Birds
Bell’s Sage Sparrow (*Amphispiza belli* ssp. *belli*)

**CITATION:**


Bell's Sage Sparrow has been listed as a Species of Special Concern in California.

**DISTRIBUTION:**

The *belli* subspecies was described as a "common resident of the Upper Sonoran zone west of the desert divides" where it "adheres closely to the chamisal (*Adenosostoma fasciculatum*) association." Occurred in the southern coastal region from San Diego to Santa Clara and Contra Costa counties and locally in Marin and Sonoma counties, along western rim of Sacramento Valley and western foothills of Sierra Nevada. Fairly common to common resident in semidesert scrub in eastern Santa Barbara County (*A. b. canescens*) and very uncommon and rare residents in coastal areas of this county. Small (1994) states *A. b. belli* to be irregular at northern edge of range in Trinity and Shasta counties, and describes an isolated pocket resident in western Sierra Nevada foothills. For *A. b. belli*, territories in San Diego and Riverside counties varied from 0.75 to 5.7 hectares. *A. b. belli* is generally non-migratory, although some populations move down-slope to lower elevations in winter.

**FOOD HABITS:**

Ground-foraging omnivore during breeding season, ground gleaning granivore during non-breeding season. Diet during the breeding season: adult and larval insects, spiders, seeds, small fruits, and succulent vegetation. Fall, winter, and early spring: small seeds, plant material, insects when available. Drinks occasionally but obtains most of water through diet.

**BREEDING HABITAT:**

Generally "prefers semi-open habitats with evenly spaced shrubs 1-2 m high." *A. b. belli*: dry chaparral and coastal sage scrub; chamise chaparral in northern part of range and in coastal San Diego County; big sagebrush at higher elevations in southern CA mountains. Less common in tall, dense, old chaparral.

* A. b. belli: diverse shrub species including: brittlebush, black sage, California buckwheat, California sagebrush, bush mallow, chamise, white sage, valley cholla, ceanothus, willow; bunchgrasses used as well. *A. b.*
**BREEDING BIOLOGY:**

Typical breeding density for *A. b. belli*: 94-111/km² near Perris, Riverside Co. Mating system is monogamous. Sings from perches to establish territory. Mean clutch size for *belli*: 3.54 ± 0.60 SD (range 2-5). Incubating sex is female predominately, although male rarely observed incubating when female leaves nest. Incubation period is 10-16 days from completion of clutch. At hatching, young are altricial, naked, blind, uncoordinated. The nestling period is 9-10 days. Both parents feed young. Immediately post-fledging, young birds perch low in shrubs and sometimes give begging calls as both parents feed young. In winter, *belli* seen moving in small mixed species flocks with other sparrow species.

**LANDSCAPE FACTORS:**

The lowest known point for *A. b. belli* on the east edge of the Sage Sparrow's range in San Diego County is at 2050 feet elevation. Occurrence of *A. b. belli* is reduced near edges with human development. No records of *A. b. belli* from isolated canyons enclosed within the city of San Diego. The fragmentation of shrubsteppe habitats by wildfire, shrub die-off, or human-caused disturbance appears to significantly affect obligate species, such as Sage Sparrows.

Disturbances that reduce shrub cover, such as frequent fire, mechanical disruption, livestock grazing, and off-highway vehicle use appear to have negative effects on Sage Sparrows, although there may often be a time-lag between the disturbance and any effects due to site-fidelity. Disturbances in coastal scrub habitats can lead to a change from shrubland to fields of exotic grasses and annual forbs; the latter is avoided by Sage Sparrows (*A. b. belli*; Misenhelter and Rotenberry 2000). In both shrubsteppe and coastal scrub, the invasion of exotic weeds can cause increased fire frequency, complete loss of shrub cover, and reductions in Sage Sparrow populations. On the other hand, long-term fire suppression in California chaparral may allow shrubs to grow higher and thicker than what is preferred by Sage Sparrows (Martin and Carlson 1998). *A. b. belli* may prefer recently burned chaparral because it has a low, open shrub structure (Lovio 1999). Disturbance by domestic grazing animals can also reduce habitat and Sage Sparrow numbers, as happened dramatically on San Clemente Island (Martin and Carlson 1998). Habitat disturbance may also promote nest parasitism. In a desert scrub habitat protected from grazing and off-highway vehicle use by fencing, Sage Sparrows were found to be 163-222% more abundant than outside the fencing (Brooks 1999).

**POPULATION TRENDS:**
In California, BBS analysis of 52 routes shows no significant population trend between 1966 and 2000. However, for individual regions in California, there is too little BBS data available (4-12 routes per region) to reliably estimate trends.

**MANAGEMENT ISSUES:**

Fire frequency and the invasion of exotic vegetation, especially grasses and annual forbs, interact to pose serious threats to Sage Sparrows in coastal scrub habitat. In much of coastal southern California, where these exotic plants are well-established and where the irreversible conversion of shrublands to grasslands is likely, fire frequency and burn size should be kept low. Where possible, flammable exotics should be removed or reduced in shrubland habitats. However, in chaparral habitats, where re-growth of shrubs following fire is common, prescribed fire may benefit Sage Sparrows.

Sage Sparrows seem to be especially sensitive to fragmentation and development at the landscape scale. The fragmentation of Sage Sparrow habitat is a serious threat in California, due to the overlap between the Sage Sparrow's distribution and areas of expanding human development.

Nest predation may be a serious factor in the declines of Sage Sparrows in California. Therefore, predation should be minimized by managing for local and landscape habitat characteristics that are associated with high nest success, and possibly by reducing the abundance of non-native predators.

**ASSOCIATED SPECIES:**

Associated species include the Greater Roadrunner, Canyon Wren, Rock Wren, Rufus-crowned Sparrow, San Diego pocket mouse. The Bell's Sage Sparrow (*A. b. belli*) is a characteristic chaparral and coastal sage scrub bird found mainly in drier, more inland areas of the Coast Ranges and southern California.

**HABITAT NEEDS and CONCERNS:**

Sage Sparrows require extensive, semi-open habitats with evenly spaced shrubs 1-2 meters high. Sage Sparrows will benefit from intermediate fire frequencies. Too frequent fires in some shrubland habitats can convert shrubland habitat to grassland and has probably contributed to the decline in Sage Sparrows throughout the western U.S. On the other hand, long-term fire suppression in chaparral allows taller, thicker chaparral to develop, probably reducing Sage Sparrow habitat in California. Other disturbances that eliminate shrubby vegetation, such as those used in some parts of the west to increase livestock forage, should also be avoided. Sage Sparrows in coastal shrublands, as well as in the Great Basin, are highly sensitive to habitat fragmentation, occurring less often in small patches and near developed edges. Thus, large areas of suitable habitat should be preserved to benefit Sage Sparrow populations. Low productivity due to nest predation in fragmented habitats is a cause for concern.

Habitat preservation for the Bell's Sage Sparrow should focus on inland coastal sage scrub associations and chaparral that contains chamise. Manage fire frequency and other disturbances to maintain a semi-open shrub structure in coastal scrub and chaparral.
Sage Sparrow (*Amphispiza belli*)

Photo by James Gallagher, Sea and Sage Audubon

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**RECOMMENDED CITATION:**

SHORTCUTS:

- range map
- action plan summary
- references

SUBSPECIES STATUS:

Five subspecies are currently recognized (*belli, clementae, cinerea, canescens*, and *nevadensis*), although the *clementae* subspecies may be more properly grouped with *belli* (Martin and Carlson 1998, Patton and Unitt 2002). Four of the five subspecies occur in California, but only two (*belli* and *canescens*) occur in the area covered by the Chaparral and Coastal Scrub BCP. This species account will focus on the *belli* and *canescens* subspecies.

MANAGEMENT STATUS:

The *belli* subspecies (Bell's Sage Sparrow) has been listed as a Species of Special Concern in California. The San Clemente Island subspecies (*A.b. clementae*), was listed as Threatened by the U.S. Fish and Wildlife Service in 1977.

DISTRIBUTION:

HISTORICAL DISTRIBUTION:

Formerly known as the Bell Sparrow, the belli subspecies was described as a "common resident of the Upper Sonoran zone west of the desert divides" where it "adheres closely to the chamiel (Adensostoma fasciculatum) association"(Grinnell 1915). Occurred in the southern coastal region from San Diego to Santa Clara and Contra Costa counties and locally in Marin and Sonoma counties, along western rim of Sacramento Valley and western foothills of Sierra Nevada (Grinnell 1915). See also Grinnell and Miller (1944). *A. b. canescens* was reported in sagebrush belt of mountains surrounding the south end of the San Joaquin Valley, west rim of Owens Valley and near Owens lake, near Walker Pass, near Bakersfield and McKittrick, on Carrizo Plain, south to east slope of San Bernardino Mountains, and north to the west side of Tulare Lake. Also reported in late summer and winter in other parts of interior southern CA (Grinnell 1915).

