March 9, 2001 (50 CFR Part 17, RIN 1018-AG27).

The recovery objective for the Morro shoulderband snail is delisting. Downlisting for the Morro shoulderband snail can be considered when sufficient populations and suitable occupied habitats from all four Conservation Planning Areas (Morro Spit, West Pecho, South Los Osos, and Northeast Los Osos) are secured and protected. These areas should be intact and relatively unfragmented by urban development. Snail populations must be large enough to minimize the short-term (next 50 years) risk of extinction on any of the four Conservation Planning Areas, based on results of tasks 3.2.1.1, 3.2.1.2, and 3.2.1.3 and on at least preliminary results from task 4.1.

Downlisting also requires that potential habitat within the snail’s historic range will have been identified and surveyed to see if undiscovered populations exist. Should surveys locate additional populations, especially north of Morro Bay, recovery criteria will have to be evaluated and revised.

Delisting can be considered for the Morro shoulderband snail when habitats from all Conservation Planning Areas (and, if necessary, any newly located populations) are successfully managed to maintain the desired community structure and secured from threats of development, invasion of non-native plants, structural changes due to senescence of dune vegetation, recreational use, pesticides (including slug and snail baits), parasites, and competition or predation from non-native snail species. Results of recovery tasks must continue to a low medium-to-long term risk of extinction from any of the four Conservation Planning Areas.

3.2 Conduct species-specific research
Although many basic characteristics of the life history of these species are known, other critical aspects need to be investigated to allow refinement of management actions.

3.2.1 Conduct species-specific research on Morro Bay species

3.2.1.1 Determine if brown garden snail is a competitive threat to Morro shoulderband and control as necessary Competition for food, estivation sites, and especially shelter sites between Morro shoulderband and the non-native brown garden snail (*Helix aspersa*) should be investigated. Preferred food, estivation, and shelter sites should be determined for both species. If the research results
show that both snails use similar resources and Helix is a competitive threat, a
detailed control strategy for Helix should be developed and implemented. The
best available method of control for exotic snail species that will not also affect
the Morro shoulderband snail is handpicking. This process is very time-
consuming and would probably not completely eradicate Helix.

3.2.1.2 Study habitat use and life history needs of the Morro shoulderband snail
Studies should be performed to determine if immature stands in earlier
successional stages offer more favorable shelter and litter higher in food value
compared to mature senescent stands of coastal dune scrub. Documented
observations and research on the feeding behaviors of the snail should be gathered
to determine the required vegetation needed for food resources. Information on
the snail’s reproduction, growth, and dispersal capabilities should also be
obtained. This information is needed to understand the ecological, management,
and recovery requirements of the snail.

3.2.1.3 Identify Morro shoulderband parasites and determine if parasitism rates
are threatening populations. The sarcophagid fly parasitoid of the Morro
shoulderband should be identified to determine whether it is native or introduced.
Since vacant fly puparia were found inside many empty subadult shells, the
mortality from the parasitoid flies probably occurs before the snail’s reproductive
maturity (Roth 1985). Research results should determine how this parasitic
infestation during pre-reproductive maturity affects the population dynamics of
the snails. If research results conclude that the parasite is detrimental to the snail’s
recovery, a control strategy for the parasite might be considered.

4. Determine population dynamics and effects of recovery efforts Studies should be conducted to
learn the number and size of successful self-sustaining populations for each species to establish
criteria for their re-classification.

4.1 Document population dynamics and cycles to ascertain trends
Wide population fluctuations, both spatially and temporally, have been observed within
populations of the Morro shoulderband snail should be conducted to document
population dynamics and cycles to determine population trends. Standardized survey
methodology should be used to track populations from one year to the next.

4.2 Evaluate effectiveness of methods used to reduce threats
Regular monitoring is needed to evaluate the success of reducing threats to these species.
This is necessary to determine if recovery goals are being met and if downlisting or
delisting are appropriate.
**Literature Cited**

Baywood and Los Osos Conservation Plan. 1998. Prepared by the Land Conservancy of San Luis Obispo with funding provided by the California Coastal Conservancy.


U.S. Fish and Wildlife Service Recovery Plan for the Morro Bay shoulderband snail and Four Plants from Western San Luis Obispo County, California, September 1998.
California brackishwater snail
*Tryonia imitator*

Class: Gastropoda
Order: Mesogastropoda
Family: Hydrobiidae

**Legal Status**
- **Federal:** Species of Concern
- **State:** None

**Species Description**
Unknown.

**Habitat and Habitat Associations**
The California brackishwater snail is found in coastal lagoons and areas where creek mouths joined the tidal marsh.

**Range**
The California brackishwater snail historically was found from San Diego to Sonoma County. Today, the populations are scattered throughout the former range with the exception of the Sonoma County population, which is believed to be extinct. Populations have been reported from salt evaporation ponds in Alameda and Monterey Counties.

**Key Populations in LOHCP Plan Area**
There is a low potential that the California brackishwater snail is in the LOHCP Plan Area. The CNDDB (2002) and existing literature have no record of known occurrence for the southern steelhead in the LOHCP Plan Area creeks. The CNDDB (2002) has one record of known occurrence for the California brackishwater snail near the LOCHP Plan Area which is the Los Osos Creek marsh, east side of Morro Bay near the intersection of South Bay Boulevard and Turri Road Blvd.

**Biology**
- **Diet:** No information was found in the literature.
- **Daily Activity:** No information was found in the literature.
- **Migration and Dispersal:** No information was found in the literature.
- **Survival:** No information was found in the literature.
- **Socio-Spatial Behavior:** No information was found in the literature.
- **Reproduction:** No information was found in the literature.
**Threats**
The species decline is attributed to loss of habitat to development and from control of tidal influences in marsh, lagoon, and estuarine habitats. The snail inhabits brackish water that is generally at the confluence of estuaries and streams.

**Special Biological Considerations**
Unknown.

**Conservation**
Unknown.
Literature Cited
Baywood and Los Osos Conservation Plan. 1998. Prepared by the Land Conservancy of San Luis Obispo with funding provided by the California Coastal Conservancy.
Morro Bay kangaroo rat
*Dipodomys heermanni morroensis*

Class: Mammalia  
Order: Rodentia  
Family: Heteromyidae

**Legal Status**  
**Federal:** Endangered, 1970  
**State:** Endangered, 1971; Fully Protected Species

**Species Description**  
This kangaroo rat, like all species of kangaroo rats, has long hind legs, small front legs and feet, brown upper parts, and a white belly. It is considered to be the darkest in color of all kangaroo rats. The lack of a complete hip stripe distinguishes this animal from other kangaroo rats. As with all kangaroo rats, this subspecies burrows into the ground for dens. It inhabits coastal scrub vegetation on old sand dune substrate and is geographically isolated from other subspecies of the Heermann's kangaroo rat.

**Habitat and Habitat Associations**  
Potential habitat for this subspecies occurs primarily south of the community of Morro Bay in coastal sage scrub habitats. Morro Bay kangaroo rats are essentially found only in disturbed areas. Optimum habitat consists of the earlier successional stages of the coastal sagebrush community that occur on the old, stabilized dune terraces on the south and southeast sides of Morro Bay. The optimum vegetation is an essentially herbaceous annual, with scattered woody perennial shrubs (sagebrush - *Artemisia californica*, coyote brush - *Baccharis pilularis*, lupine - *Lupinus arboreus* and *L. chamissonis*, and buckwheat - *Erigonum parvifolium*) no more than 2 feet in height. Shrub cover may be totally absent, or range as high as 60 percent; ground cover may vary from practically zero to 100 percent (Condon, 1971; Condon, 1975; Roest, 1973; Stewart, 1958; Stewart and Roest, 1960; Toyoshima, 1978; Toyoshima, 1979).

Within the distribution area of Morro Bay kangaroo rats the above habitat type is characteristic of early successional stages, until from 15 to 30 years after an area has been cleared of vegetation, depending on the specific site. Succession involves a gradual increase in size and coverage of brushy species, and after 20 to 30 years the brush is too tall and dense for kangaroo rats. In earlier times, vegetation was cleared and succession restarted as a result of fires intentionally set by Indians; bulldozers for either development or cultivation have cleared more recently brushy areas. The animals quickly move into such areas, usually within the first year after clearing. If the area is cultivated, they move in after the first harvest of oats or other grain, or within the first year, if the land is allowed to lie fallow (Roest, 1973; Stewart, 1958; Stewart and Roest, 1960; Toyoshima, 1978; Toyoshima, 1979). Large scale development efforts and to a lesser extent cultivation (oats/pasture) surround the known occupied habitat. Several roads surround the known occupied habitat and provide access to homes, schools, and shopping centers.
Soil is essentially raw wind-blown sand (but not active dunes), anchored by the roots of the vegetation it supports. Burrows can readily be dug in this soft substrate by the animals. Kangaroo rats are not found on steeper slopes (over about 10 to 15 percent). The have been taken from areas just above the highest tide level to an elevation of about 1000 feet, but only in areas with sandy soil. Burrows cannot be dug in the heavy clay soils found elsewhere in the region (Roest, 1973; Stewart, 1958; Stewart and Roest, 1960).

**Range**

It was found only in several small areas of less than one-half square mile in total size near Los Osos in San Luis Obispo County. Currently, if it still exists, it is thought to inhabit just one small privately owned parcel that remains in native vegetation.

**Key Populations in LOHCP Plan Area**

The Morro Bay Kangaroo rat historically is known to occur in the LOCHP Plan Area. The CNDDB (2002) has three records of known occurrence and six historical records for the Morro Bay Kangaroo rats in the LOCHP Plan Area. The records of known occurrence in the LOCHP Plan Area are located at the Bayview Drive site, south of Highland Drive between Roderson Ave & Bayview Drive; the junior high site, Santa Ysabel, east of South Bay Blvd and just west of Los Osos Creek; and the Buckskin Drive site, just north of the dead end at Buckskin Drive.

The CNDDB also lists other records in Montana de Oro State Park, Morro Bay State Park, and scattered areas throughout the community of Morro Bay. The most recent kangaroo rat surveys show that the habitat has seriously declined since the 1950s. Since 1996, Michael O’Farrel has conducted a variety of surveys of undeveloped parcels located in the northern and northeastern portions of the community of Los Osos. The various surveys conducted yielded no capture or sign of kangaroo rat. In addition, O’Farrel indicated that the various sites surveyed were no longer suitable for occupation by the species due in part to site conditions being consistent with habitat that has reached seral conditions (O’Farrel, 1998). Although these findings do not preclude Morro Bay kangaroo rat from occurring within other portions of the Los Osos and Baywood Park areas, the potential for occurrence would still be considered low.

**Biology**

**Diet:** Stewart has investigated food habits of Morro Bay kangaroo rats; the following is taken from his report (Stewart, 1958; Stewart and Roest, 1960): California aster (*Corethrogyne* sp.) seeds, deerweed (*Lotus scoparius*) seeds/leaves/stems, western thistle (*Cirsium occidentale*) seeds, cinquefoil (*Potentilla lindleyi*) seeds/pods/leaves, cat's ear (*Hypchoeris glabra*) seeds, filaree (*Erodium cicutarium*) seeds/leaves, Cryptantha (Cryptantha clevelandei) seeds, brome grass (*Bromus sp.*) seeds/leaves/stems, sand verbena (*Abronia* sp.) seeds/pods, turkish rugging (*Chorizanthe californica*) seeds, black sage (*Salvia mellifera*) seeds, mock heather (*Ericameria ericoides*) seeds, woolly blue star (*Eriastrum densifolium*) seeds/pods, Stephanomeria (*Stephanomeria virgata*) seeds, Dudleya (*Dudleya caespitosa*) seeds/leaves/stems, shrub lupine (*Lupinus chlamissonis*) seeds/leaves/stems, tree lupine (*Lupinus arboreus*) seeds/leaves/stems.
**Daily Activity:** Morro Bay kangaroo rats are strictly nocturnal; they are active early in the evening, and may or may not have another active period before dawn (Roest, 1985; Toyoshima, 1979).

**Migration and Dispersal:** The species is nonmigratory. Juveniles are occasionally taken in no suitable habitat, presumably as they are dispersing from their natal burrow (Roest, 1985).

**Survival:** No information was found in the literature.

**Socio-Spatial Behavior:** Each kangaroo rat adult maintains and defends its own burrow system, which involves a main passage extending for 6 to 10 feet in length, usually with 2 or 3 entrances. Home ranges may overlap, although the animals are not truly social; only rarely are they trapped more than 100 feet from their home burrow. Population densities vary from 1 animal per acre to over 30 per acre in optimum habitats (Condon, 1971; Roest, 1977; Roest, 1984; Stewart, 1958; Stewart and Roest, 1960; Toyoshima, 1979).

**Reproduction:** Juvenile kangaroo rats have been captured in the field from March to November, indicating at least two breeding periods per year, possibly more. Adult weight, measurements, and pelage are achieved by the age of 19 to 20 weeks (about 5 months). Females show evidence of estrous cycling about every 15 to 20 days. Gestation in the related *D. h. arenae* is approximately 30 to 33 days (Roest, 1984). The litter size varies from 2 to 4 young.

**Threats**
This kangaroo rat is threatened by loss and degradation of its habitat, although other factors may be operating. Adverse impacts to its habitat resulted from clearing for residential and urban uses, invasion of non-native plant species, and OHVs.

Owners of the last known site occupied by the kangaroo rat deny access to the DFG and the USFWS to inspect their habitat for signs of the animal or to set live traps in an attempt to capture individuals for captive breeding.

Known predators of the Morro Bay kangaroo rat include: gopher snake (*Pituophis catenifer*), rattlesnake (*Crotalus viridis*), barn owl (*Tyto alba*), horned owl (*Bubo virginianus*), gray fox (*Urocyon cinereoargenteus*), long-tailed weasel (*Mustela frenata*), badger (*Taxidea taxus*), bobcat (*Felis rufus*), and the domestic cat (*Felis catus*).

No direct causal relationships are known, other than that each of these predators does take some kangaroo rats each year (Stewart, 1958; Stewart and Roest, 1960). Stewart (1958) reported that 88.5 percent of kangaroo rats he examined had external parasites. Of these 73 percent had fleas, 37 percent had lice, and 35 percent had ticks. Unidentified nematodes were found in the gut of one of five individuals (Toyoshima, 1979).
Special Biological Considerations
Unknown

Conservation

The primary objective of the Morro Bay Kangaroo Rat Recovery Plan is to preserve sufficient land and to maintain an optimum habitat for at least 2,500 individuals. Attainment of this objective for three consecutive years may permit reclassification to Threatened. Because the population is very small and habitat is so limited, criteria for declassifying have not been developed. The recovery activities necessary to achieve the objective of declassification are:

1) To protect, secure, and enhance existing habitat through existing laws and/or via acquisition, memoranda of understanding or conservation agreements. Protection of some areas (through management plans) from future development will be necessary for both occupied and potential habitats.
2) To restore or create habitat of an early successional stage through burning or mechanical brush removal or possibly using selective, non-persistent herbicides with other treatments. Development of management plans will be necessary in both occupied and potential habitats. Restorative vegetation manipulation may be necessary.
3) To monitor habitat conditions.
4) To determine environmental requirements, population dynamics, and ecological-behavioral relationships.
5) To reestablish wild Morro Bay kangaroo rat populations with captive bred stock and translocated wild Morro Bay kangaroo rats.
6) Develop and implement public information and education programs with displays, press releases, and presentations.
7) Enforce laws and regulations for protecting the Morro Bay kangaroo rat. Controlling human access and ORV use may be necessary.

The primary reason for the species Endangered status today is the loss of habitat. The cause of habitat loss has been housing development throughout much of the original range of the kangaroo rat, particularly since about 1955. Homes, gardens, schools, shopping centers, and other structures, plus the associated roads, parking areas, and powerlines, have all replaced natural vegetation as the human population of the area grew from 1500 (in 1958) to over 12,000 (in 1984). In addition, fire suppression has resulted in maturation of the plant community and a reduction in food supply on still undeveloped land, instead of maintaining the early successional stages, which are optimal for the kangaroo rats. Feral and pet cats associated with the human population have more than replaced the natural predators of the rats. Hiking, horseback riding and off-road vehicle use have also contributed to habitat loss and burrow destruction (Condon, 197; Condon, 1975; Roest, 1973, 1977, 1984, 1985; Stewart, 1958; Stewart and Roest, 1960; Toyoshima, 1978, 1979; U.S. Fish and Wildlife Service, 1982).
Literature Cited


Roest, Aryan, I. 1985. Personal knowledge; recent observations. Biological Sciences Department; California Polytechnic State University; San Luis Obispo, CA 93407.


