Species Accounts - Birds

California brown pelican

Pelecanus occidentalis californicus

State	Endangered	1971
	Fully Protected	
Federal	Endangered	1970

General Habitat:

The California brown pelican uses a variety of natural and human-created sites, including offshore islands and rocks, sand spits, sand bars, jetties, and piers, for daytime loafing and nocturnal roosting. Preferred nesting sites provide protection from mammalian predators and sufficient elevation to prevent flooding of nests. The pelican builds a nest of sticks on the ground, typically on islands or offshore rocks. Their nesting range extends from West Anacapa Island and Santa Barbara Island in Channel Islands National Park to Islas Los Coronados, immediately south of and offshore from San Diego, and Isla San Martín in Baja California Norte, Mexico.

Description:

The brown pelican is one of two species of pelican in North America; the other is the white pelican. The California brown pelican is a large, grayish-brown bird with a long, pouched bill. The adult has a white head and dark body, but immature birds are dark with a white belly. The brown pelican weighs up to eight pounds and may have a wingspan of seven feet. Brown pelicans dive from flight to capture surface-schooling marine fishes.

Status:

The California brown pelican currently nests on West Anacapa Island and Santa Barbara Island in Channel Islands National Park. West Anacapa Island is the largest breeding population of California. In Mexico, the pelicans nest on Islas Los Coronados and Isla San Martín. Historically, the brown pelican colony on Islas Los Coronados was as large as, or larger than, that of recent years on Anacapa Island. Continued human disturbance and possible fishery overexploitation caused near-abandonment of this colony in the 1980s. Breeding still occurs on Islas Los Coronados, but it has been inconsistent and the colony size is much reduced from historical numbers. After

breeding, the pelicans disperse northward along the coast of California to Oregon and Washington and occasionally as far north as British Columbia. Pelicans from the Mexico nesting colonies mix with the California birds during this period, resulting in large numbers of pelicans along the California coast in late summer and fall. During post-breeding dispersal, it is particularly important for the pelicans to have safe resting areas by day, and night roost locations free from predators and human disturbance.

Reproductive success of the brown pelican colony on Anacapa Island has been monitored each year since 1970 (with the exception of 1995). Pelicans breeding in southern California and northern Mexico suffered near total reproductive failure in the late 1960s and early 1970s. The lack of nesting success was caused primarily by egg breakage due to excessive shell thinning associated with high levels of DDE, the primary metabolic derivative of the pesticide DDT. The influence of DDE was so great in the decade of the mid-1960s and 1970s that it masked all other potential limiting factors. As the levels of DDE in the southern California coastal ecosystem declined, pelican breeding success gradually improved, and researchers began to measure other factors, especially food availability, that potentially affected pelican breeding success. By the mid-1980s, the number of pairs breeding had dramatically increased to levels that exceeded reported mean historical numbers. Pelican nesting is also monitored on Santa Barbara Island by the National Park Service. Currently, DDE concentration in pelican eggs is at a level that appears to have little to no effect on breeding success.

Pelicans have a somewhat protracted breeding season, and the initiation dates for nesting can vary considerably from year to year. The average onset of nesting during the period of 1970-2002 was mid to late February. The earliest date for nest initiation was in late December 1985, while the latest was in early May in both 1972 and 1975. Pelicans have a 30-day incubation period, and chicks usually fledge when 13-14 weeks old. Although uncommon, fledging can occur as young as 10 weeks. The last chicks to fledge in 2003 left West Anacapa Island by mid-September. The total breeding effort (i.e., number of pairs nesting) on West Anacapa in 2003 was about 2,700; considerably less than the 6,440 nests reported for 2002 (the 2002 breeding effort was the largest on record). The 2003 colony size was 29 percent smaller than the long-term 1979-2002 mean of 3,778 pairs. In 2003, pelicans had above-average productivity of 0.71 young fledged per nest attempt, and an estimated 1,910 chicks fledged from Anacapa. Thus, despite the relatively small breeding effort, overall productivity was about 8 percent higher than the 1979-2002 mean of 0.65. The smaller 2003 colony size is probably due to limited local food supplies resulting from low level El Niño conditions early in the breeding season.

Natural cycles in the marine environment, both short and long term, affect prey abundance and pelican reproductive success relative to food availability is currently under investigation. The ongoing studies of pelican diet are needed to help explain why pelicans in California have been unable to meet recovery plan levels for productivity. Pelican productivity (the number of chicks fledged per adult pair) has been well correlated to anchovy fluctuations; in years when anchovies are abundant, pelicans almost always have higher reproductive rates. Dietary components are determined by examining regurgitations of pre-fledged chicks at Anacapa Island. Previous studies (1972-1980) documented an extremely high dependence on northern anchovies. At that time, anchovies were the primary surface-occurring, schooling prey species available in the breeding range of the species. During the 1980s, Pacific mackerel populations began increasing and were observed more frequently in pelican diet. At the same time, Pacific sardine populations along the California coast were depressed and not found in pelican food samples. Sardines in the region began recovering in the mid-1980s, but were not observed in pelican food samples until 1993. Recent preliminary data indicate that sardines have now become a major food source, along with anchovies.

Other factors affecting pelican population size include oil spill mortality, human disturbance, domoic acid poisoning, fish hook/line mortality, and direct shooting or maiming. For example, more than 100 pelicans were accidentally hooked by recreational fishermen in the Santa Cruz area when anchovies swarmed near the Santa Cruz pier in August 2001. An additional 50 birds had been found injured earlier in the summer. Other pelicans were observed with fishing line or hooks, but could not be captured. Because pelicans can mistake fishing lures for their natural food, this problem is most intense at fishing piers where pier fishing is very popular and where

pelicans often roost. A cooperative public education effort was undertaken after this large mortality event to better inform fishermen of ways to avoid pelican injury and mortality. In 2003, over 20 pelicans were found shot or maimed, primarily in the southern California area, and additional birds were found wounded in the San Francisco Bay Area. The International Bird Rescue Research Center and the International Fund for Animal Welfare stepped in to rehabilitate the injured birds.

The brown pelican nesting population in California appears stable at this time, though low productivity relative to pelican populations elsewhere is still a cause for concern and in need of further investigation. Protection of daytime and nocturnal roost sites is a high management priority, and opportunities for roost site enhancement and expansion should be pursued. Additional public education efforts are also necessary to reduce injury and mortality to pelicans from fish hooks and fishing line, and to reduce human disturbance of pelicans at nest and roost sites.

California condor *Gymnogyps californianus*

State: Endangered 1971
Fully Protected
Federal: Endangered 1967

General Habitat:

Mountain and foothill rangeland and forest habitats in a U-shaped range north from northern Los Angeles County to San Luis Obispo County in the Coast Range and to Tulare County in the western Sierra Nevada comprise habitat for the California condor. Nesting sites have been mainly on cliffs in the southern part of this range. Foraging areas are primarily in grasslands and open woodlands in the foothills, where the condors feed on carrion.

Description:

The California condor, a large vulture, has the greatest wingspread of any North American land bird. Its wingspan exceeds nine feet and it may weigh more than 20 pounds. Adults are black with a pink-orange head, and there is a white patch under each wing. It is the only living representative of this genus.

Status:

Historically, condors were widespread in western North America from British Columbia to Baja California. The species has been fully protected under state statute since 1953. By the early 1980s, they were restricted to mountains and foothills around the San Joaquin Valley, and the population dipped to about 22 birds. A major effort was begun in 1980 to determine causes for the decline and to attempt to reverse it, but that help came too late. In a last-ditch effort to avert extinction, the wild condors were captured. All 27 remaining birds were in captivity by 1987.

More than 200 captive-bred condors were produced from 1988 to 2002 in three breeding facilities in southern California and Idaho. Releases began in southern California in 1992, central coastal California and northern Arizona in winter 1996-97, and northern Baja California in 2002. On average, about 20 juveniles are being released to the wild annually. Three disjunct populations exist: southern California's historical range, Arizona/Utah, and northern Baja California.

The total condor population from January 1, 2000 to September 1, 2003 grew from 159 to 222 birds; total wild population grew from 54 to 85. The wild population in California in that time span increased from 25 to 44 birds. The first eggs were laid in the wild in 1991 in California and Arizona but failed to hatch; first hatchings in the wild of wild-laid eggs occurred in three California nests in 2002, but all three chicks died. In 2003, one chick in

California and one in Arizona were being raised and may be the first to be fledged into the wild in 21 years.

Mortality of condors released to the wild continues to slow recovery progress, but mortality rate in has declined in recent years. Less than 9% of birds in the wild through August 2003 died or had to be removed from the wild population during those two years. The loss was about 20% for 1999-2000 and about 15% for 1997-98. Unusually high losses in the Arizona population in 2000 (11 deaths and 2 removals) was followed by relatively low losses (5 deaths and 1 removal) from 2001 through August 2003, combined.

In California, deaths totaled six in 1999, five in 2000, four in 2001, and three in 2002 and nine in 2003. Also, about one bird per year is removed from the wild, usually for behavioral reasons, but the rate of removal in the past three years is lower than for previous ones. From 2000 through August 2003, causes of death of wild birds were determined for nine individuals: four - power line collision or electrocution; one - lead poisoning; one - shooting; one - predation; one - malnutrition; and one additional possible lead poisoning. The shooting case ended in a conviction.

Activities during 2003 included the following:

- all captive and wild condors were inoculated with a new avian vaccine for West Nile Virus;
- the DFG contracted for radio tracking and other monitoring of all condors in California (late 2002 and early 2003);
- an independent review of exposure of lead to condors in California was competed by University of California, Davis, under Department contract;
- the DFG continued to participate on the interagency Condor Recovery Team;
- the DFG participated in a subcommittee of the team comprising representatives of the firearms industry, shooting sports groups, conservation organizations, State wildlife agencies of California and Arizona, experts in the social science fields, and selected members of the recovery team in preparing a report and establishing mechanisms to reduce lead exposure to condors;
- the Fish and Game Commission in August approved the Department's recommendations for revision and renewal of Memoranda of Understanding for condor research and captive breeding by U.S. Fish and Wildlife Service and the captive breeding facilities.

Bald eagle *Haliaeetus leucocephalus*

State	Endangered	1971
	Fully Protected	
Federal	Endangered	1967
	Threatened	1995
	Proposed Delisted	1999

General Habitat:

Bald eagles occupy various woodland, forest, grassland, and wetland habitats. They winter throughout most of California at lakes, reservoirs, rivers, and some rangelands and coastal wetlands. The breeding range is mainly in mountainous habitats near reservoirs, lakes and rivers. Nesting territories are found mostly in the northern half of the State, and also in the southern Sierra Nevada, Central Coast Range, inland southern California south to Riverside County, and on Santa Catalina Island. Large nests are normally built in the upper canopy of large trees, typically conifers. The birds are opportunistic foragers, usually feeding on fish or waterfowl, but they also prey on other small animals and eat carrion.

Description:

The bald eagle is a large, dark brown bird of prey, which, as an adult, has a white head and tail. Eyes, beak, and feet are yellow. Adult plumage is developed at about five years of age. Wingspan may reach 7 or 8 feet, and weight is 8 to 14 pounds. Females are larger than males.

Status:

The DFG has coordinated annual, statewide breeding surveys since 1973. The breeding population continues its long-term increase in numbers and in range, although adequate documentation of these changes has not been made since 1999. Efforts by DFG to obtain statewide data declined after 1997, and have been replaced mainly with voluntary reporting by local observers. The number of breeding pairs occupying territories was 32 in 1977, 94 in 1990, 105 in 1995, and 151 in 1999. Data from most of these territories, plus a new one, have been received in at least one year from 2000 through 2003. Productivity continues to be good, with the annual number of "young produced per occupied territory of known success" averaging about 1.0 throughout the 1990s. Based on reports received, representing 30-45% of known territories each year, the ratio was 1.05 in 2001, 1.05 in 2002, and 0.86 in 2003, averaging 0.99.

In 1999, DFG had data on 190 bald eagle breeding territories that were occupied in California sometime in the 1990s. From 2001 through 2003, at least 14 new territories were discovered. The southernmost successful breeding on the mainland was documented in 2003 at Lake Hemet, Riverside County. The breeding range has expanded from portions of eight counties in 1981 to at least 32 of the California's 58 counties by 2003.

Territory data are used in pre-harvest timber planning and other local management planning to minimize disturbance and other conflicts in eagle nesting areas. The bald eagle is included in several HCPs, 2081 agreements, and other planning documents across the State.

Santa Cruz Predatory Bird Research Group (SCPBRG) has been coordinating the long-term California Midwinter Bald Eagle Survey since 2000. Winter totals vary greatly; sometimes exceeding 1,000 birds, depending on climate conditions in the western U.S., on areas surveyed, and weather conditions on the count days. In the mid-January 2003 count, 527 bald eagles were reported. SCPBRG, in cooperation with U.S. Forest Service, California Department of Parks and Recreation, and California Department of Water Resources, is tracking bald eagles by satellite telemetry to study international movements and local ecology of birds that fledge in California and of migrating birds that visit the state during the winter. In 2000, the bald eagle reintroduction program by Ventana Wilderness Society ended, after 70 bald eagles were released since 1986 to the central coast of California. Most of the breeding territories in Central Coastal California formed as a result of those releases.

On December 19, 2000, the California and federal governments settled the final remaining legal claims brought in 1990 against the Montrose Chemical Corporation and others for DDT poisoning. Settlements totaling $140 million to the state and federal governments are available for reducing exposure of people and wildlife to contaminants, e.g., DDT, and for natural resource restoration projects. Under the Montrose Settlement Restoration Program, Institute for Wildlife Studies (IWS) began releasing the first of dozens of young eagles on Santa Cruz Island in 2002, in an effort to restore a breeding population of the species on the northern Channel Islands. Bald eagles continue to be released by IWS on Santa Catalina Island, which by 2003 supported five nesting pairs.

Pacific Gas and Electric Company surveys a large proportion of California's bald eagle nests and monitors potential impacts to nesting and foraging areas in various project areas in the state, including studies required as part of Federal Energy Regulatory Commission relicensing.

Status: Increasing number of territories and an expansion in the range in the state.

Swainson's hawk *Buteo swainsoni*

State: Threatened 1983
Federal: None

General Habitat:

Swainson's hawks require large, open grasslands with abundant prey in association with suitable nest trees. Suitable foraging areas include native grasslands or lightly grazed pastures, alfalfa and other hay crops, and certain grain and row croplands. The majority of Swainson's hawk territories in the Central Valley are in riparian systems adjacent to suitable foraging habitats. Swainson's hawks often nest in proximity to riparian systems as well as utilizing lone trees or groves of trees in agricultural fields. Swainson's hawks were once found throughout lowland California and were absent only from the Sierra Nevada, north Coast Ranges and Klamath Mountains, and portions of the desert regions of the State. Today, Swainson's hawks are restricted to portions of the Central Valley and Great Basin regions where suitable nesting and foraging habitat is still available.

Description:

The Swainson's hawk is a medium-sized hawk, slightly smaller than the more common red-tailed hawk. Adult females weigh 28 to 34 ounces and males 25 to 31 ounces. There are two distinct color phases (morphs) of Swainson's hawks, light and dark, with variations in between. Hawks of the light color phase are the easiest to distinguish. They have a whitish forehead and white patch on the throat below the bill. The rest of the head, sides of the throat, patch on its chest (resembling a baby's bib), and all other upper body parts are dark brown. The belly is white, barred with brown. In flight, their wings have dark trailing edges that contrast with the light-colored leading edges and the belly. Dark color-phase individuals are entirely dark brown, except for a patch under the tail. When overhead, the trailing edges of their wings might be slightly lighter in color than the leading edges. Throughout their geographic range, hawks of the dark morph comprise only one to ten percent of the population; however, within northern California, the dark morph constitutes 35% of the population.

Status:

The loss and conversion of native grasslands and agricultural lands to various residential and commercial developments is the primary threat to Swainson's hawk populations throughout California. Additional threats are habitat loss caused by riverbank protection projects; conversion from agricultural crops that provide abundant

foraging opportunities to crops such as vineyards and orchards, which provide fewer foraging opportunities; shooting; pesticide poisoning of prey animals and hawks on foraging and wintering grounds; competition from other raptors; and human disturbance at nest sites.

Over 85 percent of Swainson's hawk territories in the Central Valley are in riparian systems adjacent to suitable foraging habitats such as native grasslands or lightly grazed pastures, alfalfa and other hay crops, and certain grain and row croplands. Unsuitable foraging habitat includes vineyards, orchards, certain row crops, rice fields, corn, and cotton fields. Nest sites may be found in mature riparian forest, lone trees or groves of oaks, other trees in agricultural fields, and mature roadside trees. Some mature landscape trees in residential areas can provide nest sites although foraging areas must occur in proximity to the nest trees. Valley oak, Fremont cottonwood, walnut, and large willow with an average height of about 58 feet, and ranging from 41 to 82 feet, are the most commonly used nest trees in the Central Valley.