CURRENT BREEDING DISTRIBUTION:

California distribution described in Small (1994). Distribution in southern CA described in Garrett and Dunn 1981; centers of abundance were western Riverside County and in the vicinity of El Cajon, San Diego County. Fairly common to common resident in semidesert scrub in eastern Santa Barbara County (*A. b. canescens*) and very uncommon and rare residents in coastal areas of this county (Lehman 1994). Patchy distribution in Monterey County in chamise chaparral but exact extent unknown (Roberson 1985). Small (1994) states *A.b. bellii* to be irregular at northern edge of range in Trinity and Shasta counties, and describes an isolated pocket resident in western Sierra Nevada foothills.

Breeding Bird Atlases:

**San Diego County** - "Our results so far reveal the Sage Sparrow to be most widespread in south-central San Diego County, where an extensive plateau is still covered with vast tracts of chamise and redshanks. Toward the northwest, where the chaparral is often denser and more diverse, the distribution becomes patchier. The most extensive population remaining near the coast is that on Marine Corps Air Station Miramar, where the Sage
Sparrow lives among the vernal pools….no records of the Sage Sparrow from isolated canyons enclosed within the city of San Diego." (http://www.sdnhm.org/research/birdatlas/).

**Contra Costa County** - Confirmed breeding in six atlas blocks and probable breeding in one block, all in vicinity of Mt. Diablo, Contra Costa County, (http://www.flyingemu.com/ecosta/sgsp.html).

**Marin County** - Described as a rare resident of relatively dry chaparral dominated by chamise (Adenostoma fasciculatum). "…all breeding season sightings were from the Carson Ridge/Pine Mountain area". Breeding confirmed in one block (Shuford 1993).

**Sonoma County** - Uncommon and distributed locally in eastern portions of the county. Breeding confirmed in 2 blocks (Burridge 1995).

**BBS route:**

Within the area covered by this Bird Conservation Plan, BBS distribution map shows three areas where Sage Sparrows reach their highest abundance. Areas of higher abundance also occur in the Mohave bioregion of California and in the Great Basin. Map and counts for each BBS route can be found at [http://www.mbr-pwrc.usgs.gov/bbs/](http://www.mbr-pwrc.usgs.gov/bbs/)

**ECOLOGY:**

**AVERAGE TERRITORY SIZE:**

Highly variable. For *A. b. belli*, territories in San Diego and Riverside counties varied from 0.75 to 5.7 hectares (Lovio 1993, 1995, BAC pers. comm.).

**TIME AND OCCURRENCE OF SEASONAL MOVEMENTS:**

*A. b. belli* is generally non-migratory, although northernmost CA populations are reported to be migratory and other populations move down-slope to lower elevations in winter (Martin and Carlson 1998). *A. b. canescens* believed to migrate southward in winter from northern portions of range, and moves down-slope into deserts in winter in southern CA.

**EXTENT OF WINTERING IN CA:**

*A. b. belli* probably winters primarily in CA. Some *A. b. canescens* winter in CA but little is known about extent.

**FOOD HABITS:**

**FORAGING STRATEGY:**

Ground-foraging omnivore during breeding season, ground gleaning granivore during non-breeding season (Martin and Carlson 1998).

**DIET:**

Breeding season: adult and larval insects, spiders, seeds, small fruits, and succulent vegetation. Fall, winter, and early spring: small seeds, plant material, insects when available (Martin and Carlson 1998).

**DRINKING:**
Drinks occasionally but obtains most of water through diet (Martin and Carlson 1998).

**BREEDING HABITAT:**

Generally "prefers semi-open habitats with evenly spaced shrubs 1-2 m high" (Martin and Carlson 1998). *A. b. belli:* dry chaparral and coastal sage scrub; chamise chaparral in northern part of range and in coastal San Diego County (Bolger et al. 1997); big sagebrush at higher elevations in southern CA mountains. Less common in tall, dense, old chaparral. *A. b. canescens:* low desert scrub of saltbush, bitterbrush, big sagebrush and shadscale, and some creosote bush-goldenhead desert scrub (Martin and Carlson 1998). *A. b. nevadensis* occurrence is associated with sagebrush cover (Knick and Rotenberry 1995).

**NEST SUBSTRATE:**

*A. b. belli:* diverse shrub species including: brittlebush, black sage, California buckwheat, California sagebrush, bush mallow, chamise, white sage, valley cholla, ceanothus, willow; bunchgrasses used as well. *A. b. canescens:* saltbush and rabbitbrush. Occasionally nest on ground.

**HEIGHT OF NEST:**

Mean nest height for *belli:* 42.3 cm ± 18.1 SD (range 22-79, n=19). No data for *canescens*.

**HEIGHT OF PLANT:**

Shrub height and structure believed to be more important to nest site choice than species; prefer taller shrubs with larger canopies. Mean nest shrub height for *belli:* 105.7 cm ± 22.3 SD (range 62-155, n=21). No data for *canescens*.

**NEST CONCEALMENT:**

No quantitative data, but nest are placed in densest part of nest site vegetation.

**VEGETATION SURROUNDING THE NEST:**

**AVERAGE SHRUB COVER:**

No quantitative data, but where shrub cover is a sparse, nests are found in denser clumps of shrubs. In one study, *A. b. belli* chose nest sites with taller vegetation within 10 m than was present at random sites (Misenhelter and Rotenberry 2000).

**DOMINANT SHRUB SPECIES:**

No quantitative data; varies according to habitat. In one study, *A. b. belli* chose nest sites with more cover from California sagebrush and brittlebush within 10 m than in random sites (Misenhelter and Rotenberry 2000). In the same study, successful nest sites had higher cover of brittlebush and higher plant species diversity within 10 m than did sites of unsuccessful nests.

**GROUND COVER:**

In one study, *A. b. belli* chose nest sites with a higher degree of bare ground within 10 m than at random sites (Misenhelter and Rotenberry 2000).

**ASPECT:**
Nest typically placed away from southwest side of shrubs, probably to avoid wind or sun exposure (Martin and Carlson 1998).

NEST TYPE:
Open cup.

BREEDING BIOLOGY:

TYPICAL BREEDING DENSITIES:


MATING SYSTEM:
Monogamous.

DISPLAYS:
Sings from perches to establish territory.

CLUTCH SIZE:
Mean for *belli*: 3.54 ± 0.60 SD (range 2-5, n=147). Mean for *canescens*: 3.62 ± 0.86 SD (range 2-6, n=41) (Martin and Carlson 1998).

INCUBATING SEX:
Female predominately, although male rarely observed incubating when female leaves nest (Martin and Carlson 1998).

INCUBATION PERIOD:
10-16 days from completion of clutch (Martin and Carlson 1998).

DEVELOPMENT AT HATCHING:
Altricial, naked, blind, uncoordinated.

NESTLING PERIOD:
9-10 days (Martin and Carlson 1998).

PARENTAL CARE:
Both parents feed young.

POST FLEDGING BIOLOGY OF OFFSPRING:
No information beyond parental care stage. Immediately post-fledging, young birds perch low in shrubs and
sometimes give begging calls as both parents feed young.

**POST BREEDING SOCIAL BEHAVIOR:**

Little information for *belli* and *canescens*. In winter, *belli* seen moving in small mixed species flocks with other sparrow species (BAC). *A. b. navadensis*: juveniles form flocks after fledging and are joined by adults after breeding ends and before migration begins.

**NUMBER OF BROODS:**

Few data for *belli* and *canescens*. *A. b. clemente* frequently double or triple broods, most *nevadensis* produce 2 broods per year (Martin and Carlson 1998).

**BROOD PARASITISM:**

Nest have been parasitized by Brown-headed Cowbirds (*Molothrus ater*) in Idaho and California, especially in disturbed areas. Both abandonment and the raising of cowbird young have been observed (Martin and Carlson 1998).

**LANDSCAPE FACTORS:**

**ELEVATION:**

Little quantitative information. The lowest known point for *A. b. belli* on the east edge of the Sage Sparrow's range in San Diego County is at 2050 feet elevation (San Diego County Bird Atlas).

