For each plant or animal addressed by the Plan, a ***Species Account*** was prepared. The Supergroup approved the list of 98 plant and animal species to be addressed by the Plan in 1996. The USGS then contracted with experts on each species, who prepared the species accounts for use in development of the Plan. A wildlife biologist or botanist possessing recognized expertise concerning the species in question authored each of these documents. These accounts describe the general status, habitat, life history, distribution, biological goals, and threats faced by each species, as well as a detailed bibliography. All species accounts were peer reviewed.

AMERICAN WHITE PELICAN
Pelecanus erythrorhynchos

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Management Status: Federal: None
California: Species of Special Concern (CDFG, 1998)

General Distribution:

The American White Pelican breeds from south-central British Columbia (Stum Lake), northeastern Alberta, northwestern Saskatchewan, central Manitoba and southwestern Ontario south locally to extreme northern California, western Nevada, northern Utah, northern Colorado, northeastern South Dakota and southwestern Minnesota, with sporadic breeding on the central Texas coast, from central to southern California (formerly Salton Sea), and in Durango and Tamaulipas, Mexico. The winter range includes central and southern California, southern Arizona, and south through the western lowlands of Mexico (including Baja California), to Guatemala, El Salvador, Nicaragua, and (very rarely) Costa Rica, and from Florida and the Gulf states south along the Gulf coast of Mexico to the Yucatan Peninsula (AOU, 1998). Some wander widely in the fall, and stragglers may occur outside the normal range, especially during the warmer months. Non-breeders may summer in the winter range (Evans and Knopf, 1993).

In California, the two largest and most persistent colonies are at Lower Klamath National Wildlife Refuge in Siskiyou County and Clear Lake National Wildlife Refuge in Modoc County. The largest numbers of non-breeding pelicans occur at Salton Sea, where thousands spend the summer and up to 30,000 have been counted in late winter (Small, 1994). Away from Salton Sea, the species is primarily a transient through southern California (Garrett and Dunn, 1981), and occurs locally in winter, with 1450 at Mystic Lake in western Riverside County in December 1994 being a significant number (S.J. Myers, pers. comm.).

Distribution in West Mojave Planning Area:

American White Pelicans occur throughout the year in the WMPA, but few are found in mid-winter and in the late spring/early summer periods.

Spring migration through the WMPA may begin as early as late January (K.L. Garrett, pers. comm.), but the peak period is mid-March through mid-May. Flocks of up to 400 birds have been seen in spring flying over various parts of Joshua Tree National Park, presumably en route from Salton Sea to breeding colonies further north (National Park Service files). Other noteworthy spring flocks are one of 200 birds on Pelican Lake at Mojave Narrows Regional Park near Victorville on 27 April 1991, one of 350 over Morongo Valley on 31 March 1985 (S.J. Myers, pers. comm.), and one of 300 over Lake Palmdale on 12 April 1980 (K.L. Garrett pers. comm.).

Immatures may be seen in mid-July, indicating that the fall migration is underway. The largest fall flock observed in the WMPA in recent years is one of 400 over Harper Lake on 16 August 1988 (C. McGaugh unpubl. data). Large migrant flocks may occur through October; 325 were seen at Piute Ponds on Edwards Air Force Base on 27 October 1989 (K.L. Garrett, pers.

comm.). Piute Ponds is the WMPA locality where pelicans are most frequently seen, both in spring and fall.

R.L. McKernan (pers. comm.) reports small flocks of 3-10 American White Pelicans in both the spring and fall of 1994 and 1995 at the sewage works on the Marine Corps Air Ground Combat Center at Twentynine Palms.

Other areas of occurrence in the WMPA include Little Lake, South Haiwee Reservoir (T. and J. Heindel, pers. comm.), Dale Lake (R.L. McKernan, pers. comm.), and the Lancaster sewage ponds (K.L. Garrett, pers. comm.; Los Angeles County Museum of Natural History files). A flock of 600 seen flying south from the vicinity of Oro Grande toward Silverwood Lake in the San Bernardino Mountains on 19 January 1987 demonstrates that there is still much to be learned about the seasonal movements of American White Pelicans (S.J. Myers, pers. comm.).

Natural History:

The American White Pelican is a huge white bird (length: 50-65 in., 127-165 cm; wingspan to 9.5 ft, 244-290 cm; weight 10-20 lbs, 4.54-9.0 kg; males larger) with black primaries and outer secondaries, an enormous orange bill with a distensible gular pouch, and webbed feet. In pre-breeding plumage the bill and legs are bright orange, the head acquires white plumes, and a laterally flattened epidermal plate ("horn") appears on the distal portion of the upper mandible. Adults during the chick-feeding phase develop dark gray crowns and napes (Johnsgard, 1993).

A gregarious species, American White Pelicans nest, roost, forage, loaf, and migrate in groups. Flocks fly in lines, "V" and "J" formations, and may cover 300 mi. (500 km) in 24 hrs (del Hoyo et al., 1992). They often soar on thermals.

Typical of most pelicans, food is obtained by dipping the bill into the water and scooping up fish. They often forage cooperatively; groups encircle fish or drive them into shallows where they can be easily caught. Although the species has been persecuted for being piscivorous, most fish taken are smaller than half the length of the bill and of little commercial value (Evans and Knopf, 1993). Regurgitated fish hooks and lures have been found at nesting colonies, indicating that some game fish are taken (Evans and Knopf, 1993). Nocturnal foraging, involving an increased rate of bill-dipping, may be common during the breeding season. Daytime foraging is more visually-cued and bill-dipping is less frequent (McMahon and Evans, 1992). American White Pelicans do not dive from the surface of the water in pursuit of fish, or from the air, as do Brown Pelicans (*Pelecanus occidentalis*). Non-breeding pelicans spend most of the time loafing, often in flocks of 100+, either in shallows or on the shore.

Nesting colonies are on low, bare islands in large lakes. The nest is typically a mound of earth approximately two-three feet across and three-six inches high with a central, unlined hollow (Evans and Knopf, 1993; Baicich and Harrison, 1997). Both parents incubate one brood of two whitish eggs for 29-36 days. During incubation the adult bird places a foot on each egg. The parents attend the altricial young for two-three weeks, then the young leave the nest and join creches ("pods") of other young pelicans. At this time the adults may return from foraging areas only once a day or once every two days, and may forage 150 mi. (240 km) or more from the colony (184 mi., 306 km, in a study in North Dakota; Lingle and Sloan 1980). Food is not carried in the bill, but swallowed and regurgitated at the colony. Usually only one of the two chicks survives; typically the younger one is the victim of harassment and, ultimately, siblicide. Young pelicans fly at 9-10 weeks of age, and begin to leave the colony for foraging areas where flocks stage prior to migration (O'Malley and Evans, 1982; Behle, 1958). Strait and Sloan (1975)

calculated a 41% mortality rate from fledging through the first year. Clapp et al. (1982) reported a maximum lifespan of 26.4 years, based on 4,344 band returns.

The breeding season extends from early April to late August. Northern colonies may not be occupied until May (Baicich and Harrison, 1997). The freezing of lakes and rivers (< biblio >) necessitates migration from many areas in the northern portion of the breeding range.

Habitat Requirements:

American White Pelican colonies are typically situated on islands in inland lakes. The stability of the habitat (i.e., water level), adequate food supplies, and minimal disturbance characterize the largest and most persistent colonies. Lakes with suitable nesting islands are most numerous in central Canada, especially in Manitoba and Saskatchewan (Sidle et al., 1985). Nests may be built on muddy, sandy, or rocky shores.

American White Pelicans forage on the edge of lakes, and in marshes, rivers, and estuaries. Foraging sites are typically shallow (1-8 ft., 0.3-2.5 m; Anderson 1991) and may be muddy or clear, oligotrophic or eutrophic. Loafing sites, important components of both breeding and wintering habitat, are typically banks or sandbars adjacent to foraging areas (O'Malley and Evans, 1984; McMahon and Evans, 1992). Foraging sites may be many miles from the colony. The species is virtually never seen on the open ocean.

Both breeding and foraging habitats may be unstable and ephemeral; water levels rise and fall and fish populations fluctuate. American White Pelicans are highly mobile and adaptable. In the WMPA, the species is found on shallow ponds and marshes.

Population Status:

Although no subspecies are recognized, the American White Pelicans of North America are divided into two populations, roughly separated by the Continental Divide. The historic range contracted until the 1970s but has recently recovered; Breeding Bird Survey data indicate an increase of 5.3% per year from 1966-1991. Still, it is likely that the current population is less than that of pre-settlement times (Terres, 1980). The species remains vulnerable to habitat degradation and human disturbance (Evans and Knopf, 1993).

Sidle et al. (1985) reported 48 breeding colonies in North America, including 29 in Canada (64,512 breeding birds) and 19 in the United States (44,598 breeding birds). Koonz (1987) reported 53,345 nests in Canada during 1985-86, up from 32,256 in 1979-80 (Sidle et al., 1985), and 14,103 in 1967-69 (Vermeer, 1970).

The species formerly nested on large lakes throughout California but declines in both the number of breeding localities and population size within colonies were evident by the 1920s (Remsen, 1978; Grinnell and Miller, 1944). Currently, Lower Klamath Wildlife Refuge and Clear Lake National Wildlife Refuge, support the only persistent colonies in the state. Sidle et al. (1985) reported a total of 4642 breeding birds at the two refuges. American White Pelicans nested at Salton Sea until 1957, when the inundation of nesting islands destroyed colonies that were sometimes occupied by several hundred pairs (Remsen, 1978). Currently, the species is found on Salton Sea throughout the year, including thousands of summering non-breeders, with late winter numbers reaching as high as 30,000 (Small, 1994), and representing a significant percentage of the world population of the species.

Threats Analysis:

An estimated 10-20% of the western North American population, approximately 8000 American White Pelicans, died at Salton Sea in the summer of 1996. The cause of death was botulism, spread by a bacterial infection in fish (Salton Sea NWR files). This disastrous event demonstrates the susceptibility of this highly gregarious species to relatively local phenomena.

Evans and Knopf (1993) considered the species vulnerable in spite of recent evidence of population stability and recovery from pre-1970 declines, which have been attributed to habitat degradation and human disturbance. Thompson (1933) reported the permanent destruction of historically critical foraging and nesting habitat.

The species was placed on the National Audubon Society Blue List in 1972 (Tate, 1981), and was suggested for protection under the Federal Endangered Species Act by Sloan (1982).

Lowered water levels in lakes that support nesting colonies allow access to predators such as Coyote (*Canis latrans*) and Red Fox (*Vulpes vulpes*); at the other extreme, islands may be inundated. American White Pelicans are prone to desert nests when disturbed by predators or humans. Panicked pelicans may accidentally destroy eggs; unguarded eggs and chicks are subject to predation by mammals and gulls, and to the effects of high temperatures (Evans and Knopf, 1993). Boats and airplanes in the vicinity of a colony may cause pelicans to temporarily leave the colony or abandon it altogether.

Shooting is the greatest source of mortality reported from band returns (Strait and Sloan, 1975; USFWS, 1984; Stepney, 1987).

Sloan (1982) reported that refuge personnel in the Klamath Basin listed human interference, colony interaction, and weather as the major factors influencing mortality. He also noted that the reproductive success is higher at smaller colonies, suggesting that overcrowding increases mortality.

The large, year round population at Salton Sea is threatened by agricultural run-off, industrial pollution, sewage, rising selenium levels, botulism, and increasing salinity (Small, 1994).

Eggshell samples from 1965 and 1972 were thinner than pre-1940 samples, and inversely related to levels of DDE and DDE+TDE (Evans and Knopf, 1993), but pesticides and mercury are not considered significant causes of reproductive failure or population declines of American White Pelicans (Anderson et al., 1969).

Biological Standards:

Standard practices/recommendations for management throughout the breeding range include protecting breeding colonies from drastic changes in water level, creating nesting islands (Stepney, 1987), maintaining habitat integrity through the monitoring and reducing of contamination by pollutants and pesticides (including the monitoring of reproductive success and population trends), and fencing colonies to minimize predation and disturbance. All nesting colonies in Saskatchewan have been designated as wildlife refuges (Sidle et al., 1985). Attempts to start new colonies by releasing independent young in their first fall at appropriate sites have not been effective. Captive rearing of the second egg has been successful in providing zoo stock.

Within the WMPA, protection and management of the species can be accomplished through the maintenance, monitoring, and (possibly) enhancement of sites known to be used for loafing and/or foraging. Two of the most frequently used areas, Piute Ponds on Edwards Air Force Base and Mojave Narrows Regional Park, are likely to remain suitable for migratory stopovers. Measures to sustain the marsh at Harper Lake, a BLM Area of Critical Environmental Concern, would be beneficial to American White Pelicans as well as other migratory and resident

species. The marsh was dry in 1997, the result of weather conditions and the cessation of alfalfa farming in the valley (E.A. Cardiff, pers. comm.).

It is possible that American White Pelicans migrating through the WMPA will benefit from an increasing number of sites with open water (e.g. parks, planned communities, sewage plants); however, foraging and loafing sites must be free from human disturbance.

Literature Cited:

American Ornithologists' Union. 1998. Checklist of North American Birds. 7th ed. Amer. Ornithol. Union, Washington, D.C.

Anderson, D.W., J.J. Hickey, R.W. Risebrough, D.F. Hughes, and R.E. Christensen. 1969. Significance of chlorinated hydrocarbon residues to breeding pelicans and cormorants. Can. Field-Nat. 83:91-112.

Anderson J.G.T. 1991. Foraging behavior of the American white pelican (*Pelecanus erythrorhynchus*) in Western Nevada. Colon. Waterbirds 14:166-172.

Baicich, P.J. and C. Harrison. 1997. A Guide to the Nests, Eggs, and Nestlings of North American Birds. 2nd ed. Academic Press, San Diego, California.

Behle, W. H. 1958. The bird life of Great Salt Lake. Univ. Utah Press, Salt Lake City, Utah.

Clapp, R.B., M.K. Klimkiewicz, and J.H. Kennard. 1982. Longevity records of North American birds: *Gaviidae* through *Alcidae*. J. Field. Ornithol. 53:81-124.

del Hoyo, J., A. Elliot and J. Sargatal eds. 1992. Handbook of Birds of the World. Vol. 1. Lynx Edicions, Barcelona.

Evans, R.M. and F.L. Knopf. 1993. American white pelican (*Pelecanus erythrorhyncos*). *In:* A. Poole and F. Gill (eds.), The Birds of North America, No. 57. Philadelphia: The Academy of Natural Sciences; Washington, D.C: The American Ornithologists' Union.

Garrett, K. and J. Dunn. 1981. Birds of Southern California: Status and Distribution. Los Angeles Audubon Society, Los Angeles, California.

Grinnell, J. and A. Miller. 1944. The Distribution of the Birds of California. Pacific Coast Avifauna No. 27. Reprinted by Artemisia Press, Lee Vining, California.

Johnsgard, P.A. 1993. Cormorants, Darters, and Pelicans of the World. Smithsonian Institution Press, Washington and London.

Koonz, W.H. 1987. Status update, the American white pelican (*Pelecanus erythrorhynchos*) in Canada. Comm. Status Endang. Wildl. Can., Can. Wildl. Serv., Ottawa.

Lingle, G.R. and N.F. Sloan. 1980. Food habits of white pelicans during 1976 and 1977 at Chase Lake National Wildlife Refuge, North Dakota. Wilson Bull. 92:123-125.

McMahon, B.F. and R.M. Evans. 1992. Nocturnal foraging in the American white pelican. Condor 94(1):101-109.

O'Malley, J.B.E. and R.M. Evans. 1984. Activity of American White Pelicans, *Pelecanus erythrorhynchos*, at a traditional foraging area in Manitoba. Can. Field. Nat. 98:451-457.

Remsen, J.V. Jr. 1978. Bird Species of Special Concern in California. Calif. Dept. Fish and Game, Wildlife Manag. Branch Admin. Rep. 78-1.

Sidle, J.G., W.H. Koonz, and K. Roney. 1985. Status of the American white pelican: an update. Amer. Birds 39:859-864.

Sloan, N.F. 1982. Status of breeding colonies of white pelicans in the United States through 1979. Amer. Birds 36:250-254.

Small, A. 1994. California Birds, Their Status and Distribution. Ibis Publishing Co. Vista, California.

Stepney, P.H.R. 1987. Management considerations for the American white pelican in Alberta. Occas. Paps. Prov. Mus. Alberta Nat. Hist. 9:155-171.

Strait, L.E. and N.F. Sloan. 1975. Movements and mortality of juvenile white pelicans from North Dakota. Wilson Bull. 87:54-59.

Tate, J. 1981. The blue list for 1981. Amer. Birds 35:3-10.

Terres, J.K. 1980. The Audubon Society Encyclopedia of North American Birds. Alfred A. Knopf, New York, New York.

Thompson, B.H. 1933. History and present status of the breeding colonies of the white pelican (*Pelecanus erythrorhynchos*) in the United States. U.S. Dept. Interior, Contr. Wildl. Div. Occas. Paper No. 1.

U.S. Fish and Wildlife Service. 1984. Guidelines for the management of the American white pelican, western population. U.S. Fish and Wildlife Service, Portland, Oregon.

Vermeer, K. 1970. Distribution and size of colonies of white pelicans, *Pelecanus erythrorhynchos*, in Canada. Can. J. Zool. 48:1029-1032.

BALD EAGLE
Haliaeetus leucocephalus

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Management Status: Federal: Threatened; Bald Eagle Protection Act
California: Endangered (CDFG, 1998)

General Distribution:

The Bald Eagle breeds from central Alaska east across northern Canada to the Atlantic coast, south to Baja California and northern Sonora, Mexico, central Arizona, southwestern and central New Mexico, and the Gulf coast from southeastern Texas east to southern Florida. Bald Eagles are absent as breeding birds in most of the Great Basin, the prairie and plains region, and the eastern United States west of the Appalachian Mountains (AOU, 1983; Brown, 1988). In California, breeding areas are restricted to the northern, forested parts of the state with the exception of a reintroduced population on the Channel Islands and several recent unsuccessful nesting attempts in southern California: Lake Silverwood in San Bernardino County (1994-1996), Tinnemaha Reservoir in Inyo County (Small, 1994), Lake Skinner (1995-1996, W.D.Wagner, pers. comm.) and the San Jacinto Valley in Riverside County (Wagner et al., 1988).

Distribution in the West Mojave Planning Area:

Bald Eagles do not nest within the WMPA. The closest nesting location is Silverwood Lake, located at the border of the WMPA south of Hesperia.

Wintering habitat in the WMPA consists primarily of lakes, ponds, and reservoirs where the eagles can forage for fish and waterfowl. Sightings have been reported from scattered locations throughout the planning area, including Piute ponds at Edwards AFB, Mojave Narrows Regional Park in Victorville, China Lake NAWS, Haiwee Reservoir, and others. Only one or two birds are usually reported. Most of these sites do not sustain Bald Eagles throughout the winter. Jess Ranch in Apple Valley attracts Bald Eagles for sustained periods, and the Bald Eagle has remained for several weeks at Horseshoe and Pelican Lakes in Mojave Narrows Regional Park. These sites are accessible to eagles from Big Bear Lake, where a regular wintering population is known.

The WMPA contains essential night roost locations (e.g., Las Flores Ranch) for Bald Eagles that utilize Silverwood Lake, Lake Arrowhead, and Big Bear Lake in the San Bernardino Mountains. This wintering population of Bald Eagles also regularly forages near several stock ponds on private lands within the WMPA.

Natural History:

Adult Bald Eagles are unmistakable large dark birds with white heads and tails. The sexes are alike. Immatures have varying amounts of white on the back and breast, and can be easily confused with Golden Eagles (*Aquila chrysaetos*). Five years are required to achieve the definitive feathering of adults. The immature plumages of the Bald Eagle all have white in the wing linings, while the Golden Eagle shows white only at the base of the primaries at the outer edge of the wing.

Data compiled from 20 different areas showed 43 percent of territorial pairs were successful in producing young, with 1.62 young produced per successful nest (Stalmaster, 1987). The juvenile mortality rate is 78.5% (Weidensaul, 1996). Birds reaching maturity with adult plumage have few predators, and are long-lived. The oldest known wild adult lived 21 years, 11 months and the oldest known captive bird lived 48 years (Weidensaul, 1996).

Northern populations of the Bald Eagle are migratory, wintering in all parts of the United States. Bald Eagles wintering in southern California often return to the same sites, although movement between sites with abundant food supplies is not uncommon.

The diet of Bald Eagles varies with location, but consists almost exclusively of fish and waterfowl. In the Mojave Desert, this species is opportunistic and feeds on whatever is available at the wintering locations, including carrion.

Habitat Requirements:

Bald Eagles wintering within or near the WMPA require water bodies with an abundant food supply, protected nighttime roosts, and availability of daytime perches near the shoreline.

Water bodies providing winter foraging areas generally contain an abundance of shallow water fish or concentrations of waterfowl, affording the opportunity for the eagles to select easily catchable prey. Bald Eagle concentrations at salmon spawning rivers are well known. In the WMPA, reservoirs supporting hundreds of coots (*Fulica americana*) and ducks are frequented, while those with lower winter waterfowl populations are avoided. Stock ponds and waters containing abundant carp or other fish detectable near the surface, such as fish hatcheries, are utilized. Although sightings have been recorded at sewage ponds, ephemeral lakes and playas, and the Mojave River when water is present, these birds do not linger there more than one or two days.

Wintering Bald Eagles require the presence of roosting sites as well as food supplies. Roosts are chosen for their relative proximity to feeding sites, inaccessibility to disturbance, darkness, and protection from wind (Johnsgard, 1990). They are sometimes located against steep canyon walls where these requirements are met (Palmer, 1988). Roost sites are often in groves of the largest and tallest trees in a region. Trees with an open branched structure facilitating landing by these large birds are favored. Night roosts are traditional and used repeatedly each year by wintering birds. Communal roosts are common, containing from a few to scores of birds.

Bald Eagles also require daytime perches located within view of their prey on the water. Perches are variable, consisting of trees and rocks, and can be located on or near the ground. Man-made structures, including power line towers, are generally avoided.

Population Status:

In 1975, the continental population of Bald Eagles was estimated at 35,000-60,000 birds, with most of these occurring in Alaska and Canada. Approximately 1,000 nesting pairs were estimated for the lower 48 states of the United States (Braun, et al., 1975).

Bald Eagles suffered a significant decline in numbers in California from the historic population size, but have increased in numbers slowly in the past two decades (Thelander, 1973; Jurek, 1994; Calif.

Dept. of Fish and Game, 1996). In 1973, Thelander (1973) surveyed 31 nesting territories and reported that 19 pairs produced 24 young. In 1977, no pairs were known to nest south of Lake County (Detrich, 1977). In 1986, 68 pairs were reported to nest in California. The wintering population varied between 711 and 872 birds between 1979 and 1982 (Henny and Anthony, 1989). In 1989 the winter count totaled 956, followed by 773 in 1990 (SCPBRG 1989, 1990) and 718 in 1995. In 1993, 103 pairs occupied breeding territories, and in 1994, the number of occupied territories was 116 (Jurek, 1995). This number declined to 105 in 1995, a result of severe storms in the northern part of the state during the nesting season (CDFG, 1996).

The gradual increase in Bald Eagle numbers in California is a result of more intensive management and a reduction in the use of organochlorine pesticides. Introductions have been made into historic habitat on the Channel Islands, and winter numbers are generally stable or increasing, although the winter counts are greatly influenced by the weather and the number of observers. Increasing reports of wintering eagles in the WMPA are probably due to increased coverage.

The State of California initiated a program to increase the number of Bald Eagles within the state in 1978 (Mallette and Schlorff, 1978). This included research on the causes of decline, methods for captive breeding, and a re-introduction program. The goal was to restore and maintain a wild population of 120 pairs in California. This goal has nearly been reached, and the status of the Bald Eagle in the state is improving (CDFG, 1996).

The U.S. Fish and Wildlife Service also set goals for recovery of the Bald Eagle on a national, regional, and statewide basis (USFWS, 1986). The goals for downlisting were met for most regions, including California, by 1994, when the protective status was reclassified from endangered to threatened (USFWS, 1994). Final rule in 1995

Threats Analysis:

The primary threat to continued use of aquatic sites by Bald Eagles in the WMPA comes from potential human disturbance at wintering sites. Human approach causing repeated flushing of Bald Eagles from perch sites will lead to site abandonment. Retention of shoreline perches, especially trees with widely spaced branches that allow Bald Eagles to take off and land easily is important. Existing trees can be modified by pruning to make them more favorable as perch trees for Bald Eagles. Night roosts are particularly susceptible to any type of intrusion, especially lights and noise (Palmer, 1988).

Alterations of reservoir management that affect the Bald Eagle food supply will also result in decreased winter use by this species. Bald Eagles are opportunistic and tend to remain at sites where food is plentiful; major declines in the availability of fish or waterfowl will lead to abandonment in favor of other locations. Use of copper sulfate and similar chemicals to eliminate algae can cause the decline of shallow-water fish such as carp (*Cyprinus carpio*), leading to decreased foraging by Bald Eagles. Boating use of reservoirs, gunfire from waterfowl hunting, fishing sites near perch trees, and low-flying aircraft all are incompatible human uses of Bald Eagle wintering sites (Detrich, 1977; Lehman, 1977).

Electrocution from small electrical distribution and transmission lines is a significant problem for the Bald Eagle (Olendorff et al., 1981). Most collisions and electrocutions are of juveniles and birds flying in windy or stormy weather. Bald Eagles prefer poles with a direct view of their foraging area, and with the crossarm oriented perpendicular to the prevailing wind. On poles with a single

crossarm, conductor spacing of less than six feet constitutes a threat of electrocution. Problem poles can be retrofitted with perch guards, which prevent eagles from landing between the span of two conductors, or artificial perches. The high-voltage metal transmission lines are rarely a problem for Bald Eagles due to wide conductor spacing and the availability of several perch sites on a single tower (APLIC, 1996).

Biological Standards:

Wintering sites for Bald Eagles must be adequately protected from human disturbance in order for the eagles to remain. Walter and Garrett (1981) determined 300 feet to be the average flushing distance (i.e. the approach distance for a human observer before the eagle would fly from its perch) for Bald Eagles at Big Bear Lake. These eagles are very habituated to human presence - in other locations Bald Eagles will fly when approached to within 1/4 mile. Regularly used wintering sites, such as the Las Flores Ranch or Mojave Narrows Regional Park, should determine the optimal setback from human approach for major perch sites and institute a seasonal closure if appropriate.

Known night roosts at wintering areas must be protected from intrusion and lighting to prevent abandonment by Bald Eagles. Roost trees must be retained.

Construction of new electrical transmission and distribution lines should employ standards which are safe for eagles. The most important aspect is the spacing of the conductors, which should be greater than 6 feet (1.83 m), especially on poles with single crossarms. In addition, conductors can be insulated on corner and transformer poles. An alternative approach is the provision of perch guards to prevent perching on unsafe poles, or artificial perches above the conductors, which allow a safe landing place for eagles. Existing electrical transmission and distribution lines located near regular Bald Eagle wintering areas can be retrofitted to meet current design standards which prevent electrocution of Bald Eagles. A thorough review of power pole design and standards is given in Olendorff et al. (1981).

Literature Cited:

American Ornithologists' Union. 1983. Check-list of North American Birds, 6th ed. Am. Ornithol. Union, Washington, D.C.

Avian Power Line Interaction Committee (APLIC), 1996. Suggested Practices for Raptor Protection on Power Lines: The State of the Art in 1996, Edison Electric Institute/Raptor Research Foundation, Washington, D. C.

Braun, C. E., Hamerstrom, F., Ray, T. D., and White, C. M., 1975. Conservation Committee Report on the Status of Eagles, Wilson Bull. 87:140-143.

Brown, B. T., 1988. Additional Bald Eagle Nesting Records from Sonora, Mexico, J. Raptor Res. 22(1):30-32.

California Department of Fish and Game, 1996. The Status of Rare, Threatened, and Endangered Animals and Plants of California, Combined Annual Report for 1993, 1994, and 1995, CDFG, Sacramento, California

California Department of Fish and Game, Natural Diversity Data Base. 1998. Special Animals. Biannual publication, Mimeo., 44 pp.

Detrich, P. J., 1977. Bald Eagle Management Study, Shasta-Trinity National Forest, Shasta and Trinity Counties, California, Calif. Dept. Fish & Game, Proj. E-1-1, Study V, Job 1.51, 23 p., CDFG, Sacramento, California.

Henny, C. J., and Anthony, R. G., 1989. Bald Eagle and Osprey, pp. 66-82 *In* Proceedings of the Western Raptor Management Symposium and Workshop, Nat. Wildl. Fed. Sci. & Tech. Ser. No 12, Nat. Wildl. Fed., Washington, D. C. 320 pp.

Johnsgard, P. A., 1990. Hawks, Eagles, & Falcons of North America, Smithsonian Institution Press, Washington, D. C.

Jurek, R. M., 1994. Bald Eagles in California, 1994 Breeding Territory Status, Calif. Dept. Fish and Game, Wildl. Man. Div., Sacramento, California.

Jurek, R. M., 1995. Bald Eagles in California, Information Leaflet, Calif. Dept. Fish and Game, Wildl. Man. Div., Sacramento, California.

Lehman, R. N., 1977. Bald Eagle Nesting Territory Management Program and Southern Bald Eagle Management Unit, Calif. Dept. of Fish and Game, Wildlife Management Branch Admin. Rep. No. CA-ED-01-BE, Calif. Dept. of Fish and Game, Sacramento, California.

Mallette, R. D. and Schlorff, R. W., 1978. A Plan for California Raptors, Calif. Dept. of Fish and Game, Wildlife Man. Branch, Sacramento, California.

Michael Brandman Associates, 1989. China Lake Naval Weapons Center Raptor Inventory and Assessment, report prepared for Naval Weapons Center, Environmental Resources Management Branch, China Lake, California.

Myers, S., 1993. Mojave River Valley Christmas Bird Count, Amer. Birds, 47(4):952.

Olendorff, R. L., Miller, A. D., and Lehman, R. N., 1981. Suggested Practices for Raptor Protection on Power Lines, The State of the Art in 1981, Raptor Research Report No. 4, Raptor Research Foundation, Inc., St. Paul, Minnesota.

Palmer, R. S., 1988. Handbook of North American Birds, Volume 5, Yale University Press, New Haven, Connecticut.

Santa Cruz Predatory Bird Research Group, 1989. California Midwinter Bald Eagle Survey Results, 1989, SCPBRG, Santa Cruz, California.

Santa Cruz Predatory Bird Research Group. 1990. California Midwinter Bald Eagle Survey Results, 1990, SCPBRG, Santa Cruz, California.

Small, A., 1994. California Birds, Their Status and Distribution, Ibis Publishing Company, Vista, California.

Stalmaster, M. V., 1987. The Bald Eagle, Universe Books, New York, New York.

Thelander, C. G., 1973. Bald Eagle Reproduction in California in 1972-1973, Calif. Dept. Fish & Game, Wildl. Manage. Branch Admin. Rep. 73-5, 17 p., CDFG, Sacramento, California

USDI, Bureau of Land Management, 1997. California Desert District Resource Area files.

USDI, Fish and Wildlife Service, 1981. California Winter Bald Eagle Survey 1979-1981, USFWS, Sacramento, California.

USDI, Fish and Wildlife Service, 1986. Pacific Bald Eagle Recovery Plan. U.S. Fish and Wildlife Service, Portland, Oregon.

USDI, Fish and Wildlife Service, 1994. Endangered and Threatened Wildlife and Plants; Reclassify the Bald Eagle from Endangered to Threatened in Most of the Lower 48 States; Proposed Rule, Fed. Reg. 59(132):35584-35593.

Wagner, W. D., McCrary, M. D., McKernan, R. L., and Schreiber, R. W., 1988. An Unusual Winter Bald Eagle Nest in Southern California, J. Raptor Res., 22(1):32-33.

Walter, H. and Garrett, K. L., 1981. The Effects of Human Activity on Wintering Bald Eagles in the Big Bear Valley, California, report to the USDA, Forest Service, San Bernardino National Forest, San Bernardino, California.

Weidensaul, S., 1996. Raptors, Lyons & Burford, New York, New York.

BANK SWALLOW
Riparia riparia

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Management Status: Federal: None
California: Threatened (CDFG, 1998)

General Distribution:

The Bank Swallow is one of the most cosmopolitan of swallows; its Holarctic breeding range extends across North America, Europe (where it is called Sand Martin) and Asia. In North America, Bank Swallows breed from western Alaska across Canada to southern Labrador and Newfoundland, and south to central California, western Nevada, northern Utah, Colorado, southern New Mexico, southern Texas, Arkansas, Tennessee, northern Alabama, central West Virginia, east Virginia, and south-central South Carolina. Bank Swallows winter in South America, India, southeast Asia, and tropical Africa (AOU, 1998; Turner and Rose, 1989).

The species has declined throughout its historic breeding range in California. Colonies on the Sacramento and Feather rivers in northern California account for most of the current breeding population (see Population Status, below). The Bank Swallow has been extirpated as a breeding bird in southern California (Small, 1994).

Distribution in the West Mojave Planning Area:

There are no nesting records of the Bank Swallow in the WMPA. The species is a fairly common spring and fall migrant through the California deserts, and uncommon (spring) to rare (fall) migrant along the coast (Garrett and Dunn, 1981). Bank Swallows migrate through the WMPA in a broad front, and, with other migrating swallows, concentrate over marshes and ponds, such as Piute Ponds and Harper Lake, and over agricultural fields. (Kaufman, 1996; Rosenberg et al., 1991).

Natural History:

Bank Swallows are distinguished from other brown-backed, white-bellied swallows by the presence of a distinct brown breast band. They are slightly smaller than other North American swallows at 5 in. (13 cm) in length and have a wingspan of 10-11 in. (25-28 cm). The tail is squarish or slightly notched. Males and females are not separable by plumage. In North America, confusion with Northern Rough-winged Swallows (*Stelgidopteryx serripennis*) and juvenile Tree Swallows (*Tachycineta bicolor*) is possible; the distinct breast band of the Bank Swallow, which often has a dark "spike" extending down from the middle, is the best field mark (Lethaby, 1996).

Bank Swallows are diurnal aerial insectivores. Studies of stomach contents by Beal (1918) and Stoner (1936) indicate that the diet includes many insects injurious to crops (Bent, 1942).

Bank Swallows are highly colonial nesters. Nests are typically in clusters of burrows (sometimes as close together as one foot) in earthen banks of sand, dirt, and gravel, usually near flowing water (AOU, 1983). Because nesting habitat is typically associated with eroded banks

near flowing water, Bank Swallows are considered a riparian species (hence the scientific name *Riparia riparia*), although they are not dependent on riparian vegetation (Garrison et al., 1987).

Bank Swallows nest in California from late March to early July (Thelander, 1994). The male begins excavating the burrow, and is assisted by the female after the pair bond is formed. Both birds build the cup nest in the burrow (1-5 ft deep), usually using rootlets, grass, weed stems, and feathers (Bent, 1942; Ehrlich et al., 1988; Thelander, 1994). Both parents incubate Four to six white, unmarked eggs for 12-16 days; nestlings fledge in 18-24 days. In western North America, Bank Swallows are typically single-brooded; in other parts of the species vast range a second clutch is not uncommon (Stoner, 1936; Ehrlich et al.,1988; Turner and Rose, 1989). Colonies are vacated between late June and early August and the swallows fly south to the wintering areas in South America, mostly east of the Andes (AOU, 1983). Bank Swallows are considered casual in southern California in winter (Garrett and Dunn, 1981; Rosenberg et al., 1991).

Although Grinnell and Miller (1944) were unable to find a "well-substantiated record ... from the southeastern deserts south of Owens Valley and east of Cushenbury Springs, San Bernardino County...," Garrett and Dunn (1981) stated that Bank Swallows are "fairly common spring and fall transients through the interior." This discrepancy probably demonstrates more of a change in ornithological effort than a change in the species' status in the last fifty years.

The spring migration of Bank Swallows in southern California peaks in April and early May. The southward movement through the deserts spans the period of mid-July to late September, with mid-August to mid-September being the peak period. Records from the Los Angeles County Museum of Natural History files indicate that observations of migrants in the Lancaster area are usually of less than 10 birds per day, with high counts of 50 for spring (26 April 1989, Piute Ponds) and 25 for fall (6 September 1981, Piute Ponds).

Habitat Requirements:

Garrison et al. (1987) noted that although Bank Swallows are often considered a riparian species, they have not been shown to be dependent on riparian vegetation. Schlorff (1992) describes critical breeding habitat for Bank Swallows as "eroding river bank."

Nests are typically placed high on vertical or near vertical banks, cliffs, bluffs, and roadcuts. The selected site must have fine-textured, sandy or loamy soil suitable for burrowing (Schlorff 1992, Thelander, 1994). Erosion by water and wind is important in creating and maintaining banks and bluffs suitable for Bank Swallow nesting. The transient nature of the nesting habitat causes the species to be less site tenacious than swallows with more stable nest sites (Turner and Rose, 1989).

Proximity to water is important at all seasons. During migration and in winter, wetlands provide a steady source of insects and a buffer against extreme temperatures (Elphick, 1995). In the WMPA, Bank Swallows are most often seen over open water.

Population Status:

Grinnell and Miller (1944) reported that "in aggregate numbers this species is the least numerous of all species of swallow in the State."

It has been estimated that since 1900 the breeding range of the Bank Swallow in California has decreased by 50%, and, as of 1992, "the population is declining throughout the state" (Schlorff, 1992). Garrett and Dunn (1981) stated that the species was "formerly widespread and

numerous as a breeder" but they know of only one recent nesting in southern California (Ventura County). Remsen (1978) reported that Bank Swallows no longer breed in much of their former range in California, and attributed the losses, in part, to flood control and bank protection projects.

A statewide survey in California conducted in 1987 reported a total of 111 colonies. Seventy to eighty percent of the California breeding population nests on the banks of the Sacramento River in 50-60 colonies between Shasta County and Sacramento County (Garrison et al., 1987). Other colonies occur at Crowley Lake (approximately 2000 pairs; Gaines 1988), along the central coast north to San Francisco Bay, and in the Lower Klamath Lake and Honey Lake regions (Remsen, 1978). There are no known breeding colonies remaining in southern California (Small, 1994).

There are no records of Bank Swallows nesting in the WMPA. There are no known roost sites used by migrant Bank Swallows in the WMPA.

Threats Analysis:

The very specific characteristics of nest sites and their colonial nesting habits render Bank Swallow populations in California vulnerable to a variety of public works projects. The loss of nesting habitat is the main reason for the decline of Bank Swallows in California; habitat has been lost to bank stabilization and flood control projects throughout the state. Schlorff (1992) stated that "Bank Swallows were eliminated from southern California because virtually every river and natural waterway was converted to flood control channels." Since 1975, many colony sites on the Sacramento River have been lost to flood control and bank stabilization projects, including the installation of riprap. "The riprapping of natural stream bank associated with bank protection is the single most serious threat to long-term survival of the Bank Swallow in California" (Schlorff, 1992). The Sacramento River Bank Protection Project has affected almost 133 miles of river bank since 1960 (Schlorff, 1992). Garrison et al. (1987) estimated a total breeding population of 16,000 pairs along the Sacramento River in 1986; by 1990 this population was reduced to about 4500 pairs (Small, 1994). Human disturbance impacts many colonies throughout northern California (Thelander, 1994).

Friedman (1963) knew of only one case of nest parasitism of Bank Swallows by Brown-headed Cowbirds (*Molothrus ater*), which mainly parasitize open cup nesting birds.

Biological Standards:

Management priorities throughout California should include the protection and monitoring of nesting colonies and the identification and protection of potential nesting habitat.

In the WMPA, localities known to concentrate migrant Bank Swallows can be protected by ensuring that open water and wetland habitats persist through the migratory periods of April-May and July-September at sites known to concentrate migrating swallows. These areas include Harper Lake, China Lake, and Piute Ponds.

Literature Cited:

American Ornithologists' Union. 1983. Checklist of North American Birds. 6th ed., Amer. Ornithol. Union, Washington, D.C.

American Ornithologists' Union. 1998. Checklist of North American Birds. 7th ed., Amer. Ornithol. Union, Washington, D.C.

Beal. F.E.L. 1918. Food habits of the swallows, a family of valuable native birds. U.S. Dept. Agr. Bull. 619.

Ehrlich, P.R., D. Dobkin, and Darryl Wheye. 1988. The Birder's Handbook: A Field Guide to the Natural History of North American Birds. Simon and Schuster, New York.

Elphick, J. ed. 1995. The Atlas of Bird Migration. Random House, New York.

Gaines, D. 1988. Birds of Yosemite and the East Slope. Artemisia Press, Lee Vining California.

Garrett, K. and J. Dunn. 1981. Birds of Southern California: Status and Distribution. Los Angeles Audubon Society, Los Angeles, California.

Garrison, B.A., J. Humphrey, and S. Laymon. 1987. Bank swallow distribution and nesting ecology on the Sacramento River, California. West. Birds 18:71-76.

Garrison, B.A., R.W Schlorff, J.M. Humphrey, S.A. Laymon, and F.J. Michny. 1989. Population trends and management of the Bank Swallow (*Riparia riparia*) on the Sacramento, River, California. pp. 267-271, *In:* D.L. Abel (ed.), Proceedings of the California Riparian Systems Conference: Protection, Management, and Restoration for the 1990's; 1988 September 22-24; Davis, California. Gen. Tech. Rep. PSW-110. Berkeley, California: Pacific Southwest Forest and Range Experiment Station, Forest Service, U.S. Dept. of Agriculture. 544p.

Grinnell, J. and A. Miller. 1944. The Distribution of the Birds of California. Pacific Coast Avifauna No. 27. Reprinted by Artemesia Press. Lee Vining, California.

Gross, A.O. In: Bent, A.C. 1942. Life Histories of North American Flycatchers, Larks, Swallows, and their allies. Dover Publ., New York.

Kaufman, K. 1996. Lives of North American Birds. Houghton Mifflin Co., Boston.

Lethaby, N. 1996. Identification of tree, northern rough-winged, and bank swallows. Birding 28(2):111-116.

Remsen. J.V., Jr. 1978. Bird Species of Special Concern in California. Calif. Dept. Fish and Game, Wildlife Manag. Branch Admin. Rep. 78-1.

Rosenberg, K., R. Ohmart, W. Hunter, and B. Anderson. 1991. Birds of the Lower Colorado River Valley. Univ. of Arizona Press, Tucson, Arizona.

Schlorff, R.W. 1992. *In* Annual Report on the Status of California State Listed Threatened and Endangered Animals and Plants. California Department of Fish and Game.

Small, A. 1994. California Birds, Their Status and Distribution. Ibis Publishing Co., Vista, California.

Stoner, D. 1936. Studies on the bank swallow *Riparia riparia riparia* (Linnaeus) in the Oneida Lake region. Roosevelt Wild Life Ann., 9:122-233.

Thelander, C. G., ed. 1994. Life on the Edge, A Guide to California's Endangered Natural Resources. Vol 1. Wildlife. BioSystems Books, Santa Cruz, California.

Turner, A. and C. Rose, 1989. Swallows and Martins, An Identification Guide and Handbook. Houghton Mifflin, Boston.

BENDIRE'S THRASHER
Toxostoma bendirei

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Management Status: Federal: BLM Sensitive
California: Species of Special Concern (CDFG, 1998)

General Distribution:

The breeding season distribution of Bendire's Thrasher extends from southeastern California, southern Nevada, southern Utah, and southeastern Colorado, south through Arizona and western New Mexico to Sonora, northern Sinaloa, and extreme northern Chihuahua (Monson and Phillips, 1981; AOU, 1983; Alcorn, 1988; England and Laudenslayer, 1989a, 1993; Andrews and Righter, 1992; Howell and Webb, 1995). The distributional details within this general range are poorly understood and documented. Breeding populations are very patchily distributed; apparently suitable habitat is disjunct and many apparently suitable sites are not occupied. During the winter, Bendire's Thrashers withdraw from the breeding range in the Mojave and Great Basin deserts, on the Colorado Plateau, and on the Arizona/New Mexico Plateau (Hayward et al., 1976; Andrews and Righter, 1992; England and Laudenslayer, 1993). A winter record from southern Sinaloa suggests movement south of the breeding range (AOU, 1983), but Bendire's Thrashers may be regular winter visitors only to northern Sinaloa and casual further south (Phillips, 1986).

The breeding distribution of Bendire's Thrasher in California is restricted almost exclusively to the Mojave Desert. The most extensive and best known population is in the eastern Mojave Desert and extends in suitable habitat from the south side of the Kingston Range to the Old Woman Mountains and from near the Nevada-California border west to Halloran Summit and the Granite Mountains (Grinnell and Miller, 1944; England and Laudenslayer, 1993). In the northern and western Mojave Desert, Bendire's Thrashers are restricted to widely scattered locations supporting either Joshua Trees (*Yucca brevifolia*), other species of yuccas, or cholla cactus (*Opuntia* spp.). Large tracts of the desert, especially in the western Mojave Desert, support one or more of these plant species but lack thrasher populations. Bendire's Thrashers do breed very locally and sporadically in the Colorado Desert, where they are restricted to habitats with arborescent species such as palo verde (*Cercidium* spp.). This type of habitat is similar to that occupied in Arizona. Breeding records in the Colorado Desert are largely along the northern edges near the boundary with the Mojave Desert (e.g., near Vidal Junction and at Corn Springs) and in the northeast near the Colorado River (England and Laudenslayer, 1989a). Outside the breeding season, Bendire's Thrasher is a migrant and casual winter visitor (England and Laudenslayer, 1989a, 1993; Rosenberg et al., 1991).

Distribution in the West Mojave Planning Area:

The primary distribution of Bendire's Thrasher breeding habitat in the WMPA extends as a discontinuous band in suitable habitat from Joshua Tree National Park (JTNP) to near Victorville (England and Laudenslayer, 1989a). The most extensive and best documented population is in JTNP. Breeding birds in JTNP are typically found in the vicinity of locations such as Cottonwood Spring, Smoke Tree Wash, White Tank, Jumbo Rocks, Ryan Campground, Covington Flats, Queen Valley, Indian Valley, Lost Horse Valley, and along Salton View Road

(Miller and Stebbins, 1964; England and Laudenslayer, 1989a; B.G. Prescott, pers. comm.). Outside JTNP to the west, breeding records and habitat become more sparse and disjunct with observations over the last 25 years: (1) near Landers, Yucca Valley, Pioneertown, and Pipes Canyon, (2) between Apple Valley and Lucerne Valley along Desert View Road; and (3) on the flats at Sidewinder Mountain northeast of Apple Valley (England and Laudenslayer, 1989a). Pierce (1921) collected eggs from a Bendire's Thrasher nest and observed a female with juveniles near Victorville in 1920, but no recent records exist for this area (England and Laudenslayer, 1989a). A bird carrying food was observed near Victorville at Stoddard Mountain on May 22, 1969, but birds were not found at this location in either 1986 or 1987 during a desertwide survey for Bendire's Thrasher (England and Laudenslayer, 1989a). Disjunct breeding populations of Bendire's Thrasher are also in Superior Valley north of Barstow and in the vicinity of Butterbredt Springs and Kelso Valley at the western edge of the Mojave Desert (England and Laudenslayer, 1989a). A small number of breeding season observations have been reported during early April for scattered locations including California City and near Lancaster; however, breeding has never been confirmed in this part of the WMPA and these observations may be transients (England and Laudenslayer, 1989a).

Natural History:

Bendire's Thrasher is a medium-sized songbird measuring 9-10 in. (23-25 cm) in total length and weighing approximately 60 g (Ridgway, 1907; Dunning, 1984). Unlike other sympatric *Toxostoma* thrashers in California, the bill is only weakly decurved, and the eye is yellow. Nonetheless, this species can be confused with other thrashers in the Mojave Desert and care should be taken when making identifications, especially of immature birds. The sexes are indistinguishable in the field. For details on thrasher identification see Kaufman (1990), Garrett and Dunn (1984), and England and Laudenslayer (1993).

The ecology of Bendire's Thrasher is poorly documented and not well understood. Much of the existing information comes from anecdotal observations of nesting, distribution, and food habits collected in the late 1800's and early 1900's. Most of this information was gathered on birds in Arizona with little from the Mojave Desert.

Spring migration in California begins by February and early March, when birds occasionally appear in the southern Colorado Desert and continues through April and May when a few records exist for coastal California (England and Laudenslayer, 1989a). Birds seen during late May and early June in habitat not suitable for breeding may be late spring migrants, unsuccessful breeders, or post-breeding dispersers wandering away from breeding habitats. The end of spring migration may overlap with movements by early post-breeding dispersers and unsuccessful breeders. Singing birds begin to appear on the breeding grounds in late March and early April. An immature female Bendire's Thrasher collected on 21 June 1961 in pine-fir forest on Mt. Charleston, Clark Co., Nevada (Austin and Bradley, 1965) indicates that movements away from breeding habitats begin immediately after the end of the breeding season. Most Bendire's Thrashers leave breeding areas in the Mojave Desert of California by the end of July; a few individuals may remain into August or later. Most migrants move to wintering grounds in the southeast. Occasional individuals, from either California or elsewhere, move north and west and spend all or part of the winter in coastal California. Winter records at Lancaster, the south end of the Salton Sea, and near Bard suggest that a few birds may winter in the California deserts (England and Laudenslayer, 1989a).

Bendire's Thrashers typically construct an open, generally bowl-shaped nest similar to other *Toxostoma* thrashers. The construction is usually finer and the nest smaller and more compact than other thrashers. A typical nest has an outside diameter of approximately 12 in. (30 cm) and is 2.8-9.8 in. (7-25 cm) deep. The internal cup is symmetrical, lined with a variety of soft materials, and is typically 2-3.5 in. (5-9 cm) in diameter and 1.5-3.5 in. (4-9) cm deep. Nests are usually placed in a shrub, cactus, or tree. Common supporting plants include cholla, mesquite (*Prosopis* sp.), juniper (*Juniperus* spp.), and Joshua Tree and other species of yucca; a variety of other shrubs are also used (Brown, 1901; Gilman, 1909; Pierce, 1921; Johnson et al., 1948; Ligon, 1961; England and Laudenslayer, 1993).

Records of singing Bendire's Thrashers in California indicate that territorial behavior begins when birds first return to breeding areas beginning in mid-March and continues through mid-June, by which time most young from first nests are fledged. Presumed first clutches have been observed from late March through the end of April. Nestlings from first clutches in California have been recorded from early May through early June, and fledglings leave the nest between late April and mid-June (England and Laudenslayer, 1989a). The dates for various breeding phenology milestones are consistent with observations in Arizona (Brown, 1901). Some Bendire's Thrashers lay a second or even a third clutch in the same breeding season (Brown, 1901; Gilman, 1915). Brown (1901) examined about 500 nests in Arizona and reported that a 3-egg clutch is typical, 4-egg clutches are not uncommon, and there are two records for 5-egg clutches. Only five nests with eggs have been reported from California (England and Laudenslayer, 1989a); three nests contained four eggs each, and the other records did not report clutch size.

The diet of Bendire's Thrasher is primarily insects and other arthropods, but also includes seeds and berries (Ambrose, 1963). Anecdotal reports of birds observed foraging or carrying prey to the nest indicate the diet is dominated by grasshoppers, beetles, caterpillars, and other larvae and pupae. Seeds and fruit are taken less often (Woodbury, 1939; Engels, 1940; Bent, 1948). The only quantitative study that examined stomach contents found that the diet was dominated by ants, termites, and lepidoptera larvae (Ambrose, 1963).

Bendire's Thrashers forage primarily on the ground (Engels, 1940; Ambrose, 1963), but will also glean vegetation for insects and pluck fruit (Ambrose 1963). They use the bill to peck and probe, and to hammer into the ground (Engels, 1940). They will dig with the bill, but digging is not believed to be as powerful or efficient, and this technique is used less frequently than other thrashers (Ambrose, 1963). They do not scratch with their feet (Engels, 1940; Ambrose, 1963), and Bent (1948) reported one observation of a bird "running along between plant rows, occasionally jumping up into the air as if catching insects."

Habitat Requirements:

The breeding season habitat of Bendire's Thrashers in California is typically described as Mojave desert scrub with either Joshua Trees, Spanish Bayonet (*Yucca baccata*), Mojave Yucca (*Y. schidigera*), cholla cactus (*Opuntia acanthocarpa*, *O. echinocarpa*, or *O. ramosissima*), or other succulents (Grinnell and Miller, 1944; Bent, 1948; Garrett and Dunn, 1981; England and Laudenslayer, 1989a). However, the species composition of the shrubs within these habitats is highly variable (England and Laudenslayer, 1989a). At most sites surveyed by England and Laudenslayer (1989a), the dominant shrubs were Creosote Bush (*Larrea tridentata*), Cheese Bush (*Hymenoclea salsola*), Nevada Mormon Tea (*Ephedra nevadensis*), Burro Bush (*Ambrosia*

dumosa), and Big Galleta (*Pleuraphis rigida*). Most often, the shrub composition was extremely diverse and included California Buckwheat (*Eriogonum fasciculatum*), Hop-sage (*Grayia spinosa*), Cooper Box Thorn (*Lycium cooperi*), Anderson Box Thorn (*L. andersonii*), rhatany (*Krameria* spp.), Bladder sage (*Salazaria mexicana*), and goldenbush (*Ericameria* spp.) as other common species. In the eastern Mojave Desert, Bendire's Thrashers also occurred at higher elevations where the vegetation was dominated by Blackbush (*Coleogyne ramosissima*) with scattered junipers (*Juniperus osteosperma*, *J. occidentalis*, or *J. californica*), Joshua Trees, and cholla cactus (England and Laudenslayer, 1989a). On Lee Flat in the extreme northern Mojave Desert, the vegetation had a sparse overstory of Joshua Trees, but the understory consisted primarily of saltbush (*Atriplex confertifolia*), Hop-sage, Winterfat (*Krascheninnikovia lanata*), and Spiny Menodora (*Menodora spinescens*).

England and Laudenslayer (1989b) compared habitat parameters at points where Bendire's Thrashers were found with those where they were absent, and identified several habitat relationships in the Mojave Desert of California. First, points where Bendire's Thrashers were found had significantly denser total succulent and arborescent species, denser columnar cholla cactus, and denser Mojave Yucca and Spanish Bayonet than points that lacked the thrasher. There was no difference in the densities of Joshua Trees between points with and without the bird. The height of succulent and arborescent species also did not differ between points with and without the thrasher.

Second, Bendire's Thrashers were found at sites lacking either Mojave Yucca and Spanish Bayonet, Joshua Trees, or columnar cholla cactus. Probable breeding birds were never found at sites lacking all three, and either Joshua Trees or Mojave Yucca and Spanish Bayonet were always present. These results confirm that yuccas, Joshua Trees, and columnar cholla cactus are important components of Bendire's Thrasher breeding habitat, and for California, they strongly suggest an interrelationship between the biology of the thrasher and members of the genera *Yucca* and *Opuntia*.

Third, sites with Bendire's Thrasher had significantly denser populations of perennial shrubs and higher shrub cover than sites lacking the thrasher. Vegetation height did not differ significantly with presence or absence of the thrasher.

Lastly, soil surface texture at sites with Bendire's Thrashers had significantly less sand, rock, and desert pavement, and more firmly packed dirt than sites without the thrasher. Bendire's Thrashers occurred less frequently on soft, sandy soils and on hard, rocky soils. Presumably this pattern was related to the fact that this species forages on the ground and the bill is used to peck, probe and hammer in the soil, but not for digging (Engels, 1940).

The habitat relationships of Bendire's Thrasher may help explain the absence of this thrasher from most of the Antelope Valley in the western Mojave Desert. Compared to sites with Bendire's Thrashers, soils at sites in the western Mojave sampled by England and Laudenslayer (1989b) had a more sandy surface texture, less firm dirt, and lower soil hardness. Mojave Yucca and Spanish Bayonet did not occur on the Antelope Valley study sites, and columnar cholla cactus were rare compared to other areas in the Mojave Desert. Perennial vegetation in the Antelope Valley had a lower absolute density and lower percent cover than areas with Bendire's Thrashers. Thus, although Joshua Trees are found in much of the Antelope Valley and adjacent bajadas, other important habitat components seemed lacking. Therefore, this part of the western Mojave Desert may be unsuitable for breeding populations of Bendire's Thrasher.

Population Status:

Historically, the primary breeding distribution of Bendire's Thrashers was considered to be the eastern Mojave Desert near Lanfair Valley, Cima Dome, and Clark Mountain (Grinnell and Miller, 1944; Garrett and Dunn, 1981). Grinnell and Miller (1944) considered the population to be "far scattered and aggregate numbers small." Garrett and Dunn (1981) considered Bendire's Thrasher to be a "fairly common but very local summer resident on the Mojave Desert, primarily in e. San Bernardino County," and noted that it bred in smaller numbers on the southern Mojave Desert south to the vicinity of Victorville and JTNP. Remsen (1978) considered the total California breeding population of Bendire's Thrasher to be under 200 pairs. Based largely on this information, the species was placed on the list of Bird Species of Special Concern by the California Department of Fish and Game (Remsen, 1978). The reasons cited for listing included small and locally distributed populations and threats from off-road vehicle use, overgrazing, and harvesting of Joshua Trees and other species of yucca.

The results of the Bendire's Thrasher survey conducted by England and Laudenslayer in 1986 and 1987 indicated the following status of Bendire's Thrashers in the deserts of California:

> Bendire's Thrashers continued to occupy all parts of the historical breeding range in the eastern Mojave Desert and at Joshua Tree National Park, and the ranges in both areas were larger than previously reported.
>
> Previously unreported, small, isolated populations existed at other scattered locations in the southern, central, northern, and western Mojave Desert. Observations over several years suggested that small isolated populations in Superior and Kelso valleys were either permanent and previously undetected or persist only a few years.
>
> Existing information was inadequate to determine whether Bendire's Thrasher populations were increasing, decreasing, or stable.
>
> Bendire's Thrashers had been reported from parts of the Colorado Desert including documented breeding records. However, the status of this thrasher in the Colorado Desert was unknown.

No additional studies of Bendire's Thrasher in California have been conducted since the 1986-87 survey, and the status of this species cannot be further defined. England and Laudenslayer (1989b) recommended additional research (1) to locate new populations, (2) to determine population sizes, and (3) to establish whether small isolated populations are permanent or undergo regular extinction and recolonization.

Threats Analysis:

The primary reasons for concern about the status of Bendire's Thrasher populations in California are their disjunct distribution, apparently isolated populations, and presumed small population size. However, systematic surveys of breeding birds in New Mexico (Darling, 1970) and California (England and Laudenslayer, 1989a) greatly expanded the known distributions in both states. Regional surveys apparently are not available from other areas. Virtually no

quantitative information is available about population densities, and most of our understanding of potential threats is based on an almost anecdotal knowledge of the ecology of this species.

The most obvious potential threat would be loss of breeding habitats to urban and agricultural development. Habitat destruction or degradation could potentially eliminate one of these small, localized populations. In some settings Bendire's Thrashers can persist in rural areas with scattered dwellings near native vegetation (Gilman, 1909, 1915a; Rea, 1983; England and Laudenslayer, 1989a) and in agricultural areas with fields bordered by mesquite and other shrubs (Ambrose, 1963). No information is available on how the intensity or extent of development relates to population declines or increases. Populations have been eliminated by dense urbanization around Tucson (Emlen, 1974) and by large scale agriculture along the Gila River (Rea, 1983). Phillips et al. (1964) suggest the species is favored by clearing and agricultural activities in some Sonoran Desert habitats and is probably much more common in Arizona now than originally. In contrast, Ambrose (1963) states the species has declined in Arizona due to habitat destruction. For New Mexico, Darling (1970) suggests that range of Bendire's Thrasher has expanded because overgrazing greatly expanded the area with scattered junipers. Remsen (1978) states that potential threats to populations in California include harvesting of Joshua Trees and other yuccas, overgrazing, and off-road vehicle activity, but no qualitative information is available to confirm these impacts.

Biological Standards:

Joshua Trees, other yuccas, and columnar cholla are required components of Bendire's Thrasher habitat in the Mojave Desert of California. In addition, Bendire's Thrashers are found at sites where perennial shrub are more dense and shrub cover is higher than sites where the species is absent. These types of sites are on higher elevation bajadas and valleys where the environment is more moist. Management of all land uses in known and potentially suitable Bendire's Thrasher habitat should be designed to promote the long-term sustainability of these relatively rich desert scrub habitats. The types of activities that should be managed include but are not limited to grazing, off-highway vehicle use, fire, and commercial and illegal removal of succulents, yuccas, and Joshua Trees. Because Bendire's Thrashers apparently avoid extremely hard soils and soft sandy soils, land uses within suitable breeding habitats that create these types of soils over large areas should be minimized.

Due to the lack of information about the ecology of this species, only rudimentary and preliminary recommendations can be made regarding management actions to protect the species. Additional data collection should be a high priority to understand the ecology, distribution, and population trends of Bendire's Thrashers in California. England and Laudenslayer (1989b) recommended the following long-term research and monitoring program to answer questions about population status, factors affecting distribution, and future management actions.

> Monitor isolated populations in the Mojave Desert. This program would confirm breeding and must be designed to determine: (1) population size; (2) whether the breeding occurs every year; and (3) if intermittent, the factors limiting breeding. The monitoring program must be relatively long-term (10+ years) to make these determinations.

Survey apparently suitable habitat lacking breeding records. The goal of this project would be to locate additional breeding populations. If done over several years, the results will indicate whether some areas are used irregularly. Effort should be concentrated in the southern, western, and northern Mojave Desert.

Conduct an extensive survey of the Colorado Desert. This survey would investigate the distribution of Bendire's Thrasher in the Colorado Desert. Existing records suggest that this thrasher may breed regularly in small numbers. The survey would identify breeding locations and document the habitats used by the species in this desert.

Investigate breeding biology. Little is known about reproductive phenology, food habits, nesting ecology, and foraging habits. The study would record basic information that could be used later either to help prepare management recommendations or to predict the impacts of desert projects on Bendire's Thrasher.

Study the impacts of desert land uses on Bendire's Thrasher. One or more studies should investigate the effects of urbanization, grazing, off-road vehicle use, or removing yucca, Joshua trees, and columnar cholla cactus on populations of this thrasher. Joshua tree/yucca/cholla vegetation is one of the more mesic and diverse lowland desert habitats and in many areas simultaneously receives several types of land use. Many wildlife species found in this habitat could be affected by these uses, and the study could easily be adapted to incorporate other species.

Literature Cited:

Alcorn, J.R. 1988. The birds of Nevada. Fairview West Publishing, Fallon, Nevada.

Ambrose, J.E., Jr. 1963. The breeding ecology of *Toxostoma curvirostre* and *T. bendirei* in the vicinity of Tucson, Arizona. M.S. Thesis, Univ. Arizona, Tucson, Arizona.

American Ornithologists' Union. 1983. Check-list of North American birds. 6th ed. American Ornithologists' Union, Washington, D.C.

Andrews, R. and R. Righter. 1992. Colorado birds: a reference to their distribution and habitat. Denver Museum of Natural History, Denver, Colorado.

Austin, G.T. and W.G. Bradley. 1965. Bird records from southern Nevada. Condor 67:445-446.

Bent, A.C. 1948. Life histories of North American nuthatches, wrens, thrashers, and their allies. Bull. U.S. Natl. Mus. 195.

Brown, H. 1901. Bendire's thrasher. Auk 18:225-231.

California Department of Fish and Game, Natural Diversity Data Base. 1998. Special Animals. Biannual publication, Mimeo., 44 pp.

Darling, J.L. 1970. New breeding records of *Toxostoma curvirostre* and *T. bendirei* in New Mexico. Condor 72:366-367.

Dunning, J.B., Jr. 1984. Body weights of 686 species of North American birds. West. Bird Banding Assoc. Monograph No. 1.

Engels, W.L. 1940. Structural adaptations in thrashers (Mimidae: Genus *Toxostoma*) with comments on interspecific relationships. Univ. Calif. Pub. Zool. 42:341-400.

England, A.S. and W.F. Laudenslayer, Jr. 1989a. Distribution and seasonal movements of Bendire's thrasher in California. West. Birds 20:97-123.

England, A.S. and W.F. Laudenslayer, Jr. 1989b. Review of the status of Bendire's thrasher in California. Calif. Dept. Fish and Game, Wildl. Mgmt. Div., Admin. Rep. No. 89-3.

England, A.S. and W.F. Laudenslayer, Jr. 1993. Bendire's Thrasher (*Toxostoma bendirei*). *In:* A. Poole and F. Gill (eds.), The Birds of North America, No. 71. The Academy of Natural Sciences, Philadelphia, Pennsylvania, and The American Ornithologists' Union, Washington, D.C.

Garrett, K. and J. Dunn. 1981. Birds of southern California: status and distribution. Los Angeles Audubon Society, Los Angeles, California.

Garrett, K.L. and J.L. Dunn. 1984. The identification of curve-billed, Bendire's and gray thrashers. West. Tanager 51:1-3.

Gilman, M.F. 1909. Among the thrashers in Arizona. Condor 11:49-54.

Gilman, M.F. 1915a. A forty acre bird census at Sacaton, Arizona. Condor 17:86-90.

Grinnell, J. and A. H. Miller. 1944. The distribution of the birds of California. Pacific Coast Avifauna No. 27.

Hayward, C.L., C. Cottam, A.M. Woodbury and H.H. Frost. 1976. Birds of Utah. Great Basin Nat. Mem. No. 1.

Howell, S.N.G., and S. Webb. 1995. A guide to the birds of Mexico and northern Central America. Oxford Univ. Press, New York.

Johnson, D.H., M.D. Bryant, and A.H. Miller. 1948. Vertebrate animals of the Providence Mountains area of California. Univ. Calif. Pub. Zool. 48:221-376.

Kaufman, K. 1990. A field guide to advanced birding: birding challenges and how to approach them. Houghton Mifflin Co., Boston, Massachusetts.

Miller, A.H. and R.C. Stebbins. 1964. The lives of desert animals in Joshua Tree National Monument. Univ. of California Press, Berkeley, California.

Monson, G. and A. R. Phillips. 1981. Annotated checklist of the Birds of Arizona. 2nd ed. Univ. Arizona Press, Tucson, Arizona.