Southern sea otter  
*Enhydra lutris nereis*

Class: Mammalia  
Order: Carnivora  
Family: Mustelidae

**Legal Status**

- **Federal:** Threatened  
- **State:** Fully Protected Species

**Species Description**

Males weigh 22 to 45 kg and are 1.2 to 1.5 m in length. Females are slightly smaller, weighing 14 to 33 kg and measuring 1 to 1.4 m in length. The tail comprises less than a third of the body length. The pelage is brown or reddish brown. Sea otter fur is the densest of all mammals, with about 100,000 hairs per square centimeter. Since sea otters do not have any insulating fat, the fur is responsible for maintaining warmth. The hind legs are long and the paws are broad, flat, and webbed. The forelimbs are short and have retractable claws. Sea otters are the only carnivores with just 4 lower incisors. Females have two mammae.

**Habitat and Habitat Associations**

The southern sea otter is common along this stretch of coastline. Sea otters spend essentially their entire life in shallow ocean waters, particularly in the vicinity of kelp beds. The canopies of giant kelp and bull kelp provide important rafting and feeding areas (Miller, 1974). They occur near land in protected coves and shallow intertidal waters.

**Range**

Sea otters are found in near shore marine environments of California from Ano Nuevo, San Mateo County to Point Sal, Santa Barbara County. Maximum densities in California occur at the periphery of the range, where food is plentiful.

**Key Populations in LOHCP Plan Area**

The southern sea otter does not occur in the LOHCP Plan Area, although they exist nearby in Morro Bay. The CNDDB (2002) and existing literature have no record of known occurrence for the southern sea otter within the LOHCP Plan Area.

**Biology**

**Diet:** They feed almost exclusively on marine invertebrates. They are opportunistic foragers, and eat mostly abalones and sea urchins, crabs, and clams in California (Wild and Ames, 1974). Other food items in California include snails, mussels, scallops, chitons, barnacles, squids, octopuses, and starfishes (Miller, 1974). Most feeding in California observed to occur at 1.5 to 12.2 m (5-40 ft) depths (Miller, 1974). In captivity, consume 15-35% of body weight in food daily (Lensink, 1962).
**Daily Activity:** Active yearlong in circadian pattern. Active day or night, with peak feeding in early morning and late afternoon (Fisher, 1939).

**Migration and Dispersal:** No information was found in the literature.

**Survival:** No information was found in the literature.

**Socio-Spatial Behavior:** Sea otters are solitary for the most part. Males congregate in groups when resting. Females tend to stay away from males except when mating (Fisher, 1939; Limbaugh, 1961; Estes, 1980; Estes et al., 1986; Cohn, 1998; Nowak, 1999).

**Reproduction:** No births have been witnessed, but observations suggest births occur on intertidal reefs, and in water (Sandegren et al., 1973; Jameson, 1983). In California, pups are born year-round, with a peak December through March (Wild and Ames, 1974). Gestation period estimated to be 4-6 mo., including delayed implantation of undetermined length (Loughlin et al., 1981). A single pup born, which is dependent upon the female for 6-7 months (Wendell et al., 1984). About 40% of females are mature sexually at 5 yr, and all are after 6 yr (Kenyon, 1969; Estes, 1980).

**Threats**
The primary threats to this species are offshore oil spills and competition from humans for abalone.

**Special Biological Considerations**
Optimal habitats include rocky substrates with ample interstices, where invertebrates can live out of reach of the sea otters. These areas provide a continuing source of food, as individuals move out and become available. Kelp beds also provide cover from high surf and predators.

**Conservation**
Unknown.
**Literature Cited**


American Badger  
*Taxidea taxus*
Class: Mammalia  
Order: Carnivora  
Family: Mustelidae

**Legal Status**

**Federal:** None  
**State:** Species of Special Concern

**Species Description**

Badgers measure 520-875mm from head to tail, with the tail making up only 100-155 mm of this length. The body is flattened, and the legs are short and stocky. They have fur on the back and flanks of the animal ranges from grayish to reddish. The ventrum is a buffy color. The face of the badger is distinct. The throat and chin are whitish, and the face has black patches. A white dorsal stripe extends back over the head from the nose. In northern populations, this stripe ends near the shoulders.

**Habitat and Habitat Associations**

Badgers can occur in a wide variety of arid open habitats but are most commonly associated with grasslands, savannas, mountain meadows, and openings in desert scrub. The principal requirements seem to be sufficient food (burrowing rodents), friable soils, and relatively open, uncultivated ground (Williams, 1986). They seem to occur primarily in areas of low to moderate slope.

**Range**

The American badger ranges throughout the western United States, north into the western provinces of Canada, and east to Ohio, Michigan and Ontario, Canada (Long, 1972). It occurs from below sea level in Death Valley to the Arctic-Alpine Life Zone at about 3,600 meters.

**Key Populations in LOHCP Plan Area**

There is a low potential that the American badger is in the LOHCP Plan Area. There is no suitable foraging habitat within the LOHCP Plan Area. The CNDDDB (2002) and existing literature have no record of known occurrence for the American badger within the LOHCP Plan Area.

**Biology**

**Diet:** The American badger is a carnivore that feeds on ground squirrels (*Spermophilus* ssp.), cottontail rabbits (*Sylvilagus* ssp.), jackrabbits (*Lepus* ssp.), small rodents (*Peromyscus, Microtus, Mus, Reithrodontomys, Dipodomys*), pocket gophers (*Thomomys* ssp.), snakes, birds and insects (Errington, 1937; Messick and Horner, 1981; Snead and Hendrickson, 1942). Badgers are fossorial animals (burrowing) and typically capture prey by digging them out of their burrows. They are well adapted to do so with their stout bodies, powerful
forelimbs, and long-curved claws (Messick and Hornocker, 1981). The proportion of different prey taken varies in relation to their availability (Messick and Hornocker, 1981; Snead and Hendrickson, 1942), suggesting that badgers are opportunistic predators rather than food specialists and can respond to fluctuations in prey availability.

**Daily Activity:** Adult badgers primarily are nocturnal but juveniles appear to active during the day, especially during dispersal in June-August (Messick and Hornocker 1981). Daily activity varies by season. Badgers often remain in their diurnal dens for days or weeks during the winter in southwestern Idaho (Messick and Hornocker 1981), while in the summer in Minnesota badgers moved dens almost daily (Sargeant and Warner 1972). Minta (1993) found that male badgers in Wyoming double their daily activity during the summer breeding season.

**Migration and Dispersal:** Juveniles emerged from natal dens in early May and family breakup occurred in late May and early June, with dispersal occurring at 3-4 months of age (June-July). Juveniles tend to be more active during the day than adults and generally are less wary (Messick and Hornocker 1981).

**Survival:** In southwestern Idaho, mortality primarily occurred from anthropogenic causes such as road kills, farm machinery, shooting, trapping for fur, and poison (intended for coyotes) (Messick and Hornocker, 1981). They found that mortality peaked in June and August in relation to badger breeding and dispersal activities. The proportion of mortality from “natural causes” such as predation, starvation, disease, or conflict with other badgers is unclear. Natural predators include eagles and coyotes (Messick and Hornocker, 1981; Rathbun et al., 1980). The oldest badger in this study was 14 years of age.

**Socio-Spatial Behavior:** Badgers are territorial throughout most of the year. Most territories are about 3 or 4 square miles (4.8 to 6.4 square km). The size of the territory might vary somewhat due to the availability of rodents, a preferred food. It seems as if territories are not defended against other badgers, or territories overlap regularly in good habitats. Habitats with sandy or porous soils are preferred. Badgers frequent wooded areas when soils are suitable for digging. Other than the dispersal of juveniles, badgers do not seem to emigrate. Typically walking from place to place, they can trot or bound along at a gallop when they chose to. They are mostly nocturnal creatures, but have been known to be active during daylight in quiet areas (Lindzey, 1978; Long, 1973; Messick and Hornocker, 1981; Minta, 1993; Sargeant and Warner, 1972).

Badgers have excellent senses of hearing and smell. Both serve in locating food species, which are usually rodents in underground dens. Badgers have been known to plug the exit holes of prey species before the badger tunnels underground to capture the prey. The long claws serve to loosen the soil and pass it backwards where the hind feet kick the soil out behind the digging animal. This dirt is often kicked backwards 6 to 8 feet (1.8 to 2.4 meters) in an almost continuous arc by a badger digging in earnest. Badgers close their eyes as they
dig underground. They rely upon smell and hearing to continue digging towards the prey (Messick and Hornocker, 1981; Minta, 1993).

Even though Badgers have relatively small territory zones, a number of dens are used regularly over different parts of the territory. These underground dens are quite often elaborate. Most tunnels are 6 to 8 feet (1.8 to 2.4 meters) deep and 20 to 30 feet (6.1 to 9.1 meters) long to the main chamber which is elevated to discourage flooding. A smaller chamber also dug underground to serve as a toilet area, and many dens have several entrance holes. Dens that have been used for generations by badgers may have as many as 30 to 40 exits, and tunnels as deep as 15 feet (4.6 meters). Bedding grass and leaves are sometimes removed from the den chamber for airing out by a den entrance, after which it is taken back down into the chamber for reuse (Messick and Hornocker, 1981; Minta, 1993).

Reproduction: Male American badgers become sexually mature as yearlings, but 30 percent of females have been found to breed in their first year, when only 4-5 months old. Badgers mate in August or September. Embryos of the badger experience an arrest in development that greatly prolongs gestation. The embryo develops for a few days, then lie dormant in the uterus, being implanted in January. Of the total gestation period of 250 days, growth occurs during only 50. Birth is usually in April, or perhaps as late as June at higher altitudes. Usually 2 to 7 young are born. Although the female has 8 teats, litter sizes tend to be small, and a litter size of 3 is common. Females care for the litter by themselves. The young badgers move out in late summer to begin solitary lifestyles.

The breeding system of badgers appears to be polygynous, with high male reproductive variability (i.e., not all males reproduce) and direct male-male competition for females (Messick and Hornocker, 1981; Minta, 1993). Male home ranges overlap with several female ranges, especially during the breeding season (Lindzey, 1978; Minta, 1993), which is consistent with a polygynous mating system. Also, males do not participate in the care of the young and are larger than females (sexual dimorphism); both characteristics of a polygynous mating system. Minta (1993) found that male mobility, home range size, and possibly aggression increased with age, indicating age-related breeding tactics.

Threats
Badgers have no natural predators. They are an important part of the food chain, since they keep the populations of ground squirrels and other small animals in check. However, agriculture, trapping (for fur), shooting, and use of poison have contributed to their decline. Ranchers hate them because they dig up and enlarge small burrows in an effort to capture its occupants, making a hazard for livestock.

The loss of large expanses of grassland habitats and other anthropogenic influences may be causing this species to decline in density and distribution. Although badgers do not have many natural enemies or predators, mortality from vehicles, eradication and accidental poisoning are serious risks for the species. As habitat becomes more fragmented, it will become increasingly difficult for badgers to disperse to suitable habitat.
Special Biological Considerations
Badgers require large grassland and sparse sage scrub habitat to thrive. Given that these animals utilize large home ranges, occur at low population densities, and probably disperse long distances, suitable habitat linkages between large habitat blocks will be required. The size and nature of an adequate habitat linkage for this species is not known.

Conservation
Unknown.
**Literature Cited**


Black Legless Lizard
Anniella pulchra nigra
Class: Reptilia
Order: Squamata
Family: Anniellidae

Legal Status
Federal: None
State: Species of Special Concern

Species Description
The Black Legless Lizard is a small (95-170 mm), slender limbless lizard with a shovel-shaped snout; a counter-sunk lower jaw; smooth, polished scales; and a blunt tail (Stebbins, 1985). Dorsal coloration is highly variable, ranging from metallic silver, to beige, to dark brown, to jet black, with a dark vertebral line and several lateral stripes (Hunt, 1983) that decrease in number as individuals mature. Ventral coloration varies from pale yellow-white to bright yellow (Klauber, 1932). The iris is black (Klauber, 1940).

Habitat and Habitat Associations
Black legless lizards are most abundant in areas with sandy or loose loamy soils under the sparse vegetation of beaches, chaparral, or pine-oak woodland; or sycamores, cottonwoods, or oaks that grow on stream terraces (Gorman, 1957; Cunningham, 1959; Banta and Morafka, 1968; Stebbins, 1985). The sandy loam soils of stabilized dunes on which bush lupine (*Lupinus arboreus*), mock heather (*Eriogonum parvifolium*), mock aster (*Ericameria ericoides*), and other native coastal shrubs occur seems especially favorable habitat (Grinnell and Camp, 1917; Miller, 1944; Smith, 1946; Bury, 1985). Legless lizards also occur in desert scrub at the western edge of the Mojave Desert (Klauber, 1932). Although legless lizards have also been found along the edges of ice plant mats within dune ecosystems, the ice plant mat community is not considered suitable habitat for legless lizards (Papenfuss and Harris, 1990). The dense root structures of ice plant and lack of leaf litter and duff produced by the species appear to provide poor burrowing conditions for the legless lizards.

They are often found under, or in the close vicinity of, surface objects such as logs, rocks, old boards (Miller, 1944; Gorman, 1957; Banta and Morafka, 1968) and the compacted debris of woodrat (*Neotoma spp.*) nests. Rocky soils or areas disturbed by agriculture or other human uses apparently lack legless lizards (Miller, 1944; Bury, 1972; Hunt, 1983; Stebbins, 1985). Black legless lizards require specific microhabitat conditions within suitable habitat areas. Because legless lizards typically spend most of the year underground they require loose sandy soils or thick duff or leaf litter that they can burrow through easily. Soil moisture is essential for legless lizards. Preference for substrates with higher moisture content has been identified in the laboratory and legless lizards die if they are unable to reach a moist substrate (Burt, 1931; Miller, 1944; Bury and Balgooyen, 1976). Soil moisture is crucial for conserving energy at high temperatures (Fusari, 1984) and also allows shedding to occur (Miller, 1944). Legless lizards are
though to be soil moisture limited at the edges of portions of their geographic range (Miller, 1944; Bury and Balgooyen, 1976). Other necessary microhabitat conditions include areas of shade and sun for thermoregulation, and abundant prey species, such as insects, spiders, or other invertebrates (Miller, 1994). Legless lizards are seldom found in areas of bare soil or open sand.

Range
Black legless lizard is a near-endemic to California, ranging from the vicinity of Antioch (Contra Costa County), California south through the Coast, Transverse, and Peninsular ranges; parts of the San Joaquin Valley; and the western edge of the Sierra Nevada Mountains and Mojave Desert to El Consuelo (Baja California Norte), Mexico (Hunt, 1983). This lizard is also known from the East and South Los Coronados and Todos Santos Islands off the coast of Baja California (Stebbins, 1985). The known elevational range extends from near sea level on the Monterey Peninsula (Bury, 1985) to 1800 m in the Sierra Nevada foothills (Hunt, 1983).

Key Populations in LOHCP Plan Area
There is a moderate potential that the black legless lizard is in the LOHCP Plan Area because there is suitable habitat present. The CNDDB (2002) and existing literature have no record of known occurrence for the black legless lizard within the LOHCP Plan Area. The CNDDB has two records of known occurrence near the LOHCP Plan Area.

Biology
Diet: This Black legless lizard usually forages at the base of shrubs or other vegetation either on the surface or just below it in leaf litter or sandy soil. Legless lizards eat insect larvae, small adult insects, and spiders (Stebbins, 1954). Adult and juvenile lizards are insectivorous and subsist largely on larval insects (especially microlepidopterans and beetles), adult beetles, termites, and spiders; prey is typically ambush from a concealed location beneath the leaf litter or substrate (Coe and Kunkel, 1906; Miller, 1944).

Daily Activity: Survival: Black legless lizards have a relatively low thermal preference (Bury and Balgooyen, 1976), which allows them to be active on cool days as well as early in the morning and even at night during warmer periods, at which time mid-day activity is reduced. Individuals from coastal and southern localities are probably active all year with only brief periods of winter inactivity. Lizards from more inland sites, especially in the Sierra foothills, undergo winter hibernation.

Migration and Dispersal: No information was found in the literature.

Socio-Spatial Behavior: No information was found in the literature.