**FRAGMENTATION:**

Occurrence of *A. b. belli* is reduced near edges with human development (Bolger et al. 1997). No records of *A. b. belli* from isolated canyons enclosed within the city of San Diego (San Diego County Bird Atlas, Soulé et al. 1988, Crooks et al. 2001). High predation rates observed in one habitat fragment in southern California (79.9%; Misenhelter and Rotenberry 2000). Knick and Rotenberry (1995) found that Sage Sparrows were less likely to occur in fragmented shrubsteppe habitats in Idaho. Also, landscape scale variables were more important predictors of Sage Sparrow presence than local habitat characteristics. They concluded that "the fragmentation of shrubsteppe habitats by wildfire, shrub die-off, or human-caused disturbance appears to significantly affect obligate species, such as Sage Sparrows" (Knick and Rotenberry 1995).

**PATCH SIZE:**

Presence of *A. b. nevadensis* positively related to shrub patch size (Knick and Rotenberry 1995).

**DISTURBANCE** (natural or managed):

Disturbances that reduce shrub cover, such as frequent fire, mechanical disruption, livestock grazing, and off-highway vehicle use appear to have negative effects on Sage Sparrows, although there may often be a time-lag between the disturbance and any effects due to site-fidelity (Wiens et al. 1986). Disturbances in costal scrub habitats can lead to a change from shrubland to fields of exotic grasses and annual forbs; the latter is avoided by Sage Sparrows (*A. b. belli*; Misenhelter and Rotenberry 2000). In both shrubsteppe and coastal scrub, the invasion of exotic weeds can cause increased fire frequency, complete loss of shrub cover, and reductions in Sage Sparrow populations. On the other hand, long-term fire suppression in California chaparral may allow shrubs to grow higher and thicker than what is preferred by Sage Sparrows (Martin and Carlson 1998). *A. b. belli* may prefer recently burned chaparral because it has a low, open shrub structure (Lovio 1999). Disturbance by domestic grazing animals can also reduce habitat and Sage Sparrow numbers, as happened dramatically on
San Clemente Island (Martin and Carlson 1998). Habitat disturbance may also promote nest parasitism. In a desert scrub habitat protected from grazing and off-highway vehicle use by fencing, Sage Sparrows were found to be 163-222% more abundant than outside the fencing (Brooks 1999).

**ADJACENT LAND USE:**

Reduced abundance near urban edges.

**PREDATORS:**

Like other open cut nesters, Sage Sparrows are extremely vulnerable to nest predation. Research suggests that nest predation can strongly reduce reproductive success and threaten population persistence (Reynolds 1981, Rotenberry and Wiens 1989, Misenhelter and Rotenberry 2000). Reynolds (1981) reported that Loggerhead Shrikes depredated nests. Snakes and ground squirrels have also been implicated as nest predators (Rotenberry and Wiens 1989). Anything that increases predation pressures (introduced or human-subsidized predators, habitat degradation) is potential a threat to Sage Sparrow long-term viability.

**EXOTIC SPECIES INVASION/ENCROACHMENT:**

In both shrubsteppe and coastal scrub habitats, the invasion of exotic weeds can cause increased fire frequency, complete loss of shrub cover, and reductions in Sage Sparrow populations (Martin and Carlson 1998, Misenhelter and Rotenberry 2000).

**VULNERABILITY TO ECOLOGICAL TRAPS:**

Sage Sparrows "selecting habitat in more preferred habitat experienced a higher likelihood of nest failure than did those in less preferred habitat" (Misenhelter and Rotenberry 2000). Therefore some populations of Sage Sparrows may occur in areas that are "ecological traps," and thus these populations may not be viable in the long run.

**DEMOGRAPHY AND POPULATION TRENDS:**

**AGE AND SEX RATIOS:**

No information.

**PRODUCTIVITY MEASURE(S):**

For *A. b. clementeae*, 2.5 fledglings per nest ± 0.87 SD, range 1-4, n = 20; (Willey 1990). For *A. b. nevadensis*, 1.3 fledglings per nest with eggs ± 1.3 SD, range 0-3, n = 15; (Reynolds 1981). Productivity in shrubsteppe habitats is higher in years with higher annual rainfall (Rotenberry and Wiens 1991).

**SURVIVORSHIP:**

No information.

**DISPERsal:**

Few data; BAC observed three color-banded young which had moved 800-900 m from their natal nest site by the following spring, and ten hatch-year birds which moved 75-600 meters from their point of capture (Martin and Carlson 1998).

**POPULATION TREND:**

In California, BBS analysis of 52 routes shows no significant trend between 1966 and 2000. However, for individual regions in California, there is too little BBS data available (4-12 routes per region) to reliably estimate trends (http://www.mbr-pwrc.usgs.gov/bbs/).

**MANAGEMENT ISSUES:**

**FIRE AND EXOTIC VEGETATION:**

Fire frequency and the invasion of exotic vegetation, especially grasses and annual forbs, interact to pose serious threats to Sage Sparrows in coastal scrub habitat. In much of coastal southern California, where these exotic plants are well-established and where the irreversible conversion of shrublands to grasslands is likely, fire frequency and burn size should be kept low. Where possible, flammable exotics should be removed or reduced in shrubland habitats. However, in chaparral habitats, where re-growth of shrubs following fire is common, prescribed fire may benefit Sage Sparrows.

**HABITAT FRAGMENTATION:**

Sage Sparrows seem to be especially sensitive to fragmentation and development at the landscape scale. The fragmentation of Sage Sparrow habitat is a serious threat in California, due to the overlap between the Sage Sparrow's distribution and areas of expanding human development.

**NEST PREDATION:**

Nest predation may be a serious factor in the declines of Sage Sparrows in California. Therefore, predation should be minimized by managing for local and landscape habitat characteristics that are associated with high nest success, and possibly by reducing the abundance of non-native predators.

**ASSOCIATED SPECIES:**


**MONITORING METHODS AND RESEARCH NEEDS:**

**Trend monitoring:** The BBS method does not monitor Sage Sparrows well in the areas of California where they are most likely to be declining due to habitat loss, fragmentation, and degradation. Off-road monitoring methods should be applied in coastal scrub and chaparral habitats in coastal California. Monitoring plans for NCCP and MSHCP efforts in southern California should include the monitoring of Sage Sparrows.

**Demographic monitoring and research:** Nest success and the factors that influence it should be monitored directly (through nest monitoring) in replicate sites to evaluate management options. Basic data on survivorship is needed and could be obtained from constant-effort mist-netting or color-band re-sighting. More basic information is needed on other aspects of productivity such as number of nesting attempts and post-fledging and juvenile survivorship. Study of whether Sage Sparrow exhibit metapopulation or source-sink dynamics would be valuable.

**Mechanisms of landscape effects:** Study of the mechanisms responsible for the reduced incidence of Sage Sparrows near edges and in areas of fragmented habitat is needed. In other words, is the negative association with edges due mainly to habitat selection (the avoidance of edges by individual birds) or due to reduced population growth rates near edges?

**Optimal fire frequency:** The association between Sage Sparrow occurrence/abundance and fire frequency should be studied to determine what the optimal fire frequency is for maintaining suitable habitat in several...
bioregions.

ACTION PLAN SUMMARY

SPECIES: Sage Sparrow *(Amphispiza belli)*

STATUS:

Two subspecies of Sage Sparrows occur in the California shrublands covered by this plan. The Bell's Sage Sparrow (*A. b. belli*) is a characteristic chaparral and coastal sage scrub bird found mainly in drier, more inland areas of the Coast Ranges and southern California. The *canescens* subspecies is found further inland in even drier, desert scrub habitats. Breeding Bird survey data from throughout the West indicate declining Sage Sparrow populations, but the data from California alone are insufficient to assess local trends. Given the amount of loss of habitat in coastal California, its distribution in coastal scrub habitat has probably been reduced. The Bell's Sage Sparrow has been listed as a Species of Special Concern in California.

HABITAT NEEDS and CONCERNS:

Sage Sparrows require extensive, semi-open habitats with evenly spaced shrubs 1-2 meters high. Sage Sparrows will benefit from intermediate fire frequencies. Too frequent fires in some shrubland habitats can convert shrubland habitat to grassland and has probably contributed to the decline in Sage Sparrows throughout the western U.S. On the other hand, long-term fire suppression in chaparral allows taller, thicker chaparral to develop, probably reducing Sage Sparrow habitat in California. Other disturbances that eliminate shrubby vegetation, such as those used in some parts of the west to increase livestock forage, should also be avoided. Sage Sparrows in coastal shrublands, as well as in the Great Basin, are highly sensitive to habitat fragmentation, occurring less often in small patches and near developed edges. Thus, large areas of suitable habitat should be preserved to benefit Sage Sparrow populations. Low productivity due to nest predation in fragmented habitats is a cause for concern.