Phillips, A.R. 1986. The Known Birds of North and Middle America. Part I. Allan R. Phillips, Denver, Colorado.

Pierce, W.M. 1921. The Bendire thrasher nesting in California. Condor 23:34.

Rea, A.M. 1983. Once a river. Univ. Arizona Press, Tucson, Arizona.

Remsen, J.V., Jr. 1978. Bird species of special concern in California. Calif. Dept. Fish and Game, Wildl, Mgmt. Branch Admin. Rep. No 78-1

Ridgway, R. 1907. The birds of North and Middle America: a descriptive catalogue of the higher groups, genera, species, and subspecies of birds known to occur in North America. Bull. U.S. Natl. Mus. 50, Part IV.

Rosenberg, K.V., R.D. Ohmart, W.C. Hunter, and B.W. Anderson. 1991. Birds of the lower Colorado River Valley. Univ. Arizona Press, Tucson, Arizona.

Scott, W.E.D. 1888. On the avi-fauna of Pinal County, with remarks on some birds of Pima and Gila Counties, Arizona. Auk 5:159-168.

USDI, Bureau of Land Management, 1997. California Desert District Resource Area files.

BROWN-CRESTED FLYCATCHER
Myiarchus tyrannulus

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Management Status: Federal: None
California: Species of Special Concern (CDFG, 1998)

General Distribution:

The Brown-crested Flycatcher is one of four *Myiarchus* flycatchers that regularly occur north of Mexico. The breeding range of the *magister* subspecies group, which includes birds occurring in California, extends from southern California, extreme southern Nevada, extreme southwestern Utah, Arizona, and southwestern New Mexico south along Mexico's Pacific slope to Oaxaca, and east to western Durango, Zacatecas, Morelos and southwestern Puebla, and from eastern Coahuila and southern Texas south on the Gulf-Caribbean slope to northern Honduras, and across the Sula Valley of Honduras to the Pacific lowlands of El Salvador and Honduras. It winters from northern Mexico south throughout its breeding range, and casually in southern Florida (AOU, 1998).

In California, Brown-crested Flycatchers of the northwestern-most subspecies (*M.t. magister*) (AOU, 1957) nest along the Colorado River and at a few scattered localities throughout the deserts. They are rarely observed in California during migration away from known breeding areas (Garrett and Dunn, 1981), and are unrecorded in winter in California (K.L. Garrett, pers. comm.).

Distribution in the West Mojave Planning Area:

In the WMPA, they nest or have nested at the following localities: the Mojave River at Victorville (1-3 pairs annually, S. Myers, unpub. data), Cushenbury Springs (one pair in 1991), and Morongo Valley (1-2 pairs annually, Garrett and Dunn, 1981; E.A. Cardiff, pers. comm.). They also nest at three localities just outside of the Planning Area: Tecopa (one pair at least three different years), the South Fork Kern River Preserve at Weldon (3-5 pairs annually, *American Birds* and *Field Notes* data), and at Rattlesnake Ranch near Mecca (one pair in recent years, C. McGaugh, pers. comm.). Tecopa is approximately 15 mi. (24 km) northeast, Weldon about 9.5 mi. (15 km) west, and Mecca 15 mi. (24 km) of the WMPA.

Natural History:

Brown-crested Flycatchers are similar in appearance to the other *Myiarchus* flycatchers that occur in the United States. In California, only one other *Myiarchus* occurs regularly, the Ash-throated Flycatcher (*M. cinerascens*). The other North American species in the genus, the Dusky-capped Flycatcher (*M. tuberculifer*) and the Great Crested Flycatcher (*M. crinitus*), are casual migrants. The upperparts of the Brown-crested Flycatcher are brownish-olive, the belly and undertail coverts are yellow, and the breast and throat are pale gray. The Brown-crested Flycatcher can be usually separated from the Ash-throated Flycatcher by its larger size,

proportionally larger bill, different pattern of rusty color in the tail feathers (as seen from below), and, especially, by differences in their vocalizations. Overall, the Ash-throated Flycatcher is paler (especially the yellow on the underparts), but age and plumage wear make this character somewhat variable (Phillips et al., 1964; Pyle et al., 1987). Brown-crested Flycatchers are 7.5-9 in. (19-23 cm) long (Lanyon, 1983), and weigh an average of 1.54 oz. (44 grams) (Dunning, 1984). Maximum recorded age for a wild Brown-crested Flycatcher is 8 years (Clapp et al., 1983).

Like most flycatchers, this species primarily eats insects, which it captures by hawking or gleaning (Bent, 1942; Ehrlich et al., 1988). They have also been observed several times capturing and eating hummingbirds (Snider, 1971; Gamboa, 1977), but this behavior may not be common.

In California, Brown-crested Flycatchers usually arrive on their nesting grounds during the first or second week of May, with an early arrival date in the region of 24 April. They normally depart the nesting grounds by mid-August, exceptionally remaining into early September (Garrett and Dunn, 1981).

Like their congeners, Brown-crested Flycatchers nest in cavities. At nesting localities in the California deserts, Fremont Cottonwoods (*Populus fremontii*) and various willows (*Salix* spp.) are probably the most common trees used for nest sites. Saguaros (*Carnegiea gigantea*) are commonly used in Arizona (Bent, 1942). Brown-crested Flycatchers have also been known to nest in utility poles and fence posts (Zeiner et al., 1990). They are secondary cavity nesters, utilizing sites originally excavated by Gila Woodpeckers (*Melanerpes uropygialis*) and Gilded Flickers (*Colaptes chrysoides*) along the Colorado River, and Nuttall's Woodpeckers (*Picoides nuttallii*), Ladder-backed Woodpeckers (*P. scalaris*), and Northern Flickers (*C. auratus*) at other California desert localities. Cavities are usually 10-30 ft. (3-9 m) above ground (Kaufman, 1996). Clutch sizes are from 3-5 eggs (Harrison, 1979). Brood parasitism of Brown-crested Flycatchers by Brown-headed Cowbirds *(Molothrus ater*) is not known. Most cavity nesters are not significantly affected by cowbirds (Friedmann, 1963).

Habitat Requirements:

In California, Brown-crested Flycatchers occur in riparian woodland or forest dominated by cottonwoods and willows, usually in a climax stage; along the Colorado River they have also bred in residential areas with tall, planted trees (Garrett and Dunn, 1981; Rosenberg et al., 1991). All southern California breeding localities contain large cottonwoods and/or willows. The presence of woodpeckers or other cavity excavating species is important. No data exist on the minimum areas of riparian habitat required by Brown-crested Flycatchers.

Ash-throated Flycatchers, which are noticeably smaller than Brown-crested Flycatchers, occur in a wider variety of habitats, and are able to use smaller trees for nesting sites. Brown-crested Flycatchers are restricted to areas with large trees, or Saguaros in Arizona (Phillips et al., 1964).

Population Status:

Brown-crested Flycatchers have expanded their range in California over the last 35+ years. Banks and McCaskie (1964) summarized all of the specimen records and observations from the Lower Colorado River Valley through the early 1960s. It was first recorded in 1921 from near Bard, Imperial County. As Rosenberg et al. (1991) point out, "the very observant Grinnell (1914) and all previous workers did not detect it" along the Lower Colorado River. By 1964, Banks and

McCaskie considered the Brown-crested Flycatcher "a regular, and probably not uncommon, breeding species in the lower Colorado River Valley." In 1964, the only California location other than the Colorado River that may have supported breeding pairs was Morongo Valley. By 1976, 800 Brown-crested Flycatchers were estimated to occur in the Lower Colorado River Valley. Habitat destruction or alteration has decreased that number significantly (Rosenberg et al., 1991).

Since the 1960s, they have expanded their range westward and northward as far as the South Fork of the Kern River (exceptionally to near Big Pine, as in 1991; Johnson, 1994; *American Birds* and *National Audubon Society Field Notes* data). At all regular breeding localities in the California desert away from the Lower Colorado River Valley, numbers appear to be stable. One to two pairs have been documented during Breeding Bird Censuses conducted at Morongo Valley since 1977 (E.A. Cardiff, pers. comm.). Numbers along the Mojave River at Victorville have remained at 1-3 pairs since it was first observed nesting in 1992 (S.J. Myers, pers. obs.). From 1988 through 1995, the population in the South Fork Kern River Valley has been from 3-5 pairs (*American Birds* and *National Audubon Society Field Notes* data).

Threats Analysis:

Habitat destruction is the primary threat to Brown-crested Flycatchers in the WMPA. Habitat destruction can occur in several ways, with the most catastrophic losses resulting from clearing of large tracts of forest or woodland for agriculture, development, or flood control. Activities such as wood cutting for fuel can degrade or destroy suitable breeding habitat for this species.

Remsen (1978) suggested that Brown-crested Flycatchers may be impacted by nest site competition with European Starlings (*Sturnus vulgaris*). Hunter (1984) and Rosenberg et al. (1991) suggested, at least along the Colorado River, that Brown-crested Flycatchers successfully defend their nesting sites, a view that Kaufman (1996) supported. Rosenberg et al. point out that cavities are plentiful along the Colorado River, which may not be the case at other California nesting areas. Even if the flycatchers can successfully defend nest sites, they arrive relatively late in the spring, after many sites have already been occupied by starlings. Other cavity nesting species, especially Northern Flickers, are thought to be impacted by starling nest site competition (E.A. Cardiff, pers. comm.). Starlings are common at Morongo Valley, Victorville, and Cushenbury Springs (S.J. Myers, unpubl. data).

Lowering of ground water has had a significant effect on cottonwood-willow forest along the Mojave River in Victorville. The extent of both marshland and riparian woodland/forest in the Victor Valley has declined markedly in the past 140 years, as a result of well drilling (Torres et al., 1992). Long-time residents have stated that much of the open, dry cottonwood woodland in the area was once similar to the dense, lush cottonwood-willow forest where Brown-crested Flycatchers now occur (Myers, 1992).

Fire can have a devastating effect on Brown-crested Flycatcher nesting habitat. A wildfire at Big Morongo Preserve on 27 April 1992 burned about 50 acres (20 ha), including many large cottonwoods (Cardiff, 1993). This habitat will probably take many years to recover completely. A smaller fire at Mojave Narrows Regional Park in recent years killed several large cottonwoods and willows. Many young cottonwoods (and a few willows and ash) have sprouted in this area, but it will take many years for the area to attain its former structure.

Non-native invasive plants can also degrade habitat. Exotics such as Salt Cedar (*Tamarix ramosissima, T. parviflora*), Giant Reed (*Arundo donax*), and Russian Olive (*Elaeagnus*

angustifolius) probably provide little in the way of habitat values for Brown-crested Flycatchers, and reduce regeneration and seedling survival of native plant species. All of these species occur along the Mojave River in the Victorville area; Russian Olive is especially prominent. Some Salt Cedar occurs at Morongo Valley.

Few, if any, data are available on the effects of off-highway vehicles on Brown-crested Flycatchers, but this activity is common at Mojave Narrows Park and other potential flycatcher nesting areas near Victorville.

Biological Standards:

The most important measure necessary to protect or enhance Brown-crested Flycatcher populations in the WMPA is to preserve known and potential nesting areas. The known nesting localities are Big Morongo Canyon Preserve (managed by BLM), Mojave Narrows Regional Park (managed by San Bernardino County Regional Parks Department (the land is owned by the State of California Wildlife Conservation Board), and the oasis at Cushenbury Springs (privately owned). Management of important nesting areas for Brown-crested Flycatcher must include protection from off-highway vehicle degradation and disturbance, wood-cutting, and wildfires. Indiscriminant removal of vegetation for flood control purposes should be monitored and regulated.

Maintenance or enhancement of water sources necessary to preserve or improve riparian habitats should also be a management priority. In some cases, restoration of riparian habitat by removing invasives and planting cottonwoods and willows may be appropriate (such as in Afton Canyon).

Since nest site competition may be a problem, at least at some localities, control of European Starlings may be appropriate in managing for this species. If starling control programs are established, it will be important to monitor populations of Brown-crested Flycatchers, Northern Flickers, and other medium to large cavity nesters.

In order to evaluate the vigor of desert riparian habitats and the viability of bird populations in the WMPA, regular monitoring is necessary. BLM documents such as ACEC Management Plans and Management Plans for Natural Areas prescribe bird monitoring programs. BLM and other participating agencies should assess the effectiveness of current monitoring methods and revise as needed. Annual review of monitoring results can be used to assist in management decisions. Such review should address whether habitats are at carrying capacity for sensitive bird species, and if not, identify corrective measures that can be taken to increase populations.

Literature Cited:

American Ornithologists' Union. 1957. Check-list of North American birds, 5th ed. Am. Ornithol. Union, Washington, D.C.

American Ornithologists' Union. 1998. Check-list of North American birds, 7th ed. Am. Ornithol. Union, Washington, D.C.

Banks, R.C. and R.G. McCaskie. 1964. Distribution and status of the Wied crested flycatcher in the Lower Colorado River Valley. Condor 66:250-251.

Bent, A.C. 1942. Life histories of North American flycatchers, larks, swallows, and their allies. Bull. U.S. Natl. Mus. 179.

California Department of Fish and Game, Natural Diversity Data Base. 1998. Special Animals. Biannual publication, Mimeo., 44 pp.

Cardiff, E.A. 1993. Desert riparian-freshwater marsh [Breeding bird census]. Resident bird counts 1992. J. Field Ornithol. 64 (suppl.):92-93.

Clapp, R.B., M.K. Klimkiewicz, and A.G. Futcher. Longevity records of North American birds: Columbidae through Paridae. J. Field Ornithol. 54:123-137.

Dunning, J.B, Jr. 1984. Body weights of 686 species of North American birds. Western Bird Banding Assoc., Monograph No. 1.

Ehrlich, P.R., D.S. Dobkin, and D. Wheye. 1988. The birder's handbook: a field guide to the natural history of North American birds. Simon & Schuster, New York.

Friedmann, H. 1963. Host relations of the parasitic cowbirds. Bull. U.S. Natl. Mus. 233.

Gamboa, G.J. 1977. Predation on rufous hummingbird by Weid's crested flycatcher. Auk 94:157-158.

Garrett, K. and J. Dunn. 1981. Birds of southern California: status and distribution. Los Angeles Audubon Society, Los Angeles, California.

Grinnell, J. 1914. An account of the mammals and birds of the lower Colorado Valley with especial reference to the distributional problems presented. Univ. Calif. Publ. Zool. 12:51-294.

Grinnell, J. and A. Miller. 1944. The distribution of the birds of California. Pacific Coast Avifauna No. 27. Reprinted by Artemisia Press, Lee Vining, California.

Harrison, H.H. 1979. A field guide to western birds' nests. Houghton Mifflin Co., Boston, Massachusetts.

Hunter, W.C. 1984. Status of nine bird species of special concern along the Colorado River. Calif. Dept. Of Fish and Game, Nongame Wildl. Investigations, Wildl. Mgt. Branch Admin. Rep. 84-2, Nongame Bird and Mammal Sec. Rep. 84.09.

Kaufman, K. 1996. Lives of North American birds. Houghton Mifflin Co., Boston, Massachusetts..

Lanyon, W.E. 1983. Brown-crested Flycatcher. pg. 280 *In:* The Audubon Society Master guide to birding (vol. 2). Alfred A. Knopf, New York, New York.

Myers, S.J. 1992. Biological inventory of the Mojave River corridor. *In:* Tierra Madre Consultants, Inc., Natural resources inventory of the Mojave River corridor. Unpub. report prepared for the Mojave River Corridor Task Force.

Phillips, A., J. Marshall and G. Monson. 1964. The birds of Arizona. Univ. Arizona Press, Tucson, Arizona.

Pyle, P., S.N.G. Howell, R.P. Yunick, and D.F. DeSante. 1987. Identification guide to North American passerines. Slate Creek Press, Bolinas, California.

Remsen. J.V., Jr. 1978. Bird species of special concern in California. Calif. Dept. Fish and Game, Wildlife Mgt. Branch Admin. Rep. 78-1.

Rosenberg, K., R. Ohmart, W. Hunter, and B. Anderson. 1991. Birds of the Lower Colorado River Valley. Univ. Arizona Press, Tucson, Arizona.

Snider, P.R. 1971. Southwest region (the nesting season). Am. Birds 25:891.

Torres, J., D. Earle, S. Connell, S. Wells and B. Love. 1992. Cultural resources sensitivity study of the Mojave River corridor, San Bernardino County, California. *In:* Tierra Madre Consultants, Inc., Natural resources inventory of the Mojave River corridor. Unpub. report prepared for the Mojave River Corridor Task Force.

USDI, Bureau of Land Management, 1997. California Desert District Resource Area files.

Zeiner, D.C., W.F. Laudenslayer, K.E. Mayer, and M. White. 1990. California's wildlife, vol. 2 (Birds). Calif. Statewide Wildlife Habitat Relationships System, Department of Fish and Game, Sacramento, California.

BURROWING OWL
Athene cunicularia

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Management Status: Federal: USFWS Species of Concern; BLM Sensitive
California: Species of Special Concern (CDFG, 1998)

General Distribution:

Burrowing Owls breed from south central Canada south through most of the western United States and Central America to the southern tip of South America, as well as in Florida and on most of the larger Carribbean islands (Haug et al., 1993). In North America, northern populations withdraw irregularly southward in winter (Zarn, 1974), corresponding with anecdotal evidence of a slight winter influx in the southwest and Mexico (Coulombe, 1971). Populations breeding in northern Arizona are apparently migratory (Phillips et al., 1964), while those breeding in California and southern Arizona are largely non-migratory (Thomsen, 1971; Haug et al., 1993).

A tendency for coloniality, with large intervening areas unoccupied (Zarn, 1974; pers. obs.), probably reflects the patchy distribution of available habitat. Dispersal of young and seasonal migration account for occasional appearances nearly anywhere within the species' general range.

Distribution in the West Mojave Planning Area:

There is virtually no published literature on details of distribution or seasonal movements for this species in the Mojave Desert. Garrett and Dunn (1981) give an overview of the species' distribution in southern California deserts: "It is quite scarce on the northern deserts from the e[east] Mojave Desert north through Inyo Co. . . . While it is largely resident in the region, there is some winter movement of more northerly birds into the southern and coastal parts of the region. . . . The Burrowing Owl reaches peak abundance in agricultural areas in the Imperial Valley; the banks of irrigation ditches provide suitable nesting sites. Open desert scrub is widely but sparsely inhabited."

There is no published evidence regarding partial or complete withdrawal in winter by breeding birds in the Mojave Desert, though such a pattern may occur at least in the northern portions of the WMPA. The seasonality, magnitude and geographic pattern (if any) of the apparent winter influx from more northerly breeders is also poorly documented. It is likely that some information on these patterns exists in widespread, unpublished data from many individual observers.

Existing records of Burrowing Owls compiled for this account includes 53 records within the WMPA. The records on hand certainly represent only a small sample of the locations at which Burrowing Owls have recently been or currently are present. Of the 53 records, 23 (43%) are from within Edwards Air Force Base; all of these have no specific locale or date. Of the other 30 records, only 13 have specific locales and dates. Probable or confirmed breeding was noted at five locales (as mapped).

Natural History:

Most data available on this species are from studies in Florida, Pacific coastal areas, and the Great Plains (e.g., Thomsen, 1971; Butts, 1973; Ross, 1974; Green, 1983; and others cited in Haug et al., 1993). Studies in desert areas include Coulombe (1971), Martin (1973), Barrows (1989), and Silva et al. (1995), although there are apparently no thorough or long-term published studies of this species in the Mojave Desert. The information presented here is based primarily on existing desert studies, along with compiled information in Haug et al. (1993).

Burrowing Owls are one of only two North American owls showing no reverse sexual size dimorphism, with males slightly larger than females (Voous, 1988) or similar in size (Plumpton, 1992, cited in Haug et al., 1993). Based on combined studies, Burrowing Owls in western North America averaged 172.0 g. (males) and 168.0 g. (females; Voous, 1988). Mean longevity in desert areas is unknown. In coastal California, apparent survival rates in a banded population were 30% for juveniles and 81% for adults (Thomsen, 1971). Oldest known age for a non-captive Burrowing Owl is 8 years and 8 months (Kennard, 1975).

This distinctive owl is active both day and night, but is generally most active near dawn and dusk (Zarn, 1974). The nesting season begins in early March in the Imperial Valley (Coulombe, 1971) and slightly later in the more strongly seasonal desert of New Mexico (Martin, 1973). The breeding season in coastal southern California (Ventura County to San Diego County) was found to extend from early April through late June (n=55; Kiff and Irwin, 1987). Fledglings appear to reach independence in August and September (Martin, 1973), although in non-migratory populations this may be a more gradual process. Burrowing Owls appear to be predominantly seasonally monogamous in migratory populations (Martin, 1973), while in non-migratory birds pair bonds often continue year-round (Haug et al., 1993). In the western United States pairs produce only a single brood per year, but will re-nest in response to early nest failures (Haug et al., 1993). Genetic work by Johnson (1997) revealed that in 20% of cases in one population in Davis, California, genetically determined parent-offspring relationships and those suggested by direct behavioral observations disagreed. Causes were nestling movement and brood mixing, extra-pair fertilization, polygamy, and possibly intraspecific brood parasitism.

Burrowing Owls in the western United States are only rarely known to construct their own burrows, in contrast to those in Florida (Haug et al., 1993). Many researchers and observers have noted a strong association between Burrowing Owls and burrowing mammals, especially ground squirrels (*Spermophilus* spp.). Soils suitable for burrows may limit distribution in natural areas, however the species will also occupy man-made niches such as banks and ditches, piles of broken concrete, and even abandoned structures (Haug et al., 1993).

Literature on Burrowing Owl diet is extensive but mostly anecdotal (e.g., Robertson, 1929; Bond, 1942; Longhurst, 1942; Carson, 1951; Glover, 1953). They are usually described as dietary generalists, with arthropods composing the majority of prey items. Both Barrows (1989) and Coulombe (1971), studying the species in California deserts, noted a prevalence of earwigs (Dermaptera). A wide variety of invertebrates and vertebrates have been noted in diets, with some indications that prey are taken approximately in proportion to availability.

Habitat Requirements:

Grinnell and Miller (1944) describe habitat in California as, "Open, dry, nearly or quite level, grassland; prairie; desert floor." Several factors in combination may explain the species' distribution within the Mojave Desert: vegetation density, availability of suitable prey, availability

of burrows or suitable soil, and disturbance (primarily from humans). In a few areas, predation may be an important factor.

Few desert areas have too much plant cover for Burrowing Owls; where they do (e.g., palm oases), they are unoccupied (e.g., Barrows, 1989). Dense vegetation probably may not exclude Burrowing Owls directly, but rather through increased predation or competition, or lowered hunting success for preferred prey. As reported in Voous (1988), "Of all North American owls examined experimentally, the Burrowing Owl showed the least ability to locate immobilized prey in the dark (Dice, 1945; Marti, 1974) . . . corresponding with the same ability to see in dim light as man."

Local and regional prey availability may be an important factor in habitat suitability, and thus distribution. For example, several researchers have found that the proportion of mammalian prey increases in winter (Haug et al., 1993), and Barrows (1989) noted that in the Mojave Desert the most common pocket mouse (*Perognathus longimembris*) hibernates during winter, while those to the south in the Colorado Desert do not, and more species are present as well. Prey abundance was not reported.

Human alteration of the landscape can inadvertently or intentionally create suitable habitat, while many kinds of human actions can also make potential habitat unsuitable. Low-intensity agriculture and surface irrigation probably create habitat by providing burrow sites and prey. However, harmful human alterations can cause loss of habitat either by decreasing prey (e.g., through urban development or pest eradication), decreasing burrow availability (e.g., eradication of ground squirrels and other fossorial mammals), degrading habitat quality (e.g., excessive noise or disturbance; invasion by exotic plants), or increasing mortality risk (e.g., through on- or off-road vehicle collisions, non-native predators such as dogs and cats). Much remains to be learned about the kinds of habitat alteration tolerated by this species, including noise impacts as well as duration and daily timing of nearby human activities.

Population Status:

Trends in populations of Burrowing Owls in the United States and Canada were recently summarized by James and Espie (1997), who relied on responses to a questionnaire mailed to the 24 states and provinces in which the owl breeds. The California Department of Fish and Game response indicated that the California population total was between 1000 and 10,000 pairs, that there was a declining trend, and that factors in the decline included habitat loss, pesticides, predators, persecution, reduced burrow availability, and vehicle collisions.

Information available on the species status and distribution in the Mojave Desert (e.g., Garrett and Dunn 1981; data mapped for this account), along with known trends in habitat changes, indicate that the species is currently uncommon, local or patchy in occurrence, and currently in slow decline, but is not yet threatened with extirpation. The total breeding population within the WMPA is likely in the range of a few hundred pairs.

Threats Analysis:

The following factors are known threats in some portion of the range, and are potential threats in the WMPA: direct mortality from man (including vehicle collisions); pesticides; habitat degradation, destruction and loss; and predators.

Haug et al. (1993) state that, "collisions with vehicles [are] often a serious cause of mortality," citing several studies in which this was documented as being significant. This may be

in part due to the relatively high tolerance of the species for vehicular disturbance (Plumpton and Lutz, 1993; Coulombe, 1971), along with a preference for roads and flat, open spaces. Direct mortality by shooting has been documented by multiple researchers in recent times in Canada and Oklahoma (Wedgwood, 1978 and Butts, 1973, both cited in Haug et al., 1993), and is a likely cause of at least limited mortality in the Mojave Desert (Zarn, 1974), where target practice (legal and illegal) is common.

Pesticide use (i.e., not intended for Burrowing Owls) has clear adverse effects on Burrowing Owls due to direct mortality, loss of animals that provide burrows, and loss of prey base (James and Fox, 1987, cited in Haug et al., 1993). Alternative pest management strategies may be possible, though research on California Ground Squirrels, *Spermophilus beecheyi*, (Van Vuren et al., 1997) indicates trapping and relocating is not a useful management alternative for problem ground squirrel colonies in most instances.

Human alteration of the landscape, including urbanization, mining, trash disposal and other uses, is a direct source of habitat loss for this species. However the more subtle process of habitat degradation, through grazing (Haug et al., 1993), invasion of non-native plants, alteration of flood patterns through flood control, erosion, and other subtle changes, also reduces the amount of suitable habitat. All of these factors are well-established for Burrowing Owls in coastal California (Haug et al., 1993; Hamilton and Willick, 1996), but already occur and can be expected to increase in desert areas as a result of continuing regional human population growth.

Maintenance and brush control of irrigation ditches can exert a major influence on Burrowing Owl populations in some areas. As Zarn (1974) notes, "Too frequent control disrupts colonization by ground squirrels; too little control allows vegetation to grow too tall for ground squirrels' habitat preferences. In either case, resultant burrow availability affects the owls."

In one study, food supplemented females laid more and larger eggs and hatched more young than those not supplemented, providing one explanation for poor reproductive success in areas where human activity reduces habitat quality (Wellicome, 1992, cited in Haug et al., 1993). Another factor affecting productivity was revealed by a study in Florida, where as many as 27% of nests with eggs and young chicks failed in some years due to collapsing burrows caused by spring rains (Millsap and Bear, 1988, cited in Haug et al., 1993); trampling by sheep in grazing areas has also been known to cause widespread collapse of burrows (Haug et al., 1993). Some populations may be threatened by changes in prey availability; in one study in Chile (Silva et al., 1995), it was shown that rodent prey was a limiting factor for populations there, even though most food items were arthropods.

A wide variety of mammalian and avian native predators are known; Badger (*Taxidea taxus*) especially seems to be a potentially serious local problem (Haug et al., 1993), but is rarely a threat except where native predators have increased as a result of changes by man, for example with Coyote (*Canis latrans*) or Great Horned Owl (*Bubo virginianus*). Non-native predators, especially Domestic Dog (*Canis familiaris*) and Domestic Cat (*Felis domesticus*) are known predators of adult and young Burrowing Owls, and may be serious problems in some areas of the WMPA.

Biological Standards:

No hard data exists on population size, structure or trends within the Mojave Desert. Recent recommendations for survey methods (Haug and Didiuk, 1993; CBOC, 1993; CDFG, 1995; CBOC, 1997) provide a basis only for determining presence or absence, limiting their use in

assessing population changes over time. The only published, quantitative census technique specifically for Burrowing Owls was developed by Martell et al. (1997), and uses a point-transect survey method and an area occupied analysis. This method is probably the most practical technique for assessing numbers of owls in small to moderate-sized areas for baseline management, to evaluate impacts from land use changes and for monitoring restoration success. Based on existing studies of population parameters and trends (e.g., James et al., 1997), five-year surveys should be adequate to indicate trends in most populations.

In the short term, the primary conservation needs for Burrowing Owl in the WMPA are to lower mortality from vehicle collisions, both on and off of roads, and to protect them against shooting and harassment. In the longer term, it is vital to protect and maintain the species' habitat, both through not harming populations of ground squirrels and other fossorial mammals, and through active conservation of both occupied and potentially occupied areas. Mitigation recommendations provided in CDFG (1995) should be followed for all projects in the WMPA, as a minimum.

Based on existing information on Burrowing Owls and existing land uses and trends within the WMPA, minimum management requirements in the WMPA should include at least the six steps below to minimize additional declines, and to address specific problems that are likely to exist locally. These are: (1) limit vehicle speeds on secondary and back roads in areas of occupied and potential Burrowing Owl habitat; (2) prohibit off-road vehicles in areas of occupied and potential Burrowing Owl habitat; (3) prohibit use of biocides or other toxins as well as shooting or trapping for pest control in occupied and potential Burrowing Owl habitat; (4) educate recreational users in the area as to the penalties for killing or harassing Burrowing Owls, and the benefits of their presence (e.g., pest control, public enjoyment and education); (5) require surveys for this species in all areas of potential habitat prior to undergoing any planned change (e.g., road or other construction, changing land use such as grazing or vehicle access); and (6) maintain an ongoing database of sensitive species information for the WMPA, made available upon request by researchers.

Literature Cited:

Barrows, C.W. 1989. Diets of five species of desert owls. W. Birds 20:1-10.

Bond, R.M. 1942. Food of the burrowing owl in western Nevada. Condor 44:183.

Butts, K.O. 1973. Life history and habitat requirements of Burrowing Owls in western Oklahoma. M.Sc. thesis, Oklahoma State Univ., Stillwater, Oklahoma.

Carson, J.A. 1951. Burrowing owl with Jerusalem cricket. Condor 53:46.

[CBOC] California Burrowing Owl Consortium. 1993. Burrowing Owl Survey Protocol and Mitigation Guidelines. Unpub. Rep. 13 pp.

[CBOC] California Burrowing Owl Consortium. 1997. Burrowing Owl Survey Protocol and Mitigation Guidelines. J. Raptor Res. Rep. 9:171-177.

[CDFG] California Department of Fish and Game. 1995. Staff report on burrowing owl mitigation. Report dated 25 Sep 1995. Calif. Dept. Fish and Game, Sacramento, California.

Coulombe, H.N. 1971. Behavior and population ecology of the burrowing owl, *Speotyto cunicularia*, in the Imperial Valley of California. Condor 73:162-176.

Dice, L.R. 1945. Minimum intensities of illumination under which owls can find dead prey by sight. Amer. Nat. 79:385-416.

Dunning, Jr., J.B., (ed.). 1993. CRC Handbook of Avian Body Masses. CRC Press, Boca Raton, Florida.

Garrett, K. and J. Dunn. 1981. Birds of Southern California: Status and Distribution. Los Angeles Audubon Soc., Los Angeles, California.

Glover, F.A. 1953. Summer foods of the burrowing owl. Condor 55:275.

Green, G.A. 1983. Ecology of breeding burrowing owls in the Columbia Basin, Oregon. M.Sc. Thesis, Oregon St. Univ., Corvallis, Oregon.

Grinnell, J. and A.H. Miller. 1944. The Distribution of the Birds of California. Pacific Coast Avifauna 27.

Hamilton, R.A. and D.R. Willick. 1996. The Birds of Orange County, California: Status and Distribution. Sea and Sage Press, Sea and Sage Audubon Society, Irvine, California.

Haug, E.A. and A.B. Didiuk. 1993. Use of recorded calls to detect burrowing owls. J. Field Ornithol. 64:188-194.

Haug, E.A., B.A. Millsap, and M.S. Martell. 1993. Burrowing Owl (*Speotyto cunicularia*). *In:* A. Poole and F. Gill (eds.), The Birds of North America, No. 61. Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

Jaksi , F.M. and C.D. Marti. 1981. Trophic ecology of *Athene* owls in Mediterranean-type ecosystems: A comparative analysis. Canad. J. Zool. 59:331-340.

James, P.C. and R.H.M. Espie. 1997. Current status of the burrowing owl in North America: An agency survey. J. Raptor Res. Rep. 9:3-5.

James, P.C. and G.A. Fox. 1987. Effects of some insecticides on productivity of burrowing owls. Blue Jay 45:65-71.

James, P.C., T.J. Ethier, and M.K. Toutloff. 1997. Parameters of a declining burrowing owl Population in Saskatchewan. J. Raptor Res. Rep. 9:34-37.

Johnnson, B.S. 1997. Reproductive success, relatedness, and mating patterns of colonial burrowing owls. J. Raptor Res. Rep. 9:64-67.

Kennard, J.H. 1975. Longevity records of North American birds. Bird-Banding 46:55-73.

Kiff, L. and D. Irwin. 1987. The breeding season of Los Angeles County Birds. Western Tanager [newsletter of the Los Angeles Audubon Society] 53(7):4-5.

Longhurst, W.M. 1942. The summer food of burrowing owls in Costilla County, Colorado. Condor 44:281-282.

Martell, M.S., J.B. Nibe, and P.T. Redig. 1997. Using the area occupied method to survey for burrowing owls in South Dakota. J. Raptor Res. Rep. 9:24-27.

Marti, C.D. 1974. Feeding ecology of four sympatric owls. Condor 76:45-61.

Martin, D.J. 1973. Selected aspects of burrowing owl ecology and behavior. Condor 75:446-456.

Millsap, B.A. and C. Bear. 1988. Cape Coral burrowing owl population monitoring. Florida Game and Fresh Water Fish Commission (Nongame Wildlife Section), Tallahassee, Florida.

Newton, I. 1991. Population limitation in birds of prey: A comparative approach. pp. 3-21 *In:* C.M. Perrins, J.-D. Lebreton, and G.J.M. Hirons, (eds.), Bird Population Studies: Relevance to Conservation and Management. Oxford Univ. Press, Oxford, U.K. 683 pp.

Phillips, A.R., J. Marshall, and G. Monson. 1964. The Birds of Arizona. Univ. Arizona Press, Tucson, Arizona.

Plumpton, D.L. 1992. Aspects of nest site selection and habitat use by burrowing owls at the Rocky Mountain Arsenal, Colorado. M.Sc. thesis, Texas Tech. Univ., Lubbock, Texas.

Plumpton, D.L. and R.S. Lutz. 1993. Influence of vehicular traffic on time budgets of nesting burrowing owls. J. Wildl. Manage. 57:612-616.

Robertson, J.M. 1929. Some observations on the feeding habits of the burrowing owl. Condor 31:38-39.

Ross, P.V. 1974. Ecology and behavior of a dense colony of burrowing owls in the Texas panhandle. M.Sc. thesis, West Texas St. Univ., Canyon, Texas.

Silva, S.I. I. Lazo, E. Silva-Aranguiz, F. M. Jaksi , P. L. Meserve, and J. R. Gutiérrez. 1995. Numerical and functional response of burrowing owls to long-term mammal fluctuations in Chile. J. Raptor Res. 29:250-255.

Thomsen, L. 1971. Behavior and ecology of burrowing owls on the Oakland Municipal Airport. Condor 73:177-192.

Van Vuren, D., A.J. Kuenzi, I. Loredo, A.L. Leider, and M.L. Morrison. 1997. Translocation as a nonlethal alternative for managing California ground squirrels. J. Wildl. Manage. 61:351-359.

Voous, K.H. 1988. Owls of the Northern Hemisphere. MIT Press, Cambridge, Massachusetts.

Wedgwood, J.A. 1978. The status of the burrowing owl in Canada. A report prepared for the Committee on the Status of Endangered Wildlife in Canada. Can. Wildl. Serv., Ottawa.

Wellicome, T.I. 1992. Reproductive performance of burrowing owls: effects of supplementary food. Abstract, Burrowing Owl Symposium. 1992 Raptor Res. Found. Annual Meeting, Seattle, Washington.

Zarn, M. 1974. Burrowing Owl. Rep. No. 11. Habitat Management Series for Unique or Endangered Species. USDI, BLM. Technical Note T-N 250. Denver, Colorado.

CALIFORNIA GULL
Larus californicus

Authors: Kathy C. Molina and Kimball L. Garrett, Section of Vertebrates, Natural History Museum of Los Angeles County, 900 Exposition Blvd., Los Angeles, CA 90007

Management Status: Federal: None
California: Species of Special Concern (CDFG, 1998)

General Distribution:

California Gulls breed in the western interior of North America from Mono Lake, California north to lakes of the Canadian Northwest Territories. Breeding colonies extend east through the northern Great Basin and northern Rocky Mountain states to the Dakotas and western Manitoba. Within this range, breeding sites are widely distributed and year to year occupation is variable (AOU, 1983; Winkler, 1996). Coastal nesting occurs only at San Francisco Bay (Winkler, 1996). Recently, a small nesting colony has become established along the southern shores of the Salton Sea, California (K. C. Molina, unpubl. data), extending the species' southern breeding limit some 600 km.

Jehl (1987) proposed two subspecies of California Gull based on morphological differences: (1) *albertaensis*, generally larger in size and with a lighter mantle, breeds in the Canadian provinces and in the Dakotas, while (2) smaller, darker-mantled *californicus* generally breeds farther south and west within the Great Basin region (and includes the California breeding range of the species). This subspecific delineation has not been supported by limited allozyme studies (Karl et al., 1987).

In winter, California Gulls range along the Pacific Coast from British Columbia south through Mexico to the states of Nayarit and Guerrero, including both coasts of Baja California (AOU, 1983). In the interior of California, large numbers of California Gulls winter in the Central Valley (Small, 1995; Christmas Bird Count data), with smaller flocks of up to several hundred aggregating at the north end of the Salton Sea (Christmas Bird Count data), and along the Colorado River, particularly at Davis Dam (Rosenberg et al., 1991).

Distribution in the West Mojave Planning Area:

California Gulls are generally considered to be rare spring and winter transients in the WMPA (Garrett and Dunn, 1981), but in some areas such as Mojave Narrows and in the Antelope Valley region they are regular and locally abundant in winter. At the China Lake Naval Weapons Center, California Gulls are uncommon to fairly common winter transients (CNDDB). Far fewer are present during winter in Victorville, at Spring Valley, Silver and Harper lakes, and at Silverwood Lake adjacent to the WMPA (Stephen J. Myers, unpubl. data). The presence of California Gulls at Harper Lake was recorded in 6 of 10 annual bird surveys conducted from 1978 through 1988 (ERT 1988).

The spring influx of northbound migrants through the WMPA begins in early February and continues through April (Garrett and Dunn, 1981). The first fall transients are usually noted in mid- to late July; hatching year birds in juvenile plumage may be noted as early as about 20-25 July (Garrett and Dunn 1981), but have been found in early July elsewhere in interior southern California (C. McGaugh and M. A. Patten, unpubl. data). The presence of mid-summer flocks (up to 60 individuals in June) at Piute Ponds and the Lancaster Sewage Ponds

(Los Angeles County Museum files) suggest that varying numbers of non-breeding birds remain well away from breeding colonies through the summer. In recent years, flocks of up to 400 California Gulls have been observed at Mojave Narrows during February through late April, and up to 3000 at the Hesperia landfill in March (S. J. Myers, unpubl. data).

During migration, California Gulls likely occur on other permanent bodies of water within the WMPA.

Natural History:

California Gulls are medium-large (21 in.; 54 cm) gulls with a medium-dark gray mantle (Scott, 1993), and exhibit little sexual size dimorphism. Winkler (1996) reported mean mass for males and females of the subspecies *californicus* as 657 and 556 g, respectively. Breeding adults have a bright yellow bill with a red spot near the gonys that merges with a black subterminal mark. Legs are bright yellow and the head is completely white. Adult plumage is generally attained at four years of age (Grant, 1986). Non-breeding adults show some dusky mottling and streaking on the head and nape, and bill and leg color becomes pale greenish-yellow. Juveniles are largely brownish, with crisp pale feather edges on the mantle and wing coverts. Subsequent plumages are progressively whiter on the head and underparts, and grayer on the mantle (Grant, 1986).

California Gulls adults are slightly larger and have darker mantles than Ring-billed Gulls; they also differ in bare part colors, with California Gulls having dark eyes and a red spot on the bill (Grant, 1986).

California Gulls begin nesting by mid-April at Mono Lake and by early June at the northern limit of the breeding range. Nest composition and degree of development varies but often includes bones, feathers and vegetation found near the nest site. Complete clutches consist of 2-3 eggs with incubation periods ranging from 24-26 days. Fledging occurs after 40-60 days (Winkler, 1996). Both mates participate in incubation and chick-rearing.

California Gulls are highly opportunistic and may eat small mammals, young chicks and eggs, fish, and a great variety of invertebrates. These gulls commonly scavenge garbage and occasionally pirate food from other species. California Gulls also forage well offshore, following ships and fishing boats (Winkler, 1996). They have also been known to forage on fruit in orchards (Cottam, 1935).

Habitat Requirements:

In the interior, California Gulls require isolated islands in rivers, reservoirs and natural lakes for nesting, where predation pressures from terrestrial mammals are diminished, using both fresh and saline aquatic habitats at variable elevations and degrees of aridity for nesting and for opportunistic foraging (Winkler, 1996). In San Francisco Bay, California Gulls nest on levees forming salt evaporation ponds. During fall and winter, these gulls move from their predominately inland breeding locations to the Pacific Coast. A few birds may remain in the breeding range during winter. As opportunistic foragers, wintering California Gulls make use of most, if not all, marine habitats (e.g., beaches, rocky coasts, mudflats, estuaries, etc.) and commonly forage in urban areas and at landfills (Winkler, 1996).

Habitats utilized by transient and wintering California Gulls in the WMPA include garbage dumps, urban areas with abundant litter (parks, playgrounds, schoolyards), sewage ponds, reservoirs, lakes and marshy areas.

Population Status:

Although many aspects of California Gull demography remain unclear, Winkler (1996) suggested that this species' current population size is greater than that during the last century. The largest breeding aggregations of California Gulls occur in Alberta, Canada, the Great Salt Lake/Snake River area and Mono Lake. Estimates by Conover (1983) indicate that California Gull populations breeding in the United States comprised some 276,000 individuals in 1982. The California Gull breeding colonies nearest to the WMPA are the major colony at Mono Lake and the small, recently established one at the southern end of the Salton Sea.

Wintering California Gulls are becoming increasingly abundant in some areas of the WMPA (K.L. Garrett, unpubl data). Currently, as many as 500 California Gulls are recorded regularly on winter bird counts in Lancaster (Christmas Bird Count data), whereas during the 1980s annual coverage of Lancaster Sewage Ponds, Piute Ponds, Apollo Lake, and Palmdale Sewage Ponds sporadically yielded only up to several dozen California Gulls during the Lancaster Christmas Counts. Several hundred California Gulls are also regularly noted on the recently established Mojave River Valley mid-winter count (Christmas Bird Count data).

Threats Analysis:

As summarized by Winkler (1996), California Gulls are not considered as agricultural or aquacultural pests, and thus, are not often shot or trapped. California Gull populations are, however, susceptible to frequent human and animal disturbances at nesting sites and to the degradation of suitable nesting habitats (e.g., land bridge connections, inundation of low-lying sites, excessive vegetative growth, etc.). Limited analyses of pesticide contamination indicated little or no threat of mortality. The ingestion of, or entanglement in, plastic, while foraging at landfills may be a potential source of mortality.

Biological Standards:

California Gulls have not bred historically, nor do they breed currently, in the WMPA. California Gulls are opportunistic foragers and it is likely that increases in southern interior California wintering populations are related to expanding residential development and subsequent enhancement of food availability (e.g., refuse dumps) in the Mojave River and Antelope valleys. The continued existence of lakes, reservoirs and other wetlands in the WMPA will provide habitat for migrating and wintering California Gulls. Given the species' absence from the WMPA as a breeder, and its opportunistic foraging repertoire, no special management policies appear to be necessary at present.

Literature Cited:

American Ornithologists' Union. 1983. Check-list of North American Birds, sixth ed. AOU. Allen Press, Lawrence, Kansas.

California Department of Fish and Game, Natural Diversity Data Base. 1998. Special Animals. Biannual publication, Mimeo., 44 pp.

Conover, M. R. 1983. Recent changes in Ring-billed and California gull populations in the western United States. Wilson Bull. 95: 362-383.

Cottam, C. 1935. Unusual food habits of California Gulls. Condor 37: 170.

ERT, Inc., 1988. Summary of baseline biology information for Harper Lake Wetlands, ERT Document No. 4360-003-550. ERT, Inc. 1220 Avenida Acaso, Camarillo, California.

Garrett, K. and J. Dunn. 1981. Birds of Southern California: status and distribution. Los Angeles Audubon Society, Los Angeles, California.

Grant, P. J. 1986. Gulls: A Guide to Identification. Buteo Books, Vermillion, South Dakota.

Jehl, J. R. Jr. 1987. Geographic variation and evolution in the California Gull (*Larus californicus*). Auk 104: 421-428.

Karl, S. A., R. M. Zink, and J. R. Jehl, Jr. 1987. Allozyme analysis of the CaliforniaGull (*Larus californicus*). Auk 104: 767-769.

Rosenberg, K. V., R. D. Ohmart, W. C. Hunter, and B. W. Anderson. 1991. Birds of Lower Colorado River Valley. Univ. Arizona Press, Tucson, Arizona.

Scott, S., ed. 1983. Field Guide to the Birds of North America. National Geographic Society, Washington D.C.

USDI, Bureau of Land Management, 1997. California Desert District Resource Area files.

Winkler, D. W. 1996. California Gull (*Larus californicus*). *In* A. Poole and F. Gill (eds.), The Birds of North America, No. 259. The Academy of Natural Sciences, Philadelphia, Pennsylvania, and The American Ornithologists' Union, Washington, D.C.

COOPER'S HAWK
Accipiter cooperii

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Management Status: Federal: None
California: Species of Special Concern (CDFG, 1998)

General Distribution:

The Cooper's Hawk breeds throughout the contiguous 48 United States, southern Canada, and northern Mexico. Population data are limited for many areas, but numbers are probably low in the Canadian prairie provinces, the Great Plains states, and along the eastern gulf coast (AOU, 1983; Rosenfield and Bielefeldt, 1993). Bent (1961) reported casual sightings during the breeding season at several locations in northern Canada. In California the species is a widespread breeder but nowhere common.

Cooper's Hawks winter infrequently in all areas of the breeding range (some individuals may remain year-round on the breeding territory). Most individuals vacate the northern half of the species' range during winter, and Cooper's Hawks commonly occur in migration across the United States. They are present coast to coast throughout most of the southern United States and Mexico. In winter, Cooper's Hawks range regularly from the southern United States south to northern Central America, casually to Costa Rica, and are possibly present in Panama and Colombia (AOU, 1983; Rosenfield and Bielefeldt, 1993).

Distribution in the West Mojave Planning Area:

Known in the WMPA primarily as a winter visitor or migrant, the Cooper's Hawk is an uncommon permanent resident in southern California, with a small breeding population restricted to open montane forests, river and creekside bottomlands, and desert oases (Garrett and Dunn, 1981; Rosenberg et al., 1991).

Sight records for the region in the Natural Diversity Database date back to 1921, with sightings reported from Victorville, Walker Pass, and Palmdale. Within the WMPA, Cooper's Hawks occur regularly in Christmas Bird Count data from China Lake, Joshua Tree National Park, Lancaster, Mojave River Valley, and Morongo Valley. The Mojave Desert Raptor Watch (McDermott, F., 1995) tallies them during migration at Apple Valley. It would not be an unusual observation to see a cooper's hawk anywhere in the WMPA from September to March.

Breeding records indicate that Cooper's Hawks occasionally nest throughout southern California and the WMPA. The Natural Diversity Database lists one known nest near Lucerne Valley in 1988; it was in oak habitat on the San Bernardino National Forest, approximately 1 mile outside of the WMPA (S.J. Myers, pers. comm.). Cooper's Hawks consistently appear in Breeding Bird Survey records within the WMPA, and are known to nest at Morongo Valley (Breeding Bird Census records) and at Mojave Narrows Regional Park (S.J. Myers, pers. comm.). The fact that Cooper's Hawks are secretive near their nests, and that they are relatively unafraid of nesting near humans, makes it probable that there are nests in wilderness and urban/residential areas that are unrecorded.

Natural History:

The Cooper's Hawk is the middle-sized North American Accipiter, larger than the Sharp-shinned Hawk (Accipiter striatus) and smaller than the Northern Goshawk (Accipiter gentilis). Like these other members of its genus, it is a species adapted to woodlands, with relatively short, rounded wings and a long, somewhat rounded tail that allow a high degree of maneuverability in thick cover. The juvenile Cooper's Hawk is brown on the back with individual feathers edged in rufous, which gives them a slightly warm tone. From above, the tail shows a distinct white terminal band. The breast is pale buff with brownish-black longitudinal streaking onto the belly, but the flanks and undertail coverts are unmarked (Wheeler and Clark, 1995). The ventral streaking is heavier on the upper breast and thins towards the belly, giving the bird a shrouded look. An adult male is slate blue-gray on the back with a distinct dark cap contrasting with the rest of the head (Mueller et al., 1981). The adult female is like the male, but sometimes retains a slight brownish tone on the back and has a less distinct dark cap (Mueller et al., 1981). Adults of both sexes are heavily barred in rufous on a white background on the breast, belly, and flanks, but the undertail coverts are clear white (Wheeler and Clark, 1995). The species shows a large degree of sexual size dimorphism, with the female as much as one-third larger than the male, and there is pronounced variation in size between eastern and western individuals (Wattel, 1973; Mueller et al., 1981; Hoffman et al., 1990; Smith et al., 1990). The Cooper's Hawk has relatively narrow wings and a longer tail than the smaller Sharp-shinned Hawk, with the tail roughly one and one-half times the breadth of the wings. The wings are held with straighter edges than on the Sharp-shinned Hawk, making the Cooper's Hawk head more pronounced ahead of the leading edge of the wings when in flight. Therefore, the Cooper's Hawk appears as a "flying cross" overhead, with a longer, lankier silhouette than that of the stouter Sharp-shinned Hawk (Dunne et al., 1988).

Although it takes more birds than any other prey type, (70-80% of the diet), the Cooper's Hawk takes more mammals than the Sharp-shinned Hawk, (estimated at 12-17% of the diet; Meng, 1951; Jones, 1979). Avian prey (observed by Walton at 77 territories in southern California in the 1970s included towhees, titmice, meadowlarks, blackbirds, jays, crows, doves, English sparrows, white-crowned sparrows, song sparrows, killdeer, green heron, juncos, phoebes, hermit thrushes, California quail, kestrels, screen owls, Virginia rails, magpies, flickers, woodpeckers, grosbeaks, orioles, wrens, and swallows). Mammals are taken especially when broods of nestlings are fledging. These include squirrels, ground squirrels, cottontails, young hares, various larger rats, and other rodents, and occasionally insects and herpetofauna (Fisher, 1893; Bent, 1961; Wattel, 1973; Jones, 1979; Palmer, 1988; Rosenfield and Bielefeldt, 1993). The Cooper's Hawk hunts from a concealed perch and makes short, fast attacks, sometimes flying low to the ground and using brush for concealment until the brief, final strike. In addition to being an expert at this typical hunting method, the Cooper's Hawk will also hunt from greater height, taking aerial prey in a falcon-like stoop in open habitat (Mead, 1963; Clark, 1977).

The Cooper's Hawk infrequently breeds in immature plumage in the second calendar year, but more often at > 2 years of age (Rosenfield, 1982; Henny et al., 1985; Asay, 1987). Pairs generally return to the same territory year after year, but often will build a new nest in the vicinity of an existing one (Reynolds and Wight, 1978). They usually lay 3-6 eggs, often 5, at intervals of 2 to 3 days, typically in the morning (Meng, 1951). Laying ranges from early April to late May (Bent, 1961; Rosenfield and Bielefeldt, 1993). Breeders in immature plumage often lay several

days later and lay smaller clutches than older individuals (Meng, 1951; Henny et al., 1985). Incubation ranges from 30-36 days (Bent, 1961; Meng, 1951; Nice, 1954; Rosenfield and Bielefeldt, 1993), with onset coinciding with laying of the third or fourth egg (Meng, 1951). Hatching is synchronous to within two or three days (Reynolds and Wight, 1978). "Branching" behavior usually occurs by 26-29 days, and fledging at 31-34 days, depending on sex (Palmer, 1988; Rosenfield and Bielefeldt, 1993).

Habitat Requirements:

The Cooper's Hawk nests in deciduous, conifer, and mixed woodlands. In southern California it generally favors extensive riparian bottomlands (Garrett and Dunn, 1981). Although less strongly associated with conifers than the Sharp-shinned Hawk, there is a great deal of overlap in the two species' nesting habitat requirements. In California sharp-shinned hawk breeding range is limited by range of smallest passerine prey resource populations. Cooper's hawks have been found breeding at low densities virtually throughout the state, predominantly in oaks and pines. In California, as reported for Wisconsin, Cooper's Hawks tended to use older, taller, and less dense woodlots than Sharp-shinned Hawks (Rosenfield and Bielefeldt, 1993). In Oregon, nests were in stands of conifers that included older and taller trees, a deeper crown, and a more open understory than a typical single-story Sharp-shinned Hawk nest stand (Reynolds et al., 1982). Most nests in a California study were in groves of six or more deciduous trees, with two or more trees close enough together that the crowns formed one continuous canopy (Asay, 1987). The range of nest height in several studies was 20-60 feet (6.1-18.3 meters; Bent, 1961; Meng, 1951; Reynolds et al., 1982; Palmer, 1988; Rosenfield and Bielefeldt, 1993). Breeding territory sizes vary significantly from study to study (one pair per 1815-5683 acres; 734-2300 hectares), depending on the quality of the habitat and abundance of prey (Craighead and Craighead, 1956; Reynolds and Wight, 1978). Distance between nests is also highly variable, from 1.5 miles (2.4 km) in New York (Meng, 1951), 1.9 miles- 3.3 miles (3.1-5.4 km) in Oregon (Reynolds and Wight, 1978), and 0.4-1.6 miles (0.7-2.6 km) in California (Asay, 1987). Territories in California are seldom contiguous. The Cooper's Hawk seems much more tolerant of human activities near the nest and is seen more often nesting in urban areas than the Sharp-shinned Hawk (Palmer, 1988). Cooper's are now limited annual nesters in suburban Los Angeles and San Francisco Bay area communities.

During migration, Cooper's Hawks use a mixture of habitat types with vegetative cover, often hunting on the edges of wooded areas (Palmer, 1988). They frequently follow ridgelines to exploit updrafts and, particularly in the intermountain west, avoid open valley floors by staying in montane forests at higher elevations where both prey and roosts are more available (HawkWatch International unpublished data).

Winter habitat requirements are poorly quantified. Christmas Bird Count data, particularly from the WMPA and adjacent southern California, suggest that Cooper's Hawks use essentially the same habitats during winter and summer. Water and cover are probably the limiting factors for prey species in the WMPA and, therefore, may determine the distribution of hawks. Accordingly, riparian areas are probably important habitat on wintering grounds, providing foraging and roosting opportunities. However, being less dependent on birds as a principal prey item than the Sharp-shinned Hawk, Cooper's Hawks are less directly associated with riparian habitats in winter. Since many cooper's hawks are simply moving through the WMPA in winter, they may be observed briefly at any location.

Population Status:

Garrett and Dunn (1981) suggest a significant decline in breeding pairs throughout southern California due to the destruction of their principal nest habitat, extensive riparian areas. There is no evidence of a decline in migratory populations of Cooper's Hawks in the western U.S. (HawkWatch International unpublished data; Golden Gate Raptor Observatory data in McDermott, 1996; Battalio, 1996). In winter, Cooper's Hawks continue to be seen in the WMPA in small numbers, particularly during the Christmas Bird Counts. These sightings may be slightly biased by the site selection criteria of the CBC, which emphasize areas of high bird species diversity and density. As with many species, it is probable since no current significant threats to the population in California have been identified except gradual loss of habitat, that the population occurs at this time at or near carrying capacity in available nesting territories.

Threats Analysis:

Habitat destruction (logging in forested areas and development in southern California), pesticide contamination, and shooting are probably the primary identified mortality factors for Cooper's Hawks, range-wide. Logging is a far greater threat to a breeding population than to a wintering population; the reduction of nest trees and, thereby, appropriate territories would have a greater impact on the species. Logging is not at issue in the WMPA. Loss of habitat to development for human needs is a known threat to many bird species in southern California. More importantly, destruction of riparian habitat, including loss of nest trees from depletion of the water source, damage by livestock, and invasion of exotic species (e.g., saltcedar replacing willow and cottonwood in the Lower Colorado drainage; Rosenberg et al., 1991) may have significantly reduced the amount of breeding habitat for Cooper's Hawks (Garrett and Dunn, 1981). The abundance of prey where songbirds have adapted to these new vegetative communities probably still attracts wintering Cooper's Hawks to altered riparian areas. However, such habitats are not viable substitutes for "natural" habitat since they often occur in proximity to human activities and alterations with a concomitant increase in risk of collisions with windows, predation by domestic pets, accidental or deliberate poisoning, and other human persecution.

Pesticides and other agricultural chemicals may pose a significant hazard to individual Cooper's Hawks in parts of the WMPA. Several studies have examined bioaccumulation of toxic material in the accipiters (Snyder et al., 1973; Elliott and Martin, 1994; Wood et al., 1996), and sprays used for insect and weed control, golf course and lawn fertilizers, and other agricultural applications often persist in the food chain with potentially negative effects.

Shooting might be a problem in the WMPA, although sight records are scattered and scarce enough that opportunities to shoot birds may be relatively infrequent. Migrants in Mexico are at high risk for shooting (HWI unpublished data), and an undocumented, but potentially significant number may also be killed as "chicken hawks" in this country. Remsen (1978) listed taking individuals for falconry as a potential threat to the species; however, the falconry community has an annual harvest in California that rarely exceeds 15 individuals, all immature.

Biological Standards:

Management in forested habitat for breeding Cooper's Hawks should include promoting an older, taller, and more open forest ecosystem. Protected forest patches should be large enough to conceal several nests because the birds rebuild each year (Reynolds and Wight, 1978), have an open understory, and encompass a foraging area large enough to support sufficient prey. In southern California and the WMPA, restoration and protection of existing riparian areas would seem to be of critical importance. In winter, Cooper's Hawks are ubiquitous wherever suitable prey occur.

Literature Cited:

American Ornithologists' Union. 1983. Checklist of North American Birds, 6th edition.

Anonymous. 1995. HMANA Hawk Migration Studies 21:appendix UU-VV.

Asay, C.E. 1987. Habitat and productivity of Cooper's Hawks nesting in California. California Fish and Game 73:80-87.

Battalio, J. 1996. Western continental summary. HMANA Hawk Migration Studies 22:57-59.

Bent, A.C. 1961. Life Histories of North American Birds of Prey. Part 1. Dover Publications, Inc., New York.

California Department of Fish and Game, Natural Diversity Data Base. 1998. Special Animals. Biannual publication, Mimeo., 44 pp.

Clark, R.J. 1977. Cooper's Hawk hunting in the city. Auk 94:142-143.

Craighead, J.J., and F.C. Craighead, Jr. 1956. Hawks, owls, and wildlife. Stackpole Co., Harrisburg, Pennsylvania.

Dunne, P., D. Sibley, and C. Sutton. 1988. Hawks in Flight. Houghton Mifflin Company, Boston, Massachusetts.

Elliott, J.E., and P.A. Martin. 1994. Chlorinated hydrocarbons and shell thinning in eggs of (Accipiter) hawks in Ontario, 1986-1989. Environ. Poll. 86:189-200.

Fisher, A.K. 1893. The hawks and owls of the United States in their relation to agriculture. Bulletin of the USDA Division of Ornithology and Mammalogy, No. 3.

Garrett, K. and J. Dunn. 1981. Birds of Southern California: status and distribution. Los Angeles Audubon Society, Los Angeles, California.

Henny, C.J., R.A. Olson, and T.L. Fleming. 1985. Breeding chronology, molt and measurements of accipiter hawks in northeastern Oregon. J. Field Ornithol. 56:97-112.

Hoffman, S.W., J.P. Smith, and J. A. Gessaman. 1990. Size of fall-migrant accipiters from the Goshute Mountains of Nevada. J. Field Ornithol. 61:201-211.

Jones, S. 1979. Habitat management series for unique or endangered species, Report No. 17: The accipiters - Goshawk, Cooper's Hawk, Sharp-shinned Hawk. USDI Bureau of Land Management Technical Note 335.

McDermott, F. 1994. California region. HMANA Hawk Migration Studies 20:56

McDermott, F., 1995, "Continental Summaries: California Region", Journal of the Hawk Migration Association of North America, 21(1): 53-56.

McDermott, F. 1996. California region. HMANA Hawk Migration Studies 22:60-61.

Mead, R.A. 1963. Cooper's Hawk attacks pigeon by stooping. Condor 65:167.

Meng, H.K. 1951. Cooper's Hawk, Accipiter cooperii. Ph.D. Diss., Cornell University, Ithaca, New York.

Mueller, H.C., D.D. Berger, and G. Allez. 1981. Age, sex, and seasonal differences in size of Cooper's Hawks. J. Field Ornithol. 52:112-126.

Nice, M.M. 1954. Problems of incubation periods in North American birds. Condor 56:173-197.

Palmer, R.S. (Ed.). 1988. Handbook of North American birds. Volume 4. Yale Univ. Press, New Haven, Connecticut.

Remsen, J.V., Jr. 1978. Bird Species of Special Concern in California. California Department of Fish and Game, Wildlife Management Branch, Sacramento, California.

Reynolds, R.T., and H.M. Wight. 1978. Distribution, density, and productivity of accipiter hawks breeding in Oregon. Wilson Bull. 90:182-196.

Reynolds, R.T., E.C. Meslow, and H.M. Wight. 1982. Nesting habitat of coexisting Accipiter in Oregon. J. Wildlife Manag. 46:124-138.

Rosenberg, K., R. Ohmart, W. Hunter, and B. Anderson. 1991. Birds of the lower Colorado River valley. Univ. Arizona Press, Tucson, Arizona.

Rosenfield, R.N. 1982. Male Cooper's hawk breeds in juvenile plumage. Wilson Bull. 94:213.

Rosenfield, R.N., and J. Bielefeldt. 1993. Cooper's Hawk (Accipiter cooperii). In: A. Poole and F. Gill (eds.), The Birds of North America, No. 75. Philadelphia, Pennsylvania: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

Smith, J.P., S.W. Hoffman, and J. A. Gessaman. 1990. Regional size differences among fall-migrant accipiters in north America. J. Field Ornithol. 61:192-200.

Snyder, N.F.R., H.A. Snyder, J.L. Lincer, and R.T. Reynolds. 1973. Research report: organochlorines, heavy metals, and the biology of North American Accipiters. BioScience 23:300-305.

USDI, Bureau of Land Management, 1997. California Desert District Resource Area files.

Wattel, J. 1973. Geographical Differentiation in the Genus Accipiter. Nuttall Ornithological Club, Cambridge, Massachusetts.

Wheeler, B.K., and W.S. Clark. 1995. A Photographic Guide to North American Raptors. Academic Press, San Diego, California.

Wood, P.B., C. Viverette, L. Goodrich, M. Pokras, and C. Tibbott. 1996. Environmental contaminant levels in Sharp-shinned Hawks from the eastern United States. J. Raptor Res. 30:136-144.

DOUBLE-CRESTED CORMORANT
Phalacrocorax auritus

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Management Status: Federal: None
California: Species of Special Concern (CDFG, 1998)

General Distribution:

The Double-crested Cormorant, a strictly North American species, occurs widely in freshwater and marine habitats along coastlines and throughout the interior of the continent. Breeding cormorants are known from 41 of 50 states in the United States and among all 10 provinces in Canada (Hatch, 1995, and pers. comm.), as well as from northwestern Mexico, the Yucatan Peninsula, and Belize (Howell and Webb, 1995) and Cuba and the Bahamas (Johnsgard 1993).

Hatch (1995) recognizes at least five rather distinct Double-crested Cormorant breeding populations representing four subspecies (population estimates, in number of pairs, follow in brackets): (1) Atlantic (ssp. *auritus*), along the New England and eastern Canadian coast [96,000]; (2) Interior (ssp. *auritus*), extending east of the Rockies and west of Appalachia and from northern Canada south to Texas and Lousiana [220,000]; (3) the Florida and Caribbean population (ssp. *floridanus*) [14,000]; (4) Alaska (ssp. *cincinatus*) [3,000]; and (5) the West Coast (ssp. *albociliatus*), including Mexico and interior nesting populations [31,000]. The breeding birds of the Bahamas and Cuba are sometimes recognized as a separate subspecies *P. a. heuretus* (Watson et. al, 1991).

In California Double-crested Cormorants are found over much of the state, but breeding populations are very local (Grinnell and Miller, 1944; Garrett and Dunn, 1981; Carter et al., 1992). They occur along most of the state's coast, although in southern California they breed only on a few of the California Channel Islands and on the Coronados Islands in adjacent Baja California Norte. A few nesting colonies are found inland on the coastal slope, such as at Lake Henshaw, San Diego County (formerly; Unitt, 1984), at Anaheim Lake, Orange County (Gallagher, 1997), and along the San Gabriel River, in Pico Rivera, Los Angeles County (Los Angeles County Breeding Bird Atlas data).