Reproduction: Black legless lizards are a live-bearing species that probably breeds in the interval between early spring and July (Goldberg and Miller, 1985). Oviductal eggs are observed in females from July through October (Goldberg and Miller, 1985) and litters of 1 to 4 (normally 2) young are born in the interval from September to November (Miller, 1944), probably after a gestation period of about 4 months (Goldberg and Miller, 1985). Young
lizards grow rapidly before reaching sexual maturity in 2 to 3 years, respectively (Miller, 1944; Goldberg and Miller, 1985). Once they reach sexual maturity, females may not reproduce every year (Goldberg and Miller, 1985), but insufficient data exist to identify biennial reproduction as the typical pattern for this species.

**Threats**

Urbanization, agricultural, or other areas where a loose substrate in which to burrow has been removed or radically altered has diminished the Black legless lizards range. A suite of other factors, including livestock grazing, off-road vehicle activities, sand mining, beach erosion, excessive recreational use of coastal dunes, and the introduction of exotic plant species (e.g., ice plants (*Carpobrotus* spp.), Marram grass (*Ammophila arenaria*), veldt grass (*Ehrharta calycina*) and eucalyptus trees (*Eucalyptus* spp.); (Bury, 1972, 1985; Vivrette and Muller, 1977) are likely to alter the substrate so that it can no longer survive there. These factors decrease soil moisture or alter the conformation of the substrate, each of which may act singly or in concert to limit the food base or make the substrate physically unsuitable for it to survive in. Exotic plants may be especially insidious because they support only a limited arthropod food base (Nagano et al., 1981) for it, likely because they replace the native vegetation (Vivrette and Muller, 1977; Powell, 1978), which supports more significant arthropod populations. Some exotics, like *C. edulis*, also build up the salt concentration in the soil (Kloot, 1983) that may create habitat unsuitable for legless lizards (Bury, 1985) either because it has difficulty osmoregulating in such a substrate, or indirectly, by limiting the arthropod food base. Black legless lizards may also be susceptible to pesticide poisoning because of their insectivorous diet (Honegger, 1975).

**Special Biological Considerations**

Unknown.

**Conservation**

Efforts should be made to enhance coastal beach habitat for legless lizards only after more precise ecological data become available on this species. Habitat restoration projects will have to be conducted to minimize impacts to existing legless lizard populations and other taxa that coexist with them. The effects of removing exotic vegetation and restoring native plant communities in coastal dune habitats harboring legless lizards are in need of controlled experimental studies.
Literature Cited


**Southwestern pond turtle**  
*Clemmys marmorata pallida*

Class: Reptilia  
Order: Testudines  
Family: Emydidae

**Legal Status**  
**Federal:** Species of Concern  
**State:** Species of Special Concern

**Species Description**  
Southwestern pond turtles are moderate-sized (120-210 mm CL), drab brown or khaki-colored turtle lacking prominent markings on its carapace (Holland, 1991). At close range, the carapace can frequently be observed to have a fine, vermiform reticulum of light and dark markings. Males frequently develop a light unmottled throat and lower facial area as they become sexually mature, markings that become even more prominent (contrasting) with increasing age; females typically retain the mottled or darker-colored throat and facial area juveniles possess into adulthood. The belly or plastron is variously marked with varying degrees of dark and light markings; turtles sometimes have an entirely dark or an entirely light plastron. The iris is straw-colored with a brown eye stripe extending through the eye (Holland, 1991).

**Habitat and Habitat Associations**  
The Southwestern pond turtle inhabits slow moving permanent or intermittent streams, small ponds, small lakes, reservoirs, abandoned gravel pits, permanent and ephemeral shallow wetlands, stock ponds, and sewage treatment lagoons (Rathbun et al., 1992; Holland, 1994). Pools are the preferred habitat within streams (Bury, 1972). Abundant logs, rocks, submerged vegetation; mud, undercut banks, and ledges are necessary habitat components for cover as well as a water depth greater than 2 meters (Brattstrom and Messer, 1988; Holland, 1994). Additionally, emergent basking sites, emergent vegetation and the availability of suitable terrestrial shelter and nesting sites seem to characterize optimal habitat. Pond turtles inhabit a wide variety of low-elevation aquatic habitats generally below 4,000 feet elevation and are primarily in rivers and streams that have persistent deep pools (Holland 1991). The pond turtle is a highly aquatic turtle that moves onto land to reproduce and overwinter (Jennings and Hayes 1994). Along the central and southern coast of California, pond turtles may remain active year-round (Holland 1991).

The Southwestern pond turtles require some slack- or slow-water aquatic habitat. Western pond turtles are uncommon in high gradient streams probably because water temperatures, current velocity, food resources, or any combination thereof may limit their local distribution (Holland, 1991). Habitat quality seems to vary with the availability of aerial and aquatic basking sites (Holland, 1991); western pond turtles often reach higher densities where many aerial and aquatic basking sites are available. Hatchlings (i.e. individuals through their first year of activity) require shallow water habitat with relatively dense submergent or short emergent vegetation in which to
forage. Such situations probably increase the probability that the nekton hatchlings require will be abundant. Western pond turtles also require an upland oviposition site in the vicinity of the aquatic site (Holland, 1991). Suitable oviposition sites must have the proper thermal and hydric environment for incubation of the eggs. The porcelain-thin shelled eggs of *C. marmorata* are suited to development in a dry nest; an excessively moist nest has a high probability of failing (Feldman, 1982; Holland, 1991).

Nests are typically dug in a substrate with a high clay or silt fraction since the female moistens the site where she will excavate the nest prior to nesting (Holland, 1991). Nests also are typically located on a slope that is unshaded (Rathbun et al., 1993) that may be at least in part south-facing, probably to ensure that substrate temperatures will be high enough to incubate the eggs. How close the aquatic site is to the nesting site probably depends largely on the availability of suitable nesting sites adjacent to aquatic sites where western pond turtles are known to occur because the array of features that make a nesting site suitable may significantly limit the availability of such sites. The nesting site can be up to 402 m from the aquatic site (Storer, 1930), but the majority of nests located to date are within 200 m. However, at localities with less of a gradient, soil moisture gradients and soil type may cause nesting sites to be located at a significantly greater distance than where the majority is located. Slope of the nest sites range up to 60°, but most nests are on slopes < 25°.

**Range**

The historical range of the southwestern pond turtle extended along most of the west coast of North America, primarily west of the Cascade-Sierra crest, from western British Colombia to northern Baja California (Ernst et al., 1994). Currently, it ranges south of San Francisco Bay to northern Baja California, Mexico, and integrates with northwestern pond turtle (*C.m. marmorata*) over a large area in central California (Bury, 1970; Stebbins, 1985). Isolated populations are known to exist as far into the Mojave Desert as Afton Canyon, and in the Amargosa River, County of Los Angeles (Lovitch, 1999). The elevational range for the species is from brackish estuarine waters at sea level to over 2,000 meters, but it’s uncommon over 1,529 meters (Stebbins, 1954; Bury, 1963; Holland, 1994).

**Key Populations in LOHCP Plan Area**

There is a moderate probability that the southwestern pond turtle is in the LOHCP Plan Area. There is suitable habitat present in the LOHCP Plan Area. The CNDDB (2002) and existing literature have no record of known occurrence for the southwestern pond turtle within the LOHCP Plan Area.

**Biology**

**Diet:** The Southwestern pond turtles are omnivorous feeder with a broad feeding niche, but do not select food items on general availability (Bury, 1986). It scavenges, but also takes live prey, acting as an opportunistic predator. Adults ingest plants as part of their diet, which provides nutrients when live prey are unobtainable, but tend to prefer live or dead animal food instead of plant material. Many small animals such as fish, crustaceans, worms and insects abound in the filamentous algae eaten by the pond turtle. Among the many types of
food items eaten by the pond turtle are aquatic plants such as the pond lily (*Nuphar polysepalum*), water beetles, mallard duck carrion, adult larval insects, coyote scat, and snails (Pope, 1939; Evenden, 1948; Carr, 1952; Holland, 1988; Bury, 1986; Goodman and Stewart, 1998).

**Daily Activity:** The Southwestern pond turtle’s daily activity revolves around foraging patterns and thermoregulation. It often suns itself at the edge of water, or on branches or stones above water. It is secretive and will seek refuge at the bottom of a pond or stream at the slightest disturbance. In the early morning and evening, pond turtles may move up or down stream, moving from one pool to the next in search of basking sites, mates or foraging. They usually terminate basking at around 90-95 degrees Fahrenheit, maintaining a body temperature of 75-90 degrees Fahrenheit for most activities (Bury, 1972). Foraging may occur during the late afternoon or early evening during the warmth of summer. Often they will remain quietly on the bottom of pools to avoid a critical thermal maximum of 104 degrees Fahrenheit.

Geographical variation occurs in the seasonal activity of the pond turtle, although in warmer portions of its range, it may be active in every month (Holland, 1994). The primary activity period is February-November for the northern portion of its range (Evenden, 1948; Bury, 1972).

**Migration and Dispersal:** No information was found in the literature.

**Survival:** Lovitch (1999) reports annual survivorship of 10-15% for 1-3 year age classes. Average annual adult mortality is 3-5% (Holland, 1994).

**Socio-Spatial Behavior:** Bury (1972) found that distribution of turtles is not uniform, with aggregations occurring in pools. This results in spatial competition for limited resources, such as basking sites, at any given pool. Western pond turtles show aggressive behaviors when competing for adequate spacing at basking sites (Bury and Wolfheim, 1973). Biting, ramming and pushing behaviors were observed between pond turtles to secure preferred basking sites.

Bury (1972) studied a population in a northern California stream and found that adult males had the largest range, averaging 2.42 acres with a mean length of 976 m. Adult female home ranges averaged 0.62 acre with a mean length of 248 m. Juveniles had the smallest home ranges, averaging 0.89 acre and 363 m. Data for in-stream movement displayed similar trends. A larger percentage of males and juveniles, 54% and 33% respectively, moved upstream rather than downstream (34% and 27% respectively). The observed number of females moving up and down stream was nearly the same at 39% (downstream) and 33% (upstream). While moving between pools within the stream system, average distances were 354 m for males, 169 m for females, and 142 meters for juveniles. Greater than 81% of males moved over 200 m, while only 37% of females and 23% of juveniles traveled that distance. When looking at percentages of the population that moved greater than 500 m, Bury (1972)
found that only 6% of juveniles and females, and 27% of males traveled that distance. In three years, males averaged 817 meters but they are capable of distances of at least 1 mile (Bury 1972), and up to 3.1 miles over land (Holland, 1994) to adjacent water bodies.

**Reproduction:** Courtship and mating behaviors of the western pond turtle have been observed from February through November (Holland, 1988; Buskirk, 1991; Goodman, 1997). Goodman (1997) found that females begin laying eggs at a carapace length greater than 11cm, and Holland (1994) suggests an age of approximately 6-7 years. Depending on latitude, the peak nesting season is from late May through early July, but extends from late April through August (Holland, 1994).

If suitable nesting sites are not available, females have been observed to travel up to 1.2 miles along a waterway to lay their eggs (Rathbun et al., 1992). Nests are typically located along stream or pond margins; however, they may be located over 100m from water on hillsides. Terrestrial nest locations inspected by Rathbun et al. (1992) were all found in open, grassy areas with a southern exposure. Holland (1994) reports that nesting forays onto land may require several days, however, Rathbun et al. (1992) reported an overnight trip. The female left the water in the evening (between 1700-2000) and returned in the morning (between 0815-0900). Nest cavities were pear-shaped and measured 2.6-3.1 inches (6.5-8.0 cm) deep with a 2.6-2.8 inch (6.5-7.0 cm) wide egg chamber and a 1.4-1.6 inch (3.5-4.0 cm) mouth (Rathbun et al., 1992). Usually nest excavation occurs in the morning or evening (Storer, 1930). Average clutch size (6.12; range 1-13) and possibly mean egg width is significantly correlated with body size (Holland, 1994; Goodman, 1997).

Incubation period varies with latitude, but is typically 80-126 days (Goodman, 1997; Holland, 1994). Hatchlings did not leave the egg if the temperature exceeded 81o F, but they emerged within 2-3 hours after moving the egg to a cooler environment (Feldman, 1982). Environmental sex determination occurs in pond turtles. At low incubation temperatures, males are produced and females at high temperatures. Ewert et al. (1994) found the pivotal temperature to be approximately 86o F.

**Threats**
Loss and alteration of aquatic habitat is the greatest threat to the western pond turtle. Over 90% of wetland habitat within its historic California range has been eliminated by agricultural development, flood control, water diversion projects, and urbanization (U.S. Fish and Wildlife, 1992, 1993). Additionally, predation on young by introduced aquatic species (e.g., bullfrogs, bass, and catfish) collection for pets, urban-related predation pressures (e.g., dogs raccoons, skunks), competition with non-native turtles (Holland, 1991), contaminant spills, grazing, off-road vehicle use and vehicle strikes on roads (Holland, 1994) have all contributed to sharp decline this species has experienced in recent decades. Dams and channelization have greatly reduced the availability of suitable habitat (Brattstrom and Messer, 1988). Reese and Welsh (1988) determined that the quality of western pond turtle habitat has been reduced by alteration of channel morphology and flow rates associated with dam construction. Invasion of exotic vegetation species such as tamarisk (Tamarix sp.) is another threat to the pond turtle.
Establishment of tamarisk results in changes to hydrology and channel morphology that degrades pond turtle habitat.

**Special Biological Considerations**

Unknown.

**Conservation**

Conservation management of aquatic turtles should include not only protection of aquatic habitat, but also preservation and restoration of dispersal corridors and adjacent terrestrial habitat (potentially 500 m or more from the wetland boundary) for nesting, hibernation, and estivation (Holland, 1994; Burke and Gibbons, 1995). These corridors should also be protected from impacts associated with exotic plant and animal species, new road construction, cattle and off-road vehicle use. Reintroductions and the establishment of satellite populations would also contribute to the protection of the pond turtle.
**Literature Cited**


Lovitch, J.E. 1999. Western Pond Turtle Clemmys marmorata. Department of Biology, University of California, Riverside.


Two-striped garter snake
Thamnophis hammondii
Class: Reptilia
Order: Squamata
Family: Colubridae

Legal Status
Federal: Species of Concern
State: Species of Special Concern

Species Description
A medium-sized (60-101 cm TL), garter snake with a variable dorsal coloration of olive, brown, or brownish gray, and a single yellow-orange lateral stripe on each side of the body (Fitch, 1940; Fox, 1951; Larson, 1984). These lateral stripes may be lacking on melanistic individuals, which are common in the northern third of the range of this species (Bellemín and Stewart, 1977; Larson, 1984). A nuchal spot may be present on the back of the neck when the middorsal stripe is absent (Stebbins, 1985). The iris is a light tan color.

Habitat and Habitat Associations
This species is considered one of the most aquatic of garter snakes and is typically associated with wetland habitats such as streams, creeks and pools (Fitch, 1940; Rossman et al., 1996). It is closely associated with streams with rocky beds and bordered by willows (Stebbins, 1985); also ponds, lakes, wetlands and vernal pools. It also occurs in mixed oak, oak woodlands and chaparral on coastal slopes of mountains and foothills to sea level. Two-striped garter snakes inhabit perennial and intermittent streams from sea level to over 7,000 feet (Jennings and Hayes, 1994). They also occupy stock ponds and other artificially created aquatic habitats.

This taxon also utilizes stock ponds and other artificially created aquatic habitats if dense riparian borders of emergent vegetation and amphibian and fish prey are present. Limited data indicate that small mammal burrows are used as overwintering sites (Rathbun et al., 1993).

Range
It occurs from Monterey County southward (including Santa Barbara, Ventura, Los Angeles, San Bernardino, Riverside and San Diego counties) along the coast and drainages within the coast and peninsular ranges to Mission San Fernando Velicata in northwestern Baja California, Mexico (Stebbins, 1985; McGuire, 1989). It also occurs in isolated populations in northern Baja California Sur as well as Catalina Island, off the California coast (Rossman, Ford and Seigel, 1996). The most northern locality reported by Van Denburgh and Slevin (1918) of a typical specimen is Oceano, San Luis Obispo County. Elevational range for the species is at least from sea level to 8,000 feet (Van Denburgh and Slevin, 1918; Stebbins, 1985).
Key Populations in LOHCP Plan Area
There is a low probability that the two-striped garter snake is in the LOHCP Plan Area. The LOHCP Plan Area is out of its known range. The CNDDB (2002) and existing literature have no record of known occurrence for the two-striped garter snake within the LOHCP Plan Area.