OBJECTIVES:

- Maintain current distribution.
- Identify healthy breeding populations.
- Increase area of habitat managed for Sage Sparrows.
- Guide conservation planning efforts to benefit Sage Sparrows.
- Improve trend and demographic monitoring efforts.
- Gather new information on the effects of management practices and habitat fragmentation on Sage Sparrow populations.

ACTION:

Habitat protection recommendations:

Habitat preservation for the Bells' Sage Sparrow should focus on inland coastal sage scrub associations and chaparral that contains chamise. The habitat and area requirements of Sage Sparrows should be addressed in multi-species conservation planning efforts (NCCPs and MSHCPs) throughout their range.

Management and restoration recommendations:

Manage fire frequency and other disturbances to maintain a semi-open shrub structure in coastal scrub and chaparral.

Monitoring and Research Needs:

http://www.prbo.org/calpif/htmldocs/species/scrub/sage_sparrow.html
As is true of many coastal shrubland bird species, Sage Sparrows are not well monitored by Breeding Bird Survey counts. Given their sensitivity to fragmentation and habitat degradation, monitoring to determine population trends and demographics should be a high priority. Because Sage Sparrows may be attracted to areas where they experience low reproductive success (i.e., "ecological traps"), research into the determinants of reproductive success and habitat quality is especially needed. Studies to determine optimal fire frequencies in various habitats, and to understand the mechanisms by which fragmentation influences Sage Sparrows are needed.

**SCIENTIFIC REFERENCES:**


Burridge, B. 1995. Sonoma County breeding bird atlas: detailed maps and accounts for our nesting birds. Madrone Audubon Society, Santa Rosa, CA.


Ellison, K. The relative effects of nest predation and brood parasitism on four passerine birds in Southern California coastal sage scrub. Master's thesis, University of California, Riverside.


http://www.prbo.org/calpiif/htmdocs/species/scrub/sage_sparrow.html


San Diego County Bird Atlas, Phil Unitt, Project Manager. San Diego Natural History Museum, P.O. Box 121390, San Diego, CA 92112-1390 Email: birdatlas@sdnhm.org


II

SPECIES ACCOUNTS

PDF of Black Swift account from:
Shuford, W. D., and Gardali, T., editors. 2008. California Bird Species of Special Concern: A ranked assessment of species, subspecies, and distinct populations of birds of immediate conservation concern in California. Studies of Western Birds 1. Western Field Ornithologists, Camarillo, California, and California Department of Fish and Game, Sacramento.
BLACK SWIFT (*Cypseloides niger*)

Don Roberson and Charles T. Collins

Breeding range of the Black Swift in California; polygons are centered on specific nest sites and encompass an estimated foraging range of 24 km (15 mi) in diameter around each site. In addition to a possible area of recent extirpation along the coast in San Mateo and Santa Cruz counties, breeding numbers have declined in Monterey County. Occurs more widely during migration.
**Special Concern Priority**

Currently considered a Bird Species of Special Concern (breeding), priority 3. Included on both prior special concern lists (Remsen 1978, 3rd priority; CDFG 1992).

**Breeding Bird Survey Statistics for California**

Data inadequate for trend assessment (Sauer et al. 2005).

**General Range and Abundance**

Breeds widely but locally throughout western North America, from southeastern Alaska to southern California, as far east as central Colorado, throughout Mexico to Costa Rica, and on some Caribbean islands. Despite this extensive range, less than 100 nesting locations have been documented, so the world population is comparatively small. Three subspecies have been described on the basis of size; the California population is part of the widespread North American subspecies *borealis*. The entire world population apparently winters in northern South America, but the specific wintering grounds of the California populations are not known (Lowther and Collins 2002).

**Seasonal Status in California**

Occurs in California as a summer resident and migrant from mid-April to mid-October. Nest sites are occupied from mid-May (Santa Cruz coast) to mid-September (Sierra), but most nesting occurs during June through August (Legg 1956, Gaines 1992, Marin 1999, Lowther and Collins 2002).

**Historic Range and Abundance in California**

Grinnell and Miller (1944) described nesting Black Swifts as “at best . . . fairly common locally,” but the overall California population was “probably small in aggregate.” Breeding was known or suspected from three distinct areas.

Central coast. Historic locations of confirmed nesting included sea cliffs from Santa Cruz to Davenport, and behind Berry Creek Falls, Big Basin Redwood State Park, Santa Cruz Mountains, both in Santa Cruz County (Grinnell and Miller 1944, MVZ egg set data). Nesting was suspected somewhere along the Big Sur coast, perhaps at the mouth of Rocky Creek, Monterey County (MVZ specimen).

Central and southern Sierra Nevada. Nesting in this region was documented behind various waterfalls and on steep cliffs in Yosemite Valley, Mariposa County, south to Ella Falls, Kings Canyon National Park, Fresno County, and the Marble Fork of the Kaweah River, Sequoia National Park, Tulare County (Grinnell and Miller 1944).

San Bernardino and San Jacinto mountains. Grinnell and Miller (1944) cited circumstantial evidence of nesting in these mountains.

Of various records cited by Grinnell and Miller (1944) as likely involving migrants or birds otherwise far from known nesting areas, two probably represented summer resident birds: one in 1892 at the Pit River, “probably in Shasta County,” and the other on 1 August 1889 at Webber Lake, Sierra County. If these were breeding birds, the montane nesting range in California at that time stretched from the southern Cascades south through the Sierra Nevada to Sequoia National Park, with a separate population in southern California’s Transverse Ranges.

**Recent Range and Abundance in California**

The overall breeding range remains largely unchanged from that in the 1940s (see map), but the entire coastal population has been in recent severe decline. This portion of the historic breeding range will be lost if the current trend continues. Numbers appear stable in both montane regions.

Central coast. A thorough survey of Santa Cruz County in 1988, including all historic coastal sites and inland at Berry Creek Falls, produced a population estimate of 17–20 pairs (Suddjian 2002). Another three pairs were known from Pt. Año Nuevo in adjacent San Mateo County (Remsen 1978). Declines were noted throughout the Santa Cruz coast during the late 1990s, and an organized survey of all known and potential breeding sites in that county was undertaken in June–July 2002. These surveys were repeated in the summer 2004. Not a single active Black Swift nest was located (Suddjian 2002, D. L. Suddjian in litt.). At Pt. Año Nuevo, no nests were located in the summers of 2001 and 2002 (P. J. Metropulos in litt.).

In Monterey County, a small population has been known from the Big Sur coast and adjacent Santa Lucia Mountains. From 1988 to 1992, a breeding bird atlas project found confirmed or suspected evidence of nesting at three coastal sites (Anderson Creek mouth, Torre Creek mouth,
Black Swift

Rocky Point; the latter is the site called “Pt. Sur” in Remsen 1978 and “Bixby Creek mouth” in Bailey 1993) and at one inland location (Canogas Falls, Devils Canyon fork of Big Creek). Bailey (1993) estimated the county population at perhaps 50 pairs.

A previous nesting site at McWay Creek mouth (Roberson 1985) had no swifts by 1990. Small declines noted during the 1990s resulted in a recent population estimate of 10–20 pairs (Roberson 2002). Surveys in the summer of 2004 found no swifts at the traditional Anderson Canyon and Rocky Point sites (R. Fowler pers. comm., D. Roberson pers. obs.); the current population may be fewer than 10 pairs.

Nesting is also recorded (up to 4 pairs) just north of Ragged Point, San Luis Obispo County; surveys in the summer of 2004 found two birds there (T. Edell in litt.).

Cascades and Sierra Nevada. The highest nesting population occurs around Yosemite Valley, Mariposa County. Michael (1927) found seven nests in lower Tenaya Canyon away from waterfalls, but most breeding activity is centered on waterfalls (Gaines 1992). Anecdotal counts at Bridalveil Falls range from 20 to 50 pairs, with over 100 birds seen late in the summer (MPCR files), when both parents are foraging to feed their nestling (Marin 1999). It is possible that 80 or more pairs breed in the Mariposa County portion of Yosemite National Park. Despite statements to the contrary (e.g., Small 1994), there is no evidence of nesting in the Tuolumne County portion of the park. There is potential habitat in the Tuolumne River canyon; Grimnell and Storer (1924) reported a midsummer bird from Dudley, Warner Valley, on or near the Mariposa-Tuolumne line, which might have been a foraging bird from a nesting pair in that canyon.