In the interior Double-crested Cormorants are rare and localized breeders. Up to several hundred pairs nest at lakes and reservoirs throughout the northern and central California counties of Siskiyou, Modoc, Lassen, Lake, Yolo, and Sacramento (Carter, et al., 1995). Rosenberg et al. (1991) considered Double-crested Cormorants to be relatively common but localized breeders in the Lower Colorado River Valley, particularly along isolated backwaters such as Topock Marsh and on the Imperial National Wildlife Refuge. In winter, large numbers often aggregate at the upper ends of these reservoirs. In the past cormorants have also nested irregularly at the Salton Sea, Imperial and Riverside counties (Dawson, 1923; Garrett and Dunn, 1981). More recently, up to several thousand pairs of cormorants have nested at the southern end of the Salton Sea during the winter and spring of 1996-97 (K. C. Molina pers. obs.).

This species is a widespread but rare to uncommon transient throughout the deserts of southern California (Garrett and Dunn, 1981), although cormorant numbers have increased at a few desert reservoirs, fishing lakes, and other wetlands in recent years.

Distribution in the West Mojave Planning Area:

Double-crested Cormorants are not known to nest in the WMPA and in general are considered rare transients (Garrett and Dunn, 1981). Currently the nearest significant breeding population are those on the Channel Islands and Coronados Islands, and at the Salton Sea, Riverside and Imperial counties.

In the far northern portion of the WMPA, small numbers of Double-crested Cormorants have been observed on sewage ponds within the China Lake Naval Air Weapons Center (California Natural Diversity Database). In the western WMPA, a few cormorants have occurred at small private ponds near Cantil (California Natural Diversity Database). In the Antelope Valley region larger flocks appear at Apollo Lake, Piute Ponds (and occasionally Lancaster Sewage Ponds), Lake Palmdale, Lake Los Angeles (until it was drained in the late 1980s), and Quail Lake (Los Angeles County Museum files; K.L. Garrett, unpubl. data). In the southern WMPA, cormorants occur along the Mojave River, in the Mojave Narrows Regional Park, Spring Valley Lake, Silver Lakes and at a small lake at Jess Ranch near Hesperia (Stephen J. Myers, unpubl. data). Small numbers of migrant Double-crested Cormorants (< 50 individuals) are usually observed in the vicinity of Mojave Narrows during March through May and again in September through January. A maximum count of 150 birds occurred in January 1992 (S.J. Myers, unpubl. Data). Although not specifically recorded at the Cronese Lakes and Harper Dry Lake, Double-crested Cormorants may be considered potential migrants at these locations in years of high rainfall, when other migratory waterbirds have been noted to frequent these lakes. Migrant cormorants undoubtedly occur occasionally, and in small numbers, at other ponds and lakes within the WMPA. Permanent bodies of water such as Lake Silverwood, adjacent to the WMPA, also provide habitat for migrating cormorants.

Natural History:

The Double-crested Cormorant is a large, heavy-bodied waterbird, related to pelicans (32 in., 81 cm, Scott, 1983), with dark glossy plumage. Males are heavier than females: Dunning (1993) indicates that males of the small Florida subspecies *floridanus* average ~1800 g, while females average ~1540 g. *P. a. albociliatus* of the Pacific Coast, southwestern states, and northwestern Mexico is considerably larger; New Mexico males average 2453 g and females 2056 g (Watson et al., 1991). The cormorant's long-necked appearance and sleek, low profile when swimming are distinctive. Young cormorants may show varying degrees of white on the breast and belly plumage (Johnsgard, 1993). Bilateral tufts of pale feathers set behind the eyes and the conspicuous yellow throat pouch of breeding adults distinguish it from the strictly marine Brandt's (*P. penicillatus*) and Pelagic (*P. pelagicus*) cormorants (Scott, 1983). The only other cormorant recorded in the interior of southern California is the Neotropic Cormorant, *P. brasilianus*, a casual vagrant to the Salton Sea and lower Colorado River. Neotropic Cormorants differ from Double-cresteds in their smaller size, relatively longer tail, white feathered border to the more pointed yellow facial skin patch, and lack of bare yellow skin in the lores (Scott, 1983).

An adept swimmer, the Double-crested Cormorant pursues subsurface schooling fish. They also take non-schooling bottom dwelling fish and, more rarely, other organisms such as mollusks, crustaceans, and amphibians (Johnsgard 1993, Hatch pers. comm.). Their flight profile is characteristic with a distinct bend in the elongated neck. Populations vary from nearly sedentary to highly migratory. Double-crested Cormorants may nest in dense colonies; interior colonies are often associated with heron and egret rookeries. Their nests are composed of twigs, seaweed, and other types of vegetation. Cormorant clutches are usually composed of 3-4 eggs, but may contain up to 6. The incubation period ranges from 24-29 days (Palmer, 1962). Short flights by young cormorants are achieved at age 5-6 weeks; juveniles are independent by 10 weeks (Palmer, 1962).

Habitat Requirements:

Double-crested Cormorant nesting colonies and roost sites are often located near large estuaries and offshore rocks. Cormorants require open water where they can forage for schooling fish. In marine environments, this species may preferentially feed in relatively shallow coastal and estuarine waters rather than in areas of deep upwelling (Boekelheide et al., 1990). In the interior cormorants require isolated sand bars, earthen levees, flooded tree snags, and mature live trees for roosting and nesting. In coastal environments, inaccessible rocky island ledges, coastal cliffs, and highway bridge under supports serve as nest and roost sites (Carter, 1995). Artificial structures, isolated by water, are commonly used for nesting and roosting throughout their range (Harris, 1991; K.C. Molina, pers. obs.). Within the WMPA, Double-crested Cormorants rest during the day and presumably also roost in live cottonwoods and planted elms at Mojave Narrows (S.J. Myers pers. comm.) and on man-made structures (flooded posts, hunting blinds) at Piute Ponds. In aquatic habitats with depauperate fisheries, cormorants may prey on introduced African clawed frogs (*Xenopus laevis*) which appear to be the main prey item for herons and egrets at Piute Ponds (K.L. Garrett, pers. obs.).

Population Status:

During the last 20 years, Double-crested Cormorant populations throughout North America have been increasing. Some 364,000 pairs currently nest in North America (Hatch 1995). Improved breeding success due to reductions in human disturbance and persecution, and reductions in exposure to pollutants are believed responsible for population growth since the turn of the century (Carter et al., 1992; Hatch, 1995). The recent large-scale expansion within the Canadian Prairie Provinces and the western Great Lakes is believed to be associated with newly created reservoirs (Hatch, 1995). Large numbers of Double-crested Cormorants now wintering on the Mississippi Delta are increasingly coming into conflict with changing aquacultural practices, particularly with the growth of catfish farming (Nettleship and Duffy, 1995).

Numbers of Double-crested Cormorants appear to have increased in the WMPA since the 1970s. In the Antelope Valley, for example, Double-crested Cormorants were considered a scarce transient up until 1980 (Los Angeles County Museum files). Currently, groups of up to several dozen individuals are seen, most often in April and May; fewer birds are noted from November through February (Los Angeles County Museum files; K.L. Garrett, unpubl. data).

Threats Analysis:

Except for managed reservoirs, fishing lakes and canals where recreation is intensified, Double-crested Cormorant habitats within the WMPA are largely ephemeral, and as such, marginal. The transitory nature of these habitats likely renders them suitable only as short-term resting stops. Water levels at Piute Ponds are maintained by water treatment effluent and provide open water year round. A breeding population has not been established there, even though suitable nesting habitat is potentially available. Sport hunting may be a potential threat at Piute Ponds and at other waterfowl areas in the WMPA as a few birds may be encountered there during the waterfowl season. In some areas of the United States cormorants have come into conflict with sportfishermen and that potential also exists on fishing and recreation lakes within the WMPA (Bayer, 1989; Hatch, 1995). Double-crested Cormorants have been "controlled" by agencies where they occur in superabundant numbers at recreation areas (e.g. Lake Cachuma, Santa Barbara County; CA Fish and Game). Because of the unpredictable and impermanent nature of most wetland habitats in the WMPA, and because of potential human-induced disturbances at recreation lakes, breeding populations are not likely to develop thus nullifying any threats to reproduction.

Biological Standards:

Suitable cormorant winter habitat in the WMPA is largely restricted to established recreation lakes such as that at Spring Valley and Silver Lakes, and in riverine or wetland habitats with a more permanent water supply such as that at Mojave Narrows and at Piute Ponds. Care should be taken to preserve mature live trees and maintain dead snags within riparian corridors that provide roosting sites for cormorants within the WMPA. To reduce the potential for cormorant-fisherman conflicts, educational programs that promote public awareness of the importance and desirability of wildlife diversity on public lands should be considered.

Literature Cited:

Bayer, R.D. 1989. The cormorant/fisherman conflict in Tillamook County, Oregon. Studies in Oregon Ornithology 6. Gahmken Press, Newport, Oregon.

Boekelheide, R.J., D.G. Ainley, H.R. Huber, T.J. Lewis. 1990. Pelagic cormorant and double-crested cormorant. *In:* D.G. Ainley and R.J. Boekelheide (eds.), Seabirds of the Farallon Islands: Ecology, Dynamics, and Structure of an Upwelling-System Community. Stanford Univ. Press, Stanford, California.

California Department of Fish and Game, Natural Diversity Data Base. 1998. Special Animals. Biannual publication, Mimeo., 44 pp.

Carter, H.R., G.J. McChesney, D.L. Jaques, C.S. Strong, M.W. Parker, J.E. Takekawa, D.L. Jory, and D.L. Whitworth. 1992. Breeding populations of seabirds in California, 1989-1991. Unpublished report. U.S. Fish and Wildlife Service, Northern Prairie Wildlife Research Center, Dixon, California

Carter, H.R., A.L. Sowls, M.S. Rodway, U.W. Wilson, R.W. Lowe, G.J. McChesney, F. Gress and D.W. Anderson. 1995. Population size, trends and conservation problems of the double-crested cormorant on the Pacific coast of North America. pp. 189-215, *In:* D. Nettleship and D. Duffy (eds.), The Double-Crested Cormorant: Biology, Conservation and Management. Colonial Waterbirds 18, Special Publication 1.

Dawson, W.L. 1923. The Birds of California. South Moulton Co., San Francisco, California.
Dunning, J.B, Jr. 1993. CRC handbook of avian body masses. CRC Press, Boca Raton, Florida.
Gallagher, S. 1997. Atlas of Breeding Birds, Orange County, California. Sea and Sage Audubon Press, Irvine, California.
Garrett, K. and J. Dunn. 1981. Birds of southern California: status and distribution. Los Angeles Audubon Society, Los Angeles, California.
Grinnell, J. and A.H. Miller. 1944. The distribution of the birds of California. Pacific Coast Avifauna No. 27.
Harris, S.W. 1991. Northwestern California Birds. Humboldt State Univ. Press, Arcata, California.
Hatch, J. J. 1995. Changing populations of Double-crested Cormorants. pp. 8-24, *In:* D. Nettleship and D. Duffy (eds.), The double-crested cormorant: Biology, Conservation and Management. Colonial Waterbirds 18, Special Publication 1.
Howell, S.N.G. and S. Webb. 1995. A Guide to the Birds of Mexico and northern Central America. Oxford University Press, New York.
Johnsgard, P.A. 1993. Cormorants, darters and pelicans of the world. Smithsonian Institution Press. Washington, D.C.
Nettleship, D. N. and D. C. Duffy. 1995. Cormorants and human interactions: An introduction. pp. 3-6, *In:* D. Nettleship and D. Duffy (eds.), The Double-crested Cormorant: Biology, conservation and management. Colonial Waterbirds 18, Special Publication 1.
Palmer, R.S. (ed.). 1962. Handbook of North American Birds, Loons through Flamingos. Yale Univ. Press, New Haven, Connecticut.
Rosenberg, K.V., R.D. Ohmart, W.C. Hunter, and B.W. Anderson. 1991. Birds of the Lower Colorado River Valley. Univ. of Arizona Press, Tucson, Arizona.
Scott, S. (ed.). 1983. Field Guide to the Birds of North America. National Geographic Society, Washington D.C.
USDI, Bureau of Land Management, 1997. California Desert District Resource Area files.
Unitt, P. 1984. Birds of San Diego County. Memoir 13, San Diego Society of Natural History, San Diego, California.
Watson, G.E., S.L. Olson, and J.R. Miller. 1991. A new subspecies of the double-crested cormorant, *Phalacrocorax auritus*, from San Salvador, Bahama Islands. Proc. Biol. Soc. Wash. 104: 356-369.

FERRUGINOUS HAWK
Buteo regalis

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Management Status: Federal: USFWS Species of Concern
California: Species of Special Concern (CDFG, 1998)

General Distribution:

The Ferruginous Hawk breeds in open, arid country in the western U.S. and the southern edge of the Canadian prairie provinces: southern Alberta, Saskatchewan, and southwestern Manitoba. In the continental United States the range extends from eastern Washington and Oregon through Nevada east of the Sierra Nevada Mountains, across northern Arizona to the Texas panhandle, and north to North Dakota (AOU, 1983; Olendorff, 1993; Bechard and Schmutz, 1995; Washington Dept. of Fish and Game, 1996). Strongly associated with plains and desert, Ferruginous Hawks are absent from montane forest; thus, the range is nearly bisected by the Rocky Mountains. Schmutz and Fyfe (1987) suggested that there may be two distinct sub-populations, or ecotypes, separated by the Rockies; however, Gossett (1993) studied genetic and morphological data gathered from both groups of birds and concluded that there is sufficient crossover and genetic mixing to preclude their being considered discrete populations.

Ferruginous Hawks winter in grassland and shrub-steppe habitat from the central and southern portions of the breeding range southwest through much of California (Garrison, 1990), northern Baja and irregularly to Baja California Sur (Unitt et al., 1992); south to southern Arizona, New Mexico, west Texas, and into northern Chihuahua and the central states of northern Mexico, and southeast to western Kansas, Oklahoma, and central Texas (Bent, 1961; Olendorff, 1993; Bechard and Schmutz, 1995; Washington Dept. of Fish and Game, 1996). They occur casually east to Wisconsin, Illinois, Indiana, western Ohio, and Missouri (Christmas Bird Count compilation map; Palmer, 1988).

Distribution in the West Mojave Planning Area:

With only a few recorded nests ever in California, all in the northeast part of the state, there are no breeding records for the Ferruginous Hawk in the WMPA; it occurs as a winter visitor or migrant. It is called fairly common in grasslands and agricultural regions in southern California from mid-September to early April (Garrett and Dunn, 1981). Grinnell and Miller (1944) found the Ferruginous Hawk a more or less common species in places, although they assert that it was formerly more abundant in California. In the adjacent lower Colorado River valley it is cited as an uncommon transient or winter resident from mid-October to mid-March (Rosenberg et al., 1991).

Sight records for southern California include Antelope Valley, Cuyama Valley (communal roost; Bloom, cited in Olendorff, 1993), Harper Dry Lake, Helendale, Lake Henshaw (communal roost; King, Hastings, and Hastings, 1988), and Victorville. Cardiff recorded Ferruginous Hawks in 9 of 10 years (1978-1988) at Harper Lake (cited in ERT, 1988). Ferruginous Hawks appear in the Christmas Bird Count at San Bernardino Valley, adjacent to WMPA boundaries, but primarily of a different habitat type than occurs in most of the WMPA.

Within the WMPA, Ferruginous Hawks occur in Christmas Bird Count data from China Lake, Lancaster (in the Antelope Valley, containing the highest number and density of wintering Ferruginous Hawks in southern California; Pete Bloom, Western Foundation for Vertebrate Zoology, personal communication), and Mojave River Valley. They were tallied in small numbers on migration at Apple Valley by the Mojave Desert Raptor Watch (McDermott, 1994; Anonymous, 1995).

Harper Lake has been identified as a Key Raptor Area by the BLM for the Ferruginous Hawk (Olendorff et al., 1989). This area, which contains 4,000 acres of BLM-managed lands, possesses prime foraging habitat for this species. Two portions of Harper Dry Lake were designated as Areas of Critical Environmental Concern upon adoption of the Desert Plan in 1980 (USDI, 1980). A management plan for the Harper Dry Lake ACEC was prepared in 1982 (USDI, 1982) which reduced the acreage to 480 acres and set management goals for the wetland, including removal of exotic vegetation, land exchanges with private property owners to consolidate public lands in the marsh, and supplementing the water supply to the marsh. The Ferruginous Hawk was not specifically identified as a target species for management actions.

Natural History:

The largest member of the genus Buteo in North America, the Ferruginous Hawk is a large, soaring bird of wide-open country. With the long, broad wings and relatively short tail characteristic of the genus, it is distinctive, nonetheless, for its size, bulk, and wing shape. Both a light and dark morph occur in the species, with dark morph individuals estimated at 1-10% of the population (Schmutz and Schmutz, 1981; Bechard and Schmutz, 1995). Light morph juveniles are mostly white underneath, with a dark comma at the carpal (wrist) joint on the extended wing. The white-feathered tarsi will often show some dark spotting. The head is light gray to brown and the shoulders and back are charcoal gray to brown, but lacking the distinctly rufous tones of the adult. The tail is very pale, washed in shades of warm brown to gray, sometimes showing a faintly dark tip, but stark white at the base and onto the uppertail coverts. Light morph adults are much like juveniles underneath except for dark red leggings sometimes barred with dark brown or black. The dark legs make a distinct "V" against the otherwise light body when the bird is seen in overhead flight. The adult light morph has a light gray to dark brown head that is usually lighter than the back but often dark-capped. The wings and back are charcoal to dark brown with rufous patches at the shoulder. The white tail is washed with rufous or gray, sometimes retaining a narrow unmarked band at the base, but with rufous uppertail coverts. Dark morph juveniles are dark brown on the head, back, wings, and covert feathers. The head, nape, and breast may be lighter, warm rufous to tawny. The legs are dark, as is the uppertail; the undertail appears gray or dirty white. Dark morph adults are dark brown overall, with the wing linings slightly rusty. The tail is gray on the dorsal surface, paler underneath. The outer primaries are tipped narrowly in black. Ferruginous Hawks are barrel-chested and stocky. The wings are broad, long, and taper gently to the tips. In soaring flight, the wings are held in a slight dihedral (Dunne et al., 1988; Wheeler and Clark, 1995).

Ferruginous Hawks are largely perch hunters, although they will also spend more time foraging on the ground than any other large raptor, course low over the ground to flush prey, and hover hunt from heights up to 300 ft. (91.5 m; Wakely, 1974; Bechard and Schmutz, 1995). In studies range-wide, mammals including thirteen-lined ground squirrel (*Spermophilus tridecemlineatus*), white-tailed jackrabbit (*Lepus townsendii*), northern pocket gopher (*Thomomys*

talpoides), prairie dogs (*Cynomys* spp.), kangaroo rats (*Dipodomys* spp.), and cottontails (*Sylvilagus* spp.) make up roughly 70-85% of the diet (up to 99% of the biomass). Birds comprise 5-13% of the diet (< 5% of the biomass), and amphibians, reptiles, and insects add the remaining proportion (Olendorff, 1993; Bechard and Schmutz, 1995). In the Antelope Valley Ferruginous Hawks prey mostly on Botta pocket gophers (*Thomomys bottae*; Pete Bloom, personal communication).

The earliest breeding age for the species is largely unsubstantiated. Palmer (1988) reported no evidence that yearlings breed. Gossett (1993) quoted ≥ 21 months (spring of the 3rd calendar year) as the minimum breeding age, and Schmutz (Bechard and Schmutz, 1995) asserts that 2 year-olds breed regularly. Ferruginous Hawks arrive on the nest territory from late February to early March and laying occurs mid-March into early June, although the bulk of laying is between mid-April and mid-May. Seasonal timing varies with fluctuations in weather and availability of prey. Palmer (1988) states that the clutch size ranges from 1-8 eggs depending on prey availability; most studies suggest 2-4 average (Weston, 1969; Loekmoen and Duebbert, 1976; Wittenhagen, 1992; Zelenak and Rotella, 1997). Incubation begins with the first egg and lasts an estimated 30-33 days (Smith and Murphy, 1978; Call, 1995) and hatching is asynchronous by 2-4 days (Bechard and Schmutz, 1995). The age at fledging is variously reported as ranging from 38-48 days, with smaller, lighter males fledging as much as 10 days ahead of females (Olendorff, 1973; Palmer, 1988; Zelenak et al., 1997).

Habitat Requirements:

Ferruginous Hawks nest in sagebrush/shrub-steppe, grassland, mixed shrub/grassland, in lone trees or sparse groves primarily in (but not restricted to) the pinyon-juniper ecotone, and in the transition zone between woodland and shrub or grassland habitats (Howard and Wolfe, 1976; Blair and Schitoskey, 1982; Perkins and Lindsey, 1983; McAnnis, 1990). In the absence of trees, the Ferruginous Hawk readily nests on the ground, favoring buttes, cutbanks, rocky pinnacles and outcrops, and cliff faces (Cameron, 1914; Roth and Marzluff, 1989; Ramakka and Woyewodzic, 1993; Ayers, 1996). There is a tendency to relocate nests off of the ground if an alternative substrate becomes available. Man-made nest substrates include haystacks, high-voltage powerline towers, abandoned buildings, gas and oil development condensation tanks, and artificial nest structures (Gaines, 1985; Call, 1995; Apple, 1997). There is a strong negative correlation with cultivated land; it seems to be tolerated near nest sites, but nests are not located in areas where cultivation represents the dominant land use (Schmutz, 1984; Gaines, 1985). Nesting density as reflected by square miles of territory per laying pair is highly variable. Olendorff (1993) summarized 35 nesting studies in the U.S. and Canada with a range of 1 laying pair per 2.7-1664 mi^2 (7.1-4261 km^2). Additionally, minimum distance between nests varies with prey availability, habitat type, site availability, and individual behavioral preference. Lardy (1980) recorded a straight-line distance of 0.6 mi. (1 km) between nests. In Olendorff's (1993) summary of 11 studies, mean distances between nests ranged from 0.5-4.5 mi. (0.8-7.2 km), with an average of 3.4 mi. (5.4 km) between nests.

Winter and migratory habitat requirements largely overlap with breeding habitat, but without the need for trees or other elevated nest placements, although trees may be used to roost if they are available (Steenhof, 1984; King, et al., 1988). Prey availability is probably the most important factor influencing winter habitat selection. Grassland, pasture, and fallow winter

croplands in which there is an abundance of prairie dogs, lagomorphs, or gophers are used extensively (Schmutz and Fyfe, 1987; Allison, et al., 1995; Plumpton, 1996).

Population Status:

The population status of the Ferruginous Hawk is uncertain owing to a need for range-wide censusing including correlation of breeding, migration, and winter observation numbers. Many of the studies cited in this review postulated declines in Ferruginous Hawk numbers. Warkentin and James (1988) analyzed Christmas Bird Count data and found no evidence for range-wide population decline and, in fact, found several areas which showed significant local increases. In an analysis of California CBC data, Garrison (1990) concluded that apparent increases in numbers of winter Ferruginous Hawks were largely the result of newer CBCs started in areas with more of the birds, as well as increased raptor awareness and improved identification skills. Some populations have declined locally, notably in western Utah (Woffinden and Murphy, 1989; K. Gardner, BLM, personal communication) where the prey base has apparently crashed, and in southwestern California where Bloom reports substantial declines (personal communication). Simultaneous increases in numbers of Ferruginous Hawks in other parts of their range (Alberta, Idaho, and Wyoming; Olendorff, 1993) may indicate opportunistic nomadism with nearly entire local or regional populations relocating to follow prey (K. Steenhof, USGS Forest and Rangeland Ecosystem Science Center, personal communication).

In order for the BLM to maintain a national perspective on populations of the Ferruginous Hawk and the relative importance of the WMPA, it is necessary to update the Key Raptor Area Data Base. Inventory and monitoring is identified as an objective of raptor habitat management in the Fish and Wildlife 2000 plan (USDI, 1987). The goal for inventory and monitoring of raptor populations in Key Raptor Areas is to maintain a current inventory of the raptor populations and monitor their status at least every five years (USDI, 1992). The Harper Dry Lake Key Raptor Area has not met this standard. Updated surveys of winter use by Ferruginous Hawks at this and other sites are needed so that an assessment can be made of the population trends in the WMPA.

Threats Analysis:

Habitat loss probably poses the greatest threat to the Ferruginous Hawk in southern California and the WMPA. Development, recreation, and water reallocation for a growing human population put stresses on the prey base, which, in turn, affects the birds. Loss of water supply to the marsh at Harper Dry Lake and conversion of agricultural lands in the Antelope Valley to urban uses could result in loss of wintering habitat in two important localities within the WMPA. Shooting remains a problem in other parts of the country and, though undocumented, probably occurs in isolated instances in the WMPA. Pesticide contamination in agricultural areas is largely undocumented for the species but remains of concern for any top predator where bio-accumulation might occur. There is very limited interest in Ferruginous Hawks for falconry purposes (less than 1 per year harvested in California; Marc Bechard, personal communication); it is insignificant in management terms.

Biological Standards:

In the absence of nesting Ferruginous Hawks in the WMPA and the attendant human interference problems with breeding birds, maintenance of habitat and protection of the prey base are probably the principal management concerns for the species. Winter agricultural fields (alfalfa) and pasturage are adequate foraging areas (primarily providing gophers) in the Central Valley, and may be important in parts of the WMPA. Water sources and native vegetation should be protected to provide habitat for larger prey (lagomorphs) to ensure stability of the winter prey base. Management should also include maintenance of a fire regime that encourages shrub-steppe as the climax vegetation; encroachment of trees also tends to degrade the habitat for prey.

Literature Cited:

Allison, P.S., A.W. Leary, and M.J. Bechard. 1995. Observations of wintering ferruginous hawks (*Buteo regalis*) feeding on prairie dogs (*Cynomys ludovicianus*) in the Texas panhandle. Texas J. Sci. 47:235-237.

American Ornithologists' Union. 1983. Checklist of North American Birds, 6th edition.

Anonymous. 1995. HMANA Hawk Migration Studies 21: Appendix UU-VV.

Apple, L. 1997. Raptor nest monitoring in the Great Divide Resource Area, 1997. Report to the Great Divide Resource Area, Rawlins Field Office, Bureau of Land Management, Rawlins, Wyoming.

Ayers, L.W. 1996. An aerial sightability model and reproductive parameters for nesting ferruginous hawks (*Buteo regalis*) in southcentral Wyoming. M.S. Thesis, Univ. of Wyoming, Laramie, Wyoming.

Bechard, M.J., and J.K. Schmutz. 1995. Ferruginous Hawk (*Buteo regalis*). *In:* A. Poole and F. Gill (eds.), The Birds of North America, No. 172. Philadelphia, Pennsylvania: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

Bent, A.C. 1961. Life Histories of North American Birds of Prey. Part 1. Dover Publications, Inc., New York.

Blair, C.L., and F. Schitoskey, Jr. 1982. Breeding biology and diet of the ferruginous hawk in South Dakota. Wilson Bull. 94:46-54.

Call, M.W. 1995. Raptor surveys and monitoring in the Shamrock Hills. PIC Technologies, Inc., Denver, Colorado.

Cameron, E.S. 1914. The ferruginous rough-leg, *Archibuteo ferrugineus* in Montana. Auk 31:159-167.

Dunne, P., D. Sibley, and C. Sutton. 1988. Hawks in Flight. Houghton Mifflin Co., Boston, Massachusetts.

ERT, Inc. 1988. Summary of Baseline Biology Information for Harper Lake Wetlands. Report submitted to California Energy Commission, Sacramento, California.

Gaines, R.C. 1985. Nest site selection, habitat utilization, and breeding biology of the ferruginous hawk in central North Dakota. M.S. Thesis, North Dakota State University, Fargo, North Dakota.

Garrett, K. and J. Dunn. 1981. Birds of Southern California: Status and Distribution. Los Angeles Audubon Society, Los Angeles, California.

Garrison, B.A. 1990. Trends in winter abundance and distribution of ferruginous hawks in California. Trans. West. Sect. Wildlife Soc. 26:51-56.

Gossett, D.N. 1993. Studies of ferruginous hawk biology: I. Recoveries of banded ferruginous hawks from presumed eastern and western subpopulations. II. Morphological and genetic differences of presumed subpopulations of ferruginous hawks. III. Sex determination of nestling ferruginous hawks. M.S. Thesis, Boise State University, Boise, Idaho.

Grinnell, J. and A. Miller. 1944. The Distribution of the Birds of California. Pacific Coast Avifauna No. 27. (1986 reprint), Artemisia Press, Lee Vining, California.

Howard, R.P., and M.L. Wolfe. 1976. Range improvement practices and ferruginous hawks. J. Range Manag. 29:33-37.

King, D., D. Hastings, and M. Hastings. 1988. Communal winter roosts of ferruginous hawks in San Diego County, California. West. Birds 19:170-171.

Lardy, M.E. 1980. Raptor inventory and ferruginous hawk breeding biology in southeastern Oregon. M.S. Thesis, Univ. Idaho, Moscow, Idaho.

Loekmoen J.T., and H.F. Duebbert. 1976. Ferruginous hawk nesting ecology and raptor populations in northern South Dakota. Condor 78:464-470.

McAnnis, D.M. 1990. Home range, activity budgets, and habitat use of Ferruginous Hawks (*Buteo regalis*) breeding in southwest Idaho. M.S. thesis, Boise ID: Boise State University.

McDermott, F. 1994. California region. HMANA Hawk Migration Studies 20:56.

Olendorff, R. R. 1973. The ecology of the nesting birds of prey of northeastern Colorado. Technical Report No. 211, U.S. International Biological Program, Grassland Biome.

Olendorff, R. R. 1993. Status, Biology, and Management of Ferruginous Hawks: A Review. Boise, ID: Raptor Research and Technical Assistance Center, Special Report. USDI, Bureau of Land Management.

Olendorff, R. R., Bibles, D. D., Dean, M. T., Haugh, J. R., and Kochert, M. N. 1989. Raptor Habitat Management under the Bureau of Land Management Multiple-Use Mandate. Raptor Res. Report (8):1-80.

Palmer, R.S. (Ed.). 1988. Handbook of North American Birds. Volume 5. Yale Univ. Press, New Haven, Connecticut.

Perkins, M.W., and W.J. Lindsey. 1983. Nesting studies of ferruginous hawks in the Ely BLM District, Nevada. North Amer. Bird Bander 8:106-107.

Plumpton, D.L. 1996. Anthropogenic effects on winter habitat use by ferruginous hawks in Colorado. M.S. Thesis, Univ. Minnesota, St. Paul, Minnesota.

Ramakka, J.M., and R.T. Woyewodzic. 1993. Nesting ecology of ferruginous hawk in northwestern New Mexico. J. Raptor Res. 27:97-101.

Rosenberg, K., R. Ohmart, W. Hunter, and B. Anderson. 1991. Birds of the Lower Colorado River Valley. Univ. Arizona Press, Tucson, Arizona.

Roth, S.D. Jr., and J.M. Marzluff. 1989. Nest placement and productivity of ferruginous hawks in western Kansas. Trans. Kansas Acad. Sci. 92:132-148.

Schmutz, J.K . 1984. Ferruginous and Swainson's hawk abundance and distribution in relation to land use in southeastern Alberta. J. Wild. Manag. 48:1180-1187.

Schmutz, J.K., and R.W. Fyfe. 1987. Migration and mortality of Alberta ferruginous hawks. Condor 89:169-174.

Schmutz, S.M., and J.K. Schmutz. 1981. Inheritance of color phases of ferruginous hawks. Condor 83:187-189.

Smith D.G., and J.R. Murphy. 1978. Biology of the ferruginous hawk in central Utah. Sociobiology 3:79-95.

Steenhof, K. 1984. Use of an interspecific communal roost by wintering ferruginous hawks. Wilson Bull. 96:137-138.

Unitt, P., R.R. Estrella, and A.C. Vera. 1992. Ferruginous hawk and pine siskin in the Sierra de la Laguna, Baja California Sur; subspecies of the pine siskin in Baja California. West. Birds 23:171-172.

USDI, Bureau of Land Management. 1980. California Desert Conservation Area Plan, BLM, California Desert District, Riverside, California

USDI, Bureau of Land Management. 1982. Management Plan for Harper Dry Lake Area of Critical Environmental Concern, BLM, Barstow Resource Area, Barstow, California.

USDI, Bureau of Land Management. 1987. Fish and Wildlife 2000, A Plan for the Future. BLM, Washington, D.C.

USDI, Bureau of Land Management. 1992. Raptor Habitat Management on Public Lands, a Strategy for the Future. BLM, Washington, D.C.

Wakely, J.S. 1974. Activity periods, hunting methods, and efficiency of the ferruginous hawk. Raptor Res. 8:67-72.

Warkentin, I.G., and P.C. James. 1988. Trends in winter distribution and abundance of Ferruginous Hawks. J. Field Ornithol. 59:209-214.

Washington Department of Fish and Wildlife. 1996. Washington State Recovery Plan for the Ferruginous Hawk. Olympia, Washington.

Weston, J.B. 1969. Nesting ecology of the ferruginous hawk *Buteo regalis*. Brigham Young Univ. Sci. Bull., Biol. Ser. 10:25-36.

Wheeler, B.K., and W.S. Clark. 1995. A Photographic Guide to North American Raptors. Academic Press, San Diego, California.

Wittenhagen, K.W. 1992. 1992 final report on the Ferruginous Hawk in southeastern Montana. USDI Bureau of Land Management, Miles City, Montana.

Woffinden, N.D., and J.R. Murphy. 1977. Population dynamics of the ferruginous hawk during a prey decline. Great Basin Nat. 37:411-425.

Woffinden, N.D., and J.R. Murphy. 1989. Decline of a ferruginous hawk population: a 20-year summary. J. Wild. Manag. 53:1127-1132.

Zelenak, J.R., and J.J. Rotella. 1997. Nest success and productivity of ferruginous hawks in northern Montana. Can. J. Zool. 75:1035-1041.

Zelenak, J.R., J.J. Rotella, and A.R. Harmata. 1997. Survival of fledgling ferruginous hawks in northern Montana. Can. J. Zool. 75:152-156.

GRAY VIREO
Vireo vicinior

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Management Status: Federal: BLM Sensitive
California: Species of Special Concern (CDFG, 1998)

General Distribution:

The Gray Vireo breeds from southern California, southern Nevada, southern Utah, northwestern and central New Mexico, and western Oklahoma south to northwestern Baja California, central and southeastern Arizona, southern New Mexico, and western Texas and adjacent Coahuila, Mexico (AOU, 1983). Most birds depart the United States in winter, when the species occurs patchily in the southern portion of Baja California, and on the Mexican mainland in Sonora. The Gray Vireo winters in small numbers in southern Arizona and western Texas. Migrants are only rarely noted away from known breeding and wintering areas.

In California Gray Vireos breed in the Grapevine Mountains of Inyo Co., and in the mountain ranges of the eastern Mojave Desert (Kingston, Clark and New York mountains). They also breed on the drier northern and eastern slopes of the Transverse Ranges (particularly the eastern San Bernardino Mountains, but very locally on the north slope of the San Gabriel Mountains), in the San Jacinto Mountains, and on the southern slopes of the Laguna Mountains (Garrett and Dunn, 1981). They are not known to winter in California. Breeding birds arrive in California from late March to early May, with arrival dates earlier in the southwestern part of the range; birds have generally departed the breeding grounds by mid- to late August (Garrett and Dunn, 1981). The few records of transients away from wintering or breeding areas from the Colorado River westward have come from 26 March to 11 May in spring and from 6 September to 1 October in fall (Garrett and Dunn, 1981, Rosenberg et al. 1991, Los Angeles County Museum files).

Distribution in the West Mojave Planning Area:

Gray Vireos breed in small numbers at a few sites on the margin of the WMPA. In Los Angeles County one singing bird was present in summer 1997 just west of the junction of Pallett Creek and Big Rock Creek (elevation = 3800 ft. or 1160 m) near Valyermo. This is approximately 8 mi. (5 km) west of Bob's Gap (elevation = 4200 ft. or 1280 m), which was occupied by 1-3 pairs from 1981 to 1992 (Los Angeles County Museum files; *American Birds* regional reports). In 1985 an additional territorial bird was found along Largo Vista Road, southeast of Pearblossom; this is approximately 8 mi. (5 km) east of Bob's Gap. The presence of a singing bird in chamise chaparral in Mint Canyon (near Acton), Los Angeles Co., in 1921 (Miller, 1921) constitutes the westernmost possible breeding site in the county; this is just southwest of the limits of the WMPA. Grinnell and Miller (1944) also cite breeding localities at 6000 ft. (1,830 m) elevation in the northeastern San Gabriel Mountains, and summering birds were known in the vicinity of Phelan, at the northeastern base of the San Gabriel Mountains, as late as the 1960s (G. Shumway Suffel, pers. comm.). Arrival dates for breeding birds at Bob's Gap ranged from 7-19 April (Los Angeles County Museum files).

In San Bernardino County Gray Vireos have bred consistently in the Round Valley/Rose Mine area of the eastern San Bernardino Mountains (elevation = 6890-7870 ft. or 2100-2400 m), and likely breed locally in similar habitat elsewhere in those mountains. Territorial males were located in the upper Crystal Creek drainage, west of Cushenbury Canyon, in 1988 (Myers, 1988); this is only 1-2 mi. (1.5-3 km) south of the WMPA. They formerly bred in chamise-dominated chaparral in Cajon Pass (Hanna, 1944). Egg sets were taken south of Hesperia, at the southern edge of the WMPA, in1937 and 1949 (San Bernardino County Museum; CNDDB). Miller and Stebbins (1964) recorded breeding Gray Vireos at Black Rock Spring, Quail Spring, and Smithwater Canyon, all in the northern portion of Joshua Tree National Park.

In Kern County Gray Vireos have bred on the west side of Walker Pass (Grinnell 1922). There is a single sight record of uncertain authenticity at Castle Butte, east of California City in 1977 (California Natural Diversity DataBase).

The status of migrant Gray Vireos in the WMPA is confused by the frequent misidentification of Plumbeous Vireos (*Vireo plumbeus*) as this species (Garrett and Dunn, 1981; Heindel, 1996). The only acceptable record of a migrant Gray Vireo in the WMPA is one from Harper Dry Lake on 3 September 1986 (specimen, San Bernardino County Museum).

Breeding birds arrive during the first half of April at known sites along the northern flank of the San Gabriel Mtns., but arrival dates for breeding birds at higher elevations in the eastern San Bernardino Mountains are until early May (Garrett and Dunn, 1981). Birds have largely departed the breeding grounds by the middle of August, and there are no records in breeding habitat after the end of August.

Natural History:

The Gray Vireo is a small (5.5 in; 13.5 cm) insectivorous and frugivorous songbird with a fairly thick, hooked bill. It is plainly marked, being entirely gray above and slightly paler gray below, with a grayish head marked only with a thin whitish eye-ring. The wings show one or two thin, indistinct whitish wingbars. The unmarked gray tail is long for a vireo, and often flipped and waved expressively in a manner suggesting a gnatcatcher. The wings are relatively short and rounded, as might be expected of one of a short-distance migrant. This species is often confused in the field with the Plumbeous Vireo; the latter is more distinctly marked with a white throat contrasting with the dark gray head, bold white spectacles, and strong white wingbars. The tail of the Plumbeous Vireo is relatively shorter, and not flipped and waved about. The vocalizations of the two species differ: the Gray Vireo's song is a series of three to six upslurred or downslurred phrases in fairly predictable pattern; the Plumbeous Vireo usually delivers its song phrases more slowly, and many of its phrases are harsher, burrier, and more strongly inflected, than those of the Gray Vireo.

Stephens (1890) suggested that Gray Vireos from California (and adjacent Baja California and NW Arizona) might represent a distinct, darker subspecies, which he called *V. v. californicus*. Few subsequent workers (excepting Phillips, 1991) have accepted that designation; most consider the species monotypic.

The ecology of this species varies greatly with the season. During the spring and summer months it feeds by gleaning twigs and leaves for insects, especially lepidoptera (butterfly and moth) larvae and beetles (Chapin, 1925). In winter it subsists largely on the fruits of the elephant tree (*Bursera microphylla*) with individuals of both sexes maintaining and defending winter territories in areas of high resource abundance (Bates 1992a,b); its winter diet is supplemented by insects.

The open cup nests are placed in shrubs at heights of about 3-4 ft (ranging from 2.5-8 ft) (Bent, 1950); they may be placed in chamise (*Adenostoma fasciculatum*), junipers (*Juniperus* spp.), mesquites (*Prosopis* spp.), big sagebrush (*Artemisia tridentata*), antelope-brush (*Purshia glandulosa*), mountain mahogany (*Cercocarpus betuloides*), pinyons (*Pinus monophylla*) or other stiff-branched or thorny shrubs or small trees (Bent, 1950). A typical clutch is four eggs (Bent 1950); incubation and nestling periods are both 13-14 days, and double-brooding is frequent (Kaufman, 1996).

Habitat Requirements:

Although the floristic composition of the breeding habitat varies considerably throughout the range of this species, all such habitats are on arid slopes dominated by short, densely branched, stiff-twigged shrubs. On the slopes of the Transverse and Peninsular ranges they may occur in chamise-dominated chaparral without any conifers. It is absent, however, from the vast majority of chamise-dominated habitats in southern California. In the drier, eastern portions of the Transverse Range they generally occur in areas of mixed shrubs, e.g. big sagebrush, antelope-brush, buckwheat (*Eriogonum fasciculatum*), box thorn (*Lycium)*, silk tassel (*Garrya)*, scrub oak (*Quercus* spp.), manzanita (*Arctostaphylos* spp.), *Ceanothus*, *Ephedra*, etc.; such shrubs are typically mixed with scattered singleleaf pinyon, California juniper, and/or joshua-tree (Grinnell and Miller, 1944). Some habitats occupied on the desert ranges and most arid slopes of the Transverse Ranges are considerably more open in general structure than the chamise chaparral used in other areas.

Winter habitats are in arid desert slopes and washes dominated by fruiting elephant trees (*Bursera microphylla*). Such habitats do not exist in the WMPA.

Population Status:

Breeding birds are unevenly distributed, even within seemingly appropriate habitat. They usually occur in low densities, although Grinnell and Swarth (1913) estimated 16 pairs per square mile in the San Jacinto Mountains of Riverside County. There are few data on population trends for this species, as they are not well-sampled through traditional methods such as the Breeding Bird Survey. However, numerous sites documented in the literature (e.g., Grinnell and Miller, 1944) are no longer occupied (Garrett and Dunn, 1981), and it seems likely that the loss of many small, local populations has occurred. In the WMPA, the small population on the north slope of the San Gabriel Mountains is tenuous, at best (Los Angeles County Museum files); intensive field work for the Los Angeles County Breeding Birds Atlas has turned up only a single singing bird and has failed to find any birds at Bob's Gap, the "traditional" locality. In San Bernardino County the populations around Round Valley apparently persist, but the current status of other populations, including those in Joshua Tree National Park, is unknown.

Threats Analysis:

The reasons for the apparent decline of this species in southern California are unclear. One likely factor is cowbird parasitism, which was considered significant with respect to Gray Vireos as early as the 1940s (Hanna, 1944). Brown-headed Cowbirds have increased in range and abundance in the WMPA and can be especially numerous in the breeding season on the montane fringes of the Mojave Desert (K.L. Garrett, pers. obs.). Habitat degradation resulting from grazing, unnatural fire regimes, and pressure from human recreation seems likely along the southwestern margin of the planning area. Both livestock grazing and fires of unnatural frequency or intensity have the potential to modify the extent and composition of shrub cover to the detriment of Gray Vireos. Human recreation pressures in the form of off-road motorized vehicles and recreational shooting has the potential to cause disturbance to nesting vireos.

Biological Standards:

Intensive surveys for territorial Gray Vireos within the WMPA and adjacent National Forest lands should be undertaken to determine the current population size; any populations found should be monitored annually and measures of reproductive success (including the effects of cowbird parasitism) should be investigated. Especially important areas to concentrate upon include the northeastern flank of the San Bernardino Mountains north and east of Granite Peak and north of Burns Canyon, as well as other areas along the northern border of the San Bernardino and Angeles National Forests.

As Gray Vireos appear to nest in loose "colonies," occupying only a small portion of seemingly suitable habitat, known areas of occupation should be protected from excessive human recreational pressures, including off-road vehicles and target shooting. Livestock and equestrian facilities, which might promote cowbird abundance, should be situated well away from Gray Vireo habitat where possible.

Frequent fires may transform arid chaparral and pinyon-juniper habitat preferred by Gray Vireos into unsuitably open, eroded slopes with reduced shrub cover and dominated by exotic annuals; natural fire regimes in such habitats should be a goal of Gray Vireo habitat management.

Literature Cited:

American Ornithologists' Union. 1983. Checklist of North American birds, 6th ed. Allen Press, Lawrence, Kansas.

Bates, J. 1992a. Frugivory on *Bursera microphylla* (Burseraceae) by wintering gray vireos (*Vireo vicinior*, Vireonidae) in the coastal deserts of Sonora, Mexico. Southwestern Nat. 37:252-258.

Bates, J. 1992b. Winter territorial behavior of gray vireos. Wilson Bull. 104:425-433.

Bent, A.C. 1950. Life histories of North American wagtails, shrikes, vireos and their allies. Bull. U.S. Natl. Mus. 197.

California Department of Fish and Game, Natural Diversity Data Base. 1998. Special Animals. Biannual publication, Mimeo., 44 pp.

Chapin, E.A. 1925. Food habits of the vireos. USDA, Agricultural Bulletin 1355. 42 pp.

Garrett, K. and J. Dunn. 1981. Birds of southern California: status and distribution. Los Angeles Audubon Society, Los Angeles, California.

Grinnell, J. 1922. Northward range of the gray vireo in California. Condor 24:211-212.

Grinnell, J. and A.H. Miller. 1944. The distribution of the birds of California. Pacific Coast Avifauna No. 27.

Grinnell, J. and H.S. Swarth. 1913. An account of the birds and mammals of the San Jacinto area of southern California. Univ. Calif. Publ. Zool. 10:197-406.

Hanna, W.C. 1944. The Gray Vireo as a victim of the cowbird. Condor 46:244.

Heindel, M.T. 1996. Field identification of the solitary vireo complex. Birding 28:458- 471.

Kaufman, K. 1996. Lives of North American Birds. Houghton Mifflin Company, Boston, Massachusetts.

Miller, L. 1921. The Gray Vireo in Los Angeles County, California. Condor 23:194.

Miller, A.H. and R.C. Stebbins. 1964. The lives of desert animals in Joshua Tree National Monument. Univ. of California Press, Berkeley, California.

Myers, S.J. 1988. Mining company leased holdings in the San Bernardino National Forest: Avian surveys during the 1988 breeding season. Unpubl. report prepared for the San Bernardino National Forest, San Bernardino, California.

Phillips, A.R. 1991. The known birds of North and Middle America. Privately Printed.

Rosenberg, K.V., R.D. Ohmart, W.C. Hunter and B.W. Anderson.1991. Birds of the lower Colorado River Valley. Univ. of Arizona Press, Tucson, Arizona.

Stephens, F. 1890. A new vireo from California. Auk 7:159-160.

USDI, Bureau of Land Management, 1997. California Desert District Resource Area files.

HEPATIC TANAGER
Piranga flava

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Management Status: Federal: None
California: Species of Special Concern (CDFG, 1998)

General Distribution:

Hepatic Tanagers breed from eastern California, southern Nevada, northwestern and central Arizona, western Colorado, northern New Mexico and far western Texas south over a vast portion of the Neotropics (AOU, 1983). Birds breeding north of Costa Rica are sometimes considered a separate species, *P. hepatica* (AOU, 1983). The northernmost populations are migratory, not normally wintering north of Mexico.

This species (subspecies *P. f. hepatica*) is scarce and local as a breeding bird in California, being at the extreme northwest of the species' range. Breeding was first documented in the upper Arrastre Creek drainage of the eastern San Bernardino Mountains in 1972, but territorial birds had been there continuously since 1967 (Johnson and Garrett, 1974). One or more pairs have been present on Clark Mountain in northeastern San Bernardino County since 1973 (Johnson and Garrett, 1974). Up to three pairs were noted in the Kingston Range in 1977 and one pair was in the New York Mountains in the same year (Remsen, 1978; Garrett and Dunn, 1981). Birds are thought to arrive on the breeding grounds in late April or early May, and depart by the end of August (Garrett and Dunn, 1974).

There are several records of wintering Hepatic Tanagers on the coastal slope of southern California, but most of the few winter records for the deserts are from the Colorado River Valley. This species is rarely recorded as a migrant away from breeding and wintering areas in California and elsewhere (Garrett and Dunn, 1981; Monson and Phillips 1981).

Distribution in the West Mojave Planning Area:

Hepatic Tanagers do not breed in the WMPA, although a few pairs have been documented breeding just outside the periphery of the area (see above). The upper Arrastre Creek drainage nesting sites are about 4.5 mi. (7.2 km) south of the northern boundary of the San Bernardino National Forest. A female was seen on 8 June 1985 in Lower Shake Canyon, west of Lake Hughes, Los Angeles County; this sighting was only 0.25 mi. (0.5 km) inside the northern boundary of the Angeles National Forest, and thus just outside the WMPA.

Garrett and Dunn (1981) cited the following records for single birds in the WMPA: Morongo Valley on 13 October 1992, 19 April 1977 and 1 October 1977; and one in Afton Canyon on 8 June 1977. We are not aware of additional records of migrants in the WMPA since then; there are no records of this species the Mojave Desert portions of Inyo, Kern, or Los Angeles counties.

Natural History:

Hepatic Tanagers are medium sized (7 in; 18 cm) insectivorous and frugivorous songbirds with moderately heavy bills. Males are mostly red, tinged with gray or dusky on the back, wings, tail, and flanks. The cheeks are dusky, contrasting with the bright red or orange-red throat and breast. Females are olive gray above, and yellowish below, brightest on the throat, upper breast and undertail coverts; their flanks are washed with dusky-gray. Wingbars are lacking. All birds have blackish bills, unlike the distinctive pale bills of Summer Tanagers (the species with which they are most often confused). Male Summer Tanagers are much brighter red than Hepatics. The common call note of a Hepatic Tanager is a single, wooden "chup", unlike the more complex "chicky-chup" or "chick-a-tup" of Summer Tanager. Hepatic

Tanagers feed by gleaning foliage of broadleafed trees and pines, usually high in the tree crowns; they sometimes capture flying insects in the air. They also visit fruiting shrubs. Food items include insects, nectar, fruits and berries. Isler and Isler (1987) summarize foraging behavior and diet.

On the breeding grounds Hepatic Tanagers are most often found in pairs; all records of transients in the WMPA are of single individuals. Breeding pairs are strongly territorial (Marshall, 1957). No data on territory size are available, but in ideal pine-oak habitat in southeastern Arizona and northwestern Mexico up to "six or seven" territorial males can be heard singing from the same observation point (Marshall 1957); densities in marginal habitat in arid montane forests of southern California are undoubtedly much lower. The nest is a loose cup placed near the end of a horizontal branch at medium or high levels in oaks, pines, or other trees; egg dates within the United States are from May to July (Isler and Isler, 1987).

Habitat Requirements:

The most commonly occupied breeding habitat is mixed montane woodland of pines and oaks. However, the limited populations in California have been in arid conifer woodlands with few or no oaks. In the San Bernardino Mountains they have nested in a mixture of Jeffrey pines (*Pinus jeffreyi*) and singleleaf pinyons (*P. monophylla*) along an intermittent stream with willows (*Salix* spp.) at 6700 ft (2045 m; Johnson and Garrett, 1974). Birds on the desert ranges of the East Mojave have nested in habitats dominated by singleleaf pinyons, mixed with white firs (Clark and Kingston mountains) or live oaks (New York Mountains) at about 6500 ft (1980 m) to 7000 ft (2135 m) elevation (Garrett and Dunn, 1981). No summer Hepatic Tanager records have come from extensive forests of Jeffrey Pines, white firs (*Abies concolor*) and California black oaks (*Quercus kelloggii*) on the northern slopes of the San Gabriel and San Bernardino Mountains, adjacent to the southern boundary of the WMPA.

Wintering birds in coastal California have mostly been observed in parks and well-planted residential areas with tall pines, eucalyptus, and (often) native coast live oaks (*Quercus agrifolia*). The few winter records for the lower Colorado River Valley have been at sites dominated by planted palms, eucalyptus, tamarisks, and fruiting shrubs (Rosenberg et al., 1991).

The few migrants noted within the WMPA have been in riparian (cottonwood-dominated) woodlands of large oases, such as Big Morongo and the Mojave River at Afton. Many such areas harbor breeding populations of the similar Summer Tanager.

Population Status:

Hepatic Tanagers breed only in small numbers in California; the species' placement on the California Bird Species of Special Concern list (Remsen, 1978) reflects its limited breeding distribution and population size in the state and potential threats from habitat degradation and disturbance.

Breeding populations in California have become established only during the latter half of the present century (Johnson and Garrett, 1974), and possibly only since the late 1960s (Johnson and Garrett, 1974). Grinnell and Miller (1944) did not record this species in the state of California, and careful searching of Clark Mountain (one of only four known breeding sites in the state) in 1939 found no birds (Johnson and Garrett 1974). The expansion of this species' breeding range into California is paralleled by similar expansions into southern Nevada, southern Utah, southern Colorado, and northern New Mexico (Johnson, 1994).

The Breeding Bird Survey (USGS Biological Resources Division) records too few Hepatic Tanagers to develop information on population trends in North America.

Threats Analysis:

Remsen (1978) considered the greatest potential threat to California breeding populations to be habitat destruction, especially through human recreation and forest fires. Increasing human recreation and density in montane woodlands suggests a growing potential for catastrophic fires in Hepatic Tanager habitat as well as for direct disturbance to nesting pairs.

Most of the few transients noted in the WMPA have been observed in cottonwood-willow riparian woodlands at large desert oases such as Big Morongo and the Mojave River at Afton. Maintenance of habitat integrity (well-layered vegetation with tall trees, brushy understory, and available fresh water) in these riparian oases is important for a great many migrant songbirds such as tanagers.

Biological Standards:

Remsen's (1978) recommendation for management of this species in California is to maintain the integrity of breeding habitat by discouraging overnight camping and firearm use in the Arrastre Creek area of the San Bernardino Mountains and to maintain the habitat integrity of desert peak white fir groves. There is no suitable breeding habitat within the WMPA, although such habitat exists nearby, and possibly within the borders of the planning area on the northern slopes of the San Bernardino and San Gabriel Mountains Records of transients within the WMPA are so few that no generalizations about management needs are possible. As this species is essentially absent from the WMPA, no specific biological standards can be suggested.

Literature Cited:

American Ornithologists' Union. 1983. Checklist of North American birds, 6th ed. Allen Press, Lawrence, Kansas.

California Department of Fish and Game, Natural Diversity Data Base. 1998. Special Animals. Biannual publication, Mimeo., 44 pp.

Garrett, K. and J. Dunn. 1981. Birds of southern California: status and distribution. Los Angeles Audubon Society, Los Angeles, California.

Grinnell, J. and A.H. Miller. 1944. Distribution of the birds of California. Pacific Coast Avifauna No. 27.

Huey, L.M. 1961. Two noteworthy records for California. Auk 78:426-427.

Isler, M.L. and P.R. Isler. 1987. The tanagers: natural history, distribution and identification. Smithsonian Institution Press, Washington D.C.

Johnson, N.K. 1994. Pioneering and natural expansion of breeding distributions in western North American birds. Stud. Avian Biol. 15:27-44.

Johnson, N.K. and K.L. Garrett. 1974. Interior bird species expand breeding ranges into southern California. West. Birds 5:45-56.

Marshall, J.T., Jr. 1957. Birds of pine-oak woodland in southern Arizona and adjacent Mexico. Pacific Coast Avifauna, No. 32.

Monson, G. and A.R. Phillips. 1981. Annotated checklist of the birds of Arizona, 2nd ed. Univ. of Arizona Press, Tucson, Arizona.

Remsen, J.V., Jr. 1978. Bird species of special concern in California. California Department of Fish and Game, Wildlife Management Branch Administrative Report No. 78-1.

Rosenberg, K.V., R.D. Ohmart, W.C. Hunter and B.W. Anderson. 1991. Birds of the lower Colorado River Valley. Univ. of Arizona Press, Tucson, Arizona.

USDI, Bureau of Land Management, 1997. California Desert District Resource Area files.

Inyo California Towhee

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Species Management Status

Federal - Threatened
California - Endangered

The Inyo California towhee was federally listed as threatened in 1987. Critical habitat was designated at the same time. A recovery plan for the species was signed in 1998.

General Distribution

The Inyo California towhee has an extremely limited range, being found only in the Argus Range in Inyo County, California (Cord and Jehl 1979). The subspecies is geographically isolated from other subspecies of the California towhee, *Pipilo crissalis* (USFWS 1998) and is believed to be a relict population of a much more widespread population in the southwestern United States and northern Mexico (Davis 1951). Current habitat is within the Great Falls Basin ACEC, Argus Range Wildlife Habitat Management Area (WHMA), Argus Range Wilderness Area, and Great Falls Basin Wilderness Study Area, all managed by the Bureau of Land Management and on the Naval Air Weapons Station, China Lake (NAWS).

The birds have been found in the Argus Range from roughly Bendire Canyon in the north to Wilson Canyon in the south (LaBerteaux and Garlinger 1998), for a distance of 32 kilometers (20 miles). The maximum width within this band occupied by towhees is about 20 kilometers (12.4 miles). It's possible towhees extend outside this band but this hasn't been documented yet. Since the species are basically non-migratory, movement of other subspecies into the area is not likely to alter the gene pool.

Distribution in the CDCA

The species is found entirely within the CDCA, as described above.

Natural History

Towhees are basically grey-brown, sparrowlike songbirds. The Inyo California towhee is medium sized, approximately 17- 19 centimeters (7-7.5 inches) in length and the sexes are similar in size and color (Van Rossem 1935). LaBerteaux (1989) reports that this subspecies is slightly smaller than the Sacramento California towhee (*Pipilo crissalis carolae*), its nearest geographic relative. *P. c. carolae* has a range that extends east to the Sierra Nevada Mountains. She found that there are also significant differences in bill length, middle toe, wing and tail lengths. Wilbur (1981) found that the Inyo California towhee had a slightly paler ash gray

plumage coloration than other members of the species, though it is a difference not readily discernable to the naked eye.

The call of the Inyo California towhee is a metallic clink, and the song a rapid chink-chink-ink-ink-ink-ink-ink-ink on the same pitch, and often ending in a trill (Peterson 1990).

LaBertaux (1989) found that food items and foraging techniques varied a great deal. She found that they are omnivorous, opportunistic feeders eating seeds throughout the year, but eating other foods depending on the time of year. Insects dominated in the spring and summer while fruit was taken from July through December. Foraging was mostly done in shade pecking on sandy and rocky substrates on open hillsides surrounding riparian vegetation within their territories (LaBerteaux 1989). Besides foraging in shrubs, they also engage in scratching, chasing, and flycatching.

She found that nesting was synchronous with shrub and tree foliage development and flowering. This would ensure that the nest sites would be protected by vegetation and food would be more abundant for producing eggs and nesting. Rainfall was important in nesting success, allowing a second attempt to nest as well as increasing the probability of survival of fledged young. Although Laabs *et al* (1992) felt that appropriate nesting habitat is very limited in the Argus Mountains and likewise the number of pairs and hatchlings also, LaBerteaux and Garlinger (1998) found that in 1998 birds were establishing breeding territories and successfully raising young in canyons with no riparian vegetation. They did find that all breeding territories were found within 700 m of open water.

Although 640 adult towhees were found in the Argus Range in 1998, LaBerteaux and Garlinger (1998) felt that the carrying capacity of towhee habitat may not have been reached. It was difficult to define minimum requirements for breeding towhees because they found in their study a linear distance of 100m between pairs and a minimum patch size of 20 sq. meters within riparian habitat. Weather was undoubtedly a factor in this case, since they reported that winter rainfall was twice normal and June temperatures were below normal. They speculate that in poor rainfall years, when food becomes scarce, food may be a factor in holding down reproduction and the population may return to levels observed in 1992. In 1992, Laabs *et al* (1992) found 76 adult towhees on BLM and CDFG land but did not survey on NAWS and a few sites on BLM.
Nesting by towhees in the Argus Range coincides with phenological events, influenced by rainfall and air temperature and begins from late March to early April and concludes by early August (LaBerteaux 1989). LaBerteaux (1989) found that nest initiation corresponded to the time at which half the perennial plant had foliated and begun to flower and immediately following a noticeable warming trend. She found the first egg laying attempts were generally in mid April with early laying occurring in late March. Second clutches began either after failed attempts or after successfully fledging a brood. By late July or early August breeding activities ended.

The nest themselves are cup shaped structures, located low in a bush or small tree (Udvardy 1977). LaBerteaux (1989) reported towhees gathering nesting material in early March one year but in early April the preceding year. As mentioned above, weather plays a key role in

determining when nesting will begin. It was not clear from the description of activities whether the male helps the female build the nest after initial building begins.

LaBerteaux and Garlinger (1998) found that 1998 nests were in a variety of plants besides the willows (*Salix lasiolepis, S. exigua, S. lasiandra and S. lutea*) most commonly found in. These included allscale (*Atriplex polycarpa*), peach thorn (*Lycium cooperi*), Mono scenecio (*Senecio flaccidus* var. *monoensis*), squaw waterweed (*Baccharis sergiloides*), wash rabbitbrush (*Chrysothamnus paniculatus*), showy goldenbush (*Ericameria linearifolia*), cheesebush (*Hymenoclea salsola*), creosote bush (*Larrea tridentata*), Joshua tree (*Yucca brevifolia*), fourwing saltbush (*Atriplex canescens*), antelope brush (*Purshia tridentata* var. *glandulaosa*), rubber rabbitbrush (*Chrysothamnus nauseosus*), desert olive, green ephedra (*Ephedra viridis*), and bladder sage (*Salazaira mexicana*).

Clutch size was 2 to 4 with 4 being the most common for this species as compared with 3 for the California towhees overall (Bendire 1890, Childs 1968, Harrison 1979). LaBerteaux (1989) found mean clutch sizes for her study of 3.6 and 3.2 for first and second nest attempts in 1985 and 3.8 and 3.5 for 1986. The incubation period for this species was 14 days and the young fledged on the eighth day after hatching. She found that the adults continued to feed their young for at least four weeks after fledging.

Habitat Requirements

The Inyo California towhee breeds only in vegetated canyon bottoms within the Argus Range. From the discussion above, willow (Salix lasiolepus) is used most consistently but a number of drier shrub species are used as well. These latter appear to be used more in high rainfall years when food supply is adequate and more birds are present. The riparian/riparian scrub vegetative communities may function as a core for nesting towhees, whereas the drier vegetation allows suitable nesting habitat when climatic conditions promotes greater reproduction. Surface water may be important as all nesting birds were found within 700 meters of open water.

Population Status

The population of Inyo California towhees has only recently been estimated with some accuracy, and has apparently changed over the past 20 years. Cord and Jehl (1978) estimated the population at a minimum of 58 adults after sampling a number of springs on BLM and NAWS. Laabs *et al* (1992) found a total of76 adults on basically BLM managed springs. LaBerteaux and Garlinger (1998) found a total of 640 adult birds in their surveys of BLM and NAWS in 1998. The reasons for the observed increase in birds may include the implementation of the Great Falls Basin ACEC plan, a higher rainfall year and a more thorough survey for the birds. A major management action improving the vegetative component was the removal of burros and wild horses from much of the range. LaBerteaux and Garlinger (1998) feel that the increase in breeding pairs at some sites may be attributed to this reduction in burros. They feel the increase in breeding pairs may be attributed to the increase in resources resulting from the removal of burros. The restrictions associated with designated Wilderness and NAWS may also be a factor in increased numbers of birds.

Threats Analysis

The U. S. Fish and Wildlife Service listed the degradation or destruction of riparian habitat as the primary threat to the continued existence of the Inyo California towhee (U. S. Fish and Wildlife Service, 1987). Burros, wild horses, livestock, OHV activity, burning, mining, and stream diversions have all been implicated in habitat degradation.

The primary agents of this degradation are feral burros and to a lesser extent feral horses and cattle (U. S. Fish and wildlife Service, 1998, LaBerteaux and Garlinger, 1998, Laabs et al, 1992). The primary impacts are grazing and trampling of grasses, shrubs, forbs and willows. Cord and Jehl (1979) reported that one destructive behavior of the burros is the creation of "burro baths" which can be 10 feet in diameter, destroying all vegetation within this circle. Wild horses and cattle use areas more to the north and west of the primary areas of towhee habitat but may stray into these sites. The exclosure at Christmas Spring has provided protection from burros at this spring.

OHV activity has directly affected habitat, primarily at Austin, Christmas, Mumford, North Ruth Springs, and People (Nadeau) Springs. Exclosures and barriers have been built at Christmas and North Ruth Springs and have reduced impacts at these. Peoples spring was so badly disturbed in 1978 that "only rushes and grasses" grew there (Cord and Jehl, 1978), but the area now (2000) has a thick stand of carrizo (*Phragmites australis*) and BLM has planted willows. Easy access to the springs for OHVs may have resulted in other impacts to towhees. Birds may have been lost through shooting, and nesting attempts may have failed due to noise and movement in close proximity by human activity. These activities includes things like shooting, hunting, camping, hiking, and picnicking. There is a lack of long-term data on the loss of birds from these activities, but the loss of any adults for a population this small could be significant.

Water diversions result both in less water at the spring site for riparian vegetation and disturbance from the road or trail used to maintain the diversion. Diversions have been for human habitation, mining activities, recreation, irrigation, livestock, rural development, and some by California Department of Fish and Game, the Navy, and BLM up through the 1970s to provide water for bighorn sheep. Riparian vegetation was often burned off to facilitate the installation and reduce transpiration.

A major problem with disturbing existing soil and vegetation is that it encourages other species, native and non-native that are not preferred by the towhee. These include the squaw waterweed (*Baccharis sergiloides*) salt cedar (*Tamarix* spp.) and carrizo (*Phragmites australis*).
Although LaBerteaux (1989) found cowbird parasitism of nests in her study, one nest successfully fledged young birds. Another nest did fail with cowbird parasitism. Cowbird parasitism does not appear to be a significant threat in the case of the towhee.

Literature Cited

Cord, B., and J. R. Jehl. 1978. Distribution, status, and ecology of the Inyo brown towhee (*Pipilo fusucus eremophilus*). Hubbs/Sea World research Institute Tech. Rep. 78-114. 31pp

Cord, B., and J. R. Jehl. 1979. Distribution, biology, and status of a relict population of brown towhee (*Pipilo fuscus eremophilus*). Hubbs/Sea World Tech. Rep. 79-118.