Biology
Diet: Presumably, two-striped garter snake forages underwater, but no data on foraging behavior are available (Rossman et al., 1996). Adults eat tadpoles, frogs, toads, small anurans and fish, fish eggs, and earthworms (Fitch, 1940; Stebbins, 1985; Van Denburgh and Slevin, 1918).

Daily Activity: Annual activity range is between January and November. During hot weather, two-striped garter snake may be crepuscular or nocturnal (Klauber, 1924).

Migration and Dispersal: No information was found in the literature.

Survival: No information was found in the literature.

Socio-Spatial Behavior: No information was found in the literature.

Reproduction: Courtship begins in Late March and early April (Cunningham, 1955). Clutch size ranges from 3 to 36, with an average of 15.6 in seven litters (Rossman et al., 1996). Stebbins (1985) noted that a captive animal gave birth to 25 young. Neonates are born in late July and August. Stewart (1972) reported that a female isolated from males for 53 months produced a living neonate, which suggests a type of sperm storage mechanism as can be found in some other species of snakes.

Threats
Much of this decline is attributed to habitat destruction from urbanization, large reservoirs, and the cement lining of stream channels in southern California for flood control.

Special Biological Considerations
Unknown.

Conservation
Unknown.
Literature Cited


PLANT SPECIES ACCOUNTS

Hoover's bentgrass
Agrostis hooveri
Class: Liliopsida
Order: Cyperales
Family: Poaceae – Grass family

Legal Status
- Federal: None
- State: None
- CNPS Ranking: 1B, 2-2-3

Species Description
Hoover’s bentgrass is a perennial herb that is approximately 30–80 cm (Jepson, 2003).

Habitat and Habitat Associations
Found on sandy soils, in open chaparral and oak woodland at elevations up to 600 m (Jepson, 2003).

Range
Hoover's bentgrass is native and endemic to California. It occurs in San Luis Obispo and Santa Barbara Counties (CNPS, 2001).

Key Populations in LOHCP Plan Area
There is a moderate potential that Hoover’s bentgrass is in the LOHCP Plan Area. There is suitable habitat within the LOHCP Plan Area (Fugro, 1997). The CNDDDB (2002) and existing literature has no record of known occurrence for the Hoover’s bentgrass within the Plan Area.

Calflora has 7 specimens, 2 documented occurrences and 1 in existing literature in San Luis Obispo County.

Biology
- Flowing Period: Blooms April through July (CNPS, 2001).
- Dispersal: No information was found in the literature.

Threats
Threats include development (CNPS, 2001).

Special Biological Considerations
Unknown.

Conservation
Unknown.
Hoover's Bentgrass Distribution in California based on 20 Observations contributed to the CalFlora Occurrence Library

Blue indicates that there is a specimen from this county in a participating herbarium. Specimens have the highest reliability of identification.

Light Blue indicates a documented observation that is vouchered or confirmed by an expert.

Lavender indicates other reported observations that are unvoucheded.

Mustard Yellow indicates the county falls within the described species range published in botanical literature.

Santa Barbara [10]
San Luis Obispo [10]
**Literature Cited**


**Arroyo de la cruz manzanita**

*Arctostaphylos cruzensis*

Class: Dicotyledoneae  
Order: Ericales  
Family: Ericaceae - Heath family

**Legal Status**

- **Federal:** Species of Concern  
- **State:** None  
- **CNPS Ranking:** 1B, 2-2-3

**Source:** David Graber, CNPS

**Species Description**

La Cruz Manzanita is a small shrub that grows to 2-3’ tall and 4-5’ in width. It has auriculate leaves that are gray on smooth dark red stems (Jepson, 2003).

**Habitat and Habitat Associations**

La Cruz Manzanita is found in broadleafed upland forest, coastal bluff scrub, closed-cone coniferous forest, chaparral, coastal scrub, and valley and foothill grassland. The coastal sage scrub/coastal chaparral plant communities in which it lives also have *Ceanothus hearstiorum*, *Ceanothus thyrsiflorus*, *Adenostoma fasciculatum*, *Iris douglasii*, *Lonicera involucrata*, *Baccharis pilularis*, *Salvia mellifera*, *Toxicodendron diversilobum*, *Diplacus aurantiacus*, and *Lupinus arboreus*. The soil varies from near adobe through red clay overlaying hardpan to a gray, sand-rock composite. This species receives summer fog and rainfall of about 20-30 inches per year (CNPS, 2001).

**Range**

It grows on old ocean beaches and bluffs from San Luis Obispo County to Monterey County. It is found at elevations up to 150 m (CNPS, 2001).

**Key Populations in LOHCP Plan Area**

There is a moderate potential that La Cruz manzanita is in the LOHCP Plan Area. The CNDDDB (2002) has one historical record of known occurrence for La Cruz manzanita within the LOHCP Plan Area, which is 1.5 miles southeast of the mouth of Los Osos Creek, east of Morro Bay.

Calflora has 17 specimens, 14 observations, and 1 in existing literature within San Luis Obispo County. The CNDDDB list other records of known occurrence in Montana de Oro State Park and throughout the community of Morro Bay.

**Biology**

- **Flowing Period:** Blooms December through March (CNPS, 2001).

- **Dispersal:** No information was found in the literature.
Threats
Unknown.

Special Biological Considerations
Unknown.

Conservation
Unknown.

Arroyo de la La Cruz Manzanita Distribution in California based on 38 Observations contributed to the CalFlora Occurrence Library

Blue indicates that there is a specimen from this county in a participating herbarium. Specimens have the highest reliability of identification.

Light Blue indicates a documented observation that is vouchered or confirmed by an expert.

Lavender indicates other reported observations that are unvoucheded

Mustard Yellow indicates the county falls within the described species range published in botanical literature

Monterey [5]
San Luis Obispo [32]
Literature Cited


Morro manzanita

*Arctostaphylos morroensis*

Class: Dicotyledoneae
Order: Ericales
Family: Ericaceae - Heath family

**Legal Status**

- **Federal:** Threatened
- **State:** None
- **CNPS Ranking:** 1B, 2-3-3

**Species Description**

Morro manzanita reaches a height of 1.5 to 4.0 meters (5 to 13 feet) and has crowded oblong to ovate grey-green to olive-green leaves, 2.5 to 4.0 centimeters (1 to 1.5 inches) long, with petioles 2 to 6 millimeters (0.08 to 0.20 inch) long. The white to pinkish flowers are 5 to 8 millimeters (0.2 to 0.3 inch) long, and form orange-brown fruits 8 to 13 millimeters (0.3 to 0.5 inch) in diameter with 8 to 10 stones per fruit (Wells, 1993; Tyler and Odion, 1996) that are fused but separable.

Morro manzanita is distinguished from other manzanitas by the bark of the trunk is a shaggy grey to brown; the leaf blades range from wedge-shaped (cuneate) to rounded or nearly straight (truncate) at the base, with the lower surface paler and usually somewhat tomentose (short woolly hairs).

**Habitat and Habitat Associations**

The distribution of Morro manzanita is correlated with Baywood fine sands. Morro manzanita is found in association with coastal scrub, maritime chaparral, and coast live oak woodland communities in sites with no or low to moderate slopes. On steeper slopes, particularly on the north-facing slopes of the Irish Hills, Morro manzanita occurs in almost pure stands. Where Morro manzanita occurs in dense stands, few understory species are present (Tyler and Odion, 1996). Morro manzanita is not known to inhibit the growth or seed germination of other plants (i.e., to be allelopathic), but allelopathy is known in at least one other species of manzanita (Chou and Muller, 1972). Older individuals of Morro manzanita may have canopies 10 meters (33 feet) in diameter.

**Range**

The historic distribution of Morro manzanita was estimated to cover between 2,000 and 2,700 acres (McGuire and Morey, 1992), based on the distribution of Baywood fine sands soil in the Los Osos area. The flat areas covered by Baywood fine sands have largely been developed, primarily in the communities of Los Osos, Baywood Park, and Cuesta-by-the-Sea on the south and east sides of Morro Bay. Some development has also occurred on the steeper north-facing slopes of the Irish Hills. The current range of Morro manzanita is approximately 840 to 890 acres (LSA Associates Inc., 1992); half of the range consists of small or low-density patches of manzanita plants that remain in and around developed areas of Los Osos and Baywood Park, and...
half consists of more continuous and more dense (at least 50 percent cover by this species) stands of manzanita. An analysis of mapped distributions by cover classes suggests that the area actually covered by Morro manzanita shrubs may currently be less than 162 hectares (400 acres) (Tyler and Odion, 1996). Population estimates from 1992 range from 86,000 to 153,000 individuals, depending on the method used (McGuire and Morey, 1992; LSA Associates, 1992).

Approximately 65 per cent of the remaining Morro manzanita habitat is in private ownership with the bulk of this is habitat with high densities of manzanita. Approximately 35 per cent of the plant’s habitat is on publicly owned lands within Montana de Oro State Park, and two small preserves managed by California Department of Fish and Game; most of the habitat on public lands supports low or moderate densities of Morro manzanita (McGuire and Morey, 1992). It occurs at elevations up to 200 m (Jepson, 2003).

**Key Populations in LOHCP Plan Area**
Morro manzanita is known within the LOHCP Plan Area. The CNDDB (2002) has two records of known occurrence for Morro manzanita within the LOHCP Plan Area. They are in Baywood Park at the junction of 1st Street and Santa Ysabel Avenue and at the intersection of 2nd Street and street just north of Santa Ysabel, the Baywood Park Vicinity; and from north of Santa Ysabel Avenue southward to Nipomo Avenue.

Calflora has 23 specimens, 33 documented observations, and 1 in the existing literature in San Luis Obispo County, that occur mainly in the LOHCP Plan Area and throughout the community of Morro Bay. The CNDDB list other records in East of San Luis Obispo, throughout the community of Morro Bay and in Montana de Oro State Park. See the Figure below for Morro manzanita’s coverage in the LOHCP Plan Area.
Biology

**Flowing Period:** Blooms December through March (CNPS, 2001).

**Dispersal:** The fruit maturing and seed dispersing in summer and fall (Tyler and Odion 1996).

Threats

The greatest threat to Morro manzanita is loss and fragmentation of its habitat from development. About 75 percent of its historical habitat has been altered by development, primarily in the communities of the Los Osos area. Over half the remaining habitat is in private ownership; proposals are pending to develop several large parcels. Although approximately a third of the habitat for Morro manzanita is owned and managed by the California Department of Parks and Recreation (Montana de Oro State Park), it is still subject to alteration. Groves of non-native Eucalyptus trees planted in the early 1900’s have encroached on nearby stands of Morro manzanita (Holland et al., 1990).

Except for two parcels owned by California Department of Fish and Game, the remaining habitat for Morro manzanita is in private ownership on lands that surround the communities of Baywood Park and Los Osos. Expansion of these communities has already destroyed Morro manzanita habitat, and much of what remains is slated for residential development (Keil, 1990; Holland, 1990; San Luis Obispo County, 1991).

Special Biological Considerations

Recent studies found that Morro manzanita seeds were typically very common under the canopies of adult individuals, but not beyond the canopy. Under canopies seed densities were estimated at 12,000 to 37,000 seeds per square meter, although viability of the seeds was less than 5 percent. About 80 percent of the seeds were found in the top 2.5 centimeters (1-inch) of the soil samples (Tyler and Odion 1996).

Conservation

Morro manzanita is included in the USFWS's Recovery Plan for Morro Shoulderband Snail and Four Plants form Western San Luis Obispo County, California, completed in 1998. The recovery objective for the Morro Manzanita is delisting. The delisting criteria developed by USFWS for the Morro Manzanita is described below.

“Morro manzanita can be considered for delisting when all three of the following have been achieved: (1) 90 percent of existing acreage supporting high (75-100 percent) and medium (25-75 percent) cover of Morro manzanita and 85-90 percent of low (1-24 percent) cover supporting Morro manzanita are secured from human-induced threats in preserves in the Northeast Los Osos, South Los Osos and West Pecho Conservation Planning Areas with no greater fragmentation by roads, residences, or other areas of human use than currently exists, (2) evidence that the acreage and approximate cover classes of Morro manzanita in preserves can be maintained over time and that preserves...
are not made unmanageable by small size, proximity to urban development, or fragmentation, and (3) site-specific management plans have been successfully implemented for the preserves.

Because habitat in the Conservation Planning Areas must remain unfragmented to recover this species, habitat attrition must be restricted to isolated or remnant patches of Morro manzanita that are unlikely to be viable over the long term. Highest priority for securing sites should be given to stands where Morro manzanita is the dominant in terms of cover, where large, contiguous blocks of occupied habitat are still present, and where Morro manzanita habitat can be secured that abuts other protected lands, as in the South Los Osos Conservation Planning Area.”

Morro Manzanita Distribution in California based on 59 Observations contributed to the CalFlora Occurrence Library

Blue indicates that there is a specimen from this county in a participating herbarium. Specimens have the highest reliability of identification.

Light Blue indicates a documented observation that is vouchedered or confirmed by an expert.

Lavender indicates other reported observations that are unvouchedered.

Mustard Yellow indicates the county falls within the described species range published in botanical literature.

Santa Barbara [1]
San Luis Obispo [57]
Literature Cited


Mullany, M. 1990. The distribution and variation of Arctostaphylos morroensis (Ericaceae). Thesis. California State Polytechnic University, San Luis Obispo, California, USA.


Oso manzanita

*Arctostaphylos osoensis*

Class: Dicotyledoneae  
Order: Ericales  
Family: Ericaceae – Heath Family  

**Legal Status**  
Federal: Species of Concern  
State: None  
CNPS: 1B, 3-2-3  

**Species Description**  
Oso manzanita is a little shrub that grows to 2-3' tall and 4-5' across. It has auriculate leaves that are gray on smooth dark red stems (Jepson, 2003).  

**Habitat and Habitat Associations**  
Oso manzanita grows in chaparral and in cismontane woodland on dacite porphyry buttes (CNPS, 2001).  

**Range**  
Oso manzanita is endemic to San Luis Obispo County. It is located at elevations from 300-500 m (CNPS, 2001).  

**Key Populations in LOHCP Plan Area**  
Oso manzanita is known to occur within the LOHCP Plan Area. The CNDDB (2002) has one record of known occurrence for Oso manzanita within the LOHCP Plan Area. It is located in the isolated buttes along the divide on the north side of Los Osos. Calflora lists 3 documented observations and 1 occurrence in the literature in San Luis Obispo County. The CNDDB list other records in Morro Bay.  

**Biology**  
**Blooming Period:** Blooms February through March (CNPS, 2001).  

**Dispersal:** No information was found in the literature.  

**Threats**  
Urbanization is a known threat (CNPS, 2001).  

**Special Biological Considerations**  
Unknown.  

**Conservation**  
Unknown.
Oso Manzanita Distribution in California based on 4 Observations contributed to the CalFlora Occurrence Library

Blue indicates that there is a specimen from this county in a participating herbarium. Specimens have the highest reliability of identification.

Light Blue indicates a documented observation that is vouchered or confirmed by an expert.

Lavender indicates other reported observations that are unvoucheded.

Mustard Yellow indicates the county falls within the described species range published in botanical literature.

San Luis Obispo [4]
Literature Cited


**Dacite manzanita**  
*Arctostaphylos tomentosa ssp. daciticola*  
Class: Dicotyledoneae  
Order: Ericales  
Family: Ericaceae – Heath Family

**Legal Status**  
- **Federal:** Species of Concern  
- **State:** None  
- **CNPS Ranking:** 1B, 3-3-3

**Species Description**  
Dacite manzanita is an evergreen shrub that is approximately 1–2.5 m (Jepson, 2003).

**Habitat and Habitat Associations**  
Located in chaparral and cismontane woodland on dacite porphyry buttes (Fugro, 1997).

**Range**  
Found on the southern Central Coast (Jepson, 2003; CNPS, 2001).

**Key Populations in LOHCP Plan Area**  
There is the low potential for dacite manzanita to occur within the LOHCP Plan Area because of the only documented occurrences are limited to the northwest slope of Hollister Peak and isolated buttes along the north side of Los Osos Valley (Fugro, 1997). The CNDDB (2002) has no record of known occurrence for dacite manzanita within the LOHCP Plan Area. Calflora lists 1 occurrence in the literature and 2 observations in San Luis Obispo County.

**Biology**  
- **Flowing Period:** Blooms through March (CNPS, 2001).  
- **Dispersal:** No information was found in the literature.

**Threats**  
This species is potentially threatened by urbanization.

**Special Biological Considerations**  
Unknown.

**Conservation**  
Unknown.
Dacite manzanita Distribution in California based on 3 Observations contributed to the CalFlora Occurrence Library

Blue indicates that there is a specimen from this county in a participating herbarium. Specimens have the highest reliability of identification.