About 80 percent of Central Valley population is located in Sacramento, San Joaquin, and Yolo Counties. During historical times (ca. 1900), Swainson's hawks may have maintained a population of more than 17,000 pairs. Based on a study conducted in 1994, the statewide population was estimated to be approximately 800 pairs. Additional surveys are needed to document current population levels. Surveys from 1998 to 2003 in the Owens Valley revealed a population of about 20 pairs, larger than had been documented in the 1970's and 80's. This small population is primarily centered on alfalfa fields that have suitable nest trees nearby.

The habitat conservation and management needs of the Central Valley breeding population are fairly well known. These requirements include preservation of riparian systems and groves of tall trees; preservation of lone mature trees within agricultural fields for nesting; conservation of foraging sites, such as grasslands, pastures, and croplands, within about 10 miles of nest areas; and, maintenance of agricultural practices compatible with the Swainson's hawk's foraging requirements. Nest abandonment and loss of young birds as a result of disturbance could be minimized by eliminating noise-generating construction and development activities within a 0.5 mile radius of active nests during the nesting season (March 1 to September 15). Maintaining a buffer zone, or avoidance of nest sites, is essential to the conservation of Swainson's hawk populations. Implementation of these measures can contribute substantially to the recovery of the Swainson's hawk.

Research on this species includes radio telemetry of Central Valley and Owens Valley birds by DFG and the Swainson's Hawk Technical Advisory Committee (TAC), and analysis of the genetics of the species. The TAC is an ad-hoc group composed of researchers and managers experienced with the biology and habitat requirements of the Swainson's hawk. The Wildlife Ecology Unit of the Veterinary Genetics Laboratory at the University of California, Davis is analyzing blood samples to determine genetic diversity, population structure, and taxonomic distinctiveness of Swainson's hawks in California. A portion of blood samples will be analyzed by researchers at the University of California, Davis, to determine the exposure rate to West Nile Virus of Swainson's hawks breeding in California. Another research project, funded through the State's CalFed program, assessed Swainson's hawk habitat use in a vineyard landscape in the lower Mokelumne River watershed.

In 1997, the first six Swainson's hawks from the Central Valley were fitted with satellite transmitters and tracked to determine routes of migration and the locations of wintering areas. Central Valley birds appear to winter in Mexico and Columbia, although a hawk from northeastern California was tracked to Argentina during the winter of 1996. The Central Valley birds were located wintering in a region north of Mexico City, Mexico, and near Bogota, Columbia. No birds from the Central Valley have been tracked further south. Die-offs of several thousand Swainson's hawks and other raptors from 1996 to 1998 were attributed to pesticide use at agricultural fields in Argentina. Farmer education programs and restrictions on use of highly toxic organophosphate pesticides implemented by government and industry appear to have dramatically reduced the impacts of these compounds on wintering Swainson's hawks. Continued monitoring will be required, however, to assess the long-term effectiveness of these measures.

Additional satellite transmitters were subsequently affixed in 1998 to 2001. A sample of 17 birds confirmed that the Swainson's hawks of the Central Valley migrate to a wintering area in Mexico. To date, results from this study suggest that the Swainson's hawks that winter in Mexico tend to use large, multi-site areas, and appear more nomadic in nature than migratory in the traditional sense. In addition, the birds seem to stage and roost in the same locations as they move south along the western Mexican coast; they take a great deal longer to get to their southern-most wintering areas than do individuals in other populations of North America.

Breeding habitat and population studies are ongoing in Yolo County, in the Central Valley, and in Owen's Valley. In 2002, a total of forty-nine adult Swainson's hawks and 140 young birds from Yolo County were banded with aluminum and colored leg bands. The goal of the Yolo County study is to obtain information on habitat use and nest site fidelity, as well as provide additional information on local movements and migration. The study of the population of Swainson's hawks in the Owen's Valley is currently in its fifth year. In 2003, four hawks were fitted with satellite transmitters to determine the migration route and wintering ground of this population. The DFG provided funding for the satellite transmitters used in this research; the TAC is involved in tracking the birds. The Owens Valley research presents an opportunity to track a small number of territories that are almost completely dependent on intensively managed agriculture, irrigated alfalfa fields, for foraging habitat. Findings on the habitat use and other factors from this research will assist in habitat conservation and management as well as recovery of the species elsewhere within the State.

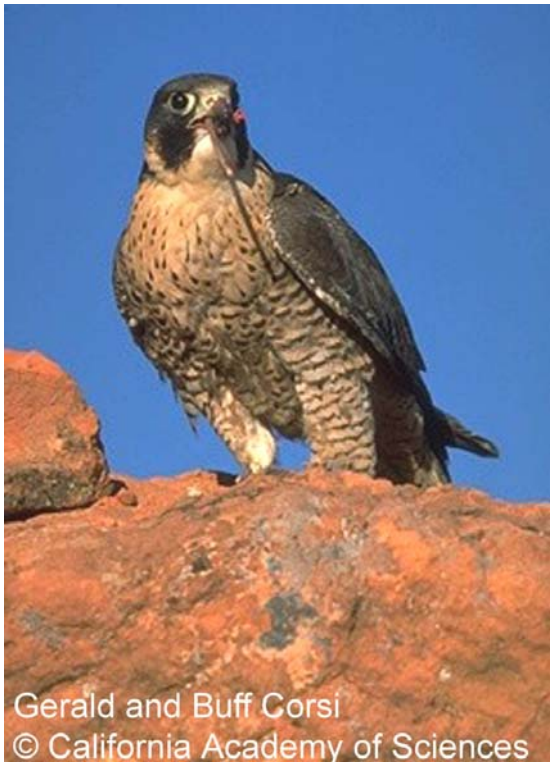
The CalFed study focused on the lower Mokelumne River watershed where vineyards have increased over the past 15 years. Preliminary surveys of hawks indicated that the Swainson's hawk might be declining in the area. In 2002 and 2003, systematic surveys of Swainson's hawk nests were conducted in the lower watershed, along with road surveys to record foraging-habitat associations. After the breeding season, nest tree variables were measured at nest sites and at random sites. Habitat selection was determined for nesting and foraging, and comparisons between use of vineyards and other available habitats were made. The analysis concluded that Swainson's hawks forage and nest in vineyard habitat less than expected by random choice, forage more in irrigated hayfields, and nest more in rural habitat. Nest sites were distinguished from random sites by larger and taller trees that were located closer to paved roads, hayfields, and to habitat edges. The area surrounding the nest tree exhibited higher habitat diversity, and a higher perimeter density than random trees. This study reinforced the importance of maintaining landscapes conducive to the Swainson's hawk in the Central Valley and also defines features that increase nest presence.

The DFG is currently engaged in Swainson's hawk recovery planning. DFG staff are updating existing nest site data bases from various sources into a data base that will provide information on the locations of Swainson's hawk nesting territories statewide. This information can form the basis for a variety of conservation and recovery actions for the species. A recovery strategy for the Swainson's hawk has long been planned by the DFG and the TAC. A mitigation policy to address impacts to the species and its habitat has been also developed but needs revision. An effective DFG mitigation policy is needed to address the continued loss of habitat and disturbance of nests sites, particularly in the Central Valley where most of the population still exists.

The current status of the Swainson's hawk in California is declining.

American Peregrine falcon *Falco peregrinus anatum*

State	Endangered	1971
	Fully Protected	
Federal	Delisted	1999



General Habitat:

The range of the American Peregrine Falcon includes most of California during migrations and in winter. The California breeding range, which has been expanding, now includes the Channel Islands, the coast of southern and central California, inland north coastal mountains, the Klamath Mountains and Cascade Range, and the Sierra Nevada. Nesting sites are typically on ledges of large cliff faces. Many pairs are nesting on city buildings and bridges, and some pairs nest in tree cavities of coastal redwoods. Nesting and wintering habitats are varied, including wetlands, woodlands, other forested habitats, cities, agricultural areas and coastal habitats. Peregrine Falcons feed on birds that are caught in flight.

Description:

This bird is a medium-sized raptor with long, pointed wings and a long tail. The adult is slate gray; its wing, tail feathers, and flanks are barred with black. The dark cap of the head extends to the cheeks and its throat is white. Coloring for the lower part of the body is nearly white, and is extensively spotted and barred with black. The legs and feet are yellow. Immature birds are brown above, streaked below. The wingspan exceeds three feet.

Status:

Beginning in the late 1970s, intensive efforts were made annually by federal and state agencies and cooperators to assess breeding population size and locations, and to collect information on breeding success. Comprehensiveness of statewide surveys of breeding status diminished since the late 1990s. A DFG-contracted statewide breeding survey was conducted during 1997 by the University of California, Santa Cruz Predatory Bird Research Group (SCPBRG), when observers checked nearly 150 known and suspected nesting areas and obtained data on at least 111 active territories (i.e., two courting adults present); productivity averaged about 1.5 young per pair. Owing to reduced availability of funding, only about half of the 193 known territories in the State could be

adequately monitored by the SCPBRG in 1998 and 1999. The Department ceased recommending projects for funding under ESA Section 6 after this species was delisted in 1999, in anticipation of post-delisting monitoring by USFWS. A 2003 national survey was supported financially by USFWS as part of its post-delisting monitoring plan.

Partial statewide surveys were made by SCPBRG from 1999 through 2003. From 1999 to 2002, 96 of the state's known territories were found to have been occupied at least one of the years; 20 percent of the territories were on man-made structures. The cumulative total of sites known to have been active at some time since 1975 increased from 202 in 1999 to 222 in 2002. Undoubtedly, many other relatively new sites have not been found. Number of active sites monitored has generally declined since 1997, ranging from 39 to 66 during 1999-2002. Reproductive outcomes were determined from most of those active sites each year, and number of young produced per active site of known outcome ranged from 1.58 to 2.72. These rates, which appear to show that reproductive success is higher than prior years, are not directly comparable to data gathered before the late 1990s, when most sites were checked annually. In those partial surveys, no attempted was made to be obtain a representative sample of the state, and site selections were biased toward easily accessible sites, especially urban sites.

The USFWS is now coordinating national monitoring efforts. When federal delisting of the Peregrine occurred in 1999, USFWS was mandated by the Federal Endangered Species act to develop a plan--in cooperation with State wildlife or natural resource agencies, recovery team members, and other cooperators--to monitor the national Peregrine population for not less than five years after delisting. The plan is designed to examine trends nationwide and to detect declines in territory occupancy, nest success, and productivity in six regions across the U.S. Data are being collected from a randomly selected subset of Peregrine territories for five sampling periods, at three-year intervals. The monitoring started in 2003 and will end in 2015. Monitoring efforts include collecting samples of addled eggs and of feather for contaminant analyses.

After a trial monitoring effort in the Pacific states region in 2002, 96 randomly chosen Peregrine nest sites in Washington, California, Oregon, Idaho, and Nevada were monitored in 2003. Under the USFWS-funded effort, 30 territories were sampled in California. The Pacific region's overall occupancy was 86% (93% in California), the overall nest success was 64% (75% in California), and the overall productivity was 1.4 young per occupied site (1.5 in California). In these five states, approximately 43 new territories were discovered in 2003, including 9 in California.

As part of the federal delisting process, USFWS, with advice from western states, developed criteria for allowing a harvest of Peregrine Falcons for falconry purposes under revised national falconry regulations. Beginning in 2001, USFWS authorized 11 western states to coordinate the take of Peregrine nestlings within their jurisdictions and allowed a take of up to 5% of the state's productivity, at the discretion of each state. CDFG agreed that the proposed take would have extremely limited effects on the population of this species. However, Peregrine Falcons may not be taken in California for use in falconry. The American Peregrine Falcon is classified in California Fish and Game Code Section 3511 as a "fully protected bird." This law prohibits the take of Peregrine nestlings in the wild for uses such as falconry. Before the Commission could consider allowing such take, new legislation must be enacted to remove this subspecies from the fully protected bird list, or amended to allow such take; the Commission must approve removal of the Peregrine Falcon from State endangered and threatened species classification under CAC, Title 14, Section 670.5; and the Commission must add this species to the list of birds of prey that may be taken for use in falconry under CAC, Title 14, Section 670.

The increasing population of Peregrines has presented new risks to other endangered or sensitive birds, such as California Least Terns and Marbled Murrelets. Monitors of such species must assess the threat Peregrines pose and recommend actions, such as harassment or live-capture and relocation of individual Peregrines. At Least Tern colonies, predation by Peregrines and other rare native predatory birds normally is tolerated and monitored, but if immediate action is necessary to avoid major impacts to a colony, monitors would contact experienced Peregrine

biologists or wildlife control agents to arrange for live capture of the Peregrine.

Urban-nesting Peregrine Falcons present special protection and management challenges. About 20 percent of breeding pairs in the state nest on buildings and bridges. Often, nesting ledges selected by adult birds are suitable for egg-laying, but productivity of such sites is poor without intensive human intervention. Such sites are at risk from human disturbance, lack of good substrate for supporting eggs or young birds, and lack of wind protection. Commonly, management of this species in urban sites includes installation of special nesting platforms, rescuing of at-risk eggs and chicks, and implementation of restrictions on human actions during nesting periods. In coastal areas where an urban Peregrine nest is near endangered bird nesting sites, removal and relocation of the Peregrine chicks to wild nests or hack sites elsewhere in the state has been necessary at times to avoid subjecting the endangered prey to predation by the fledged Peregrines.

The status in 2003 of the American Peregrine Falcon: *Increasing*.

California black rail

Laterallus jamaicensis coturniculus

State Threatened 1971
Fully Protected
Federal None

General Habitat:

The California black rail inhabits saltwater, brackish, and freshwater marshes. Nesting habitat is characterized by water depths of about one inch that do not fluctuate during the year, and by dense vegetation providing adequate cover. Larger wetlands are more likely to support populations that will exist over time. Black rails prefer vegetation dominated by pickleweed over other short species and taller vegetation in San Francisco Bay wetlands while those on the lower Colorado River preferentially selected habitat dominated by California bulrush and three-square.

Description:

The California black rail is tiny, about the size of a sparrow, and is blackish in color with a small black bill, a back speckled with white. The area around the neck of deep chestnut brown. California black rails lay three to eight eggs.

Status:

Historically, the California black rail occurred along the coast from Baja California, Mexico north to San Francisco. Inland, these rails occurred from the delta of the Colorado River north through the San Joaquin and Sacramento Valleys to eastern Oregon wetlands. Today, the California black rail is found at several locations in the Sacramento-San Joaquin River delta, the San Francisco Bay area, Bolinas Lagoon and Tomales Bay in Marin County, Morro Bay in San Luis Obispo County, White Slough in San Joaquin County, the Salton Sea area, and the Lower Colorado River Valley. Populations have also been found in Yuba, Butte, and Nevada Counties. An additional population was discovered in April 2003 in Placer County. The Placer County birds are thought to be non-migratory based on observations made throughout the year. A desert stronghold for this species appears to be along the lower Colorado River where over a hundred birds have been observed repeatedly during censuses in recent years.

Threats to black rail populations fall into three main categories: habitat loss, predation, and contamination. The loss of coastal and interior wetlands has greatly reduced the range of this species and is the principal threat to the California black rail. Impacts to the species include flooding of suitable habitat due to El Niño events, levee and road construction, filling of wetlands, and land subsidence due to groundwater pumping; cattle grazing in Sierra Nevada wetlands inhabited by the rail; habitat loss from invasive non-native plants such as perennial pepperweed and non-native cordgrass; predation by native and non-native animals; and contamination of wetlands by oil refineries, chemical plants, manufacturing, and urban runoff. Documented predators of California black rails include great blue heron, great egret, northern harrier, and owls. The red fox and rats are believed to prey on nests around San Francisco Bay. Predation of black rails can be intense in marshes that lack the transitional vegetation between the high marsh and upland cover.

A report prepared in 2000 by the San Francisco Bay Area Wetlands Ecosystem Goals Project, a project of the San Francisco Bay Regional Water Quality Control Board, identified characteristics of habitats that would support the California black rail. Specific features include fully-tidal (undiked) wetlands or habitat adjacent to such wetlands, marshes with dense stands of pickleweed or other salt-tolerant plants, safe sites at or above the mean high water level, and the control of non-native predators. Because black rails are able to colonize isolated marsh sites, including created wetlands, protection of all suitable marsh habitat is essential to the survival of this species.

California black rail studies in the San Francisco Bay region have been ongoing for more than 20 years. During surveys conducted in the San Francisco Bay Estuary in the late 1980s, researchers from the Point Reyes Bird Observatory (PRBO) found that the majority of breeding black rails were in the San Pablo Bay system in the North Bay. Breeding birds were also found in Suisun Marsh but were very uncommon in the Central and South Bays. One exception was in the South Bay at the Don Edwards San Francisco Bay National Wildlife Refuge's large Dumbarton marsh. The low numbers of breeding birds was attributed to the lack of suitable habitat above the high tide level in the South Bay.