Elsewhere in the Cascades and Sierra Nevada, small breeding colonies exist locally, in almost all cases behind or adjacent to waterfalls. The known or suspected sites, with most recent population estimates when available, are Grizzly Falls, the Trinity Alps Wilderness (up to 3 pairs; J. E. Hunter in litt. 2003), Trinity County; Mossbrae Falls near Dunsmuir on the upper Sacramento River (7–9 pairs most years; Remsen 1978, MPCR files, C. Collins pers. obs.), McCloud Falls, McCloud River (nesting suspected, Remsen 1978), and in the vicinity of Bridge Creek and Snowslide Gulch, Marble Mountain Wilderness, 21 km northeast of Somes Bar (1–2 pairs by presence of midsummer birds, T. Leskiw in litt. 2003), Siskiyou County; MacArthur-Burney Falls (5–20 pairs annually; Remsen 1978, Small 1994, MPCR files), Shasta County; Feather Falls, Plumas National Forest (up to 7 pairs; Remsen 1978, Knorr 1993, H. Highley fide R. Altman pers. comm. 2004), Butte County; near Yuba Pass (5–7 pairs; Remsen 1978), Sierra County; East Fork Creek near Pinoli Ridge (nesting suspected 4–8 pairs, D. Lukas in litt. 2003), Nevada County; Royal Gorge, North Fork American River (likely but undocumented sites include Heath, Rattlesnake, Snow Mountain, and Wabena falls; T. Beedy in litt. 2003) and Grouse Falls in a tributary of the American River (4–6 pairs possible; MPCR files, E. Pandolfino in litt. 2003), Placer County; Cloudburst Canyon, off West Fork Carson River, Carson Range (4–6 pairs, Knorr 1993), Alpine County; Rainbow Falls, Devils Postpile National Monument (1–2 pairs; Gaines 1992, MPCR files), Madera County (contra attribution to “Mono County” in Small 1994 and Lowther and Collins 2002); Ella Falls and possibly other sites in Kings Canyon, Kings Canyon National Park (possibly 10–20 pairs; Dixon 1943, D. Roberson pers. obs. 2002), and confluence of Disappearing and Goddard creeks (nesting suspected, at least 8 pairs in mid-July 1979, H. Green in litt. 2003), Fresno County; and along Marble Fork of Kaweah River, Sequoia National Park (6+ pairs, 3 nests found, Dixon 1943), Noble Creek Falls, 8 km southwest of Johnsdalde (1 pair; Lowther and Collins 2002, MPCR files), and along Middle Fork of Tule River, near Springville (nesting suspected 1–3 pairs, MPCR files), Tulare County.

Summer observations at San Juan Ridge, Nevada County (D. Lukas in litt. 2003); Mineral King, Sequoia National Park, Tulare County (MPCR files); North Fork of Kern River, Kern County (S. A. Laymon in litt. 2003); and in the White Mountains and at or near Owens Lake, Inyo County (S. A. Laymon in litt., T. Heindel in litt. 2004) suggest there may be other undiscovered breeding sites.

A review of data from all known and presumed breeding locations suggests a total Cascades-Sierran population of perhaps 180 pairs at up to 30–35 sites. Although many nest sites were discovered only in the past half-century, Black Swifts have high fidelity to breeding locales (Knorr 1993, Lowther and Collins 2002), and it seems likely that these represent a historically stable montane population.

San Gabriel, San Bernardino, and San Jacinto mountains. Foerster and Collins (1990) summarized recent surveys that showed small populations in these southern California mountains.
Nesting is known at two sites in the San Gabriel Mountains, Los Angeles County (Sturdevant and Wolfskill Falls; 2–4 pairs); at Big Falls in Mill Creek Canyon near Fallsville, San Bernardino Mountains, San Bernardino County (1–2 pairs); and at three sites on the west side of the San Jacinto Mountains, Riverside County (Lawler and Four falls, Strawberry Grotto; 9–10 pairs). Black Swifts near Black Mountain Camp, Riverside County (Remsen 1978) were likely foraging birds upstream of nearby Lawler Falls. Swifts in Tahquiz Canyon, Riverside County, on the east side of the San Jacintos (Remsen 1978) may represent either an unsurveyed site or simply wanderers.

The entire California population appears to be composed of perhaps 200 pairs at 40–45 sites. At nearly half of these, three or fewer pairs are suspected of nesting annually. MacArthur-Burney Falls, Bridalveil Falls, and large canyons in Kings Canyon and Sequoia national parks are the only sites where numbers are suspected to exceed 10 pairs, and the national park populations have not been systematically surveyed in nearly 75 years.

ECOLOGICAL REQUIREMENTS

Breeding Black Swifts are restricted to a very limited supply of potential nesting locations: behind or beside permanent or semipermanent waterfalls, on perpendicular cliffs near water (above Sierran rivers or on the sea coast), and in sea caves (Legg 1956, Knorr 1993, Lowther and Collins 2002). Key aspects of the Black Swift breeding biology appear to be adaptations to a distant, relatively limited, and unpredictable food supply: a single large egg (not replaced if lost), lengthy incubation and nestling periods, and a nestling fed by both parents on high-fat insect prey so that by the time it fledges the young outweighs them (Marin 1997, 1999). Studies in southern California show that both adults and young leave the nesting vicinity at fledging and presumably migrate south immediately (Marin 1999, Collins pers. obs.).

Studies in southern California found that over 90% of the diet fed to nestlings was winged ants (Foerster 1987, Marin 1999, Rudalevige et al. 2003). These flying ants occur patchily in localized outbreaks during the summer. Foraging adults in summer cruise far from nesting locales and over a wide variety of habitat types to locate these swarms (Lowther and Collins 2002).

THREATS

Few threats to these swifts are documented and fewer still appear to have population-level effects. The inaccessibility of most nesting sites and that many of these are located on protected lands greatly reduces potential threats at nesting locales. Remsen (1978) cited rock climbing as a potential threat, but the wet and mossy nature of the nesting substrate should reduce even that threat in most locations. One nest in southern California was destroyed by a thrown rock (Foerster 1987, Lowther and Collins 2002). Coastal and cliff-face erosion probably destroys and creates suitable nesting sites; presumably this has no long-term net effect unless human activities alter the natural process.

With a historic and current population of only about 200 pairs, and the heavy reliance of those pairs on a patchy and unpredictable food source to feed nestlings, the sheer demographics of the state’s population make it vulnerable to changes in the summer prey base of swarming winged ants. If coastal and Sierran populations rely on patchy local swarms of winged ants, as is known in southern California, collapses in the prey species could seriously affect local breeding success. Flying ant populations may be at risk from pesticide use, incursions of non-native ant species, or the spread of other exotics. The sudden and unexpected declines in the state’s entire coastal population may be linked to prey-base collapses, but these links have not yet been documented. It is also possible that recent losses may be traced to problems on the swifts’ wintering grounds (Lowther and Collins 2002).

MANAGEMENT AND RESEARCH RECOMMENDATIONS

- Continue to protect known nest sites from disturbance, and place appropriate interpretive signs in parks and along trails adjacent to waterfall nesting sites to educate the public and reduce random vandalism (e.g., discourage rock throwing).
- Investigate the causes of the recent decline in the coastal population, including possible changes in the population of swarming winged ants in this area.
- Once the causes of declines in the coastal population have been identified, adopt appropriate recommendations to reduce those threats, including reducing, as possible, any habitat degradation or alien species that threaten the underlying prey base.
- Conduct focused surveys to determine more precise population estimates, and survey probable nesting sites to determine
occupancy, using a standard protocol (e.g., Schultz and Levad 2001, Altman 2004).

- Initiate studies, possibly telemetry-based, to determine the precise wintering locations for California-nesting Black Swifts and potential threats in those areas.

**MONITORING NEEDS**

No current monitoring efforts are adequate to monitor annual or long-term population changes in Black Swifts. Annual or semiannual inventories of breeding locations, with the aid of a standard protocol for establishing the site’s population size (e.g., Schultz and Levad 2001, Altman 2004), are needed to monitor the status of this scarce species.