Davis, J. 1951. Distribution and variation of the brown towhees. Univ. Calif. Publ. Zool. 52:1-120.

Laabs, D., M. Allaback, and L. LaPre. 1992. Inyo California towhee survey: Great Falls Basin Area of Critical Environmental Concern, Inyo County, California. Contract #B950-C200-18. Prepared for USDI, Bureau of Land Management, Ridgecrest, CA 36pp

LaBerteaux, D. L. 1989. Morphology, foraging behavior, and nesting biology of the Inyo California towhee (*Pipilo crissalis eremophilus*). M. S. Thesis. Northern Arizona Univ., Flagstaff. 114 pp.

LaBerteaux, D. L. and B. H. Garlinger. 1998. Inyo California towhee (*Pipilo crissalis eremophilus*) census in the Argus and Coso Mountain Ranges, Inyo County, California. Contract N62474-98-M-3113. Prepared for: Commanding Officer (83E000D), Naval Air Weapons Station, China Lake, CA 94pp

Udvardy, Miklos 1977. The Audubon Society Field Guide to North American Birds. Alfred A. Knopf. New York, NY. 855pp

U. S. Fish and Wildlife Service. 1998. Recovery plan for the Inyo California towhee. U. S. Fish and Wildlife Service, Portland, Oregon. 32pp.

Van Rossem, A. J. 1935. A new race of brown towhee from the Inyo region of California. Trans. San Diego Soc. Nat. Hist. 8:69-71.

Wilbur, S. R. 1981. Environmental assessment for proposal of threatened status and critical habitat for the Inyo brown towhee (Pipilo fuscus eremophilus). U. S. Fish and Wildlife Service, Department of the Interior, Portland, Oregon.

LEAST BELL'S VIREO
Vireo bellii pusillus

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Management Status: Federal: Endangered
California: Endangered (CDFG, 1998)

General Distribution:

The Least Bell's Vireo is a subspecies of the Bell's Vireo. The Bell's Vireo breeds in the southwestern United States and northwestern Mexico, northward through the Great Plains of the central United States to the southwestern fringe of the Great Lakes (Brown, 1993). This species winters in southern Baja California, on the Pacific slope of mainland Mexico from Sonora south through northern Nicaragua (Brown, 1993), and on the Atlantic slope from Veracruz south to Honduras (AOU, 1998).

Distribution in the West Mojave Planning Area:

The Least Bell's Vireo breeds in southwestern California and adjacent northwestern Baja California (Wilbur, 1980, Garrett and Dunn, 1981); it largely occurs in cismontane southern California, but it does extend into transmontane areas along the western flank of the Anza-Borrego Desert (San Diego County; Unitt, 1984), in the vicinity of Palm Springs (Riverside County; C. McGaugh pers. comm.), at Leona Valley (Los Angeles County; summering, breeding not proven; K.L. Garrett in litt.), and in San Bernardino County at Morongo Valley and along the Mojave River (Patten, 1995; S. J. Myers in litt.). There are breeding records for this subspecies just north of the WMPA in the southern Owens Valley of Inyo County and it regularly breeds just northwest of the WMPA at the South Fork of the Kern River Preserve (Kern County; M.T. Heindel pers. comm.). Elsewhere within the WMPA, the Bell's Vireo is an occasional migrant.

The eastern limit of the range of the Least Bell's Vireo in California is contentious, in that the ranges of the Least Bell's Vireo and the Arizona Bell's Vireo (*V. b. arizonae*) in California are based more on supposition than on direct evidence. It is generally believed that the Arizona Bell's Vireo is confined to the Lower Colorado River Valley, whereas the Least Bell's Vireo occurs in cismontane southern California and on the western edge of the deserts, extending north up the Mojave River into the Owens Valley, and eastward into Death Valley National Park, along the Amargosa River (Inyo County) and at Fort Piute in the East Mojave Desert (Goldwasser, 1978; Goldwasser et al., 1980; Garrett and Dunn, 1981; Regional Environmental Consultants, 1986; Franzreb, 1987a, 1987b, 1989; Brown, 1993; Small, 1994). Considering the biogeography of similarly-distributed cismontane and transmontane species pairs (Grinnell and Miller, 1944; Garrett and Dunn, 1981), such as California (*Callipepla californica*) and Gambel's quail (*C. gambelii*), Nuttall's (*Picoides nuttallii*) and Ladder-backed woodpeckers (*P. scalaris*), and California (*Toxostoma redivivum*) and Crissal thrashers (*T. crissale*), it is probable that Arizona Bell's Vireo is in fact the subspecies occurring in the East Mojave Desert (including Fort Piute and the Amargosa River) northward through Death Valley, and this subspecies may occasionally occur in the extreme eastern portion of the WMPA. Data to support this contention is provided

by the observations that spring birds in Death Valley and at Fort Piute are more brightly-colored (i.e., they have a greener back and yellower flanks), and thus more like *V. b. arizonae*, than are birds along the Mojave River or at Morongo Valley, which are grayer and thus more like *V. b. pusillus* (M.A. Patten pers. obs.). Also, there is a late February specimen of the Arizona Bell's Vireo taken in the Anza-Borrego Desert (Unitt, 1985; Phillips, 1991), showing that this subspecies can occur well west of its described range.

Natural History:

The Bell's Vireo is a conspicuous member of riparian habitats where it occurs because of its lively, complex song. However, given its penchant for dense vegetation, it is far more often heard than seen. Its song belies its rather subtle, drab plumage: this small passerine is basically olive-gray (with emphasis on the latter in *V. b. pusillus*) above with a single faint wingbar, a thick bill, thin but distinct "spectacles," and a long tail that is flipped expressively from side-to-side. In overall plumage and behavior, this species most closely resembles a Gray Vireo (*V. vicinor*), a species with a very different song that occurs in pinyon-juniper and redshank-chaparral associations.

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 (Ridgway, 1904; Phillips, 1991). Specimens of Bell's Vireo from eastern California (e.g., Death Valley) were identified as Least Bell's Vireo (Ridgway, 1904; Grinnell, 1923). However, these specimens were taken in spring (Fisher, 1893; Grinnell, 1923), when the plumage of a Bell's Vireo can be quite worn (Unitt, 1985), thus confounding subspecific identification. An examination of specimens at the Natural History Museum of Los Angeles County, the Museum of Vertebrate Zoology, University of California, Berkeley, and elsewhere indicates that evidence for defining the eastern extent of the range of Least Bell's Vireo is weak (M.A. Patten unpubl. data; A.R. Phillips in litt.; N.K. Johnson in litt.). Seven external characters have proven useful in distinguishing these subspecies (Ridgway, 1904; Phillips, 1991): exposed culmen length, wing chord, tail length, rump color, flank color, mantle color, and undertail covert color. These subspecies may also have slight differences in song (L.R. Hays pers. comm.), and they apparently differ in habitat choice (see below).

The Least Bell's Vireo arrives on its breeding grounds in mid-March (Brown, 1993), with males arriving slightly before females (Nolan, 1960; Barlow, 1962). This vireo shows a high degree of nest site tenacity (Greaves, 1987). Most individuals depart by September (Brown, 1993), although some individuals remain on their breeding grounds into late November (Rosenberg et al., 1991). This subspecies winters primarily in Baja California, with occasional individuals remaining through the winter in cismontane southern California (there is also a record for the Sonoran Desert at this season, although the subspecies in not known). Nesting takes place from early April through the end of July, with two broods usually being attempted. Nests are suspended from forks in dense bushes or small trees; over 60 species of plants have been used by Bell's Vireos for nest sites (Brown, 1993), but the Least Bell's Vireo predominantly uses willows (*Salix* spp.). The Bell's Vireo feeds almost exclusively on arthropods, with insects and spiders comprising over 99% of their diet (Brown, 1993).

Habitat Requirements:

The Bell's Vireo occurs in riparian habitats. The Least Bell's Vireo typically breeds in willow riparian forest supporting a dense, shrubby understory of mulefat (*Baccharis salicifolius*) and other mesic species (Goldwasser, 1981; Gray and Greaves, 1984; Franzreb, 1989). Oak woodland with a willow riparian understory is also used in some areas (Gray and Greaves, 1984), and individuals sometimes enter adjacent chaparral, coastal sage scrub, or desert scrub habitats to forage (Brown 1993; L.R. Hays pers. comm.). The Least Bell's Vireo and the Arizona Bell's Vireo probably have different habitat requirements. Least Bell's Vireos in cismontane California occur in riparian forest dominated by willows (Goldwasser, 1981; Gray and Greaves, 1984), whereas Arizona Bell's Vireos tend to occur in riparian woodland dominated by mesquite (*Prosopis* sp.; Rosenberg et al., 1991; Brown, 1993; L.R. Hays pers. comm.; M.A. Patten pers. obs.). Similar habitats are used during the winter months. Although the Arizona Bell's Vireo will use non-native salt cedar (*Tamarix* spp.) in parts of its range (Brown, 1993), the Least Bell's Vireo avoids riparian areas dominated by these plants.

Population Status:

The most recent published population censuses for the Least Bell's Vireo indicated that this subspecies was critically endangered, with a total population estimated to be only a few hundred pairs (Goldwasser, 1978; Goldwasser et al., 1980; Wilbur 1980). Primarily as a result of extensive efforts to restore riparian habitat and to remove Brown-headed Cowbirds (*Molothrus ater*) from breeding areas, populations of the Least Bell's Vireo have increased dramatically at several locations in cismontane southern California (L.R. Hays pers. comm.; Brown, 1993), particularly at the two core population sites of the Santa Margarita River, San Diego County (±400 pairs) and the Prado Basin, Riverside County (±150 pairs). The total population breeding within the WMPA is much smaller, with only a 1-3 pairs at Morongo Valley and 1-2 pairs along the Mojave River (M.A. Patten pers. obs.; S.J. Myers in litt.).

Threats Analysis:

Loss of habitat, combined with increased brood parasite pressure from Brown-headed Cowbirds (Goldwasser, 1978; Beezley and Rieger, 1987), has led to the two breeding subspecies in California, Least Bell's Vireo and Arizona Bell's Vireo, being listed as Endangered by the State of California and, for *V. b. pusillus*, by the federal government (Franzreb, 1989; Franzreb et al., 1992; Salata, 1992; U.S. Fish and Wildlife Service, 1992). Losses of habitat similarly have affected the Bell's Vireo throughout its range (Brown, 1993). Habitat loss within the WMPA probably most often results from flood control efforts (e.g., stream channelization or vegetation clearing along the Mojave River). Conversion of occupied habitat to parks or golf courses is generally less of a problem, if only because it occurs more rarely.

Although Brown-headed Cowbirds are perhaps less prevalent in transmontane sites occupied by this vireo, cowbirds nevertheless can have a huge negative impact on the breeding success of the Least Bell's Vireo (Goldwasser, 1978; Beezley and Rieger, 1987; Clark, 1988), and they have increased dramatically in California in the past century (Laymon, 1987; Rothstein, 1994). Populations of the Least Bell's Vireo have responded dramatically to efforts to remove cowbirds from breeding areas (see above), underscoring the severe impact of brood parasitism. The recent, albeit slow, northwesterly range expansion of the Bronzed Cowbird (*M. aeneus*), could present this vireo with yet another brood parasite (M.A. Patten unpubl. data).

Biological Standards:

Much effort has been expended to maintain minimum viable populations of the Least Bell's Vireo at certain core population sites in cismontane southern California (e.g., the Santa Margarita River, the Prado Basin, and the Santa Ynez drainage in Santa Barbara County). Recovery efforts have generally been extremely successful; prospects for the long-term survival of the Least Bell's Vireo are much better now than they were 15-20 years ago when recovery was initiated (L.R. Hays pers. comm.). However, even historically this vireo has occurred only in low numbers within the WMPA, and in few locations, so management of vireo habitat within its boundary likely will not have a substantial effect on the subspecies as a whole. Nevertheless, conservation and sustainable management of the small breeding populations at Morongo Valley and along the Mojave River could be accomplished through (1) limiting the destruction of riparian habitat in these areas, including less invasive flood control management activities, (2) eradication of non-native salt cedar, giant reed (*Arundo donax*), and Russian olive (*Elaeagnus angustifolius*) from sites occupied by the vireo, with willows and mulefat planted in their place, (3) extensive trapping and removal of Brown-headed Cowbirds from breeding areas, and (4) restoration of riparian habitats, because cowbird parasitism is reduced woodland habitats with lower edge to area ratios (Laymon 1987). An additional measures could be the limiting access of both cattle and humans (hikers and off-highway vehicle users) to prime nesting areas.

Literature Cited:

American Ornithologists' Union (AOU). 1998. Check-List of North American Birds, 7th ed. Amer. Ornithol. Union, Washington, D.C.

Barlow, J.C. 1962. Natural history of the Bell vireo, *Vireo bellii* Audubon. Univ. Kansas Publ. Mus. Nat. Hist. 12:241-296.

Beezley, J.A., and J.P. Rieger. 1987. Least Bell's vireo management by cowbird trapping. West. Birds 18:55-61.

Brown, B.T. 1993. Bell's Vireo (*Vireo bellii*). No. 35, *In:* A.F. Poole and F. B. Gill, (eds.), Birds of North America. Acad. Nat. Sci. Philadelphia and Am. Ornithol. Union, Washington, D.C.

Clark, C.F. 1988. Observations on the nesting success of Bell's vireo in southern Arizona. West. Birds 19:117-120.

Fisher, A.K. 1893. Report on the ornithology of the Death Valley expedition of 1891, comprising notes on the birds observed in southern California, southern Nevada, and parts of Arizona and Utah. N. Am. Fauna 7.

Franzreb, K.E. 1987a. Least Bell's vireo recovery plan. U.S. Fish Wildl. Serv., Portland. Franzreb, K. E. 1987b. Endangered status and strategies for conservation of the least Bell's vireo (*Vireo bellii pusillus*) in California. West. Birds 18:43-49.

Franzreb, K.E. 1989. Ecology and conservation of the endangered Least Bell's Vireo. U.S. Fish Wildl. Serv. Biol. Rep. 89.

Franzreb, K.E., L. Salata, L. Hays, K. Kramer, and B. Ruesink. 1992. Revised proposed determination of critical habitat for the least Bell's vireo (*Vireo bellii pusillus*). Fed. Register 57:34892-34908.

Garrett, K., and J. Dunn. 1981. Birds of Southern California: Status and Distribution. Los Angeles Audubon Soc., Los Angeles, California

Goldwasser, S. 1978. Distribution, reproductive success and impact of nest parasitism by Brown-headed Cowbirds on Least Bell's Vireo. Proj. rep. W-54-R-10, Calif. Dept. Fish Game, Sacramento, California.

Goldwasser, S. 1981. Habitat requirements of the least Bell's Vireo. Proj. rep. E-W-4, Calif. Dept. Fish Game, Sacramento, California.

Goldwasser, S., D. Gaines, and S. Wilbur. 1980. The least Bell's vireo in California: A de facto endangered race. Amer. Birds 34:742-745.

Gray, M.V., and J.M. Greaves. 1984. Riparian forest as habitat for the Least Bell's Vireo. pp. 605-611, *In:* R.E. Warner and K. M. Hendrix, (eds.), California riparian systems: Ecology, conservation, and productive management. Univ. California Press, Berkeley, California.

Greaves, J.M. 1987. Nest-site tenacity of Least Bell's Vireos. West. Birds 18:50-54.

Grinnell, J. 1923. Observation upon the bird life of Death Valley. Proc. Calif. Acad. Sci. 8:43-109.

Grinnell, J., and A.H. Miller. 1944. The distribution of the birds of California. Pac. Coast Avifauna 27.

Laymon, S.A. 1987. Brown-headed cowbirds in California: Historical perspectives and management opportunities in riparian habitats. West. Birds 18:63-70.

Nolan, V. 1960. Breeding behavior of the Bell Vireo in southern Indiana. Condor 62:225-240.

Patten, M.A. 1995. Checklist of the birds of Morongo Valley. Bureau Land Manage., Morongo Valley, California.

Phillips, A.R. 1991. The known birds of North and Middle America, pt. II. Allan R. Phillips, Denver, Colorado.

Regional Environmental Consultants. 1986. Draft Comprehensive Species Management Plan for Least Bell's Vireo. Unpubl. rep., San Diego Assoc. Govern., San Diego, California.

Ridgway, R. 1904. The birds of North and Middle America, pt. 3. U.S. Natl. Mus. Bull. 50.

Rosenberg, K.V., R.D. Ohmart, W.C. Hunter, and B.W. Anderson. 1991. Birds of the Lower Colorado River Valley. Univ. Ariz. Press, Tucson, Arizona.

Rothstein, S.I. 1994. The cowbird's invasion of the far west: History, causes and consequences experienced by host species. pp. 301-315 *In:* J.R. Jehl, Jr., and N.K. Johnson, (eds.), A century of avifaunal change in western North America. Stud. Avian Biol. 15.

Salata, L. 1992. Notice of public hearings on revised proposal to designate critical habitat for the Least Bell's Vireo. Fed. Register 57:43685-43686.

Small, A. 1994. California Birds: Their Status and Distribution. Ibis Publ., Vista, California.

United States Fish and Wildlife Service. 1992. Least Bell's vireo survey guidelines. U.S. Fish Wildl. Serv., Laguna Niguel, California.

Unitt, P. 1984. The birds of San Diego County. San Diego Soc. Nat. Hist. Memoir 13.

Unitt, P. 1985. Plumage wear in *Vireo bellii*. West. Birds 16:189-190.

Wilbur, S.R. 1980. The Least Bell's Vireo in Baja California, Mexico. West. Birds 11:129-133.

LE CONTE'S THRASHER
Toxostoma lecontei

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Management Status: Federal: BLM Sensitive
California: Species of Special Concern (CDFG, 1998)

General Distribution:

The Le Conte's Thrasher is a non-migratory bird that is endemic to four southwestern states and northwestern Mexico. Although widespread, they are uncommon to rare residents in desert scrub habitats. Two subspecies are recognized (AOU, 1957):

(1) The nominate *T. l. lecontei* occurs in California as far west as near Julian, Palm Springs, Banning, Antelope Valley, Walker Pass, and the San Joaquin Valley. To the north it ranges as far as the Owens Valley, Panamint Valley, and Death Valley. It ranges across southern Nevada to the Beaver Dam Mountains in the southwestern corner of Utah and southeastward to central and southern Arizona. It occurs south into Mexico on the west coast of Sonora to Port Lobos and on the east coast of Baja California to San Felipe Bay (Bent, 1948; AOU, 1998). Recent studies by Zink et al. (1997) conclude that the isolated population in the Taft-Maricopa area of the San Joaquin Valley is *T. l. lecontei*, and not a distinct subspecies (*T. l. macmillinorum*), as was suspected by Phillips (1965) and Browning (1990).

(2) *T. l. arenicola* is an isolated population on the west central coast of Baja California between latitudes 26º and 29º (Bent, 1948). It differs from *T. l. lecontei* by its darker coloration, shorter tail, and longer wing. Recent mitochondrial DNA studies indicate that this taxon may merit full species status (Zink et al., 1997).

Distribution in the West Mojave Planning Area:

California contains a major portion of the range of the Le Conte's Thrasher, and the WMPA holds a large percentage of the California range. They are found in desert scrub throughout the WMPA. They occur in the Antelope Valley north to eastern Kern County, including California City, Ridgecrest and the Naval Air Weapons Station at China Lake. They also occur north into the Owens and Panamint valleys. In the southern portion of the WMPA, Le Conte's Thrashers occur widely throughout Joshua Tree National Park, and west along the northern base of the San Bernardino and San Gabriel mountains.

Natural History:

The Le Conte's Thrasher is pale gray-brown on the upperparts and pale buff on the underparts. The long tail is dark brown to blackish, and contrasts with the pale body. The undertail coverts are buffy. The wings are short and rounded, typical of sedentary, terrestrial birds. The sexes are similar, weighing 55-75 g (19-26 ozs.) and are 10-11 in. (25.4-28 cm) in length (Sheppard, 1996; Pyle, 1997).

Within the range of the Le Conte's Thrasher in California, two other thrashers have long decurved or "sickle" bills, the California Thrasher (*T. redivivum*) and Crissal Thrasher (*T. crissale*). These three species share other traits: long tails and lack of breast spotting. While all three spend a great deal of time on the ground, the Le Conte's Thrasher is probably the most

terrestrial of the group, and its behavior is suggestive of a miniature roadrunner (Bent, 1948). Le Conte's Thrashers have pale-colored backs that contrast with their darker tails, while the backs and tails of the California and Crissal thrashers are dark brown. Le Conte's Thrasher has buffy undertail coverts; while California Thrasher is darker cinnamon brown, and Crissal Thrasher is dark chestnut brown. A fourth "sickle-billed" thrasher, the Curve-billed Thrasher (*T. curvirostre*), is sympatric with the Le Conte's Thrasher in southwestern Arizona and northwestern Mexico.

The habitat of these thrashers usually differs. The Le Conte's Thrasher prefers open desert with scattered shrubs and sandy and/or alkaline soil (Grinnell and Miller, 1944). The Crissal Thrasher takes cover in dense vegetation: mesquite thickets, canyon hillsides and along edges of irrigated fields. The California Thrasher prefers chaparral, brush, thickets, or riparian woodlands (Small, 1994). California and Le Conte's thrashers share range and breeding habitat in the higher deserts, especially where California juniper (*Juniperus californica*) occurs, such as Lost Horse Valley in Joshua Tree National Park (B.G. Prescott, pers. obs). Most of the area of overlap of California and Le Conte's thrashers occurs along the western edge of the Colorado and Mojave deserts; the California Thrasher does not occur broadly across these deserts, as does Le Conte's. An exception is along the Mojave River, where the California Thrasher occurs in riparian habitats north to at least Helendale (S.J. Myers, pers. comm.). Other thrashers that might be found in the California range of the Le Conte's Thrasher are Sage Thrasher (*Oreoscoptes montanus*) and Bendire's Thrasher (*Toxostoma bendirei*). Both are smaller, and have breast spots and pale eyes.

The Le Conte's Thrasher is monogamous, and both sexes share in building the nest and caring for the young. The nest typically is placed in a cactus, thorny shrub, or small tree, chosen to offer protection from predators and sun (Sheppard, 1996). The nest is a bulky mass of twigs and sticks and is lined with plant down, leaves, flowers, and sometimes human-made materials (Sheppard, 1996). It is typically placed about 2-4 ft (0.6-1.2 m) above ground but can be as high as 8 ft. (2.4 m) in a small tree, such as a smoke tree (*Psorothamnus spinosus*). A pair usually nests in the same area year after year and over a period of several years. Territories of 8.5-20 acres (3.5-8 ha) may be occupied (Sheppard, 1996). The territories of nesting pairs may be adjacent, especially in years when the food supply is adequate. On several occasions, active nests have been found within 200 yd. (180 m) of each other at Indian Cove and Panorama Heights in Joshua Tree National Park (B.G. Prescott, unpub. data). Although pairs are territorial during the nesting season, conflicts between adjacent pairs are rarely seen (Sheppard, 1996). The Le Conte's Thrasher usually does not occur in areas of monotypic creosote bush scrub, as it provides little cover or nesting sites. Creosote bush (*Larrea tridentata*) does not provide the structure needed for nest placement (B.G. Prescott, pers. obs.; S.J. Myers, pers. comm.).

The eggs are bluish green with a varying amount of brownish spotting, usually on the larger end. One egg is laid daily and incubation starts after the last egg is laid. While incubating, the female is often fed by the male, who provides most of the food to the young during the early brooding stage. The male assists in incubation. At night, the female is more likely to incubate. In most instances, if the nest is destroyed or preyed upon, the pair will begin a new nest. The incubation time is about 15 days, and the young fledge about 15 days later. The fledglings are able to run on the ground, but stay close to the nest for the first day or two. They begin to fly short distances about a week after leaving the nest. The young are fed insects, spiders, scorpions, pseudoscorpions, and small lizards (Sheppard, 1996).

Egg dates span nearly half the year, from 22 January to 24 June (Bent, 1948). The clutch size is from 2-5, and is commonly 3-4. When there is heavier than normal rainfall, food supply increases and 4-5 eggs may be laid. Nests with only 2 eggs have been reported, but they are not

common and in some cases may be the result of predation or some other disturbance (B.G. Prescott, pers. obs.). Sheppard (1996) reported 1-3 clutches per year at Maricopa, California, but 1 or 2 clutches is probably more common in the Mojave Desert (B.G. Prescott, pers. obs.). This may vary by location, food availability, and elevation. Birds that nest at elevations of 4200-4600 ft.(1280-1380 m), as at Lost Horse and Queen valleys of Joshua Tree National Park, usually do not nest until early to mid-May and thus have a shorter nesting season.

Other species that nest in the Le Conte's Thrasher's range may compete for food or nest sites. Some of the more common include Cactus Wren (*Campylorhynchus brunneicapillus*), Northern Mockingbird (*Mimus polyglottos*), House Finch (*Carpodacus mexicanus*), Black-throated Sparrow (*Amphispiza bilineata*), Loggerhead Shrike (*Lanius ludovicianus*), and Greater Roadrunner (*Geococcyx californianus*). Different species may share the same nesting shrub or tree. In the Pinto Basin of Joshua Tree National Park, an active Le Conte's Thrasher nest was found just 5 ft. (1.5 m) from an active Loggerhead Shrike nest in a smoke tree (B.G. Prescott, unpub. data).

Le Conte's Thrashers are very rarely parasitized be cowbirds. At least one case of parasitism by a Bronzed Cowbird (*Molothrus aeneus*), but none by the Brown-headed Cowbird (*Molothrus ater*), has been recorded (Friedmann 1963). In one experiment, 11 Brown-headed Cowbird eggs were placed in Le Conte's Thrasher nests in Maricopa, California, and were accepted (Sheppard, 1996).

Le Conte's Thrashers forage for much of their food by digging and probing in the soil. Other items are gleaned from vegetation or pursued on the ground. Their diet consists of arthropods, small lizards, small snakes, and seeds and fruits (Sheppard, 1996).

Habitat Requirements:

The Le Conte's Thrasher inhabits desert flats, washes and alluvial fans with sandy and/or alkaline soil and scattered shrubs (Grinnell and Miller, 1944). The thrashers are rarely found on rocky soil, hillsides, in riparian vegetation or on agricultural lands. They are not found in urban or dense residential areas but may be found near scattered rural residences that abut suitable habitat. Access to water is not a factor since they obtain moisture from their diet. The plant species used for nesting varies with availability. Where it occurs, silver cholla (*Opuntia echinocarpa*) is the preferred nesting plant. It is not always the tallest or largest plant that is used, but one with the proper branching structure that provides the best protection from sun and predation. In the southwestern end of the San Joaquin Valley, in the Antelope Valley, at Harper Lake, and in portions of the Victor/Lucerne valleys, the only suitable plant for nesting is allscale (*Atriplex polycarpa*). Other species of saltbush found in the Le Conte's Thrashers range, such as shadscale (*A. confertifolia*), quailbush (*A. lentiformis*), desert holly (*A. hymenolytra*) and four-winged saltbush (*A. canescens*) may be occasionally used for nesting. Other plants used are pencil cholla (*Opuntia ramosissima*), smoke tree, blue palo verde (*Cercidium floridum*), ironwood (*Olneya tesota*), honey mesquite (*Prosopis glaudulosa var. torreyana*), and Mojave yucca (*Yucca schidigera*). To a lesser degree jojoba (*Simmondsia chinensis*) and California juniper have been found as nest plants (B.G. Prescott, pers. obs.).

Population Status:

The Le Conte's Thrasher has a relatively small worldwide range and its numbers are low for a passerine (Remsen, 1978). The species has declined in many areas of its range due to urban and agricultural development (Laudenslayer, et al., 1992). In California, notable areas of decline

include the San Joaquin, Coachella and Imperial valleys. Near Phoenix, Arizona, its range has been decreasing due to urban, residential and agricultural development (Phillips et al., 1964). In the WMPA, as cities and towns in the Antelope Valley, Mojave River Valley and the Morongo Basin continue to increase in size, the thrashers lose more and more habitat (B.G. Prescott, pers. obs.; S.J. Myers, pers. comm.). In undisturbed areas of its range the Le Conte's Thrasher populations appear to be stable. Population density estimates range from 6.4 pairs to less than 1 pair /mile² (2.5-0.4/km²) (Sheppard 1996). Le Conte's Thrasher is absent from some areas of seemingly suitable habitat (Remsen, 1978).

Threats Analysis:

Loss of habitat throughout its range is the main threat to the Le Conte's Thrasher. Commercial, industrial, residential, and agricultural development all pose threats to the species. To a lesser degree, recreational activities may impact thrashers. In 1996, Sheppard reported finding a thrasher near Maricopa (San Joaquin Valley) that had been shot. Off-road vehicle use, especially in the nesting season, could be detrimental to the birds (Remsen, 1978). Fire has become a threat to habitats in the California deserts since the relatively recent invasion of non-native grasses. Formerly, the spacing of the desert scrub was sufficient to limit the spread of wildfires in the desert (J.W. Cornett, pers. comm.).

. Due to limited access, it is hard to assess the impact of military operations on Le Conte's Thrasher at various bases in the WMPA. Since approximately 27% of the WMPA is military land, more study is needed to determine the effects of military activities on Le Conte's Thrashers. Le Conte's Thrashers are widespread in Joshua Tree National Park, and both the species and its habitat are protected in perpetuity. However, disturbances at park boundaries may impact Le Conte's Thrashers and other wildlife in the park. The proposed Eagle Mountain landfill, southeast of the WMPA, is projected to be one of the largest landfills in the world. The impacts to wildlife, including Le Conte's Thrasher, are uncertain. Other mega-landfills and nuclear waste sites have been proposed in and around the Mojave Desert. This use of the desert area would certainly impact all wildlife, including the Le Conte's Thrasher.

Biological Standards:

Measures to ensure the viability of Le Conte's Thrasher populations in the WMPA involve land use policies. Populations in the WMPA will be sustained only through habitat conservation efforts. Activities that destroy nesting and/or foraging habitat should be eliminated. This includes off-road racing, especially along washes, as the Le Conte's Thrasher prefers this kind of habitat for nesting. Other manageable activities include shooting, mining, and cactus poaching. As urbanization continues in the Antelope and Victor valleys and the Morongo Basin, it is expected that the range of the species will continue to decrease. Large tracts, unfragmented by urban development are needed to maintain viable populations of Le Conte's Thrashers. It may be possible to identify important Le Conte's Thrasher habitat areas and, by land exchange and consolidation, provide for sustainable populations.

Literature Cited:

American Ornithologists' Union. 1957. Checklist of North American birds, 5th ed. American Ornithologists' Union, Baltimore, Maryland.

American Ornithologists' Union. 1998. Checklist of North American birds, 7th ed. American Ornithologists' Union, Baltimore, Maryland.

Bent, A.C. 1948. Life histories of North American nuthatches, wrens, thrashers, and their allies. Bull. U.S. Natl. Mus. No.195.

Browning, M.R. 1990. Taxa of North American birds described from 1957 to 1987. Proc. Bio. Soc. Wash. 103:432-451.

California Department of Fish and Game, Natural Diversity Data Base. 1998. Special Animals. Biannual publication, Mimeo., 44 pp.

Grinnell, J. and A. Miller. 1944. The distribution of the birds of California. Reprinted by Artemisia Press, LeeVining, California.

Laudenslayer, W.F., Jr., A.S. England, S. Fitton, and L. Saslaw 1992. The *Toxostoma* thrashers of California: Species at risk? Trans. West. Sect. Wildlife Soc. 28:22-29.

Phillips, A. R. 1965. Notas sistematicas sobre aves Mexicanas 3. — Revista de la Sociedad Mexicanas de Historia Natural 25:217-242.

Phillips, A.R., J. Marshall, and G. Monson. 1964. The birds of Arizona. The Univ. of Arizona Press, Tucson, Arizona.

Pyle, P. 1997. Identification guide to North American birds. Part 1, Columbidae to Ploceidae. Slate Creek Press, Bolinas, California.

Remsen, J.V., Jr. 1978. Bird species of special concern in California. Calif. Dept. Fish and Game, Wildlife Mgt. Branch Admin. Rep. 78-1.

Sheppard, J.M. 1996. Le Conte's Thrasher (*Toxostoma lecontei*). *In* A. Poole and F. Gill (eds.), The Birds of North America, No. 230. The Academy of Natural Sciences, Philadelphia, Pennsylvania, and The American Ornithologists' Union, Washington, D.C.

Small, A. 1994. California birds: Their status and distribution. Ibis Publishing Co., Vista, California.

USDI, Bureau of Land Management, 1997. California Desert District Resource Area files.

Zink, R.M., R.C. Blackwell, and O. Rojas-Soto. 1997. Species limits in the Le Conte's thrasher Condor 99:132-138.

LOGGERHEAD SHRIKE
Lanius ludovicianus

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Management Status: Federal: USFWS Species of Concern
California: Species of Special Concern (CDFG, 1998)

General Distribution:

Loggerhead Shrikes are widely distributed across North America, from Alberta south to the Isthmus of Tehuantepec in southern Mexico, absent heavily forested areas in the Pacific Northwest and Canada, as well as much of the midwestern and northeastern United States (Yosef, 1996). The species departs northern areas in winter, with individuals remaining as far north as northern Nevada in the western United States. In the deserts of southern California there is a modest influx in winter, with breeding birds probably remaining resident (Grinnell and Miller, 1944).

Distribution in the West Mojave Planning Area:

This shrike is one of the most widely distributed vertebrates in the WMPA, although it is not truly common anywhere in the deserts. As the records compiled for this report suggest, the species is to be expected virtually anywhere in the WMPA except the centers of the largest and most barren dry lake beds. Distribution in the WMPA may be limited primarily by the presence of adequate nesting sites and foraging posts, and the degree and nature of local habitat degradation or augmentation by man. In some areas, adequately dense nesting substrate may be a limiting factor, as the species is well-known to use artificial plantings at ranchyards and roadsides.

Natural History:

Loggerhead Shrike is relatively well-studied among North American birds (Yosef, 1996), due to its wide distribution, interesting habits, and conspicuous nature. Studies of behavior and energetics are numerous, however most research in recent decades appears to have been conducted in the eastern United States, where population declines have been most severe (Yosef, 1996). The few published studies of the species addressing desert populations include Miller (1931); Reid and Fulbright (1981); Reynolds (1979); Peterjohn and Sauer (1995); Sauer et al. (1995); and Woods (1994, 1995a, 1995b); none of these include field studies in or close to the WMPA. Information on aspects of the species' biology as a whole has been compiled in Yosef (1996). Information below is from Yosef (1996) except as cited otherwise.

Adult Loggerhead Shrikes average about 1.66 ounces (47.5 g) in mass and 8.27 in. (210 mm) in total length. There are no thorough studies of longevity or survivorship, as efforts have been stymied by a lack of quantification of emigration and immigration rates.

This species is generally monogamous, with minor exceptions (Verner and Wilson, 1969; Haas and Sloane, 1989; Yosef, 1996). Egg-laying extends from early February through June, with a peak in April (Kiff and Irwin, 1987; Yosef, 1996). Nests are generally well-hidden in taller shrubs or low in trees, and often at a break in the landscape, such as at the base of slopes or edge

of a woodland or clump of trees (Bent, 1950; Yosef, 1996; pers. obs.). Mean nest height in several studies (see Yosef, 1996) ranged from 31-91 in. (0.8-2.3 m) above ground and probably reflects in part the local availability of plants of adequate density. Clutch size is typically 5 or 6 eggs (mode 6; mean 5.4), based on data sets from several large samples over a large area.

Limited published data appears to be available on when young become independent from adults, and the age of dispersal. Scott and Morrison (1990) noted that parental care on San Clemente Island lasted 50 days (SD 11.9 days; n=4), and young began foraging at approximately 30 days after hatching. In two mainland studies, the ability to kill vertebrate prey developed gradually, averaging 40 (Smith, 1972) or 41 days (Busbee, 1976). Banded juveniles are rarely recaptured in later seasons (Collister, 1994 cited in Yosef, 1996), and adult females appear to show much lower nest site fidelity than do adult males (Haas and Sloan, 1989).

Loggerhead Shrikes are opportunistic and generalist in diet, with prey items including primarily arthropods, and as available, a variety of small to medium-sized vertebrates (Miller, 1931; Yosef, 1992; Chapman and Castro, 1972; Reid and Fulbright, 1981; Scott and Morrison, 1995; Yosef, 1996). The majority of the diet in all or nearly all areas is invertebrates, but individual prey can also potentially exceed the shrike in mass (Balda, 1965). The importance of vertebrates in the diet in desert areas is not well-established, but may be critical at some seasons (e.g., Scott and Morrison, 1990, on San Clemente Island, California). The species is known to occasionally forage on carrion, including road kills (Anderson, 1976; Hayes and Baker, 1987).

Habitat Requirements:

Grinnell and Miller (1944) state of this species that, "chief requisites are open terrain with well spaced lookout posts, at least two feet high, from which moving animals -- insects or small vertebrates -- may be seen below on the bare ground or in short or sparse grass. Densely timbered areas and chaparral are avoided." Garrett and Dunn (1981) add that, "Loggerhead Shrikes are very widespread in open and semi-open habitats throughout the lowlands of the region. Often only very limited taller vegetation is required. There is some expansion into open agricultural areas in winter." The same habitat types are occupied all year.

Brooks and Temple (1990) and Yosef and Grubb (1994) have performed important habitat analyses. Both found that suitable hunting perches were very important. The latter study experimentally added wooden posts averaging 53 in. (135 cm) tall to shrike territories. Productivity rose and territory size decreased for those with perches added, compared with controls. The authors concluded that, "Areas to be managed as prime [Loggerhead] shrike habitat should include not only an appropriate prey base and nest sites, but also an abundance of hunting perches."

As the species is a food generalist (see Natural History), and many potential prey items (e.g., small lizards) are common and widespread in the WMPA, the prey base per se does not appear likely to be a limiting factor in most areas, although competition with certain other species that are increasing because of man may be a problem in desert areas (see Threats Analysis). There is anecdotal evidence that sufficiently dense nest sites at appropriate heights may limit the species' occurrence in desert areas during breeding (Yosef, 1996; pers. obs.), in contrast to more mesic areas, where the availability of fallow meadows and other open ground for foraging may be a limiting factor.

Population Status:

This species has declined precipitously in portions of eastern North America, and Breeding Bird Survey data indicate a significant negative trend in much of the west, including Mojave Desert areas (Peterjohn and Sauer, 1995; Sauer et al., 1995), but there is no specific information on total population size or trends within the WMPA. Based on existing information (e.g., Miller, 1931) along with observations gathered for this report, it appears likely that there is a slight seasonal increase in the total number in the WMPA in winter, compared with summer. Temple (1995) hypothesized that most shrike populations are limited outside the breeding season, and if so, conditions in the WMPA may be an important limiting factor for populations breeding elsewhere and wintering in or migrating through the WMPA.

Threats Analysis:

Yosef (1996) notes that, "the Loggerhead Shrike is one of the few North American passerines whose populations have declined continentwide in recent decades. Changes in human land-use practices, the spraying of biocides, and competition with species that are more tolerant of human-induced changes appear to be major factors contributing to this decline." Yosef (1996) mentions American Kestrel (*Falco sparverius*) and European Starling (*Sturnus vulgaris*) as potential competitors for food. Common Raven (*Corvus corax*) and the nonnative Old World rats (*Rattus* spp.) and House Mouse (*Mus musculus*) may also be potential food competitors in the WMPA, especially near dwellings. Interference competition is a potential issue with starlings, kestrels and other species, which harass or are harassed by shrikes.

The role of biocides has not been fully elucidated. Anderson and Duzan (1978) found thinning of eggshells in shrike eggs from southern Illinois, while Morrison (1979) found none in shrike eggs from California and Florida, however for both studies, sample size was very small (Klaas et al., 1974). It remains unclear how such potential eggshell changes, and various tissue levels of biocides, affect Loggerhead Shrikes.

Based on studies summarized in Yosef (1996), the primary causes of direct mortality appear to be: (1) inclement weather (mainly affecting nestlings and fledglings); (2) predation (many known predators, including raptors, native predatory mammals, and feral cats (*Felis cattus*); low nests and hunting posts, and frequent foraging bouts to the ground probably heighten their vulnerability, as does association with habitat edges, a trait in common with many predators); (3) and collisions with vehicles and other man-made objects (the species often forages at road edges). There is no evidence that shooting and other direct persecution are significant mortality factors in desert areas. Though the use of prominent perches may make this species vulnerable, the problem may be impossible to measure with any precision.

Other species of predators and generalists, such as American Kestrel and Common Raven, appear to have benefited from human alteration of the landscape in desert areas (Sauer et al., 1997; Boarman and Berry, 1995). Because they are known to take similar foods as do shrikes as well as taking fledgling songbirds, and ravens frequently depredate eggs (kestrel: Richards, 1967; Palmer, 1988; raven: Nelson, 1934; Engel and Young, 1989; Stiehl and Trautwein, 1991), these two species may compete with as well as predate Loggerhead Shrikes and their nestlings. Nest failure directly due to human disturbance, or indirectly by depredation from opportunistic species, has apparently not been documented. However it certainly occurs to some degree, given the

species' proclivity for ranchyards and other altered sites in the WMPA. Nest parasitism of shrikes by Brown-headed Cowbird is apparently quite rare (DeGeus and Best, 1991).

A final, potentially important issue is alteration of desert habitats through invasion by non-native plants, especially exotic grasses; in one Mojave Desert study, non-native Red Brome (*Bromus madritensis* ssp. *rubens*) accounted for 97% of the annual biomass total (Rundel and Gibson, 1996; pp. 312-314). Increased herb cover potentially decreases foraging efficiency, increases predation risk (if additional time is spent at or near the ground, especially by fledglings learning to hunt), and/or alters the prey base.

Biological Standards:

As noted above, there has been little or no formal study of Loggerhead Shrikes in the Mojave Desert. Thus population structure, size and trends in the WMPA are unknown during both breeding and winter seasons. As population trends based on Breeding Bird Surveys and Christmas Bird Counts in the western United States, and more specifically the Mojave, have been consistently and significantly negative over the last 30 years (see above), it is likely that the trend is similar in the WMPA. In addition, based on the information presented here in Threats Analysis, it is likely that continued alteration and development in the Mojave Desert by man will lead to additional declines.

Minimum management requirements in the WMPA should include the following five steps: (1) whenever feasible avoid removal of all dense, isolated trees and large shrubs (i.e., over 6 ft., or 2 m, tall), including non-native trees (unless replaced by suitable natives), as they provide nesting sites; (2) discourage use of biocides and other toxins or other intensive pest control within the WMPA, as this can both directly kill and cause nest failure (due to lack of food) in Loggerhead Shrikes; (3) all BLM and BLM-approved biological evaluations for projects and planning changes (e.g., road or other construction, changing land use such as grazing) should include an explicit evaluation of the impacts or benefits to this species, including cumulative impacts; (4) insofar as practical, limit disturbance to known, occupied shrike nests, including that from vehicles, until the species tolerance for such disturbance is clarified; and (5) maintain an ongoing database of sensitive species information for the WMPA, made available upon request by researchers.

In the short term, the primary conservation needs for Loggerhead Shrike in the WMPA are to halt and/or offset ongoing degradation of nesting and foraging habitat as a result of past and current land management decisions, and to address suspected mortality factors such as increased predation and vehicle strikes. In the longer term, it is vital to protect and properly manage the species' habitat through acquisition of sound information as a basis for sound land management decisions. Examples are the need for research to evaluate the influence of Common Raven population increases in desert areas on Loggerhead Shrike winter and breeding populations, and relative productivity and mortality under variable conditions of disturbance and habitat conditions, such as invading non-native plants.

Literature Cited:

Anderson, R.M. 1976. Shrikes feed on prey remains left by hawks. Condor 78:269.

Anderson, W.L. and R.E. Duzan. 1978. DDE residues and eggshell thinning in loggerhead shrikes. Wilson Bull. 90:215-220.

Balda, R.P. 1965. Loggerhead shrike kills mourning dove. Condor 67:359.

Bent, A.C. 1950. *Lanius ludovicianus excubitorides* Swainson: White-rumped Shrike. pp. 155-157 *In:* A.C. Bent (ed.), Life Histories of North American Wagtails, Shrikes, Vireos, and Their Allies. U. S. Natl. Mus. Bull. 197.

Boarman, W.I., and K.H. Berry. 1995. Common ravens in the southwestern United States, 1968-92. pp. 73-75 *In:* E.T. LaRoe, G.S. Farris, C.E. Puckett, P.D. Doran, and M.J. Mac (eds.), Our Living Resources, U.S. Dept. Int., Natl. Biol. Serv., Washington, D.C.

Brooks, B.L., and S.A. Temple. 1990. Habitat availability and suitability for loggerhead shrikes in the upper Midwest. Am. Midl. Nat. 123:75-83.

Busbee, E.L. 1976. The ontogeny of cricket killing and mouse killing in loggerhead shrikes (*Lanius ludovicianus* L.). Condor 78:357-365.

Chapman, B.R., and S.D. Castro. 1972. Additional vertebrate prey of the loggerhead shrike. Wilson Bull. 84:496-497.

Collister, D.M. 1994. Breeding ecology and habitat preservation of the loggerhead shrike in souteastern Alberta. Master's thesis, Univ. of Calgary, Calgary, Alberta.

DeGeus, D. W., and L.B. Best. 1991. Brown-headed cowbirds parasitize loggerhead shrikes: First records for family Laniidae. Wilson Bull. 103:504-506.

Engel, K.A., and L.S. Young. 1989. Spatial and temporal patterns in the diet of common ravens in southwestern Idaho. Condor 91:372-378.

Garrett, K., and J. Dunn. 1981. Birds of Southern California: Status and Distribution. Los Angeles Audubon Society, Los Angeles, California.

Grinnell, J., and A.H. Miller. 1944. The Distribution of the Birds of California. Pacific Coast Avifauna 27.

Haas, C.A., and S.A. Sloan. 1989. Low return of migratory loggerhead shrikes: winter mortality or low site fidelity. Wilson Bull. 101:458-460.

Hayes, F.E., and W.S. Baker. 1987. Loggerhead shrike feeds on a dead American coot. W. Birds 18:133-134.

Kiff, L., and D. Irwin. 1987. The breeding season of Los Angeles County birds. W. Tanager 53(7):4-5.

Klaas, E.E., H.M. Ohlendorf, and R.G. Heath. 1974. Avian eggshell thickness: Variability and sampling. Wilson Bull. 86:156-164.

Miller, A.H. 1931. Systematic revision and natural history of the American shrikes (*Lanius*). Univ. of Calif. Pub. in Zool. 38:11-242.

Morrison, M.L. 1979. Loggerhead shrike eggshell thickness in California and Florida. Wilson Bull. 91:468-469.

Nelson, A.L. 1934. Some early summer food preferences of the American raven in southeastern Oregon. Condor 36:10-15.

Palmer, R.S. 1988. Handbook of North American Birds. Vol. 5. Yale Univ. Press, New Haven, Connecticut.

Peterjohn, B.G., and J.R. Sauer. 1995. Population trends of the loggerhead shrike from the North American breeding bird survey. Shrikes (Laniidae) of the World: Biology and Conservation. Proc. West. Found. Vert. Zool. 6:117-121.

Reid, W.H., and A.J. Fulbright. 1981. Impaled prey of the loggerhead shrike in the northern Chihuahua Desert, New Mexico, Texas, USA. Southwest. Nat. 26:204-205.

Reynolds, T.D. 1979. The impact of loggerhead shrikes on nesting birds in a sagebrush environment. Auk 96:798-799.

Richards, G.L. 1967. Nest-robbing behavior of the sparrow hawk. Condor 69:88.

Rundel, P.W., and A.C. Gibson. 1996. Ecological Communities and Processes in a Mojave Desert Ecosystem: Rock Valley, Nevada. Cambridge Univ. Press, Cambridge, England.

Sauer, J.R., S. Orsillo, and B.G. Peterjohn. 1995. Geographic patterns in relative abundances and population trends of breeding and wintering loggerhead shrikes in North America. Shrikes (Laniidae) of the World: Biology and Conservation. Proc. West. Found. Vert. Zool. 6:117-121.

Sauer, J.R., J.E. Hines, G. Gough, I. Thomas, and B.G. Peterjohn. 1997. The North American Breeding Bird Survey Results and Analysis. Version 96.4. Patuxent Wildlife Research Center, Laurel, Maryland. Updated 29 July 1997.

Scott, T.A., and M.L. Morrison. 1990. Natural history and management of the San Clemente loggerhead shrike. Proc. West. Found. Vert. Zool. 4:23-57.

Scott, T.A., and M.L. Morrison. 1995. Opportunistic foraging behavior of loggerhead shrikes. Shrikes (Laniidae) of the World: Biology and Conservation. Proc. West. Found. Vert. Zool. 6:117-121.

Smith, S.M. 1972. The ontogeny of impaling behavior in the loggerhead shrike, *Lanius ludovicianus* L. Behavior 42:232-247.

Stiehl, R.B., and S.N. Trautwein. 1991. Variations in diets of nesting common ravens. Wilson Bull. 103:83-92.

Temple, S.A. 1995. When and where are shrike populations limited? Shrikes (Laniidae) of the World: Biology and Conservation. Proc. West. Found. Vert. Zool. 6:6-10.

Verner, J., and M.F. Wilson. 1969. Mating systems, sexual dimorphism, and the role of male North American passerine birds in the nesting cycle. Ornithol. Monogr. No. 9.

Woods, C.P. 1994. The loggerhead shrike in southwest Idaho. Master's Thesis, Boise State Univ., Boise, Idaho.

Woods, C.P. 1995a. Status of loggerhead shrikes in the sagebrush habitat of southwestern Idaho. Shrikes (Laniidae) of the World: Biology and Conservation. Proc. West. Found. Vert. Zool. 6:117-121.

Woods, C. P. 1995b. Breeding ecology of loggerhead shrikes nesting in sagebrush. Shrikes (Laniidae) of the World: Biology and Conservation. Proc. West. Found. Vert. Zool. 6:117-121.

Yosef, R. 1992. Loggerhead shrikes eat crayfish. Florida Field Nat. 20:75-76.

Yosef, R. 1996. Loggerhead Shrike (*Lanius ludovicianus*). *In:* A. Poole and F. Gill (eds.), The Birds of North America, No. 231. The Academy of Natural Sciences, Philadelphia, Pennsylvania, and The American Ornithologists' Union, Washington, D.C.

Yosef, R., and T.C. Grubb, Jr. 1994. Resource dependence and territory size in loggerhead shrikes (*Lanius ludovicianus*). Auk 111:465-469.

LONG-BILLED CURLEW
Numenius americanus

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Management Status: Federal: None
California: Species of Special Concern (CDFG, 1998)

General Distribution:

The Long-billed Curlew breeds from south-central British Columbia, southern Alberta, southern Saskatchewan, and southern Manitoba (formerly) south to east-central California (Siskiyou, Modoc, Lassen counties, irregularly south to the vicinity of Big Pine in Inyo County; McCaskie, 1978; Small, 1994), central Nevada, central Utah, central New Mexico, northern Texas, and east to southwestern North Dakota, northwestern South Dakota, north-central Nebraska, and southwestern Kansas. Formerly, the species bred east to northwestern Iowa, Wisconsin, and Illinois. The winter range extends from southwestern British Columbia (rarely) to California, southern Arizona (rarely), northern Mexico, southern Texas, southern Louisiana, southern Alabama, and coastal South Carolina south to southern Mexico and southern Florida, and irregularly south to Costa Rica (AOU, 1998; Zeiner et al., 1990).

The winter range in California includes the San Joaquin Valley, the Imperial Valley, portions of the West Mojave, and (locally) coastal estuaries (Garrett and Dunn, 1983). Non-breeding individuals occasionally summer in the winter range (AOU, 1998).

Distribution in West Mojave Planning Area:

The Long-billed Curlew is primarily a migrant and winter visitor in the WMPA. One near Lancaster 19 June 1983 may have remained through the summer (K.L. Garrett, pers. comm). The largest winter flocks have been found in alfalfa fields east of Lancaster. Fields at 90th Street East and Avenue F have been a favored location in recent years. Other areas of occurrence are Piute Ponds and Rosamond Lake on Edwards Air Force Base, Lancaster Sewage Ponds, East Cronese Lake, and Harper Lake.

Natural History:

The Long-billed Curlew is the largest North American shorebird (length 23 in., 58 cm, wingspan to 40 in., 1.0 m, Terres 1980). By virtue of its size and its very long, decurved bill, it is almost unmistakable. Confusion with the Whimbrel (*Numenius phaeopus*) is possible, but the Long-billed Curlew is considerably larger, lacks distinct headstripes, has a longer, more smoothly curved bill, and warmer cinnamon-buff plumage. It is distinguished from the other "long billed" curlews of the world (which are allopatric) by its cinnamon wing-linings. The Marbled Godwit (*Limosa fedoa*), a large sandpiper with remarkably similar plumage, is smaller and has a long, slightly recurved bill.

Both of the recognized subspecies occur in California. Breeders in northern California are *N. a. parvus*, the smaller, shorter-billed, more northern subspecies (AOU, 1957; Garrett and

Dunn, 1983). Based on what is known of the winter distribution of the subspecies, it is likely that most of the birds in southern California in winter are *N. a. americanus*, although *parvus* occurs in mixed flocks with *americanus*. Short-billed *parvus* may be mistaken for Whimbrels (Garrett and Dunn, 1983). Age and gender variation in size and bill length makes field identification of subspecies problematic. Grinnell and Miller (1944, p. 141) stated that "in California there is no practicable way of separating available specimens into two racial categories."

The Long-billed Curlew's extraordinary bill, which is longer on females, is used to probe into muddy or sandy substrates or to grab prey from the surface. Curlews often wade belly-deep and forage in submersed mud. Food items on the Pacific coast include mud crabs (*Hemigrapsus oregonensis*), ghost shrimp (*Callianassa californiensis*), mud shrimp (*Upogebia pugettensis*), gem clams (*Gemma gemma*), and insect pupae (Stenzel et al., 1976). Inland, curlews eat insects, worms, spiders, crayfish, berries, snails, and small crustaceans (Bent, 1929).

The Long-billed Curlew is a solitary or loosely colonial nester. In California, nests are usually near lakes or marshes (Grinnell and Miller, 1944). The nesting season extends from mid-April to September, and is heralded by advertisement flights and vocal displays (Johnsgard, 1981). The nest is a shallow depression lined with grass, other plant material, and debris. Both adults incubate four eggs (rarely five) for 27-28 days. Both adults attend the young. First flights occur at 32-45 days (Johnsgard, 1981; Baicich and Harrison, 1997).

The species is gregarious in migration and winter. Wedge-shaped flocks move through the deserts in July, August, and September. Most wintering birds depart by early May; a flock of 32 at the Lancaster Sewage Ponds on 21 May 1981 was quite late (K.L. Garrett, pers. comm.). Migrating flocks are seen during daylight hours (Small, 1994).

Habitat Requirements:

Long-billed Curlews are birds of open habitats: upland shortgrass prairies, wet meadows, grasslands, and, in winter, agricultural fields, saltwater marshes with tidal channels, intertidal mudflats, and coastal estuaries. At all seasons, flat or gently rolling terrain is characteristic of curlew habitat. Fitzner (1978) reported that birds in southeastern Washington needed little or no direct water on the breeding grounds - diet seemed to satisfy their hydric requirements. Breeding habitat in northern California has been characterized as wet meadow habitat and "grasslands with lakes or marshes nearby" (Small, 1994). In eastern Washington, Fitzner (1978) reported an average nesting density of 1 pair/250 acres (1 km?).

In the WMPA, migrant and wintering Long-billed Curlews use agricultural (alfalfa) fields, sewage ponds, shallow wetlands (e.g., Piute Ponds), and shallow marshes and adjacent fields (e.g., Harper Lake). Garrett and Dunn (1981) describe wintering habitat in inland California as "agricultural fields and grasslands."

Population Status:

In 1929, Arthur Cleveland Bent wrote, "The last of the great open prairies are disappearing; and with them are going the curlews...and a host of other birds that cannot stand the encroachments of agriculture" (Bent, 1929 p. 98). Since then, the breeding range has continued to retract; Long-billed Curlews no longer breed in several midwestern states where they formerly bred (Johnsgard, 1981).

While Bent (1929) stated that the species was still quite common in California in the non-breeding season, Grinnell and Miller (1944) describe a winter range in the state that is "not now anywhere as large as prior to 1900."

The largest winter flocks in interior California occur in the Central and Imperial valleys, and are associated with agricultural habitats. The Salton Sea (south) Christmas Bird Count often has the national high count of Long-billed Curlews; 4,490 in 1987 is the highest total of any count in North America in the last ten years (*American Birds* 42:1137, 1988).

Garrett and Dunn (1981) called the species a fairly common fall transient and winter visitor in the Antelope Valley. Long-billed Curlews have been recorded on 16 of 18 Christmas Bird Counts in the Lancaster area, 1979-1996. Data indicate a perhaps insignificant decline in the last 9 years, but census effort in the habitat may be highly variable from year to year. The largest number recorded on a Lancaster Christmas Bird Count was 207 on 15 December 1984. The largest flock known to occur in the WMPA is one of 450 in an alfalfa field northeast of Lancaster on 22 October 1981 (Los Angeles County Museum of Natural History unpubl. data).

Small migrant flocks are observed annually in the Harper Lake area (E.A. Cardiff, pers. comm.). It is likely that other lakebeds and playas (e.g., East Cronese Lake, Rosamond Lake) throughout the WMPA are at least sporadically used by migrant Long-billed Curlews.

Threats Analysis:

Although once considered a "fine game bird" because of its size and the ease at which it could be decoyed, the Long-billed Curlew is no longer hunted (Bent, 1929). The greatest threat to the species throughout its range is change in agricultural practices (Tate, 1981). The Long-billed Curlew is a High Priority Species on the National Audubon Society's "WatchList" (Carter et al., 1996) and was formerly a candidate for Federal Endangered Species status (Zeiner et al., 1990).

In the WMPA, the greatest threats to Long-billed Curlew are the loss of alfalfa fields to urbanization and changes in agricultural practices dictated by economics (i.e., the rising cost of water for irrigation; Tate, 1981).

The marsh at Harper Lake, a BLM Area of Critical Environmental Concern, existing mainly because of adjacent agriculture run-off, has dried up as alfalfa farming has ceased in the valley. This migratory stopover may soon be eliminated.

Biological Standards:

The occurrence of Long-billed Curlews in the WMPA is directly correlated with the presence of agricultural alfalfa. As alfalfa farming decreases due to urbanization and agricultural economics, it is likely that Long-billed Curlew sightings will become less frequent and of fewer birds. Management for the species in the WMPA must include the maintenance of alfalfa farming on a scale suitable to provide foraging and roosting areas for large winter flocks.

The preservation and enhancement of shallow marshes (e.g., Harper Lake, Piute Ponds), while important for myriad reasons including the conservation of many bird species, likely will not compensate for the loss of alfalfa fields that currently provide winter habitat.

Literature Cited:

American Ornithologists' Union. 1957. Checklist of North American Birds, 5th ed., Washington, D.C.

American Ornithologists' Union. 1998. Checklist of North American Birds, 7th ed., Washington, D.C.

Baicich, P. and C. Harrison. 1997. A Guide to the Nests, Eggs, and Nestlings of North American Birds, 2nd ed., Academic Press, San Diego, California.

Bent, A.C. 1929. Life Histories of North American Shorebirds. Part 2. Bull. U.S. Natl. Mus. 146.

California Department of Fish and Game, Natural Diversity Data Base. 1998. Special Animals. Biannual publication, Mimeo., 44 pp.

Carter, M., G. Fenwick, C. Hunter, D. Pashley, D. Petit, J. Price, and J. Trapp. 1996. For the Future, WatchList 1996. Nat. Audubon Soc. Field Notes 50:238-240.

Fitzner, J.N. 1978. The ecology and behavior of the long-billed curlew (*Numenius americanus*) in southeastern Washington. Ph.D. Diss., Washington State Univ., Pullman, Washington.

Garrett, K. and J. Dunn. 1981. The Birds of Southern California, Status and Distribution. Los Angeles Audubon Society, Los Angeles, California.

Garrett, K. and J. Dunn. 1983. The identification of curlews, genus *Numenius*. West. Tanager 49:1-2, Los Angeles Audubon Society, Los Angeles, California.

Grinnell, J. and A.H Miller. 1944. The Distribution of the Birds of California. Pacific Coast Avifauna No. 27. Artemisia Press. Lee Vining, California.

Johnsgard, P. 1981. The Plovers, Sandpipers, and Snipes of the World. Univ. Nebraska Press, Lincoln, Nebraska.

McCaskie, G. 1978. Southern Pacific coast region. Amer. Birds 32:1206-1211.

Small, A. 1994. California Birds, Their Status and Distribution. Ibis Publishing Co., Vista, California.

Stenzel, L.E., H.R. Huber, and G.W. Page. 1976. Feeding behavior and diet of the long-billed curlew and Willet. Wilson Bul. 88(2):314-322.

Tate, J., Jr. 1981. The Blue List for 1981: the first decade. Amer. Birds 35:3-10.

Terres, J.K. 1980. The Audubon Society Encyclopedia of North American Birds. Alfred A. Knopf, New York, New York.

USDI, Bureau of Land Management, 1997. California Desert District Resource Area files.

Zeiner, D.C., W.F. Laudenslayer, K.E. Mayer, M. White. 1990. California's Wildlife, Volume II, Birds. Department of Fish and Game, Sacramento, California.

LONG-EARED OWL
Asio otus

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Management Status: Federal: None
California: Species of Special Concern

General Distribution:

This medium-sized owl occurs across many portions of the temperate zone of the Northern Hemisphere (Marks et al., 1994; Voous, 1988). In North America it is found across central Canada southward, across the northeastern United States and within most of the western United States. The species' occurrence in desert areas of the southwest is probably limited by the availability of appropriate roosting and nesting habitat, but where this occurs, the species is not rare (Garrett and Dunn, 1981).

Within most of California the species' status is poorly known. It appears to occur most regularly in desert areas, but this may be a function of greater detectability rather than of any different status in more mesic habitats. In Europe and other areas of its range, this species appears to vary cyclically in abundance, in synchrony with strong population cycles in its prey species, especially voles (Voous, 1988). However in North America this pattern is largely absent, and winter irruptions in North America are also weak (Marks et al., 1994). This may indicate adaptability in diet or energetic requirements. Moderate winter influxes in California occur most strongly or at least conspicuously in desert areas (Garrett and Dunn, 1981; Barrows, 1989). The species does not usually occur at elevations over about 5900 feet (1800 meters) except as a transient, though there are a few high elevation nest records in California (Garrett and Dunn, 1981; Gaines, 1988).

Distribution in the West Mojave Planning Area:

There is no clear geographic pattern to this species' distribution within and near the WMPA. Most records are from southern portions of the WMPA, but this could easily be a function of the distribution of suitable habitat and of observers. While there is clearly some winter influx (Garrett and Dunn 1981), it is not clear whether the majority of birds are winter visitors. Most of the 20 records compiled for this report (at least 14 locales) appear to be breeding or possible breeding records. There is no direct information on whether breeding birds are resident, although at least most of the well-known breeding areas have winter records as well. Bent (1938) reports visiting a, "small nesting colony [in] . . . an extensive tract of cottonwoods and willows along the Mojave River" which was "around Victorville." No date was given, but he was told that at least four nesting pairs were present the year before (not mapped for the current work).

Natural History:

There have been few thorough studies of the ecology or population biology of Long-eared Owls in California. Useful studies in southern California or adjacent desert areas include Barrows (1989), Bloom (1994), Brown (1995), Marti et al. (1986), and Stophlet (1959). Most of these

studies emphasize diet, and none examine either breeding productivity over multiple years or issues of human disturbance. Away from desert areas, this species is probably best-studied within North America in Idaho (e.g., Craig and Trost, 1979; Marks and Yensen, 1980; Marks, 1984; Thurow and White, 1984; Craig et al., 1985). Information on the species' biology has been compiled in Marks et al. (1994), and a useful review of 42 ecological studies for this species is given in Holt (1997).

As in most raptorial birds, male Long-eared Owls average smaller than females. Average mass in males is 8.6 oz. (245.3 g.; n=38) with females 14% greater; average wing-length in males is 11.06 in. (281 mm.; n=47) with females 1% greater (Earhart and Johnson, 1970). This places the species near the middle of the range in size of North American owls. Marks et al. (1994) states that, "[The] North American longevity record of 9 yr. (Clapp et al., 1983) [is] likely an underestimate given the small number of recoveries (n=98). No information on annual survivorship of adults in North America." The longevity record in Europe is 27 yr. (Rydzewski, 1978, cited in Cramp, 1985).

The following nesting biology information is from Marks et al. (1994) unless stated otherwise. Long-eared Owls are monogamous as a rule, but there is no evidence that pair bonds last beyond a single nesting cycle. There is no evidence that this owl does any nest construction, instead using (and occasionally usurping) nests of appropriate size, especially those of Common Raven (*Corvus corax*), American Crow (*Corvus brachyrhynchos*), Black-billed Magpie (*Pica pica*), and Cooper's Hawk (*Accipiter cooperii*). First clutches are laid from mid-March to mid-May in Idaho (Marks, 1986). Extent of the breeding season in coastal southern California (Ventura County to San Diego County) extends from early February through mid-May (n=133; Kiff and Irwin, 1987). There is no known instance of two separate broods fledged by a single pair in one year, but renesting in response to failure is common. Clutch size averages 4.5 eggs in North America (n = 393; Murray, 1976). Young birds leave the nest April through June, and typically leave the natal nest grove at 9.5 -11 weeks, often departing abruptly and traveling long distances.

This is one of the most strictly nocturnal of all owls. Very occasional vocalizations or hunting to support young occur before sunset, especially on overcast days and during breeding activities. This temporal pattern may be due to either prey activity cycles, predation avoidance (see Threats Analysis), or both. Food is typically a broad variety of mammals below 3.5 oz. (100 g) in mass, with mean mass estimated at 0.88-1.58 oz. (25-45 g.) in various studies (see Marks et al., 1994). In many areas voles (*Microtus* spp.) are dominant in the diet, but among studies in arid areas the most usual prey items are pocket mice (*Perognathus* spp.) and/or kangaroo rats (*Dipodomys* spp.), as summarized in Marks *et al.* (1994); this was confirmed by Barrows (1989) in a study of pellets at six locations in the Colorado Desert of California. Shifts in diet among years within sites may indicate that Long-eared Owls are responsive to prey availability (Barrows 1989).