Point Reyes Bird Observatory conducted a subsequent survey in 1996 to determine the stability of the California black rail in several marshes. Suisun Marsh and marshes in San Pablo Bay retained populations of breeding birds. However, there was no indication that the rails had expanded their range to marshes that had been unoccupied in the 1980s. Some of the isolated, outlying marshes showed declines in numbers since the prior survey. Based on these data, PRBO concluded that the California black rail was stable at some core sites, but was possibly declining at the marshes situated on the margin of the Estuary.

In a follow-up study in 2000 and 2001, PRBO conducted surveys at 34 tidal marshes in San Pablo Bay, Suisun Bay, the north San Francisco Bay, and western Marin County. Their goal was to develop up to date information on the distribution and abundance of the rails; to develop a predictive tool based on vegetation, habitat, and landscape features; and to summarize information on nesting and nest site characteristics. Measures of abundance showed an increase at eight marshes when compared to earlier surveys, lower numbers at four marshes, and two marshes with no change. Black rails were also detected at seven of 13 marshes surveyed for the first time. PRBO also found 26 nests at five study sites between 1998 and 2001. An estimated 23 percent of young fledged. Black rails preferred short vegetation dominated by pickleweed over other short species and taller vegetation. Taller vegetation was used only when shorter material was not available. The majority of nesting activity occurred from early April to May.

The data from the PRBO study showed that factors affecting rail distribution were the size of marsh, distance to water, the size of the core area of the marsh, the amount of surrounding urban land, and vegetation height and species composition. The data indicated that the California black rail prefers large marshes that are close to water, away from urban areas, with saline to brackish water, and with a high proportion of pickleweed, three square, rush, and cattail.

The San Francisco Estuary Wetlands Regional Monitoring Program (WRMP) Plan was released in 2002. The mission of the WRMP, which is a product of the San Francisco Estuary Institute and wetland managers representing a variety of agencies including the DFG, "is to provide the scientific understanding necessary to protect, create, restore, and enhance wetlands of the San Francisco Bay Region, through objective and cost-effective monitoring, research, and communication." A survey protocol developed by PRBO for the California black rail is included in the WRMP planning document. This protocol is designed to collect the following kinds of information about California clapper rails and black rails: an estimate of breeding population size, population trends, health and stability of populations, and rates of colonization at restoration sites.

The California black rail is also addressed in several large habitat conservation planning efforts, for example, the Coachella Valley MSHCP, the Lower Colorado River MSCP, the U.S. Bureau of Reclamation (USBR) Salton Sea Restoration Plan, and the Solano County Water Agency HCP. Existing populations of black rails in the Coachella Valley are within the MSHCP Dos Palmas Conservation Area and Coachella Valley Stormwater Channel and Delta Conservation Area. The Dos Palmas Conservation Area includes the existing Dos Palmas Area of Critical Environmental Concern (ACEC), Oasis Springs Ecological Reserve, and a portion of the Salton Sea State Recreation Area. California black rail are known to occur within the Salt Creek watershed of the Dos Palmas region and have been reported from the Whitewater River area at the north end of the Salton Sea. Management of these wetlands could expand suitable habitat for the rail in this area.

Radio telemetry studies of the black rail on the Lower Colorado River found that preferred habitat was dominated by California bulrush and three-square, water depth of less than one inch, and 25% of the substrate covered with water. Birds were found closer to the shoreline than would have been expected in random distribution. Home range was approximately 1.0 to 1.5 acres. Habitat modeling was used to delineate black rail habitat within the Coachella Valley MSHCP area where 643 acres (91%) of the modeled habitat are conserved. The conserved acreage includes the four known locations of black rail within the Plan area.

Threats to the black rails' continued occurrence within the Coachella Valley Plan area include water diversions that reduce marsh habitat; lining of the All American canal; lining of the earthen Coachella canal above Dos Palmas; habitat modification for flood control at the Whitewater River delta; tamarisk infestations that degrade and dry up marsh habitat; and predation from exotic bullfrogs. Although accurate population numbers are not available, researchers have concluded that the population in the Plan area is small and may require immigration of birds from areas outside of the Coachella Valley Plan area to maintain a viable rail population. A Draft Monitoring and Adaptive Management Plan has been prepared for the MSHCP and A Dos Palmas Mitigation Strategy & Long Term Monitoring plan is in preparation. Habitat protection and improvement at the Dos Palmas area would also benefit other listed species such as the Yuma clapper rail and the desert pupfish. In analyzing restoration alternatives for the Salton Sea, USBR concluded that under the No Project Alternative, more than 300 acres of wetland habitat suitable for the black rail, Yuma rail, and desert pupfish would be lost due to dramatic increases in salinity.

California clapper rail *Rallus longirostris obsoletus*

State	Endangered	1971
	Fully Protected	
Federal	Endangered	1970

General Habitat:

The California clapper rail is now restricted almost entirely to the tidal marshes of San Francisco estuary, where the only known breeding populations occur. Some individuals use brackish marshes during the spring breeding season. The rail formerly occurred at Humboldt Bay in Humboldt County, Elkhorn Slough in Monterey County, and Morro Bay in San Luis Obispo County.

Description:

The California clapper rail is the size of a coot and is slightly larger and grayer than the two southern California subspecies of the clapper rail. It is characterized by a long, slightly downward-curving bill, olive-brown upper parts, a cinnamon-buff colored breast, dark flanks crossed by white bars and white undertail feathers that are often exposed when the bird is agitated. Male and female rails differ only in size. In general, males are slightly larger. Juveniles have a paler bill and darker plumage, with a gray body, black flanks and sides, and indistinct light streaking on flanks and undertail feathers. The breeding season of California clapper rails begins by February. Nesting starts in mid-March and extends into August. Both parents share in incubation and rearing.

Status:

Clapper rails are secretive and difficult to observe in dense vegetation. They are most active in early morning and late evening, when they forage in marsh vegetation in and along creeks and mudflat edges. They often roost at high tide during the day. The rail is threatened by destruction and degradation of its habitat due to conversion of salt marshes to brackish marshes by freshwater discharges from sewage treatment plants, invasion of non-native cordgrass (*Spartina alternifolia*), and pollution from urban runoff, industrial discharges, mercury poisoning, and sewage effluent. The rail itself is subject to predation by the non-native red fox, feral cat, and the Norway rat, and various native mammals.

Of the 193,800 acres of tidal marsh that bordered San Francisco Bay in 1850, only about 30,000 acres remain, a reduction of 84 percent. The remaining habitat is degraded. Industrialization and development of bay tidelands has resulted in linear remnant wetlands on the bay fringe. Many of these linear marshes are completely submerged during high tides and lack sufficient escape habitat. These wetlands also do not provide suitable nesting, foraging, or escape sites for the California clapper rail, and are highly susceptible to environmental perturbations. The East Bay shoreline is eroding from San Leandro to Calaveras Point. Habitat in the North Bay is fragmented, degraded,

and discontinuous. The once extensive salt marsh along Coyote Creek, Alviso Slough, and Guadalupe Slough has been converted to freshwater or brackish water marsh due to freshwater discharges from South Bay water treatment facilities. Mercury levels are high in the South Bay; its accumulation results in embryo mortality. Although small populations are found throughout San Pablo Bay, their occurrence is sporadic and in low numbers in Suisun Marsh. USFWS currently estimates about 600 birds in the South Bay.

The San Francisco Bay National Wildlife Refuge Complex is involved in an integrated predator management program to reduce effects of non-native predators on native wildlife species. Efforts include predator barriers, removal of predators, and habitat management to reduce suitability for these predators. It is also actively involved in restoration of tidal marshes throughout the bay, such as in the Napa Marsh and in the Alviso area. East Bay Regional Parks is working cooperatively with the Refuge to restore tidal action to a 300-acre diked wetland along the shore of Hayward.

The DFG, Refuge, and RWQCB are working with the City of San Jose to develop mitigation for impacts to tidal marsh from freshwater discharge from the Santa Clara and San Jose Water Pollution Control Plants. Tidelands in this area support the salt marsh harvest mouse in addition to the California clapper rail. Part of this mitigation has been the purchase of 835 acres of inactive Cargill salt ponds and additional acreage north of the Dumbarton Bridge. These areas will be restored to tidal marsh and seasonal wetlands. The City of San Jose is also diverting some of its treated effluent and using it for landscape irrigation, agricultural irrigation, and industrial use, thereby lessening freshwater flow to the tidal marsh. The DFG is also working with USFWS and the Refuge to acquire a 1673-acre tract of diked wetlands in Redwood City. This parcel could be especially important to the recovery of rail populations due to its large size and location adjacent to a fairly large existing population of rails on Greco Island.

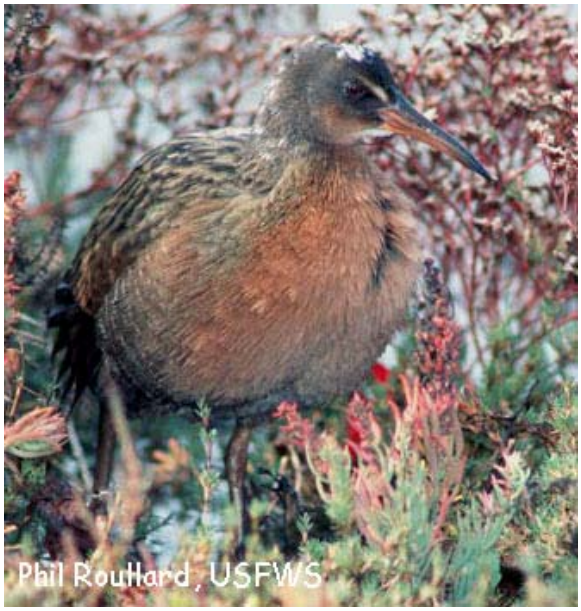
In another major undertaking to benefit the California clapper rail, the COE and the California Coastal Conservancy are working with a number of agencies and environmental groups to restore the abandoned Hamilton Army Airfield in San Pablo Bay to approximately 1000 acres of tidal marsh and seasonal wetlands adjacent to existing wetland and rail habitat. Wetland creation will entail beneficial reuse of sediments dredged from shipping channels in San Francisco Bay. A specially-designed elevated pipeline will carry the material needed for the wetlands while avoiding rail habitat within the wetland.

The USFWS is preparing a recovery plan for tidal-marsh species in the San Francisco Bay, including the rail. Determining the distribution and abundance of the rail is one of the management goals of the San Francisco Estuary Wetlands Regional Monitoring Program (WRMP) Plan, the first version of which was released in June 2002. The WRMP is a cooperative effort of the San Francisco Estuary Institute and wetland managers representing a variety of agencies including the DFG. The mission of the WRMP "is to provide the scientific understanding necessary to protect, create, restore, and enhance wetlands of the San Francisco Bay Region, through objective and cost-effective monitoring, research, and communication." A survey protocol for the California clapper rail is included in the WRMP planning document. This protocol is in conformance the USFWS survey protocol and is designed to collect the following kinds of information about California clapper rails and black rails: an estimate of breeding population size, population trends, health and stability of populations, and rates of colonization at restoration sites.

At the end of 2002, the DFG considered the population trend and status for the California clapper rail to be *Unknown*.

Light-footed clapper rail

Rallus longirostris levipes



State	Endangered	1971
	Fully Protected	
Federal	Endangered	1970

General Habitat:

Disjunct populations breed in marsh vegetation of coastal wetlands from Santa Barbara County to San Diego County and northern Baja California. These populations inhabit cordgrass-pickleweed salt marsh year-round, feeding primarily on crabs, snails, and other intertidal invertebrates. The amount of suitable habitat available to this subspecies across its entire range is about one-third of that which existed historically.

Description:

The light-footed clapper rail is slightly smaller than the California clapper rail. It is characterized by its hen-like appearance, a long, slightly downward-curving bill, gray-brown back, a cinnamon-colored breast, and vertical dusky and white bars on the flanks. The stripe over the eye is whitish. Male and female rails differ only in size. In general, males are slightly larger. Juveniles have a paler bill and darker plumage, with a gray body, black flanks and sides, and indistinct light streaking on flanks and undertail coverts.

Status:

The 2003 light-footed clapper rail census resulted in the detection of 286 pairs. The total number of pairs detected in 2004 was 350 and part of a recent upward trend. Captive-reared birds have been released in California and may have contributed to the above total. However, the number of occupied marshes in 2004 is 15, down from 16 recorded in 2003. The species is responding to major habitat restoration projects in its range, as well as increased predator management at key locations. Annually, the United States population fluctuates dramatically, and the species clearly remains critically endangered. The total population of the subspecies, both in its entire range and in its range in California, represents one of the smallest known populations of any bird subspecies on the west coast of North America. The San Quintin population in Baja California is under threat from human disturbance, grazing animals, agriculture, egg collecting and dogs.

Light-footed clapper rails were detected in up to 19 marshlands in the early 1980s, up to 14 in the late 1980s, up to 13 in the early 1990s, and from 11 to 17 in the past decade. The 1980-1992 population totals fluctuated from 142 to 277 pairs annually. Up to 300 breeding pairs were detected in annual surveys from 1993 to 1995, 325 pairs in 1996, and 307 pairs in 1997. In 1998 and 1999, populations numbered 222 pairs and 233 pairs respectively, some of the lowest populations counted since 1990, representing a significant decline from 1996. Only 217 pairs

were detected in 2001.

Most of these rails are found in only three locations, Upper Newport Bay, Tijuana Marsh, and Anaheim Bay, with the rest of the 16 occupied breeding sites harboring few pairs of rails. However, primarily because of recently instituted captive propagation and translocation programs, the future of the species looks more assured now than at any time since the Federal and State listings of this species as endangered in the 1970s. A substantial volunteer force has donated hundreds of hours of effort to conserve this exceedingly rare species. In addition, Section 6 funding was obtained to complete monitoring and predator control in 2003. A positive response from clapper rail populations is expected so long as current monitoring and management programs remain in place and receive adequate funding.

Monitoring and management activities are conducted annually, in accordance with Recovery Plan guidance to protect, manage, and maintain breeding sites and to monitor population status. Breeding biology, food habits, inter-marsh movements, and predation are examined. Data on distribution, population, and breeding biology are collected annually. Interagency censuses of light-footed clapper rails are made in all coastal wetlands (known or suspected to have suitable habitat) twice annually using standard survey techniques (winter high tide counts and broadcasted tape-recorded calls during breeding). Population trends are critically important in assessing progress in protection efforts and in directing future management.

Nest platforms are refurbished and new ones constructed, in selected marshes, and breeding success is monitored. Rails are trapped, marked and tracked to determine movements and habitat use patterns. Predator control, through deterrents or control by trapping or shooting, is implemented wherever necessary to protect existing populations or to improve chances of success of reintroduction efforts, including at Carpinteria Marsh (the northernmost marshland habitat of this subspecies) and Kendall-Frost Marsh, which have experienced significant depredation or predator pressures.

The increasingly isolated light-footed clapper rail populations have low genetic variability and a low rate of dispersal, except to nearby marshes. Translocating eggs and young clapper rails to aid genetic mixing and to restore declining or extirpated populations in some marshes is being implemented. Habitats that are suitable for light-footed clapper rail population reintroduction or augmentation efforts are identified and enhanced. Captive propagation efforts have been under way in the San Diego Bay area at the Chula Vista Nature Center since December 1998, and at Sea World since 2001, and relocation of captive-raised rails is being implemented.

Protection of the clapper rail through site management and predator control also aids in recovery efforts for the Western snowy plover (Federally-listed as threatened), California least tern (State and Federally-listed as endangered), Belding's Savannah sparrow (State-endangered), possibly the black rail (State-listed as threatened) and other rare coastal wetland wildlife species (e.g., gull-billed, elegant, and royal terns; black skimmer) that share the same coastal ecosystems with clapper rails. Proper management of the clapper rails entails ensuring sensitive, appropriate control of predation by predators that are themselves specially protected or rare in the coastal zone, such as the endangered peregrine falcon and the northern harrier.

Reports of statewide efforts by the Department and all other cooperating agencies and individuals are prepared and disseminated to the public annually. Current status: This species is considered stable.

Yuma clapper rail *Rallus longirostris yumanensis*

State	Threatened	1971
	Fully Protected	
Federal	Endangered	1967

General Habitat:

The Yuma clapper rail is generally a resident of shallow, freshwater marshes containing stands of cattails and bulrushes in the Coachella Valley. It is found along habitat edges in less dense vegetation to facilitate mobility and access. An average water depth between three and eight inches is preferred, with mats of decaying vegetation providing access in deeper water. In habitats found along and adjacent to the lower Colorado River, these rails selected some combination of cattails and bulrush for breeding sites.