Light Blue indicates a documented observation that is vouchered or confirmed by an expert.

Lavender indicates other reported observations that are unvoucheded.

Mustard Yellow indicates the county falls within the described species range published in botanical literature.

San Luis Obispo [3]

www.CalFlora.org  2002
Literature Cited


San Luis mariposa lily  
*Calochortus obispoensis*  
Class: Monocotyledoneae  
Order: Liliales  
Family: Liliaceae – Lily Family  

**Legal Status**  
**Federal:** None  
**State:** None  
**CNPS Ranking:** 1B, 2-2-3  

**Source:** Dean Wm. Taylor, CNPS  

**Species Description**  
The San Luis Mariposa lily grows 30 to 60 cm. (1 to 2 feet) tall from a bulb. The inflorescence is erect and contains two to six flowers. The three ovate petals measure about 10 to 20 mm. (1/2 to 1 inch) long. They are deep yellow to orange and coarsely hairy inside, fringed, and bears a dark tuft of hairs at the tip. Each petal has a round nectary that is nearly hidden by dense hairs (Jepson, 2003).  

**Habitat and Habitat Associations**  
The San Luis mariposa lily is found in chaparral, coastal scrub, grassland, and freshwater seep habitats of dry, serpentine soils (CNPS, 2001).  

**Range**  
The San Luis mariposa lily is endemic to San Luis Obispo County. It grows at elevations of 75-730 m (CNPS, 2001; CDFG, 2002).  

**Key Populations in LOHCP Plan Area**  
There is the low potential that the San Luis mariposa lily is in the LOHCP Plan Area. The only record of a known occurrence near the LOHCP Plan Area is in the Irish Hills. The CNDDB (2002) and existing literature have no record of known occurrence for the San Luis mariposa lily within the LOHCP Plan Area.  

Calflora has 27 specimens, 19 documented occurrences and 1 in existing literature in San Luis Obispo County.  

**Biology**  
**Flowing Period:** Blooms late May through June (CNPS, 2001).  

**Dispersal:** No information was found in the literature.  

**Threats**  
Threats include grazing, development, road construction, recreation and potentially mining (CNPS, 2001).
Special Biological Considerations
Unknown.

Conservation
Unknown.

San Luis mariposa lily Distribution in California based on 47 Observations contributed to the CalFlora Occurrence Library

Blue indicates that there is a specimen from this county in a participating herbarium. Specimens have the highest reliability of identification.

Light Blue indicates a documented observation that is vouchered or confirmed by an expert.

Lavender indicates other reported observations that are unvouchered.

Mustard Yellow indicates the county falls within the described species range published in botanical literature.

San Luis Obispo [47]
Literature Cited


**San Luis Obispo sedge**  
*Carex obispoensis*  
Class: Monocotyledoneae  
Order: Cyperales  
Family: Cyperaceae – Sedge Family  

**Legal Status**  
**Federal:** None  
**State:** None  
**CNPS Ranking:** 1B, 2-2-3

Source: CNPS

**Species Description**  
San Luis Obispo sedge is a perennial (rhizomatous) herb that is native and endemic to California.

**Habitat and Habitat Associations**  
San Luis Obispo sedge occurs on steep, serpentine-derived hillsides in association with chaparral and coastal sage scrub habitats. Suitable habitat for this species is present within areas of the watershed containing serpentine soils.

**Range**  
San Luis Obispo sedge occurs in Monterey and San Luis Obispo Counties. The San Luis Obispo sedge is found at elevations from 10-790 m (CNPS, 2001).

**Key Populations in LOHCP Plan Area**  
There is the low potential that the San Luis Obispo sedge is in the LOHCP Plan Area. There is no suitable habitat in the LOHCP Plan Area. The CNDDDB (2002) and existing literature have no record of known occurrence for the San Luis Obispo sedge within the LOHCP Plan Area.

Calflora has 16 specimens, 17 documented occurrences and 1 in existing literature in San Luis Obispo County, with the majority of these from west Cuesta Ridge, San Simeon, Cerro Alto, and the Prefumo Creek region.

**Biology**  
**Flowing Period:** Blooms April through June (CNPS, 2001).

**Dispersal:** No information was found in the literature.

**Threats**  
This species is threatened by grazing (CNPS, 2001).

**Special Biological Considerations**  
Unknown.
**Conservation**

Unknown.

**San Luis Obispo Sedge Distribution in California based on 34 Observations contributed to the CalFlora Occurrence Library**

- **Blue** indicates that there is a specimen from this county in a participating herbarium. Specimens have the highest reliability of identification.
- **Light Blue** indicates a documented observation that is vouchered or confirmed by an expert.
- **Lavender** indicates other reported observations that are unvouchered.
- **Mustard Yellow** indicates the county falls within the described species range published in botanical literature.

San Luis Obispo [34]
**Literature Cited**


Brewer's spineflower
*Chorizanthe breweri*
Class: Dicotyledoneae
Order: Caryophyllales
Family: Polygonaceae – Buckwheat Family

**Legal Status**
- **Federal:** None
- **State:** None
- **CNPS Ranking:** 1B, 3-1-3

**Species Description**
The brewer's spineflower is an annual herb. The stem is decumbent to ascending, 3–35 cm, reddish, and thinly hairy. The leaf blade is 5–20 mm and generally ovate. The inflorescence lower bracts are oblanceolate and leaf-like. The flowers perianth is 3–3.5 mm with white to red and hairy (Jepson, 2003).

**Habitat and Habitat Associations**
Brewer’s spineflower occurs in closed-cone coniferous forest, chaparral, cismontane woodland, and coastal scrub habitats; primarily on serpentine substrates.

**Range**
Brewer’s spineflower is only found in San Luis Obispo County in the outer South Coast Ranges (Jepson, 2003). It occurs at elevations below 800 m.

**Key Populations in LOHCP Plan Area**
There is the low potential that the Brewer’s spineflower is in the LOHCP Plan Area. It is only found in San Luis Obispo County in the outer South Coast Ranges. The CNDDB (2002) and existing literature have no record of known occurrence for the Brewer’s spineflower within the LOHCP Plan Area.

Calflora has 16 specimens, 31 documented occurrences and 1 in existing literature in San Luis Obispo County, with the majority located on west Cuesta Ridge, upper SLO Creek in Reservoir Canyon, Stenner Creek, and Chorro Creek.

**Biology**
- **Flowing Period:** Blooms May through August (CNPS, 2001).
- **Dispersal:** No information was found in the literature

**Threats**
Road construction is a possible threat (CNPS, 2001).
Special Biological Considerations
Closely related to *C. staticoides* (Jepson, 2003).

Conservation
Unknown.

Brewer's spineflower Distribution in California based on 48 Observations contributed to the CalFlora Occurrence Library

Keyboard shortcuts:

- **Blue** indicates that there is a specimen from this county in a participating herbarium. Specimens have the highest reliability of identification.
- **Light Blue** indicates a documented observation that is vouchered or confirmed by an expert.
- **Lavender** indicates other reported observations that are unvoucheded
- **Mustard Yellow** indicates the county falls within the described species range published in botanical literature

San Luis Obispo [48]
Literature Cited


Monterey spineflower
*Chorizanthe pungens ssp. pungens*
Class: Dicotyledoneae
Order: Carophyllales
Family: Polygonaceae -- Buckwheat family

Legal Status
Federal: Threatened
State: None
CNPS Ranking: 1B, 2-2-3

Species Description
George Bentham first described Monterey spineflower in 1836 from samples of the 1833 Douglas collection from Monterey. Monterey spineflower has been classified as a separate variety due to its larger size and awn shape (Reveal and Hardham 1989). This species measures 0.5-1.5 dm (1.9-5.9 inches) in height and 0.5-10 dm (1.9-39.4 inches) in width. The awns are hooked at the tip (uncinate). Chromosome counts of this species are n = 20 (Reveal and Hardham 1989). The stem is prostrate to erect, 5–50 cm, grayish or reddish, soft hairy with a leaf blade 5–70 mm. The inflorescence is involucral tube 2–3 mm, cylindric, bracts 6, scarious margins conspicuous, white to purple, awns ± equal, hooked (Jepson, 1993).

Habitat and Habitat Associations
Monterey spineflower occurs in coastal dunes, coastal scrub and further inland on sandy soils (Zoger and Pavlik, 1987). This species tends to occur on bare sandy patches where there is little vegetative cover and in areas of relatively mild maritime climate, characterized by fog and winter rains. The fog helps keep summer temperatures cool and winter temperatures relatively warm, and provides moisture in addition to the normal winter rains (Zoger and Pavlik, 1987). Monterey spineflower is found in sandy soils within coastal habitats from the Monterey Peninsula (Monterey County) northward along the coast to southern Santa Cruz County, and inland to the coastal plain of the Salinas Valley.

At coastal sites ranging from the Monterey Peninsula north to Manresa State Beach, Monterey spineflower is found in active coastal dune systems and on coastal bluffs upon which windblown sand has been deposited. The distribution of suitable habitat is subject to dynamic shifts caused by patterns of dune mobilization, stabilization, and successional trends in coastal dune vegetation that increase in cover over time. Accordingly, individual colonies of Monterey spineflower, found in gaps between stands of scrub, shift in distribution and size over time. Other native plants associated with Monterey spineflower in these areas include beach bur (*Ambrosia chamissonis*), beach sagewort, mock heather, Monterey Indian paintbrush (*Castilleja latifolia*), and beach pea (*Lathyrus littoralis*). At some locations, Monterey spineflower occurs in close proximity to the endangered Monterey gilia (*Gilia tenuiflora ssp. arenaria*), Menzies’ wallflower (*Erysimum menziesii ssp. menziesii*), Smith’s blue butterfly (*Euphilotes enoptes smithi*), and the threatened western snowy plover (*Charadrius alexandrinus nivosus*).
At more inland sites, Monterey spineflower occurs on sandy, well-drained soils in a variety of plant communities, most frequently maritime chaparral, valley oak woodland, and grassland. Within grassland communities, Monterey spineflower occurs along roadways, in firebreaks, and in other disturbed sites, while in oak woodland, chaparral, and scrub communities, it occurs in sandy openings between shrubs. In older stands with a high cover of shrubs, the plants are restricted to roadways, firebreaks, and trails that bisect these communities. Prior to the onset of human use of this area, Monterey spineflower may have been restricted to openings within these communities created by animal movement corridors, herbivory, and wildfires.

The southwestern edge of Monterey spineflower habitat on the former Fort Ord was once likely continuous with habitat found in the community of Del Rey Oaks and at the Monterey Airport. Other inland sites that support Monterey spineflower are located in the area between Aptos and La Selva Beach in Santa Cruz County and near Prunedale in northern Monterey County. At some of these locations, Monterey spineflower occurs in close proximity with the federally endangered Yadon’s piperia (Piperia yadonii) and robust spineflower (Chorizanthe robusta var. robusta). It is found at elevations below 450 m (Jepson, 1993).

**Range**
Monterey spineflower occurs from the Monterey Peninsula (Monterey County) northward along the coast to southern Santa Cruz County, and inland to the Salinas Valley (Reveal and Hardham, 1989; Ertter, 1990). Early collections by Gambel in 1842 indicated that this species historically occurred as far south as San Simeon near the northern boundary of San Luis Obispo County; however, in recent times this species has not been found south of the Monterey Peninsula (Reveal and Hardham 1989). The occurrence of *C. pungens* var. *pungens* in the Salinas Valley is now limited to a few populations near Prunedale (Reveal and Hardham, 1989). The northernmost population occurs in Day Valley near Soquel in Santa Cruz County.

**Key Populations in LOHCP Plan Area**
There is the low potential that the Monterey spineflower is in the LOHCP Plan Area. The LOHCP Plan Area is not in its known range. The CNDDB (2002) and existing literature have no record of known occurrence for the Monterey spineflower within the LOHCP Plan Area.

Calflora has 1 documented occurrence and 1 in existing literature in San Luis Obispo County.

**Biology**

**Flowering Period:** Flowers are produced from April through June and seed collectable through August (Durrell-Canepa, 1995; CNPS, 2001).

**Dispersal:** Dispersal of seeds is facilitated by the spines, which help attach the seed to passing animals. The preference of these species for sandy substrate allows seedlings to establish in areas that are relatively free from other competing species; this is particularly true for *C. pungens* var. *pungens* that prefers bare soils. State Park personnel hypothesize that
while trampling could be a problem along trails, it may actually aid germination (Roye, 1996).

Each flower produces one seed; depending on plant vigor, dozens, if not hundreds, of seeds could be produced per individual. The importance of pollinator activity in seed set has been demonstrated by the production of seed with low viability where pollinator access was limited (Harding Lawson Associates, 2000).

**Threats**

Habitat loss and conversion from agricultural and residential development, activities at military institutions, and invasion by non-native plants were identified as the primary threats to Monterey spineflower. Hikers and equestrians may trample these plants at various locations throughout its range. The proposed development of a parcel owned by Pebble Beach Company threatens a population on the Monterey Peninsula (59 FR 5505). Residential development in maritime chaparral habitat is a potential threat to several small populations in Monterey and Santa Cruz counties (59 FR 5505). The proposed route realignment of Highway 101 in northern Monterey County also has the potential to impact several small, scattered populations (59 FR 5505).

Most of the historical locations of Monterey spineflower in the Salinas Valley have probably been extirpated by conversion of grassland and valley oak woodland habitats to agricultural fields. The one remaining population near Prunedale is in Manzanita County Park; however, the park has no management plan for this species. Replacing the natural vegetation with turf for playing fields threatens the existence of this species at Manzanita County Park (Vernal Yadon, 1994).

Populations of Monterey spineflower at Sunset State Beach are threatened by recreational activities and are subject to trampling. Invasive non-native species that were introduced as part of dune stabilization programs are also a threat to these populations. Non-native species, which have invaded dune habitats and are now widespread, include European beach grass (*Ammophila arenaria*) and iceplant (*Carpobrotus edulis*).

**Special Biological Considerations**

Unknown.

**Conservation**

Monterey spineflower, a small, prostrate annual in the buckwheat family, was listed as threatened on February 4, 1994 (59 FR 5499). On February 15, 2001, USFW proposed critical habitat for the Monterey spineflower in Santa Cruz and Monterey counties, California, and on May 29, 2002, we designated final critical habitat for Monterey spineflower (67 FR 37498).

The primary constituent elements of critical habitat for the Monterey spineflower have been defined as: 1) Sandy soils associated with active coastal dunes, coastal bluffs with a deposition of windblown sand, inland sites with sandy soils, and interior floodplain dunes; 2) Plant communities that support associated species, including coastal dune, coastal scrub, grassland,
maritime chaparral, oak woodland, and interior floodplain dune communities, and have a structure such that there are openings between the dominant elements (e.g., scrub, shrub, oak trees, clumps of herbaceous vegetation); 3) No or little cover by non-native species which compete for resources available for growth and reproduction of Monterey spineflower; and 4) Physical processes, such as occasional soil disturbance, that support natural dune dynamics along coastal areas. These attributes are considered essential to the conservation of the Monterey spineflower (67 FR 37498).

Monterey spineflower Distribution in California based on 61 Observations contributed to the CalFlora Occurrence Library

Blue indicates that there is a specimen from this county in a participating herbarium. Specimens have the highest reliability of identification.

Light Blue indicates a documented observation that is vouched or confirmed by an expert.

Lavender indicates other reported observations that are unvouched.

Mustard Yellow indicates the county falls within the described species range published in botanical literature.

Monterey [42]
Santa Cruz [13]
San Luis Obispo [2]
Literature Cited


**Salt marsh bird's beak**  
*Cordylanthus maritimus* ssp. *maritimus*  
Class: Dicotyledoneae  
Order: Lamiales  
Family: Scrophulariaceae – Figwort Family  

**Legal Status**  
*State Status:* Endangered  
*Federal Status:* Endangered  
*CNPS Ranking:* 1B, 2-2-2  

**Species Description**  
Salt marsh bird's-beak is a diffusely branched annual herb with grayish-green, tinged purple hairy leaves. It has spikes of bee-pollinated flowers with two-lipped petals. Upper petals are beak-like with yellowish tips, and lower petals have a purplish pouch. The plants are hemiparasitic, sometimes obtaining moisture and nutrients from the roots of their host plants, which are usually perennials.  

**Habitat and Habitat Associations**  
Salt marsh bird's-beak grows in the higher reaches of coastal salt marshes to intertidal and brackish areas influenced by freshwater input. Some plants occur in non-tidal areas or in areas of perched water tables; there may be different ecotypes.  