Based on small sample sizes males, but not females, appear to show natal philopatry (i.e., returning initially to breed near where born; Marks 1985), while both sexes show very low rates of fidelity to subsequent breeding and wintering home ranges (Ulmschneider 1993, cited in Marks *et al.* 1994). Home ranges do not appear to be well-defined. Five owls radio-tagged in the Netherlands had a mean home range of 7.78 square mi. (2025 ha.) in winter, though 90% of use was in areas of 1.35-2.70 square mi. (350 - 700 ha.; Wijnandts 1984, cited in Marks *et al.* 1994). Similarly in another study, 2 breeding pairs each used core areas within 0.62 mi. (1 km.) of the

nest over a period of 8-9 days, with occasional forays up to 1.86 mi. (3 km.; Craig et al., 1988). There is no evidence of territories in which the birds exclude conspecifics, and in fact the species is often described as "vaguely" or "somewhat" colonial during nesting (e.g., Bent, 1938).

Habitat Requirements:

Grinnell and Miller (1944) describes the habitat as, "typically, bottomlands grown to tall willows and cottonwoods; but also, west of Sierran divides, belts of live oaks, especially as paralleling stream courses. Adjacent open land productive of mice is requisite, as also presence of old nests of crows, hawks or magpies for breeding purposes. Indeed, east of Sierra Nevada, the breeding range of this owl is suggestively coincident with that of the Black-billed Magpie." Marks et al. (1994) describe habitat as, "dense vegetation adjacent to grasslands or shrublands; also open forests. Elevations range from near sea level to >2000 m. Reports of forests as main habitat (e.g., Bent, 1938; AOU, 1983; Johnsgard, 1988; Sibley and Monroe, 1990) [is] misleading in that Long-eared Owls normally use these habitats for nesting and roosting only."

In xeric areas, the species is often reported roosting and/or nesting in willows (*Salix* spp.), cottonwoods (*Populus* spp.), and junipers (*Juniperus* spp.; Marks et al., 1994). Garrett and Dunn (1981) mention native oaks (*Quercus* spp.) in desert mountains, as well as dense plantings in desert areas of tamarisk (*Tamarix* spp.), elms (*Ulmus* spp.), cottonwoods, and conifers. In the Colorado Desert, Barrows (1989) noted the species in naturally occurring California Fan Palms (*Washingtonia filifera*).

Because the species appears to be relatively adaptable in prey selection (see above), habitat, human disturbance, and predation may be the primary factors determining where Long-eared Owls occur on a local scale. There is anecdotal evidence that Long-eared Owls avoid Great Horned Owls (*Bubo virginianus*) in coastal southern California, both in site selection and in behavior (Bloom, 1994; W.E. Haas, personal communication). In desert areas the species frequently occurs in artificial plantings near structures, indicating considerable tolerance of human disturbance. In contrast, Bloom (1994), speaking about coastal California, noted that, "I have never found an active Long-eared Owl nest within 1 km [0.62 mi.] of a residential area in California." Another researcher in that area has stated that the species sometimes occurs near rural residences, but not close to developed areas (W.E. Haas, personal communication).

Population Status:

Currently available data or conclusions on status within the WMPA include anecdotal reports by many observers, but no quantitative work (see Distribution in the WMPA, and Population Status, above). Population summaries in Marti and Marks (1989) report the species as "rare" and "decreasing" in California, but make no distinction between coastal and desert populations. They state in text that, "Although Long-eared Owls have declined in California, the current trend is unknown (G. Gould, pers. comm.)." Based on existing data it appears that the total number is greater in winter than summer in the WMPA, but without focused efforts, status must be regarded as very poorly known.

Threats Analysis:

Threats to Long-eared Owl within the WMPA have not been formally studied. Direct persecution (e.g., shooting) and environmental toxins (e.g., pesticides and poisoned prey) do not appear to be substantial problems in North America (Marks et al. 1994). In the WMPA, likely

potential threats are habitat degradation and disturbance at nest and roost areas. Degradation of habitat can consist of loss or degradation of riparian woodlands and isolated tree groves (including fan palm oases), but perhaps just as serious (though less obvious) may be degradation of adjacent open foraging habitat through grazing, erosion, off-road vehicle use, or human development including agriculture. While artificially planted trees may provide an alternative for lost natural roost sites, the prey base is may often be poor and/or variable, disturbance may lower productivity, and potential changes in landscaping or land use remove any assurance of future availability at most such sites. As noted at Antelope Valley ranchyards, "abandonment of alfalfa farming and subsequent abandonment of ranchyards least to death of trees and loss of nesting sites" (K.L. Garrett, pers. comm.).

While there may be some immediate benefit to Long-eared Owls from the increasing numbers of Common Ravens in desert areas (Boarman and Berry, 1995) due to increased nest availability, nest predation on owls is probably also increased by these same species, especially at sites with human disturbance (see Marks et al., 1994 for examples). Another species benefiting from human development is Great Horned Owl (Garrett and Dunn 1981), which is a known and potentially a major predator of Long-eared Owls (Marks et al., 1994; Bloom, 1994). As noted in the Antelope Valley, "There has been an increase in Great Horned Owls in the Antelope Valley and simultaneous decrease in Barn Owls; if [this is] causative, then [the] Great Horned Owl increase might be implicated in [a] Long-eared Owl decrease" (K.L. Garrett, pers. comm.). Other raptors are also known to predate this species (e.g., Collins, 1962), but probably do so uncommonly or rarely.

Biological Standards:

Population structure, size and trends in the WMPA are unknown for either breeding or wintering populations. Undoubtedly those birds present in the WMPA are part of a larger metapopulation, which may encompass most of North America, as birds are known to disperse and migrate long distances, and appear to have low nest site and winter site fidelity (Marks et al., 1994).

Minimum management requirements in the WMPA should include the following four steps: (1) prohibit, or limit and monitor, use of biocides or other toxins as well as shooting or trapping for pest control in all potentially occupied roosting or foraging habitat and (just as importantly) in adjacent open areas where the species could potentially forage, to a radius from roosts and nests of at least 4900 feet (2.7 square miles, or 700 hectares, the 90% use area defined by Wijnandts 1984, cited in Marks et al., 1994); (2) require surveys for this species in all areas of potential habitat prior to undergoing any planned change or increased disturbance (e.g., road or other construction, changing land use such as grazing); (3) limit disturbance, including off-road vehicle use and heavy foot traffic, in areas of potential habitat (especially fan palm oases and dense woodland); (4) either avoid removal of dense stands of trees (including non-native trees) or replace them through restoration of appropriately dense natives, as such sites may be occupied by Long-eared Owls at times of year other than when examined, or may become occupied in the future; and (5) maintain an ongoing database of sensitive species information for the WMPA, made available upon request by researchers.

In the short term, the primary conservation needs for the Long-eared Owl in the WMPA are to halt and/or offset both ongoing and future degradation of roosting, nesting, and foraging habitat as a result of land management decisions. In the longer term, it is vital to protect and

manage the species' habitat through acquisition of sound information as a basis for sound land management decisions. An example is research helpful in evaluating the influence of increases in Common Ravens in desert areas (Boarman and Berry 1995) on Long-eared Owl populations. These birds provide nest sites, but may also predate owl nests.

Literature Cited:

American Ornithologists' Union. 1998. Check-list of North American birds. 7th ed. American Ornithologists' Union, Washington, D.C.

Barrows, C.W. 1989. Diets of five species of desert owls. W. Birds 20:1-10.

Bent, A.C. 1938. *Asio wilsonianus* (Lesson): Long-eared Owl. pp. 153-169, *In:* A. C. Bent, (ed.), Life Histories of North American Birds of Prey, Part II. U.S. Natl. Mus. Bull. 170.

Bloom, P.H. 1994. The biology and current status of the long-eared owl in coastal southern California. Bull. Southern California Acad. Sci. 93:1-12.

Boarman, W.I. and K.H. Berry. 1995. Common ravens in the southwestern United States, 1968-92. pp. 73-75 *In:* E.T. LaRoe, G.S. Farris, C.E. Puckett, P.D. Doran, and M.J. Mac, (eds.), Our Living Resources, U.S. Dept. Int., Natl. Biol. Serv., Washington, D.C.

Brown, N.L. 1995. Notes on the winter roost and diet of long-eared owls in the Sonoran Desert. J. Raptor Res. 29:277-279.

Clapp, R.B., N.K. Klimkiewicz, and A.G. Futcher. 1983. Longevity records of North American birds: Columbidae through Paridae. J. Field Ornithol. 54:123-137.

Collins, C.T. 1962. Red-tailed hawk attacks long-eared owl. Wilson Bull. 74:89.

Craig, E.H., T.H. Craig, and L.R. Powers. 1988. Activity patterns and home-range use of nesting long-eared owls. Wilson Bull. 100:204-213.

Craig, T.H., E.H. Craig, and L.R. Powers. 1985. Food habits of long-eared owls (*Asio otus*) at a communal roost site during the nesting season. Auk 102:193-195.

Craig, T.H., and C.H. Trost. 1979. The biology and nesting density of breeding American kestrels and long-eared owls on the Big Lost River, southeastern Idaho. Wilson Bull. 91:50-61.

Cramp, S., ed. 1985. The Birds of the Western Palearctic. Vol. 4. Oxford Univ. Press, Oxford, England.

Earhart, C.M., and N.K. Johnson. 1970. Size dimorphism and food habits of North American owls. Condor 72:251-264.

Gaines, D.A. 1988. Birds of Yosemite and the East Slope. Artemisia Press, Lee Vining, California.

Garrett, K. and J. Dunn. 1981. Birds of Southern California: Status and Distribution. Los Angeles Audubon Society, Los Angeles, California.

Grinnell, J. and A.H. Miller. 1944. The Distribution of the Birds of California. Pacific Coast Avifauna 27.

Holt, D.W. 1997. The long-eared owl (*Asio otus*) and forest management: A review of the literature. J. Raptor Res. 31:175-186.

Johnsgard, P.A. 1988. North American Owls. Smithsonian Inst. Press, Washington, D.C.

Kiff, L., and D. Irwin. 1987. The breeding season of Los Angeles County Birds. Western Tanager [newsletter of the Los Angeles Audubon Society] 53(7):4-5.

Marks, J.S. 1984. Feeding ecology of breeding long-eared owls in southwestern Idaho. Can. J. Zool. 62:1528-1533.

Marks, J.S. 1985. Yearling male long-eared owls breed near natal nest. J. Field Ornithol. 56:181-182.

Marks, J.S. 1986. Nest-site characteristics and reproductive success of long-eared owls in southwestern Idaho. Wilson Bull. 98:547-560.

Marks, J.S., D. L. Evans, and D. W. Holt. 1994. Long-eared Owl (*Asio otus*). *In:* A. Poole and F. Gill (eds.), The Birds of North America, No. 133. Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

Marks, J.S. And E. Yensen. 1980. Nesting sites and food habits of long-eared owls in southwestern Idaho. Murrelet 61:86-91.

Marti, C.D. and J.S. Marks. 1989. Medium-sized owls [status report]. pp. 124-133 *In:* B.G. Pendleton, (ed.), Proceedings of the Western Raptor Management Symposium and Workshop. Natl. Wildl. Found. Scientific and Tech. Ser. No. 12. Natl. Wildl. Found., Baltimore, Maryland.

Marti, C.D., J.S. Marks, T.H. Craig, and E.H. Craig. 1986. Long-eared owl diet in northwestern New Mexico. Southwest. Nat. 31:416-419.

Murray, G.A. 1976. Geographic variation in the clutch sizes of seven owl species. Auk 93:602-613.

Sibley, C.G., and B.L. Monroe, Jr. 1990. Distribution and Taxonomy of Birds of the World. Yale Univ. Press, New Haven, Connecticut.

Stophlet, J.J. 1959. Nesting concentration of long-eared owls in Cochise County, Arizona. Wilson Bull. 71:97-99.

Thurow, T.L., and C.M. White. 1984. Nesting and prey selection of long-eared owls along a juniper/sagebrush ecotone in southcentral Idaho. Murrelet 65:10-14.

Voous, K.H. 1988. Owls of the Northern Hemisphere. MIT Press, Cambridge, Massachusetts.

MOUNTAIN PLOVER
Charadrius montanus

Author: Chet McGaugh, Tierra Madre Consultants, Inc., 1159 Iowa Avenue, Suite D, Riverside, California, 92507

Management Status: Federal: USFWS Candidate Species
California: Species of Special Concern (CDFG, 1998)

General Distribution:

The Mountain Plover is endemic to open, sparsely vegetated habitats in North America. The breeding range, in the dry tablelands of the western Great Plains and the Colorado Plateau, includes extreme southern Alberta, northern Montana, Wyoming, western Nebraska, Colorado, western Kansas to central and southeastern New Mexico, western Texas, and western Oklahoma. The winter range extends from northern California (rarely) through southern California, southern Arizona, and central and coastal Texas to northern Mexico (Cogswell, 1977; AOU, 1998; Knopf, 1996).

Mountain Plovers do not breed in California, but approximately 70% of the total population winters in the state (National Audubon Society unpubl. data). The major wintering areas in California are in the Sacramento, San Joaquin, and Imperial valleys. Smaller numbers winter in the west Mojave Desert (Antelope Valley, Harper Lake), San Jacinto Valley, Santa Maria Valley, Salinas Valley, the Carrizo Plain, Seal Beach, Tijuana River Valley, and the Lower Colorado River Valley.

Distribution in West Mojave Planning Area:

Mountain Plovers are recorded annually in fall and winter in the agricultural lands east of Lancaster, and at Harper Lake. The species may occur, at least irregularly, in Lucerne Valley (Garrett and Dunn, 1981), and on dry lakebeds throughout the Mojave Desert.

Natural History:

The Mountain Plover is a fairly large (9 in., 21-23 cm), drably-colored plover, slightly smaller than a Killdeer (*Charadrius vociferus*). In breeding plumage, a black loral stripe extends from the black bill to the eye, and contrasts with the white forehead and throat. A black forecrown bar and unmarked white breast distinguish Mountain Plover from all other plovers that regularly occur in North America. The sandy brown coloration of the upper parts extends to the neck and sides of the breast, and renders a motionless bird almost invisible in its habitat.

The nest is a shallow depression in the ground, often lined with plant material. The clutch of (usually) three eggs, is incubated for 28-31 days. The female may lay consecutive clutches in separate nests, and each clutch is incubated by one of the adults. The precocial young leave the nest within four hours of hatching, and are able to fly several hundred feet after 33-34 days (Baicich and Harrison, 1997).

The breeding season lasts from March to early August, after which Mountain Plovers disperse across the southern and western Great Plains before migrating to their winter areas. The migration of the species to and from California is more of an east-west movement than the typical north-south movement of migrant shorebirds in North America. In spring, Mountain Plovers

returning to their breeding areas may fly non-stop over the Sierra Nevada, the Great Basin, and the Rocky Mountains (Knopf and Rupert, 1995).

Mountain Plovers are gregarious in winter; flocks often exceed 100 birds, and sometimes number 500 birds. Opportunistic flocks range widely in search of large insects and other invertebrates. A study in California identified 2092 different food items, and found that diet differed greatly by location (Knopf, 1998). Prey is captured with a lunge at the end of a short, quick run. Flock organization is loose, and the movement patterns of flocks and individuals is highly variable (Knopf and Rupert, 1995).

In California, and in the WMPA, Mountain Plovers have been recorded rarely in late July, but most arrive in mid-October or later. Mid-November to early February is the period of peak abundance in California. Most birds are back on the breeding grounds by late March or early April, but stragglers have been recorded in California in May, and one remained at Salton Sea through the summer of 1967 (McCaskie, 1970).

Habitat Requirements:

In spite of the common and scientific name, Mountain Plovers do not nest in the mountains, but in relatively high elevation (2000-8500 ft, 640-2580 m) short-grass prairies and plains used historically by herbivores such as Bison (*Bison bison*), Pronghorns (*Antilocapra americana*), and prairie dogs (*Cynomys* spp.). Dense and tall cover is avoided at all seasons, and, unlike most other plovers, they are seldom found near water. Migrants are occasionally found on mudflats (e.g., Piute Ponds at Edwards Air Force Base in the Antelope Valley).

Winter areas in California historically supported Tule Elk (*Cervus elaphus nannodes*), Pronghorns, and kangaroo rats (*Dipodomys* spp.) in a "microlandscape similar to the nesting grounds" (Knopf, 1996, p.2). These areas are usually below 3000 ft (915 m) elevation. In the Sacramento and San Joaquin valleys, valley sink scrub and non-native grasslands, as well as agricultural lands, are used. In the Imperial Valley, Mountain Plovers show a preference for recently burned fields (K.C. Molina, pers. comm.).

In the WMPA, Mountain Plovers are almost exclusively associated with agricultural lands: plowed or disced fields, and fallow, harvested, or grazed alfalfa fields (K.L. Garrett, pers. comm.).

Population Status:

The breeding range of the Mountain Plover has been reduced substantially this century, and the populations within the current breeding range have declined drastically in recent years. Breeding Bird Survey data indicate a 3.7% ($P < 0.01$) reduction per year from 1966-1993 (Knopf and Rupert, 1995; Knopf, 1996). Knopf (1994) reported declines from virtually all breeding areas since 1966. Miller and Knopf (1993) concluded that the declines may represent problems in migration or in wintering areas and/or the continuation of long-term declines in breeding areas.

The North American population of the Mountain Plover was estimated to be 8000-10,000 after a one-day (29 January 1994) survey of all known Mountain Plover sites in California, the species' winter stronghold. Survey data indicated that approximately 7000 Mountain Plovers (approximately 70% of the North American population) winter in California. Up to 3000 Mountain Plovers were estimated to winter in Texas and Mexico (National Audubon Society unpubl. data; Knopf, 1996).

Small (1994) reported that numbers are declining in coastal California; in the interior the species is declining and very local. Only six of 105 Christmas Bird Counts in California in the winter of 1996-1997 reported Mountain Plovers (*National Audubon Society Field Notes* 51:602-648, 1997). These data accounted for only 250 in a state known to be the center of winter abundance. The Lancaster Christmas Bird Count recorded 90 Mountain Plovers, the California high count.

The Mountain Plover is a "Highest Priority Species" on the National Audubon Society's *WatchList* (Carter et al., 1996).

Threats Analysis:

Threats to Mountain Plovers include predation, severe weather during the nesting/fledging period, direct persecution by humans, and loss and degradation of breeding and wintering habitat (Knopf, 1996).

Eggs and chicks of Mountain Plover are susceptible to a variety of predators, including birds, mammals, and reptiles. Prairie Falcon (*Falco mexicanus*) and Kit Fox (*Vulpes macrotis*) have been observed preying on adult Mountain Plovers (Knopf and Rupert, 1995; Knopf, 1996). Extreme weather conditions may have drastic effects; Knopf (1996) reported that hail and flooding caused almost complete reproductive failure at the Pawnee National Grassland, Colorado, in May, 1995. In the 1800s and early 1900s market hunters and sport hunters found Mountain Plovers to be easy game, as the birds are unwary and tend to form tight flocks. Bent (1929, p. 267) reported that a California correspondent told of 65 being killed with two shots, and of another saying, in 1916, "they don't seem as plentiful as they were 25 years ago."

Habitat degradation and destruction is the greatest threat to the species. As the prairies were plowed and populated in the 1800s, and the bison were exterminated, the ecology of the Great Plains was forever altered. The reduction of short-grass prairie, by plow and gun (the elimination of primary grazers that kept the habitat sparsely vegetated) began the reduction and degradation of Mountain Plover habitat in the breeding range that continues to the present.

Knopf (1996) reported that agricultural practices in the southern part of the breeding range within the last 25 years may have contributed significantly to the decline of the Mountain Plover. Fields formerly left fallow through the spring are now planted with profitable crops such as sunflower and millet. Mountain Plovers begin nesting while the fields are fallow but then either fall victim to farm equipment or abandon their nests when the crop becomes too tall to satisfy the plovers' safety requirements (i.e., an obstructed view).

In the Antelope Valley, urbanization and changes in water policy that make alfalfa farming unprofitable threaten wintering Mountain Plovers. The cessation of alfalfa farming near Harper Lake may soon render the area unsuitable for wintering flocks of Mountain Plovers (E.A. Cardiff, pers. comm.).

Wintering Mountain Plovers in California are exposed to pesticides in the agricultural fields where they may spend up to 75% of the time, but there is no evidence that reproductive success or survival has been affected (Knopf, 1996).

Biological Standards:

Mountain Plover winter habitat in the WMPA is almost exclusively private agricultural land, and, therefore, the fate of the species in the WMPA is directly linked to agriculture. Alfalfa farming in the Antelope Valley and at Harper Lake has sustained winter flocks of Mountain

Plovers for many years, but urbanization, water policy, and the economics of alfalfa farming has caused a significant, ongoing reduction of habitat.

More so for Mountain Plovers than for most other sensitive species, habitat can be created and managed. Mountain Plovers are often found in plowed or heavily grazed fields, and recently burned fields provide night-roosting habitat (Knopf and Rupert, 1995). Since it seems unlikely that urbanization will slow in the Antelope Valley, or that the decline of alfalfa farming will halt, relatively drastic measures may be needed to ensure the sustainability of the WMPA winter population. These measures could include subsidies for alfalfa farmers, the establishment of agricultural preserves, and the encouragement of land-use practices that benefit Mountain Plovers (i.e., the periodic discing and/or burning of fields, controls on the use of pesticides). Many of the alfalfa fields used by Mountain Plovers in the Antelope Valley are grazed by sheep, so livestock ranching is also a factor in the habitat equation (K.L. Garrett, pers. comm.). Habitat management for Mountain Plovers may also benefit other sensitive wildlife such as Long-billed Curlews (*Numenius americanus*) and migrant and wintering raptors.

An important consideration for management of Mountain Plover in the WMPA is the possibility of Federal listing under the Endangered Species Act. As a "Highest Priority Species" on the National Audubon Society's *WatchList* (Carter et al., 1996), the species has been determined to be in serious decline. The winter range of Mountain Plovers in the WMPA should be precisely delineated and annual monitoring should be done to assess population trends and habitat use. Data from monitoring efforts in the WMPA could provide information on recovery or further decline of the species.

Literature Cited:

American Ornithologists' Union. 1998. Checklist of North American Birds. 7th ed., Amer. Ornithol. Union, Washington, D.C..

Baicich, P.J. and C. Harrison. 1997. A Guide to the Nests, Eggs, and Nestlings of North American Birds. 2nd ed., Academic Press, San Diego, California.

Bent, A.C. 1929. Life Histories of North American Shorebirds, Part Two. Dover Publications, Inc., New York, New York.

Carter, M., G. Fenwick, C. Hunter, D. Pashley, D. Petit, J. Price, and J. Trapp. 1996. For the Future, Watchlist 1996. Nat. Audubon Soc. Field Notes 50:238-240.

Cogswell, H. 1977. Water Birds of California. Univ. of California Press, Berkeley, California.

Garrett, K. and J. Dunn. 1981. Birds of Southern California: Status and Distribution. Los Angeles Audubon Society, Los Angeles, California.

Knopf, F.L. 1994. Avian assemblages on altered grasslands. Stud. Avian Biol. 15:247-257.

Knopf, F.L. 1996. Mountain Plover (*Charadrius montanus*). *In:* A. Poole and F. Gill (eds.), The Birds of North America, No. 211. The Academy of Natural Sciences, Philadelphia, Pennsylvania, and The American Ornithologists' Union, Washington, D.C.

Knopf, F.L. 1998. Foods of mountain plovers wintering in California. Condor 100:382-384.

Knopf, F.L. and J.R Rupert. 1995. Habits and habitats of mountain plovers in California. Condor 97:743-751.

Miller, B.J. and F.L. Knopf. 1993. Growth and survival of mountain plovers. J. Field Ornithol. 64: 500-506.

McCaskie, G. 1970. Shorebird and waterbird use of the Salton Sea. Calif. Fish and Game 56:87-95.

Small, A. 1994. California Birds, Their Status and Distribution. Ibis Publishing Co., Vista, California.

NORTHERN HARRIER
Circus cyaneus

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Management Status: Federal: None
California: Species of Special Concern (CDFG, 1998)

General Distribution:

The Northern Harrier (called "Hen Harrier" in the English-speaking Old World, and formerly called "Marsh Hawk" in North America) breeds across North America and Eurasia, south in the New World to northwestern Baja California, the southern Great Plains and the mid-Atlantic Coast. The northern populations are migratory, with the species' winter range extending north in North America to southwestern and southeastern Canada, the central Great Plains, Pennsylvania, and southern New York. Some winter as far south as Panama and the Greater Antilles (rarely south to northernmost South America).

In California this harrier is a local and declining breeding species (Grinnell and Miller, 1944; Garrett and Dunn, 1981). Grinnell and Miller (1944) cite breeding localities over much of the state, including the interior from Siskiyou County south to western Riverside and San Bernardino Counties and coastal regions from Marin County to San Diego County. Garrett and Dunn (1981) cite the following breeding localities current as of about 1980 in the interior of southern California: the Owens Valley (Inyo County); Lakeview (Riverside County); Harper Dry Lake (San Bernardino County); and probably the Antelope Valley (Los Angeles County). Most former nesting areas along the coast had been deserted by the 1970s, with current nesting only in coastal San Luis Obispo and San Diego counties (Garrett and Dunn, 1981).

The Northern Harrier is a widespread migrant and winter visitor through California. Fall migrants may be noted as early as late August, and this species is numerous away from breeding areas by late September; wintering birds may be present through March and often until mid-April (Garrett and Dunn, 1981). An estimated 13,200 birds winter in California (MacWhirter and Bildstein, 1996).

Distribution in West Mojave Planning Area:

Regular breeding is limited in the WMPA to Piute Ponds on the Edwards Air Force Base and Harper Dry Lake. At Piute Ponds this species has been present through the spring and suspected of nesting since at least 1980 (K.L. Garrett, unpubl. data). Nesting was confirmed in May 1992 when a nest with six eggs was discovered by L.F. Kiff (Los Angeles County Museum files). At least three pairs of Northern Harriers are suspected of nesting at Piute Ponds through the 1990s (K.L. Garrett, unpubl. data). Nesting pairs at Piute Ponds occupy extensive bulrush (*Scirpus*) marshes and adjacent dense, wet grasses and sedges bordered by saltbush (*Atriplex*) scrub. Northern Harriers

have been seen widely in the western part of the Edwards Air Force Base in Kern and Los Angeles counties (Air Force Flight Training Center Environmental Management Office, 1993), but nesting on the base is probably restricted to Piute Ponds.

Northern Harriers occur commonly throughout the year and nest regularly at Harper Dry Lake (ENSR, 1989); the breeding population there is estimated at two to four pairs. This species may also nest in other marshy wetlands in the WMPA, at least after wet winters.

It is possible that Northern Harriers may occasionally nest (particularly after wet winters?) in agricultural or grassland areas elsewhere in the WMPA. For example, an adult male was observed in an agricultural area dominated by alfalfa on 24 May 1980 about 15 miles (24 km) east of Lancaster in the Antelope Valley (K.L. Garrett, pers. obs.). This is well after wintering birds and transients have departed in spring.

In winter this species is recorded annually on the Lancaster Christmas Bird Count, with a minimum count of 13 individuals, a maximum of 62, and a mean count of 34.1 between 1979 and 1996 (F. Heath, in litt.). In the northern WMPA it is considered common in winter at China Lake NWC (California Natural Diversity Database); recent Christmas Bird Counts at China Lake have recorded four to eight harriers (*American Birds/National Audubon Society Field Notes*). This species is fairly common through the winter in the Mojave Narrows/Victorville/Hesperia area (S.J. Myers, unpubl. data), with recent records for this area falling between 19 September and 17 February; Northern Harriers are regularly recorded on the Mojave River Valley Christmas Bird Count (*American Birds/National Audubon Society Field Notes*).

Fall migration through the region is mainly in September and October. Intensive monitoring of migrant raptors south of Weldon (Kern Co.) in the southern Sierra Nevada during 1994 yielded thirteen Northern Harriers between 13 September and 17 October, giving an indication of the species' fall migration period (Rowe and Gallion, 1996). There is no clear period of spring migration through the WMPA, but wintering birds largely depart by mid-April.

Natural History:

Northern Harriers are moderately large raptors with rather long, narrow wings, a long tail, and a striking white band on the upper tail coverts. Length varies from 16-20 inches (41-50 cm), and wingspread is 38-48 inches (97-122 cm; Clark and Wheeler, 1987). Females are considerably larger and heavier than males, with the mass averaging 513 g in the breeding season, vs. 336 g for breeding males (MacWhirter and Bildstein, 1996). This species is strongly dimorphic in plumage. Adult males are primarily pale gray on the head, breast and upperparts, and white below; in flight they show black wingtips and white uppertail coverts. Females are brown on the head, breast and upperparts and buffy below with dark streaks; they also show white uppertail coverts. Immatures generally resemble adult females but are a deeper, ruddier brown in coloration.

Harriers have a distinctive slow, buoyant flight, with the wings raised in a slight dihedral; when foraging they often fly within a few feet of the ground.

The diet is usually dominated by rodents. Breeding season data (MacWhirter and Bildstein 1996) show that about 70% of prey delivered to nestlings consists of rodents over most of the species' range, although one study in California (Selleck and Glading,

1943) found that 80% of prey consisted of birds, especially marsh-dwelling songbirds such as blackbirds (Icteridae). There have been few studies of winter dietary habits in southwestern North America; voles (*Microtus*) and other rodents probably dominate the winter diet in southern California, although small birds are undoubtedly taken as well.

Foraging behavior and diet overlap considerably with the Short-eared Owl (*Asio flammeus*), although the latter species hunts more at dawn, dusk, and in darkness; each species has been noted robbing the other of prey (Berger, 1958; Bildstein and Ashby, 1975).

Northern Harriers are ground nesters, with the nest placed in dense, low ground cover in marshes or uplands; nests may sometimes be placed in croplands (MacWhirter and Bildstein, 1996). Both sexes collect nest material, but the female performs most of the nest building. Mean clutch size of 16 studies ranged from 3.7-5.5 eggs; only one clutch is laid per season (MacWhirter and Bildstein, 1996). The eggs are incubated for about 30 days, and the young fledge after about another 30 days (MacWhirter and Bildstein, 1996).

Breeding population densities in northern North American populations range from 0.8 nests per 10 km^2 to 19.5 nests per 10 km^2 (MacWhirter and Bildstein, 1996); the highest densities were noted in the northern Great Plains (Minnesota, North Dakota and Manitoba). Densities in cold desert shrublands of Utah and Idaho are considerably lower (<0.1 nests per 10 km^2). Breeding densities vary considerably from year to year, depending on prey availability (MacWhirter and Bildstein, 1996).

Habitat Requirements:

Northern Harriers breed in open wetlands, wet, lightly grazed pastures, fallow fields, dry uplands, prairies, agricultural lands, and cold desert shrub-steppe (MacWhirter and Bildstein, 1996); in western North America they are found more often in dry upland habitats than in the rest of the continent (MacWhirter and Bildstein, 1996). Breeding habitat in California consists of both coastal and freshwater marshlands, usually where there is adjacent upland vegetation of grasslands including saltgrass, pasturelands, native prairies, and montane meadows (Grinnell and Miller, 1944).

Migrants and wintering birds are somewhat broader in their range of occupied habitats, using both wetland habitats and a variety of upland habitats with low vegetation. Wintering birds in the desert regions occur mainly in agricultural areas (Garrett and Dunn, 1981), especially those dominated by alfalfa fields; they also occupy extensive marshes such as at Piute Ponds and Harper Dry Lake. Migrants in the deserts are widespread in open habitats, including marshes, grasslands, pastures, agricultural fields, saltbush scrub, and even creosote scrub.

Population Status:

Overall, North American populations have declined during the twentieth century, with the major causes being the extensive draining of wetlands, implementation of monoculture farming, and reforestation of open farmlands (MacWhirter and Bildstein, 1996). White (1994) considers this species of variable, but possibly decreasing trends in western North America, citing habitat alterations (particularly wetlands loss) as the most important cause of possible declines. Breeding Bird Survey and Christmas Bird Count

data suggest a decline in populations of the southwestern United States since the early 1960s (MacWhirter and Bildstein, 1996).

Threats Analysis:

The primary threat to breeding Northern Harriers in the WMPA is the loss of or disturbance to the few extensive marsh habitats in the region. The overall area of the freshwater marshes at Piute Ponds has increased with the completion of a Ducks Unlimited marsh project in the late 1980s.

Shooting and trapping has been a threat to this species in parts of its range, especially where birds congregate at communal roosts in winter (MacWhirter and Bildstein, 1996); no large communal roosts of harriers occur in California.

Organochloride pesticides contributed to a 19% reduction in eggshell thickness and mass in Northern Harriers of western North America (Anderson and Hickey 1972), probably leading to reproductive failures and population declines. Such effects and declines have largely been reversed with the reduction in the use of DDT (MacWhirter and Bildstein, 1996). Dieldrin, heptachlor epoxide, mercury, and lead have been found in harrier tissues, but not at levels threatening reproductive success (MacWhirter and Bildstein, 1996).

Habitat degradation appears to be an important factor in this species' decline in California (Remsen, 1978). Destruction of or disturbance to marshes and other wetlands, grasslands, and wet meadows negatively affect this species; burning, plowing, or disking of grasslands during the breeding season may cause breeding failures (Remsen, 1978). Disturbance at nest sites may reduce reproductive success in some areas; pairs nesting in hayfields or agricultural fields may fail due to disturbance or nest destruction by livestock or agricultural activities (MacWhirter and Bildstein, 1996).

Known predators of eggs and nestlings include feral dogs (*Canis familiaris*), coyotes (*C. latrans*), raccoons (*Procyon lotor*), striped skunks (*Mephitis mephitis*), red foxes (*Vulpes fulva*), and Common Ravens (*Corvus corax*) (MacWhirter and Bildstein, 1996). All of these species have increased, have been introduced (feral dogs), or could potentially become established (red foxes) in areas of human activity in the WMPA, such as urban and suburban areas, ranches, and parks.

Biological Standards:

Wetlands preservation for waterfowl and habitat management for upland game birds may have a beneficial impact on Northern Harriers (MacWhirter and Bildstein, 1996). Such enhanced wetlands occur in the WMPA at sites such as Piute Ponds, Edwards Air Force Base. Habitat management resulting in extensive, undisturbed marshes and reedbeds will benefit harriers.

Harriers nesting in upland sites may benefit from the protection of habitats undisturbed by agricultural activities, livestock grazing, and recreational pressures; they may also benefit from the retention of annual growth through the breeding season. A reduction in or elimination of winter livestock grazing in wetland areas and grasslands may result in increased foraging success for harriers (MacWhirter and Bildstein, 1996).

Management of non-native predators and adaptable small to medium-sized carnivores (such as skunks and raccoons) may reduce predation at harrier nests; such

management is often accomplished, at least in part, by the maintenance of healthy populations of larger carnivores such as coyotes and mountain lions (*Felis concolor*), although an overabundance of coyotes may threaten harriers.

As for all raptors, continuing public education about the benefits of raptors and their legal protection is likely to benefit harriers.

Literature Cited:

Air Force Flight Test Center Environmental Management Office. 1993. Biological resources environmental planning technical report. Edwards Air Force Base, California.

Anderson, D.W. and J.J. Hickey. 1972. Eggshell changes in certain North American birds. pp. 514-540 *In:* H.H. Voous (ed.), Proceedings of the XVth International Ornithological Congress. P.J. Brill, Leiden.

Berger, D.D. 1958. Marsh Hawk takes prey from short-eared owl. Wilson Bull. 70:90.

Bildstein, K.L. and M. Ashby. 1975. Short-eared owl robs marsh hawk of prey. Auk 92:807-808.

California Department of Fish and Game, Natural Diversity Data Base. 1998. Special Animals. Biannual publication, Mimeo., 44 pp.

Clark, W.S. and B.K. Wheeler. 1987. A field guide to hawks of North America. Houghton Mifflin Co., Boston, Massachusetts.

ENSR Consulting and Engineering. 1989. Final biological baseline report for the Luz SEGS XI and XII project area, Harper Lake, California. Report No. 4360-009. ENSR Consulting and Engineering, Fort Collins, Colorado, and Camarillo, California.

Garrett, K. and J. Dunn. 1981. Birds of southern California: status and distribution. Los Angeles Audubon Society, Los Angeles, California.

Grinnell, J. and A.H. Miller. 1944. Distribution of the birds of California. Pacific Coast Avifauna, No. 27.

MacWhirter, R.B., and K.L. Bildstein. 1996. Northern Harrier (*Circus cyaneus*). *In:* A. Poole and F. Gill (eds.), The Birds of North America. The Academy of Natural Sciences, Philadelphia, Pennsylvania, and The American Ornithologists' Union, Washington, D.C.

Remsen, J.V., Jr. 1978. Bird Species of Special Concern in California. California Department of Fish and Game, Sacramento, California.

Rowe, S.P. and T. Gallion. 1996. Fall migration of turkey vultures and raptors through the southern Sierra Nevada, California. Western Birds 27:48-53.

Selleck, D.M. and B. Glading. 1943. Food habits of nesting barn owls and marsh hawks at Dune Lakes, California, as determined by the "cage nest" method. Calif. Fish and Game 20:122-131.

USDI, Bureau of Land Management, 1997. California Desert District Resource Area files.

White, C.M. 1994. Population trends and current status of selected western raptors. Studies in Avian Biology 15:161-172.

SHARP-SHINNED HAWK

Accipiter striatus velox

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Management Status: Federal: None
California: Species of Special Concern (CDFG, 1998)

General Distribution:

The Sharp-shinned Hawk breeds throughout the boreal forests of Canada and Alaska, and in both deciduous and evergreen forest habitats throughout much of the remaining United States including north Florida to Texas, and the southwestern border states. It is found primarily at higher altitudes in montane evergreen forests in the drier regions of the western United States. The range also extends south through the higher elevations of Mexico to the state of Oaxaca, and east into the Lesser Antilles (AOU, 1983).

Sharp-shinned Hawks winter infrequently in all areas of the breeding range (some individuals may remain year-round on the breeding territory). Most individuals vacate the northern half of the species' range during winter and they occur commonly in migration across the United States. In winter, they are present coast to coast throughout the southern United States and northern Mexico, and range as far south as Nicaragua, Costa Rica, and Panama (HawkWatch International, unpublished data; Evans and Rosenfield, 1985; AOU, 1983). They are casual or accidental in Bermuda and the Bahamas (Bent, 1961).

Distribution in the West Mojave Planning Area:

There are no breeding records for the Sharp-shinned Hawk in the WMPA; it occurs primarily as a winter visitor or migrant. It is a common winter visitor in all districts of southern California, and as a scarce summer resident in mountainous regions (Garrett and Dunn, 1981; Rosenberg et al., 1991).

Sight records exist dating back to 1893 in Death Valley (A.K. Fisher, in Grinnell and Miller, 1944), and the Colorado River valley in 1914 (Grinnell and Miller, 1944), both near, but not in the WMPA.
Within the WMPA, Sharp-shinned Hawks occur regularly during winter, as indicated by Christmas Bird Count data from China Lake, Joshua Tree National Park, Lancaster, Mojave River Valley, and Morongo Valley. They are tallied during migration at Apple Valley by the Mojave Desert Raptor Watch (McDermott 1994; Anonymous 1995). HawkWatch International had a winter (February) band recovery from Joshua Tree National Park of a female banded as a juvenile the previous autumn in the Goshute Mountains in eastern Nevada; it was found dead in 1985.

Natural History:

The smallest of the North American *Accipiters,* the Sharp-shinned Hawk shares a common general morphology with its larger congeners: short, rounded wings and a long, rudder-like tail for maneuverability in wooded habitats; long legs; and lithe, grasping toes. They occur in two distinct plumages; hatch-year or immature, and adult (definitive for the duration of the bird's life). The immature bird is brown on the back, and the head may be noticeably lighter in a clear dorsal view. Individual dorsal feathers are edged in rufous. The ventral surface is creamy white and heavily streaked with rusty-reddish to dark brown longitudinal markings evenly distributed breast to belly. Flanks are usually barred to heavily barred, with unmarked undertail coverts. Adults are slate-gray on the back and head, lacking a contrasting dark cap as seen on the Cooper's

Hawk (*Accipiter cooperii)*. The breast and belly are heavily barred in rufous on white, as are the flanks, with only the undertail coverts clear and starkly white (Wheeler and Clark, 1995). In overall proportions, the Sharp-shinned Hawk has relatively wider wings and a shorter tail than the larger Cooper's Hawk, resulting in a more stout, stumpy silhouette. The folded tail is often notched to square-tipped in the Sharp-shinned Hawk and more rounded in the Cooper's Hawk, although molt patterns can obscure these tendencies. When fully flared, the Sharp-shinned Hawk's tail may appear quite rounded. Sharp-shinned Hawks show the highest degree of sexual size-dimorphism of any North American bird, with the female nearly one-third larger, and up to twice as heavy as the male (Hill, 1944; Reynolds, 1972; Snyder and Wiley, 1976; Mueller et al., 1979; Meyer, 1987; Palmer ,1988; Hoffman et al., 1990). In addition to age and sex related dimorphism, there is significant regional variation in size (Wattel, 1973; Smith et al., 1990).

The diet is composed primarily of avian prey, from small songbirds up to bobwhite-sized quail, as well as the young of domestic fowl and Sharp-tailed Grouse (Fisher, 1893; Ferguson, 1922; Storer, 1966; Snyder and Wiley, 1976; Jones, 1979; Clarke, 1984; Joy et al., 1994). Occasionally they take small terrestrial mammals, bats, insects, lizards, frogs, and snakes (Jones, 1979; Palmer, 1988). As a hunter, the Sharp-shinned Hawk relies on speed and stealth, making short, quick forays after prey from a concealed perch. In urban areas, it is a common winter visitor at bird feeders, frequently quite visible as the abundance of prey seems to override its usual wariness of humans. In Cornell University's FeederWatch data it is the most common predator seen at feeders in winter, and Christmas Bird Count numbers of Sharp-shinned Hawks in the northeast have increased in recent years (Laurie Goodrich, Hawk Mountain Sanctuary, personal communication). Sharp-shinned Hawks are bold to the point of recklessness, sometimes crashing into dense foliage after prey, and they occasionally run prey down on foot.

The Sharp-shinned Hawk may reach sexual maturity and begin to breed in juvenile plumage in the second calendar year, but more commonly at >2 years of age (Bent, 1961; Clarke, 1984; Fischer 1984; Henny et al., 1985). They return to the breeding ground the latest of the accipiters (concurrently with the arrival of migrant passerines), and most frequently build a new nest each year within the previous year's territory (Hennessy, 1978; Reynolds and Wight, 1978; Clarke, 1984; Palmer, 1988). Laying generally occurs from early May through mid-July; the clutch size is most commonly 4 or 5 eggs in a range from 3-8 (Bent, 1961; Harrison, 1978). Eggs are laid on alternate days (Meng, 1951); therefore, incubation does not begin until the clutch is nearly complete. Incubation is from 21-35 days (Bent, 1961; Nice, 1954; Reynolds and Wight, 1978; Meyer, 1987; Palmer, 1988) with hatching synchronous to within one or two days (Palmer, 1988). "Branching" behavior begins between 21-27 days, with fledging several days later (Reynolds and Wight, 1978). Rearing of nestlings tends to coincide with the fledging of many of the Neotropical migrant songbirds, when the abundance of prey corresponds to the greatest demand for food (Palmer, 1988).

Habitat Requirements:

Sharp-shinned Hawks nest in large forests composed of conifer, deciduous, or mixed woodlands with a closed canopy dense enough that the nest is completely hidden. Nest trees are generally located near openings and brushy areas where prey is abundant and cover is sufficient for the perch and dash foraging style. A major breeding study in Oregon noted a preference for proximity to water, and characterized typical nest sites as even-aged (40-60 years), dense, single-layer canopy stands of conifer (Reynolds et al., 1982). Nest heights range from 10-60 feet (Harrison, 1978; Palmer, 1988). The male defended a nest territory approximately 245 feet (75 meters) in diameter in a study in New York, and there was apparently no overlap between the nest territory and the foraging territory (Meng, in Palmer 1988). Similar results were recorded in Utah; Sharp-shinned Hawks flew up to 0.75 miles (1200 meters) from the nest territory to hunt

(Platt, 1973). The average total area required in a study in Wyoming was 0.25-0.50 square mile (64.8-129.5 hectares) per pair (Craighead and Craighead, 1956).

During migration, Sharp-shinned Hawks use most habitat types with vegetative cover, avoiding bare areas and extensive openings (Palmer, 1988). They frequently follow ridgelines to exploit updrafts and, particularly in the inland west, avoid open valley floors by staying in montane forests at higher elevations where both prey and roosts are more available (HWI unpublished data). In the WMPA it is not uncommon to find Sharp-shinned Hawks at lower elevations in desert scrub, desert washes, Joshua tree woodland, and other vegetation.

Sharp-shinned Hawks also take advantage of a wide array of habitats during winter. They populate lower elevations using brush, shrubs, and trees that provide cover, and where there are concentrations of small birds (Palmer, 1988). Water and shelter are probably the limiting factors for prey species in the WMPA, and therefore may determine the distribution of hawks. Accordingly, riparian areas are probably the most important habitat on wintering grounds, providing foraging opportunities and roost sites for avian predators and prey species.

Population Status:

There is no evidence of a decline in migratory populations of Sharp-shinned Hawks in the western U.S. (HawkWatch International unpublished data; Golden Gate Raptor Observatory data in McDermott 1996; Battalio, 1996). Sharp-shinned Hawks continue to be seen in southern California and the WMPA in small but consistent numbers in winter, particularly during the Christmas Bird Counts. These sightings may be slightly biased by the site selection criteria of the CBC, which emphasizes areas of high bird species diversity and density.

Threats Analysis:

Habitat destruction (logging in forested areas and development in southern California), pesticide contamination, and shooting are probably the primary threats to Sharp-shinned Hawks, range-wide. Logging is a far greater threat to a breeding population than to a wintering population; the reduction of nest trees and, thereby, appropriate territories would have a greater impact on the species. This is not at issue in the WMPA. Loss of habitat to development for human needs is a known threat to many bird species in southern California. Sharp-shinned Hawks will adapt to an altered environment temporarily, for example by taking passerines at backyard feeders in the winter. However, this greatly increases the risk of collisions with windows, predation by domestic pets, and persecution by homeowners, and is not a viable substitute for "natural" habitat.

Pesticides and other agricultural chemicals may pose a significant hazard to Sharp-shinned Hawks in parts of the WMPA. Several studies have examined bioaccumulation of toxic material in the accipiters (Snyder et al., 1973; Elliott and Martin, 1994; Wood et al., 1996), and sprays used for insect and weed control, golf course and lawn fertilizers, and other agricultural applications often persist in the food chain with potentially negative effects.

Shooting might be a problem in the WMPA, although sight records are scattered and scarce enough that opportunities to shoot birds may be relatively infrequent. Remsen (1978) listed taking individuals for falconry as a potential threat to the species; however, the falconry community currently shows little interest in Sharp-shinned Hawks because of their small size, delicate nature, and general inappropriateness for the sport.

Biological Standards:

Management for the species to breed should include promoting, maintaining, and protecting a mosaic of closed-canopy forest within the designated height range. Protected forest patches must be large enough to conceal several nests because the birds rebuild each year (Reynolds and Wight, 1978), have an open or brushy understory, and encompass a large enough foraging range outside the defended nest territory to support sufficient prey. Sharp-sinned Hawks are ubiquitous in winter wherever suitable prey occur. Management to provide suitable habitat for wintering forest songbirds will, almost by default, constitute management for wintering Sharp-shinned Hawks.

Literature Cited:

American Ornithologists' Union. 1983. Checklist of North American Birds. 6th edition.

Anonymous. 1995. HMANA Hawk Migration Studies 21:appendix UU-VV.

Battalio, J. 1996. Western continental summary. HMANA Hawk Migration Studies 22:57-59.

Bent, A.C. 1961. Life Histories of North American Birds of Prey. Part 1. Dover Publications, Inc., New York.

California Department of Fish and Game, Natural Diversity Data Base. 1998. Special Animals. Biannual publication, Mimeo., 44 pp.

Clarke, R.G. 1984. The Sharp-shinned Hawk (*Accipiter striatus* Vieillot) in interior Alaska. M.S. thesis, Univ. Alaska, Fairbanks, Alaska..

Craighead, J.J., and F.C. Craighead, Jr. 1956. Hawks, owls, and wildlife. Stackpole Company, Harrisburg, Pennsylvania.

Elliott, J.E., and P.A. Martin. 1994. Chlorinated hydrocarbons and shell thinning in eggs of (*Accipiter*) hawks in Ontario, 1986-1989. Environ. Pollution 86:189-200.

Evans D.L., and R.N. Rosenfield. 1985. Migration mortality of sharp-shinned hawks ringed at Duluth, Minnesota, USA. pp. 311-316. *In:* I. Newton and R.D. Chancellor (eds.), Conservation Studies of Birds of Prey, ICBP Technical Publication 5. Thessaloniki: International Council for Bird Preservation.

Ferguson, A.L., and H.L. Ferguson. 1922. The fall migration of hawks as observed at Fisher's Island, N.Y. Auk 39:488-496.

Fischer, D.L. 1984. Successful breeding of a pair of Sharp-shinned Hawks in immature plumage. Raptor Res. 18:155-156.

Fisher, A.K. 1893. The hawks and owls of the United States in their relation to agriculture. Bulletin of the USDA Division of Ornithology and Mammalogy, No. 3.

Garrett, K. and J. Dunn. 1981. Birds of Southern California: status and distribution. Los Angeles Audubon Society, Los Angeles, California.

Grinnell, J. and A. Miller. 1944. The distribution of the birds of California. Pacific Coast Avifauna No. 27. (1986 reprint) Artemisia Press, Lee Vining, California.

Harrison, C. 1978. Nests, eggs and nestlings of North American birds. Collins, New York.

Hennessy, S.P. 1978. Ecological relationships of accipiters in northern Utah - with special emphasis on the effects of human disturbance. M.S. thesis, Utah State Univ. Logan, Utah.

Henny, C.J., R.A. Olson, and T.L. Fleming. 1985. Breeding chronology, molt and measurements of accipiter hawks in northeastern Oregon. J. Field Ornithol. 56:97-112.

Hill, N.P. 1944. Sexual dimorphism in the falconiformes. Auk 61:228-234.

Hoffman, S.W., J.P. Smith, and J. A. Gessaman. 1990. Size of fall-migrant accipiters from the Goshute Mountains of Nevada. J. Field Ornithol. 61:201-211.

Jones, S. 1979. Habitat management series for unique or endangered species, Report No. 17: The accipiters - Goshawk, Cooper's Hawk, Sharp-shinned Hawk. USDI Bureau of Land Management Technical Note 335.

Joy, S.M., R.T. Reynolds, R.L. Knight, and R.W. Hoffman. 1994. Feeding ecology of Sharp-shinned Hawks nesting in deciduous and coniferous forests in Colorado. Condor 96:455-467.

McDermott, F. 1994. California region. HMANA Hawk Migration Studies 20:56.
McDermott, F. 1996. California region. HMANA Hawk Migration Studies 22:60-61.
Meng, K.H. 1951. Cooper's Hawk, *Accipiter cooperii*. Ph.D. Diss., Cornell Univ., Ithaca, New York.
Meyer, K.D. 1987. Sexual size dimorphism and the behavioral ecology of breeding and wintering Sharp-shinned Hawks (*Accipiter striatus*). Ph.D. Diss., Univ. North Carolina, Chapel Hill, North Carolina.
Mueller, H.C., D.D. Berger, and G. Allez. 1979. Age and sex differences in size of Sharp-shinned Hawks. Bird-Banding. 50:34-44.
Nice, M.M. 1954. Problems of incubation periods in North American birds. Condor 56:173-197.
Palmer, R.S. (Ed.). 1988. Handbook of North American Birds. Volume 4. Yale Univ. Press, New Haven, Connecticut.
Platt, J.B. 1973. Habitat and time utilization of a pair of nesting Sharp-shinned Hawks - a telemetry study. M.S. thesis, Brigham Young Univ., Provo, Utah.
Remsen, J.V., Jr. 1978. Bird species of special concern in California. Department of Fish and Game, Wildlife Management Division, Sacramento, California.
Reynolds, R.T. 1972. Sexual dimorphism in accipiter hawks: a new hypothesis. Condor 74:191- 197.
Reynolds, R.T., and H.M. Wight. 1978. Distribution, density, and productivity of accipiter hawks breeding in Oregon. Wilson Bull. 90:182-196.
Reynolds, R.T., E.C. Meslow, and H.M. Wight. 1982. Nesting habitat of coexisting *Accipiter* in Oregon. J. Wildlife Manage. 46:124-138.
Rosenberg, K., R. Ohmart, W. Hunter, and B. Anderson. 1991. Birds of the lower Colorado River valley. Univ. Arizona Press, Tucson, Arizona.
Smith, J.P., S.W. Hoffman, and J. A. Gessaman. 1990. Regional size differences among fall-migrant accipiters in North America. J. Field Ornithol. 61:192-200.
Snyder, N.F.R., H.A. Snyder, J.L. Lincer, and R.T. Reynolds. 1973. Research report: organochlorines, heavy metals, and the biology of North American accipiters. BioScience 23:300-305.
Snyder, N.F.R., and J.W. Wiley. 1976. Sexual size dimorphism in hawks and owls of North America. Ornithological Monographs, 20:1-96.
Storer, R.W. 1966. Sexual dimorphism and food habits in three North American accipiters. Auk 83:423-436.
USDI, Bureau of Land Management, 1997. California Desert District Resource Area files.
Wattel, J. 1973. Geographical differentiation in the genus *Accipiter*. Nuttall Ornithological Club, Cambridge, Massachusetts.
Wheeler, B.K., and W.S. Clark. 1995. A photographic guide to North American raptors. Academic Press, San Diego, California.
Wood, P.B., C. Viverette, L. Goodrich, M. Pokras, and C. Tibbott. 1996. Environmental contaminant levels in Sharp-shinned Hawks from the eastern United States. J. Raptor Res. 30:136-144.

SHORT-EARED OWL
Asio flammeus

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Management Status: Federal: None
California: Species of Special Concern (CDFG, 1998)

General Distribution:

This widespread owl breeds over much of northern North America; additional populations occur across Eurasia, in the grasslands of South America, and on many oceanic islands. Many populations are migratory, and North American breeders winter south to Baja California, northern Mexico, and Florida. All North American birds belong to the nominate subspecies *A. f. flammeus*.

In California Short-eared Owls breed (or formerly bred) locally in the northern part of the state, in the Central Valley, and along the coast of southern California (Grinnell and Miller, 1944); a few breeding stations on the deserts have been recorded as well. Garrett and Dunn (1981) indicated that this species was eliminated as a breeder on the southern California coast before the middle of the twentieth century.

As noted above, the more northerly populations of this species are migratory, with an influx of birds into southern California occurring mainly from late October (casually as early as early September) through early March (and casually through April; Garrett and Dunn 1981). Short-eared Owls were formerly "abundant" in winter through much of California, and were still considered "common and widely distributed" by Grinnell and Miller (1944). Garrett and Dunn (1981) considered the species an uncommon and local winter visitor on the coastal slope, and generally rare on the deserts (although concentrations are sometimes reported).

Distribution in West Mojave Planning Area:

Nesting in the WMPA has been recorded only at Harper Dry Lake, where as many as twelve birds were present in April and May of 1980 and three active nests were found (Garrett and Dunn, 1981). Nesting was suspected, but not confirmed, in the Antelope Valley, six miles east of Lancaster, in spring of 1992 (Los Angeles County Museum files); two birds were present here in annual growth in abandoned alfalfa fields at least from 2-23 May 1992. During that same spring three birds were noted adjacent to Fox Field, northeast of Lancaster, on 25 March (Los Angeles County Museum files); this is around the time when most wintering birds have departed the region. A single bird was observed at Piute Ponds on the Edwards Air Force Base on 8 August 1993 (Los Angeles County Museum files), again with no evidence of nesting activity. Any nesting within the WMPA probably occurs only after exceptionally wet winters.

Short-eared Owls occur on the deserts (and presumably in the WMPA) mainly from late October through early March (Garrett and Dunn, 1981), with a few birds reported as early as early September and as late as late April. A group of 150 Short-eared Owls was reported in 1987 by Larry Foreman (pers. comm.) near the Harper Lake marshes. Apart from this report, the largest recent concentration found within the WMPA was of twenty or more birds on Cronese Dry Lake on 19 November 1978 (Garrett and Dunn, 1981). Four were south of Kelso on 27 October 1978 (Garrett and Dunn, 1981). This species is an occasional winter visitor and rare transient at the China Lake Naval Weapons Center (California Natural Diversity Data Base).

On the Lancaster Christmas Bird Count, this species has been recorded in eight years between 1979 and 1996, with only a single individual recorded in each instance (CBC data; F. Heath, unpublished data); most sightings on this count have been at Piute Ponds on the Edwards Air Force Base. Other winter sightings in the Antelope Valley (Los Angeles County Museum files) include two in alfalfa fields west of Lancaster on 1 November 1986 and one at Piute Ponds on 15 February 1981.

Natural History:

This medium-large owl (15 in, 38 cm) is distinguished by its buffy overall coloration, streaked underparts, and distinctive black "comma"-shaped marks on the greater primary coverts on the underside of the wing. Females are larger than males, averaging 378g to the males' 315g (Holt and Leasure, 1993). The Long-eared Owl (*A. otus*) is morphologically similar to the Short-eared, but is readily distinguished by its darker overall plumage, cross-barring on the streaked underparts, longer feathered tufts on the head, and (in flight) solid black patch on the under greater primary coverts. The two species differ in behavior and activity patterns as well: Short-eareds are largely crepuscular and are often active during the day, whereas Long-eareds are strictly nocturnal. The more buoyant, quartering hunting flight of the Short-eared Owl is more reminiscent of a Northern Harrier (*Circus cyaneus*) than of other owls. Short-eared Owls are not especially vocal away from the nesting areas; winter birds occasionally give a barking "kee-ow" call. On the breeding grounds they give a variety of additional calls and also engage in distinctive aerial courtship flights, often termed "sky-dancing" (Holt and Leasure, 1993).

Ecologically, this species is a crepuscular/nocturnal analog of the Northern Harrier, although the owl's diet includes far fewer birds. Numerous dietary studies (summarized by Clark 1975 and Holt and Leasure 1993) show that mammal prey constitutes up to 99% (and nearly always over 80%) of the diet. The great majority of mammal prey items are microtine rodents (e.g., voles, genus *Microtus*), with smaller numbers of *Thomomys* gophers, other rodents, shrews, and moles making up the remainder. In parts of the range of the Short-eared Owl, especially where colonial-nesting waterbirds are in close proximity, the owls may take chicks and recently-fledged young birds; waterbird nesting colonies are generally absent from the WMPA, although heronries are located at Piute Ponds and in the Mojave Narrow area. Prey is located by auditory and visual cues.

Short-eared Owls generally nest as widely dispersed pairs. In some regions they may nest semi-colonially, with densities of up to one pair per 13.6 acres (5.5 hectares). More typically a given breeding pair has a territory of 124-198 acres (50-80 hectares), and occasionally as large as 339 acres (137 hectares; Holt and Leasure, 1993). Pair formation occurs as early as mid-February in the southern part of the breeding range (including, presumably, the WMPA); courtship behavior may be noted as late as June. The white eggs (mean clutch size in North America is 5.6 eggs; Holt and Leasure 1993) are typically laid in April; incubation period is 21 days, and the young can fly when 30-35 days old (Holt and Leasure, 1993). Second broods have been reported in Europe, but there is no confirmation of double-clutching in North America (Holt and Leasure, 1993). The nest is located on the ground among herbaceous ground vegetation 30-50 cm (12-20 in.) in height.

Winter birds concentrate at communal roosts which may include up to 200 individuals in some regions (Holt and Leasure, 1993); the largest communal winter roosts noted in the WMPA have been of twenty birds (Garrett and Dunn, 1981), and numbers are typically much lower than this.

Habitat Requirements:

Typical habitat consists of open country which supports concentrations of microtine rodents; depending on the region breeding habitat might include prairies, coastal grasslands, salt and freshwater marshes, shrub-steppe, or agricultural lands including irrigated alfalfa fields (Holt and Leasure, 1993; Grinnell and Miller, 1944). Winter habitats are similar to those occupied in the breeding season, but more often include marshes and weedy fields; winter birds are sometimes noted at garbage dumps (Holt and Leasure, 1993). Grinnell and Miller (1944) note that, in California, tule (*Scirpus*) patches or tall grass is needed for nesting and daytime roosts; nest sites are usually on drier, raised sites compared to surrounding vegetation (Holt and Leasure, 1993). Rosenberg et al. (1991) consider this species to benefit from the agricultural development of the lower Colorado River Valley, where it occupies alfalfa fields as well as marshes.

Much habitat apparently suitable for Short-eared Owls is unoccupied, and presence of owls at a given sight may vary considerably from year to year (Holt and Leasure, 1993). In some instances wintering birds may remain to breed on the wintering territory (Holt and Leasure, 1993).

Population Status:

Concern for this species' status in parts of North America led to its placement on the National Audubon Society "Blue List" in 1976; it remained on that list until the Blue List was discontinued in 1986 (Holt and Leasure, 1993). Declines have been precipitous in much of northeastern United States, where loss of habitat due to human encroachment has been cited as the major factor (Holt and Leasure, 1993). Breeding Bird Survey data show significant declines in Short-eared Owls in much of Oregon, southern Idaho, and south-central Washington from 1966-1989; the same data suggest non-significant increases in California populations, although sample sizes are low (Holt and Leasure, 1993). Many authors have commented on the fluctuating nature of winter populations of Short-eared Owls.

Threats Analysis:

The primary threats to North American populations of this owl include shooting and habitat loss and degradation (Holt and Leasure, 1993). Grinnell and Miller (1944) considered shooting by waterfowl hunters to be the main cause in the decline of wintering birds in California; shooting has likely declined as a significant cause of mortality, although even as late as the mid-1970s Remsen (1978) considered the owl "especially vulnerable to shooting" in California. Like many owls, this species is susceptible to collisions with automobiles; Phillips et al. (1964) noted that four birds were picked up after being killed along a highway through alfalfa fields near Gila Bend, Arizona, during the month of December 1960.

The destruction of marsh and tall grassland habitat was considered "certainly the main cause for the decline" of this species in California (Remsen, 1978). Such degradation has occurred through the draining and filling of coastal and freshwater marshlands, grazing of grasslands, conversion of grasslands to agriculture, and urbanization.

Predators on eggs and small young of Short-eared Owls include corvids, domestic dogs (*Canis familiaris*), red foxes (*Vulpes vulpes*), and skunks (*Mephitis mephitis*). Two of these (red fox, domestic dog) are not native to the WMPA but are abundant (dog) or potentially established (fox). White (1994) considered Short-eared Owls to be especially vulnerable to predation by mammalian predators (e.g. foxes; raccoons, *Procyon lotor*) which increase their populations as a result of habitat alteration. The tremendous increase in WMPA populations of Common Ravens (*Corvus corax*; Boarman and Berry, 1994) could potentially impact breeding attempts of Short-eared Owls in the region. Holt and Leasure (1993) note that increases in Barn Owls (*Tyto alba*) through nest box programs in the eastern United States have possibly led to decreases in Short-eared Owls. Barn Owls are numerous in the WMPA (Garrett and Dunn 1981), but there is no evidence that they are increasing significantly (White, 1994); in fact, populations of Barn Owls in the Antelope Valley appear to have decreased during the 1990s (K. L. Garrett, pers. obs.).

There is little evidence for detrimental effects of pesticides on North American Short-eared Owl populations (Holt and Leasure ,1993).

Biological Standards:

Habitat protection is the most important management practice that might ensure the continued existence of Short-eared Owls in the WMPA. Freshwater marshes, in particular, have high value for this (and many other) species. Grassland habitats and lush annual herbaceous growth should be protected and restored where possible. Habitat management requirements for this species and for the Northern Harrier are similar. Habitat management for waterfowl could also benefit the Short-eared Owl and harrier, although the ratio of marsh vegetation to open water should be high (neither the owl nor the harrier make extensive use of large areas of open water); waterfowl management schemes (such as that implemented by Ducks Unlimited at

Piute Ponds, Los Angeles County, in 1989; **CITATION**) should consider habitat requirements of sensitive wetland species as well as game species.

Management of this species must recognize the degree of annual fluctuations in wintering populations and the occasional or ephemeral nature of breeding populations. The total amount of suitable habitat is certainly higher after exceptionally wet winters.

Attempts should be made to survey appropriate habitats for the presence of wintering and breeding Short-eared Owls; surveys should be undertaken during a period centered around dusk. Breeding birds are perhaps best surveyed in the early spring when aerial courtship flights ("sky-dancing") are given (Holt and Leasure, 1993).

Areas that are found to harbor breeding populations of Short-eared Owls should be protected from damage by livestock (which can destroy nests and damage marsh and grassland habitat). Continuing public education regarding the beneficial impacts of owl and other raptor populations and the illegality of shooting raptors should reduce the impacts of shooting cited by Grinnell and Miller (1944).

Literature Cited:

Boarman, W.I. and K.H. Berry. 1995. Common ravens in the southwestern U.S. Pp. 73-75. in Our living resources: a report to the nation on the distribution, abundance, and health of U.S. plants, animals, and ecosystems (E. T. Laroe., ed.). National Biological Service,Washington, DC.

California Department of Fish and Game, Natural Diversity Data Base. 1998. Special Animals. Biannual publication, Mimeo., 44 pp.

Clark, R.J. 1975. A field study of the Short-eared Owl (*Asio flammeus*) Pontoppidan in North America. Wildlife Monog. 47:1-67.

Garrett, K. and J. Dunn. 1981. Birds of southern California: status and distribution. Los Angeles Audubon Society, Los Angeles, California.