Description:

This rail closely resembles the other two clapper rail subspecies found in California. It is gray-brown above and buffy-cinnamon below and has brownish-gray cheeks and flanks barred with black and white. Its somewhat orange bill is long and slightly down-curved. The Yuma clapper rail is the most slender and pale of the three subspecies.

Status:

The Yuma clapper rail is included in several large habitat conservation planning efforts, the Coachella Valley MSHCP, the Lower Colorado River MSCP, and the U.S. Bureau of Reclamation (USBR) Salton Sea Restoration Plan. Within the Coachella Valley MSHCP, Yuma clapper rails are known to occur within the Salt Creek watershed of the Dos Palmas region in the Coachella Valley and have been reported from the Whitewater River area at the north end of the Salton Sea. The Dos Palmas area may have particular importance in that it may be one of the few occupied sites throughout this bird's entire range that is relatively free of chemical contaminants. Both Dos Palmas and the Whitewater River delta/Salton Sea could, if managed appropriately, provide additional habitat to what already exists there. The population size of Yuma clapper rails within this area is not known, nor are the trends in its population numbers. Immigration for occupied habitat to the south may be necessary to maintain long-term viability of this populaiton.

Habitat modeling was used to delineate suitable Yuma clapper rail habitat within the Coachella Valley Plan Area. Habitat consists of marshes dominated by cattail and California bulrush; along the Lower Colorado River, rails selected some combination of cattails and bulrush for breeding. Higher elevation sites provided post-breeding habitat at some locations. These areas were dominated by willow, arrowweed, common reed, and tamarisk. Water depth was an important habitat characteristic and optimal water depths varied between six and eight inches. In deeper water, vegetation mats provided access throughout the occupied habitat. Under the MSHCP, 643 acres (91%) of modeled habitat will be conserved although it is not known if this amount of Yuma clapper rail habitat is

large enough to sustain a viable population. Additional surveys are needed as part of Coachella Valley Plan implementation to determine patch sizes and whether they are adequate to sustain a viable population. There are opportunities for habitat restoration and enhancement in the Plan area, and management of existing wetlands could expand suitable habitat for the rail in this area.

Threats to the rail's continued occurrence within the Coachella Valley Plan area include water diversions that reduce marsh habitat; lining of the All American canal; lining of the earthen Coachella canal above Dos Palmas; habitat modification for flood control at the Whitewater River delta; chemical contamination in the Whitewater area; tamarisk infestations that degrade and dry up marsh habitat; and predation from exotic bullfrogs. Leakage from the Coachella Canal currently provides a portion of the water supply to rail habitat at the Dos Palmas Preserve/ACEC. The canal lining may also be a threat to the water supply in Salt Creek.

A Draft Monitoring and Adaptive Management Plan has been prepared for the MSHCP and A Dos Palmas Mitigation Strategy & Long Term Monitoring is in preparation. Habitat protection and improvement at the Dos Palmas area would also benefit other listed species such as the black rail and the desert pupfish. In analyzing restoration alternatives for the Salton Sea, USBR concluded that under the No Project Alternative, more than 300 acres of wetland habitat suitable for the black rail, Yuma rail, and desert pupfish would be lost due to dramatic increases in salinity.

The DFG Imperial Wildlife Area staff have been assessing the effects of waterfowl habitat management on Yuma clapper rail nesting areas. Careful control of flooding regimes have improved habitat for nesting birds. Adult rails are commonly seen in these managed areas. The DFG participates in the federal Yuma Clapper Rail Recovery Team, which meets periodically to coordinate research, management, and planning. One of the team's tasks is to coordinate biennial surveys of each known and likely site during the nesting season.

Greater sandhill crane *Grus canadensis tabida*

State: Threatened 1983
Fully Protected
Federal: None

General Habitat:

Sandhill cranes use large and small tracts of open habitat where visibility is good from all vantage points. Wet meadows, marshes, shallow ponds, hayfields, and grain fields are all favored for nesting, feeding, and roosting. Emergent wetland vegetation is a key component of nesting territories, and nests are typically placed on piles of emergent vegetation, grass, and mud. Pairs return to the same territory and even the same approximate nest location every year. Based on the survey data recorded to date, areas of suitable wetland and meadow habitat on private and public lands in Lassen, Modoc, Plumas, Shasta, Sierra, and Siskiyou counties constitute the current breeding grounds of greater sandhill cranes in California.

Description:

Greater sandhill cranes are the largest of the six subspecies of sandhill cranes. Average adult males weigh 10.5 pounds while females average 8.4 pounds. Except for these size differences, sexes are similar in appearance. General coloration is pale gray with darker primary feathers. The cheeks, ear coverts, and chin are white, and all but juveniles have bare, reddish foreheads. Fledglings are similar in size to adults but can be distinguished by rust-brown feathers on the nape of the neck. Greater sandhill cranes eat a variety of foods, but, on the wintering ground, they primarily feed on grains such as corn and rice left over after harvest of agricultural fields.

Status:

In California, sandhill cranes establish territories in wet meadows that are often interspersed with emergent marsh. California birds tend to nest in rather open habitat; however, in certain areas, they nest in association with a dense cover of bulrush and bur-reed. Favorable roost sites and an abundance of cereal grain crops characterize the cranes' Central Valley wintering ground. Rice is used extensively by cranes near the Butte Sink area of Butte County, and corn is the principal food source at most other Central Valley wintering areas, particularly in the Sacramento-San Joaquin Delta near Lodi, San Joaquin County. Irrigated pastures are chosen for resting sites throughout the wintering ground. A communal roost site consisting of an open expanse of shallow water is a key feature of wintering habitat.

When the greater sandhill crane was designated a threatened bird species in 1983, all populations of the threatened species breeding or wintering in the State were placed under the protections of CESA. This action represented the first step in the recovery of the species. The provisions of CESA ensure that a variety of activities that benefit or impact the species are scrutinized by the State to guard against harm to crane populations and their habitats. This species continues to experience threats on both wintering and breeding grounds due to agricultural and residential conversion of habitat, predation, human disturbance, and collisions with power lines. Greater demand for agricultural crops such as alfalfa could lead to private land conversions in the primary crane breeding areas of the State. Wintering sandhill cranes in the Central Valley currently are dependent on certain agricultural practices and cropping patterns that are compatible with their foraging and non-foraging activity needs. Cranes concentrate primarily on private lands and are therefore potentially vulnerable to land-use changes that alter their feeding, loafing, and roosting habitat.

Historically, California's breeding population of greater sandhill cranes was documented nesting in eastern Siskiyou County, northeastern Shasta County, and south to Honey Lake, Lassen County. Early research estimated that three to four pairs had territories in California in 1944. However, no range wide searches for active crane territories were conducted during these earlier times. Breeding records tended to be from incidental sightings rather than systematic surveys, so it is difficult to develop population trend data from past to present times. Recent surveys have been much more intensive and comprehensive compared to historic records. Baseline population estimates have been developed from results of increasingly intensive surveys in 1971, 1981, 1988, and 2000. These six northeastern counties have been the sites of documented breeding territories since 1981. During the last breeding ground survey in 2000, the following estimates of breeding crane pairs were made in these northern California counties: Modoc (252), Lassen (122), Siskiyou (51), Plumas (20), Shasta (10), and Sierra (10). Population estimates indicate the role that survey effort has played in determining the "accurate number" of breeding cranes in California. These estimates ranged from a low of 112 breeding pairs in 1971 (in 3 of the above 6 counties) to a high of 465 pairs in 2000.

After young fledge, cranes concentrate on grain fields near favorable roost sites. They confine most of their activities within these habitats until migration time in the fall. Food consists of a variety of cereal grains, including barley, rye, wheat, and oats. Fields used consistently by cranes are usually within a few miles of a shallow water body that serves as a communal roost site. Once cranes leave pre-migratory staging areas, they fly southwest to wintering grounds in the Central Valley from near Chico, Butte County, south to Delano, Kern County. Large flocks of lesser sandhill cranes (*G. c. canadensis*) and Canadian sandhill cranes (*G. c. rowani*) also spend the winter in the Central Valley. Favorable roost sites and an abundance of cereal grain crops characterize winter concentration areas. Rice is the primary food source for cranes near Gray Lodge Wildlife Area, Butte County, and corn is the most important food at the majority of other concentration areas in the Central Valley particularly in the Sacramento - San Joaquin Delta. Irrigated pastures are used extensively as loafing sites in some wintering areas. Greater sandhill cranes of the Lower Colorado River Valley Population winter in California in small numbers (less than 1000 individuals) in Imperial County. These birds breed in Utah and Nevada and most of the population winters in Arizona.

Attempts to estimate the wintering population of greater sandhill cranes have been complicated by the fact that there are a total of three subspecies inhabiting the Central Valley from about mid September to early March each year. However a few researchers made sandhill crane population estimates at different locations during winters in the 1960's to early 1990's in an attempt to document local habitat use patterns. Currently, the estimate for greater sandhill cranes within their Pacific Flyway range is between 5,000 and 6,000 individuals. There are about 25,000 lesser sandhill cranes wintering in California each year. In addition about 6,000 Canadian sandhill cranes also mix with the other two subspecies on the wintering ground. The latter subspecies is thought to be a relatively new arrival in the State and is midway in size between the others and tends to be quite brownish in coloration.

Since 1978, the Department has participated, with other states within the Pacific Flyway, in the development of

planning that could be modified as a recovery plan. Specific management recommendations are contained in the Pacific Flyway Management Plans on all breeding and wintering California populations of greater sandhill cranes. The Pacific Flyway Plans contained several recommended research and management task categories that would also be necessary to effect recovery of the greater sandhill crane in California. In 1997, amendments to CESA directed the DFG to develop and implement a recovery strategy pilot program for the greater sandhill crane. Several years before the 1997 amendments of CESA called for a formal recovery planning strategy, the Department had taken some important initial steps toward the recovery of the greater sandhill crane by acquiring key habitats that studies had identified as important for nesting and wintering populations. Two winter roost sites were purchased by the WCB in 1985-87 based upon Department recommendations and the results of wintering ground studies in San Joaquin County. On the breeding ground, State WA's are to consider the needs of the crane population in management of those lands. The Ash Creek WA, Lassen and Modoc counties, was identified as a key breeding area and it is currently the largest State-owned facility supporting greater sandhill crane breeding populations.

A DFG led Recovery Strategy Team consisting of representatives from State and federal agencies, local landowners, environmental groups, and persons with scientific expertise, has produced a draft of the recovery strategy. Existing scientific information serves as the basis for the strategy, which will include interim and long-term recovery goals, and a range of alternative management goals and activities. The ultimate goal of the greater sandhill crane recovery strategy in the State is to improve the status of the species through a variety of specific habitat protection and other actions so the protections of CESA are no longer necessary and therefore de-listing can be proposed.

The recovery of the species is dependent upon specific actions in the areas of habitat protection, habitat management, habitat enhancement, predator management, interpretative programs, and scientific research. For example, wetland management in wildlife areas should provide sandhill crane wintering habitat, as is being done at DFG's Los Banos Wildlife Area, as well as continue to provide traditional and hunting opportunities. Similarly, recreation in traditional crane use areas needs to be designed to avoid, or at least minimize, potential conflict directly with sandhill cranes wintering in the same areas. Wildlife viewing at Cosumnes River Preserve, for example, is restricted when sandhill cranes winter at the preserve. Periodic monitoring of crane reproductive performance is necessary to determine if persistently low recruitment rates occur in particular regions of the State and to trigger more intensive studies. Similarly, the effects of predators on crane survivorship should be determined so that control measures can be implemented as necessary. Because cranes collide with utility lines near some wintering areas, crane mortality could be reduced by marking lines to increase visibility.

The status in 2003 of the greater sandhill crane: *Stable*

California least tern *Sterna antillarum browni*

State	Endangered	1971
	Fully Protected	
Federal	Endangered	1970

General Habitat:

California least terns nest in colonies on bare or sparsely vegetated flat substrates near the coast. Their nesting range is along the Pacific coast from southern Baja California to San Francisco Bay. Nest sites are typically near estuaries, bays, or harbors where small fish are abundant. Development and recreational use have largely eliminated the natural nesting habitats of this species. Typical nesting sites are now on isolated or specially protected sand beaches or on natural or artificial open areas in remnant coastal wetlands.

Least terns usually arrive in California in April and depart in August. This migratory bird winters in Latin America, but the winter range and habitats are largely unknown.

Nest, at arrow.

Description:

The California least tern is a small tern, about nine inches long with a 20-inch wingspan. It is mostly white and pale gray, and wingtips are black. The head of the adult has a black cap and white forehead, and the yellow beak is black-tipped. Birds nest in colonies ranging in size from only a few pairs to hundreds. Largest colonies in recent years in California have exceeded 500 pairs, and colony size has exceeded 1,000 at Camp Pendleton.

Status:

The long-term increase in the number of nesting pairs in California is continuing. In 1970, there were about 600 nesting pairs statewide. Owing to intensive protection and enhancement efforts, the population has grown eleven-fold to nearly 7,000 pairs in 2003. Statewide surveys of all nesting sites are conducted annually to identify nest site locations and threats, to document annual nesting success, and to track population trends. Coordination of survey efforts and preparation of statewide annual reports are undertaken by a statewide coordinator, under contract by DFG. On-site monitoring and protection efforts at nesting sites are funded by land-owning agencies, cooperating organizations, and volunteers.

Predation is the primary limiting factor to reproductive success. Other mortality causes included a heat wave in part of the state, nest abandonment, and human activity. Many human, wildlife, and environmental sources of

mortality and disturbance limit breeding use and reproductive success. Most colonies are located in fragmented wild lands adjacent to residential, commercial, and recreational areas, and highways. Human activities and human-enhanced populations of scavengers and predators (i.e., crows, ravens, kestrels, other birds of prey, domestic cats, and non-native red foxes) place nesting colonies at risk. Most tern colonies are perennially at risk of significant predation. Some colonies are in areas under continuous threat of abrupt, and often catastrophic, predation by locally abundant native predators, mainly birds, as well as domestic cats and red foxes. At some sites, the presence of large populations of predators precludes nesting. Human disturbance continues to disrupt some colonies.

Each year from 2000 to 2003, a private consultant was contracted by DFG, under Section 6 ESA funds, to coordinate the statewide survey. In 2000, a minimum of 4,521 breeding pairs of terns nested at 37 locations. At least 3,710 fledglings were produced (0.77 fledglings per pair--average productivity during the 1980s and 1990s was about 0.7 fledglings per pair.). Ten colonies comprised more than 200 nests each. The only inland nesting area, the Tulare Lake bed evaporation ponds, first documented in 1998, was used again in 2000, and Caltrans mitigation islands, newly created in Albany, Alameda County, were colonized.

In 2001, a minimum of 4,712 breeding pairs of terns nested at 38 locations. At least 1,773 fledglings were produced, slightly more pairs nesting, but half the production, compared with the prior year. Colony sizes were similar to those reported in 2000, but no nesting was found at the Tulare Lake bed evaporation ponds site. The number of nesting pairs declined in 2002; a minimum of 3,511 breeding pairs nested at 38 locations. About at least 450 fledglings were produced, one of the lowest totals of the past decade. A slight increase in totals from 2001 to 2002 occurred in the northern part of the range, but that was overshadowed by significant decreases in many colonies in the southern counties. Fledglings only increased slightly at Oceano Dunes. All other sites failed.

In 2003, a major increase in nesting pairs was documented. A minimum of 6,687 pairs were found--2,000 more than the previous high count in 2001 and about twice the average breeding population size during the late 1990s. More than 2,100 fledglings were produced, for a low productivity of at least 0.34 fledged per pair. Nesting was reported at 39 sites, nine of which exceeded 300 pairs.

Terns continue to use most of the 40 to 50 sites occasionally or regularly used by nesting terns in the same wetland areas and beaches during the past decade. Several new colonies formed since the late 1990s, including those on nesting islands created at Batiquitos Lagoon and Albany bay shore. Most of the population increase is accounted for by growth in colony size of 10 or 15 of the largest colonies. The tern colony at Alameda Island, San Francisco Bay, formerly part of a Naval Air Station, is now under National Wildlife Refuge management by USFWS and continues to be one of the largest least tern colonies in the state.

Habitat improvement projects at Mugu Lagoon, DFG's San Dieguito and Batiquitos Lagoon Ecological Reserves, and the mouth of the Santa Ana River are benefiting many species, including the least tern. Habitat restoration efforts planned for Ballona Wetlands will enhance the nesting and foraging habitat of the tern. Future management of the South San Diego Bay Unit of the San Diego National Wildlife Refuge and the Sweetwater Marsh National Wildlife Refuge under a Comprehensive Conservation Plan will significantly improve habitat conditions for this species. Eight state and federal agencies are proceeding with planning and environmental compliance requirements for one of the largest wetlands restoration projects in Southern California, the Bolsa Chica Wetlands Restoration Project, in Orange County. The project will enhance nesting and foraging habitat for least terns. USFWS is working to enhance and restore San Elijo Lagoon, San Diego County, under its Coastal Program. The DFG is also expanding Venice and Huntington Beach protected areas and replacing worn fence at both sites.