**ACKNOWLEDGMENTS**

We thank T. Heindel, T. P. Ryan, and D. L. Suddjian for providing useful comments on a draft account; Suddjian also first drew our attention to serious swift declines in Santa Cruz County. S. Glover graciously provided copies of the Middle Pacific Coast (Northern California) region files of *North American Birds* in his possession. R. Altman provided results from American Bird Conservancy surveys in the summer of 2004. T. Beedy, T. Edell, R. Fowler, H. Green, H. Highley, J. E. Hunter, S. A. Laymon, T. Leskiw, D. Lukas, P. J. Metropolis, J. Meyer, E. Pandolfino, and D. L. Suddjian all provided unpublished information about Black Swift breeding populations.

**LITERATURE CITED**


Black Swift  
(*Cypseloides niger*)

This is the only large *Cypseloides* swifts known to occur north of Sinaloa, Mexico. In most regions where it occurs it is rather uncommon and local but in its British Columbia breeding range, flocks of several thousands have been seen during the breeding season and during migration.

**Identification**
The largest swift in the U.S. and Canada. Black overall with pale gray head. The tail is forked, though there is some variation in this. When seen in the distance, this swift appears long-winged. In the northern part of its range, it is the only strikingly dark swift with a forked tail.

**Distribution and Population Trends**
Black Swift has an extensive range but within this range occurs in rather isolated pockets sometimes separated from each other by hundreds of miles. It is found from the Nearctic to Central America and in the West Indies. In North America, its breeding range extends from southeastern Alaska through northwestern and central British Colombia and southwestern Alberta south along the western coastal states to southern California, northwestern Montana, Colorado, central Utah, to north-central New Mexico. Black Swifts nest at Audubon Colorado's Box Canyon Falls and Park Important Bird Area which may support the state's largest population. Audubon California has identified the Fall River valley Important Bird Area within which the state's largest breeding population of Black Swifts (20+ pairs) occurs at McArthur-Burney State Park. The species is thought to winter in South America but the location of its wintering grounds remains a mystery. In general the species never occurs in very high abundance except occasionally flocks of thousands have been seen in its British Columbia range. Though the species is difficult to survey because of its inaccessible nest sites and high-flying habits, Breeding Bird Survey trend analysis shows a 6.3% per year rangewide decline from 1966-2001. Of greatest concern is the fact that some of the greatest declines are in its British Columbia breeding range where it has traditionally occurred in highest abundance.

**Ecology**
Black Swift is considered primarily a mountainous species, occurring over a range of highland habitats, particularly over rugged terrain and coastal cliffs. Nests on canyon walls near water and sheltered by overhanging rock or moss, preferably near waterfalls or on sea cliffs. It occasionally occurs in lowlands during migration or in bad weather conditions. It breeds in California from May to September. Autumn migration from northern portions of the breeding range begins as early as late August. The species' wintering grounds are not definitively known. The nests are shallow cups made of moss bound with mud. Lays one to two eggs. Feeds on flying insects.

**Threats**
The general relative inaccessibility of nest sites suggests that threats at these sites are not a major problem though increasing numbers of recreational rock-climbers in some areas and hikers and cave explorers near waterfalls may disturb birds. A more likely broad-scale threat is from decreases in aerial insect abundance from habitat loss and use of pesticides on breeding and wintering grounds. Birds may also be ingesting pesticides directly and bioaccumulating them in tissues which may cause decreases in reproductive output and increases in adult mortality, especially under extreme weather conditions.

**Conservation**
While little conservation activity has been directed at the Black Swift, some actions for other species may benefit this one. For example, seasonal closures of cliff areas from recreational rock-climbers to protect Peregrine Falcons and other birds could decrease human activity near potential Black Swift nest sites. On public lands, government agencies should consider similar seasonal closures at known Black Swift nesting sites and rerouting of trails near waterfall breeding areas. Land protection activities in swift foraging areas should help to protect the insect populations necessary for this species' survival.

Unfortunately, the lack of basic knowledge about the species life history and factors causing population declines currently hampers our ability to take actions that we know will stop the declines and increase swift populations. Research to better understand these issues should be a priority for government and university scientists.

**What Can You Do?**
- **WatchList Search**
  - **Status:**
  - **Population size:** 150,000
  - Photo by Glen Tepke.

http://audubon2.org/watchlist/viewSpecies.jsp?id=38 11/10/2010
Audubon's Important Bird Area program is a vital tool for the conservation of Black Swifts as well as other species. To learn more about the Important Bird Area programs in states with breeding populations of Black Swift, and how you can help, visit http://www.audubon.org/bird/iba.

Support local land trusts, government agencies, and other organizations working to preserve Black Swift foraging and nesting habitat in your area. Contact your state Important Bird Areas coordinator (http://www.audubon.org/bird/iba/state_coords.html) to find out if there are sites in your area important for Black Swifts that need increased protection.

Volunteers are crucial to the success of programs that monitor the long-term status of wintering populations of Black Swift and other bird species. Audubon's Christmas Bird Count (CBC) is one of the longest-running citizen-science monitoring programs in the world and has helped to follow changes in the numbers and distribution of Black Swift. To learn more about the CBC and how you can participate, visit http://www.audubon.org/bird/cbc.

Information on where Black Swifts occur and in what numbers is vital to conserving the species. Help in monitoring this and other species by reporting your sightings to eBird. A project of Audubon and the Cornell Lab of Ornithology, eBird is the world's first comprehensive on-line bird monitoring program http://www.audubon.org/bird/ebird/index.html

References


Blue Grosbeak

Passerina caerulea  |  ORDER: PASSERIFORMES  |  FAMILY: CARDINALIDAE

IUCN Conservation Status: Least Concern

A beautiful blue bird with silvery bill and chestnut wingbars, the Blue Grosbeak is an uncommon bird of shrubby habitats across the southern United States.

Identification

Appearance

Adult Description
- Medium-sized songbird.

Life History

Sound

Video

Visit Birds of North America for more on this species
- Large silver-gray bill.
- Male deep blue with two brown wingbars.
- Female mostly brown with two brown wingbars.

### Male Description
Black in front of eyes extending down to bill. Flight feathers dark brown to black, with blue edging. Breeding (Alternate) Plumage: Blue all over, with brown wingbars. Nonbreeding (Basic) Plumage: Body blue with brownish feather edges.

### Female Description
Brown all over, with some blue feathers on back. Flight feathers dark brown to black, with brown edging.

### Immature Description
First-year female resembles adult female, with even less blue on the upperparts. First-year male, through the first full summer of life, shows plumage intermediate between that of adult female and adult male, with variable amounts of blue mixed with brown.

### Field Marks

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[Map of eBird sightings](http://www.allaboutbirds.org/guide/Blue_Grosbeak/id)
**Similar Species**

- **Eastern Bluebird** has reddish chest and white belly.
- **Indigo Bunting** is similar in all plumages, but is much smaller, has a smaller bill, with wingbars less distinct or lacking.
- Immature **Lazuli Bunting** is similar, but is smaller, paler, and has a smaller bill.
- Female and juvenile **Brown-headed Cowbird** lack wingbars and may be streaked on breast.
Blue Grosbeak (\textit{Guiraca caerulea})
by Mark Johns

\textbf{Wild Facts about the Blue Grosbeak}

Blue Grosbeaks are large buntings of forest edge with a widespread breeding range in North America, Mexico and Central America. The males are often seen singing from roadside wires and tree tops. While the breeding biology of this bird is likely similar to its relative, the Indigo Bunting, there is little detailed information about Blue Grosbeak nesting ecology, courtship behavior and song structure available. In addition, very little is known about the populations that breed in Mexico and Central America, and even less about the birds that breed in North Carolina on their wintering grounds. The Blue Grosbeak’s breeding range overlaps that of the related Indigo Bunting, so ecological competition with this species may help to keep its overall numbers low. Indeed, the Blue Grosbeak resembles a ‘jumbo’ version of its smaller relative, and can be mistaken for it without careful observation.

\textbf{History and Status}

Found throughout the state as a breeder, the Blue Grosbeak actually has some of its greatest nesting densities in temperate North America in the Piedmont areas of the Carolinas and Georgia. It is a neotropical migrant, although a few birds sometimes linger in the Carolinas into winter. Neotropical (New World) migratory birds breed during summer in temperate North America, migrating north each spring from wintering areas, then fly back south to spend the bulk of the year in Mexico, Central or South America, or the Caribbean.