Grinnell, J. and A.H. Miller. 1944. Distribution of the birds of California. Pacific Coast Avifauna No. 27.

Holt, D.W. and S.M. Leasure. 1993. Short-eared Owl (*Asio flammeus*). *In:* A. Poole and F. Gill (eds.), The Birds of North America, No. 62. Philadelphia, Pennsylvania: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

Johnsgard, P. A. 1988. North American owls. Smithsonian Institution Press, Washington, D.C.

Phillips, A.R., J.T. Marshall and G, Monson. 1964. The Birds of Arizona. Univ. of Arizona Press, Tucson, Arizona.

Remsen, J.V., Jr. 1978. Bird Species of Special Concern in California. Wildlife Management Branch Administrative Report No. 78-1.

Rosenberg, K.V., R.D. Ohmart, W.C. Hunter and B.W. Anderson. 1991. Birds of the Lower Colorado River Valley. Univ. of Arizona Press, Tucson, Arizona.

USDI, Bureau of Land Management, 1997. California Desert District Resource Area files.

White, C. M. 1994. Population trends and current status of selected western raptors. Studies in Avian Biology No. 15:161-172.

SNOWY PLOVER
Charadrius alexandrinus

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Management Status: Federal: Threatened (Pacific Coast population only, 1993)
California: Species of Special Concern (CDFG, 1998)

General Distribution:

The species as a whole (known in the English-speaking Old World as "Kentish Plover" or "Sandplover") breeds over much of Eurasia, Africa, Australia, the eastern coast of Asia, the western coast of South America, and western, south-central and southeastern North America (Johnsgard, 1981). It occurs widely in North America; on the Pacific coast Snowy Plovers nest as far north as northern Washington and south to southern Baja California, including the northern Gulf of California. Coastal breeding populations also occur along the Gulf of Mexico, portions of the Greater Antilles, and eastern Mexico. Western populations may winter as far south as Guatemala. Inland, Snowy Plovers nest as far north as southern Saskatchewan and as far east as central Nebraska, Oklahoma and Texas (Page et al., 1995). Interior populations in the west breed at playa lakes and other shallow water habitats from east-central Oregon south to the Salton Sea, Imperial County, and east through the Great Basin (Page et al., 1995; Shuford, 1995). In California, wintering Snowy Plovers largely withdraw from the colder, more northerly latitudes, particularly in the interior, while plover numbers remain rather constant in the San Joaquin and Imperial valleys (Shuford, 1995).

Distribution in the West Mojave Planning Area:

Snowy Plovers nest on certain playas (dry lakes) and other wetland areas in the WMPA; most appear to depart the region for the winter, but migrants and wintering birds are known from a few localities as well. Page et al. (1991) reported small, relatively stable Snowy Plover breeding populations in their 1978 and 1988 censuses for China, Koehn, and Rosamond dry lakes. Largest numbers (61 plovers) were reported from Harper Lake during both surveys. The first documented nesting of Snowy Plovers and the highest counts of 96 plovers at Harper wetlands was provided by LeValley in June of 1978 (CNDDB). Page et al. (1991) attribute the lack of Snowy Plovers at Searles Lake during their 1988 census to reductions in suitable habitat (high lake levels). Since the early 1980s breeding has been suspected at Piute Ponds where as many as 20 adults have been observed at one time. From May through July, territorial and nest-scraping behaviors have often been observed. Nesting was finally confirmed at Piute Ponds in 1991 when K. L. Garrett (unpubl. data) noted the presence of two young chicks and 18 adults in July. During the breeding season, Snowy Plovers are also regularly observed at the salt evaporator ponds at Dale Dry Lake and at the Edison Solar I ponds near Daggett (Michael Patten, unpubl. data) and it is likely that they also nest at these sites.

Snowy Plovers are generally absent from the WMPA in winter (Garrett and Dunn, 1981). A few do winter at Piute Ponds and the Lancaster Sewage Ponds. Here, the presence of Snowy Plovers has been erratic during the period 1979 through 1996. As many as 26 plovers have been recorded here on the Lancaster Christmas Bird Count (American Birds/National Audubon Society Field Notes), with the species found on eight of 18 such counts. Although as many as 30 Snowy Plovers have been recorded in late October at Harper Lake (S. Myers, unpubl. data) in recent years, four to six birds are typically found there from November through February (Shuford, 1995). One additional published winter record within the WMPA reported a single plover at East Cronese Lake in mid-November, 1978 (McCaskie, 1979).

Natural History:

Snowy Plovers are small shorebirds (5-7 in., 15-17 cm) that show little or no sexual dimorphism in size. The mean mass of Snowy Plovers in California was 40-43 g (Page et al.,

1995). These plovers are distinguished by an incomplete breast band that is restricted to dark lateral patches at the shoulders. Their pale brown upperparts (matching dry alkali mud remarkably well), thin black bill, blackish legs and feet, and abbreviated breast band distinguish them from the Semipalmated Plover (*Charadrius semipalmatus*) of similar size (Scott 1993). Markings at the forecrown, ear coverts and at sides of breast are black in males and tend to be somewhat browner in females and inconspicuous in immature birds (Page et al., 1995; Scott, 1983).

Page et al. (1995) provide the following natural history information for this species; no specific data are available from breeding populations in the WMPA. Snowy Plover pair formation and nesting generally begins by mid-March; but may vary geographically, with later nest initiation dates among northern populations. On the coast, Snowy Plovers nest on sandy beaches with little slope, while in the interior, plovers nest on sparsely vegetated alkali flats, at dry lake margins and at evaporation ponds. Nest scrapes are usually placed away from cover and are lined with small pebbles, fish bone, and shell fragments. Egg clutches range from 2-6, but 3 eggs are most common. Both male and female Snowy Plovers participate in incubation, which generally lasts between 26-32 days. Young plovers attain flight at 29-33 days of age. Coastal California Snowy Plovers may raise multiple clutches during a single breeding season.

Snowy Plovers sometimes cover eggs with a shallow layer of fine gravel when disturbed from their nests. This behavior does not necessarily appear to protect eggs from the lethal effects of direct insulation (Grant, 1986; K. C. Molina, pers. obs.). While not possessing any apparent physiological adaptations for breeding in hot environments, Snowy Plovers appear to be behaviorally adapted to nesting in arid and saline environments (Purdue, 1976; Purdue and Haines, 1977).

Snowy Plover dietary items include brine flies, shrimp, amphipods, polychaetes, and beetles along with other invertebrate prey. These plovers may also feed by stamping their feet in shallow water, which presumably enhances prey capture (Page et al., 1995).

Habitat Requirements:

Coastally, Snowy Plovers use sandy beaches, lagoons and salt-evaporation ponds for nesting and feeding. In the interior, plovers inhabit salt flats around playa lakes and evaporation ponds. In the WMPA breeding populations have been found on several such playas and evaporation ponds. Additional habitats within the WMPA that are used by breeding birds include diked sewage treatment ponds (as at Lancaster) and ponds managed for wintering waterfowl (Piute Ponds on the Edwards Air Force Base).

Snowy Plovers lay their eggs in scrapes excavated in sandy or silty substrates. On mudflats, nests and eggs may be placed in existing depressions such as in the dried tracks of humans, animals and motor vehicles (Page et al., 1995; Mellink et al., 1996).

Snowy Plovers forage for small invertebrate prey along tidal flats or at shallow water margins (Page et al., 1995).

Population Status:

Most recent information estimates the U.S. breeding population of Snowy Plovers at 21,000 individuals. During their western North American survey of 1988-89, Page et al. (1991) reported a maximum of 9,800 breeding Snowy Plovers in Washington, Oregon, California, Nevada and Utah, a decline of 20% over population censuses taken almost a decade earlier. The coasts of Oregon and California north of San Francisco appear to have suffered the greatest declines during this period. California populations of interior nesting plovers have experienced no net difference in the number of breeding plovers; declines observed at Owens Lake are somewhat offset by the increases in the San Joaquin Valley (Page et al., 1991). These authors indicated relatively stable Snowy Plover breeding populations between their 1978 and 1988 censuses for China, Koehn, and Rosamond lakes, and attributed the lack of Snowy Plovers at Searles Lake during the 1988 census to reductions in suitable nesting habitat.

Recent surveys by Shuford et al. (1995) indicate that in the interior, most California Snowy Plovers winter in the San Joaquin Valley and at the Salton Sea.

Threats Analysis:

Startling declines among Pacific coast populations in the late 1980s (Page et al., 1995) led to the federally threatened listing and the identification of critical habitat for those populations occurring within 50 miles of the coast (USFWS 1993). Although interior populations lack any special status and are treated as discrete from coastal ones, limited banding data indicate some movement of Snowy Plovers from the interior to the coast during winter and may indicate some degree of interpopulational mixing. (Page et al., 1995). Because Snowy Plovers nest on open coastal strand beaches, their eggs and young are susceptible to tidal inundation of low lying mudflats and sandbars on the coast and near river mouths. Their nests are also vulnerable to disturbances by humans, their pets and off-road vehicles. Common avian predators include gulls (*Larus* spp.), ravens (*Corvus corax*), and Northern Harriers (*Circus cyaneus*). Snowy Plover nests are also susceptible to mammalian predators such as foxes (*Vulpes vulpes*), feral dogs and cats (Page et al., 1995). On desert alkali playas and other breeding habitats in the WMPA, breeding Snowy Plovers are similarly vulnerable to human disturbances including off-road vehicle use in the vicinity of dry lake beds and to mammalian predators (e.g. coyotes, *Canis latrans*). Potential avian predators of eggs and young of these plovers in the WMPA include Loggerhead Shrikes (*Lanius ludovicianus*), falcons (*Falco* spp.), gulls, crows (*C. brachyrhynchos*), and ravens (Page et al., 1995). Breeding Snowy Plovers may also be susceptible to rising water levels at managed impoundments that inundate low-lying islets used for nesting (Barnum et al., 1992).

Biological Standards:

Within the WMPA, the restriction of lake margins from off highway vehicle use during the breeding season in areas where significant numbers of Snowy Plovers are known to nest (e.g. Harper, China, Koehn, and Rosamond dry lakes, and Piute Ponds) is essential. Appropriate water management regimes (draw downs) in impoundments can enhance Snowy Plover breeding and foraging habitat in artificial systems. Snowy Plovers nesting on evaporation ponds in the San Joaquin Valley appear to be relatively insensitive to selenium accumulation (Shuford 1995), a potential problem that is characteristic of evaporation impoundments in arid environments.

Literature Cited:

Barnum, D.A., W.L. Hohman, and D.L. Roster. 1992. Characteristics of snowy plover (*Charadrius alexandrinus*) nest sites on agricultural drainwater evaporation ponds in the San Joaquin Valley, California. pp. 27-31, *In:* Endangered and sensitive species of the San Joaquin valley, California: their biology, management, and conservation. D. Williams, S. Byrne, and T. Rado, eds. Calif. Energy Commission, Sacramento.

California Department of Fish and Game, Natural Diversity Data Base. 1998. Special Animals. Biannual publication, Mimeo., 44 pp.

Garrett, K.L. and J.L. Dunn. 1981. Birds of Southern California: Status and Distribution. Los Angeles Audubon Society, Los Angeles, California.

Grant, G.S. 1982. Avian incubation: egg temperature, nest humidity, and behavioral thermoregulation in a hot environment. Ornithol. Monogr.30. American Ornithologists' Union. Washington D.C.

Johnsgard, P.A. 1981. The plovers, sandpipers and snipes of the world. Univ. of Nebraska Press, Lincoln, Nebraska.

McCaskie, G. 1979. The southern pacific coast region. Am. Birds 33:213-218.

Mellink, E., E. Palacios, and S. Gonzalez. 1996. Notes on nesting birds of the Cienega de Santa Clara saltflat, northwestern Sonora, Mexico. West. Birds 27:202-203.

Page, G.W. and L.E. Stenze (eds.). 1981. The breeding status of the snowy plover in California. West. Birds 12:1-40.

Page, G.W., M.A. Stern, and P.W.C. Paton. 1995. Differences in wintering areas of snowy plovers from inland breeding sites in western North America. Condor 97:258-262.

Page, G.W., J.S. Warriner, J.C. Warriner, and P.W.C. Paton. 1995. Snowy plover (*Charadrius alexandrinus*). *In:* A. Poole and F. Gill (eds.), The Birds of North America, No. 154. The Academy of Natural Sciences, Philadelphia, Pennsylvania, and The American Ornithologists' Union, Washington, D.C.

Purdue, J. R. 1976. Thermal environment of the nest and related parental behavior in snowy plovers, *Charadrius alexandrinus*. Condor 78:180-185.

Purdue, J. R., and H. Haines. 1977. Salt water tolerance and water turnover in the Snowy Plover. Auk 94:248-255.

Scott, S. (ed.). 1983. Field Guide to the Birds of North America. National Geographic Society, Washington D.C.

Shuford, W.D., G.W. Page, and C.M. Hickey. 1995. Distribution and abundance of snowy plovers wintering in the interior of California and adjacent states. West. Birds 26:82-98.

USDI, Bureau of Land Management, 1997. California Desert District Resource Area files.

USDI, Fish and Wildlife Service. 1993. Final rule listing the Western Snowy Plover as threatened. U.S. Federal Register, March 1993.

SOUTHWESTERN WILLOW FLYCATCHER
Empidonax traillii extimus

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Management Status: Federal: Endangered
California: Endangered (CDFG, 1998)

General Distribution:

The Willow Flycatcher is a nearly transcontinental species breeding widely across temperate North America and migrating for the winter to Middle and northwestern South America. It consists of four subspecies (*contra* Browning, 1993).

(1) Nominate *traillii* (including *campestris*) breeds in the Great Plains region and has extended its range into the northeastern U.S.

(2) *E. t. adastus* breeds in the Great Basin and central Rocky Mountain region, south to Utah and Colorado.

(3) *E. t. brewsteri* breeds in the Pacific Northwest and south in the Sierra Nevada in central California.

(4) *E. t. extimus* breeds in southern California (north to the Santa Ynez River, Kern River, and Independence on the Owens River), southern Nevada, southern Utah, Arizona, New Mexico, and extreme western Texas. A few records suggest rare or sporadic breeding in northwestern Baja California and northeastern Sonora. *Extimus* differs from the other two western races by its paler upperparts and lack of contrast between crown and back (dark centers to the crown feathers often contrast with the paler olive tips, generating a dappled effect).

All subspecies of the Willow Flycatcher are completely migratory. The species as a whole winters from southern Mexico south through Central America to Panama and western Venezuela. Subspecies *extimus* has been collected in winter in Guatemala, El Salvador, Honduras, and Costa Rica (Unitt, 1997). Otherwise, the winter distribution and ecology of the subspecies remain unknown.

Because the species is strongly migratory, migrants of the more northern subspecies occur commonly in the breeding range of *extimus*. Southern California lies across the main migration route of *brewsteri*, and specimens of *brewsteri* outnumber specimens of *extimus* in collections from the range of the latter. With the population crash of *extimus*, almost all Willow Flycatchers seen in southern California are *brewsteri*. *Extimus* is encountered only at the few sites where it breeds.

Subspecies *extimus* arrives in spring usually in early May, rarely as early as the last two or three days of April. In occasional years they are delayed until the third week of May. In fall, the adults depart mainly during the last half of August, remaining rarely as late as 4 September. Juveniles remain later in September but all have departed by 1 October.

Distribution in the West Mojave Planning Area:

The Southwest Willow Flycatcher (*E.t. extimus*) is confirmed to occur in the WMPA on the basis of a single specimen, a male with "testes large" collected at Oro Grande on 26 May 1920 (Museum of Vertebrate Zoology 40543). However, the occurrence of this subspecies just to the west at Weldon on the South Fork Kern River, to the north at Independence, and to the east along the Colorado River imply that any population of Willow Flycatchers nesting in the western Mojave Desert would be *extimus*. Subspecies *brewsteri* occurs as a regular migrant throughout the area.

Summering Willow Flycatchers in the area thus interpreted as *extimus*, the subspecies appears to be known from only two sites in the WMPA:

(1) At Big Morongo Wildlife Preserve, Cardiff et al. (1982) found one nesting pair in 1981. Subsequent years' regular study, however, failed to reveal any further resident Willow Flycatchers (E. A. Cardiff pers. comm.). The birds' use of the site is evidently only ephemeral.

(2) Along the Mojave River, since the specimen from Oro Grande in 1920, the only subsequent reports of summering Willow Flycatchers are Stephen J. Myers' (pers. comm.) observation of a territorial male from 16 June to 8 July 1990 at Mojave Narrows Regional Park and Robert McKernan's (pers. comm.) observations in 1994 and 1995 about one-quarter mile downstream (north-northwest) of the Interstate 15 crossing. From 10 to 21 June 1994 McKernan observed a single pair, saw it copulating on the first date, and heard another singing bird on the last date. He observed two pairs at the site on 13, 16, and 19 June 1995. Nesting was never confirmed.

The California Natural Diversity Data Base has a record of a supposedly nesting Willow Flycatcher just south of the WMPA at Whitewater on 17 May 1987, too early for the species' nesting and therefore evidently in error.

Natural History:

The Southwestern Willow Flycatcher has grayish olive upperparts, a whitish throat, a pale gray tinge on the breast, and a pale yellow-tinged belly. The dark gray wing feathers are edged paler, olive on the coverts (forming wing bars) and pale grayish on the secondaries, especially the tertials. The bird weighs about 12-13 grams, has a wingspread of around 8.1-8.7 in. (??-?? cm), and is around 5.5-5.9 in. (??-?? cm) long.

The Willow Flycatcher closely resembles several other small flycatchers of the genus *Empidonax* as well as the Western Wood Pewee (*Contopus sordidulus*). It differs from the other species of *Empidonax* by its near lack of a pale eye ring and from the Western Wood Pewee by its smaller size, paler, more olive upperparts, and habit of wagging the tail. The song of the Willow Flycatcher is characteristic: "witcha-pew," commonly rendered "fitz-bew" in the literature. The species is not easily identified by the inexperienced; intensive study both in the field and museum is essential to reliable identifications, in the field or in the hand. Studies of nonsinging birds that are not supported by such experience (e.g., Yong and Finch, 1997) lead to inaccurate data. The subspecies can be identified reliably only through comparison of museum specimens.

Like most other flycatchers, the Willow is a diurnal insectivore, catching its prey on the wing usually in the middle story of riparian woodland. Males maintain and advertise a territory by singing. Territorial defense begins essentially immediately after spring arrival. Females occasionally sing, apparently when stimulated by territorial disputes (Seutin, 1987; Sogge et al., 1997). Most birds are monogamous within one breeding season, but 10-20% of males have two

mates, and one instance of trigyny is known from the South Fork Kern River. Not all territorial males are mated.

Territory sizes of *extimus* along the San Luis Rey River range from 0.097-0.18 acres (W.E. Haas pers. comm.), in the Grand Canyon from 0.036-0.2 acres (Sogge et al., 1997). A study in Wisconsin found that territory size is apparently independent of population density. Population density in suitable habitat can range up to 6 females and 5 males in 1.78 acres (0.75 females per acre), as observed along the South Fork Kern River (M. Whitfield pers. comm.). The birds use a home range larger than the defended territory.

Nests are initiated usually within one week of pair formation, 10-14 days after spring arrival. Building them takes three to eight days. The nests are open cups, attached by the sides to slender stems and twigs, which may be vertical, horizontal, or slanting. They may be in an upright crotch or without support from below. Nest material often trails from the bottom of the cup. Only the female builds the nest. The nest substrate varies greatly by site. In historic egg collections from southern California, 86% of nests were in willows (*Salix* spp.), 4% in stinging nettles (*Urtica dioica*), and 10% in other plants (Unitt 1987). On the South Fork Kern River 70% were in willows, 10% in stinging nettles, and 15% in both (M. Whitfield pers. comm.). On the San Luis Rey River, however, a canyon rather than floodplain site, 92% of nests have been in coast live oak (*Quercus agrifolia*). Materials used in the nest include bark, plant fibers, stems, and grass in the cup, grass, animal hair, plant down, feathers, and spider cocoons in the lining. The height of the nest above the ground is highly variable. In historic egg collections from southern California, the range is 2-18 ft (?-? m), mean 7.5 ft (? m; Unitt 1987). More recent data also show much variability: range 2-33 ft (?-?? m) on the South Fork Kern River (M. Whitfield pers. comm.), 2-28 ft (?-?? m) on the San Luis Rey River (W. E. Haas pers. comm.).

Egg-laying may begin as early as 24 May (historic egg collections); recent studies found the earliest clutches initiated on 25 May on the South Fork Kern River (M. Whitfield pers. comm.) or 5 June on the San Luis Rey River (W. E. Haas pers. comm.). The median date of 92 first nest attempts on the South Fork Kern River from 1989 to 1995 was 12 June (M. Whitfield pers. comm.). The clutch consists normally of 3 or 4 eggs; 2-egg clutches are rare, 5-egg clutches very rare. In historic egg collections, the average clutch size in coastal southern California is 3.4 eggs, along the Colorado River, 2.8 eggs. Along the South Fork Kern River, Mary Whitfield has found a mean size of 3.78 eggs in first nest attempts, 2.78 in second nest attempts, and 2.29 in third or fourth nest attempts. The incubation period is 12 or 13 days from the laying of the last egg. Only the female incubates. The young fledge at an age of 12-15 days. They may disperse from their natal territory 14 or 15 days after fledging, but they remain longer when, as usual, no second clutch follows.

Viable clutches may be laid as late in the summer as 16 July. The latest recorded dates for eggs are 30 July (historic southern California egg collections) and 31 July (South Fork Kern River, M. Whitfield pers. comm.). Singing decreases through July, ending in the last week of July or first week of August.

Habitat Requirements:

The Southwestern Willow Flycatcher breeds only in riparian woodland, typically adjacent to or even over water. Surface water or saturated soil is usually present in or adjacent to nesting sites during at least the initial portion of the nesting period (Muiznieks et al., 1994; Tibbits et al., 1994). Riparian woodland used by Willow Flycatchers typically has a canopy and an understory

of shrubs or saplings. The vegetative composition of the habitat varies greatly from site to site. The habitat commonly represented in historical records, and still occupied on the South Fork Kern, Santa Margarita, and Santa Ynez rivers, is dominated by native willows. Along the San Luis Rey River the plant species are more varied, with ash, alder, and coast live oak being major components. In Arizona, as at Roosevelt Lake and in the Grand Canyon, the Willow Flycatcher occupies nearly pure stands of mature nonnative tamarisk (e.g., Spencer et al., 1996; Sogge et al., 1997). In very low deserts, however, as along the Colorado River south of Lake Havasu, the flycatcher makes little if any use of tamarisk woodland. Young tamarisk thickets are not occupied anywhere. Near the Gila River in New Mexico, *extimus* occupies floodplain forest dominated by cottonwoods and boxelders and narrow strips of riparian vegetation, including the nonnative Russian olive, along networks of water-diversion ditches (D. Zimmerman in litt.). Because the flycatchers frequently nest adjacent to water, aquatic plants such as cattail, bulrush, or (along the San Luis Rey River) *Sparganium eurycarpum* are a conspicuous element of the habitat. Clearly, water and vegetation structure are important to the Willow Flycatcher; plant-species composition is not. Studies in Arizona find the birds selecting the densest riparian vegetation available (e.g., Spencer et al., 1996).

Population Status:

In southern California, *extimus* was once widespread in riparian woodland. Through the 20th century, however, the subspecies declined precipitously, becoming restricted to a few small scattered populations. The principal sites are along the South Fork Kern River near Weldon, along the Santa Ynez River from Vandenberg Air Force Base to Buellton, Prado Basin in the Santa Ana River, near Corona, Santa Margarita River, Camp Pendleton to Fallbrook, and San Luis Rey River, La Jolla Indian Reservation to Lake Henshaw. Other sites are used only ephemerally or their regularity of use has yet to be ascertained. In any case, use of other sites is likely of only a few scattered pairs. It seems improbable that other significant populations remain to be discovered.

Threats Analysis:

Synergy between loss and degradation of riparian habitat and brood-parasitism by the invading Brown-headed Cowbird seems responsible for the Southwestern Willow Flycatcher's decline (Unitt, 1987). Loss of riparian wetlands has been especially severe in California, estimated at 91%. In coastal southern California, these losses have been due largely to conversion of floodplains to agriculture (and then commonly to cities) and flood-control projects. In Arizona and New Mexico, overgrazing by cattle has been an important factor. Overgrazing can degrade Willow Flycatcher habitat both directly and indirectly. Cattle eat and trample the vegetation on which the flycatcher depends, removing the understory. On a broader scale, overgrazing removes vegetative cover that assists rain in permeating the ground; water tables decline and wetlands dry out, eliminating Willow Flycatcher habitat. Other processes that disrupt water tables, such as overpumping for agriculture or urban use or compaction of the soil, accelerating runoff, also adversely affect the Willow Flycatcher's habitat.

Brood-parasitism by the Brown-headed Cowbird is also a major negative factor on the Willow Flycatcher. For example, Harris (1991) found that at least 68% of Willow Flycatcher nests on the South Fork Kern River had been parasitized and that cowbird parasitism was the leading cause of nest failure. The flycatchers may accept the cowbird eggs, in which case they

invariably raise cowbird young if the cowbird lays shortly after the flycatcher. Even if the cowbird lays too late in the flycatcher's incubation period to be assured sufficient incubation, it typically removes one of the host's eggs, reducing the number of young the flycatcher can raise. More frequently, the flycatchers abandon the parasitized nest and start their nesting cycle over. Repeated cases of parasitism may lead to repeated nesting attempts, reducing the birds' efficiency--often to zero. Because the birds arrive so late in the spring, the Willow Flycatcher's breeding season is among the shortest of North American songbirds, heightening the species' sensitivity to disruptions to its breeding cycle of any sort.

Biological Standards:

The minimum requirements necessary for a self-sustaining population of the Willow Flycatcher can only be guessed at under the current state of knowledge. Nesting birds defend only a small territory, commonly under 0.2 acre (Sogge et al., 1997; W.E. Haas pers. comm.). Several pairs may pack themselves into suitable habitat at close to this density. Along the San Luis Rey River, where the birds are arranged in a narrow linear strip, the population consists of about 35 pairs in 3 mi. (W. E. Haas pers. comm.). In Arizona, sites of stands of riparian woodland occupied by Willow Flycatchers ranged from 0.12 (in montane willows) to 20 (in low-elevation tamarisk) acres (Spencer et al., 1996).

Though the Willow Flycatcher maintains some degree of fidelity to its nesting sites, this fidelity is not absolute; birds shift from site to site from year to year, complicating the question of the size of a viable population. Good information on how this vagility affects the bird's population dynamics is possible only with multiple populations intensively banded over several years. Such a banding effort only began in 1996; because the effort so far depends heavily on volunteers and the vagaries of the U.S. Fish and Wildlife Service's permitting procedures, its future remains cloudy.

The Southwestern Willow Flycatcher's remaining population is distributed among both larger populations or colonies and isolated scattered pairs and individuals. Do the scattered pairs contribute positively or negatively to the subspecies' population dynamics? Data on population dynamics sufficient to answer this population do not exist. Fluctuations of Willow Flycatchers in the Grand Canyon show that the isolated pairs are *not* self-sustaining (Sogge et al., 1997). Data currently available are not sufficient to reveal whether any population or colony is self-sustaining. Alleviation of parasitism pressure through cowbird trapping has not resulted in immediate population increases at least on the Kern River (M. Whitfield pers. comm); evidently all the negative factors on the species have not been identified.

Because the viability of the current population is open to question, the species cannot be considered recovered until its numbers are substantially greater than today's. Because of the questionable contribution of isolated pairs, the estimate should take into account substantial colonies only. A few years' experience along the San Luis Rey River suggests that a population of 35-38 pairs may be self-sustaining, at least in the short term, if high nesting success can be maintained by eliminating cowbirds. Twenty-five colonies of 40 pairs each, in combination with intensive cowbird trapping at each, yields a total population of 1000 pairs, which may have a chance of sustaining itself.

The Mojave Desert has never been reported as an important region for the Willow Flycatcher. Currently, the birds use the area only sporadically. Apparently, at present, the habitat is only marginally suitable. However, it is quite possible that the Mojave River once supported a significant population that was extirpated before it was reported by biologists. The Kern River

offers an intriguing parallel. On both the Kern and Mojave rivers, the *Empidonax traillii extimus* is known from a single historic specimen. The birds of neither area were thoroughly inventoried and reported on in the earlier literature. Yet now the Kern River is the site of one of the subspecies' key populations, presumably as a relict. The Mojave may once have had an equally important role, suggesting it as a site for an attempt at restoration.

Literature Cited:

Browning, M.R. 1993. Comments on the taxonomy of *Empidonax traillii* (Willow Flycatcher). West. Birds 24:241-257.

California Department of Fish and Game, Natural Diversity Data Base. 1998. Special Animals. Biannual publication, Mimeo., 44 pp.

Cardiff, E.A., Kniffen, J., and Kniffen, R. 1982. Breeding birds survey 197. Desert riparian-freshwater marsh and ponds. Amer. Birds 36-102-103.

Harris, J.H. 1991. Effects of brood parasitism by brown-headed cowbirds on willow flycatcher nesting success along the Kern River, California. West. Birds 22:13-26.

Muiznieks, B.M., T.E. Corman, S.J. Sferra, M.K. Sogge, and T J. Tibbits. 1994. Arizona partners in flight 1993 southwestern willow flycatcher survey. Nongame and Endangered Wildlife Program Technical Report 52. Arizona Game and Fish Dept., Phoenix, Arizona.

Seutin, G. 1987. Female song in willow flycatchers (*Empidonax traillii*). Auk 104:329-330.

Sogge, M.K., T.J. Tibbitts, and J.R. Peterson. 1997. Status and breeding ecology of the southwestern willow flycatcher in the Grand Canyon. West. Birds 28:142-157.

Spencer, J.A., S.J. Sferra, T.E. Corman, J.W. Rourke, and M.W. Sumner. 1996. Arizona partners in flight 1995 southwestern willow flycatcher survey. Nongame and Endangered Wildlife Program Technical Report 97. Arizona Game and Fish Dept., Phoenix, Arizona.

Tibbits, T.J., M.K. Sogge, and S.J. Sferra. 1994. A survey protocol for the Southwestern Willow Flycatcher (*Empidonax traillii extimus*). Technical Report NPS/NAUCPRS/NRTR-94/04. Colorado Plateau Research Station, Northern Arizona Univ., Flagstaff, Arizona.

Unitt, P. 1987. *Empidonax traillii extimus*: An endangered subspecies. West. Birds 18:137-162.

Unitt, P. 1997. Winter range of the southwestern willow flycatcher (*Empidonax traillii extimus*). Report to Bureau of Reclamation, P.O. Box 9980, Phoenix, Arizona 85068-0980.

USDI, Bureau of Land Management, 1997. California Desert District Resource Area files.

Yong, W., and Finch, D.M. 1997. Migration of the willow flycatcher along the middle Rio Grande. Wilson Bull. 109:253-268.

SUMMER TANAGER
Piranga rubra

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Management Status: Federal: None
California: Species of Special Concern (CDFG, 1998)

General Distribution:

The Summer Tanager is one of four tanagers, all of the genus *Piranga* that regularly occur north of Mexico. Its breeding range extends from southern California, southern Nevada, southwestern Utah, central Arizona, central New Mexico, central Texas, west-central Oklahoma, eastern Kansas, southeastern Nebraska, southern Iowa, central (rarely northern) Illinois, southern Wisconsin (formerly), central Indiana, southern (rarely northern) Ohio, southwestern Pennsylvania, West Virginia, Virginia, eastern Maryland, and New Jersey south to northeastern Baja California, southeastern Sonora, northern Durango, southeastern Coahuila, central Nuevo León, southern Texas, the Gulf Coast, and southern Florida (AOU, 1998). The subspecies breeding in California, *P.r. cooperi*, occurs from southern California east to western Texas and south to Durango and Nuevo León, Mexico. In California, Summer Tanagers nest along the Colorado River and at scattered localities throughout the deserts. *P.r. cooperi* winters from southern Baja California and southern Sinaloa to Michoacán, Morelos, and Guerrero (AOU, 1957).

Summer Tanagers are rare, but regular migrants and winter visitors throughout much of southern California (except the mountains). Based on museum specimens, it is believed that most records of migrants pertain to the nominate *P.r. rubra*. Little is currently known of the status of migrant *P.r. cooperi* in the region (Garrett and Dunn, 1981).

Distribution in the West Mojave Planning Area:

In the WMPA, they nest or have nested at the following localities: Big Rock Creek near Valyermo (1-2 pairs annually, K.L. Garrett), Little Rock Creek (1-2 pairs in the WMPA, and 1-2 pairs on the adjacent Angeles National Forest), the Mojave River at Victorville (10-15 pairs annually, S.J. Myers, unpubl. data), Cushenbury Springs (1 pair, at least sporadically, S.J. Myers, unpubl. data; R.L. McKernan, pers. comm.), Morongo Valley (2-4 pairs annually, Small 1994), and Yucca Valley (1 pair annually; M.A. Patten, pers. comm.). A female or immature was observed at Camp Cady in August 1997, suggesting potential breeding (B. Deppe, pers. comm.). The species also nests at four localities just out of the WMPA: Tecopa (sporadically, Small 1994), Soledad Canyon (2-3 pairs in 1997; K.L. Garrett, unpubl. data), Whitewater Canyon (2-4 pairs annually; D. Hatch, pers. comm.), and South Fork Kern River Preserve at Weldon (30-38 pairs annually, Robinson 1996). Tecopa is approximately 15 mi. (24 km) northeast of the WMPA; Weldon is about 9.5 mi. (15 km) northwest, Whitewater Canyon (trout farm) 3 mi. (5 km) south, and Soledad Canyon 6 mi. (10 km) west of the WMPA.

There are also at least three winter records in the WMPA: one at Twentynine Palms 28 December 1991, another there 2 January - 24 February 1997 (*American Birds* 51:615, 1997; B.

Prescott, unpubl. data), and one near Morongo Valley on 21 December 1991 (*American Birds* 46:984, 1992). The subspecific status of the wintering birds is not known.

Natural History:

Summer Tanager males are easily identified by their bright, all red plumage, which in California distinguishes them from all birds except the Hepatic Tanager (*Piranga flava*) and Northern Cardinal (*Cardinalis cardinalis*). Compared to the Summer Tanager, male Hepatic Tanagers have a duller red plumage often washed with grayish, a dark gray auricular patch, and a darker bill (blackish or bluish). Male Northern Cardinals have a prominent crest and a black face, characters which Summer Tanagers lack. Female and immature Summer Tanagers have yellow underparts with brown to olive upperparts. Their bills are pinkish-tan (juveniles) to bright yellow. Female and immature Hepatic Tanagers are similar to Summer Tanagers, but have darker bills and grayish-tan, rather than cinnamon-buff rumps (Pyle et al., 1987). Female Western Tanagers (*P. ludoviciana)*, another *Piranga* commonly occurring in California, have yellowish or whitish wing bars (male Western Tanagers have mostly yellow bodies with red heads and black wings). Second and third year male Summer Tanagers are mostly red, but can be mottled with greenish or yellowish patches.

Summer Tanagers are about 7 in. (18 cm) long, and weigh an average of 1.16 oz. (33 grams); *P.r. cooperi* is larger than *P.r. rubra* (Isler and Isler, 1987; Robinson, 1996). They are primarily insectivorous during the breeding season, specializing on bees and wasps (Skutch, 1989; Robinson, 1996). Wintering and migrating birds regularly feed on fruit (Isler and Isler, 1987). They capture insects both by aerial hawking and gleaning from foliage or bark (Robinson, 1996). On the nesting grounds, Summer Tanagers are known to forage from near the ground to the canopies of tall gallery forest (Robinson, 1996).

In the California deserts, Summer Tanagers arrive each year about 20 April, with an early arrival date in the region of 13 April (Garrett and Dunn, 1981). Males arrive slightly earlier than females (Robinson, 1996). Summer Tanagers generally depart the nesting grounds by mid- or late September, although a few are observed most years in early October. There are at least two records at Morongo Valley in November (20 November 1982, 5 November 1996, C. McGaugh, unpubl. data) that may pertain to breeding *P.r. cooperi*.

Summer Tanager nests are usually placed well out from tree trunks, 4 - >70 ft. (1.2 - >21.4 m) high. Their single clutch contains 3 or 4 eggs, and rarely 5. Incubation, entirely by the female, takes 11-12 days (Bent, 1958; Harrison, 1979) . Both parents feed the nestlings.

The rate of brood parasitism of Summer Tanagers by Brown-headed Cowbirds, *(Molothrus ater*) varies geographically. In Illinois, high rates of parasitism have been noted, but only one of 16 nests at Weldon, California was affected (Robinson, 1996). Friedmann (1963) considered Summer Tanagers to be uncommon hosts of Brown-headed Cowbird parasitism. Robinson (1996) points out that there are few data on the success of Brown-headed Cowbird parasitism on Summer Tanagers because nests are generally too high for researchers to access.

Habitat Requirements:

Western populations of the Summer Tanager (*P.r. cooperi*) require riparian woodland or forest dominated by cottonwoods (*Populus* spp.) and willows (*Salix* spp.), usually in a climax stage (Garrett and Dunn, 1981; Robinson, 1996). All southern California breeding localities contain cottonwood and/or willow communities, except the trout farm in Whitewater Canyon (just out of the WMPA), where Summer Tanagers nest in large, planted Siberian Elms (*Ulmus pumila),* other ornamentals, and a few Fremont Cottonwoods (*Populus fremontii*) (S.J. Myers, pers. obs.). They also occur in Athel (*Tamarix aphylla*) along the Colorado River, such as at Topock (Hunter, 1984; Rosenberg et al., 1991).

Studies at the South Fork Kern River Preserve indicate that Summer Tanagers use territories of between 9 and 11 ha (22.5-27.5 ac) (Robinson 1996).

Little quantitative data exist regarding the composition of Summer Tanager habitat in the California deserts. Five vegetation plots conducted within tanager territories at Mojave Narrows Regional Park in 1991 revealed canopy cover between 60 and 85%. The same plots had shrub cover from 1-23%, and herbaceous cover from 25-90% (Myers, 1992).

Population Status:

Summer Tanagers have apparently expanded their range in California over the last 40-50 years (Johnson, 1994; Small, 1994). Grinnell and Miller (1944) reported them as a nesting bird in California only along the Colorado River. They considered them common along the river, but mentioned no other nesting localities. Reports of nesting Summer Tanagers at other localities, especially Morongo Valley, began to appear in *Audubon Field Notes* at the end of the 1950s and early 1960s. Since the 1960s, they have expanded their range westward and northward as far as the South Fork of the Kern River. There is at least one nesting record each for Scotty's Castle in Death Valley National Park and near Big Pine (*American Birds* 45:1162; 1991).

Remsen (1978) and Rosenberg et al. (1991) discussed the Summer Tanager's decline along the Colorado River. It has become a rare to uncommon breeding bird, with greatly reduced numbers (compared to historic times) being documented during an extensive survey in 1986. Habitat destruction, caused by the conversion of riparian forest to agricultural, residential, and recreational areas, is the primary cause of the decline. Brown-headed Cowbird parasitism may have also contributed to the decline.

In most other California desert breeding localities, however, numbers appear to be either stable or increasing. As an example, from 1-4 pairs have been documented during Breeding Bird Censuses conducted at Morongo Valley between 1977 and the present (E.A. Cardiff, pers. comm.). Numbers along the Mojave River at Victorville have increased notably over the past 11 years: from 3 or 4 pairs in 1987 to 12-15 pairs in 1996, and at least 12 pairs in 1997 (S.J. Myers, unpubl. data). The population at Big Rock Creek has remained stable since the early 1980s at 1-2 pairs annually (K.L. Garrett, pers. comm.). Breeding at the golf course at Yucca Valley has been sporadic (Small, 1994; E.A. Cardiff, pers. comm.). Regular field work has not been conducted at Cushenbury Springs, so the Summer Tanager's continuity there is not known.

Threats Analysis:

As demonstrated in the Lower Colorado River Valley, habitat destruction is the primary threat to Summer Tanagers in California (Remsen, 1978; Rosenberg et al., 1991). Habitat

destruction can occur in several ways, with the most catastrophic losses resulting from clearing of large tracts of forest or woodland for agriculture, development, or flood control. On a smaller scale, activities such as wood cutting can degrade or destroy suitable breeding habitat for this species. Such wood cutting has occurred historically in Afton Canyon (R.L. McKernan, pers. comm.), where large cottonwoods and willows were removed in the decades leading up to the 1960s. It is not known whether the woodland at Afton Canyon was ever extensive enough to support Summer Tanagers.

Lowering of ground water has had a significant effect on cottonwood-willow forest along the Mojave River in Victorville. The extent of both marshland and riparian woodland/forest has declined markedly in the past 140 years, primarily due to the drilling of wells in the Victor Valley (Torres et al., 1992). Long-time residents have stated that much of the open, dry cottonwood woodland in the area was once similar to the dense, lush cottonwood-willow forest where Summer Tanagers now occur (Myers, 1992).

Fire can have a devastating effect on Summer Tanager nesting habitat. A wildfire at Big Morongo Preserve on 27 April 1992 burned about 50 acres (20 ha), including many large cottonwoods (Cardiff, 1993). This former Summer Tanager habitat may take many years to recover completely. A smaller fire at Mojave Narrows Regional Park in recent years killed several large cottonwoods and willows. Many young cottonwoods (and a few willows and ash) have sprouted in this area, but it may take many years for the area to attain its former structure. Cottonwoods and willows as tall as 50 feet (15 m) may appear within five years, but only under optimal conditions, including adequate ground water and soil conditions (Rosenberg et al., 1991).

Non-native invasive plant species can also degrade habitat. Although Summer Tanagers have begun nesting in Athel, such as at Topock, other exotics such as Salt Cedar (*Tamarix ramosissima, T. parviflora*), Giant Reed (*Arundo donax*), and Russian Olive (*Elaeagnus angustifolius*) probably provide little in the way of habitat values, and displace native species. All of these species occur along the Mojave River in the Victorville area; Russian Olive is especially prominent. Some Salt Cedar occurs at Morongo Valley. Big Rock Creek at Valyermo contains a small amount of Salt Cedar.

Few, if any, data are available on the effects of off-highway vehicles on Summer Tanagers, but this activity is common at Mojave Narrows Park and other tanager nesting areas near Victorville.

The severity of Brown-headed Cowbird parasitism on Summer Tanagers is largely unknown in the western U.S., but in areas containing large cowbird populations some adverse effects are likely. Brown-headed Cowbirds are common in Morongo Valley and Victorville during nesting season. Both areas are commonly used for horseback riding, and stables, which provide feeding areas for cowbirds (Laymon, 1987), and are located near tanager habitat. Also, at least at Mojave Narrows Regional Park, equestrians create a myriad of trails through riparian forest and woodland, increasing the amount of edge, which is known to be a favorable condition for the proliferation of Brown-headed Cowbirds (Brittingham and Temple, 1983; Rothstein, 1994).

Another potential threat to Summer Tanagers is direct persecution, such as shooting. On 19 June 1991 in Haskell Canyon, Los Angeles County, a biologist conducting riparian bird surveys witnessed a child shooting a Summer Tanager (K.L. Garrett, pers. comm.).

Biological Standards:

The most important measure necessary to protect or enhance Summer Tanager populations in the WMPA is to preserve known and potential nesting areas. Of the five known nesting localities, only Big Morongo Canyon Preserve is managed by BLM. Mojave Narrows Regional Park is managed by San Bernardino County Regional Parks Department (the land is owned by the State of California Wildlife Conservation Board), Big Rock Creek, the golf course at Yucca Valley, and the oasis at Cushenbury Springs are privately owned.

Management of important nesting areas for the Summer Tanager should include protection from off-highway vehicle degradation and disturbance, wood-cutting, and wildfires. Indiscriminant removal of vegetation for flood control purposes should be monitored and regulated.

Maintenance or enhancement of water sources necessary to preserve or improve riparian habitats is a management consideration. In some cases, restoration of riparian habitat by removing non-native invasive plant species and planting cottonwoods and willows may be appropriate (such as in Afton Canyon).

Control programs for Brown-headed Cowbirds at important riparian nesting areas in the WMPA may benefit the Summer Tanager. Such programs should be long-term, into perpetuity if possible. In order to initiate cowbird control at all important nesting sites in the WMPA, it is necessary for agencies at federal, state, county, and local levels to participate in cooperative plans.

In order to evaluate the vigor of desert riparian habitats and the viability of bird populations in the WMPA, regular monitoring is necessary. BLM documents such as ACEC Management Plans and Management Plans for Natural Areas prescribe bird monitoring programs. BLM and other participating agencies should assess the effectiveness of current monitoring methods and revise as needed. Annual review of monitoring results can be used to assist in management decisions. Such review should address whether habitats are at carrying capacity for sensitive bird species, and if not, identify corrective measures that can be taken to increase populations.

Literature Cited:

American Ornithologists' Union. 1957. Check-list of North American birds, 5th ed. Am. Ornithol. Union, Washington, D.C.

American Ornithologists' Union. 1998. Check-list of North American birds, 7th ed. Am. Ornithol. Union, Washington, D.C.

Bent, A.C. 1958. Life histories of North American blackbirds, orioles, tanagers, and allies. Bull. U.S. Natl. Mus. 211.

Brittingham, M.C. and S.A. Temple. 1983. Have cowbirds caused forest songbirds to decline? Bio-Science 33:31-35.

California Department of Fish and Game, Natural Diversity Data Base. 1998. Special Animals. Biannual publication, Mimeo., 44 pp.

Cardiff, E.A. 1993. Desert riparian-freshwater marsh [Breeding bird census]. Resident bird counts 1992. J. Field Ornithol. 64 (suppl.):92-93.

Friedmann, H. 1963. Host relations of the parasitic cowbirds. Bull. U.S. Natl. Mus. 233.

Garrett, K. and J. Dunn. 1981. Birds of southern California: status and distribution. Los Angeles Audubon Society, Los Angeles, California.

Grinnell, J. and A. Miller. 1944. The distribution of the birds of California. Pacific Coast Avifauna No. 27. Reprinted by Artemesia Press, Lee Vining, California.

Harrison, H.H. 1979. A field guide to western birds' nests. Houghton Mifflin Co., Boston, Massachusetts.

Hunter, W.C. 1984. Status of nine bird species of special concern along the Colorado River. Calif. Dept. Of Fish and Game, Nongame Wildl. Investigations, Wildl. Mgt. Branch Admin. Rep. 84-2, Nongame Bird and Mammal Sec. Rep. 84.09.

Isler, M.L. and P.R. Isler. 1987. The tanagers, natural history, distribution, and identification. Smithsonian Institution Press, Washington, D.C.

Johnson, N.K. 1994. Pioneering and natural expansion of breeding distributions in western North American birds. pp. 27-44 *In:* J.R. Jehl, Jr., and N.K. Johnson, (eds.), A century of avifaunal change in western North America. Stud. Avian Biology 15.

Laymon, S.A. 1987. Brown-headed Cowbirds in California: Historical perspectives and management opportunities in riparian habitats. West. Birds 18:63-70.

Myers, S.J. 1992. Biological inventory of the Mojave River corridor. *In:* Tierra Madre Consultants, Inc., Natural resources inventory of the Mojave River corridor. Unpubl. report prepared for the Mojave River Corridor Task Force.

Pyle, P., S.N.G. Howell, R.P. Yunick, and D.F. DeSante. 1987. Identification guide to North American passerines. Slate Creek Press, Bolinas, California.

Remsen. J.V., Jr. 1978. Bird species of special concern in California. Calif. Dept. Fish and Game, Wildlife Mgt. Branch Admin. Rep. 78-1.

Robinson, W.D. 1996. Summer Tanager (*Piranga rubra*). *In:* A. Poole and F. Gill (eds.), The birds of North America, No. 248, A. The Academy of Natural Sciences, Philadelphia, Pennsylvania, and The American Ornithologists' Union, Washington, D.C

Rosenberg, K., R. Ohmart, W. Hunter, and B. Anderson. 1991. Birds of the Lower Colorado River Valley. Univ. Arizona Press, Tucson, Arizona.

Rothstein, S.I. 1994. The cowbird's invasion of the far west: History, causes and consequences experienced by host species. pp. 301-315 *In:* J.R. Jehl, Jr., and N.K. Johnson, (eds.), A century of avifaunal change in western North America. Stud. Avian Biology 15.

Skutch, A.F. 1989. Life of the tanager. Comstock Publ. Assoc., Cornell Univ. Press, Ithaca, New York.

Small, A. 1994. California birds: Their status and distribution. Ibis Publ. Co., Vista, California.

Torres, J., D. Earle, S. Connell, S. Wells and B. Love. 1992. Cultural resources sensitivity study of the Mojave River corridor, San Bernardino County, California. *In:* Tierra Madre Consultants, Inc., Natural resources inventory of the Mojave River corridor. Unpub. report prepared for the Mojave River Corridor Task Force.

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SWAINSON'S HAWK
Buteo swainsoni

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Management Status: Federal: None
California: Threatened (CDFG, 1998)

General Distribution:

Swainson's Hawks breed regularly from southwestern Canada to northern Mexico (Godfrey, 1986; Semenchuk, 1992; Howell and Webb, 1995; Smith, 1996; England et al., 1997). The western limit of their breeding distribution extends from eastern Washington, eastern Oregon, and northeastern California, through Nevada to northern and southeastern Arizona (Bloom, 1980; Monson and Phillips, 1981; Alcorn, 1988; Gilligan et al., 1994; Price et al., 1995; England et al., 1997). The eastern limit of the breeding range extends to western Minnesota, eastern Nebraska, central Kansas, central Oklahoma, and central Texas (Oberholser, 1974; Janssen, 1987; Thompson and Ely, 1989; Baumgartner and Baumgartner, 1992). Apparently isolated outlier populations also occur in: (1) the interior valleys of British Columbia (Campbell et al., 1990); (2) the Central Valley of California (Bloom, 1980); (3) west-central Missouri (Robbins and Easterla, 1992); and (4) in northeastern Illinois (Herkert, 1992).

Nearly all Swainson's Hawks spend the northern hemisphere winter in South America. The primary winter range is on the pampas of Argentina (Blake, 1977). Small numbers are also reported irregularly during the winter in Brazil (Sick, 1993), Colombia (Hilty and Brown, 1986), Costa Rica (Stiles and Skutch, 1989), Panama (Ridgely and Gwynne, 1989), and Mexico (Howell and Webb, 1995). Small populations regularly winter in southern Florida (Stevenson and Anderson, 1994) and in the Sacramento-San Joaquin River Delta of central California (Yee et al., 1991; Herzog, 1996). Museum specimens and band recoveries also indicate small numbers of wintering birds (primarily immatures) in New Mexico, Texas, and Louisiana (Browning, 1974). Sight records of wintering immature birds require careful evaluation due to potential confusion with other species (Garrett and Dunn, 1981; England et al., 1997); Browning (1974) estimated <18% of winter sightings in North America were acceptable.

Historically, the Swainson's Hawk breeding range in California included (1) the Great Basin including the Modoc Plateau, (2) the Sacramento and San Joaquin Valleys, (3) along the coast in Marin, Monterey, Ventura, Los Angeles, and San Diego counties, and (4) a few scattered sites in the Colorado and Mojave deserts (Bloom, 1980). Today, Swainson's Hawk still nest in most previously occupied regions of the state, but the number of breeding birds has been greatly reduced throughout major portions of the range (e.g., Central Coast Ranges), and the species has been extirpated in coastal southern California (Bloom, 1980). Only the Central Valley and Modoc Plateau still support more than a few isolated pairs. In California, migrating flocks of up to 100+ Swainson's Hawks may be observed away from the major mountain ranges during the spring and fall. These observations have become less frequent as the overall population has declined (Garrett and Dunn, 1981; Small, 1994). Approximately 30 birds have wintered in the Sacramento-San Joaquin River Delta annually since 1991 and are the only confirmed regularly wintering population in California (Yee et al., 1991; Herzog, 1996).

Distribution in the West Mojave Planning Area:

All documented nesting attempts by Swainson's Hawks in the WMPA are in the Antelope, Victor, and Apple valleys from near Palmdale and Lancaster to Adelanto and Victorville. Within this range, they nest in extremely low densities and apparently not in all years in desert scrub vegetation with an overstory of Joshua Trees (*Yucca brevifolia*) and in Fremont Cottonwoods (*Populus fremontii*) along stream courses or planted as windbreaks. The breeding distribution in the WMPA may be unchanged since the earliest reported records. Grinnell and Miller (1944) reported that Swainson's Hawks are "[a]pparently scarce in summer in Colorado and Mohave deserts," but do not mention nesting within the WMPA. In his review of the status of Swainson's Hawks in California, Bloom (1980) reported nine historical nest records from the WMPA. Since 1979, nesting attempts have been reported from near Lancaster and Palmdale in 1979-83 and 1991-97 (K. Garrett and K. Molina pers. comm.). Another recent report of possible nesting was in the Fremont Valley, Kern County, on May 26, 1986 (McCaskie, 1986); nesting was not confirmed and no subsequent observations have been reported from this part of the WMPA. Flocks of migrating Swainson's Hawks are may be found in the WMPA during either the spring or fall (Garrett and Dunn, 1981; Small, 1994).

Natural History:

Unlike any other buteos in the western United States (e.g., Red-tailed Hawk, Red-shouldered Hawk), Swainson's Hawks migrate long distances, are highly gregarious, and are largely insectivorous. Their annual round-trip migration between North America and Argentina covers approximately 12,500 mi (20,000 km; England et al., 1997). Birds typically return to nest sites in early March to April (later in more northern areas), immediately form pairs, and begin the nesting cycle. Nest building typically begins 7-15 days after arrival and lasts for about one week (Fitzner, 1978). Clutch sizes range from 1-4 eggs with an average size of about 2.5 eggs (Bechard, 1983; Olendorff, 1973). In Colorado, egg-laying through fledging lasted 99-110 days (Olendorff, 1973). The average fledging date in Butte Valley on the Modoc Plateau was 18 August, and in the Central Valley of California fledging occurs between 1 July and mid-August (Estep, 1989). Migratory flocks begin to form in late August and September, and most birds are apparently on the wintering grounds by November.

The plumage coloration of Swainson's Hawks is polymorphic and is called light, dark, or rufous based on coloration of the under parts (Palmer, 1988). Color variation is almost continuous from lightest to darkest morphs making these categories convenient but somewhat arbitrary (Palmer, 1988). Most birds are light to intermediate in color. In flight, these individuals are easily distinguished from other buteos in the Mojave Desert by an underwing pattern of dark flight feathers contrasting with paler wing-linings. The belly is light in contrast to the dark upper breast giving pale morph birds the appearance of having a "bib." Dark morphs are more difficult to identify but even in these birds, the undertail coverts are buffy white, barred with dark brown; dark morph birds of other buteos have dark undertail coverts. In flight, the overall appearance of a Swainson's Hawk, whatever color morph, is slimmer with a thinner body and narrower wings compared to other North American buteos. Also, when soaring, they hold their wings in a dihedral reminiscent of a Turkey Vulture (*Cathartes aura*).

Swainson's Hawks are relatively small buteos (males 25-33 oz. [693-936 g] and females 33-48 oz. [937-1,367 g]; Palmer, 1988) that take a variety of mammals, birds, lizards, snakes,

amphibians, and insects. Food items delivered to nestlings very similar to other buteos because they are dominated by mammals and to a lesser extent by birds. The specific prey species taken vary from location to location, but are generally dominated by ground squirrels, jackrabbits, cottontails, small rodents, and birds. In northeastern California, the biomass of the diet was dominated by voles (*Microtus* sp.) and Belding's ground squirrel (*Spermophilus beldingi*), but also included numerous grasshoppers (Bloom, 1980; Woodbridge, 1991). In the Central Valley, the diet consisted of voles, California ground squirrel (*Spermophilus beecheyi*), valley pocket gopher (*Thomomys bottae*), Mourning Dove (*Zenaida macroura*), and Ring-necked Pheasant (*Phasianus colchicus*) (Estep, 1989).

The diet of adult Swainson's Hawks has not been well documented during the period while they provision young in the nest. Insects are recorded sporadically at the nest, but insects may be taken by adults while foraging away from the nest (Woodbridge, 1991). Outside the breeding season, Swainson's Hawks are primarily insectivores consuming grasshoppers, crickets, and dragonflies (Munro, 1929; Johnson et al.,1987; Jaramillo, 1993; Woodbridge et al., 1995; Serracin Araujo and Tiranti, 1996). This pattern includes postbreeding birds, migratory birds, nonbreeding or prebreeding birds arriving on the breeding grounds, and birds wintering in South America. Thus, insects are an important part of the diet throughout the year.

The natural foraging habitat of Swainson's Hawks is relatively open stands of grass-dominated vegetation and relatively sparse shrublands. Trees are typically widely scattered or found in bands along riparian corridors. Much of the original habitat has been converted to either urban development or cultivated agricultural uses. Swainson's Hawks can forage agricultural fields with many types of crops. However, Schmutz (1987) found that this hawk is more abundant in areas of moderate agricultural development than in either grassland or areas of extensive agricultural development. Alfalfa fields are routinely used by foraging Swainson’s Hawks (Estep, 1989; Woodbridge, 1991), but the ability of the hawk to any agricultural crop for foraging is a complex interaction of phenology and cultural practices (Schmutz, 1987; Estep, 1989; Woodbridge, 1991). Orchards and vineyards in general are not suitable foraging habitat for Swainson's Hawk due to the dense woody cover (Estep, 1989).

The home range of Swainson’s Hawks is highly variable ranging from an mean of 1,534 acres (621 hectares) in southeastern Washington (Fitzner, 1978) to 9,978 acres (4,038 acres) in the Central Valley of California (Babcock, 1995). Larger home ranges are found in areas with unsuitable crops such as mature grain and row crops, orchards, and vineyards (Bechard, 1982; Estep, 1989; Babcock, 1995). The smallest home ranges are reported at nest sites near alfalfa, fallow fields, and dry pasture (Bechard, 1982; Estep, 1989; Woodbridge, 1991). Home ranges become larger seasonally when crops mature, providing cover, and making prey unavailable (Bechard, 1982; Estep, 1989; Woodbridge, 1991; Babcock, 1995). The largest home ranges belong to males and the smallest to females with the smallest female home ranges an order of magnitude smaller than the largest used by males (Fitzner, 1978; Estep, 1989; Andersen, 1995; Babcock, 1995).

Throughout the range of the species, Swainson's Hawks nest almost exclusively in trees. In a few instances, they have been recorded nesting on cliffs, coulees (i.e., a deep gulch or ravine with sloping sides), structures, and the ground, but these sites are rarely used (England et al., 1997). Nest trees are typically located on the edges between woodland and either grass or shrubland habitats or in isolated trees or clumps of trees in open terrain (Estep, 1989). A survey of nesting birds in California during 1979 revealed that Swainson's Hawks nested almost

exclusively in large, sparsely vegetated flatlands characterized by valleys, plateaus, broad floodplains, and large expanses of desert. Only three territories were found in low rolling hills, and none were found nesting in the mountains, except for certain large valleys. Single trees or riparian areas were preferred for nesting. None were found nesting in densely wooded areas unless adjacent to sparsely vegetated plains or agricultural areas with suitable foraging habitat (Bloom, 1980).

In central and northeastern California, most Swainson's Hawk nests are located in cottonwood (*Populus* sp.), oaks (*Quercus* spp.), sycamore (*Platanus racemosa*), or willows (*Salix* spp.; Bloom, 1980). In urban landscapes, a variety of ornamental species, especially conifers, are selected for nest sites (England et al.,1995), and in the Mojave Desert, Joshua trees (*Yucca brevifolia*) are used (Bloom 1980). Nest trees near human habitations are used throughout the range of the species. Swainson's Hawks have been recorded nesting in urban landscapes in the Central Valley of California, but these sites are always within approximately 5 mi (8 km) of suitable foraging habitat and the reproductive success is lower than adjacent rural-nesting birds (England et al., 1995).

Habitat Requirements:

Breeding Swainson's Hawks have three general habitat requirements: (1) suitable foraging habitat with adequate prey, (2) nest sites, and (3) and isolation from disturbances that may disrupt breeding activities. No quantitative information has been published on the habitat requirements of Swainson's Hawks in the Mojave Desert. In the WMPA, nesting opportunities are found in Joshua tree woodland, riparian woodland, and ornamental plantings. The primary nest trees are Joshua trees and Fremont cottonwoods, but other large trees could also be used, especially where planted in narrow bands such as agricultural windbreaks (e.g., cottonwoods). In both the WMPA and the Eastern Mojave National Preserve, Swainson's Hawks forage on suitable prey within the Joshua tree woodlands. In addition, agricultural areas in the WMPA with suitable crop types and located in proximity to nest sites may meet Swainson's Hawk foraging requirements. As evidenced by urban and rural nesting birds in the Central Valley, some individual Swainson's Hawks are able to tolerate the routine disturbances associated with automobile traffic on city streets and rural highways, agricultural machinery, and small airplanes, especially if they are present and on-going at the time of nest site selection (A. S. England). These and other disturbances can be disruptive if intermittent or if exceedingly loud or extensive.

Population Status:

At the end of the 19th century, Swainson's Hawks were considered to be a common to abundant breeding species in California (Sharp, 1902). By the early 1940s, ornithologists working in the state were already beginning to document breeding population declines (Grinnell and Miller, 1944). Bloom (1980) conducted the first statewide survey of Swainson's Hawks in California in 1979. He documented the existence of 110 active pairs, and estimated approximately 375 were present statewide. These data revealed that the remaining population centers were in the Great Basin in the extreme northeastern portion of the state and in the Central Valley, and that the species was nearly extirpated throughout large parts of its former range. The declines were greatest in the coastal southern California where Sharp (1902) had classified the species as abundant.

To measure the magnitude of the population decline, Bloom (1980) estimated the number of breeding pairs likely found in the state prior to intense urban and agricultural development by assuming that densities found in the Great Basin in 1979 were similar to what would have occurred elsewhere. The results indicated that (1) the historical population was 4,000-17,000 pairs, (2) the Central Valley remained an important population center, (3) the relative importance of the Great Basin population had increased because populations elsewhere had declined faster, and (4) assuming the lower historical population levels and the larger estimated 1979 population, Swainson's Hawks had declined by over 90 % in California.

A statewide survey conducted in 1988 generally supported Bloom's findings. Among 320 active territories, approximately 241 were in the Central Valley and 78 were in the Great Basin in northeastern California (Calif. Dep. Fish and Game, 1988). Estimates based on these data indicated a likely population of 430 pairs in the Central Valley and 100 pairs in the Great Basin. Five pairs were expected from the Owens Valley and five from the Mojave Desert. The species was considered extirpated from southern California and the coastal valleys. The total statewide population was estimated to be 550 breeding pairs in 1988. Additional surveys done in California during the 1990s indicate that the total statewide population is 500-1,000 breeding pairs. The latter estimates are higher than the estimate developed by Bloom (1980), but the difference may reflect increased survey effort and not a population increase.

Threats Analysis:

Several hypothesis have been suggested to explain the decline of Swainson's Hawks in California. Among them are: (1) mortality during migration and on the wintering grounds in South America; (2) poisoning by toxic chemicals, including pesticides, in South America; (3) eggshell thinning; (4) habitat loss on the wintering grounds; (5) disturbance on the breeding grounds; (6) loss or degradation of habitat on the breeding grounds; and (7) increased competition with other species. No single hypothesis provides an adequate explanation for the observed declines in California. Mortality due to acute toxicity from pesticides has been recently reported from Argentina where documented kills of 4,100 hawks were recorded in 1996 (Goldstein et al., 1996). This single die-off may have represented as much as 1 % of the world's population of Swainson's Hawks, and if the die-off covered a large area in South America, could have been as high as 5 % (Goldstein et al., 1996). Chronic exposure and bioaccumulation leading to eggshell thinning and other reproductive failures have not been documented in this species (Stendell et al., 1988; Risebrough et al., 1989).

One or more local factors on the breeding grounds in California are also presumed to be the reason for observed declines (Risebrough et al., 1989). Habitat loss and degradation are likely factors in some cases. For example, approximately 98 % of the original Central Valley riparian forest has been removed (Katibah, 1983) with similar losses of grasslands and other wetland habitats. The southern end of Central Valley has few trees due to agricultural clearing, and common crops such as vineyards and cotton are unsuitable foraging cover (Estep, 1989).

Habitat loss does not explain declines observed in the Mojave Desert, Central Coast Ranges, Southern Transverse Ranges, and parts of Oregon and Nevada. Many of these areas support apparently suitable habitat but Swainson's Hawks no longer breed there. Bloom (1980) estimated the historical population in the Mojave and Colorado Deserts at 270-1080 pairs. If these estimates are accurate, it could mean that Swainson's Hawk populations in this region have declined by over 95%. While these estimates are the best available, caution should be used when

characterizing local declines since they were calculated assuming nesting densities from different habitat types in another part of the range. The reason proposed by Bloom (1980) for the calculated declines in the Mojave Desert was that, "historically, the range of the Joshua Tree was larger, especially in Antelope Valley. As the tree's range decreased, Swainson's Hawk numbers probably decreased proportionately." Some loss of Joshua tree woodland habitat in the Antelope, Victor, and Apple valleys has occurred as a result of urban and agricultural land development.

Within the WMPA, loss or degradation of nesting and foraging habitat is the primary threat to the small breeding population of Swainson's Hawks. Continued loss of Joshua tree and riparian woodland habitats to urban and agricultural developments could further reduce or eliminate both nesting and foraging habitat. Habitat degradation could occur through a variety of mechanisms including, but not limited to:

> Fires, which eliminate nesting opportunities in Joshua trees and riparian trees for decades until the vegetation, recovers
>
> Off-highway vehicle use, which leads to a decrease in prey availability or prevents the long-term recruitment of new nest trees
>
> Flood control projects that alter normal stream and wash hydrology leading to the loss of riparian habitat and nesting opportunities
>
> Lowering of water tables that lead to the loss of nesting habitat or contribute to a decline in prey availability

Direct loss of Swainson's Hawks may occur as a result of shooting, which historically contributed to the loss of birds but the frequency of which appears to be declining (England et al., 1997). Off-highway vehicle use and operation of loud equipment could disrupt nesting activities, especially if these sources of noise and disturbance occur intermittently or early in the nesting cycle. The limited data on the effects of pesticide use in North America on Swainson's Hawks does not indicate this to be a threat. However, the role of acute poisoning in South America in the mortality of birds from California is unknown.