**Range**  
Historically, salt marsh bird's-beak was widespread in coastal salt marshes from Morro Bay in San Luis Obispo County to San Diego County and northern Baja California Norte. Presently, it occurs only in scattered sites at fewer than 10 remnant salt marshes. Half of the original occurrences are now extirpated.  

**Key Populations in LOHCP Plan Area**  
The salt marsh bird's-beak is known within the LOHCP Plan Area. The CNDDB (2002) has two records of known occurrence for salt marsh bird's-beak within the LOHCP Plan Area. They are South end of Morro Bay along Mitchell Drive (Pecho Rd.) in Cuesta-By-The-Sea and at Sweet Springs Marsh at the south end of Morro Bay, north of Bay Street and east of Doris Avenue.  

Calflora has 2 specimens, 4 documented occurrences and 1 in existing literature in San Luis Obispo County, with most located around Morro Bay salt marsh area and Cuesta-by-the-sea. The CNDDB also lists other records of known occurrence in Montana de Oro State Park.  

**Biology**  
*Flowering Period:* Blooms May through October (CNPS, 2001).  

*Dispersal:* No information was found in the literature.
Threats
Salt marsh bird's-beak is highly vulnerable to loss of genetic variation. Maintenance of nearby upland habitat supporting native pollinators is important to the species' survival. Several non-native competitors are displacing salt marsh bird's beak from their habitat, including sea lavender and several exotic grasses.

Special Biological Considerations
Unknown.

Conservation
Unknown.

Salt Marsh Bird's Beak Distribution in California based on 100 Observations contributed to the CalFlora Occurrence Library

Blue indicates that there is a specimen from this county in a participating herbarium. Specimens have the highest reliability of identification.

Light Blue indicates a documented observation that is vouchered or confirmed by an expert.

Lavender indicates other reported observations that are unvouchered.

Mustard Yellow indicates the county falls within the described species range published in botanical literature.

Los Angeles [2]
Orange [12]
Santa Barbara [16]
San Bernardino [2]
San Diego [21]
San Luis Obispo [7]
Ventura [36]
Literature Cited


Beach spectaclepod
*Dithyrea maritima*
Class: Monocotyledoneae
Order: Brassicales
Family: Brassicaceae - Mustard Family

Legal Status
- **Federal:** Species of Concern
- **State:** Threatened, 1990
- **CNPS Ranking:** 1B, 3-3-2

Source: California Native Plant Society

Species Description
Beach spectaclepod is an annual, perennial herb; herbage hairs dense, stellate, multi-branched.

Habitat and Habitat Associations
Beach spectaclepod is a low growing, whitish-flowered perennial herb. It is found in small transverse foredunes within approximately 50-300 meters from the surf. Beach spectaclepod is usually found in areas of these fragile dunes where the sand is relatively unstable (CDFG, 2002).

Range
Although historically ranging as far south as Los Angeles County and possibly Baja California Norte, Mexico, this species currently occurs in the dunes of San Luis Obispo and Santa Barbara counties and on San Nicholas and San Miguel Islands (CDFG, 2002).

Key Populations in LOHCP Plan Area
There is the low potential that the beach spectacle pod is in the LOHCP Plan Area. The CNDDB (2002) and existing literature have no record of known occurrence for the beach spectacle pod within the LOHCP Plan Area.

Calflora has 6 specimens, 9 documented occurrences and 1 in existing literature in San Luis Obispo County, with most located around Morro Bay and Oso Flaco Lake.

Biology
- **Flowing Period:** Blooms March through May (CNPS, 2001).
- **Dispersal:** No information was found in the literature.

Threats
Threats are heavy recreational use including trampling and vehicles in addition to invasion of non-native plants (CNPS, 2001), specifically *Carpobrotus*, and sand blowouts (DFG, 2002).

Special Biological Considerations
Unknown.
Conservation
Several populations on Unocal property in the foredunes of the Guadalupe Dunes just north of the Santa Maria River are at risk from long-term soil and water contamination from a diluting substance on Unocal's property. The DFG, the San Luis Obispo County and other agencies are currently reviewing a proposal by Unocal to clean up their site; remediation of the site may directly impact the populations in the dunes. In 1999, the DFG met with DPR and the Land Conservancy of San Luis Obispo County to outline a program of dune grass and veldt grass removal within the Guadalupe Dunes. It is expected that at least one population of beach spectacle pod will benefit from this program, to be conducted by the Land Conservancy (CDFG, 2002).

Beach spectaclepod Distribution in California based on 58 Observations contributed to the CalFlora Occurrence Library

Blue indicates that there is a specimen from this county in a participating herbarium. Specimens have the highest reliability of identification.

Light Blue indicates a documented observation that is vouchered or confirmed by an expert.

Lavender indicates other reported observations that are unvoucheded.

Mustard Yellow indicates the county falls within the described species range published in botanical literature.

Los Angeles [7]
Santa Barbara [16]
San Luis Obispo [16]
Ventura [11]
Literature Cited


San Luis Obispo serpine dudleya  
*Dudleya abramsii* ssp. *bettinae*

Class: Dicotyledoneae  
Order: Rosales  
Family: Crassulaceae – Stonecrop Family

**Legal Status**  
**Federal:** Species of Concern  
**State:** None  
**CNPS Ranking:** 1B, 3-2-3  
Source: G. F. Hrusa, CNPS

**Species Description**  
San Luis Obispo serpine dudleya is a succulent, perennial herb. The leaf is 2–7 cm long and 2–7 mm wide. The flowers petals are fused 1–2 mm, often purple-tinged near tip, with few purple flecks (Jepson, 2003).

**Habitat and Habitat Associations**  
San Luis Obispo serpine dudleya is typically associated with coastal scrub and valley foothill grassland communities on serpine soils (CNPS, 2001).

**Range**  
San Luis Obispo serpine dudleya is endemic to San Luis Obispo County. Its elevation range is 50–180 m (Jepson, 2003).

**Key Populations in LOHCP Plan Area**  
There is the low potential that the San Luis Obispo serpine dudleya is in the LOHCP Plan Area. The LOHCP Plan Area does not have suitable habitat. The CNDDB (2002) and existing literature have no record of known occurrence for the San Luis Obispo serpine dudleya within the LOHCP Plan Area.

Calflora has 5 specimens, 10 documented occurrences and 1 in existing literature in San Luis Obispo County, with most located around Morro Bay and Cayucos.

**Biology**  
**Flowing Period:** Blooms May through July (CNPS, 2001).

**Dispersal:** No information was found in the literature.

**Threats**  
Unknown.

**Special Biological Considerations**  
Unknown.
**Conservation**
Unknown.

San Luis Obispo Serpentine Dudleya Distribution in California based on 16 Observations contributed to the CalFlora Occurrence Library

[Map showing San Luis Obispo region highlighted in blue]

- **Blue** indicates that there is a specimen from this county in a participating herbarium. Specimens have the highest reliability of identification.
- **Light Blue** indicates a documented observation that is vouchered or confirmed by an expert.
- **Lavender** indicates other reported observations that are unvouchedered.
- **Mustard Yellow** indicates the county falls within the described species range published in botanical literature.

San Luis Obispo [16]
Literature Cited


Blochman's dudleya
*Dudleya blochmaniae* ssp. *blochmaniae*
Class: Dicotyledoneae
Order: Saxifragales
Family: Crassulaceae – Stonecrop Family

**Legal Status**
- **Federal**: Species of Concern
- **State**: None
- **CNPS Ranking**: 1B, 2-3-2

**Species Description**
Blochman's dudleya is a perennial herb. The leaf is 3-12 per rosette, 1-6 cm, 3-8 mm wide, 2-4 mm thick (Jepson, 1993).

**Habitat and Habitat Associations**
Blochman’s dudleya is found on open, rocky slopes mainly on soils of serpentine or clay or in rocky areas with little soil (Jepson, 1993; DFG, 2002). Plant communities where it is located are coastal bluff scrub, chaparral, coastal scrub, and valley and foothill grassland. It is found at an elevation of 5-450m (CNPS, 2001).

**Range**
This species ranges along the coast from Baja California at the south to San Luis Obispo County at the north (CNPS, 2001). In San Luis Obispo County it occurs from Cayucos to Turri Road (off Los Osos Valley Road), and on the hills running along the western part of the San Luis Valley (Halvorson and Clark, et al., 1992).

**Key Populations in LOHCP Plan Area**
There is the low potential that the Blochman’s dudleya is in the LOHCP Plan Area. There is no suitable habitat in the LOHCP Plan Area. The CNDDDB (2002) and existing literature have no record of known occurrence for the Blochman’s dudleya within the LOHCP Plan Area.

Calflora has 5 specimens, 6 documented occurrences and 1 in existing literature in San Luis Obispo County, with most located around Morro Bay and Cayucos.

**Biology**
- **Flowing Period**: Blooms April through June (CNPS, 2001).
- **Dispersal**: No information was found in the literature.

**Threats**
Threats include development (CNPS, 2001).
Special Biological Considerations
Unknown.

Conservation
Unknown.

Blochman's Dudleya Distribution in California based on 54 Observations contributed to the CalFlora Occurrence Library

Blue indicates that there is a specimen from this county in a participating herbarium. Specimens have the highest reliability of identification.

Light Blue indicates a documented observation that is vouchered or confirmed by an expert.

Lavender indicates other reported observations that are unvouchedered.

Mustard Yellow indicates the county falls within the described species range published in botanical literature.

Alameda [2]
Los Angeles [5]
Orange [11]
Santa Barbara [7]
San Diego [9]
San Luis Obispo [12]
Ventura [7]
Literature Cited


**Blochman's leafy daisy**  
*Erigeron blochmaniae*

Class: Dicotyledoneae  
Order: Asteridae  
Family: Asteraceae –Sunflower Family

**Legal Status**  
- **Federal**: None  
- **State**: None  
- **CNPS Ranking**: 1B, 2-2-3  
  Source: Hartmut Wisch

**Species Description**  
Blochman's leafy daisy is a perennial herb of the sunflower family with purple and yellow daisy-like flowers. Perennial 40–80 cm, from woody caudex (or rhizome), generally ascending, branched above, densely and minutely curled- or bent-hairy (Jepson, 2003).

**Habitat and Habitat Associations**  
This species is only found in limited dune scrub habitats (Jepson, 2003).

**Range**  
Southern Central Coast in Santa Barbara and San Luis Obispo Counties. It is found at elevations less than 30 m (Jepson, 2003).

**Key Populations in LOHCP Plan Area**  
There is the moderate potential that the Blochman's leafy daisy is in the LOHCP Plan Area. There is suitable habitat in the LOHCP Plan Area. CNDDDB (2002) and existing literature have no record of known occurrence for the Blochman's leafy daisy within the LOHCP Plan Area.

Calflora has 8 specimens, 14 documented occurrences and 1 in existing literature in San Luis Obispo County. The CNDDDB has three records of known occurrence in several locations in Montana de Oro State Park and in dunes at the south end of Morro Bay.

**Biology**  
- **Flowering Period**: Blooms July through August (CNPS, 2001).

  - **Dispersal**: No information was found in the literature.

**Threats**  
Development, non-natives and vehicles are the main threats to Blochman’s leafy daisy (CNPS, 2001).

**Special Biological Considerations**  
Unknown.
Conservation
Unknown.

Blochman's Leafy Daisy Distribution in California based on 37 Observations contributed to the CalFlora Occurrence Library

**Blue** indicates that there is a **specimen** from this county in a participating herbarium. Specimens have the highest reliability of identification.

**Light Blue** indicates a **documented** observation that is vouchered or confirmed by an expert.

**Lavender** indicates other **reported** observations that are unvouchered.

**Mustard Yellow** indicates the county falls within the described species range published in botanical literature.

Santa Barbara [13]
San Luis Obispo [23]
Literature Cited


**Indian knob mountainbalm**

*Eriodictyon altissimum*

Class: Dicotyledoneae  
Order: Solanales  
Family: Hydrophyllaceae - Waterleaf family

**Legal Status**

<table>
<thead>
<tr>
<th>Level</th>
<th>Status</th>
<th>Year</th>
</tr>
</thead>
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<tr>
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<tr>
<td>State</td>
<td>Endangered</td>
<td>1979</td>
</tr>
<tr>
<td>CNPS Ranking</td>
<td>1B, 3-3-3</td>
<td></td>
</tr>
</tbody>
</table>

**Source:** CNPS

**Species Description**

Indian Knob mountainbalm is a tall, evergreen shrub with dark green, sticky leaves, and clusters of tubular pale lavender flowers. Indian Knob mountainbalm has diffusely branched evergreen shrub of the waterleaf family (Hydrophyllaceae) reaches a height of 2 to 4 meters (6.6 to 13 feet). The sticky leaves are long (6 to 9 centimeters [2.4 to 3.5 inches]) and narrow (2 to 4 millimeters [0.08 to 0.20 inch]); the lavender flowers (1.1 to 1.5 centimeters [0.4 to 0.6 inch] long) are arranged in coiled clusters and produce tiny (0.4 millimeter [0.02 inch] long) seeds. As with other fire-adapted chaparral plants, Indian Knob mountainbalm produces new growth primarily from rhizomatous suckers (Jepson, 2003).

**Habitat and Habitat Associations**

Indian Knob mountainbalm occurs in soils derived from marine sandstones containing tar deposits referred to as “tar sands” and, in the northern part of its range, on Baywood fine sands and weathered ancient dune soils. This species co-occurs with Morro manzanita in several locations in maritime chaparral. Vanderwier (1987) did a detailed study of the chaparral and oak woodland communities at the type locality for Indian Knob mountainbalm. As with other members of this genus, Indian Knob mountainbalm is thought to be adapted to ecological disturbance, specifically to periodic fire within the chaparral community. Field botanists have noted that most stands of Indian Knob mountainbalm are mature or senescent, and that prescribed fire may be needed to revitalize the stands (Bittman 1985; John Chesnut, 1997; Keil, 1997).

**Range**

Indian Knob mountainbalm is restricted to a limited area in the coastal region of San Luis Obispo County. Indian Knob mountainbalm is known from six occurrences, one of which was not seen when it was last searched for in 1985. Five of six extant stands occur within a few square miles of each other, from the south side of the community of Los Osos to the north end of Montana de Oro State Park. Each of these stands has fewer than 50 plants. A sixth stand is found 15 miles to the southeast on Indian Knob, between San Luis Obispo and Arroyo Grande; with more than 500 plants, it comprises the largest stand (Lynn Dee Oyler, 1991). It is found at elevations of approximately 250 m (Jepson, 2003).
Key Populations in LOHCP Plan Area

Indian Knob mountainbalm is known within the LOHCP Plan Area. The CNDDB (2002) has three records of known occurrence for Indian Knob mountainbalm within the LOHCP Plan Area. These are located west of Broderson Ave. and east of bend in Travis Dr., south of Los Osos; in Los Osos on a north-facing slope between Broderson Ave. and Bayview, just above Highland Dr.; and in Los Osos at the extension of Bayview at Calle Cordoniz, 50 yards southwest of the road.

Calflora has 6 specimens, 8 documented occurrences and 1 in existing literature in San Luis Obispo County, mostly within the LOHCP Plan Area and Montana de Oro State Park. The CNDDB lists other records of known occurrence in Montana de Oro State Park. See the Figure below for the location of the known occurrences in the LOHCP Plan Area.
Biology

**Flowing Period:** Blooms March through June.

**Dispersal:** No information was found in the literature.

Threats
The potential for development is the greatest threat to Indian Knob mountainbalm on private lands. Additional threats include energy development, vehicles and possibly alteration of fire regimes and invasion of non-native plants (CNPS, 2001).

Special Biological Considerations
Unknown.

Conservation
The State of California Fish and Game listed this species as endangered in 1979. Indian Knob mountainbalm is included in the USFWS's Recovery Plan for Morro Shoulderband Snail and Four Plants form Western San Luis Obispo County, California, completed in 1998.

Two of the Morro Bay stands are on lands owned and managed by Montana de Oro State Park, and co-occur with Morro manzanita in Hazard Canyon. The remaining stands are on private property. Because rugged terrain in the Irish Hills (between Morro Bay and Indian Knob) has precluded extensive botanical surveying, it is not known whether other stands of Indian Knob mountainbalm occur in this area.
Indian Knob Mountainbalm Distribution in California based on 15 Observations contributed to the CalFlora Occurrence Library

- **Blue** indicates that there is a specimen from this county in a participating herbarium. Specimens have the highest reliability of identification.
- **Light Blue** indicates a documented observation that is vouchered or confirmed by an expert.
- **Lavender** indicates other reported observations that are unvouchedered.
- **Mustard Yellow** indicates the county falls within the described species range published in botanical literature.