Protection of the least tern through site management and predator control also aids in recovery efforts for the Western snowy plover (Federally-listed as threatened), light-footed clapper rail (State and Federally listed endangered), Belding's Savannah sparrow (State-endangered), and other rare coastal wetland wildlife species (e.g.,

gull-billed, elegant, and royal terns; black skimmer) that share the same coastal ecosystems with least terns. Proper management of the terns entails ensuring sensitive, appropriate control of predation by species such as the endangered peregrine falcon and the northern harrier that are also specially protected or rare in the coastal zone.

Reports of statewide efforts by the Department and all other cooperating agencies and individuals are prepared and disseminated to the public annually. The 2000 survey report is the latest one completed.

Marbled murrelet

Brachyramphus marmoratus

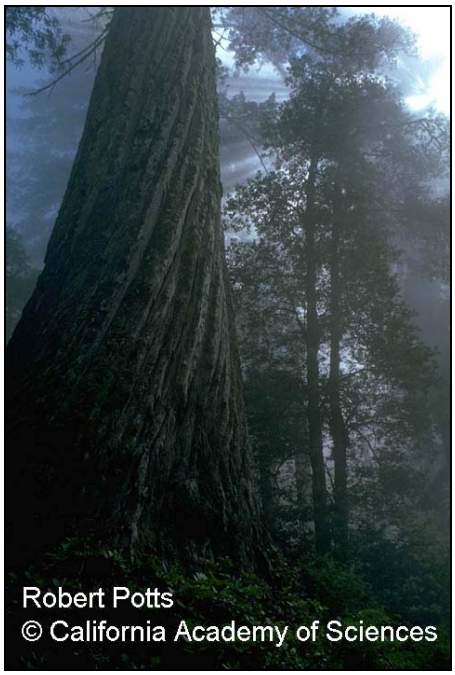
State	Endangered	1992
Federal	Threatened	1992

General Habitat:

Marbled murrelets occupy the nearshore areas, estuaries, and sounds, and feed mostly on fish and invertebrates. They nest primarily in large intact stands of old growth forest, but some nest sites have been found in smaller stands of large trees, or in areas where a few old growth trees still exist in a second-growth landscape. In California, marbled murrelets are found from Eureka north to the Oregon border and from Half Moon Bay south to Santa Cruz.

Description:

The marbled murrelet is a small seabird of the puffin, or alcid family (Alcidae). Murrelets are approximately eight inches in length and weigh about seven ounces. Like most alcids, they are chunky in appearance with a short neck and thick body. Breeding plumage is camouflaged, dark brown-black above with some cinnamon and some white in the shoulder area. The underside is mostly a dark brown and white marbled pattern. The birds go through a flightless molt in late summer, changing into a winter, or basic plumage, which is mostly blackish gray above and white below. Then, they partially molt again, back into the cryptic breeding plumage beginning in late March. Their nesting season runs from late March through mid September. Murrelets lay a single egg high in old-growth trees on large horizontal limbs. This tree nesting habit is unique among the alcids.



Status:

The 1997 USFWS Marbled Murrelet Recovery Plan recognized three conservation zones for California, roughly corresponding to populations or aggregations of birds at sea during the breeding season: 1) Northern California (Zone 4) extends from southern Oregon to the Mendocino county line; 2) North-Central California (Zone 5) extends from the Mendocino county line to the Golden Gate; and 3) Central California (Zone 6) extends from the Golden Gate to just south of Carmel, California (Point Sur, Monterey County).

Marbled murrelets are very secretive in their nesting behavior, usually flying inland in the dark before sunrise, and not vocalizing when accessing their nest site. Since they nest relatively high in large trees, have camouflaged

plumage, and fly quickly through the forest canopy, their nests generally remain hidden from view and are exceedingly difficult to find. Their nesting habits remained an ornithological mystery until 1974 when a tree trimmer found a nestling high in an old-growth Douglas fir tree in Big Basin Redwoods State Park in the Santa Cruz Mountains of central California. For this reason, traditional nest finding methods used for population monitoring of other bird species are not practical for murrelets.

A standardized population monitoring protocol for murrelets at sea was developed as a result of President Clinton's Northwest Forest Plan. The murrelet was one of the species selected for effectiveness monitoring under the forest plan. Surveys for murrelets at sea during the breeding season provide one of the best, most cost-effective methods for estimating population size and trend on a broad scale. From 2000 through 2003, this at-sea survey protocol was utilized in Zones 4 and 5 in California and southern Oregon. A similar protocol was used in the Santa Cruz Mountains population of murrelets (Zone 6).

Results from 2003 are not yet available in Northern California (Zone 4), but for 2002 the murrelet population was estimated at approximately 4,900 birds (3,500-6,400). The North-Central (Zone 5) population was estimated at only 300 birds. The 2003 preliminary estimate for the Santa Cruz Mountains population (Zone 6) is 615 birds (463-815). These estimates put the total population size for California, including southern Oregon, at approximately 5,815 birds. High variability in murrelet detection rates within a year, and between years, makes it difficult to detect changes in overall population size. Additional years of monitoring will be necessary to more fully describe population trend, and other studies as described below will also have to be factored in to population assessments.

Inland surveys using the established Pacific Seabird Group protocol also provide a method for population monitoring. The inland surveys rely on "detections" of murrelets over a two hour period near dawn when the birds are actively flying inland and vocalizing, circling over the forest canopy, flying below canopy, and occasionally even landing in trees for up to 30 minutes or more. This behavior is probably associated with non-breeding birds, but could also represent birds prospecting for nesting sites or failed nesters. Dawn flight behavior is considered to be biologically significant behavior, and additional information such as the presence of murrelet predators can be gathered simultaneously with the dawn survey.

As with the at-sea surveys, high variability in murrelet detection rates make it difficult to detect changes in overall population size. Inland surveys at Big Basin Redwoods State Park in the Santa Cruz Mountains have documented a steady decline in murrelet detections from 1991 to 2003. Average detections in 1991 were greater than 180, but by 2003, the average had declined to fewer than 50. A less drastic decline has also been noted for Portola Redwoods State Park, also in the Santa Cruz Mountains. At Portola Redwoods State Park, average detections ranged from 32-167 during 1992-2002, but averaged only 21 in 2003. Researchers have also radio-marked murrelets in Zones 4 and 6 in order to find nest sites, document nest site characteristics and nest success, describe at-sea distribution, determine home range size, and study effects of human disturbance. The results of these efforts from 1997-2003 have greatly increased the knowledge of murrelet biology in California. Telemetry studies in Zone 4 have been very successful, with a total of 102 murrelets radio-marked, and 29 nest sites located. One nest site was utilized in three sequential years with the birds nesting at the same location on the same limb. At least two other nest locations were used in two sequential years, involving just three different trees. These results match some earlier studies at Big Basin Redwoods State Park and indicate high nest site fidelity for marbled murrelets, a trait observed in other alcids. A camera placed at one nest site documented a Steller's jay displacing an incubating adult murrelet, after which the jay punctured the egg and consumed some of the contents, and then flew off with the whole egg. At another nest site, the camera documented a murrelet chick having to fight off an attack by a Steller's jay. At-sea surveys for juvenile murrelets in Zone 4 have also revealed low reproduction, though some researchers question the value of such surveys and maintain that juvenile murrelets occur in different locales from the adults. This theory has not been tested and needs further study.

In Zone 6, all the nests found via radio telemetry failed. A number of other nests found in Zone 6 without the aid

of telemetry have also failed. This data would appear to corroborate the decline in the inland detections at Big Basin Redwoods State Park as evidence of population decline. However, the at-sea surveys have yet to detect a population decline although the at-sea surveys have detected very few murrelet juveniles on the water, which is also indicative of population decline. For these reasons, the Zone 6 population is considered to be in decline and in serious need of recovery actions.

Past studies have documented a high nest failure rate in marbled murrelets; only 28 percent of eggs laid have produced fledglings. This observation generally matches the low number of juveniles seen at sea. Using this information and information from other alcids to estimate murrelet breeding age, reproduction, and survival, modeling has indicated that murrelet populations are declining from 2-4 percent per year, and possibly at even higher rates. Lack of definitive data on murrelet reproduction, survival, and longevity present problems in developing a more definitive population model.

Murrelets are vulnerable to oil spill impacts, and two damaging spills that occurred in Zone 4 years ago have yet to be settled. While negotiations about the impacts and restoration obligation from these spills were underway, the State of California purchased some murrelet habitat in the Grizzly Creek complex near Grizzly Creek State Park in southern Humboldt county. This complex was one of the marbled murrelet reserves originally set aside under the Pacific Lumber Company (Palco) Habitat Conservation Plan (HCP) in 1999. The area will be managed by the California Department of Parks and Recreation and should greatly assist in murrelet recovery.

In 2004, oil spill restoration funds (from past oil spills in Zone 6 where murrelets were killed) will be available to assist in murrelet recovery in Zone 6. A park visitor/park management education campaign will be initiated at key nesting areas in the Santa Cruz Mountains in an attempt to reduce corvid predators (Steller's jay and common Raven) that are easily attracted to human food sources. Corvids are known predators at murrelet nest sites, taking both chicks and eggs. Corvids are opportunistic foragers, and have been demonstrated to occur in higher numbers when associated with recreational park settings. Inadequate garbage management practices and intentional and unintentional feeding contribute to their elevated population numbers. The ultimate goal of the visitor/park management education campaign is to increase murrelet nest success, decrease corvid populations, and engage park visitors and park employees in the murrelet conservation effort.

Xantus's murrelet *Synthliboramphus hypoleucus*

State Threatened 2002
Federal None

General Habitat:

Xantus's murrelets spend most of their lives at sea, foraging for small fish and zooplankton, and only come ashore for breeding purposes. Though they are occasionally found in the nearshore marine environment, they are usually found about 10-100 miles from shore. In California, Xantus's murrelet nests on six of the Channel Islands in southern California. Their nests are generally well-concealed, and located in natural cavities and under shrubs, especially along or near cliffs. Sea caves are also used for nesting.

Description:

The Xantus's murrelet is a small seabird of the puffin or alcid family (Alcidae), measuring about 9-10 inches from tip of bill to tip of tail. An adult bird fits easily into the outstretched hand of an adult human. They weigh approximately 6 ounces. Adult and juvenile birds are marked cleanly, black above and white below. The winter plumage of adult birds is not distinct from breeding coloration except by close inspection. The Xantus's murrelet lays only 1-2 eggs per clutch and is nocturnal when attending to nest sites. A replacement clutch can be laid if the first clutch is lost. They usually return to the same island for breeding each year. Xantus's murrelets have been documented to live up to 15 years in the wild. Two subspecies are recognized: *S.h. scrippsi* and *S.h. hypoleucus*. The subspecies differ in facial plumage, bill size, and range.

Status:

The worldwide breeding range of the Xantus's murrelet is restricted to the Channel Islands of southern California and small islands along the west coast of Baja California, Mexico. Post breeding and winter distribution is offshore from British Columbia south to Baja California. Approximately 8,310 breeding birds are known currently, with only 3,460 breeding birds in California. Historical accounts and literature from the 1940s indicate that murrelets were more abundant at that time than today.

Research from the 1970s to 1991 documented a decline in murrelet numbers of approximately 30% on Santa Barbara Island. Santa Barbara Island, the smallest of the Channel Islands at one square mile in size, currently supports 51% of the murrelet population in California. Data collected over the past 15 years at National Park

Service (NPS) nest monitoring plots on Santa Barbara Island indicate that this decline is continuing. During this study, nest site occupancy rates for identified potential nest sites declined from approximately 35-70% to less than 30%. Another (larger) nest plot monitoring study outside of, but also including part of one of the NPS Santa Barbara Island nest plots, showed a decline of 14% in the number of active nests when comparing 1991 to 2001.

The Xantus's Murrelet is threatened due to 1) its small breeding population size in California; 2) low productivity; 3) the documented population decline on Santa Barbara Island; 4) near extirpation from previously known nesting sites; 5) its vulnerability to oil spills; 6) predation by native and non-native predators; 7) and human disturbance including impacts from military operations, bycatch in fisheries, and artificial light pollution. Of these threats, predation by native and non-native predators appears to be exerting the greatest influence on the species.

In an effort to help restore murrelet populations, rat eradication efforts at Anacapa Island were initiated in 2001 and 2002 as part of the American Trader Oil Spill Restoration Plan. Murrelets had been limited from occupying suitable habitat on this island because of rat presence and predation. Initial monitoring efforts indicate that rats have been eradicated, and that more murrelets are now occupying the waters around Anacapa Island. The number of known nests has increased slightly and nesting success has increased. However, due to the low reproductive rate, low juvenile survival, and high colony fidelity, it may take 10 years or more to see substantial increases in nesting effort and reproductive success at Anacapa Island.

Xantus's Murrelet populations in California are currently considered to be in decline, although the rat eradication effort on Anacapa Island and other conservation measures being implemented may help reverse the trend in the future. Interagency coordination is currently underway with the goal of stopping, and then reversing the population decline of the murrelet.

Western yellow-billed cuckoo

Coccyzus americanus occidentalis

State Endangered 1971
Federal None

General Habitat:

The western yellow-billed cuckoo requires dense, large tracts of riparian woodlands with well-developed understories for breeding (gallery forests). It occurs in deciduous trees and shrubs, especially willows which are required for roost and nest sites. During the breeding season, the cuckoo is restricted to river bottoms and other moist habitats along slow-moving watercourses where humidity is high. Willows are almost always a dominant component of the vegetation in southern California. The western yellow-billed cuckoo also utilizes orchards adjacent to streams in the Sacramento Valley. Mesquite thickets are sometimes used along the Colorado River where willow is absent.

Description:

The cuckoo is a slender brown bird with white underparts. In flight, its wings show rufous or cinnamon color, and its tail shows black with white spots.

Status:

The western yellow-billed cuckoo is threatened by loss and degradation of its habitat due to land clearing, fire, flood control projects, surface water diversions and groundwater pumping, and overgrazing by livestock. Such disturbances often foster the establishment of invasive non-native plants such as tamarisk and Arundo. The resulting fragmentation reduces the size and quality of habitat for the cuckoo, potentially leading to local extinctions. Migration routes can also be lost or fragmented, thus affecting the ability of the cuckoo to recolonize habitat areas. One study showed that cuckoos were excluded from suitable habitat when the riparian stand was less than seven acres in size.

Two habitat models for the western yellow-billed cuckoo were developed by researchers at the Point Reyes Bird Observatory (PRBO). The models concluded that willow-cottonwood riparian habitat at least 325 feet wide with high humidity provided suitable habitat. Age classes of the vegetation did not appear to affect suitability. Additional research refined the original models and found that optimal sites for the cuckoo were larger than 200 acres and wider than 1950 feet. Habitat less than 38 acres in size and narrower than 325 to 650 feet wide were not suitable. Other studies found that the extent of habitat along a river, as well as the presence of low woody vegetation, were important factors in determining yellow-billed cuckoo distribution. Research at the South Fork Kern River characterized nesting habitat as having a high level of canopy closure, denser foliage, and intermediate tree heights.