Biological Standards:

Due to the precipitous decline in nesting Swainson's Hawks throughout California and due to the low numbers that breed in the entire Mojave Desert, it is extremely important that existing and potential nesting areas be surveyed, monitored, and protected. Management should include protecting nesting pairs to prevent disturbances that could disrupt nesting or reduce reproductive success and habitat protection to ensure an adequate prey base and nest sites are available. Recovery of the species in California and ultimate removal from the California list of Threatened Species will require a statewide solution. Long-term protection of a small breeding population in the WMPA and the East Mojave National Preserve should be a part of this effort to ensure that the breeding range of these species is not further reduced. Federal, State, County, City and local agencies should participate in development of a statewide recovery strategy for the Swainson's Hawk and take the actions needed to ensure the Mojave Desert population contributes to this recovery.

Literature Cited:

Alcorn, J.R. 1988. The birds of Nevada. Fairview West Publishing, Fallon, Nevada.

Andersen, D.E. 1995. Productivity, food habits, and behavior of Swainson's Hawks breeding in southeast Colorado. J. Raptor Res. 29:158-165.

Babcock, K.W. 1995. Home range and habitat use of breeding Swainson's Hawks in the Sacramento Valley of California. J. Raptor Res. 29:193-197.

Baumgartner, F.M., and A.M. Baumgartner. 1992. Oklahoma bird life. Univ. Oklahoma Press, Norman, Oklahoma.

Bechard, M.J. 1982. Effect of vegetative cover on foraging site selection by Swainson's Hawk. Condor 84:153-159.

Bechard, M.J. 1983. Food supply and the occurrence of brood reduction in Swainson's Hawk. Wilson Bull. 95:233-242.

Bent, A.C. 1937. Life histories of North American birds of prey, pt. 1. Bull. U.S. Natl. Mus. 167.

Blake, E.R. 1977. Manual of neotropical birds. Vol. 1. Univ. Chicago Press, Chicago, IL.

Bloom, P.H. 1980. The status of the Swainson's Hawk in California, 1979. Wildlife Mgmt. Branch, Nongame Wildl. Invest, Job II-8.0. Calif. Dept. Fish and Game, Sacramento, California.

Browning, M.R. 1974. Comments on the winter distribution of the Swainson's Hawk (*Buteo swainsoni*) in North America. Am. Birds 28:865-867.

California Department of Fish and Game. 1988. Five-year status report: Swainson's Hawk. California Department of Fish and Game, Wildlife Management Division, Nongame Bird and Mammal Section, Sacramento, California.

Campbell, R.W., N.K. Dawe, I. McTaggart-Cowan, J.M. Cooper, G.W. Kaiser, and M.C.E. McNall. 1990. The birds of British Columbia, vol II, nonpasserines. Royal British Columbia Museum, Vancouver, British Columbia.

England, A.S., M.J. Bechard, and C.S. Houston. 1997. Swainson's Hawk (*Buteo swainsoni*). *In:* A. Poole and F. Gill (eds.), The Birds of North America, No. 265. The Academy of Natural Sci., Philadelphia, PA, and The American Ornithologists' Union, Washington, D.C.

Estep, J.A. 1989. Biology, movements, and habitat relationships of the Swainson's Hawk in the Central Valley of California, 1986-87. Calif. Dep. Fish and Game, Nongame Bird and Mammal Sec. Rep.

Fitzner, R.E. 1978. Behavioral ecology of the Swainson's Hawk (*Buteo swainsoni*) in southeastern Washington. Ph.D. diss., Washington State Univ., Pullman, Washington.

Garrett, K. and J. Dunn. 1981. Birds of southern California: status and distribution. Los Angeles Audubon Society, Los Angeles, California.

Gilligan, J., M. Smith, D. Rogers, and A. Contreras, eds. 1994. Birds of Oregon: status and distribution. Cinclus Publications, McMinnville, Oregon.

Godfrey, W.E. 1986. The birds of Canada. 2nd ed. National Museum of Canada, Ottawa, Ontario.

Goldstein, M.I., B. Woodbridge, M.E. Zaccagnini, and S.B. Canavelli. 1996. An assessment of mortality of Swainson's Hawks on wintering grounds in Argentina. J. Raptor Res. 30:106-107.

Grinnell, J. and A. H. Miller. 1944. The distribution of the birds of California. Pacific Coast Avifauna No. 27.

Herkert, J.R., ed. 1992. Endangered and threatened species of Illinois: Status and distribution, vol. 2, Animals. Endangered Species Protection Board, Springfield, Illinois.

Herzog, S.K. 1996. Wintering Swainson's Hawks in California's Sacramento-San Joaquin River Delta. Condor 98:876-879.

Hilty, S.L., and W.L. Brown. 1986. A guide to the birds of Colombia. Princeton Univ. Press, Princeton, New Jersey.

Howell, S.N.G., and S. Webb. 1995. A guide to the birds of Mexico and northern Central America. Oxford Univ. Press, New York, New York.

Janssen, R.B. 1987. Birds in Minnesota. Univ. Minnesota Press, Minneapolis, Minnesota.

Jaramillo, A.P. 1993. Wintering Swainson's Hawks in Argentina: food and age segregation. Condor 95:475-479.

Johnson, C.G., L.A. Nickerson, and M.J. Bechard. 1987. Grasshopper consumption and summer flocks of nonbreeding Swainson's Hawks. Condor 89:676-678.

Katibah, E. H. 1983. A brief history of riparian forests in the Central Valley of California. pp. 23-29. *In:* R.E. Warner and K.M. Hendrix (eds.), California riparian systems: Ecology, conservation, and productive management. Univ. California Press, Berkeley, California.

McCaskie, G. 1986. The Nesting Season–So. Pacific Coast Region. Am. Birds 40:1254-1257.

Monson, G. and A.R. Phillips. 1981. Annotated checklist of the Birds of Arizona. 2nd ed. Univ. Arizona Press, Tucson, Arizona.

Munro, J.A. 1929. Notes on the food habits of certain raptors in British Columbia and Alberta. Condor 31:112-116.

Oberholser, H.C. 1974. The bird life of Texas. vol. 1, pages 234-236. Univ. Texas Press, Austin, Texas.

Olendorff, R.R. 1973. The ecology of the nesting birds of prey of northeastern Colorado. USIBP Grassland Biome Tech. Rep. No. 211.

Palmer, R.S. 1988. Swainson's Hawk. Pp. 48-73 in Handbook of North American birds, vol. 5, diurnal raptors (part 2). Yale Univ. Press, New Haven, Connecticut.

Price, J., S. Droege, and A. Price. 1995. The summer atlas of North American birds. Academic Press, London.

Ridgely, R.S., and J.A. Gwynne, Jr. 1989. A guide to the birds of Panama with Costa Rica, Nicaragua, and Honduras, 2nd ed. Princeton Univ. Press, Princeton, New Jersey.

Risebrough, R.W., R.W. Schlorff, P.H. Bloom, and E.E. Littrell. 1989. Investigations of the decline of Swainson's Hawk populations in California. J. Raptor Res. 23:63-71.

Robbins, M.B., and D.A. Easterla. 1992. Birds of Missouri: their distribution and abundance. Univ. Missouri Press, Columbia, Missouri.

Schmutz, J.K. 1987. Habitat occupancy of disturbed grasslands in relation to models of habitat selection. J. Range Manag. 40:438-440.

Semenchuk, G.P., ed. 1992. The atlas of breeding birds of Alberta. Federation of Alberta Naturalists, Edmonton, Alberta.

Serracin Araujo, R., and S.I. Tiranti. 1996. Stomach contents of a Swainson's Hawk from Argentina. J. Raptor Res. 30:105-106.

Sharp, C.S. 1902. Nesting of Swainson's Hawk. Condor 4:116-118.

Sick, H. 1993. Birds in Brazil: a natural history. Translated from the Portuguese by William Belton. Princeton Univ. Press, Princeton, New Jersey.

Small, A. 1994. California birds: their status and distribution. Ibis Publishing Co., Vista, California.

Smith, A.R. 1996. Atlas of Saskatchewan birds. Sask. Nat. Hist. Soc., Regina, Saskatchewan.

Stendell, R.C., D.S. Gilmer, N.A. Coon, and D.M. Swineford. 1988. Organochlorine and mercury residues in Swainson's and Ferruginous Hawk eggs collected in North and South Dakota, 1974-79. Environ. Monit. and Assess. 10:37-41.

Stevenson, H.M., and B.H. Anderson. 1994. The birdlife of Florida. Univ. Press of Florida, Gainesville, Florida.

Stiles, F.G., and A.F. Skutch. 1989. A guide to the birds of Costa Rica. Cornell Univ. Press, Ithaca, New York.

Thompson, M.C., and C. Ely. 1989. Birds of Kansas, vol. 1. Univ. Kans. Mus. Nat. Hist. Publ. Educ. Ser. No. 11.

Woodbridge, B. 1991. Habitat selection by nesting Swainson's Hawks: a hierarchical approach. M.S. Thesis, Oregon State Univ., Corvallis, Oregon.

Woodbridge, B., K.K. Finley, and S.T. Seager. 1995b. An investigation of the Swainson's Hawk in Argentina. J. Raptor Res. 29:202-204.

Yee, D.G., S.F. Bailey, and B.E. Deuel. 1991. The Winter Season–Middle Pacific Coast Region. Am. Birds 45:315-318.

TRICOLORED BLACKBIRD
Agelaius tricolor

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Management Status: Federal: USFWS Species of Concern
California: Species of Special Concern (CDFG, 1998)

General Distribution:

Tricolored Blackbirds have one of the smallest ranges of any bird species in North America (AOU, 1998). Almost the entire population is limited year round to cismontane California, and the Central Valley supports the largest population. Small numbers occur in transmontane California (i.e., deserts and Great Basin), Oregon, western Nevada, Washington state, and northern Baja California (Beedy and Hamilton 1999). Grinnell and Miller (1944) cited records as high as 4400 feet (1340 meters) in the Great Basin, but this species is largely a bird of lowland areas, below 3000 feet (Gaines, 1988; pers. obs.).

The species is known to make predictable seasonal movements, but the occupancy of individual colony sites is often unpredictable (Neff, 1937; Payne, 1969; DeHaven et al., 1975; Beedy et al., 1991). Studies over the last 30 years have indicated that this may be a natural, adaptive response to variable annual spatial patterns in the species' food supplies, especially insects. Interestingly, despite such movements, all banding returns for the species in southern California are of birds banded there (n=13), while none of the birds banded in the Central Valley, and eventually recovered, were found in southern California (n=136; Neff, 1942; DeHaven and Neff, 1973). This may indicate that there are two distinct metapopulations, and Beedy and Hamilton (1997) recommend investigation to determine whether the separation may be significant at genetic and/or taxonomic levels.

Distribution in the West Mojave Planning Area:

Based on the available information compiled for this report (see map) along with information provided in Garrett and Dunn (1981), a clear peak in Tricolored Blackbird records in desert areas occurs in spring, especially April and May, with a smaller peak in September and October, with small numbers of birds through the winter. Occasional strays can occur at nearly any wetland or irrigated grassy area (e.g., golf courses and cemeteries) that attracts wildlife, and flocks and individuals often associate with other blackbirds and European Starlings (*Sturnus vulgaris*) in the nonbreeding season.

Within the Mojave Desert (including the WMPA), the species appears to be most frequent toward the western edges. In the Antelope Valley, it breeds in several small colonies, "but appears to mostly withdraw in late summer and early fall," and, "has probably declined" (K. Garrett, pers. comm.). The species also breeds along the Mohave River near Interstate 15, and may do so at sewage treatment ponds in Barstow (S. Myers, pers. comm.). There are apparently no historical or current breeding records for this species in Inyo County (Beedy et al., 1991). A few small colonies are likely undiscovered, and changes in land use, such as new sewage treatment plants or wetlands restoration, have the potential to establish new colonies. The largest recent colony in southern California (c. 35,000 individuals) occurred at newly restored wetlands

at a sewage treatment facility near Hemet in western Riverside County, but recent changes in vegetation management have made the facility unsuitable for Tricolored Blackbird breeding (E. Beedy, pers. comm.).

Natural History:

Tricolored Blackbirds are a rather poorly studied species, probably due to their limited range and their close taxonomic affinity (and presumed similarity) with the widespread and heavily studied Red-winged Blackbird (*Agelaius phoeniceus*). A review indicates that just over half of 50 scientific papers and reports addressing Tricoloreds have been published since 1970. There are apparently no published studies addressing the species in desert areas. Thus the information that follows is based on cismontane studies. Few significant changes to the species' biology in desert regions are anticipated, beyond a greater restriction of available habitat for both foraging and nesting. The recent and thorough summary of status and management by Beedy and Hamilton (1997) is very useful, and a comprehensive summary of the biology and natural history of the species has been provided in the upcoming account for the Birds of North America series (Beedy and Hamilton, 1999).

As might be expected for a species with such a small range and extensive individual movement, there are no described subspecies, and no published information indicating significant geographic variation (AOU, 1957; Pyle, 1997). However there has also apparently been no modern analysis of geographic variation, morphologically or genetically.

Average mass is 2.39 ounces (68.2 g.) for males, and 1.72 ounces (49.2 g.) for females (Dunning, 1993). Thus males outweigh females by about 39%, compared with a figure of about 53% for the same measure in Red-winged Blackbirds (Dunning, 1993). Male Tricolored Blackbirds outweigh male Red-winged Blackbirds modestly, and females outweigh their counterparts substantially, though this is partly obscured by the considerable geographic variation in Red-winged Blackbird (Dunning, 1993). Adult specimens average 8.31 inches (211.1 mm; n=9) in total length, and female specimens 7.41 inches (188.2 mm; n=10; Ridgway, 1902). No studies of annual survivorship have been published, but available banding studies (Neff, 1942; DeHaven and Neff, 1973) indicated ages of at least 13 years have been achieved in non-captive birds.

Tricolored Blackbirds are one of the most colonial of all North American species (Bent, 1958; Orians, 1980; Beedy and Hamilton, 1999), perhaps second only to the extinct Passenger Pigeon (*Ectopistes migratorius*). Nesting colonies with over 200,000 nests have been documented (Neff, 1937), and as recently as 1994, colonies estimated at 70,000 nests have been found (Beedy and Hamilton, 1997). During 1997 statewide surveys, 75% of all adult Tricoloreds counted in late April were in the largest ten colonies (Beedy and Hamilton, 1997). As discussed under Threats Analysis, smaller colonies may fledge proportionately fewer young than large colonies. They may thus act as population sinks, with productivity rates lower than mortality rates.

This species is regularly polygamous, with a typical ratio of two females for every male nesting in a colony (occasionally as much as 1:1); females typically breed at one year, and males at two (Lack and Emlen, 1939; Payne,, 1969; Beedy and Hamilton, 1999). Nesting colonies in the San Joaquin Valley form in late March and is widespread by early April (Beedy and Hamilton, 1999). Nest are constructed by the females, generally 6.6 feet (2 m) or less above the ground or water (rarely on the ground) in a wide variety of plant species; occasional colonies in tree

canopies have nests located considerably higher. The rather solidly built nest consists of an outer woven layer, often with stems and leaves sticking out; a middle mud, algal strand, or fine fiber layer; and an inner layer of fine, downy plant material (Payne, 1969; Beedy and Hamilton, 1997; 1999). Rather uniform in size, typically 7.6 cm high by 7.6 cm wide (Beedy and Hamilton, 1999).

Typical clutch size is 3-4 eggs (Bent, 1958; Payne, 1969). Females will renest after loss of the first nest, and are known to do so both within a colony, and after relocating to another colony. There is apparently no proof of successful multiple brooding, though itinerant breeding suggests it (Hamilton, 1998). Young achieve independence from parents at about 24 days, with a full nesting effort requiring about 41-45 days, about ten days less than for Red-winged Blackbird; both sexes of Tricoloreds provision nestlings (Payne, 1969; Beedy and Hamilton, 1997). Tricolored Blackbirds have low natal site fidelity; among recaptured birds originally banded as fledglings, only 39% were found within 10 miles (16 km) of their natal colonies (n=33; DeHaven et al., 1975). Seasonal movements and dispersal of adults appear to be complex, with low breeding site fidelity of individuals, but fairly high site fidelity by colonies (Beedy and Hamilton, 1997). Aggregation of many or most individuals occurs in early fall, with birds moving into portions of the Sacramento Valley in very high concentrations (DeHaven et al., 1975). Regular fall movements in late fall are also documented into both the Sacramento Valley and northern San Joaquin Valley (Beedy and Hamilton, 1997). As mentioned under General Distribution, there is some evidence that birds in southern California are isolated from birds in the Central Valley and elsewhere in central and northern California; seasonal movement patterns in southern California remain unclear.

Beedy and Hamilton (1997, 1999) summarized diet information, reporting that animal matter (almost entirely adult and larval insects) composed about 91% of the food volume of nestlings and fledglings, 56% of the food volume of adult females, and 28% of that of adult males. Collier (1968, cited in Beedy and Hamilton 1999) concluded in coastal southern California that diet of Tricolored Blackbird during the breeding season is no more specialized than is that of Red-winged Blackbird, though they may rely more heavily on relatively abundant sources. According to Crase and DeHaven (1978), greater than 88% of winter food is plant matter, especially rice (*Oryza sativa*) and other grains, and weed seeds. Despite the size disparity between sexes, there is apparently no established difference in their diets outside the breeding season, although some foraging flocks at that time are strongly sexually segregated (Beedy and Hamilton, 1999; pers. obs.).

Habitat Requirements:

Habitats utilized appear to have changed significantly over the years, though this has not been quantified. Changes are probably a response to how and where the required food, shelter and nest substrate resources may be obtained, as a result in turn of steady conversion of the landscape to more intensive human uses such as intensive crop farming, sheep and cattle grazing, introduction of nonnative plants and, more recently, expansion of vineyards, orchards, and urban development (Beedy and Hamilton, 1997, 1999). Habitat use in the early part of the 20th century, when agriculture was already widespread but not intensive in the core range of the species, is well summarized by Grinnell and Miller (1944):

> "In nesting season, vicinity of fresh water, especially marshy areas. The most favored sites for colonies are heavy growths of cattails and tules, but even when these are available, other vegetation may be resorted to for nesting: sedges, nettles,

willows, thistles, mustard, blackberry, wild rose, foxtail grass, barley, etc. . . . One essential would seem to be provision at the site of the colony for a large number of individuals. Nests apparently must be close together and pairs usually in excess of 50 in order to meet the instinctive requirements of the species. Foraging grounds about the colony may be utilized even if several miles distant. Flooded lands, margins of ponds, and grassy fields, in summer and winter, constitute typical foraging terrain."

Beedy and Hamilton (1997) provide an accurate summary of habitat requirements in the context of the species' behavior and changing environment:

"The Tricolor's highly synchronized and colonial breeding system may have adapted to exploit a rapidly changing environment where the locations of secure nesting habitat and rich insect food supplies were ephemeral and likely to change each year (Orians, 1961; Orians and Collier, 1963; Collier, 1968; Payne, 1969).

"Tricolors have three basic requirements for selecting their breeding colony sites: (1) open accessible water; (2) a protected nesting substrate, which is usually either flooded or thorny or spiny vegetation; and (3) a suitable foraging space providing adequate insect prey within a few kilometers of the nesting colony (Beedy, 1989; Hamilton et al., 1995).

"Almost 93% of the 252 Tricolor breeding colonies reported by Neff (1937) were in freshwater marshes dominated by tules (*Scirpus* sp.) and cattails (*Typha* sp.). The remaining colonies in Neff's study were in willows (*Salix* spp.), blackberries (*Rubus* sp.), thistles (*Cirsium* and *Centaurea* spp.), or nettles (*Urtica* sp.). In contrast, only 53% of the colonies reported during the 1970's were in cattails and tules (DeHaven et al., 1975).

"An increasing percentage of Tricolor colonies in the 1980s and 1990s were reported in Himalaya berries (*Rubus discolor*) [a non-native], and some of the largest recent colonies are in silage and grain fields (Hamilton et al., 1995). Other substrates where Tricolors have been observed nesting include Giant Cane (*Arundo donax*), Safflower (*Carthamus tinctorius*; DeHaven et. al. 1975), tamarisk trees (*Tamarix* spp.), and Poison-oak (*Toxicodendron diversilobum*). In addition, they have been found in habitats that include riparian scrublands (e.g., *Salix*, *Populus*, *Fraxinus*) and forests and a lemon orchard (American Birds file data).

"Tricolor foraging habitats in all seasons include pastures, dry seasonal pools, agricultural fields (such as large tracts of alfalfa with continuous mowing schedules), rice fields, feedlots, and dairies. Tricolors also forage occasionally in riparian scrub, saltbush (*Atriplex* spp.) scrub, marsh borders, and grassland habitats. Weed free row crops and intensively managed orchards and vineyards do not serve as regular foraging sites.

> "During nesting, Tricolors forage away from their nest sites, often well out of sight of the colony. Most Tricolors forage within 5 km [3.1 miles] of their colony sites (Orians, 1961), but commute distances of up to 13 km [8.1 miles] have been reported (Hamilton pers. obs.). Short-distance foraging (i.e., within sight of the colony) for nesting provisioning also is common."

There is no detailed information on habitat use specifically in desert areas. Garrett and Dunn (1981) describe habitat for southern California as a whole: "Tricolored Blackbirds breed in dense colonies in extensive reed beds. Like other blackbirds they congregate (in either mixed-species flocks or pure flocks) in agricultural areas outside of the breeding season. Even in the breeding season most foraging takes place in agricultural areas or on open lawns (golf courses, cemeteries, etc.)."

Within the Mojave Desert, potentially positive habitat changes from natural conditions include local increases in irrigation of crops and lawns for parks, cemeteries and golf courses as well as some creation of artificial lakes, reservoirs and sewage treatment facilities, depending on available resources. Negative habitat changes include loss of riparian and other natural wetland habitats.

Population Status:

Survey data for the species' overall range in California indicate a strong, continuing decline in total population. Focused surveys for Tricolored Blackbirds in 1997 documented 37% fewer birds than found in comparable statewide counts in 1994 (Beedy and Hamilton, 1997). Population declines were said to be most apparent in historical strongholds of the species' range in the Central Valley including Sacramento, Fresno, Kern, and Merced counties.

There are no available data on total population size or trends within the Mojave Desert or the WMPA, and no careful counts indicating trends across years at specific locales therein. There is anecdotal information indicating declines, such as the statement that the species, "has largely ceased nesting at extensive *Scirpus* marshes at Piute Ponds, Edwards AFB, in late 1990's, perhaps because of decline in alfalfa farming in areas to south, southeast, and west" (K.L. Garrett, pers. comm.). Based on the available information (see Garrett and Dunn, 1981) and observations gathered for this report, no definite pattern is evident in population trends, but based on known losses of wetland habitats and population declines elsewhere, it appears likely that there has been a significant decrease in the total number of Tricolored Blackbirds in the WMPA over the last several decades.

Threats Analysis:

Beedy and Hamilton (1999) summarize published and unpublished data documenting 21 species of known avian, mammalian, and reptilian predators of adults and/or nestlings; many others are likely. The authors considered predation a major source of mortality. Black-crowned Night Heron are considered, "perhaps the worst Tricolored Blackbird predators of all" (E.C. Beedy, pers. comm.). All of the predators listed by Beedy and Hamilton are native except Virginia Opossum (*Didelphis virginiana*) and feral cats (*Felis cattus*), although others, such as Common Raven (*Corvus corax*) have increased due to man. Most of the species listed are present in the WMPA. Extreme weather events, including severe storms, cold, and hail, can cause

catastrophic destruction in nesting colonies (Beedy and Hamilton, 1997). Brown-headed Cowbirds are known to place eggs in this species' nests, though it is rare, and it is unclear whether cowbirds are successful and whether host brood reduction occurs (Beedy and Hamilton, 1999; Hamilton et al., 1995).

Most threats to Tricolored Blackbirds are directly or indirectly related to human activities, though natural predation can also be considerable. In order of suspected importance, these anthropogenic threats include:

(1) Degradation and loss of habitat. Rangewide, most potential natural nesting and foraging habitats have been developed into agricultural, residential, and other uses for man's benefit during the last 150 years (Frayer et al., 1989; Wilen and Frayer, 1990; both cited in Beedy and Hamilton, 1999). While some of the converted areas, such as sewage treatment plants, can support Tricolored Blackbirds, most cannot. Indeed some, such as certain crop fields, lure colonies to nest, with the crop being harvested before young can fledge (Beedy and Hamilton, 1999). Recent and ongoing changes in agricultural practices in the Central Valley, such as widespread conversion to vineyards and orchards from grain and silage crops, have exacerbated the loss of potential nesting and feeding areas. In addition, remaining natural potential habitats are invaded to varying degrees by non-native plants, vertebrates, and invertebrates, which change the ecosystem balance, potentially decreasing productivity for this species in a variety of ways. In desert areas, the species is likely to be highly dependent on resources intensively used by humans, such as natural and artificial desert wetlands and irrigated crops, magnifying the consequences of any habitat changes.

(2) Pollutants and Biocides. Pollutants, such as selenium buildup in portions of the Central Valley (Beedy and Hamilton 1999), are a serious problem at a local scale. Application of biocides, such as insecticides, has a negative effect on the local food base for many colonies, as well as simply making food supplies unreliable for Tricolored Blackbird colonies. The potential for direct, negative effects is also present (Beedy and Hamilton, 1999). Beedy and Hamilton (1997) state that, "at the present time chemical threats to Tricolors are a far less serious problem than are habitat losses." However they also cite aerial spraying for mosquitoes as having caused at least one colony failure, and this issue should not be overlooked in other pest management actions.

(3) Human disturbance. Direct human disturbance is a potentially important problem for any highly colonial species. Beedy and Hamilton (1999) specifically discuss the potential for impacts from researchers and land managers, but other factors, including unleashed dogs (*Canis familiaris*), power boats, or noise from off-road or other vehicles, are among potential disturbances in desert colonies and foraging areas. Intentional destruction of large numbers of blackbirds in response to crop depredation, nuisance issues, and even as a food source was a serious threat in the past but not today (E.C. Beedy, pers. comm.). See McCabe (1932); Neff (1937) and Bent (1958) for historical accounts of mass slaughter, and DeHaven et al. (1971) and Schafer and Brunton (1971) for examples of more recent methods.

In many regards, Tricolored Blackbird problems may be relatively amenable to management, in comparison to less colonial birds whose declines appear to be largely a function of broad landscape or regional land use changes (e.g., Loggerhead Shrike, *Lanius ludovicianus*; California Gnatcatcher, *Polioptila californica*). This is due to: (1) the relatively high level of current protection for wetland habitats; (2) the tendency for a relatively small number of sites to produce a relatively high fraction of the young in a given year; and (3) restoration methods for

wetlands are relatively sophisticated, compared with that for many other habitats. However there are also relatively intractable management issues for this species, including: (1) many of the potential predators (e.g., Common Ravens) are difficult to control, and are increasing on a broad scale (Boarman and Berry, 1995); (2) nesting sites must be both high quality, and within perhaps 3.1 miles (5 km) of high quality feeding areas (Beedy and Hamilton, 1997); (3) the species' erratic distribution may be an adaptation to conditions we do not yet fully understand, or which might be difficult to manage, such as large-scale, cyclic arthropod population fluctuations, or parasite or disease epidemiology.

Biological Standards:

Minimum management requirements in the WMPA should include the following five steps: (1) protect and enhance wetland and riparian systems, including non-native trees unless replaced by suitable natives, as they may provide nesting sites and foraging habitat; (2) prohibit use of biocides and other toxins as well as shooting or other removal for pest control; (3) BLM-approved biological evaluations for projects and planning changes (e.g., road or other construction, changing land use such as grazing) should include, as relevant, an evaluation of the impacts or benefits to this species, including cumulative impacts; (4) insofar as possible, limit disturbance including vehicles, boats and off-road vehicle use in areas of potential habitat; and (5) maintain an ongoing database of sensitive species information for the WMPA, made available upon request by researchers.

Survey methods for this species are provided in Hamilton et al. (1995) and Beedy and Hamilton (1997), with important cautions provided in Hamilton (1998), and these should be followed by researchers assessing and monitoring colonies. Beedy and Hamilton (1997) provide six top priority research recommendations which are potentially important to the biology and management of the species within the WMPA: (1) investigate land uses near colonies; (2) evaluate predator - prey relationships; (3) investigate itinerant breeding; (4) inventory and analyze peripheral colonies; (5) monitor demography; and (6) determine taxonomic and genetic status of southern California Tricolored Blackbirds.

In the short term, the primary conservation needs for Tricolored Blackbird in the WMPA are to: (1) determine whether numbers are declining, stable or increasing; (2) halt or offset degradation of nesting and foraging habitat as a result of land use changes; and (3) address suspected mortality factors such as increased predation. Though this species does irregularly use artificially created sites, it is important to recognize that mitigation for loss occupied habitat cannot be assured at this time simply through creation of wetlands, even when similar plants are used. In the longer term, it is vital to protect and properly manage the species' habitat through acquisition of sound information as a basis for sound land management decisions.

Literature Cited:

[AOU] American Ornithologists' Union. 1957. Check-list of North American Birds. 5th ed. American Ornithologists' Union, Baltimore, Maryland.

[AOU] American Ornithologists' Union. 1998. Check-list of North American Birds. 7th ed. American Ornithologists' Union, Washington, D.C.

Beedy, E.C. 1989. Draft habitat suitability index model, tricolored blackbird (*Agelaius tricolor*). Prep. by Jones and Stokes Assoc. for U.S. Bureau of Reclamation, Sacramento, California.

Beedy, E.C., S.D. Sanders, and D.A. Bloom. 1991. Breeding status, distribution, and habitat associations of the tricolored blackbird (*Agelaius tricolor*), 1850-1989. Jones and Stokes Assoc., Inc. (JSA 88-187), Sacramento. Unpubl. rep. prepared for U.S. Fish and Wildl. Serv., Sacramento, California.

Beedy, E.C. and W.J. Hamilton III. 1997. Tricolored blackbird status update and Management Guidelines. Jones and Stokes Assoc., Inc. 97-099. Sacramento, California. Prep. for U.S. Fish and Wildl. Service, Portland, Oregon, and Calif. Dept. of Fish and Game, Sacramento, California.

Beedy, E.C. and W.J. Hamilton III. 1999. Tricolored Blackbird (*Agelaius tricolor*). *In:* A. Poole and F. Gill, (eds.), The Birds of North America, No. 423. The Birds of North America, Inc. Philadelphia, Pennsylvania.

Bent, A.C. 1958. *Agelaius tricolor* (Audubon): Tricolored Redwing. pp. 179-190 *In:* A.C. Bent, (ed.), Life Histories of North American Blackbirds, Orioles, Tanagers, and Allies. U.S. Natl. Mus. Bull. 211.

Boarman, W.I. and K.H. Berry. 1995. Common ravens in the southwestern United States, 1968-92. pp. 73-75 *In:* E.T. LaRoe, G.S. Farris, C.E. Puckett, P.D. Doran, and M.J. Mac (eds.), Our Living Resources, U.S. Dept. Int., Natl. Biol. Serv., Washington, D.C.

Collier, G. 1968. Annual cycle and behavioral relationships in the red-winged and tricolored blackbirds of southern California. Ph.D. diss., Univ. of Calif., Los Angeles, California.

Crase, F.T. and R.W. DeHaven. 1978. Food selection by five sympatric California blackbird species. Calif. Fish and Game 64:255-267.

DeHaven, R.W., F.T. Crase, and P.P. Woronecki. 1975. Movements of tricolored blackbirds banded in the Central Valley of California, 1965-1972. Bird-Banding 46:220-229.

DeHaven, R. W., J. L. Guarino, F. T. Crase, and E. W. Schafer, Jr. 1971. Methiocarb for repelling blackbirds from ripening rice. Int. Rice Comm. Newsl. 22(4):25-30. Dec. 1971.

DeHaven, R.W. and J.A. Neff. 1973. Recoveries and returns of tricolored blackbirds, 1941 - 1964. Western Bird Bander 48:10-11.

Dunning, J.B., Jr., ed. 1993. CRC Handbook of Avian Body Masses. CRC Press, Boca Raton, Florida.

Frayer, W.E., D.D. Peters, and H.R. Pywell. 1989. Wetlands of the California Central Valley: Status and trends - 1939 to mid-1980s. U.S. Fish and Wildlife Service, Region 1, Portland, Oregon.

Gaines, D.A. 1988. Birds of Yosemite and the East Slope. Artemisia Press, Lee Vining, California.

Garrett, K. and J. Dunn. 1981. Birds of Southern California: Status and Distribution. Los Angeles Audubon Society, Los Angeles, California.

Grinnell, J., and A. H. Miller. 1944. The Distribution of the Birds of California. Pacific Coast Avifauna 27.

Hamilton, W.J. III. 1998. Tricolored blackbird itinerant breeding in California. Condor 100:218-226.

Hamilton, W.J. III, L. Cook, and R. Grey. 1995. Tricolored Blackbird project 1994. Unpubl. rep. prep. for U.S. Fish and Wildl. Serv., Portland, Oregon.

Lack, D., and J.T. Emlen, Jr. 1939. Observations on breeding behavior in tricolored red-wings. Condor 41:225-230.

McCabe, T.T. 1932. Wholesale poison for the red-wings. Condor 34:49-50.

Neff, J.A. 1937. Nesting distribution of the tri-colored red-wing. Condor 39:61-81.
Neff, J.A. 1942. Migration of the tricolored red-wing in central California. Condor 44:45-53.
Orians, G.H. 1961. Social stimulation within blackbird colonies. Condor 63:330-337.
Orians, G.H. 1980. Some Adaptations of Marsh-nesting Blackbirds. Princeton Univ. Press, Princeton, New Jersey.
Orians, G.H., and G. Collier. 1963. Competition and blackbird social systems. Evolution 17:449-459.
Payne, R.B. 1969. Breeding seasons and reproductive physiology of tricolored blackbirds and red-winged blackbirds. Univ. Calif. Publ. Zool. 90:1-137.
Pyle, P. 1997. Identification Guide to North American Birds. Part I. Slate Creek Press, Bolinas, California.
Ridgway, R. 1902. The Birds of North and Middle America. Part II. Bull. U.S. Natl. Mus. No. 50, Washington, DC.
Schafer, E.W., Jr., and R.B. Brunton. 1971. Chemicals as bird repellants: Two promising agents. J. Wildl. Manage. 35:569-572.
Wilen, B.O., and W.E. Frayer. 1990. Status and trends of United States wetlands and deepwater habitats. Forest Ecology and Management 33:181-192.

VAUX'S SWIFT
Chaetura vauxi

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Management Status: Federal: None
California: Species of Special Concern (CDFG, 1998)

General Distribution:

Vaux's Swifts breed in western North America from the Pacific Northwest south through the mountain ranges of central California and, in the Neotropics, from eastern and western Mexico south to Panama and, disjunctly, on the Yucatan Peninsula and in northern Venezuela (Bull and Collins 1993). The northern, nominate subspecies is the one occurring in western North America. Its breeding range extends from extreme southeastern Alaska, western and southern British Columbia, Washington, northern Idaho, and western Montana, to Oregon (except the arid southeast) and California. The California breeding range, detailed by Sterling and Paton (1996) includes the forested coastal regions from Del Norte County to Santa Cruz County, with a small breeding population possibly also occurring on the Big Sur coast of Monterey County (Roberson and Tenney 1993). Breeding populations also occur locally and in low densities through northeastern California and south in the Sierra Nevada to Tulare County (Sterling and Paton 1996).

The winter range of northern, nominate Vaux's Swifts is not well known, because of difficulty in separating birds of this subspecies from birds of resident subspecies of the Neotropics. Most birds probably winter from central and southern Mexico south through Guatemala and Honduras (AOU 1957, Bull and Collins 1993). Vaux's Swifts are scarce and irregular winter visitors in coastal southern California (Garrett and Dunn 1981), although concentrations of 100 or more have been noted.

Migrant Vaux's Swifts occur throughout southern California, primarily from mid-April to late May in spring, and from late August to mid-October in fall. Large concentrations of 10,000+ migrants may gather at traditional roosting sites, such as in downtown Los Angeles, in spring and fall (Garrett 1996). Miller and Stebbins (1964) cite spring dates of 27 April-13 May and fall dates of 4-13 September for Joshua Tree National Park. Along the lower Colorado River Rosenberg et al. (1991) cite a spring peak for early May. Numbers are generally small there, with the largest concentrations noted during series of severe storms; fall numbers are even lower than those of spring.

Distribution in the West Mojave Planning Area:

Vaux's Swifts are likely to be found throughout the WMPA during normal spring and fall migration periods, with spring numbers exceeding those of fall. They do not breed within the WMPA; the nearest breeding localities are in the southern Sierra Nevada in Tulare County. Areas of concentration appear to be around lakes, reservoirs and wetlands,

where abundant flying insect food may sustain migrations during inclement weather. Examples include Piute Ponds on the Edwards Air Force Base, Lake Palmdale, and Harper Lake. During calm, warm weather these swifts probably pass rapidly through the region.

There are no winter records for the WMPA. A record for 7 April 1980 at Pearblossom, Los Angeles Co. (Garrett and Dunn 1981), is the earliest spring transient known from the planning region. Fall records in the planning region extend at least as late as 8 October 1981 at Piute Ponds, Edwards Air Force Base, Los Angeles County.; K. L. Garrett, pers. obs.). Migration peaks in the planning area are presumably the same as those for the entire southern California region: early May in spring and late September in fall.

Natural History:

A small (4 3/4"; 11 cm) aerially-foraging bird, with typical swift proportions (long, narrow wings, short bill with large gape, very short and weak legs); wing span averages 273 mm (M. Marin, unpubl. data). The tail is short and slightly rounded, with spines projecting at the tip of each rectrix. Flight is rapid and "twinkling", consisting of rapid series of shallow wingbeats alternated with short looping glides. Easily distinguished from swallows by narrower wings with wrist joint closer to body, by rapid stiff wingbeats, and overall gray-brown coloration. Distinguished from the only other widespread swift in the Mojave Desert, the White-throated Swift (*Aeronautes saxatalis*) by smaller overall size, much shorter rear body and tail, shorter wings, and relatively uniform plumage (lacking the contrasting white patches of White-throated). Most similar to the Chimney Swift (*Chaetura pelagica*), which appears to be a rare breeding species and transient in southern California (Garrett and Dunn 1981); however, the close similarity of Chimney to Vaux's and other, extralimital *Chaetura* species renders its status in California somewhat speculative. Chimney Swifts are somewhat larger and darker overall, with relatively longer wings and longer body projection behind the wings in flight; Chimney Swifts tend to fly with longer and more frequent glides, although there is considerable overlap in this behavioral character. The two species are best distinguished by vocalizations: loud staccato chippering calls of Chimney Swifts, as opposed to high, insect-like trilling and rapid weak chips of Vaux's Swifts. Identification information presented here was derived from Chantler and Driessens (1995), Dunn (1979), and KLG (pers. obs.).

Foraging is exclusively aerial and diurnal. Food consists almost exclusively of aerial insects and aerially-drifting spiders; in one study, 88% of food items in boluses brought to nestlings consisted of Homoptera, Diptera, and Ephemeroptera (Bull and Beckwith 1993). Adequate studies of adult diets (as opposed to nestling diets determined from boluses) are lacking (M. Marin, pers. comm.). Optimal foraging heights, tracking the greatest densities of aeroplankton, probably vary in a complex manner with wind, temperature, topography, time of day, and season.

Nest sites are in hollow live trees, residual snags, and, to a lesser extent, chimneys and other man-made structures (Bull and Collins 1993, Sterling and Paton 1996). The single annual clutch consists of 5-7 eggs, with six being the most common clutch size (Bull and Collins 1993; M. Marin, pers. comm.).

The Vaux's Swift is a diurnal migrant, usually flying high (Bull and Collins 1993); they may fly as low as 1-2 m (3-6 feet) when encountering strong headwinds.

Habitat Requirements:

In coastal northern and central California, where the state's highest breeding densities occur, preferred nesting habitat is old-growth redwood (*Sequoia sempervirens*) forests. Breeding distribution seems closely linked to nest site availability (Sterling and Paton 1996). There is thought to be a close relationship between breeding distributions of this swift and the Pileated Woodpecker (*Dryocopus pileatus;* Sterling and Paton 1996); the latter species excavates large nest cavities in conifers rotted by fungus, and such cavities are known to be utilized by swifts. Breeding habitat in the Sierra Nevada is montane coniferous forest; one nest in the Yosemite region was in a red fir (*Abies magnifica*; Gaines 1988).

In the spring large numbers concentrate over lakes and marshes during northerly storms and associated westerly or northerly winds, often mixed with flocks of migrant swallows. During calm, warm weather such concentrations are less common, as birds appear to pass through southern California rapidly on their way north. Migration over the deserts of southern California appears to be on a broad front.

For roosting, migrant Vaux's Swifts require some kind of shelter. If available they will utilize hollow structures such as decayed or burned trees, chimneys, barns, outbuildings, or building shafts (Bull and Collins 1993). If such protection is not available they may cling to tree trunks on cold nights (Stager 1965), huddling together to reduce thermal stress. There is no specific information on roost sites used by migrant Vaux's Swifts in the Mojave Desert.

Population Status:

Breeding Bird Survey data show sharp declines over much of the breeding range of this species (Bull and Collins 1993). These declines, and the restriction of most of the California breeding population to old-growth forests, led to the placement of this species on the California Bird Species of Special Concern list.

No estimates of the total population of nominate *vauxi* exist.

Threats Analysis:

The chief cause of population decline is thought to be the felling of old growth forests and replacement with young, even-age stands; this deprives swifts of available nest and roost sites (Bull and Collins 1993). Man-made structures such as chimneys are used for nest sites in parts of the breeding range; changes in chimney design and blocking of chimney entrances by screens and spark arresters may eliminate potential nest sites (Bull and Collins 1993).

A potential threat to migrants is the loss of important, traditional roost sites for migrants. For example, a large concentration of migrant Vaux's Swifts occurs annually in the downtown Los Angeles area, perhaps taking advantage of foraging opportunities provided by updrafts along slopes adjacent to the Los Angeles River (K. L. Garrett pers. obs.); as many as 10,000 of these birds utilize a single man-made roost site, a building

shaft in central Los Angeles. Loss of availability of this roost site, or severe disturbance to roosting birds within the site, has the potential for harming a significant number of swifts.

Over most of the WMPA there appear to be few or no threats to the Vaux's Swift, since this species does not breed in the region and there are no known regularly-used roost sites involving large numbers of migrants. These swifts may fly as low as 1-2m (3-6 feet) when migrating into strong headwinds (Bull and Collins 1993). Birds encountering severe storms (particularly in spring) may be vulnerable to collisions with vehicles or stationary objects such as buildings, towers, or guy wires. At least one individual was killed by severe burns when flying through a solar-energy generating complex near Daggett (R. L. McKernan, pers. comm.; specimen at Los Angeles County Museum). Collins (1971) cites one case of a spine from an *Opuntia* cactus imbedded in a live Vaux's Swift banded at Big Morongo Canyon, suggesting that collisions with cacti might sometimes occur during low flights.

Biological Standards:

As Vaux's Swifts are strictly transients through the WMPA, there are few management options likely to benefit the species. This species is entirely aerial during its passage through the WMPA except for the occupation of night time roosts in chimneys or other hollow building shafts, in hollow trees, or (when the preceding are unavailable) on tree trunks. Management guidelines should stress the protection of any known, regularly used night time roost sites and the reduction in mortality through collisions with buildings, towers, and wires. Aeroplankton generated by wetlands, including desert marshes and freshwater lakes and reservoirs, provide important foraging opportunities for transient Vaux's Swifts in the WMPA, and may be critical to energy-stressed birds which encounter cold fronts during spring migration over the deserts; such wetlands should be protected.

Literature Cited:

American Ornithologists' Union. 1957. Checklist of North American birds, 5th Ed. American Ornithologists' Union, Baltimore, Maryland.

Bull, E.L. and R.C. Beckwith. 1993. Diet and foraging behavior of Vaux's Swifts in northeastern Oregon. Condor 96:1016-1023.

Bull, E.L. and C.T. Collins. 1993. Vaux's Swift (*Chaetura vauxi*). *In:* A. Poole and F. Gill (eds.), The Birds of North America, No. 77. Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

Chantler, P. and G. Driessens. 1995. Swifts: a guide to the swifts and treeswifts of the world. Pica Press, Sussex.

Collins, C.T. 1971. A probable swift-cactus collision. California Birds 2:101.

Dunn, J. 1979. Field notes: Black, Vaux's, and Chimney Swifts. Western Tanager 45(9):11.

Gaines, D. 1988. Birds of Yosemite and the east slope. Artemisia Press, Lee Vining, California.

Garrett, K.L. 1996. Birding downtown Los Angeles. Western Tanager 62(9):1-3.

Garrett, K. and J. Dunn. 1981. Birds of southern California: status and distribution. Los Angeles Audubon Society, Los Angeles, California.

Miller, A. H. and R. C. Stebbins, 1964. The lives of desert animals in Joshua Tree National Monument. University of California Press, Berkeley, California.

Roberson, D. and C. Tenney. 1993. Atlas of the breeding birds of Monterey County, California. Monterey Peninsula Audubon Society, Monterey, California.

Rosenberg, K. V., R. D. Ohmart, W. C. Hunter and B. W. Anderson. 1991. Birds of the lower Colorado River valley. University of Arizona Press, Tucson, Arizona.

Stager, K. E. 1965. An exposed nocturnal roost of migrant Vaux's Swifts. Condor 67:81-82.

Sterling, J. and P. W. C. Paton. 1996. Breeding distribution of Vaux's Swift in California. Western Birds 27:30-40.

VERMILION FLYCATCHER
Pyrocephalus rubinus

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Management Status: Federal: None
California: Species of Special Concern (CDFG, 1998)

General Distribution:

The Vermilion Flycatcher is a widespread tropical species whose range barely extends northward into the southwestern United States, where it breeds locally northward to southeastern California and southern Nevada. It is more abundant from central Arizona, central New Mexico, and west-central Texas south (with some range gaps) through northern Chile and central Venezula (AOU, 1998), where it breeds from sea level to 10,000 ft. (3000 m). In North America, its winter range is largely the same, although it does withdraw toward the tropics at this season. During winter months some individuals disperse east, west, and north of their breeding range.

Distribution in the West Mojave Planning Area:

The Vermilion Flycatcher is a local breeder in southeastern California. This species has undergone a significant and interesting range-shift in California during the past five decades. It was formerly a widespread and fairly common breeder throughout the Sonoran Desert, with numerous records for the Coachella and Imperial valleys (van Rossem, 1911; Hanna, 1935) and along the Lower Colorado River (Grinnell, 1914), but there were no breeding records from an elevation greater than 500 ft. (150 m; Grinnell and Miller, 1944).

This change in status, from breeder to early winter visitor, has been documented in other parts of its Sonoran Desert range (Rea, 1983:191). By contrast, the Vermilion Flycatcher is now virtually unknown as a breeder in the Sonoran Desert of California (Rosenberg et al., 1991; M.A. Patten unpubl. data), but breeds in many locations in the Mojave Desert, almost all of which are well above 500 ft. elevation. For example, this species breeds regularly (up to 3 pairs) in Morongo Valley (San Bernardino County; Garrett and Dunn, 1981; Patten, 1995), at both Covington Park and the northern edge of the Big Morongo Canyon Preserve, which lies at an elevation of over 2500 ft. (750 m). It is possible that the multiple individuals observed in the 1930s in suitable habitat in early spring at Twentynine Palms (San Bernardino County) were part of a historic breeding population there, but no evidence for nesting was reported (Carter, 1937).

Additional areas within the WMPA where the Vermilion Flycatcher currently breeds or has recently bred are Yucca Valley, San Bernardino County (up to 3 pairs from 1991 through 1999; M. A. Patten pers. obs.); Jess Ranch in Apple Valley, San Bernardino County (1 pair in 1995 and 1997; S. J. Myers in litt.); Fort Irwin, San Bernardino County (1 pair in 1996; R. Camp pers. comm.); Ridgecrest, Kern County (1 pair in 1992 and 1994; *Am. Birds* 46:1179, 1992, *Natl. Audubon Soc. Field Notes* 48:989, 1994); China Lake, Kern County (1 pair in 1994; *Natl. Audubon Soc. Field Notes* 48:989, 1994); Antelope Valley northwest of Lancaster, Los Angeles County (1 pair in 1998; Los Angeles County Breeding Bird Atlas data); and Leona Valley, Los

Angeles County (1 pair in 1994; K. L. Garrett in litt., *Natl. Audubon Soc. Field Notes* 48:989, 1994).

Just outside the southeastern boundary of the WMPA, it has recently bred at Lake Tamarisk in Desert Center, Riverside County (up to 2 pairs from 1994 through 1997; M.A. Patten pers. obs.) and in the residential area at Iron Mountain Pumping Plant, San Bernardino County (1 pair in 1996 and 1997; M. A. Patten pers. obs.). Also just northwest of the WMPA were 2 pairs at the South Fork of the Kern River Preserve (Kern County) in 1996 and 1998 (*Natl. Audubon Soc. Field Notes* 50:997, 1996, M.A. Patten pers. obs.).

Natural History:

The Vermilion Flycatcher is a distinctive species. Indeed, males are among the more strikingly-plumaged and unmistakable birds that occur in California. Females and young males have more subtle plumage, although any small flycatcher with light streaking on the breast and a rose or pink wash to the belly and vent ought to be readily identifiable as this species. Immature female are duller still, often with only a light yellow wash on the belly. Like its closest relatives, the phoebes (*Sayornis* spp.), this flycatcher is partial to open areas and often perches in a conspicuous location from which it sallies frequently attempting to capture prey. No systematic studies have been conducted, but its prey consists largely of flying insects, although, again like phoebes, it will take arthropods from the ground (Bendire, 1895).

This species is mainly a summer visitor to the southwestern United States, although it regularly winters in the Sonoran and Chihuahuan deserts and in cismontane southern California. Birds that migrate arrive on their breeding grounds by late February or early March and typically depart by late September (egg dates range from early March to early July; Bent, 1942). Their open-cup nests are usually placed 8-20 ft. (2.5-6 m) above the ground in a horizontal fork of a large tree (Bent, 1942); some nests have been reported as high as 60 ft. (18 m) above the ground (Dawson, 1923). A typical clutch consists of 3 eggs, although nests with 2 or 4 eggs have been recorded (Bent, 1942). The clutch is incubated for 12 days before the chicks hatch, and another two weeks is required before the young fledge. Two broods are frequent.

Habitat Requirements:

When the Vermilion Flycatcher formerly bred in the Sonoran Desert of California, it was associated with low-lying, open riparian areas with accessible water (either pooled or flowing) and dominated by mesquite (*Prosopis* spp.). Willow (*Salix* spp.) and Fremont cottonwood (*Populus fremontii*) are also used (Grinnell and Miller, 1944). This species continues to occupy habitat similar to this description, at least in part, at Morongo Valley. Elsewhere in the Mojave Desert, this species invariably uses parkland or golf course settings that support either native or non-native trees, and may or may not have accessible water; indeed, there is a substantial parkland element to the occupied habitat at Morongo Valley. In native habitats, trees used for nesting range from massive cottonwoods, sycamores (*Platanus* spp.), and even oaks (*Quercus* spp.) to more mid-sized trees such as willow and mesquite.

Population Status:

Estimates of overall population size of the Vermilion Flycatcher in California are not available, but it is likely under 100 pairs. It is possible that the overall population in the State has changed little during this century, with instead there being only a major shift in breeding locations

from the Sonoran Desert to the Mojave Desert, a shift reminiscent of the one by the Summer Tanager (*Piranga rubra cooperi*) in southern California (Johnson, 1994). However, given the extensive habitat along the Lower Colorado River that formerly supported this species (Grinnell, 1914; Rosenberg et al., 1991), it seems likely that this species has declined to some extent in California since the turn of the century. Nevertheless, as noted above, this flycatcher has increased as a breeding species, in terms of both numbers of pairs and breeding locales, during the 1990s.

Threats Analysis:

The primary threat to the Vermilion Flycatcher is habitat loss. The destruction of much of the native riparian habitat along the Lower Colorado River, and its replacement in many areas by non-native salt cedar (*Tamarix* spp.), has probably led to its near-extirpation as a breeding species there (Rosenberg et al., 1991). The increase in flycatcher nesting locations in the Mojave Desert of California perhaps can be attributed to the advent of various man-made habitat oases, such as parks, golf courses, and suburban housing places, in areas formerly supporting desert scrub. Unfortunately, the parks and golf courses now frequently used by nesting Vermilion Flycatchers provide excellent foraging habitat for the Brown-headed Cowbird (*Molothrus ater*), a brood parasite known to use this flycatcher as a host (Hanna, 1936).

A Western Scrub-Jay (*Aphelocoma californica*) depredated a Vermilion Flycatcher nest at Morongo Valley in May 1997 (C. McGaugh in litt.). This jay is commonly associated with suburbia and parkland in southern California, and may pose a threat to Vermilion Flycatchers in some areas. However, the ranges of the two species overlap little, so in general impacts by Western Scrub-Jays are not threat to Vermilion Flycatchers in California.

Biological Standards:

Management of the Vermilion Flycatcher within the WMPA could be accomplished by preservation of suitable riparian and desert wash habitats (e.g., through restricted access, removal of livestock, and prohibition of tree cutting). In many areas, the quality of this habitat could be enhanced through removal of non-native salt cedar and compensatory planting of native mesquite, palo verde, or willow trees. Adjacent parkland and golf courses may not require further protection or management, save potential efforts to trap and remove cowbirds from these areas, but more study is needed. Provided that riparian and riparian-parkland habitats are retained within the WMPA, it is unlikely that the Vermilion Flycatcher will decrease in, let alone be extirpated from, this region.

Literature Cited:

American Ornithologists' Union (AOU). 1998. Check-List of North American Birds, 7th edn. Amer. Ornithol. Union, Washington, D.C.

Bendire, C.E. 1895. Life histories of North American birds. U. S. Natl. Mus. Spec. Bull. 3.

Bent, A.C. 1942. Life histories of North American flycatchers, larks, swallows, and their allies. U. S. Natl. Mus. Bull. 179.

Carter, F. 1937. Bird life at Twentynine Palms. Condor 39:210-219.

Dawson, W.L. 1923. The Birds of California, vol. 1. South Moulton Co., Los Angeles, California.

Garrett, K., and J. Dunn. 1981. Birds of Southern California: Status and Distribution. Los Angeles Audubon Soc., Los Angeles, California.

Grinnell, J. 1914. An account of the mammals and birds of the Lower Colorado Valley, with especial reference to the distributional problems presented. Univ. Calif. Publ. Zool. 12:51-294.

Grinnell, J., and A.H. Miller. 1944. The distribution of the birds of California. Pac. Coast Avifauna 27.

Hanna, W.C. 1935. Vermilion Flycatcher increasing in Coachella Valley, California. Condor 37:173.

Hanna, W.C. 1936. Vermilion Flycatcher a victim of the Dwarf Cowbird in California. Condor 38:174.

Johnson, N.K. 1994. Pioneering and natural expansion of breeding distributions in western North American birds. pp. 27-44, *In:* J.R. Jehl, Jr., and N.K. Johnson, (eds.), A century of avifaunal change in western North America. Stud. Avian Biol. 15.

Patten, M.A. 1995. Checklist of the birds of Morongo Valley. Bureau Land Manage., Morongo Valley, California.

Rea, A.M. 1983. Once a River. Univ. Ariz. Press, Tucson, Arizona.

Rosenberg, K.V., R.D. Ohmart, W.C. Hunter, and B.W. Anderson. 1991. Birds of the Lower Colorado River Valley. Univ. Ariz. Press, Tucson, Arizona.

van Rossem, A. 1911. Winter birds of the Salton Sea region. Condor 13:129-137.

VIRGINIA'S WARBLER
Vermivora virginiae

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Management Status: Federal: None
California: Species of Special Concern (CDFG, 1998)

General Distribution:

This southwestern relative of the Nashville Warbler (*V. ruficapilla*) is endemic to the western United States, breeding from eastern California, Nevada, southern Idaho, southwestern and central Wyoming, and Colorado (exclusive of the plains regions) south through Utah, Arizona (except southwest), and New Mexico to western Texas (Dunn and Garrett 1997, AOU 1998). It winters mainly in western Mexico south to Oaxaca, with sight records as far south as Belize and Guatemala (Dunn and Garrett 1997). Migrants are noted in small numbers through most of the southwest, with the bulk of the migration occurring east of the Colorado River Valley (Rosenberg et al. 1991). A few are found as far west as the coast of California, with most occurring in the fall (Garrett and Dunn 1981). Vagrants have been noted as far from the normal range as Labrador, Canada, and the Bahama Islands (Dunn and Garrett 1997).

This species is a rare breeder in California, occurring primarily in the Great Basin region, from the White Mountains and locally on the eastern slope of the Sierra Nevada of Mono and Inyo counties, south to the higher ranges of the east Mojave Desert: Clark Mountain (2-4 pairs according to Remsen 1978), and the New York Mountains, San Bernardino County (Garrett and Dunn 1981). A few pairs breed in the eastern San Bernardino Mountains (especially the upper Arrastre Creek drainage; Garrett and Dunn 1981), and at least one pair has been confirmed nesting in the northeastern San Gabriel Mountains (*American Birds* 40(5):1256, 1986).

Virginia's Warblers are very rare spring migrants through southern California, and, although still very uncommon, are somewhat more numerous in fall (Garrett and Dunn 1981). Spring records are mostly from mid-April through late May, and fall migrants are generally found from mid-August through early October. Along the lower Colorado River there are fall records as early as 23 July and as late as 2 November (Rosenberg et al. 1991). A few have wintered in coastal southern California (Garrett and Dunn 1981), and exceptionally in the southeastern portion of the state, south of the Mojave Desert (McCaskie 1989).

Distribution in the West Mojave Planning Area:

Virginia's Warblers do not breed in the WMPA, although a few pairs have been documented breeding just outside the periphery of the area. The upper Arrastre Creek drainage nesting sites at an elevation of 7220-7875 ft. (2200-2400 m) are about 4.5 miles (7 km) south of the northeastern San Bernardino National Forest boundary. The one documented site in the San Gabriel Mountains, near the intersection of Blue Ridge Rd.

and the Angeles Crest Hwy. at an elevation of 6890 ft. (2100 m), is about 3.5 miles (5.5 km) south of the northern boundary of the Angeles National Forest.

This species occurs as a rare transient through the WMPA. Los Angeles County Museum files include nine records for the Lancaster area of the Antelope Valley; all are for fall, from 25 August to 2 October (with six from September). This seasonal pattern probably holds throughout the WMPA. The numerous records for Kern Co. (e.g., California City, Mojave, Galileo Hill, Cantil) are nearly all for fall (M. T. Heindel, pers. comm); perhaps as few as two of the several claimed spring records for Kern County can be considered valid (M. T. Heindel, pers. comm.). Files at the Joshua Tree National Park headquarters list six sightings of Virginia's Warblers between 1964 and 1985 for the park, all in spring, but only one (12 April 1982) includes a convincing description. Among the few valid spring records for the WMPA was one at Twentynine Palms 26 April 1994 (American Birds 48(3)). In San Bernardino County one was northwest of Silverwood Lake at the intersection of Hwy. 138 and Hwy. 173 on 9 September 1972 (K. L. Garrett pers.obs.); additional records undoubtedly occur for other sites in the San Bernardino County portion of the WMPA. It has been recorded as late as October at China Lake Naval Weapons Station (CNDDB).

Natural History:

Virginia's Warblers are small (4.5 in., 11.5 cm) insectivorous songbirds, which are primarily gray in plumage. All plumages show a greenish yellow rump and upper tail coverts and bright yellow undertail coverts. Adult males have a large (but variable) patch of yellow on the breast and a chestnut crown patch, which is usually concealed. Adult females and immatures show less (or no) yellow on the breast and the crown patch is reduced or absent. This warbler frequently bobs its tail in a down-up motion, a behavior shared with the western subspecies (*Vermivora ruficapilla ridgwayi*) of the closely related to the Nashville Warbler (Dunn and Garrett 1997). Dull immature female Nashvilles with reduced yellow on the underparts and olive-gray upperparts are often mistaken for Virginia's Warblers; Virginia's is distinguished in all plumages by the lack of any olive on the gray wing coverts and flight feather edges (Dunn and Garrett 1997).

Virginia's Warblers forage actively by gleaning adult and larval insects from twigs and leaves. Most foraging is in brush and the lower portions of trees; territorial males may sing from high in trees. Migrants are usually noted foraging in low brushy or weedy habitats, especially in fall (Dunn and Garrett 1997).

The nest is a woven cup placed on the ground on a steep slope, and concealed by vegetation (Dunn and Garrett 1997). Clutch size varies from three to five, but is typically three (Ehrlich et al. 1988).

Habitat Requirements:

This is a warbler of rather open montane woodlands with much brushy understory, especially on slopes . Occupied habitats are often rather arid. Dominant brushy species in breeding habitats include mountain mahogany (*Cercocarpus betuloides*), serviceberry (*Amelanchier* spp.), manzanita (*Arctostaphylos* spp.), currant (*Ribes* spp.), snowberry (*Symphorocarpus* spp.), and scrub oak (*Quercus* spp.). Intermixed trees may include various conifers, including pinyon pines (*Pinus monophylla*), ponderosa pines *(P.*

ponderosa), douglas fir (*Pseudotsuga menziesii*), white fir (*Abies concolor*), Gambel oak (*Quercus gambeli*), California black oak (*Q. kelloggi*), and aspen (*Populus tremuloides*) (Dunn and Garrett 1997).

Migrants along the coast of California are often noted in patches of exotic fennel (*Foeniculum vulgare*) or tree tobacco (*Nicotiana glauca*; Garrett and Dunn 1981). Migrants through the desert can be found in almost any habitat where migrant insectivorous songbirds are concentrated, including riparian groves, shade plantings around towns, parks, or ranchyards, and occasionally microphyll woodlands.

Population Status:

Virginia's Warblers breed only in small numbers in California; the species' placement on the California Bird Species of Special Concern list (Remsen 1978) reflects its limited breeding distribution and population size in the state and potential threats from breeding habitat destruction.

Some or most breeding populations in California have perhaps become established only during the latter half of the present century (Johnson and Garrett 1974). Grinnell and Miller (1944) did not record breeding birds away from Clark Mountain and, possibly, Mono County.

Threats Analysis:

Remsen (1978) considered the greatest potential threat to California breeding populations to be habitat destruction, especially through forest fires. Increasing human recreation and density in montane woodlands and brushlands suggests a growing potential for catastrophic fires in Virginia's Warbler habitat. Dunn and Garrett (1997) noted that populations are generally stable, and that cowbird parasitism, while recorded, does not appear to have significantly impacted this species.

Biological Standards:

Remsen's (1978) recommendation for management of this species in California is to maintain the integrity of breeding habitat. Breeding habitat within the WMPA is marginal, at best, although suitable habitat lies within the Angeles and San Bernardino National Forests just outside the area.

Transients through the WMPA most often occur, like most migrant passerines, at sites providing adequate water, food and shelter such as riparian groves, desert woodlands, landscaped parks and wooded ranchyards. Such sites, particularly natural riparian areas and woodlands, should be preserved. Because Virginia's Warblers forage largely in shrubby habitats and woodland understory during migration, such vegetation layers should be preserved in WMPA riparian habitats; in some cases this might require a reduction or curtailment of livestock grazing activity. The availability of pools, springs, or flowing water in riparian habitats is important to passerine migrants in general, and should not be compromised at WMPA riparian sites.

Literature Cited:

American Ornithologists' Union. 1998. Checklist of North American birds, 7th ed. American Ornithologists' Union, Washington, D.C.

Dunn, J.L. and K.L. Garrett. 1997. A field guide to warblers of North America. Houghton Mifflin Co., Boston MA.

Ehrlich, P.R., D.S. Dobkin, D. Wheye. 1988. The birders' handbook. Simon and Schuster, New York, New York.

Garrett, K. and J. Dunn. 1981. Birds of southern California: status and distribution. Los Angeles Audubon Society, Los Angeles, California.

Grinnell, J. and A.H. Miller. 1944. Distribution of the birds of California. Pacific Coast Avifauna No. 27.

Johnson, N.K. 1976. Breeding distribution of Nashville and Virginia's warblers. Auk 93:219-230.

Johnson, N.K. and K.L. Garrett. 1974. Interior bird species expand breeding ranges into southern California. West. Birds 5:45-56.

McCaskie, G. 1989. Winter Season. Southern Pacific Coast Region. American Birds 43:368.

Remsen, J.V., Jr. 1978. Bird species of special concern in California. California Department of Fish and Game, Wildlife Management Branch Administrative Report No. 78-1.

Rosenberg, K.V., R.D. Ohmart, W.C. Hunter and B.W. Anderson. 1991. Bird of the lower Colorado River Valley. Univ. of Arizona Press, Tucson.

YELLOW WARBLER
Dendroica petechia

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Management Status: Federal: None
California: Species of Special Concern (CDFG, 1998)

General Distribution:

Across its vast range, the Yellow Warbler is a highly variable species. Forty-three subspecies are currently recognized, and are treated geographically as three groups. The *aestiva* group breeds throughout much of the U.S. and Canada, from northern Alaska, northern Yukon, northwestern and central Mackenzie, northern Saskatchewan, northern Manitoba, northern Ontario, central Quebec, central Labrador, and Newfoundland, south to central Alaska, northern Baja California, though the central plateau region of Mexico to northern Guerrero, Puebla, and southeastern San Luis Potosí, and to central and northeastern Texas (formerly), central Oklahoma, central Arkansas, central Alabama, central Georgia, extreme northwestern South Carolina, and central North Carolina. The *aestiva* group winters from Veracruz, Sinaloa, and Yucatán south to Peru and northern Brazil, and sparingly north to southern California. The *petechia* group is resident from southernmost Florida and the Bahamas south through the West Indies to the northern coast of Venezuela (including Trinidad, Tobago, and Cozumel islands). The *erithachorides* group is resident from southern Baja California, Sonora, and southern Tamaulipas south along both coasts of Central America to eastern Panama; it also ranges along the west coast of South America from northwestern Colombia south to central Peru, and east along the northern coast of Colombia to northwestern Venezuela (Dunn and Garrett, 1997; AOU, 1998).