This is a bird of forest edges and shrubby fields, and they are also found in old fields, logged-over areas, streamsides and hedgerows. At this time in our state there is a good amount of this type of habitat, and is very possibly more common now than before European settlement. They seem to thrive in disturbed sites and can even be found singing in small brushy woodlots in quite urbanized areas, especially if water is nearby.

Breeding Bird Survey (BBS) data show an increase in numbers over the species range between 1965 and 1979. Between 1982 and 1991, increases were indicated in states along the northern edge of their range, such as Minnesota, Indiana and Ohio, but decreases occurred in Pennsylvania, Missouri and Florida. Currently according to the BBS this species seems to be increasing.

\textbf{Description}

The Blue Grosbeak is sexually dimorphic (males and females look different). Adult males are purplish blue with two brown wingbars. The female is brown with occasional blue feathers on upper parts, and two brown wingbars. Young resemble the female, with males having varying amounts of blue on their body.

These birds have stout conical bills, larger and stouter than that of the smaller Indigo Bunting. Also, Indigo Buntings lack wingbars, except for young males, which are often
mistaken for adult Blue Grosbeaks. Female and young Brown-headed Cowbirds are larger and lack wingbars, and the juvenile cowbirds have faint streaking below.

**Habitat and Habits**

As brilliant as the males of this species are, only a few Blue Grosbeak nests have ever been found. This is interesting in that these are birds of forest edge, transmission-line corridors, open slashings left after logging, hedgerows, streamsides and even multi-age pine forests. Females most likely build the nest, usually low in small trees, shrubs, or tangles of vines, briars and other vegetation. Nests are often built near open areas or even roads. The small bowl-shaped nest sometimes contains manmade items like rags, cellophane, string or even newspaper. Females do all the incubating and most of the feeding while young are still in the nest. The male feeds young more actively after they fledge and while the female is building a second nest.

These birds are heavily parasitized by the Brown-headed Cowbird and also a known host for the Bronzed Cowbird. Blue Grosbeaks have been observed building a nest on top of a parasitized nest, and have been documented successfully raising both cowbirds and their own young. Unlike some of the breeding neotropical migrants of eastern North America, the Blue Grosbeak has evolved with cowbirds in parts of its range for some time.

At the end of the nesting season, Blue Grosbeaks form large flocks that feed in weed and grain fields before flying to their wintering areas in Central America. During the breeding season adults feed on a variety of insects but especially favor grasshoppers, beetles, cicadas and mantis. Seeds of wild and cultivated grasses are also consumed, as well as snails. Their large bill allows for effective manipulation of seeds as large as corn, and large insects.

Courtship and nesting behavior is not well known, but males do arrive on the breeding grounds before females, and it is assumed they are monogamous for the nesting season. Males usually sing from high perches, and their song serves to attract a female and to proclaim his territory to other males. The song is a long, rich warble that has a certain huskiness to it. It lacks the paired notes of the Indigo Bunting song, and the burry quality of the Purple and House Finches. The Orchard Oriole is similar but its song has distinct phrases. The Blue Grosbeak also has a habit of flicking and spreading its tail, even while singing.

**Range and Distribution**

Blue Grosbeaks breed throughout the lower half of the United States and into Mexico and Central America, where they are year-round residents. They winter mainly in Mexico and Middle America south to central Panama. Most of the Blue Grosbeaks nesting in the eastern United States probably migrate across the Caribbean. They are known to live almost six years.

**People Interactions**

There are no published information, but populations may be expected to benefit for the abandonment of agricultural land in the breeding range. They seem to be widespread in the Carolinas, but are not as frequently encountered as Indigo Buntings. The effect of tropical agricultural practices and deforestation in the wintering range is unknown. Suburbia does not seem to support many breeding Blue Grosbeaks, perhaps due to predation problems with domestic and feral cats. Apparently little management is
needed, but the lack of basic information on this species makes it difficult to assess management or conservation needs.

**Suggested Reading**

*The Birders Handbook* by Ehrlich, Dobkin and Wheye, 1988, Simon & Schuster

Blue Grosbeak (Guiraca caerulea)

Photo by James Gallagher, Sea and Sage Audubon

Prepared by ennifer hite (jdwee9 mizzou.edu)

University of Missouri, Columbia

http://www.prbo.org/calpif/htmldocs/species/riparian/blue_grosbeak.htm
R COMM ND D CITATION


SHORTCUTS:

range map

S BSP CI S STAT S:

Three of 7 described subspecies occur in the United States. Grinnell considered the Colorado River valley, Imperial and Coachella valley populations to be the Arizona Blue Grosbeak *G. c. interfusa*, but these populations are now considered *G. c. salicaria* (Ingold 1993).

*G. c. caerulea* - se and s central U.S.

*G. c. interfusa* - sw U.S. and n Mexico

*G. c. salicaria* - Central valley, CA and se deserts valley floors, from Oasis, Mono and Owens valley, Armagosa River, sw CA to nw Baja and east to the Virgin River in sw Utah and the Colorado River, A (Phillips et al. 1964).

MANA M NT STAT S None.

DISTRIBUTION

HISTORICAL BR DIN DISTRIBUTION

Early 20th century breeding range more southerly than now (Am. On. Union 1931). *G. c. caerulea* Only breeding consistently in New Jersey and Ohio since 1970s. Coues (1874 in Ingold 1993) originally suggested range expansion of this species, possibly due to cutting of eastern forests. *G. c. salicaria* also possibly expanding north (Ingold 1993).

C RR NT BR DIN DISTRIBUTION

*G. c. salicaria* 150,000 km2; *G. c. 2,000,000 km2* (USFWS) ECOLOGY The greatest Blue Grosbeak densities are reported for *G. c. caerulea* in se U.S. (spot-mapping, Ingold 1993). Reported densities are 30 males km2 in Florida (Baker 1989 in Ingold 1993), and 31 males km2 in e T (Dickson Segelquist 1979 in Ingold 1993). BBS data from map in Ingold indicates CA densities to be less than 5 birds per route per year. Along the Colorado River, densities are reported as 4 to 6 pairs 40 ha (Rosenberg 1991). In Orange Co., CA, 2 nests were located 15 m apart (Bleitz 1956).

COLO

A RA T RRITOR SI

SC 6.12 ha to 5.2 ha and 6.2 ha (Odum and Kuensler 1955 in einer 1990); GA 1.2 ha in tung-oil groves.

**TIM OF OCC RR NC AND S ASONAL MO M NTS**

Arrival date on breeding grounds  Males arrive in southern California from 5 April to mid-April (Garrett and Dunn 1981). Males arrive from 18 to 22 April (Tyler 1913, Rosenberg et al. 1991 in USFWS). Few females arrive before 1 May (USFWS). Departure date from breeding grounds  Begins 8 Aug (Tyler 1913 in USFWS). All birds have usually left California by the end of September. Early SEFI record on 16 Aug (Pyle and Henderson 1991). Spring migration period  Mid-April to May and mid-May (Ingold 1993), slightly later on Colorado River, late spring migrant 18 June on SEFI. Fall migration period  Mid-August to mid-September in S. Dakota (S. Dakota Ornithol. Union 1991), late August to early September in Coastal CA (Garrett and Dunn 1981 in Ingold 1993), 8 Aug (Tyler 1913), 16 Aug (SEFI Pyle and Henderson 1991).

Extent of wintering in CA  Stragglers through mid-October (Rosenberg et al. 1991, Unitt 1984) and mid-November (Garrett and Dunn 1981). Late fall migrant recorded on 3 December 1988 at Oak Canyon Nature Center (OCNC) and one definite winter record at Irvine Regional Park, from 29 February to 9 March, 1992 (Hamilton and Willick 1996). Also, one valid record of G. c. salicaria in Arizona on 18 February, 1951 (Parker in Phillips et al. 1964). G. c. salicaria winters in western Mexico from southern Sonora to Guerrero (USFWS).

**MIGRATION STOPOVER CHARACTERISTICS**

Stop-over period  no information. Habitat use  Fall migrants in U.S. gather in flocks in grasslands, rice fields and grain fields (Ingold 1993). Routes  no information on G. c. salicaria, G. c. caerulea migrates along Pacific slope and some may cross the Gulf of Mexico (Ingold 1993).

**FOOD HABITS**

**FORAGING STRATEGY**

No detailed information, may hover and glean, fly-catch, walk or hop on the ground (Ingold 1993). Large bill allows for manipulation of large grains such as corn (zea mays), and insects such as grasshoppers and mantids (Ingold 1993).