San Luis Obispo [15]
Literature Cited


U.S. Fish and Wildlife Service Recovery Plan for the Morro Bay shoulderband snail and Four Plants from Western San Luis Obispo County, California, September 1998.
San Benito fritillary
*Fritillaria viridea*
Class: Monocotyledoneae
Order: Liliales
Family: Liliaceae – Lily Family

**Legal Status**
- **Federal:** Species of Concern
- **State:** None
- **CNPS Ranking:** 1B, 2-2-3

**Species Description**
The San Benito fritillary has 3–6.5 dm stems with leaves in 1–2 whorls, narrowly lanceolate (Jepson, 2003).

**Habitat and Habitat Associations**
San Benito fritillary is found in chaparral. It is located at elevations 200-1525 m (CNPS, 2001).

**Range**
San benito fritillary occurs in Monterey, San Benito and San Luis Obispo Counties (CNPS, 2001).

**Key Populations in LOHCP Plan Area**
There is the low potential that the San Benito fritillary is in the LOHCP Plan Area. The LOHCP Plan Area is not in its known range. The CNDDB (2002) and existing literature have no record of known occurrence for the San Benito fritillary within the LOHCP Plan Area.

Calflora has 3 documented occurrences and 1 in existing literature in San Luis Obispo County.

**Biology**
- **Flowing Period:** Blooms March through May (CNPS, 2001).

- **Dispersal:** No information was found in the literature.

**Threats**
Threats include vehicles and potential expansion of mining (CNPS, 2001).

**Special Biological Considerations**
Plants found in Monterey County may be a different species, *F. ojaiensis* (CNPS, 2001).

**Conservation**
Unknown.
San Benito Fritillary Distribution in California based on 24 Observations contributed to the CalFlora Occurrence Library

Blue indicates that there is a specimen from this county in a participating herbarium. Specimens have the highest reliability of identification.

Light Blue indicates a documented observation that is vouchered or confirmed by an expert.

Lavender indicates other reported observations that are unvoucheded

Mustard Yellow indicates the county falls within the described species range published in botanical literature

Monterey [3]
San Benito [17]
San Luis Obispo [4]
Literature Cited


Coulter’s goldfields

*Lasthenia glabrata* ssp. *coulteri*

Class: Dicotyledoneae
Order: Asterales
Family: Asteraceae - Sunflower Family

**Legal Status**
- **Federal**: Species of Concern
- **State**: None
- **CNPS**: 1B, 2-3-2

**Species Description**
Coulter's goldfields are an annual that is less than 60 cm tall. The stems are erect, simple or branched, glabrous or slightly hairy. The leaves are 4–15 cm, linear or awl-shaped, entire, glabrous (Jepson, 2003).

**Habitat and Habitat Associations**
Coulter’s goldfields are associated with low-lying alkali habitats along the coast and in inland valleys (Ornduff, 1966a). The majority of the populations are associated with coastal salt marsh. Coulter’s goldfields occur in wetter areas.

**Range**
Coulter’s goldfields is distributed from coastal San Luis Obispo County south through coastal Santa Barbara County, Ventura County, Los Angeles to San Diego County and northwestern Baja California from sea level to about 1,000 meters (Ornduff, 1966; Munz, 1974; Ornduff, 1993; Reiser, 1996). Interior valley populations have been recorded from the Carrizo Plain of San Luis Obispo County south through Tehachapi (Kern County), Twenty Nine Palms (San Bernardino County), and cismontane western Riverside County, to the Ojos Negros Valley east of Ensenada, Mexico (Munz, 1974; Ornduff, 1993; Reiser, 1996; CNDDB, 2002). Coulter’s goldfields have also been reported from Santa Rosa Island.

**Key Populations in LOHCP Plan Area**
Coulter’s goldfields are known within the LOHCP Plan Area. The CNDDB (2002) has one records of known occurrence for Coulter’s goldfields within the LOHCP Plan Area, which is in Baywood Park at Sweet Springs Marsh and at the southern end of Morro Bay Salt Marsh.

Calflora has 2 specimens, 2 documented occurrences and 1 in existing literature in San Luis Obispo County.

**Biology**
- **Flowering Period**: Coulter’s goldfields flowers from February through June (Skinner and Pavlik, 1994).
**Dispersal:** Coulter’s goldfields has united and persistent bracts. Ornduff (1966) speculates that this cuplike structure may serve as a catapult by throwing the fruit when moved by strong wind or passing animals.

**Threats**
Coulter’s goldfields are declining severely over the majority of its historic range. Coulter’s goldfields are presumed extirpated from Kern, Los Angeles, and San Bernardino Counties. It is severely declining in Orange and San Diego. In Riverside County, this species and its habitat are threatened by the same activities that threaten San Jacinto Valley crownscale: habitat destruction and fragmentation from urban and agricultural development, pipeline construction, alteration of hydrology and flood plain dynamics, excessive flooding, channelization, off road vehicle activity, trampling by cattle and sheep, weed abatement, fire suppression practices (including discing and plowing), and competition from alien plant species (CNDDB, 2002; U.S. Fish and Wildlife, 1998).

**Special Biological Considerations**
Coulter’s goldfields have a patchy distribution within this habitat and its spatial distribution shifts over time as conditions and seed banks change. Like other species dependent on alkali wetlands, this species likely requires significantly more habitat than is occupied during any one season to maintain population dynamics within the watershed and microhabitat diversity upon which this taxon depends (Ornduff, 1966; Bramlet, 1993b). Coulter’s goldfields require irregular seasonal inundation or flooding for seed dispersal, germination, and habitat maintenance. This plant is restricted to wetter areas within the alkali habitat, particularly lake margins, playa borders, and vernal pools. Coulter’s goldfields usually flowers from February through June (Skinner and Pavlik, 1994). Because of its annual habit and reliance on periodic inundation, population size varies considerably from year to year, and is difficult to recognize in dry years or after recent disturbance such as discing. Habitat that is impacted by discing or dry land farming activities may require several years without disturbance before reforming after flooding events or a wet winter.

**Conservation**
Unknown.
Coulter's Goldfields Distribution in California based on 132 Observations contributed to the CalFlora Occurrence Library

Blue indicates that there is a specimen from this county in a participating herbarium. Specimens have the highest reliability of identification.

Light Blue indicates a documented observation that is vouchered or confirmed by an expert.

Lavender indicates other reported observations that are unvouched.

Mustard Yellow indicates the county falls within the described species range published in botanical literature.

Colusa [1]
Kern [8]
Los Angeles [11]
Orange [13]
Riverside [34]
Santa Barbara [24]
San Bernardino [3]
San Diego [19]
San Luis Obispo [5]
Tehama [2]
Tulare [3]
Ventura [6]
**Literature Cited**


Jones's layia  
*Layia jonesii*
Class: Dicotyledoneae  
Order: Asteridae  
Family: Asteraceae – Sunflower Family

**Legal Status**

**Federal:** Species of Concern  
**State:** None  
**CNPS Ranking:** List 1B, 3-2-3  

**Source:** CNPS

**Species Description**
Jones’s layia is an annual herb that is 7–55 cm tall. The leaves are less than 7 cm, linear to oblanceolate. The ray flowers are 5–10 mm, yellow and white-tipped (Jepson, 2003).

**Habitat and Habitat Associations**
Jones’s layia is found on serpentine or clay-based chaparral and valley grassland habitats.

**Range**
Jones’s layia is endemic to California. Within San Luis Obispo County, this species is found primarily from the Cayucos area south to San Luis Obispo. It is located at elevations of 5-400 m (CNPS, 2001).

**Key Populations in LOHCP Plan Area**
There is the low potential that the Jones’s layia is in the LOHCP Plan Area. There is no suitable habitat in the LOHCP Plan Area. The CNDDDB (2002) and existing literature have no record of known occurrence for the Jones’s layia within the LOHCP Plan Area.

Calflora has 21 specimens, 9 documented occurrences and 1 in existing literature in San Luis Obispo County, mostly occurring throughout the community of Morro Bay.

**Biology**

**Reproduction:** Blooms from March through May (CNPS, 2001).

**Dispersal:** No information was found in the literature.

**Threats**
Unknown.

**Special Biological Considerations**
Unknown.
Conservation
Unknown

Jones's Layia Distribution in California based on 33 Observations contributed to the CalFlora Occurrence Library

Blue indicates that there is a specimen from this county in a participating herbarium. Specimens have the highest reliability of identification.

Light Blue indicates a documented observation that is vouchered or confirmed by an expert.

Lavender indicates other reported observations that are unvouchered

Mustard Yellow indicates the county falls within the described species range published in botanical literature

Monterey [2]
San Luis Obispo [31]
Literature Cited


Curly-leaved monardella
*Monardella undulata*
Class: Dicotyledoneae
Order: Lamiales
Family: Lamiaceae – Mint Family

**Legal Status**
- **Federal:** Species of Concern
- **State:** None
- **CNPS Ranking:** List 4, 1-2-3

**Source:** Brother Alfred Brousseau

**Species Description**
Curly-leaved monardella is an annual herb. It grows up to 1 foot tall; branching, erect stems with several terminal purple flowers having 5 petals; wavy leaf margins (Jepson, 2003).

**Habitat and Habitat Associations**
Curly-leaved monardella occurs on coastal dunes and sandy backshores. Plant communities where it can be found include closed-cone coniferous forest, chaparral, coastal dunes, coastal prairie, coastal scrub, and lower montane coniferous forest. Found at elevations up to 305 m (CNPS, 2001).

**Range**
Curly-leaved monardella is found from Marin to Santa Barbara Counties, California (CNPS, 2001).

**Key Populations in LOHCP Plan Area**
There is the moderate potential that the curly-leaved monardella is in the LOHCP Plan Area. There is suitable habitat in the LOHCP Plan Area. The CNDDB (2002) and existing literature have no record of known occurrence for the curly-leaved monardella within the LOHCP Plan Area.

Calflora has 8 specimens, 1 documented occurrences and 1 in existing literature in San Luis Obispo County.

**Biology**
- **Flowing Period:** Blooms May through September (CNPS, 2001).

  - **Dispersal:** No information was found in the literature.

**Threats**
Threats include coastal development, sand mining, and non-native plants (CNPS, 2001).
Special Biological Considerations
Unknown.

Conservation
Unknown.

Curly-leaved Monardella Distribution in California based on 67 Observations contributed to the CalFlora Occurrence Library

Blue indicates that there is a specimen from this county in a participating herbarium. Specimens have the highest reliability of identification.

Light Blue indicates a documented observation that is vouchered or confirmed by an expert.

Lavender indicates other reported observations that are unvouchered.

Mustard Yellow indicates the county falls within the described species range published in botanical literature.

Monterey [9]
Marin [16]
Santa Barbara [15]
San Benito [1]
Santa Cruz [4]
San Francisco [4]
San Luis Obispo [10]
San Mateo [1]
Sonoma [4]
Ventura [1]
Literature Cited


Short-lobed broomrape
*Orobanche parishii* ssp. *brachyloba*
Class: Dicotyledoneae
Order: Lamiales
Family: Orobanchaceae - Broom-rape Family

**Legal Status**
- **Federal:** None
- **State:** Species of Special Concern
- **CNPS Ranking:** List 4, 1-2-2

**Species Description**
Short-lobed broomrape is a perennial parasitic herb that is small, spicate or weakly paniculate. It is a downy, glandular root parasite lacking green leaves and having an elongated axis with alternate scales and pediculate, yellow flowers (Jepson, 2003).

**Habitat and Habitat Associations**
Short-lobed broomrape is found in coastal bluff scrub and coastal dunes.

**Range**
Short-lobed broomrape is found in San Diego County, San Luis Obispo County, San Nicolas Island, Santa Catalina Island, Santa Cruz Island, San Miguel Island, Santa Rosa Island, Baja California and Isla Guadalupe, Mexico. It is located at elevations from 3-305 m (CNPS, 2001).

**Key Populations in LOHCP Plan Area**
There is the low potential that the Short-lobed broomrape is in the LOHCP Plan Area. There is low suitable habitat in the LOHCP Plan Area. The CNDDB (2002) and existing literature have no record of known occurrence for the short-lobed broomrape within the LOHCP Plan Area. Calflora has 1 specimen, 1 documented occurrence and 1 in existing literature in San Luis Obispo County.

**Biology**
- **Flowing Period:** Blooms April through October (CNPS, 2001).
- **Dispersal:** No information was found in the literature.

**Threats**
Unknown.

**Special Biological Considerations**
It is a parasite on shrubs for example *Isocoma menziesii* (CNPS, 2001).

**Conservation**
Short-lobed Broomrape Distribution in California based on 76 Observations contributed to the CalFlora Occurrence Library

Blue indicates that there is a specimen from this county in a participating herbarium. Specimens have the highest reliability of identification.

Light Blue indicates a documented observation that is vouchered or confirmed by an expert.

Lavender indicates other reported observations that are unvouched.

Mustard Yellow indicates the county falls within the described species range published in botanical literature.

Los Angeles [3]
Santa Barbara [31]
San Diego [5]
San Luis Obispo [3]
Ventura [29]
Literature Cited


Adobe Sanicle
*Sanicula maritima*
Class: Monocotyledoneae
Order: Apiales
Family: Apiaceae – Carrot Family

**Legal Status**
- **Federal:** Species of Concern
- **State:** Rare, 1981
- **CNPS Ranking:** 1B, 3-3-3

**Species Description**
Adobe sanicle grows as a stout, aromatic, perennial herb with large basal leaves, smaller upper leaves, and yellow flowers in head-like clusters (CDFG, 2002).

**Habitat and Habitat Associations**
It is found in wet to dry clay soils of coastal prairie and coastal sage scrub plant communities (CDFG, 2002).

**Range**
Adobe sanicle is endemic to California (Lum, K-L. 1975). Its distribution is centered in the coastal hills of San Luis Obispo and Monterey counties with additional historical records from the San Francisco Bay Area. Fewer than 10 occurrences of adobe sanicle are still extant and all but two, located in the Los Padres National Forest and Andrew Molera State Park, are privately owned. It can be found at elevations of approximately 150 meters (CDFG, 2002).

**Key Populations in LOHCP Plan Area**
There is the low potential that the Adobe sanicle is in the LOHCP Plan Area. The only record of a known occurrence near the LOHCP Plan Area is around Cerro Romauldo Peak. The CNDDB (2002) and existing literature have no record of known occurrence for the Adobe sanicle within the LOHCP Plan Area.

Calflora has 10 specimens, 11 documented occurrences and 1 in existing literature in San Luis Obispo County, with the majority of occurrences around Cerro Romauldo Peak and San Simeon.

**Biology**
- **Flowing Period:** Blooms February through May (CNPS, 2001).
- **Dispersal:** No information was found in the literature.

**Threats**
Threatened by urbanization (CNPS, 2001).
Special Biological Considerations
Unknown.

Conservation
Adobe sanicle would benefit from protection of both the privately and publicly owned occurrences. Studies to determine its ecological requirements would also aid efforts to protect this plant (CDFG, 2002).

Adobe Sanicle Distribution in California based on 32 Observations contributed to the CalFlora Occurrence Library

Blue indicates that there is a specimen from this county in a participating herbarium. Specimens have the highest reliability of identification.

Light Blue indicates a documented observation that is vouchered or confirmed by an expert.

Lavender indicates other reported observations that are unvouchered.

Mustard Yellow indicates the county falls within the described species range published in botanical literature.

Alameda [2]
Monterey [3]
San Francisco [5]
San Luis Obispo [22]
**Literature Cited**


Cuesta Pass checkerbloom

*Sidalcea hickmanii* ssp. *anomala*

Class: Dicotyledoneae

Order: Malvales

Family: Malvaceae – Mallow Family

**Legal Status**

- **Federal:** Species of Concern
- **State:** Rare, 1979
- **CNPS:** 1B, 3-2-3

**Species Description**

Cuesta Pass checkerbloom is a perennial herb that is distinguished by its covering of grayish, star-shaped hairs, rounded basal leaves and deeply lobed stem leaves and pinkish-lavender flowers above broad bracts.

**Habitat and Habitat Associations**

It grows in open sites on serpentine rock and soils at in the vicinity of Sargent cypress forest. It is restricted to a small area of San Luis Obispo County on West Cuesta Ridge.