Three Yellow Warbler subspecies nest in California: *D. p. brewsteri* along the Pacific coast (plus a few desert locations), *D .p. morcomi* from the east slope of the Sierra Nevada to the Great Basin, and *D .p. sonorana* along the Colorado River (Dunn and Garrett, 1997).

Yellow Warblers are commonly observed during migration in California, on both the Pacific slope and in the deserts and interior valleys (Garrett and Dunn, 1981).

Distribution in the West Mojave Planning Area:

In the WMPA, the Yellow Warbler nests or has nested at only four localities: the Mojave River at Victorville (8-12 pairs annually; S. Myers unpubl. data), Camp Cady (1 pair in 1985, Kaufman et al., 1986), Morongo Valley (1-6 pairs annually, E.A. Cardiff, pers. comm.; Breeding Bird Census data), and Big Rock Creek (1-2 pairs annually, K.L. Garrett, pers. comm.; Los Angeles Co. Breeding Bird Atlas data). Several pairs also nest along Big Rock Creek just outside of the WMPA, on the Angeles National Forest. It also nests at four localities just outside of the WMPA: Tecopa (1 pair in 1979, *American Birds* 33:898, 1979), Whitewater Canyon (1-2 pairs annually, S.J. Myers, pers. obs.), Little Rock Creek (a few pairs, Los Angeles County Breeding Bird Atlas data), and South Fork Kern River Preserve at Weldon (500 pairs in 1997, S.A. Laymon, pers. comm.). Tecopa is approximately 15 mi. (24 km) northeast, Whitewater 3

mi. (5 km) south, and Weldon about 9.5 mi. (15 km) west of the WMPA. Little Rock Creek is on the Angeles National Forest, just south of the WMPA.

As a migrant, Yellow Warbler is common throughout the WMPA. Single day maxima of "hundreds" have been observed during mid-May at Butterbredt Canyon; fall daily maxima in the same area are typically between 50-100 (M.T. Heindel, *in litt.*). It is casual during winter in the WMPA: one was observed during the Mojave River Christmas Bird Count, 5 January 1997 (*National Audubon Society Field Notes* 51:622-623), and another at Galileo Hill Park, Kern Co. on 14 January 1996 (*National Audubon Society Field Notes* 50:225).

Natural History:

Yellow Warblers belong to the wood-warbler genus *Dendroica*, whose members generally possess distinct characteristics such as wing bars, tail spots, flank streaks, and patterning around the eyes (Dunn and Garrett, 1997). Yellow Warbler upperparts are yellow to greenish-yellow, with underparts bright yellow. Adult males have vertical reddish streaks on the breast. Males of subspecies in the *petechia* and *erithachorides* groups also have chestnut crowns and heads, respectively. All Yellow Warblers have yellow wing bars and/or flight feather edges, and they are the only North American wood-warblers (except the very different American Redstart, *Setophaga ruticilla*) with yellow tail spots (Pyle, 1997; Dunn and Garrett, 1997). The olive to yellowish wings have yellow wing bars that vary from bold and distinct to nearly lacking, depending on age, sex, and subspecies. In California, the species most likely to be confused with the Yellow Warbler are the Orange-crowned Warbler (*Vermivora celata*) and Wilson's Warbler (*Wilsonia pusilla*), both of which lack wing bars and yellow tail spots.

Yellow Warblers are 4.5-5.25 in. (11-13 cm) long, and weigh an average of 0.35 oz. (10 g; Dunning 1984). The maximum recorded age of a wild Yellow Warbler is 8 yrs., 11 mo. (Klimkiewicz et al. 1983).

This species primarily eats insects, which, like most other wood-warblers, it captures by foliage gleaning (Bent 1953, Ehrlich et al., 1988). Male and female Yellow Warblers have exhibited marked differences in average foraging heights (Morse, 1989).

In southern California, Yellow Warblers usually arrive on their nesting grounds at the end of March or the first week of April. The influx of migrants from breeding grounds to the north makes departure dates for southern California breeders difficult to determine. Spring migration numbers in southern California peak during the first half of May, and during September in the fall (Dunn and Garrett, 1997).

Nests are deep cups, placed in an upright fork in shrubs or small trees, typically 3-8 ft. (1-2.6 m) high, but occasionally to 60 ft. (19 m; Bent, 1953; Harrison, 1979; Dunn and Garrett, 1997). No data exist regarding plants used for nest placement at breeding localities in the California deserts, but Yellow Warblers' habits elsewhere suggest that California Wild Rose (*Rosa californica*), various shrubby willows (*Salix* spp.), and Mulefat (*Baccharis salicifolia*) may be used.

Yellow Warblers are one of the more frequent hosts for parasitism by Brown-headed Cowbirds *(Molothrus ater*). Friedmann (1963) noted that he stopped accumulating data when he had exceeded 900 records. Frequency of parasitism varies geographically, with a maximum rate of 59% of nests parasitized in Michigan. Friedmann does not include rates for *D.p. brewsteri*, but Gaines (1974) considered nesting Yellow Warblers in the Sacramento Valley to be highly susceptible to parasitism.

Habitat Requirements:

In the California desert, Yellow Warblers occur in riparian woodland or forest dominated by cottonwoods and willows. All four breeding localities in the WMPA contain cottonwoods and willows. Nesting habitat must contain dense understory vegetation. Fremont Cottonwoods (*Populus fremontii*) and larger willows (*Salix laevigata, S. gooddingii, S. lasiolepis*) typically form the canopy at breeding sites such as Big Morongo Canyon and the Mojave River at Victorville.

Population Status:

Most Yellow Warbler populations in the eastern U.S. appear to be stable. Western populations, however, are declining (Remsen, 1978; Garrett and Dunn, 1981; Dunn and Garrett, 1997). Grinnell and Miller (1944) considered *D.p. brewsteri* to be common or abundant at many breeding localities, but there has been a steady and significant decline of Pacific coast populations (Dunn and Garrett, 1997). The most serious decline has been along the Colorado River, where *D.p. sonorana* was thought to be extirpated (Rosenberg et al., 1991; Dunn and Garrett, 1997), until surveys for the Southwestern Willow Flycatcher (*Empidonax traillii extimus*) in 1997 revealed the presence of approximately 30 pairs between Topock and Picacho (R.L. McKernan, pers. comm.). Numbers of Yellow Warblers at Morongo Valley appear to be generally stable, although numbers of pairs has fluctuated since 1977 (Breeding Bird Census data). Numbers along the Mojave River at Victorville have remained at 8-12 pairs in recent years (pers. obs.). Brown-headed Cowbird trapping at the South Fork of the Kern River near Weldon, along with some habitat enhancement, has allowed the Yellow Warbler population there to increase dramatically over the past four years (S.A. Laymon, pers. comm.).

Threats Analysis:

Habitat destruction and parasitism by Brown-headed Cowbirds are the primary threats to breeding Yellow Warblers in the WMPA. Habitat destruction can occur in many ways, with the most catastrophic losses resulting from clearing of large tracts of forest or woodland for agriculture, development, or flood control. Activities such as wood cutting can degrade or destroy suitable breeding habitat for this species.

Grazing by cattle or other livestock can have significant adverse effects on riparian habitats. In addition to eating seedlings, saplings, shrubs, and herbaceous plants, livestock trample vegetation and the substrate of riparian areas, causing increased erosion and sedimentation. These adverse effects lead to a reduction in cover and nesting sites for birds, along with declines in available insect prey (USDI, 1981; Crumpacker, 1984). Smith (1989), studying the recovery of a riparian habitat in northern California following the exclusion of cattle, concluded that the establishment of good quality willow riparian habitat is possible only in the absence of cattle browsing.

Brown-headed Cowbird parasitism on Yellow Warblers is a serious problem in southern California (Garrett and Dunn, 1981). Brown-headed Cowbirds are common in Morongo Valley and Victorville during the nesting season. Both of these areas are commonly used for horseback riding; stables, which provide feeding areas for cowbirds (Laymon, 1987), are located near riparian habitats in these areas. At Mojave Narrows Regional Park, equestrians have created an extensive network of trails through riparian forest and woodland, increasing the amount of edge,

which is known to be a favorable condition for the proliferation of Brown-headed Cowbirds (Brittingham and Temple, 1983; Rothstein, 1994). Considering the vast amount of apparently suitable habitat at Mojave Narrows Park and nearby areas, numbers of breeding Yellow Warblers seem fairly low. It is possible that cowbird parasitism is a limiting factor. At the South Fork Kern River Valley the Yellow Warbler population has increased from 14 pairs in 1986 to approximately 500 pairs in 1997; an active Brown-headed Cowbird control program is thought to be responsible for this impressive recovery (S.A. Laymon, pers. comm.).

Lowering of ground water has had a significant effect on cottonwood-willow forest along the Mojave River in Victorville. The extent of both marshland and riparian woodland/forest has declined markedly in the past 140 years, primarily due to the drilling of wells in the Victor Valley (Torres et al., 1992). Long-time residents have stated that much of the open, dry cottonwood woodland (with little understory) in the area was once more similar to the dense, lush cottonwood-willow forest where Yellow Warblers now nest (Myers, 1992).

Fire can have a devastating effect on nesting habitat of riparian species. A wildfire at Big Morongo Preserve on 27 April 1992 burned about 50 acres (20 ha), including many large cottonwoods and willows (Cardiff, 1993). This habitat will take many years to recover completely.

Non-native invasive plant species can also degrade habitat. Exotics such as Salt Cedar (*Tamarix ramosissima, T. parviflora*), Giant Reed (*Arundo donax*), and Russian Olive (*Elaeagnus angustifolius*) displace native plant species and probably provide little in the way of habitat values for Yellow Warblers. All of these species occur along the Mojave River in the Victorville area; Russian Olive is especially prominent. Some Salt Cedar occurs at Morongo Valley.

Few, if any, data are available on the effects of off-highway vehicles on Yellow Warblers, but this activity is common at Mojave Narrows Park and other potential nesting areas near Victorville. Four-wheel drive pickup trucks have been observed crashing through dense willow thickets along the active channel of the river (S.J. Myers, pers. obs.). Such thickets appear suitable for Yellow Warbler nesting.

Biological Standards:

The most important measure necessary to protect or enhance Yellow Warbler populations in the WMPA is to preserve known and potential nesting areas. Of the known nesting localities, Big Morongo Canyon Preserve is managed by BLM, Mojave Narrows Regional Park is managed by San Bernardino County Regional Parks Department (the land is owned by the State of California Wildlife Conservation Board), Camp Cady is owned by California Department of Fish and Game, and Big Rock Creek is privately owned.

Management of important nesting areas for Yellow Warbler must include protection from grazing, off-highway vehicle degradation and disturbance, wood-cutting, and wildfires. Indiscriminate removal of vegetation for flood control purposes should be monitored and regulated. Typically, the vegetation removed during or in anticipation of flooding (such as along the Mojave River) is that used by nesting Yellow Warblers, Yellow-breasted Chats, and endangered species such as Least Bell's Vireo (*Vireo bellii pusillus*) and Southwestern Willow Flycatcher (*Empidonax traillii extimus*).

Livestock and feral burros should be removed or excluded from riparian areas in the WMPA. Exclusion will necessitate the installation of fencing, which is designed to accommodate

native wildlife (e.g., Coyotes, Kit Foxes, Bobcats), while excluding livestock and burros. It may be necessary to install stock tanks in some locations to compensate for the loss of water sources for livestock. Areas whose avifaunas may benefit from livestock exclusion include Camp Cady, Afton Canyon, Cushenbury Springs, and Big Rock Creek. At Mojave Narrows Regional Park, grazing is currently limited to pastures adjacent to the river bottom, with the exception of cattle and horses that are allowed to graze throughout the Lower Slough. The slough contains a marsh of nearly 30 acres with mixed riparian scrub and woodland suitable for breeding Yellow Warblers. Restricting livestock to the pastures in this area would greatly enhance the marsh and riparian habitat.

Maintenance or enhancement of water sources necessary to preserve or improve riparian habitats should be implemented. In some cases, restoration of riparian habitat by removing invasives and planting cottonwoods and willows may be appropriate (e.g., Afton Canyon).

Management of Brown-headed Cowbird populations at important riparian bird nesting sites is of paramount importance in managing for Yellow Warbler habitat in the WMPA. Such programs must be long-term, preferably into perpetuity or until cowbirds have been eliminated. In order to initiate cowbird management at all important nesting sites in the WMPA, it will be necessary for agencies at federal, state, county, and local levels to participate in cooperative plans.

In order to evaluate the vigor of desert riparian habitats and the viability of bird populations in the WMPA, regular monitoring is necessary. BLM documents such as ACEC Management Plans and Management Plans for Natural Areas prescribe bird monitoring programs. BLM and other participating agencies should assess the effectiveness of current monitoring methods and revise as needed. Annual review of monitoring results can be used to assist in management decisions. Such review should address whether habitats are at carrying capacity for sensitive bird species, and if not, identify corrective measures that can be taken to increase populations.

Literature Cited:

American Ornithologists' Union. 1998. Check-list of North American birds, 7th ed. Amer. Ornithol. Union, Washington, D.C.

Bent, A.C. 1953. Life histories of North American wood warblers. Bull. U.S. Natl. Mus. 203.

Brittingham, M.C. and S.A. Temple. 1983. Have cowbirds caused forest songbirds to decline? BioScience 33:31-35.

California Department of Fish and Game, Natural Diversity Data Base. 1998. Special Animals. Biannual publication, Mimeo., 44 pp.

Crumpacker, D.W. 1984. Regional riparian research and a multi-university approach to the special problem of livestock grazing in the Rocky Mountains and Great Plains. pp. 413-423 *In:* R.E. Warner and K.M. Hendrix (eds.), California riparian systems: Ecology, conservation, and productive management. Univ. of California Press, Berkeley, California.

Dunn, J.L., and K.L. Garrett. 1997. A field guide to warblers of North America. Houghton Mifflin, Boston, Massachusetts.

Dunning, J.B, Jr. 1984. Body weights of 686 species of North American birds. Western Bird Banding Assoc., Monograph No. 1.

Ehrlich, P.R., D.S. Dobkin, and D. Wheye. 1988. The birder's handbook: a field guide to the natural history of North American birds. Simon & Schuster, New York.

Friedmann, H. 1963. Host relations of the parasitic cowbirds. U.S. Natl. Mus. Bull. 233.

Gaines, D. 1974. A new look at the nesting riparian avifauna of the Sacramento Valley, California. West. Birds 5: 61-80.

Garrett, K. and J. Dunn. 1981. Birds of southern California: status and distribution. Los Angeles Audubon Society, Los Angeles, California.

Grinnell, J. and A. Miller. 1944. The distribution of the birds of California. Pacific Coast Avifauna No. 27. Reprinted by Artemesia Press, Lee Vining, California.

Harrison, H.H. 1979. A field guide to western birds' nests. Houghton Mifflin Co., Boston, Massachusetts.

Kaufman, N.M., R.J. Bransfield, and N. Gilbert. 1986. Fish and Wildlife coordination act report, Mojave River Forks Dam Water Conservation Project, San Bernardino County, California. Unpubl. report prepared for the U.S. Army Corps of Engineers, Los Angeles, by U.S. Fish and Wildlife Service, Laguna Nigel, California.

Klimkiewicz, M.K., R.B. Clapp, and A.G. Futcher. 1983. Longevity records of North American birds: Remizidae through Parulinae. J. Field Ornithol. 54:287-294.

Laymon, S.A. 1987. Brown-headed Cowbirds in California: Historical perspectives and management opportunities in riparian habitats. West. Birds 18:63-70.

Morse, D.H. 1989. American warblers: An ecological and behavioral perspective. Harvard Univ. Press, Cambridge, Massachusetts.

Myers, S.J. 1992. Biological inventory of the Mojave River corridor. *In:* Tierra Madre Consultants, Inc., Natural resources inventory of the Mojave River corridor. Unpubl. report prepared for the Mojave River Corridor Task Force.

Pyle, P. 1997. Identification guide to North American. Part I, Columbidae to Ploceidae. Slate Creek Press, Bolinas, California.

Remsen. J.V., Jr. 1978. Bird species of special concern in California. Calif. Dept. Fish and Game, Wildlife Mgt. Branch Admin. Rep. 78-1.

Rosenberg, K., R. Ohmart, W. Hunter, and B. Anderson. 1991. Birds of the Lower Colorado River Valley. Univ. of Arizona Press, Tucson, Arizona.

Rothstein, S.I. 1994. The cowbird's invasion of the far west: History, causes and consequences experienced by host species. pp.301-315 *In:* J.R. Jehl, Jr. and N.K. Johnson (eds.), A century of avifaunal change in western North America. Stud. Avian Biol. 15.

Smith, J.J. 1989. Recovery of riparian vegetation on an intermittent stream following removal of cattle. pp. 217-221 *In:* D.L. Abell (tech. coordinator), Proceedings of the California Riparian Systems Conference: protection, management, and restoration for the 1990s; 1988 September 22-24, Davis, Calif. Gen. Tech. Rep. PSW-110. Pacific Southwest Forest and Range Experiment Station, Forest Service, U.S. Dept. of Agriculture, Berkeley, California.

Torres, J., D. Earle, S. Connell, S. Wells and B. Love. 1992. Cultural resources sensitivity study of the Mojave River corridor, San Bernardino County, California. *In:* Tierra Madre Consultants, Inc., Natural resources inventory of the Mojave River corridor. Unpubl. report prepared for the Mojave River Corridor Task Force.

USDI, Bureau of Land Management. 1981. California Desert Conservation Area: Volume E, Appendix 9 (Wildlife). Riverside, California.

USDI, Bureau of Land Management, 1997. California Desert District Resource Area files.

YELLOW-BILLED CUCKOO
Coccyzus americanus

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Management Status: Federal: None
California: Endangered (CDFG, 1998)

General Distribution:

Yellow-billed Cuckoos (*Coccyzus americanus*) have a wide distribution throughout North America. They breed from the West Indies and northern third of Mexico north to extreme southern Canada (AOU, 1983) and winter from northern South America south to northern Argentina, primarily east of the Andes, excluding the Amazon Basin (AOU, 1983; Hughes, 1999) There are scattered winter records from Central America and the West Indies (Hughes, 1999).

The western subspecies, the California Yellow-billed Cuckoo (*C.a. occidentalis*), has a much smaller range and more restrictive habitat requirements. It breeds in scattered locations where suitable habitat is available throughout California, Idaho, Utah, Arizona, New Mexico, extreme western Texas, and possibly Nevada and western Colorado (Gaines and Laymon, 1984). In Mexico it breeds south to the Cape region of Baja California, Sinaloa, and Chihuahua (AOU, 1957). Historically, it has bred north to southern British Columbia (AOU, 1957).

A statewide survey of Yellow-billed Cuckoos in California conducted during 1986 and 1987 found a total of 30-33 pairs and 31 unmated males at nine localities (Laymon and Halterman, 1989). The majority of the cuckoos were concentrated along the upper Sacramento River from Red Bluff to Colusa (18 pairs and 19 unmated males) and at the South Fork Kern River (7 pairs and 3 unmated males). The remaining cuckoos were found at scattered locations including: 1 pair and 5 unmated males along the Feather River; 1-4 pairs in the Prado Flood Control Basin; 1 unmated male at the Mojave River near Hodge; 1 unmated male in the Owens Valley; 1 pair along the Amargosa River near Tecopa; 1 pair and 1 unmated male along the Colorado River north of Blythe; 1 unmated male along the Colorado River in the Picacho Region; and 1 pair along the Colorado River in the Laguna Dam Region (Laymon and Halterman, 1989).

More recent surveys on the Sacramento River from 1988-1990 have shown a fluctuating population of 23-35 pairs depending on the year (Halterman 1991). Continuous surveys on the South Fork of the Kern River from 1985-1996 have shown a population that varied from a low of 2 pairs in 1990 to a high of 24 pairs in 1992 (Laymon et al., 1997). These two sites are the only localities in California that sustain breeding populations of Yellow-billed Cuckoos.

Distribution in the West Mojave Planning Area:

There are no confirmed nesting areas within the WMPA. Cuckoos have been observed during the breeding season at several locations along the Mojave River between Victorville and Barstow. Most of these sightings have been of unmated males (Gaines and Laymon, 1984; Laymon and Halterman, 1989). They probably breed at Mojave Narrows near Victorville, but nests or fledged young have not been located (Stephen Myers pers. comm.). Yellow-billed Cuckoos could occur in migration at any desert oasis with willows and cottonwoods, although

there are very few records for migrant Yellow-billed Cuckoos within the WMPA (Garrett and Dunn, 1981; Gaines and Laymon, 1984; Laymon and Halterman, 1989).

Cuckoos nest at three localities just outside of the WMPA. A major breeding population of 10-20 pairs is found in the South Fork Kern River Valley at Weldon (Laymon et al., 1997). Small and unstable breeding populations are found along the Amargosa River near Tecopa and at several locations in the Owens Valley.

Natural History:

Yellow-billed Cuckoos are elegant streamlined birds with rich brown upper parts and creamy white under parts. The primaries and outer tail feathers have a rufous tinge. The under tail is black with prominent white spots, typical of many members of the cuckoo family. Yellow-billed Cuckoos have a yellow to orange lower mandible contrasting with a black upper mandible. In western birds the bill tends to be brighter orange than in the east. Though gender can not be safely determined in the field, females are larger than males and tend to have brighter orange bills and larger white spots on the under tail. Yellow-billed Cuckoos (30 cm, 12 in) are longer than a Western Scrub-jay (*Aphelocoma californica*; 29 cm, 11.75 in), but weigh much less (cuckoo 64 gm vs. scrub-jay 80 gm; Oberholser, 1974; Dunning, 1984).

Yellow-billed Cuckoos are primarily foliage gleaning insectivores, but also hover glean, hawk, and even hop on the ground to obtain their prey (Ehrlich et al., 1988; S.A. Laymon pers. obs.). In the east, the cuckoo's prey consists mostly of hairy caterpillars, with lesser numbers of bird eggs, frogs, lizards, berries, and fruit (Ehrlich et al., 1988). On the South Fork Kern River, in California, the diet of cuckoos, based on 2420 prey items brought to nests, consists of green caterpillars (predominately Sphinx moth larvae; 44.9%), tree frogs (23.8%), katydids (21.8%), and grasshoppers (8.7%). The remaining 1.3% of the diet includes cicadas, dragonflies, butterflies, moths, beetles, and spiders (Laymon et al., 1997). The provisions that are brought to the young are whole prey items, with the exception of the first few hours after hatching when young are fed regurgitated food (S.A. Laymon pers. obs.; contra Ehrilch, 1988).

During spring migration, Yellow-billed Cuckoos generally arrive in California during June, though there are a few early records for May (Gaines and Laymon, 1984). Nesting generally begins shortly after their arrival, though in some years, presumably those with low food availability, nesting is delayed for up to a month after arrival (S.A. Laymon pers. obsv.). A clutch consists of 2-5 light bluish-green unmarked eggs. Incubation begins with the first egg laid leading to asynchronous hatching. Of 90 nests at the South Fork Kern River, most were initiated in July (67.8%), while fewer were initiated in June (31.1%) and only one was initiated in August (1.1%) (S.A. Laymon unpublished data).

Yellow-billed Cuckoos are normally solitary nesters, though nests of adjacent pairs can be as close as ?? ft (100 m). Cuckoos are normally monogamous, but at the South Fork Kern River, up to one-third of the nests are tended by a helper male in addition to the dominant male and female of the pair (S.A. Laymon pers. obs.). The helper males provide as much as one-third of the food to the young. The male and female spend equal amounts of time tending the nest, except that the male does all the nocturnal incubation and brooding (S.A. Laymon pers. obs.).

In most years Yellow-billed Cuckoos lay only one clutch of eggs. In years of above average food supply many pairs lay two clutches and successfully fledge two broods. In 1992, presumably a year of high food supply, most pairs at the South Fork Kern River double clutched.

In addition, several pairs triple clutched and successfully fledged young from three successive nests (Laymon et al., 1993).

Yellow-billed Cuckoos build a loose platform (saucer) nest of sticks and twigs, lined with leaves and other vegetation (Ehrlich et al., 1988; S.A. Laymon pers. obsv.). The nest is 6-7 in. (15-17.5 cm) in diameter. Nests are usually placed two-thirds distance out from the trunk to the tip on horizontal branches, though some are in forks or crotches of trees.

Fall migration begins in early August and most cuckoos have departed California by mid-September (Gaines and Laymon, 1984). By mid-August, vocalizations have become less frequent and softer and, hence, the species is harder to detect (S.A. Laymon pers. obs.).

Detection of the species is often made by vocalization. Unmated males cuckoos make a series of cooing calls, similar to a Mourning Dove. This can be considered the species song. As soon as the male finds a mate, he no longer uses the cooing song. The most common call of the cuckoo is the kowlp call, which is as follows, ca-ca-ca-ca-ca-kow-kow-kow. This call is used for contact between members of a pair and less often between members of adjacent pairs. This is the call that should be broadcast when surveying for the species (Laymon, 1999).

Habitat Requirements:

Yellow-billed Cuckoos have one of the most restrictive suite of macro-habitat requirements of any bird species. Not only are they restricted to a single habitat type, but the size and configuration of the habitat is also extremely important. During the breeding season in California, they are confined to cottonwood-willow riparian habitat. Cuckoos have large home ranges, often exceeding 50 acres (20 hectares), and sometimes approaching 100 acres (40 ha), in extent (Laymon and Halterman, 1985).

Gaines and Laymon (1984) concluded that willow-cottonwood habitat of any age with high humidity and a habitat breadth of 325 ft (100 m) was necessary for suitable Yellow-billed Cuckoo habitat. Additional research based on occupancy rates allowed for refinement of these requirements (Laymon and Halterman 1989). Away from the Colorado River in California, 9.5% of the 50-100 acre (20-40 ha) sites (n=21), 58.8% of the 101-200 acre (41-80 ha) sites (n=17), and all of the >200 acre (80 ha) sites (n=7) were occupied. Laymon and Halterman (1989) concluded that sites >200 acres (80 ha) in extent and wider than 1950 ft (600 m) were optimal, sites 101-200 acres (41-80 ha) in extent and wider than 650 ft (200 m) were suitable, sites 50-100 acres (20-40 ha) in extent and 325-650 ft (100-200 m) in width were marginal, and sites <38 acres (15 ha) in extent and <325 ft (100 m) in width were unsuitable.

During a four-year study of Yellow-billed Cuckoos on the Sacramento River, Halterman (1991) found that (1) habitat patch area, (2) the extent of habitat in a 5 mi. (8 km) section of river, and (3) presence of low woody vegetation were the most important variables in explaining the distribution of cuckoos. These variables combined explained 46% of the variation observed in the distribution of breeding pairs.

Micro-habitat requirements are also important. Nesting groves at the South Fork Kern River are characterized by higher canopy closure, higher foliage volume, intermediate basal area, and intermediate tree height when compared to random sites (Laymon et al., 1997). Sites with less than 40% canopy closure are unsuitable, those with 40%-65% are marginal to suitable, and those with greater than 65% are optimal.

Cuckoos seldom use sites that have a foliage volume of less than 64,354 yds^3/acre (20,000 m^3/ha); these sites are considered unsuitable. Most nest sites have a foliage volume from 96,530

yds^3/acre (30,000m^3/ha) to 289,591 yds^3/acre (90,000m^3/ha); these sites are considered optimal. Also, sites with 64,354 yds^3/acre (20,000m^3/ha) to 96,530 yds^3/acre (30,000m^3/ha) and over 289,591 yds^3/acre (90,000m^3/ha) appear to be suitable (Laymon et al., 1997).

Cuckoos tend to choose nest sites with a mean canopy height of 23-33 ft (7-10 m). This tree height may be optimal for the species. Sites with a mean canopy height from 13-23 ft (4-7 m) are chosen less frequently but appear to be suitable, as are sites with a mean canopy height of 33-49 ft (10-15 m). Sites with a mean canopy height of less than 13 ft (4 m) are unsuitable (Laymon et al., 1997) .

Cuckoos tend to choose nest sites that have a basal area (as defined as the summation of the cross-sectional area of a trees trunk at breast height for a given land area) of between 21.9 5 ft^2/acre (5m^2/ha) and 87.5 ft^2/acre (20m^2/ha); these sites appear to be optimal. Sites with basal area 87.5 ft^2/acre (20m^2/ha) to 240.7 ft^2/acre (55m^2/ha) are not used as frequently, but are suitable. Sites with basal area less than 21.9 ft^2/acre (5m^2/ha) and over 240.7 ft^2/acre (55m^2/ha) are seldom used by cuckoos and can be considered marginal (Laymon et al., 1997).

The presence of at least one willow on the nest site is very important. At the South Fork Kern River, 94 of 95 nests (99%) were in willows (Laymon et al., 1997).

Population Status:

Historically, the California Yellow-billed Cuckoo bred as far north as southern British Columbia. Over the past 80 years the range has decreased in size by approximately 50%. The last breeding records for British Columbia were in 1927, in Washington in 1934, and in Oregon in 1945 (Roberson, 1980). The last breeding record in California north of the Sacramento Valley was at Mt. Shasta in 1951 (Gaines and Laymon, 1984).

The 1986-87 statewide survey for cuckoos in California revealed a decline of 73% to 82% from a similar survey during 1977 (Laymon and Halterman, 1989). The population had dropped to 19 pairs (from 35-68 pairs) in Northern California and to 11-14 pairs (from 87-95 pairs) in Southern California. Most of the decline in Southern California came from a 95% decline on the Colorado River (122 pairs in 1977 to 6 pairs in 1987).

The decline of Yellow-billed Cuckoos, both historically and recently, is due primarily to habitat loss on the breeding grounds. It has been estimated that 95% or more of the original riparian habitat in the Central Valley of California has been lost over the past 150 years since settlement by Europeans (Warner and Hendrix, 1985). In addition, much of the remaining 5% is highly degraded and fragmented, and is not suitable because the patches are too small in extent and too narrow in width.

The extent of the historic breeding population of Yellow-billed Cuckoos in the WMPA is unknown. It is likely that habitat along the Mojave River and at Morongo Valley was more extensive historically than it is today and that a breeding population occurred at least along the Mojave River. It is unlikely that other areas of habitat sizable enough to support a population of Yellow-billed Cuckoos existed, though a pair may have nested at larger oases from time to time.

Threats Analysis:

Habitat loss on the breeding grounds is the primary threat to the Yellow-billed Cuckoo in California. Habitat loss can occur in many ways. Clearing for agriculture has probably removed the largest fraction of riparian habitat in the state, as evidenced by the amount of land that was historically riparian and is now in agriculture (S.A. Laymon pers. obs.). Other important long-

term, and often permanent, causes of riparian habitat loss are: (1) clearing for flood control, (2) flooding behind dams, (3) withdrawal of groundwater causing a lowering of the water table, (4) clearing for urban and suburban development, (5) invasion by exotic vegetation, and (6) long-term (greater than 100 years) intensive year-around grazing. Important temporary losses of riparian habitat are caused by firewood cutting and wildfire.

Recent restoration of riparian habitat has shown the importance of maintaining habitat on the upper flood terrace. In wet years when lower sites are flooded, the upper terrace restoration sites provide foraging habitat for cuckoos early in the breeding season. This is probably because of higher survival of katydid and sphinx moth larvae, which winter underground under cottonwoods and willows on these higher, drier sites (S.A. Laymon pers. obv.).

Other potential threats to Yellow-billed Cuckoos in California are direct causes, such as shooting and indirect causes, such as the effects of pesticides. Shooting could be a problem in dove hunting season during the first half of September, given the similar size, shape, and appearance of the Mourning Dove and the Yellow-billed Cuckoo. This is a potential problem only in the immediate vicinity of riparian habitat.

Pesticides, especially larvacides used in mosquito control, could be a major threat when applied on a widespread area (especially aerially). Along the Stanislaus River at Caswell State Park, larvacides were regularly applied by air during the spring and summer for many years. This resulted in an avifauna depauperate of insect eating birds such as warblers, vireos, orioles, flycatchers, and cuckoos (S.A. Laymon pers. obs.).

Biological Standards:

There are no nesting records for Yellow-billed Cuckoos in the WMPA, although breeding may take place along the Mojave River from the Mojave Narrows down stream (north) to Helendale. The only other site within the project area where suitable breeding habitat exists is at Morongo Valley. This site is too small for a breeding population, though a pair may nest there at some time in the future.

Protection of existing riparian habitat at both Morongo Valley and along the Mojave River is important for the survival of the species in the WMPA. Protection could include: (1) developing a fire management plan with fire brakes around riparian sites, (2) removing exotic vegetation, (3) fencing to exclude livestock and feral domestic animal grazing, (4) excluding firewood cutting, (5) excluding off-road vehicle use, and (6) developing a recreation plan that examines the impacts of recreation on the riparian resource. These are the only sites with potential breeding habitat and the only high quality habitat for migrant cuckoos within the Planning Area.

It is unlikely that restoration of a sufficient amount of riparian habitat could be carried out at Morongo Valley to provide habitat for more than one to two pairs of Yellow-billed Cuckoos. Restoration of riparian habitat along the Mojave River could be more productive but, at present, most of the potential restoration sites are in private ownership and are heavily grazed. Restoration of the ground water table may also be needed below Mojave Narrows before suitable habitat can be restored. Providing habitat for a minimum population of 10 pairs of cuckoos should be the target for any habitat restoration for this species (Laymon and Halterman, 1989). This would require approximately 1000 acres (400 ha) of intact riparian habitat at a site.

Restoration of cottonwoods and willows at oases within the WMPA could provide additional foraging habitat for Yellow-billed Cuckoos during migration. At many oases, removal

of competing exotic vegetation (e.g., salt cedar [*tamarisk sp*.] and giant reed [*Arundo donax*]) will be needed prior to beginning of restoration efforts.

Literature Cited:

American Ornithologists' Union. 1957. The A.O.U. Checklist of North American Birds. 5th ed. Amer. Ornithol. Union, Washington, D.C.

American Ornithologists' Union. 1983. The A.O.U. Checklist of North American Birds. 6th ed. Amer. Ornithol. Union, Washington, D.C.

Dunning, J.B. 1984. Body weights of 686 species of North American birds. Western Bird Banding Association. Monograph No.1.

Ehrlich, P.R., D.S. Dobkins, and D. Wheye. 1988. The Birder's Handbook. Simon and Schuster, Fireside Books, New York.

Gaines, D.A. and S.A. Laymon. 1984. Decline, status and preservation of the Yellow-billed Cuckoo in California. West. Birds 15:49-80.

Garrett, K. and J. Dunn. 1981. Birds of Southern California: Status and Distribution. Los Angeles Audubon Society, Los Angeles, California.

Halterman, M.D. 1991. Distribution and habitat use of the Yellow-billed Cuckoo (*Coccyzus americanus occidentalis*) on the Sacramento River, California, 1987-1990. M.S. Thesis, California State University, Chico.

Hughes, J.M. 1999. Yellow-billed Cuckoo (*Coccyzus americanus*). *In:* A. Poole and F. Gill (eds.), Birds of North America, No. 418. The Birds of North America, Inc., Philadelphia, Pennsylvania.

Laymon, S.A. and M.D. Halterman. 1985. Yellow-billed Cuckoos in the Kern River Valley: 1985 population, habitat use, and management recommendations. California Department of Fish and Game, Nongame Bird and Mammal Section Rept. 85.06.

Laymon, S.A. and M.D. Halterman. 1989. A proposed habitat management plan for Yellow-billed Cuckoos in California. USDA Forest Service Gen. Tech. Rep. PSW-110 p 272-277.

Laymon, S.A., P.L. Williams, and M.D. Halterman. 1993. Monitoring of riparian habitat restoration sites: Breeding birds and habitat characteristics, 1992, and Yellow-billed Cuckoo study, 1992. Admin. Rept. The Nature Conservancy, Kern River Preserve, #CARO 060894. and California Dept. of Fish and Game #FG1496.

Laymon, S.A., P.L. Williams, and M.D. Halterman. 1997. Breeding status of the Yellow-billed Cuckoo in the South Fork Kern River Valley, Kern County, California: summary report 1985 -1996. Admin. Rept. USDA Forest Service, Cannell Meadow Ranger District, Sequoia National Forest.

Laymon, S.A. 1998. Yellow-billed Cuckoo survey and monitoring protocol for California. Available from the author, P.O. Box 1236, Weldon, California 93283. E-mail: slaymon@lightspeed.net

Oberholser, H.C. 1974. The Bird Life of Texas. Univ. of Texas Press, Austin, Texas.

Roberson, D. 1980. Rare birds of the west coast. Woodcock Publications, Pacific Grove, California.

Warner, R.E. and K.M. Hendrix. 1985. Riparian Resources of the Central Valley and the California Desert. Final Draft Admin. Rept. Calif. Dept. of Fish and Game.

YELLOW-BREASTED CHAT
Icteria virens

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Management Status: Federal: None
California: Species of Special Concern (CDFG, 1998)

General Distribution:

The Yellow-breasted Chat breeds from southern British Columbia, southern Alberta, southern Saskatchewan, North Dakota, southern Minnesota (casually), southern Wisconsin, southern Michigan, southern Ontario, central New York, casually to southern Vermont and southern New Hampshire, south to south-central Baja California, on Pacific slope to northern Sinaloa, in the interior to Zacatecas, on Atlantic slope to southern Tamaulipas, and to the Gulf coast, and northern Florida. It winters from southern Baja California, southern Sinaloa, southern Texas, southern Louisiana, and southern Florida south through Middle America to western Panama (Dunn and Garrett, 1997; AOU, 1998). Chats are known to wander northward following breeding, at least in the eastern U.S. (Dennis, 1977; Harrison, 1984).

In California, Yellow-breasted Chats nest locally in riparian habitats the length of the state, including several widely-scattered desert locations. They are uncommonly observed in California during spring migration, and rarely observed during fall migration. There are only a few winter records for the west coast of California, and north to Oregon (Garrett and Dunn, 1981; Small, 1994).

Distribution in the West Mojave Planning Area:

In the WMPA, Yellow-breasted Chats nest or have nested at five localities: the Mojave River at Victorville (6-10 pairs annually; S. Myers unpubl. data), Camp Cady (2 pairs in 1985, Kaufman et al., 1986), Morongo Valley (2-7 pairs annually, E.A. Cardiff, pers. comm.; Breeding Bird Census data), Cushenbury Springs (1 pair, sporadically, S.J. Myers, pers. obs., R.L. McKernan, pers. comm.), and Afton Canyon (1 pair in 1977, Breeding Bird Census data). They also nest at South Fork Kern River Preserve near Weldon, just outside of the WMPA (between 50 and 100 pairs annually, S. Laymon, pers. comm.).

Yellow-breasted Chats are uncommon to rare migrants throughout the WMPA. They have not been reported during winter in the WMPA (K.L. Garrett, pers. comm.).

Natural History:

The Yellow-breasted Chat is the largest wood-warbler, and differs from other wood-warblers in behavior, vocalizations, and morphology. Authorities have questioned its taxonomic relationship to the other wood-warblers, but recent genetic work confirms its place in the family Parulidae (Sibley and Ahlquist, 1982). This species is characterized by its large size, bright yellow throat and breast, white belly, uniform olive-green upperparts, and distinct white "spectacles," which contrast with a black or gray loral area (Dunn and Garrett, 1997).

The Yellow-breasted Chat is 7-7.5 in. (17-19 cm) long, and weighs an average of approximately 0.9 oz (26 g). The western subspecies (*I. v. auricollis*) has a longer tail than the

eastern subspecies (*I. v. virens*), by an average of ¼ in. (6 mm) (Dunn and Garrett, 1997; Dennis, 1958; Dunning, 1984). The maximum recorded age of a wild Yellow-breasted Chat is 8 years, 11 months (Klimkiewicz et al., 1983).

The Yellow-breasted Chat's diet is comprised of insects, including beetles, bugs, ants, weevils, bees, wasps, mayflies, and caterpillars, and wild fruit such as elderberries, blackberries, and grapes. It forages for insects by gleaning foliage and branches (Bent, 1953; Ehrlich et al., 1988).

In southern California, the Yellow-breasted Chat usually arrives on its nesting grounds during mid-April (Dunn and Garrett, 1997). Little data are available on departure dates for southern California breeders, but it has been recorded as late as 29 September at Morongo Valley (C. McGaugh, unpubl. data).

Nests are coarse, bulky cups, about 5 in. (12.7 cm) across and 3 in. (7.6 cm) high, placed typically 3-6 ft. (0.9-1.8 m) high in dense thickets (Bent, 1953; Harrison, 1979; Dunn and Garrett, 1997). No data exist regarding plants used for nest placement at breeding localities in the California deserts, but chats' habits elsewhere suggest that California Wild Rose (*Rosa californica*), various shrubby willows (*Salix* spp.), Desert Grape (*Vitis girdiana*), and Mulefat (*Baccharis salicifolia*) may be used. Fremont Cottonwoods (*Populus fremontii*) and larger willows (*Salix* spp.) typically form the canopy at breeding sites such as Big Morongo Canyon, Cushenbury Springs, Camp Cady, and the Mojave River at Victorville.

Yellow-breasted Chats lay clutches of 3-6 eggs, most commonly 4-5. They are single-brooded (Bent, 1953; Harrison, 1979; Kaufman, 1996). Incubation, performed by the female, takes 11-12 days (Baicich and Harrison, 1997). Yellow-breasted Chats are frequent hosts for parasitism by Brown-headed Cowbirds *(Molothrus ater*). Friedmann (1963) reports that rates of parasitism and chats' responses to it vary locally. Gaines (1974) considered the Yellow-breasted Chat's susceptibility to parasitism in the Sacramento Valley to be moderate. Along the Colorado River in Grand Canyon National Park, Brown (1994) reported a parasitism rate of 11%.

Habitat Requirements:

Yellow-breasted Chats occur in a wide variety of habitats across the U.S., including thickets and brambles of willows and thorny vegetation at the edges of deciduous forests in the east, and mesquite in the southwest (Phillips et al., 1964; Dunn and Garrett, 1997).

In the southwestern deserts, Yellow-breasted Chats occur in riparian woodland, forest, and scrub dominated by cottonwoods, willows, Arrow Weed (*Pluchea sericea*), Salt-cedar (*Tamarix* spp.), and Mulefat (Hunter et al., 1988; Brown and Trosset, 1989; Dunn and Garrett, 1997) . All breeding in the WMPA occurs in riparian habitats dominated by cottonwoods and willows. Nesting habitat must have dense understory vegetation and larger trees that are used for singing perches (Dunn and Garrett, 1997). No data exist regarding territory sizes in California, but various studies in the midwest and east reported territories averaging 0.3-3.1 acres (0.12-1.3 ha) (Thompson and Nolan, 1973; Zeiner et al., 1990).

Population Status:

Yellow-breasted Chat populations in the eastern U.S. have declined significantly in recent times. Western populations are generally stable, but some local declines have occurred in California as a result of urbanization, flood control activities, and perhaps cowbird parasitism (Dunn and Garrett, 1997). A serious decline has occurred along the Colorado River (Remsen,

1978; Hunter, 1984; Rosenberg et al., 1991). This species appears to be stable at Morongo Valley. Numbers along the Mojave River at Victorville have generally increased since 1987, but some fluctuation has occurred due to flood control activity (S.J. Myers, pers. obs.). It is likely that the Mojave River, prior to the lowering of its groundwater, formerly supported more chats than it now does, but data supporting this view are limited. Yellow-breasted Chats formerly nested at Yermo (Lamb, 1912); there is little or no suitable habitat there now. It is unknown whether the species still nests at Afton Canyon or Camp Cady.

Threats Analysis:

Habitat destruction and parasitism by Brown-headed Cowbirds are the primary threats to breeding Yellow-breasted Chats in the WMPA. Habitat destruction and degradation occurs in many ways, with the most catastrophic losses resulting from clearing of large tracts of forest or woodland for agriculture, development, or flood control. In southern California, Yellow-breasted Chats rely heavily on early seral stage willows for nesting, so flood control maintenance involving the removal of vegetation along active river channels can destroy habitat, at least temporarily.

Grazing by cattle or other livestock can have significant adverse effects on riparian habitats (Sedgwick and Knopf, 1987). In addition to eating seedlings, saplings, shrubs, and herbaceous plants, livestock tramples vegetation and the substrates of riparian areas, causing increased erosion and sedimentation. These adverse effects lead to a reduction in cover and nesting sites for birds, along with declines in available insect prey (USDI, 1981; Crumpacker, 1984). Smith (1988), studying the recovery of a riparian habitat in northern California following the exclusion of cattle, concluded that the establishment of good quality willow riparian habitat is possible only in the absence of cattle browsing.

Brown-headed Cowbird parasitism on Yellow-breasted Chats may be a problem in southern California (Garrett and Dunn, 1981; Dunn and Garrett, 1997). Brown-headed Cowbirds are common in Morongo Valley and along the Mojave River during the nesting season. Both of these areas are commonly used for horseback riding; stables, which provide feeding areas for cowbirds (Laymon, 1987), are located near riparian habitats in these areas. At Mojave Narrows Regional Park, equestrians have created an extensive network of trails through the riparian forest and woodland, increasing the amount of "edge," which is known to be a favorable condition for the proliferation of Brown-headed Cowbirds (Brittingham and Temple, 1983).

Lowering of ground water has had a significant effect on cottonwood-willow forest along the Mojave River in Victorville. The extent of both marshland and riparian woodland/forest has declined markedly in the past 140 years, primarily due to the drilling of wells in the Victor Valley (Torres et al., 1992). Long-time residents have stated that much of the open, dry cottonwood woodland (with little understory) in the area was once more similar to the dense, lush cottonwood-willow forest where Yellow-breasted Chats now occur (Myers, 1992).

Fire can have a negative, though perhaps short-term effect on Yellow-breasted Chat nesting habitat in the California desert. A wildfire at Big Morongo Preserve on 27 April 1992 burned about 50 acres (20 ha), including many large cottonwoods and willows (Cardiff, 1993), but the Yellow-breasted Chat was among those species which had recovered to pre-burn numbers by 1995 (Cardiff, 1996). Nesting was unsuccessful in the burned area the year of the fire. Non-native, invasive plants can also degrade habitat. Exotics such as Salt Cedar (*Tamarix ramosissima, T. parviflora*), Giant Reed (*Arundo donax*), and Russian Olive (*Elaeagnus angustifolius*) displace native plant species and provide little or no habitat value for riparian-

obligate birds such as Yellow-breasted Chats (Anderson et al., 1989). All of these invasive species occur along the Mojave River in the Victorville area; Russian Olive is especially prominent. Salt cedar is common at Camp Cady and Afton Canyon; some occurs at Morongo Valley.

Few, if any, data are available on the effects of off-highway vehicles on Yellow-breasted Chats, but this activity is common at Mojave Narrows Park and other potential nesting areas along the Mojave River. Weinstein (1978), studying effects of off-road vehicles on birds at Afton Canyon, found that many birds abandoned areas while vehicles were using them. Additionally, birds flushed from these areas were probably more susceptible to predation due to being forced to areas containing less cover. Four-wheel drive pickup trucks have been observed crashing through dense willow thickets along the active channel of the river (S. Myers, pers. obs.).

Biological Standards:

The goal of management activities for the Yellow-breasted Chat in the WMPA is the preservation and enhancement of known and potential nesting areas. Of the known nesting localities, Big Morongo Canyon Preserve and Afton Canyon are managed by BLM. Mojave Narrows Regional Park is managed by San Bernardino County Regional Parks Department (the land is owned by the State of California Wildlife Conservation Board). Camp Cady is a Department of Fish and Game Wildlife Area. Cushenbury Springs is owned by Mitsubishi Cement Company.

Livestock and feral burros should be excluded from riparian areas in the WMPA. This may require the installation of fencing designed to accommodate native wildlife (e.g., Coyotes, Kit Foxes, Bobcats), but exclude livestock and burros. It may be necessary to install stock tanks in some locations to compensate for the loss of water sources for livestock. Areas whose avifaunas may benefit from livestock exclusion include Camp Cady, Afton Canyon, and Cushenbury Springs. At Mojave Narrows Regional Park, grazing is currently limited to pastures adjacent to the river bottom and the Lower Slough. Cattle and horses are allowed to graze throughout the slough, which contains a 30 acre marsh with mixed riparian scrub and woodland suitable for Yellow-breasted Chats. A fence restricting livestock to the pastures in this area would greatly enhance the marsh and riparian habitat.

Brown-headed Cowbird control at important riparian bird nesting sites in the WMPA may benefit breeding Yellow-breasted Chats. Cowbird control programs must be long-term. In order to initiate cowbird control at all important nesting sites in the WMPA, it may be necessary for agencies at federal, state, county, and local levels to participate in cooperative plans.

Management of important nesting areas for Yellow-breasted Chats must include protection from off-highway vehicle degradation and disturbance, wood-cutting, and wildfires. Removal of vegetation for flood control purposes should be regulated with consideration given to biological resources. Typically, the vegetation removed during or in anticipation of flooding (such as along the Mojave River) is that used by nesting Yellow-breasted Chats, Yellow Warblers (*Dendroica petechia*), and endangered species such as Least Bell's Vireo (*Vireo bellii pusillus*) and Southwestern Willow Flycatcher (*Empidonax traillii extimus*; S.J. Myers, pers. obs.).

Maintenance or enhancement of water sources necessary to preserve or improve riparian habitats should be a management consideration. In some cases, as in Afton Canyon, restoration of riparian habitat by removing invasives and planting cottonwoods and willows may be appropriate.

In order to evaluate the vigor of desert riparian habitats and the viability of bird populations in the WMPA, regular monitoring is necessary. BLM documents such as ACEC Management Plans and Management Plans for Natural Areas prescribe bird monitoring programs. BLM and other participating agencies should assess the effectiveness of current monitoring methods and revise as needed. Annual review of monitoring results can be used to assist in management decisions. Such review should address whether habitats are at carrying capacity for sensitive bird species, and if not, identify corrective measures that can be taken to increase populations.

Literature Cited:

American Ornithologists' Union. 1983. Check-list of North American birds, 6th ed. Amer. Ornithol. Union, Washington, D.C.

Anderson, B.W., W.C. Hunter, and R.D. Ohmart. 1989. Status changes of bird species using revegetated riparian habitats on the lower Colorado River from 1977 to 1984. USDA Forest Service Gen. Tech. Rep. PSW-110.

Baicich, P.J. and C.J.O. Harrison. 1997. Nests, eggs, and nestlings of North American birds. 2nd ed. Academic Press, San Diego, California.

Bent, A.C. 1953. Life histories of North American wood warblers. Bull. U.S. Natl. Mus. 203.

Brittingham, M.C. and S.A. Temple. 1983. Have cowbirds caused forest songbirds to decline? Bio-Science 33:31-35.

Brown, B.T. 1994. Rates of brood parasitism by Brown-headed Cowbirds on riparian passerines in Arizona. J. Field Ornithol. 65:160-168.

Brown, B.T. and M.W. Trosset. 1989. Nesting-habitat relationships of riparian birds along the Colorado River in Grand Canyon, Arizona. Southwestern Naturalist 34:260-270.

California Department of Fish and Game, Natural Diversity Data Base. 1998. Special Animals. Biannual publication, Mimeo., 44 pp.

Cardiff, E.A. 1993. Desert riparian-freshwater marsh [Breeding bird census]. Resident bird counts 1992. J. Field Ornithol. 64 (suppl.):92-93.

Cardiff, E.A. 1996. Desert riparian-freshwater marsh [Breeding bird census]. Resident bird counts 1995. J. Field Ornithol. 67 (suppl.):75.

Crumpacker, D.W. 1984. Regional riparian research and a multi-university approach to the special problem of livestock grazing in the Rocky Mountains and Great Plains. pp. 413-423 *In:* R.E. Warner and K.M. Hendrix (eds.), California riparian systems: Ecology, conservation, and productive management. Univ. California Press, Berkeley, California.

Dennis, J.V. 1958. Some aspects of the breeding ecology of the Yellow-breasted Chat (*Icteria virens*). Bird-Banding 39:169-183.

Dennis, J.V. 1967. Fall departure of the Yellow-breasted Chat (*Icteria virens*) in eastern North America. Bird-Banding 38:130-135.

Dunn, J.L., and K.L. Garrett. 1997. A field guide to warblers of North America. Houghton Mifflin, Boston, Massachusetts.

Dunning, J.B, Jr. 1984. Body weights of 686 species of North American birds. Western Bird Banding Assoc., Monograph No. 1.

Ehrlich, P.R., D.S. Dobkin, and D. Wheye. 1988. The birder's handbook: a field guide to the natural history of North American birds. Simon & Schuster, New York.

Friedmann, H. 1963. Host relations of the parasitic cowbirds. Bull. U.S. Natl. Mus. 233.

Gaines, D. 1974. A new look at the nesting riparian avifauna of the Sacramento Valley, California. West. Birds 5: 61-80.

Garrett, K. and J. Dunn. 1981. Birds of southern California: status and distribution. Los Angeles Audubon Society. Los Angeles, California.

Harrison, H.H. 1979. A field guide to western birds' nests. Houghton Mifflin Co., Boston, Massachusetts.

Harrison, H.H. 1984. Wood warblers' world. Simon and Schuster, New York, New York.

Hunter, W.C. 1984. Status of nine bird species of special concern along the Colorado River. Calif. Dept. Of Fish and Game, Nongame Wildl. Investigations, Wildl. Manage. Branch Admin. Rep. 84-2, Nongame Bird and Mammal Sec. Rep. 84.09.

Hunter, W.C., R.D. Ohmart, and B.W. Anderson. 1988. Use of exotic saltcedar by birds in arid riparian systems. Condor 90:113-123.

Kaufman, K. 1996. Lives of North American birds. Houghton Mifflin, Boston, Massachusetts.

Kaufman, N.M., R.J. Bransfield, and N. Gilbert. 1986. Fish and Wildlife coordination act report, Mojave River Forks Dam Water Conservation Project, San Bernardino County, California. Unpubl. report prepared for the U.S. Army Corps of Engineers, Los Angeles, by U.S. Fish and Wildlife Service, Laguna Nigel, California.

Klimkiewicz, M.K., R.B. Clapp, and A.G. Futcher. 1983. Longevity records of North American birds: Remizidae through Parulinae. J. Field Ornithol. 54:287-294.

Lamb, C. 1912. Birds of a Mohave Desert oasis. Condor 14:32-40.

Laymon, S.A. 1987. Brown-headed Cowbirds in California: Historical perspectives and management opportunities in riparian habitats. West. Birds 18:63-70.

Myers, S.J. 1992. Biological inventory of the Mojave River corridor. *In:* Tierra Madre Consultants, Inc., Natural resources inventory of the Mojave River corridor. Unpubl. Report prepared for the Mojave River Corridor Task Force.

Phillips, A., J. Marshall and G. Monson. 1964. The birds of Arizona. Univ. Arizona Press, Tucson, Arizona.

Remsen. J.V., Jr. 1978. Bird species of special concern in California. Calif. Dept. Fish and Game, Wildlife Mgt. Branch Admin. Rep. 78-1.

Rosenberg, K., R. Ohmart, W. Hunter, and B. Anderson. 1991. Birds of the Lower Colorado River Valley. Univ. Arizona Press. Tucson, Arizona.

Sedgwick, J.A. and F.L. Knopf. 1987. Breeding bird response to cattle grazing of a cottonwood bottomland. J. Wildl. Manag. 51:230-237.

Sibley, C.G. and J.E. Ahlquist. 1982. The relationships of the Yellow-breasted Chat (*Icteria virens*) and the alleged slowdown in the rate of macromolecular evolution in birds. Postilla No. 187.

Small, A. 1994. California birds: Their status and distribution. Ibis Publ. Co., Vista, California.

Smith, J.J. 1989. pp 217-221 *In:* D.L. Abell (tech. coordinator), Proceedings of the California Riparian Systems Conference: protection, management, and restoration for the 1990s; 1988 September 22-24, Davis, Calif. Gen. Tech. Rep. PSW-110. Pacific Southwest Forest and Range Experiment Station, Forest Service, U.S. Dept. of Agriculture, Berkeley, California.

Thompson, C.F. and V. Nolan, Jr. 1973. Population biology of the Yellow-breasted Chat (*Icteria virens* L). in southern Indiana. Ecol. Monog. 43:145-171.

Torres, J., D. Earle, S. Connell, S. Wells and B. Love. 1992. Cultural resources sensitivity study of the Mojave River corridor, San Bernardino County, California. *In:* Tierra Madre Consultants, Inc., Natural resources inventory of the Mojave River corridor. Unpubl. report prepared for the Mojave River Corridor Task Force.

USDI, Bureau of Land Management. 1981. California Desert Conservation Area: Volume E, Appendix 9 (Wildlife). Riverside, California.

USDI, Bureau of Land Management, 1997. California Desert District Resource Area files.

Weinstein, M. 1978. Impact of off-road vehicles on the avifauna of Afton Canyon, California. Unpubl. report prepared for Dept. of Interior, Bureau of Land Management. Contract No. CA-060-CT7-2734.

Zeiner, D.C., W.F. Laudenslayer, K.E. Mayer, and M. White. 1990. California's wildlife, vol. 2 (Birds). Calif. Statewide Wildlife Habitat Relationships System, Department of Fish and Game, Sacramento, California.

YUMA CLAPPER RAIL
Rallus longirostris yumanensis

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Management Status: Federal: Endangered
California: Threatened (CDFG, 1998)

General Distribution:

The Clapper Rail is largely a coastal species, although one subspecies, the Yuma Clapper Rail, does occur inland in the southwestern United States. On the Pacific Coast, the Clapper Rail occurs from San Francisco Bay in central California south to Magdelena Bay in central Baja California. It is found throughout the Gulf of California south to La Paz, Baja California Sur, on the west side and Nayarít, Mexico, on the east side. Part of this population extends northward (mostly in summer) into the interior in the Lower Colorado River Valley and around the Salton Sea. On the Atlantic Coast, this species occurs from Connecticut south through Florida, westward along the Gulf of Mexico to Texas and south through the Yucatan Peninsula and scattered islands in the Caribbean Sea to Peru and Brazil (AOU, 1998).

Distribution in the West Mojave Planning Area:

In the United States, the Yuma Clapper Rail is found only along the Lower Colorado River (from Topock Marsh southward) and around the Salton Sea. There are two records of the Yuma Clapper Rail for the West Mojave: calling birds were present 4-7 June 1977 at Harper (Dry) Lake (San Bernardino County; Henderson, 1977), and 17 May 1978 at East Cronese Lake (San Bernardino County; Garrett and Dunn, 1981). In addition, one was photographed 31 May 1992 just outside the southeastern boundary of the WMPA at Lake Tamarisk, Desert Center (Riverside County; *Am. Birds* 46:480 and 501, 1992). This bird was fairly brightly-colored, and was perhaps a Light-footed Clapper Rail (*R. l. brevipes*), an Endangered subspecies found along the coasts of southern California and Baja California.

Natural History:

The Clapper Rail is the largest rail in western North America. Although it is superficially similar to the more numerous Virginia Rail (*R. limicola*) in having a long neck and a long, orange-toned, decurved bill, it differs from that species in being grayer in overall plumage and in being substantially larger. The Yuma Clapper Rail differs from the Light-footed Clapper Rail in being less richly-colored in plumage (it is paler, with more olive and gray tones) and in having a more slender bill (Dickey, 1923). The Clapper Rail gives a loud, sharp call consisting of a series of "kek" or "clack" notes that are strung together in a cackling fashion. Their calls have an odd ventriloqual quality, and calls of single birds often sound as if multiple birds are calling (Grinnell et al., 1918).

Yuma Clapper Rails breed from March through July. They build there nest on a platform of vegetation raised 3-6 in. (7-15 cm) above the ground and concealed in dense marsh vegetation (Grinnell et al., 1918). Like most rails, this species lays a remarkably variable number of eggs: the typical clutch size is 8-10 eggs, but clutches can range from 5-14 eggs (Bent, 1926). In

marshes along the Colorado River, the Yuma Clapper Rail feeds primarily on crayfish (*Procambarus* spp., *Oropectes* spp.; Ohmart and Tomlinson, 1977). Similar crustaceans are taken at the Salton Sea, and the abundance of animals may be a better predictor of rail population densities than is vegetation (Anderson and Ohmart, 1985). This subspecies is partially migratory, with many birds wintering in brackish marshes along the Gulf of California (Banks and Tomlinson, 1974). Some remain on their breeding grounds throughout the year; for example, the Salton Sea (south) Christmas Bird Count frequently records this species in the fresh-water marshes in and around the Imperial Wildlife Area (Wister Unit).

Habitat Requirements:

The Clapper Rail is generally associated with tidal marshes; however, the Yuma Clapper Rail is unique among the Clapper Rails in being the only one that occupies fresh-water marshes during the breeding seasons yet largely winters in brackish marshes south of the United States (Anderson and Ohmart, 1985). This subspecies breeds in heavily-vegetated fresh-water marshes with cover ranging from moderately dense stands of *Typha domingensis* (cattail) and *Scirpus* spp. (bulrush) along the Colorado River (Smith, 1975; Anderson and Ohmart, 1985) to dense, near-monotypic stands of *Typha* at the Salton Sea (Bennett and Ohmart, 1978). Vegetation density is a more significant factor than the species composition, as some rails occur even in areas supporting dense stands of *Phragmites australis* (reed; Anderson and Ohmart, 1985).

Harper (Dry) Lake provides the only suitable Yuma Clapper Rail habitat in the WMPA, but despite follow-up surveys (LeValley, 1978) and extensive ornithological effort in this area by Eugene A. Cardiff and colleagues since the late 1970s, the 1977 record remains the only one for this location. Presumably because of increased pumping of ground water for irrigation of surrounding alfalfa farms, the water table has now been lowered enough at Harper (Dry) Lake that the once extensive marsh is now mostly dry (as of 1997). Marginally suitable marsh habitat occurs at China Lake (Kern County) and at the Piute Ponds (Los Angeles County) but the Yuma Clapper Rail is unlikely to colonize either location because are far from range of the subspecies.

Population Status:

Hydroelectric dams along the Colorado River have destroyed much of the native riparian forest, but have apparently increased the amount of marsh habitat (Ohmart et al., 1975). Population numbers of the Yuma Clapper Rail along the Lower Colorado River may have increased, expanding its range northward in response to the increase in available habitat (Anderson and Ohmart, 1985). As of the early 1980s, an estimated 750 individuals occupied the Lower Colorado River north of the Mexico border (Anderson and Ohmart, 1985). A recent genetic analysis showed that this subspecies is outbred (Fleischer et al., 1995); thus, unlike in the closely-related Light-footed Clapper Rail, population numbers of the Yuma Clapper Rail have not become so low as to reduce genetic diversity. This rail currently does not occur within the WMPA, and no historical populations are known from within its boundaries.

Threats Analysis:

Coastal populations of Clapper Rails experience predation pressure from some non-native species such as the Red Fox (*Vulpes vulpes*; Zembal, 1993); however, predation effects on the Yuma Clapper Rail are unknown. Draining and alteration of fresh-water marsh habitat is probably

the most serious threat to the Yuma Clapper Rail, and to other rail species that occur in southern California, but information is lacking in this regard.

Biological Standards:

Because the Yuma Clapper Rail is not a component of the wildlife within the WMPA, management of habitat for it within the WMPA will not effect this subspecies. Maintenance of rail habitat at Harper (Dry) Lake is important, however, as this site formerly supported a healthy population of the Virginia Rail (Henderson 1977; LeValley, 1978), and, given the 1977 record, could potentially provide habitat for the Yuma Clapper Rail in the future. Habitat at this site could be maintained or improved by ensuring that a perennial source of water exists for the marsh.

Literature Cited:

American Ornithologists' Union. 1998. Check-List of North American Birds, 7th edn. Amer. Ornithol. Union, Washington, D.C.

Anderson, B.W., and R.D. Ohmart. 1985. Habitat use by clapper rails in the Lower Colorado River Valley. Condor 87:116-126.

Banks, R.C., and R.E. Tomlinson. 1974. Taxonomic status of certain clapper rails of southwestern United States and northwestern Mexico. Wilson Bull. 86:325-335.

Bennett, W.W., and R.D. Ohmart. 1978. Habitat requirements and population characteristics of the Clapper Rail in the Imperial Valley, California. Unpubl. rep., Univ. Calif. Lawrence Livermore Lab., Livermore, California.

Bent, A.C. 1926. Life histories of North American marsh birds: Orders Odontoglossae, Herodiones and Paludicolae. U.S. Natl. Mus. Bull. 135.

Dickey, D.R. 1923. Description of a new Clapper Rail from the Colorado River Valley. Auk 40:90-94.

Fleischer, R.C., G. Fuller, and D.B. Ledig. 1995. Genetic structure of endangered clapper rail (*Rallus longirostris*) populations in southern California. Conserv. Biol. 9:1234-1242.

Garrett, K., and J. Dunn. 1981. Birds of Southern California: Status and Distribution. Los Angeles Audubon Soc., Los Angeles, California.

Grinnell, J., H.C. Bryant, and T.I. Storer. 1918. The Games Birds of California. Univ. California Press, Berkeley, California.

Henderson, P. 1977. A survey of rail composition in six desert localities, southeast California, June 1977. Unpubl. ms.

LeValley, R.R. 1978. Harper Lake rail survey. Unpubl. ms.

Ohmart, R.D., W.O. Deason, and S.J. Freeland. 1975. Dynamics of marsh formation and succession along the lower Colorado River and their importance and management problems as related to wildlife in the arid Southwest. Trans. N. Amer. Wildl. Nat. Resourc. Conf. 40:240-251.

Ohmart, R.D., and R.E. Tomlinson. 1977. Foods of western Clapper Rails. Wilson Bull. 89:332-336.

Smith, P.M. 1975. Habitat requirements and observations on the clapper rail (*Rallus longirostris yumanensis*). M.Sc. thesis, Arizona State Univ., Tempe, Arizona.

Zembal, R. 1993. Light-footed Clapper Rail census and study, 1992. Calif. Dept. Fish and Game, Nongame Bird and Mamm. Rep. 93-8.