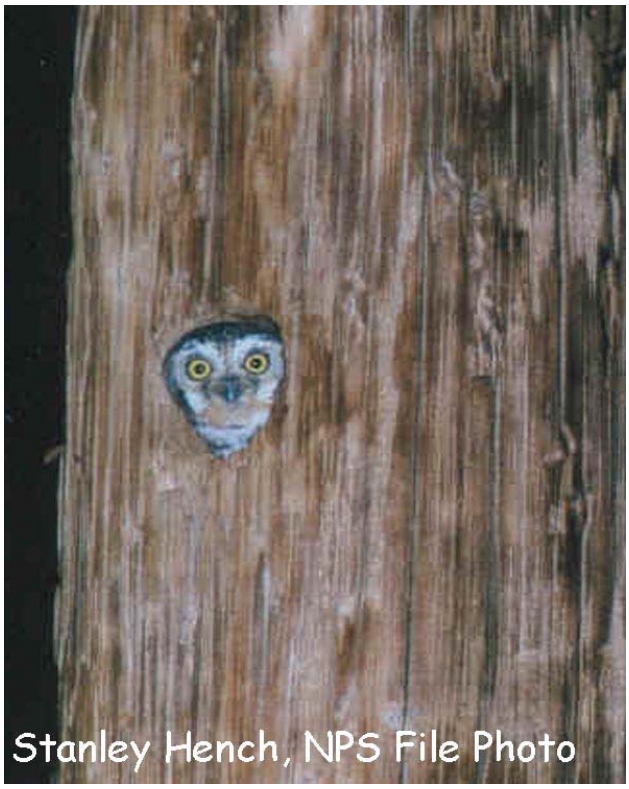
In 2001, the USFWS commissioned a genetics study to help determine whether the yellow-billed cuckoo in the western United States should be added to the Federal List of Threatened and Endangered Species. The USFWS also reopened the comment period for the 12-month finding on a petition to list this species as endangered. Prior to that, USFWS announced that a petition seeking Endangered Species Act protection for the western yellow-billed cuckoo presented sufficient information to warrant a review of the bird's current status. The Service initiated a comprehensive review to determine whether to list the western yellow-billed cuckoo as a distinct population segment, one that is separated from other populations by physical, physiological, ecological or behavioral factors. The genetics study, "Taxonomic and Evolutionary Significant Unit (ESU) Status of Western Yellow-billed Cuckoos (*Coccyzus americanus*)," was prepared by Robert Fleischer of the Smithsonian Institute's National Zoological Park under contract with the USFWS and the U.S. Geological Survey. The study did not confirm the existence of an eastern and western subspecies of the western yellow-billed cuckoo. Later in 2001, the administration issued a decision to again delay listing the species despite a population decline of over 95% due to habitat loss. Instead, the cuckoo was placed on the "warranted but precluded" list.

The western yellow-billed cuckoo is included in habitat conservation and multiple species planning efforts in southern California. These plans include the Western Riverside MSHCP and Lower Colorado River MSCP. Western yellow-billed cuckoo territories have been documented in the Western Riverside Plan Area. Up to seven territories, including three pairs, were found in the Prado Basin during the 2001 breeding season. Breeding was not confirmed in 2001 and has been confirmed only once during 14 years of observations in the Prado Basin. The low numbers of observations may reflect the difficulty in finding nests in the dense salt cedar-willow stands such as are found in the Prado Basin. The limited availability of large tracts of suitable riparian habitat within the Plan Area may restrict breeding by the birds. Habitat conservation under the MSHCP will focus on specific locations where the species has been observed or has been documented to breed in the past so that the cuckoo can expand its range if suitable habitat develops over time. Several objectives relating to the western yellow-billed cuckoo are included in the MSHCP: 1) conserve at least 8,970 acres of suitable habitat including southern cottonwood/willow riparian, riparian scrub, riparian forest, and southern willow scrub; 2) conserve at least five core population areas, connecting habitat, and buffer lands; 3) maintain and/or improve riparian habitat, and the hydrologic conditions that support them, where cuckoos have been observed recently; 4) conserve 100 percent of any occupied habitat identified during project reviews; and 5) maintain the continued use of and reproduction in a minimum of 75 percent of occupied habitat.

A major component of the species goals in the Lower Colorado River MSCP is the proposed restoration of thousands of acres of riparian habitat to support new breeding centers for species such as the southwestern willow flycatcher, western yellow-billed cuckoo, and other riparian associated wildlife. The DPR is restoring riparian habitat at Picacho State Recreation Area. To date, approximately 60 acres have been planted with willow, cottonwood, mesquite, and palo verde. A single yellow-billed cuckoo has been seen recently in the restoration area. The relatively small size of the restoration area and lack of a developed riparian forest will likely preclude colonization of this habitat by the yellow-billed cuckoo in the immediate future.

Elf owl *Micrathene whitneyi*

State: Endangered 1980
Federal:


Stanley Hench, NPS File Photo

General Habitat:

The elf owl is primarily limited to the riparian corridor along the lower Colorado River in California. It can be found during summer months in some areas of south and southwest Texas, southern New Mexico, Arizona, and parts of southern California. It also occurs in many parts of western Mexico. Good quality habitat consists of mature dense vegetation with large trees and an understory of mesquite, willow, or tamarisk. Elsewhere within their range, habitat consists of dense mesquite, dry oak woodlands, wooded canyons, and sycamores at elevations up to 7000 feet. It is a cavity nester and will occupy an old woodpecker hole or cavity in a large cactus or dead tree. Successful nests require larger trees with thick walls next to the cavity to provide the needed insulation from high daytime temperatures.

BLM File Photo

Description:

The elf owl is the smallest owl in North America, only five to six inches tall, has a short tail and yellow eyes. Plumage is spotted with buff and white on a gray or brown base. The breast is white with rust or brown streaks. The top of the head has some rust color and white 'eyebrows' are obvious. The male selects a deserted woodpecker hole or tree cavity as a nest site and also assists in the incubation of eggs. A clutch is usually three eggs, laid at two-day intervals. Incubation takes 14 days and young are ready to leave the nest by late June or early July.

The elf owl's diet consists almost entirely of large insects, centipedes, and scorpions. Using their superb hearing to locate prey, elf owls usually hunt from a low perch and capture most victims in their talons while flying. The elf owl is migratory and only spends the breeding season in California. It probably arrives in March and leaves in October. Almost 70 percent of the records of elf owls in California come from April and May. This is the height of the breeding season, and during this period, males are very territorial.

Status:

The elf owl is restricted to the scattered, mature, native riparian forest along the lower Colorado River. This habitat type has been reduced to less than four percent of its original acreage as a result of hydrologic changes on

the Colorado River, the historical use of riparian trees for firewood, loss of mature forest to wildfire, and introduction of the exotic salt cedar. Remaining habitat is threatened by recreational use (camping, hunting, OHVs). The elf owl was probably never a common or widespread species along the lower Colorado River where it is at the northern extent of its range. The reason for the scarcity of elf owls in California is unknown although the population status of the elf owl depends directly on available nesting holes and on sufficient rainfall and warmer temperatures that increase arthropod prey populations during the breeding season.

Historically, elf owls have been recorded at six sites in California. Two of these sites were near the Colorado River, one about four miles and the other about 16 miles north of Yuma. Since 1978, elf owls have been seen or heard at 12 locations along the Colorado River, from Picacho State Recreation Area north to nine miles north of Needles. Two sites have comprised the major portion of the recent population: one site is about ten miles north of Needles, and the other, about 22 miles north of Blythe. A maximum of nine pairs have been estimated at the site north of Needles and two to four pairs at the site north of Blythe. The other sites were at desert oases west and southwest of Blythe; one was as far from the Colorado River as Joshua Tree National Monument. None of the other sites was believed to support more than two pairs at the time that they were located due to the lack of suitable habitat. No elf owls were found at these sites during DFG surveys in 1978 and 1987.

In 1998, DFG conducted surveys in the remaining remnant patches of riparian and mesquite bosque habitat along the Colorado River. However, no elf owls were found in any of the 51 sites surveyed, including all of the sites where elf owls had been previously located. Again in 1999, no elf owls were heard during DFG surveys of the major sites where elf owls had been located in 1978 and 1987. The DFG conducted a survey at selected sites in 2000, again with no detections. However, the call of an elf owl was heard near Needles in the summer of 2002. The only reports from the California side of the lower Colorado River during 2000–2002 were of a confirmed breeding pair at Picacho State Park in 2000 and one to two birds at the Soto Ranch in 2002, according to information presented in the Lower Colorado River MSCP.

The DFG is participating in a planning process anticipated to improve the conservation of the species. The owl is one of the covered species addressed in the Draft Northern and Eastern Colorado Desert Coordinated Management Plan. At the end of 2002, this plan still was in a draft stage.

Great gray owl *Strix nebulosa*

State: Endangered 1980
Federal: None

General Habitat:

Nearly all great gray owls are found in or near meadows within forest habitats. Forests surrounding meadows require a high density of large diameter snags for nests and a high canopy closure to provide cover and a cooler sub-canopy microclimate. Great gray owls are mainly distributed in the scattered meadow-mature forest zone on the west slope of the central Sierra Nevada.

Description:

Although it does not weigh quite as much as either the great horned or snowy owl, the great gray owl has the longest body and the largest wingspan, five feet, of any species of owl in North America. In addition, great gray owls have a large head with a large, circular facial disk. Plumage is thick and provides insulation for wintering at high elevations and in northern latitudes. The gray and gray-brown feathers are streaked with light and darker grays. This owl exhibits no regular seasonal migration. However, food availability causes movement to higher elevations after the breeding season and to lower elevations in the winter.

Status:

There has been no recent change in the impacts to great gray owls. The loss of mature forest habitat for nesting and the degradation of montane meadows by livestock grazing remain the major sources of habitat loss. There are no conservation management plans addressing the great gray owl. The majority of currently known nesting sites is in Yosemite National Park and thus is protected through the natural resource management of the park. USFS monitors sites on or near their lands during planning for timber harvest or other projects.

All 15 of the known breeding sites and 71 percent of the sites with multiple observations come from Mariposa and Tuolumne counties in the Yosemite area. Sites with multiple observations also come from Alpine, Calaveras, Fresno, Plumas, Sierra, and Tulare counties. This pattern indicates that great gray owls are mainly distributed in the scattered meadow-mature forest zone on the west slope of the central Sierra Nevada. Great gray owls also have been observed in 13 other counties, from the southern Sierra Nevada to Del Norte, Humboldt, Siskiyou, Shasta, and Modoc counties across the northern portion of the State. Owls seen in this part of the

State are probably vagrants from populations in Oregon. With few exceptions, those in other Sierran counties are probably individuals wandering from the main population. The DFG Resource Assessment Program has initiated a statewide survey for great gray owls. The focus of this survey is currently along the Sierra Nevada-Cascade Range axis in Tahoe, Plumas, and Sierra National Forests.

During the breeding season, great gray owls are found in Sierra Nevada mixed conifer and red fir forests. Except for birds dispersing, nearly all great gray owls are found in or near meadows within these forest habitats. Important meadow characteristics include meadow size, the height of grass, the portion of the meadow covered by nongrass-forb vegetation, and the livestock grazing pressure. Forests surrounding meadows require a high density of large diameter snags for nests and a high canopy closure to provide cover and a cooler sub-canopy microclimate.

Owls attempting to nest probably return to the same nesting area each year. Nests usually are placed in the broken tops of snags or large conifer trees, 35 feet or more from the ground. Nest trees must be large enough to provide a nest for a 30-inch long owl. Normally, two or three eggs are laid. Incubation lasts about 30 days, nestlings remain in the nest about three weeks, and the flightless young remain in the vicinity of the nest for another three to five weeks. These fledglings then stay in the nesting territory for several more months until they can fend for themselves.

The current status of the great gray owl is unknown.

Gila woodpecker *Melanerpes uropygialis*

State Endangered 1988
Federal None

General Habitat:

The Gila woodpecker is a permanent resident of mature cottonwood-tree willow riparian forest, mesquite riparian woodland, and saguaro forest. It is resident from southeastern California and central Arizona south into Mexico. In California, it was formerly found along the lower Colorado River and in the cottonwood groves of the Imperial Valley south of the Salton Sea. It is now known only at scattered locations along the Colorado River between Needles and Yuma and at Brawley in the Imperial Valley.

Description:

This woodpecker is 8-10 inches, grayish-brown on the head, neck, and underparts and is barred with black and white on the back. In flight, the bird has a white patch on the wing at the base of the primaries and conspicuous black and white barring on the mantle and tail feathers. The male has a red crown patch. This species excavates its own nest cavities in the trunks of trees.

Status:

This bird is threatened by loss and degradation of its habitat. Adverse impacts to woodpecker habitat are from water projects, severe flooding due to water releases from dams, clearing of land for urban and suburban development and for agriculture (e.g., row crops), human disturbance (e.g., illegal camping and firewood cutting), fire in riparian habitat, OHVs, livestock trampling and grazing, and invasion of non-native plants (e.g., tamarisk).

The DFG is participating in planning processes anticipated to improve conservation of the species. The woodpecker is one of the covered species in the Draft Northern and Eastern Colorado Desert Coordinated Management Plan, and the Lower Colorado River MSCP. At the end of 2002, these plans were still in a draft stage. There have been no field surveys to determine the status of the woodpecker since the FGC listed the species.

DFG considers the population trend and status for the Gila woodpecker to be *Unknown*.

Gilded flicker

Colaptes chrysoides
(= Colaptes auratus chrysoides)

State Endangered 1988
Federal None

General Habitat:

Historically, the species was associated with saguaro cacti near Laguna Dam in Imperial County, the extensive cottonwood-tree willow habitat along the length of the lower Colorado River in both California and adjacent Arizona, and Joshua tree woodland at Cima Dome in San Bernardino County. Today, the bird is found at a few sites on the California side of the Colorado River north of Blythe in Riverside County. Vegetation consists primarily of screwbean mesquite, honey mesquite, quailbush, Goodings willow, and cottonwood snags.

Description:

The gilded flicker has a brown-barred back, white rump, yellow wing and tail linings, brown crown, gray cheeks and throat, and spotted underparts with black crescent bib. The male has a red whisker stripe. The flicker excavates its own nest cavities in the trunks of trees in mature cottonwood-willow riparian forests along the lower Colorado River.

Status:

The gilded flicker is a resident of the Sonoran Desert, an area that extends from southeastern California into southwest Arizona and into Mexico. When listed, the species was considered to be a subspecies of the more widespread northern flicker (gilded northern flicker). It is now treated as a full species, the gilded flicker.

This bird is threatened by loss and degradation of its habitat. Adverse impacts to flicker habitat include land clearing for urban and suburban development and for agriculture, human disturbance (e.g., illegal camping), fire in riparian habitat, OHVs, livestock impacts to tree saplings, invasion of non-native plants (e.g. tamarisk and giant reed), flood control projects, groundwater pumping, and severe flooding due to water releases from dams.

The DFG is participating in a planning process anticipated to improve conservation of the species. The flicker is one of the covered species addressed in the Lower Colorado River MSCP. At the end of 2002, the plan was still in a draft stage. The gilded flicker populations along the California-Arizona border are considered regionally significant in the MSCP. The alternatives analysis presented in the MSCP indicate that a reduction in flows in three reaches of the Colorado River could degrade approximately half of the habitat suitable for the gilded

flicker. The plan looks to habitat enhancement or restoration to offset these impacts.

There have been no field surveys to determine the status of the gilded flicker since FGC listed the species. The DFG considers the population trend and status for the gilded flicker to be *Unknown*.

Willow flycatcher *Empidonax traillii*

State: Endangered 1990
Federal: Endangered* 1995
*Southwestern willow flycatcher (*E. traillii extimus*)

General Habitat:

The habitat of the willow flycatcher is extensive willow thickets. Breeding populations are found only in isolated meadows of the Sierra Nevada, and along the Kern, Santa Margarita, San Luis Rey, and Santa Ynez Rivers in southern California.

Description:

The willow flycatcher measures about 5.75 inches in length, and weighs only about 0.4 ounces. Overall, it is roughly the size of a small sparrow. Both sexes look alike. The flycatcher's appearance is overall greenish or brownish gray above, with a white throat that contrasts with a pale olive breast. The belly is pale yellow. Two white wing bars are visible, but the eye ring is faint or absent. The upper mandible is dark, and the lower mandible light. Both male and female willow flycatchers sing. The willow flycatcher is insectivorous and catches insects on the wing.

The willow flycatcher closely resembles several other species of the *Empidonax* genus, particularly the closely-related Alder Flycatcher (*Empidonax alnorum*). The *Empidonax* flycatchers are renowned as one of the most difficult groups of birds to distinguish by sight alone. The only reliable method of identifying willow flycatchers in the field is by their songs.

Status:

The willow flycatcher was formerly a common summer resident throughout California. Its breeding range extended wherever extensive willow thickets occurred. The species has now been eliminated as a breeding bird from most of its former range in California. Only small, scattered populations remain in isolated meadows of the Sierra Nevada and along the Kern, Santa Margarita, San Luis Rey, and Santa Ynez Rivers in southern California. The smallest of these populations consists of about five pairs and the largest of about 50 pairs.

Loss and degradation of riparian habitat is the principal reason for the decline of willow flycatcher population and the decrease in geographic range of the species. Impacts of livestock grazing to both the habitat and nests of breeding birds have also been implicated in the decline of the species. Nest parasitism by brown-headed cowbirds has contributed to population reductions. Livestock grazing the meadow systems of the Sierra Nevada have contributed to many detrimental impacts including loss of willow habitat, compaction and drying of meadows, and an increase in cow bird populations.

The USFWS listed a subspecies, the southwestern willow flycatcher with small populations in riparian scrub in southern California and other western states, as a federal endangered species in 1995. The southwestern form in California is found as a breeding species at the South Fork of the Kern River in Kern County, Santa Ynez River in Santa Barbara County, Santa Margarita and San Luis Rey Rivers in San Diego County, and several other locations in Southern California. It also is found in Arizona, Nevada, New Mexico, Utah, and Colorado.