**Range**

Cuesta Pass checkerbloom is found exclusively on West Cuesta Ridge just north of San Luis Obispo in San Luis Obispo County. The elevation of the population is 600-800 m.

**Key Populations in LOHCP Plan Area**

There is the low potential that the Cuesta Pass checkerbloom is in the LOHCP Plan Area. The only record of a known occurrence is limited to the vicinity of West Cuesta Ridge. The CNDDB (2002) and existing literature have no record of known occurrence for the Cuesta Pass checkerbloom within the LOHCP Plan Area.

Calflora has 10 specimens, 6 documented occurrences and 1 in existing literature in San Luis Obispo County, with the majority of occurrences on Cuesta Ridge.

**Biology**

- **Flowing Period:** Blooms May through June (CNPS, 2001).

- **Dispersal:** No information was found in the literature.

**Threats**

Historically threatened by vehicle off-roading (DFG, 1988).
**Special Biological Considerations**

Extremely limited population. The Highway 41 wildfire of August 1994 burned tens of thousands of acres in Los Padres National Forest. Prior to the fire, this population consisted of fewer than 50 individuals. Surveys in 1995 and 1996 revealed that the checkerbloom extends throughout the Cuesta Ridge Botanical Area and beyond, including most of the serpentine soils on west Cuesta Ridge and boomed to tens of thousands of individuals after the 1994 wildfire.

**Conservation**

Unknown.

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**Cuesta Pass Checkerbloom Distribution in California based on 18 Observations contributed to the CalFlora Occurrence Library**

![Map of California with color-coded information about the Checkerbloom distribution.]

- **Blue** indicates that there is a specimen from this county in a participating herbarium. Specimens have the highest reliability of identification.
- **Light Blue** indicates a documented observation that is vouchered or confirmed by an expert.
- **Lavender** indicates other reported observations that are unvouched.
- **Mustard Yellow** indicates the county falls within the described species range published in botanical literature.

- Santa Barbara [1]
- San Luis Obispo [17]
Literature Cited


California seablite
*Suaeda californica*
Class: Dicotyledoneae
Order: Caryophyllales
Family: Chenopodiaceae (Goosefoot)

**Legal Status**
- **Federal:** Endangered
- **State:** None
- **CNPS:** 1B, 3-3-3

**Source:** CNPS

**Species Description**
California seablite is a succulent-leaved perennial plant (Jepson, 2003).

**Habitat and Habitat Associations**
California seablite is found in coastal salt marshes and swamps. The shrubs are discontinuously distributed in a narrow band around the Bay adjacent to other marsh plants including *Salicornia* sp. (pickleweed), *Distichlis spicata* (saltgrass), *Juncus acutus* (rush), *Jaumea carnosa* (Jaumea), and *Frankenia salina* (Frankenia) and the federally endangered *Cordylanthus maritimus* ssp. *maritimus* (salt marsh birds-beak).

**Range**
*Suaeda californica* occurs along the perimeter of Morro Bay, where it is restricted to the upper intertidal zone within coastal marsh habitat. The distribution of *S. californica* around Morro Bay was recently mapped (Hillaker 1992). On the East Side of the bay, colonies occur adjacent to the communities of Morro Bay, Baywood Park and Cuesta by the sea, though it apparently is absent from the more interior portion of the marshlands that are created by Chorro Creek runoff. On the West Side of the bay, *S. californica* is found along most of the length of the spit excepting the northern flank adjacent to the mouth of the bay. Elkhorn Slough in Monterey Bay is the only other remaining location considered being potential habitat for *S. californica* on the California coast (Dirk Walters, 1991), but this area has not been recently surveyed.

**Key Populations in LOHCP Plan Area**
California seablite is known within the LOHCP Plan Area. The CNDDB (2002) has one records of known occurrence for California seablite within the LOHCP Plan Area, which is in Baywood Park at Sweet Springs Marsh.

Calflora has 3 specimens, 8 documented occurrences and 1 in existing literature in San Luis Obispo County, with mainly occurrences in Morro Bay. The CNDDB has other occurrences within Morro Bay State Park and Montana de Oro State Park.

**Biology**
- **Flowing Period:** Blooms July through October (CNPS, 2001)
Dispersal: No information was found in the literature.

Threats
All three stands are threatened by recreational activity on the tidal flats and erosion from changing hydrologic conditions in the intertidal zone. Sedimentation of the Bay from the Los Osos Creek and Chorro Creek watersheds has altered the abundance and distribution of marsh habitat on the east side of the bay. Dredging of the Bay may alter subsurface currents and affect shoreline stability.

Special Biological Considerations
California seablite's colonial habit makes it difficult to determine the total number of individuals comprising the species. One estimate places the number of individuals at no more than 500 (McLeod, 1991b).

Conservation
Unknown.
California Seablite Distribution in California based on 47 Observations contributed to the CalFlora Occurrence Library

- **Blue** indicates that there is a specimen from this county in a participating herbarium. Specimens have the highest reliability of identification.
- **Light Blue** indicates a documented observation that is vouchered or confirmed by an expert.
- **Lavender** indicates other reported observations that are unvoucheded.
- **Mustard Yellow** indicates the county falls within the described species range published in botanical literature.

Counts:
- Alameda [17]
- Contra Costa [1]
- Los Angeles [1]
- Monterey [1]
- Orange [1]
- Santa Barbara [2]
- Santa Clara [4]
- San Diego [2]
- San Francisco [2]
- San Luis Obispo [12]
- Sonoma [2]
- Ventura [1]
Literature Cited


**Spiraled old man's Beard**  
*Bryoria spiralisfera*  
Class:  
Order:  
Family: Usneaceae

**Legal Status**  
**Federal:** None  
**State:** None  
**CNPS Ranking:** 1B, 3-3-3

**Species Description**  
Spiraled old man's Beard is a foliose lichen that is a dark to pale reddish-brown, filamentous, epiphytic lichen. It has short pendant thallus, 6-7 cm long with obvious long (< 4 mm), white, linear sometimes furrowed pseudocyphellae, most twisted in long spirals around the branches. Other features are the numerous short, slender perpendicular branches, paler than the main branches. Main branches are 0.2-0.25 mm in diameter, uneven in cross section, and straight to twisted. Branching pattern is isotomic dichotomous at the base, with main branches becoming anisotomic dichotomous. It has an absence of true lateral spinules, isidia, and soralia. Apothecia and pycnidia are unknown (Brodo and Hawksworth, date unknown).

**Habitat and Habitat Associations**  
Spiraled old man's Beard grows on exposed trees and shrubs on forested, coastal, windswept dunes and headlands at or near sea level. It hands down from the twigs and branches of large older shrubs of oak trees. It requires frequent fog and other ocean-influenced climatic, vegetative and edaphic factors (Brodo and Hawksworth, date unknown).

**Range**  
Spiraled old man's Beard is rare, endemic to coastal Oregon and California. is a rare lichen, endemic to coastal California and Oregon. In California, it is known from Humboldt County (Samoa Peninsula, Patricks Point State Park, Humboldt Lagoons State Park, Cove State Beach), Monterey County (Point Lobos), Sonoma County (Stewart's Point Road), and San Luis Obispo County (Baywood Park). It occurs at elevations up to 50 m and within 3 km of the ocean (Brodo and Hawksworth, date unknown).

**Key Populations in LOHCP Plan Area**  
Spiraled old man's Beard is known within the LOHCP Plan Area. Spiraled old man's Beard is known from only six populations in California with three being in the Los Osos and Baywood Park area (Riefner et al., 1995).

**Biology**  
**Reproduction:** Spiraled old man's Beard reproduces asexually by thallus fragmentation. Smaller asexual propagules containing both fungal and algal partners (for example, soredia
or isidioid spinules) are absent for this species, and sexual reproductive structures (fungal apothecia) have never been observed (Brodo and Hawksworth, 1977).

Like other pendent lichens in the genera *Alectoria*, *Bryoria* and *Usnea* that reproduce by thallus fragmentation (Esseen *et al.* 1981, Stevenson 1988, Dettki 1998), Spiraled old man's Beard reproduces effectively over short distances (within a few hundred meters) but is may be dispersal limited over long distances. Many lichens produce microscopic sexual and asexual propagules that are dispersed long distances by wind, animals, or birds (Bailey 1976). The thallus fragments of Spiraled old man's Beard are less likely to be carried as far by wind or animal vectors. Because the habitat is rare, even propagules, which are transported across long distances, are unlikely to encounter conditions suitable for establishment. In addition, because current populations are widely separated, and because *B. spiralifera* apparently lacks the means for sexual reproduction, genetic diversity within populations may be low and exchange of genetic material between populations may be absent (Brodo and Hawksworth, date unknown).

**Dispersal:** Effective dispersal over a few hundred meters. Asexual propagules of Spiraled old man's Beard unlikely to disperse and establish as far and as successfully by wind or animal vectors because of the very limited requirements for establishment (Brodo and Hawksworth, date unknown).

**Threats**
Threats include trampling from recreation, harvesting trees, road, trail and building construction, invasive exotic plants, burning, grazing, changes in local hydrology and air pollution (Brodo and Hawksworth, date unknown).

**Special Biological Considerations**
No information was found in the literature.

**Conservation**
The objective of managing in habitat areas is to maintain the habitat conditions for Spiraled old man's Beard. Specific recommendations are to:

- Determine the extent of the local population and habitat area with a site visit.
- Maintain suitable habitat around the current host trees and shrubs, so that the lichen may have adequate new substrate as current substrates decline.
- Develop practices to route human use away from the populations in habitat areas (for example, divert roads, trails and off-road vehicles). Trampling shrubs or cryptogam mats, compacting roots, damaging trees or branches that serve as substrates, introducing non-native species by seed dispersal or planting, can all adversely affect habitat integrity.
- Avoid harvesting trees, shrubs, or other vegetation from the population and the habitat area unless these actions would do no harm to, or would improve, the habitat for Spiraled old man's Beard (for example, by preventing deeply shaded conditions or by removing invasive exotics).
• Prevent fire in the population but utilize or prevent fire in habitat areas, depending on the plant community, according to management guidelines suggested by Christy et al. (1998).
• Maintain integrity of the foredunes where they protect habitat areas.
• Restrict commercial collection of moss or fungi or other special forest products if these activities would adversely affect the integrity of habitat areas (Brodo and D Hawksworth).
**Literature Cited**


Los Osos black and white lichen
*Hypogymnia mollis*

Class:
Order:
Family: Parmeliaceae

**Legal Status**
- **Federal:** None
- **State:** None
- **CNPS Ranking:** 1B, 3-3-3

**Species Description**
Los Osos Black and White Lichen is an uncommon bicolored epiphytic foliose lichen that has small, hollow, pale gray green, tube-like thallus lobes which are short and stubby; 2 mm wide. It is whitish on top and lack below both on the outer surfaces of the plant and inside the hollow tubes. The surface is covered with diffuse soredia (Hale and Cole, 1988). The upper cortex is wrinkled, becoming sorediate, older portions of the thallus sorediate over entire surface; interior of lobes darkening (Von Reis, 1991; Fugro, 1997).

**Habitat and Habitat Associations**
The Los Osos black and white lichen grows on bark and twigs of trees and older shrubs of Coast Live Oak Woodland, Coastal Scrub, and Chaparral in the fog belt region of California.

**Range**
Occurs in Monterey, Riverside, San Diego and San Luis Obispo Counties (Hale and Cole, 1988; Fugro, 1997).

**Key Populations in LOHCP Plan Area**
Los Osos Black and White Lichen occurs in the LOHCP Plan Area. It is found on bark at Los Osos Oaks State Reserve, on *Ceanothus*, and wood at Los Osos, on *Arctostaphylos morroensis* by Turri Creek, on *Artemisia californica* and *Ceanothus cuneatus* at El Morro Elfin Forest. Also referenced by Bratt (1967) as found on *Quercus, Adenostoma, Ceanothus, Haplopappus* and *Salvia* at Los Osos Oaks State Reserve (Von Reis, 1991).

**Biology**
- **Reproduction:** No information was found in the literature.
- **Dispersal:** No information was found in the literature.

**Threats**
No information was found in the literature.
Special Biological Considerations
Similar to *H. tubulosa* (Hale and Cole, 1988).

Conservation
No information was found in the literature.
Literature Cited


Von Reis, Jennifer Brown Clarke. *Lichens of California State University, San Luis Obispo and Other Selected Areas of San Luis Obispo County.* A Thesis Presented to the Faculty of California State University, San Luis Obispo. June, 1991.
Long-fringed White Parmotrema  
*Parmotrema hypolecinum*  
Class:  
Order:  
Family: Parmeliaceae

**Legal Status**  
- **Federal:** None  
- **State:** None  
- **CNPS Ranking:** 1B, 3-3-3

**Species Description**  
Long-Fringed White Parmotrema is an epiphyte foliose lichen with a white-surfaced thallus with long hair-like fringes along the edges of the thallus lobes. There is a wide white area on the lower surface’s edge (Brodo et al., 2001). This lichen is endemic to the Los Osos region and rare throughout its range (Fugro, 1997).

**Habitat and Habitat Associations**  
Long-Fringed White Parmotrema occurs on bark and twigs of trees and older shrubs in Coast Live Oak Woodland, Chaparral, Coastal Scrub and Arroyo Willow Series (Fugro, 1997).

**Range**  
The fog belt of central and southern coastal California including Marin, San Luis Obispo, Santa Barbara, Ventura, Los Angeles, Orange, San Diego Counties (Fugro, 1997).

**Key Populations in LOHCP Plan Area**  
Long-Fringed White Parmotrema is known to occur in the LOHCP Plan Area. Long-Fringed White Parmotrema was collected from *Myrics californica* at Turri Road site and chamise (chaparral) at Calle Cordoniz (Fugro, 1997).

**Biology**  
- **Reproduction:** No information was found in the literature.  
- **Dispersal:** No information was found in the literature.

**Threats**  
No information was found in the literature.

**Special Biological Considerations**  
No information was found in the literature.

**Conservation**  
No information was found in the literature.
Literature Cited

Splitting yarn lichen  
*Sulcaria isidiifera*  
Class:  
Order:  
Family: Ramalinaceae  

**Legal Status**  
Federal: Species of Concern  
State: None  
CNPS Ranking: 1B, 3-3-3

**Species Description**  
Splitting yarn lichen is a short shrubby species with many isidia (Brodo et al., 2001). It is fruticose lichen that’s thallus is dull yellowish-white grading into light brown and reddish-brown at the more exposed tips; rarely shades of olive-grey in places. The main branching isotomic to anisotomic dichotomous, with ± perpendicular spinulose branches developing from splits in the thallus; branches splitting lengthwise and opening into rather wide, linear soralia filled with spinulose isidia and spinules, often with brown tips; main branches 0.3-0.5 mm wide; secondary branches 0.15-0.3 wide; branches fairly even and smooth except for the sulci and isidial development; branches very brittle (Brodo, 1986).

**Habitat and Habitat Associations**  
Splitting yarn lichen is an epiphyte on branches of *Quercus agrifolia, Adenostoma fasciculatum,* and *Ceanothus ramulosus* in sandy areas on branches of oaks and shrubs; 20-30 meters. Grows on shrubs and herbs (such as monkey flower) and is found only rarely on oaks (Brodo, 1986).

**Range**  
Splitting yarn lichen is endemic to Los Osos (Von Reis, 1991).

**Key Populations in LOHCP Plan Area**  
Splitting yarn lichen is known to occur in the LOHCP Plan Area. The CNDDB (2002) has two records of known occurrence for Splitting yarn lichen within the LOHCP Plan Area. They are in the Los Osos Oaks State Reserve, north of the town of Baywood, south of Morro Bay State Park. It has been observed on *Adenostoma fasciculatum* in El Morro Elfin Forest. Has been found growing mixed with *Bryoria capillaris* (Von Reis, 1991).

**Biology**  
Reproduction: No information was found in the literature.

Dispersal: No information was found in the literature.

**Threats**  
Threats include overcollecting, being overgrown by other plants like *Toxicodendron diversilobum,* and development (CNDDB, 2002).
**Special Biological Considerations**
No information was found in the literature.

**Conservation**
No information was found in the literature.
Literature Cited


Charis Bratt, Lichenologist, Santa Barbara Botanic Garden, Santa Barbara, CA.


Von Reis, Jennifer Brown Clarke.  *Lichens of California State University, San Luis Obispo and Other Selected Areas of San Luis Obispo County.* A Thesis Presented to the Faculty of California State University, San Luis Obispo. June, 1991.