Since 1991, annual surveys conducted by the DFG and other researchers on livestock-free land at Red Lake in Alpine County continue to indicate that a moderate-sized population of willow flycatcher persists at this locality. DFG and USFS developed a survey protocol for use in montane meadow and willow riparian habitats in the northern ranges of the species. Recent population surveys conducted by USFS personnel and researchers under contract to that agency have documented that willow flycatcher numbers are low in many areas of the Sierra Nevada and that habitat conditions have deteriorated due to the impact of livestock, especially on National Forest lands. Studies at 20 locations on National Forest lands in the Sierra Nevada during 1997-99 have resulted in documentation of 28, 65, and 56 active nesting territories respectively. In 1997, a population of about 60 pairs was documented in the McCloud river drainage area on the Shasta-Trinity National Forest in Siskiyou County. Computer modeling has been used to begin investigating habitat suitability that will aid in further population monitoring. The DFG's Resource Assessment Program has been active in willow flycatcher survey work recently as well as habitat modeling and GIS.

USFS habitat management plans are being developed to survey the entire range of the willow flycatcher before the end of the year 2001. Based on declines documented by researchers working on Sierra Nevada National Forests during 1999, where only a small number (28) of formerly active (since 1982) territories were found to have singing male birds (a population index), there have been recent discussions by the Willow Flycatcher Working Group (an ad hoc group of agency biologists, researchers, and land managers) to consider proposing federal listing of the remaining subspecies of willow flycatcher in the Pacific States. Contacts with biologists in Oregon and Washington indicate that the status of the species is either presumed to be not a problem or that it is (mostly) unknown at this time.

To benefit the southwestern subspecies, the DFG obtained federal Section 6 grant funding to continue cowbird-control programs along the South Fork of the Kern River from 1996 through 1999. In 1997 the DFG obtained additional Section 6 grant funding for an investigation of the status of both the southwestern willow flycatcher and the State and federally listed least Bell's vireo at several locations in Southern California.

In 1997, several independent groups were formed to work on various aspects of conservation and recovery of the southwestern willow flycatcher. USFS's Rocky Mountain Research Station in Albuquerque organized a group to develop a conservation plan that includes a complete list of research needs. The COE established a group to offer advice on mitigation for the loss of flycatcher habitat at Lake Isabella, a reservoir on the Kern River. In early 1998, the USFWS established a recovery team for the southwestern willow flycatcher.

The DFG and USFWS jointly conduct an annual meeting of an interest group for the southwestern willow flycatcher. This is an informal gathering of agency biologists, private researchers, consulting biologists, and university scientists who share information and advise the DFG and USFWS on conservation matters relating to the flycatcher.

Bank swallow *Riparia riparia*

State: Threatened 1989
Federal: None

General Habitat:
Bank swallows are restricted to portions of California where sandy, vertical bluffs or riverbanks are available for the birds to dig their burrows and nest in colonies. The birds build nests within two to three-foot deep burrows that are dug perpendicularly into near vertical earthen banks along streams, coastal bluffs, and sand and gravel pits.

Description:
The bank swallow is the smallest North American swallow species, with a body length of about 4.75 inches. Bank swallows are distinguished from other swallows by their distinct brown breast band and contrasting white underparts. The upper parts are brown.

Status:
In California, bank swallows rely on naturally eroding habitats of major lowland river systems. The species nests in colonies and creates nests by burrowing into vertical banks consisting of fine-texture soils. Currently, bank swallows are locally common only in restricted portions of California where sandy, vertical bluffs or riverbanks are available. Seventy-five percent of the State's remaining population is concentrated on the banks of Central Valley streams, including several colonies on the Sacramento River, particularly the upper reaches between Red Bluff and Butte City. In this alluvial plain, the river system provides suitable soil types and erosion needed for prime nesting habitat. The birds build nests within two to three-foot deep burrows that are dug perpendicularly into near vertical earthen banks along streams, coastal bluffs, and sand and gravel pits. The colonies that make up the breeding population in California each year have ranged in size from five to over 3,000 burrows; the average sized colony is about 350 burrows.

Research indicates that about half of all burrows dug are used as nest sites at any particular time. The birds lay a clutch of four to five eggs beginning in early to late April at the Sacramento River colonies. After a two week incubation period, and a further three weeks of chick development, fledgling bank swallows leave the nest. By mid-July, most nesting activities are completed. Bank swallows feed on a variety of flying insects. Bank swallows are relatively short-lived species with a high juvenile mortality rate (about 70-80%) and an average life span of two to three years for adults. Collapsed burrows due to natural bank sloughing or human caused disturbance and colony destruction are significant mortality factors for nestlings. The species is colonial and migratory, spending the spring and summer months in the Central Valley and wintering in north central South America. The South American wintering habitat is similar to the breeding habitat, being broad, open lowland river valleys.

The range of bank swallows in California has been reduced by 50 percent since 1900. Bank swallows have been extirpated from southern California due to channelization of rivers and flood control projects. Historically, they

occurred principally along the coast and bank swallow colonies thrived at the Los Angeles River, San Pedro, Oceanside, and Santa Cruz. Today, there remain only three coastal nesting areas, Smith River mouth, Ft. Funston in San Francisco, and Año Nuevo State Park, and a few colonies are known from Mono and Inyo Counties.

There have been significant changes in the degree and type of endangerment factors for the bank swallow since the 1992. The rip-rapping of natural stream banks associated with bank protection projects is the single most serious, human-caused threat to the long-term survival of the bank swallow in California. Existing colonies and areas of potential habitat may be lost over the next several years if current planning is implemented. Rip-rap installed under the Sacramento River Bank Protection Project has already affected almost 150 miles of Sacramento River bank since 1960. Many recent construction locations have coincided with the location of the largest remaining population segment of the bank swallow in the State. Additional rip-rap proposed under this project may result in extensive loss of essential, eroding bank habitat.

Survey information collected annually since 1986 indicates a long period of decline in bank swallow populations on the Sacramento River. Based on an average occupancy rate of about 45 percent of all burrows dug into river banks, an estimated population of 13,170 pairs of bank swallows nested in Sacramento River habitats in 1986. In 1998, the population reached its lowest level of 4,990 pairs and then rebounded dramatically in 1999 to 8,210 pairs. Population estimates for the next four years have shown general increase, with the 2003 figure at about 9,590 pairs. The significance of the apparent turnaround may not be known for a few more years. Factors responsible for the fluctuating population levels are not completely understood, but the drought years followed by flooding may have had a major influence along with the loss of several major breeding colonies to bank protection projects. In addition, several thousand young swallows that were killed in their burrows during bank stabilization projects from about 1960 until 1985 may have suppressed the population's ability to rebound. In 1985, USFWS and DFG prevented the COE from constructing projects during the height of the nesting season.

A State Recovery Plan for the bank swallow was completed and adopted by the Fish and Game Commission in 1992. The goal of the recovery plan is to conserve and maintain a self-sustaining wild population free from the threat of habitat loss and unnatural disturbance. A major component of the recovery plan is a population model that assesses the risks of extinction and plots a target for a level of abundance and reproductive performance necessary to attain recovery based on survey information from 1986 to 1992. However, the recovery plan should be revised to reflect the current status of modeling technology and include Statewide and Sacramento River intensive studies, migration studies, and a revised population model utilizing the 18 years of monitoring data now available. It should also consider what options remain to prevent extirpation of the species from California in light of current flood management planning. The Recovery Plan identifies habitat preserves and a return to a natural, meandering riverine ecosystem as the two primary strategies for recovering the bank swallow. Several hundred acres of river habitat have been purchased by the USFWS over the last decade for inclusion into the Sacramento River National Wildlife Refuge. As a result, many large colonies of bank swallows have been protected.

A recovery planning team has also been established and has had periodic meetings since 1990. The group discusses bank swallow research and recovery issues, and the group has also cited the return to naturally functioning riparian ecosystems as the best way to preserve, recover, and conserve the many species, including the bank swallow, that are dependent on this unique ecosystem. There have been no meetings of the recovery team for the past six years. Revision of the recovery plan, funding, and completion of needed research continue to be important objectives.

The current status of the bank swallow is one of fluctuating population levels. Although the trend since 1986 is one of gradual increase statewide, the overall numbers of birds is still significantly lower than the 13,170 pairs documented in 1986.

Arizona Bell's vireo *Vireo bellii arizonae*

State: Endangered 1988
Federal:

General Habitat:
The vireo is a summer resident in the willow-mesquite thickets and willow-cottonwood riparian habitat along the lower Colorado River. In California, it is found only at a few sites along the Colorado River: near Needles in San Bernardino County, and at Picacho State Recreation Area and near Laguna Dam in Imperial County.

Description:
This small bird is drab gray above and whitish below, with sides and flanks faintly washed with grayish olive-yellow. It has indistinct white spectacles and faint wing bars with the lower bar being more prominent. The Least Bell's Vireo and the Arizona Bell's Vireo differ slightly in size and subtlety of color, with the latter being slightly smaller and more brightly colored. There is no known range overlap of the two subspecies.

Status:
Arizona Bell's vireo is threatened throughout its range by loss and degradation of its habitat. Water diversion, flooding due to water releases from dams, residential and industrial development, agricultural activities, recreational use of occupied habitat, fire in riparian habitat, nest parasitism by the brown-headed cowbird, and invasion of non-native plants (e.g., tamarisk and giant reed) have all impacted this species. Arizona Bell's vireo is a Special Status species in Arizona and is on the Watch List of the Nevada Natural Heritage Program.

The vireo is one of the species addressed in the Lower Colorado River Multiple Species Conservation Program (MSCP) of which California, Nevada, and Arizona are signatories. The program area covers the mainstream of the lower Colorado River from below Glen Canyon Dam to the southerly International Boundary with Mexico. Participants have agreed to pursue an ecosystem-based approach to developing the MSCP for interim and long-term compliance with applicable endangered species and environmental laws, and to implement conservation and protection measures for included species and habitats. The program area includes the 100-year flood plain and reservoirs to full-pool elevations. Potential conservation measures will focus on the lower Colorado River from Lake Mead to the international boundary, while the partnership is also open to considering cooperative conservation efforts developed by the Grand Canyon management effort. Among the potential impacts to the Arizona Bell's vireo identified in the MSCP with respect to flow reductions in two reaches of the Colorado River are degradation and removal of habitat and loss of prey species as a result of lowering groundwater elevations; disturbance in or near occupied habitat; and injury or mortality of individuals from the removal of occupied nest sites associated with the implementation of the plan. This plan still is still in a draft stage.

The DPR is restoring riparian habitat at Picacho State Recreation Area. To date, approximately 60 acres have been planted with willow, cottonwood, mesquite, and palo verde. At least three singing male Arizona Bell's vireos have been observed in 2003 at Picacho SRA and one pair of birds, believed to be nesting, has been observed yearly.

There have been no rangewide field surveys to determine the status of the vireo since the FGC listed the species and the vireo's current status is unknown.

Least Bell's vireo *Vireo bellii pusillus*

State: Endangered 1980
Federal: Endangered 1986

General Habitat:

The least Bell's vireo is a summer resident of riparian areas in southern California. It was once abundant in its historic breeding range along lowland rivers from northwestern Baja California to Red Bluff, Tehama County. The species' breeding distribution is currently restricted to eight California counties: Kern, San Diego, San Bernardino, Riverside, Ventura, Los Angeles, Santa Barbara, and Imperial. Preferred habitat for this species is dense willow-dominated riparian habitat with a well-developed understory. The understory shrub thickets provide nesting habitat. Willows are most commonly used. High and low shrub layers are used as foraging substrate. Other plant species used for nesting and foraging include California wild rose and coast live oak. Most nest sites are located near the edges of thickets.

Description:

Least Bell's vireo is a small, olive-grey migratory songbird. It is dull olive-gray above, whitish below, with a faint white eye ring and wing bars. This subspecies of the Bell's vireo is quite similar in appearance to the Arizona Bell's vireo. The Least Bell's Vireo is slightly larger than the Arizona Bell's Vireo while the Arizona subspecies is more brightly colored than Least Bell's vireo. There is no overlap in their ranges.

Status:

Least Bell's vireo is threatened by loss and degradation of its riparian habitat and by brood parasitism by the brown-headed cowbird. Widespread habitat losses have fragmented most remaining populations into small, disjunct, widely dispersed subpopulations. The combined threat of cowbird parasitism and loss of riparian habitat resulted in the listing of least Bell's vireo as an endangered species. Currently, about half of the vireos in California occur at Camp Pendleton, with the remainder along half a dozen major drainages, including the Tijuana, Sweetwater, San Diego, San Luis Rey, and Santa Ana Rivers.

The USFWS designated critical habitat for the Least Bell's vireo in 1994, including ten stream systems from Santa Barbara south to San Diego County, an area of 38,000 acres. Approximately 10,000 acres of critical habitat is located within the Santa Clara River drainage in Ventura County. The critical habitat designation includes riparian corridors, as well as some adjacent upland habitat. A draft recovery plan is currently being circulated. The recovery strategy focuses on stabilizing existing populations by protecting currently occupied habitat, securing and

restoring riparian habitat within the historical breeding range, re-establishment of the least Bell's vireo in its historic range, modifying land uses where practicable and managing cowbird parasitism, monitoring and performing range wide surveys, and conducting research activities necessary to monitor and guide the recovery effort.

Cowbird trapping is an effective recovery action and has led to an increase in the number of breeding pairs of least Bell's vireos since 1986. Between 1977 and 1985, biologists were only able to locate 300 pairs of birds, primarily in San Diego County. Surveys of least Bell's vireo nests in the 1980s found that at least 15 percent of all vireo nests had been parasitized by the cowbird. In some cases, 90 percent of the vireo nests contained cowbird eggs. In other areas nest parasitism ranged from eight percent to as high as 45 percent. In 1998, about 2,000 pairs of birds were found in the eight counties that comprise its range in southern California. If trapping and other recovery activities outlined in the plan are implemented, the Least Bell's vireo could be downlisted under Federal law from Endangered to Threatened.

Least Bell's vireo is addressed in the majority of habitat conservation and multiple species planning efforts in southern California. These plans include the Coachella Valley MSHCP, Western Riverside MSHCP, the Camp Pendleton Resource Management Plan, and the Orange County NCCP. Recovery and management recommendations in these plans include continuing cowbird removal programs, nest monitoring for cowbird parasitism, and restoration of riparian vegetation. Resolution of land use conflicts, such as from livestock grazing within riparian corridors, water diversion, and developed parks adjacent to suitable vireo habitat, will require long-term planning.

The Coachella Valley MSHCP will conserve existing breeding habitat and migration corridors. Within the Plan Area, known breeding habitat is found in Chino Canyon and Andreas Canyon. Suitable habitat that could support breeding birds is found at a number of sites including Dos Palmas, the Oasis de Los Osos Ecological Reserve, and the Willow Hole-Edom Hill Preserve/ACEC. Approximately 95% of modeled breeding habitat (2,909 acres) within the Plan Area would be conserved. Because least Bell's vireo migrates through the Plan Area, conservation of migratory habitat will include protection of more than 40,000 acres (72%). In addition to conservation of existing natural habitats, the MSHCP will also enhance degraded habitat through tamarisk removal and create additional habitat along the Coachella Valley Stormwater Channel.

Community-based monitoring will be used for species addressed in the Western Riverside MSHCP. Distribution and nesting success would be monitored at least every three years following an initial baseline survey. Western Riverside MSHCP objectives that will benefit the least Bell's vireo include 1) conservation of at least 9400 acres of suitable riparian habitat; 2) conservation of eight population centers (core areas), connecting habitat, and buffers; 3) conservation of at least 90 percent of occupied habitat; and 4) maintenance of the continued use of and reproduction in a minimum of 75 percent of occupied habitat.

Current research sponsored by the USGS Western Ecological Research Center, is focused on colonization of restored riparian habitat, predation, and potential correlation between predation and habitat characteristics. Such research is exemplified by the Pilgrim Creek Restoration Project. The Pilgrim Creek Habitat Mitigation site is located in San Diego County adjacent to Camp Pendleton. It was originally acquired by Caltrans in 1995 to mitigate impacts to riparian and coastal sage scrub habitat from a nearby highway expansion protect. The Pilgrim Creek site is now owned by DFG. Restoration of riparian habitat began in 1995. Monitoring began in 1996 and continued for five years. Monitoring objectives were to 1) assess the status and reproductive success of least Bell's vireo; 2) evaluate the planted vegetation for its suitability for nesting vireos and other riparian birds; and, 3) to compare bird use in native habitat to the restoration site. The least Bell's vireo population within the study site numbered 25 territorial males in 2001, including 22 pairs and three unpaired males. Vireos occupied the entire site, but continued to expand into the restoration site. Thirteen territories were established within the restoration site, an increase of eight sites over the previous year. A total of 32 nests were documented, including five nests in the restored habitat. Young birds fledged successfully in about half of these nests.

A 2002 study of least Bell's vireos and their predators on the San Luis Rey River and Pilgrim Creek in San Diego

County used point counts and tracking stations with video photography to document potential predators. Four mammal and five bird species were identified as potential predators from point counts and tracking stations. Coyotes and yellow-breasted chats were the most abundant animals recorded. Twelve predation events were recorded on videotape. The western scrub jay was implicated in 67 percent of the predation events, Virginia opossum in two cases, gopher snake in one event, and argentine ants in one event. Although the coyote and yellow-breasted chat were recorded frequently by point counts and tracking stations, these methods did not identify actual nest predators. Similarly, the scrub jay was not recorded in high abundance during point counts, possibly due to the fact that they do not vocalize as much as the yellow-breasted chat. The use of video stations could improve predator detection and enhance management to benefit least Bell's vireo. Once a major predator is identified, management could focus on methods to control its abundance, change its foraging behavior, or alter the landscape to decrease their abundance.

In another recent study, the effects of habitat edge, nest site characteristics, nest predation, and adjacent land uses were analyzed. This study was designed to assess the effects of nest placement, edge, and surrounding land uses on nest predation, as well as the spatial distribution of nest predation within the landscape. The results were used to develop a model to describe nest predation. Specific nest locations and site characteristics provided fine scale measurements; the riparian edge, the intermediate scale; and surrounding land uses, the broad scale. None of the fine scale features (nest height, plant species, overstory cover, understory cover) were found to relate to nest predation when compared to nests that were not affected. Similarly, distance from the riparian edge, as well as gaps within the riparian zone, did not affect nest predation. On the broad scale, land use surrounding the riparian habitat did not affect the likelihood of nest predation with the possible exception of increased predation on nests located adjacent to a golf course. The clumping of nest predation around a single point, such as a golf course, can pinpoint areas of special management concern.

Least Bell's vireo use of restored habitat has also been documented at the Rancho Jamul Mitigation Bank, located in the DFG's Rancho Jamul Ecological Reserve. Approximately 150 acres of riparian and adjacent upland habitat were restored in cooperative effort with Wildlands, Inc., the Trust for Public Lands, and the DFG. Approximately 40 acres of emergent wetlands and riparian thickets were created, and invasive exotic plants were removed from over seven miles of riparian habitat along Dulzura and Jamul Creeks. After cattle were removed, willows began to regenerate in the creek channels. Prior to implementation of restoration activities, five least Bell's vireos were found along these creeks. In 2002, 15 birds had been documented: eight birds on Dulzura Creek and seven birds on Jamul Creek.

In 2003, a series of wildfires burned extensive areas in southern California. Although native species are adapted to natural fire cycles, the scale, severity, and patterns of the 2003 wildlifes could result in impacts for least Bell's vireo until habitat recovers. Impacts will be compounded by habitat fragmentation, lack of refugia, loss of migration corridors, potential erosion and siltation of riparian habitats downstream from burned areas, and the potential invasion or increase of non-native plants. As a result of these fires, 3% of critical habitat and 2% of WHR-modeled habitat for least Bell's vireo was lost. Localized impacts, however, could be greater, as in San Diego County, where approximately 3% of least Bell's vireo occurrences and 10.2% of habitat (about 4,500 acres) burned in the Cedar-Otay-Paradise fires. Suitable habitat for individuals that survived or those produced during the next breeding season may be limited, resulting in overcrowding and increased competition for limited food and nesting resources. Predation may also increase, particularly if snake and rodent communities survived the fires in burrows. Vegetation loss will impact least Bell's vireo and likely prevent reoccupation of burned habitat for the next two to five years. Nevertheless, long-term impacts may not be significant as riparian vegetation recovers. Because least Bell's vireo prefers successional riparian scrub and younger willow woodland habitat, the burn and subsequent flooding and associated material deposition may actually benefit this species, and mimic the natural scouring and deposition cycle of naturally functioning riparian ecosystems.

In San Bernardino County, the Old and Grand Prix fires affected approximately 3,000 acres of least Bell's vireo habitat. Seventy-five percent burned at a low to moderate fire intensity, leaving areas of intact or lightly-burned

riparian vegetation. However, increased sedimentation and increased flows are anticipated until upslope hillsides revegetate; there is the potential for additional loss of riparian habitat due to high or severe stream flows and erosion. The Piru fire in Ventura County similarly burned areas of habitat at a low to moderate intensity. Long-term effects of the Piru fire are not expected to be adverse to the least Bell's vireo. The Cedar, Otay and Paradise fires burned large areas of San Diego County. Of the three fires, the Paradise fire directly impacted the San Luis Rey River corridor which supported high densities of willow flycatchers and least Bell's vireo. Approximately 80% of Rancho Jamul Ecological Reserve burned in the Otay fire and destroyed breeding habitat for the least Bell's vireo. At this time, it is not known if birds will occupy stands of riparian vegetation that survived, areas in which they had not previously nested, or if they will occupy the adjacent Hollenbeck Canyon Wildlife Area, which did not burn.

Inyo California towhee

Pipilo crissalis eremophilus

State	Endangered	1980
Federal	Threatened	1987

Image is of a California towhee.

General Habitat:

The Inyo California towhee is restricted to dense riparian vegetation composed of willow, Fremont cottonwood, and desert olive in the southern Argus Mountains of Inyo County. This subspecies requires areas of dense riparian habitat to provide nesting substrate, protection from predators, and shade from the desert sun. Adjacent creosote bush habitat is their principal foraging ground and also provides nesting habitat.

Description:

The Inyo California towhee is a dull gray-brown bird with a moderately long, dark tail. It is an isolated subspecies of the California towhee in the southern Argus Mountains of Inyo County. Nesting occurs in the spring. Young are fully independent at about six months of age. Towhees forage for seeds and insects primarily on open hillsides, but will also forage on low branches and in litter in the dense riparian corridor. Its nearest relative is the California towhee whose range extends into the Sierra Nevada. Differences in wing and tail length, bill length, and length of the middle toe separate the Inyo California towhee from related subspecies. The spotted towhee also occurs with the Inyo California towhee.

Status:

The Inyo California towhee is a relict species whose range once extended from the southwestern United States into Mexico. It became isolated in its current range in the Argus Range following prehistoric climatic changes between 2.5 and 5.5 million year ago. The Inyo California towhee is threatened by loss and degradation of its habitat due to water diversions at springs, OHV activity, recreational use of its riparian habitat, grazing by feral

burros, military activities, rural development, and mining. For example, willows were routinely burned around springs as recently as the 1970s to improve access for bighorn sheep. Habitat degradation further creates conditions favorable to colonization by species, such as carrizo and tamarisk, which are not used by the towhee.

Critical habitat was designated for this species in 1987. It consists of several springs, associated riparian corridors, and adjacent creosote bush scrub habitat. Approximately 68 percent of its habitat occurs within the China Lake Naval Air Weapons Station (NAWS). The remaining habitat is on lands managed by BLM and DFG. When listed by the USFWS, population numbers were estimated at between 117 and 200 individuals. The most recent estimate of population size (1995) is still at about 200 individuals. A 1992 survey of BLM land found 109 individuals, including juveniles, and a 1995 survey of the lower Indian Joe Canyon documented successful breeding. Approximately eight to ten birds were observed. Springs higher in the canyon were not surveyed.

In 1998, USFWS released the recovery plan for the Inyo California towhee. The document proposes that USFWS consider the towhee for delisting when its population sustains a minimum of 400 individuals for five years. This is the estimated carrying capacity for the species. In addition, threats to its habitat must be reduced and managed and degraded habitat restored and maintained. NAWS has implemented recovery actions including removal of feral burros and horses, and elimination of mining in areas that support the towhee. NAWS and BLM have removed about 2000 burros from the Argus Range, a designated Wilderness Area.

The BLM designated a portion of towhee habitat the Great Falls Basin Area of Critical Environmental Concern (ACEC) in 1982. Eight areas within the ACEC are designated as critical habitat. Since that time, vehicular access to riparian areas and springs has been controlled, springs have been barricaded from OHV use, and some riparian restoration has been implemented. In 1994, DFG purchased Indian Joe Canyon, the only parcel in private ownership, to protect the towhee. This area now comprises the Indian Joe Spring Ecological Reserve. Long-term management for this species at the Ecological Reserve includes protection of the riparian habitat, protection of the water supply, and control of deleterious non-native species, such as the brown-headed cowbirds and feral burros, where necessary. Recent management activities have included erecting a fence around the spring to protect it from impacts associated with burros. A management plan for the area has not yet been written.

In January 2001, settlement of a lawsuit required BLM to implement conservation measures in the California Desert Conservation Area. The measures include restricting camping and vehicle access at all springs within the historic range of the Inyo California towhee. The court also stipulated that BLM install vehicle barriers at three specific springs to direct vehicle and recreation use away from the riparian area occupied by the towhee.

The DFG is participating in a planning processes anticipated to improve conservation of the species. The towhee is considered a special status species in the West Mojave Plan, currently in review, as well as the Northern and Eastern Mojave Desert Management Plan developed by the BLM. The Record of Decision for the Approved Northern and Eastern Mojave Management Plan was approved in December 2002. Ongoing burro removal, control of non-native plant species, revegetation, and control of vehicular access in Inyo California towhee habitat are aspects of this plan.

Belding's Savannah sparrow

Passerculus sandwichensis beldingi

State Endangered 1974
Federal None

General Habitat:

This sparrow is resident in coastal salt marshes from Goleta Slough in Santa Barbara County to northern Baja California. Nesting occurs primarily in pickleweed (mainly the perennial species, *Salicornia virginica*) habitat at the mid- and high-marsh elevations of the salt marshes, above the reach of the highest spring tide. Birds occur in highest densities in marshes with full tidal flushing.

Description:

This 5.5 inch-long bird is similar to other subspecies of Savannah sparrow but is darker and is heavily streaked on the back, breast, and sides. The lores (feathers between the eye and bill) are yellow. Breeding birds are year-round residents in the wetlands, forming winter flocks when foraging on the ground and in the marsh vegetation or on mudflats. They feed on insects and on some vegetation in winter, such as the succulent tips of pickleweed. Unusual among passerine birds, this subspecies is able to drink seawater and is not physiologically adapted to use freshwater. It has no salt glands, as seabirds have; instead, it has extremely efficient kidneys.

Breeding territoriality begins by December, nest building starts as early as March; active nesting is under way from March to August. The outer shell of the nest is built of pickleweed twigs and it is lined with soft material, usually dried grass. Nests are usually placed a few inches above ground above the reach of the highest tides in spring, as the eggs are not resistant to inundation. Incubation lasts for about two weeks; young leave the nest by 10 days of age, before they can fly, and are fed by the parents in the vicinity of the nest for another week to 10 days, while young learn to forage.

Status:

The Belding's Savannah sparrow is restricted to mid and high elevations in coastal salt marshes of southern California. Historically, these marshes formed vast expanses of low-growing salt-tolerant vegetation suitable for nesting, in some places extending inland for miles. This marsh habitat is now greatly restricted, degraded, or eliminated in most areas as a result of filling, dredging, and development of wetlands, loss of regular tidal connection with the ocean. Continuing loss of habitat suitable for breeding and foraging is due to sedimentation,

changes in hydrology from upstream development and flood control, loss of natural tidal regimes in upper marsh habitat and degradation of pickleweed habitat, flooding from chronic closures of river-mouths, illegal trash dumping, human disturbance, and predation by native and non-native carnivores mainly in the upper levels of the marsh near developed areas.

Larger marshes support larger populations of the sparrow, but relatively few pairs are supported in marshes less than about 25 acres in size. Breeding territories range from less than .02 acres to over .20 acres. Pairs form territories throughout suitable habitat, occurring in densities of more than 20 pairs per 2.5 acres in the better habitats, sometimes exceeding 30 pairs. Limitations of male territory establishment and success in attracting mates allow relatively few males to have the opportunity to reproduce, contributing to genetic differentiation of the subpopulations.

Total population size may be quite variable from year to year. A partial statewide survey was conducted in 1973, and the first statewide survey was made in 1977. Since 1986, statewide surveys have been undertaken at five-year intervals. In interim years, data on populations also are collected at some wetlands as part of local wildlife management, research, or protection programs. Since 1973, breeding pairs have been recorded in 31 marshland locations.

The latest statewide count was conducted in 2001 by Richard Zembal, Orange County Water District, under contract from Department of Fish and Game and funded by Rare and Endangered Species Preservation Program (Tax Check-off) and Federal Aid in Wildlife Restoration Program (Pittmann-Robertson). During March through May 2001, 32 coastal salt marshes were surveyed, and Belding's were found to be breeding in 30 of them. A minimum of 2,902 pairs was detected, about 90% of which were present in 14 of the wetlands containing over 50 pairs each. This is the highest state total reported since periodic counts began in 1973. In 1996, 2,350 breeding pairs were counted. The largest populations in 2001 occurred at Mugu Lagoon (809 pairs), Upper Newport Bay (206 pairs), Tijuana Marsh (289 pairs), and Anaheim Bay (293 pairs). At least 100 pairs each were counted at Santa Margarita River Estuary, Bolsa Chica Wetlands, Los Penasquitos Lagoon, and South San Diego Bay Western Salt Company dikes/Otay River.

The statewide population is maintaining itself, and apparently increasing, although fluctuating greatly in total numbers and in local breeding population size annually. The number of habitat sites known to have supported breeding pairs apparently had been slowly declining from 28 in 1977, to 27 in 1986 and 1991, to 26 in 1996; however, pairs were found in 30 in 2001. Since surveys began, one subpopulation of these sparrows has disappeared; four apparently had disappeared by 1996, although all had pairs again in 2001; and one new population formed by 1996 at Newport Slough, site of a marsh restoration project by the COE at the mouth of the Santa Ana River.

Marshlands with large populations of Belding's Savannah sparrow have been supporting these populations long-term at stable or increasing levels, whereas areas with small populations are more subject to serious local declines. Most of the 17 largest populations, those with at least 50 pairs recorded on any survey, have increased or remained relatively stable in population size since the 1970s. Of the 30 breeding populations detected in 2001, nine, or 30 percent, were composed of 20 or fewer pairs.

Habitat improvement projects at several of the salt marshes have restored tidal flushing to the wetlands, eliminated exotic plants, and actively trapped and removed predators. Wetlands enhancement and restoration projects that benefit Belding's Savannah sparrows also benefit the California least tern, the light-footed clapper rail, and the tidewater goby. At the Mugu Lagoon, Ventura County, site of the largest population of the species, twice as many pairs of sparrows were found in 2001 compared with 1996. That represents 28% of the state's pair total. This substantial increase resulted from habitat restoration and predator control projects implemented by the Naval Air Weapons Station since the mid 1990s. The restoration projects reestablished tidal flow to formerly isolated patches of degraded salt marshes. Restoration of tidal processes and creation of estuarine conditions at

DFG's San Dieguito Ecological Reserve, San Diego County, also benefited breeding birds. Subsequently, approximately 75 pairs were reported in 2001, twice the populations recorded in surveys in the 1980s and 1990s before restoration at the Ecological Reserve commenced. Habitat protection and enhancement projects, such as those at Batiquitos Lagoon and the mouth of the Santa Ana River, have resulted in improvements in habitat conditions. Some wetlands, such as Goleta in Santa Barbara County, have been fenced to prevent human access. Several habitat restoration efforts planned or underway in the Goleta Slough and Bolsa Chica wetlands can expand the foraging habitat of the Belding's Savannah sparrow. Future management, under a Comprehensive Conservation Plan, of the *South San Diego Bay Unit of the San Diego National Wildlife Refuge and the Sweetwater Marsh National Wildlife Refuge, San Diego County,* will significantly improve habitat conditions for Belding's Savannah sparrow. Eight state and federal agencies are proceeding with planning and environmental compliance requirements for the Bolsa Chica Wetlands Restoration Project, Orange County, one of the largest wetlands restoration projects in Southern California, which would restore potentially hundreds of acres of Belding's Savannah sparrow pickleweed habitat.

The DFG is involved in several conservation planning efforts that include the Belding's Savannah sparrow. These include a multiple jurisdiction Multiple Habitat Conservation Plan, the San Diego MSCP, and the SDG&E subregional NCCP. Also, USFWS is working to enhance and restore San Elijo Lagoon, San Diego County under its Coastal Program. In conjunction with DFG, other government agencies, and private organizations, such as the San Elijo Lagoon Conservancy, the Coastal Program seeks to restore tidal circulation to several thousand acres of wetlands as its primary goal.

The status in 2003 of the Belding's Savannah sparrow: Stable to increasing (Trends: variable annual population size, increasing recently; promising increases in available habitat.)