**DIET**

Insects are eaten during the breeding season. Primarily, grasshoppers and crickets, secondarily, seeds of wild and cultivated grains, in the winter often in rice fields. Snails and other invertebrates, fruits.

**DRINK IN**

**BR DIN HABITAT**

The Blue Grosbeak has been described as a habitat generalist as it will readily nest in the exotic salt cedar (Tamarix chinensis), in orchard trees, or in native willow cottonwood habitat (Rosenberg et al. 1991 in USFWS). Miller (1951 in Bent 1968) found grosbeaks in California to occur mainly in riparian woodland and fresh-water marshes. Blue Grosbeaks are riparian edge species, occurring at forest field edges or at forest gravel-bar interfaces (Gains 1974). Blue Grosbeaks prefer herbaceous annuals and young, shrubby willows and cottonwoods, such as those regenerating after a flood (Grinnell and Miller 1944, Rosenberg et al. in USFWS). Plant growth form is likely more important than plant species, Blue Grosbeaks prefer upright growing herbs for nest placement. Tall plants, shrubs and trees may be important in providing singing perches and shade for nest sites.

**N ST SIT**

Canopy Cover:
Canopy cover (averaged densiometer readings): Densiometer readings at the nest, mean = 11.61 (n = 36, SE = 4.11, median = 0) (PRBO unpubl. data, Cosumnes and Lower Sacramento Rivers, Central Valley, CA).

Distance to water: Tyler (1913 in Bent 1968) thought it important, but P. Unitt (1992) found them nesting in dry washes in San Diego Co. and Pequegnat (1951) found them to be common along dry Baccharis dominated arroyos on the Pacific drainage below 1,500 ft. Orange Co.

Nest Substrate: Substrate (species) At Central Valley, CA sites Cosumnes River and Lower Sacramento River Milk Thistle (Silybum marianum), Smartweed (Polygonum spp), Pale Smartweed (Polygonum lapathifolium), Sunflower (Helianthus annuus), Himalayan Blackberry (Rubus discolor), Mustard (Brassica spp), Sandbar Willow (Salicaceae sessilifolia), Beggar ticks (Bidens frondosa), Daisy, Cockle Bur (Xanthium canadense), Dock (Rumex spp), Goosefoot (Chenopodium spp), Prickly Lettuce (Lactuca serriola) (PRBO, unpubl. data). Rosenberg et al. (in Ingold 1993) document a positive effect on nesting Blue Grosbeaks from planting of natural habitat in residential areas and from the spread of salt cedar (Tamarix) in the lower Colorado River valley.

Height of nest: Range from 15 cm to 7.8 m (Stabler 1959 and Bent 1968 in Ingold 1993), and from 0.15 to 6m but most often 0.6 to 3m (einer 1990). Nest height, mean = 55.47cm (n = 38, SE = 3.37, median = 55) (PRBO unpubl. data, Cosumnes and Lower Sacramento Rivers, Central Valley, CA).

Height of nest plant: Mean = 131.32cm (n = 38, SE = 7.23, median = 110) (PRBO unpubl. data, Cosumnes and Lower Sacramento Rivers, Central Valley, CA).

Percent of nest cover: Mean = 85.30 (n = 33, SE = 4.34, median = 96) (PRBO unpubl. data, Cosumnes and Lower Sacramento Rivers, Central Valley, CA).

Nest Type: Open cup, made of stems, thin twigs, bark strips, rootlets, dead leaves, corn husks, cardboard, cotton, paper, plastic cellophane, shed snakeskin, lined with fine rootlets, tendrils, hair, fine grasses. Shed snakeskin is reportedly a common component in nests. Tyler (1913 in Bent 1968) reports that in his experience there was always a piece of paper or a paper-like leaf woven into the nest. Two nests from Cosumnes contained clear plastic (PRBO unpubl. data). CA nests fastened to 2-3 upright shoots (Tyler in Bent 1968).


MATING SYSTEM

Assumed monogamous, 2 successive nesting attempts observed by same pair (Stabler 1959). No known color band studies.

CLUTCH SIZE

Range from 2 to 5, usually 4.

INCUBATION

Female.

INCUBATION PERIOD

11-12 days (Stabler 1959).

DEVELOPMENT AT HATCHING

Altricial and nidicolous, natal down mouse gray, no information on hatching weight or vocalizations (Ingold 1993). Approximately 2 days to hatch (Stabler 1959). Bill (gray lower mandible), legs and feet dull brownish pink, gape flanges yellow (Baicich and Harrison 1997). Post fledging biology of offspring mixed age, mixed sex feeding flocks (Bent 1968 in Ingold 1993).

NESTLING PERIOD

Range from 9-19 days (Stabler 1959), 9-13 days (Baicich and Harrison 1997).

PARENTAL CARE

Altricial young attended by both male and female, females re-nest while males attend fledglings (Baicich and Harrison 1997). No information on female attentiveness during incubation, female fed by male (Ingold 1993). First eggs in California from 18 April to 12 July (Taber in Bent 1968), first eggs in Coastal southern California from 10 April (Willett 1933) to 7 July (Unitt 1984). First egg at Cosumnes CA (5 16 97) last egg (8 6 95) (PRBO unbupl. data). Breeding in the southwest may coincide with monsoon rains in July (Short 1974).

POST-BREEDING SOCIAL BEHAVIOR

Mixed age, mixed sex feeding flocks (Bent 1968 in Ingold 1993).

NUMBER OF BROODS

Two.

BROOD PARASITISM

Reportedly heavy parasitism by brown headed cowbirds, and a known host to Bronzed cowbird (Ingold 1993). Friedmen studied museum nest collections and found a rate of 10.8% brood parasitism for G. c. salicaria (1977). Nests may be built over a cowbird egg (1992). Blue Grosbeaks can raise both host and parasites (Sutton 1967).

LANDSCAPE FACTORS
In western Sierra foothills there are few records above 1,000 ft. There is one nest record at 1,700 ft. in Mariposa Co., and nest records from above Lake Isabella (Verner and Boss 1980). Nests below 1,500 ft. Orange Co. to valley floors, to -200 ft at Salton Sea.

**FRA M NTATION**

Does well along road sides and near open areas or fields, young willow riparian weedy field edge. Ordination study results give the Blue Grosbeak low ordination values (1.80 (range 1.8 to 9.57) Whitmore 1975, and 8.1 (range 3.2 to 43.3) James 1971) which indicates that Blue Grosbeaks prefer open areas with higher ground cover. May have increased in ne U.S. due to forest fragmentation there.

**PATCH SI**

At Cosumnes nested on roadsides with only thin strips of vegetation between road and agricultural field.

**DIST RBANC**

Benefits from floods which increase annuals and young willow cottonwood habitat.

**AD AC NT LAND S**

Forages in agricultural fields and nests along roadsides and cultivated fields.

**D MO RAPH AND POP LATION TR NDS**

**D MO RAPHICS**

Apparently, not recorded recently from the inland valleys of the Coast Ranges of central California, USFWS. Expansion northward, two nest records in Idaho (Powers 1969, Rich and Trentlage 1981 in USFWS report).

**POP LATION TR ND**

einer et. al (1990) reported that the breeding population declined in California in recent decades because of habitat degradation, destruction and cowbird parasitism. The Blue Grosbeak is generally acknowledged to have declined in some parts of its California range, including coastal southern California (Willett 1912) and the San Joaquin valley (Remsen 1978). Gains (1974) considered the Blue Grosbeak to be uncommon in the Sacramento valley, occupying only 20 to 40% of suitable habitat (in USFWS report). BBS data from 42 California sites, 1969 to 1989, suggest a non-significant annual rate of increase of 2.5% (USFWS report).

**MANA M NT ISS S AND OPTIONS**

**OTIC SP CI S IN ASION NCROACHM NT**

Readily nests in exotic plant species (e.g., Tamarix).

**MANA M NT**

There is limited biological information on the distribution, nest success, Brown-headed Cowbird parasitism rates, and possible effects of pesticide use on Blue Grosbeak. Blue Grosbeaks benefit from the conservation and management for early successional riparian habitat and adjacent open areas.

**HABITAT AND POP LATION OB CTI S**
**MONITORING METHODS AND RESEARCH NEEDS**

Determine current breeding distribution throughout California.

Locate and increase amount of high quality breeding habitat.

Gather natural history information for California Blue Grosbeak in valley riparian habitat and in dry washes arroyos of Coastal California.

**SCIENTIFIC REFERENCES**

Blue Grosbeak (Guiraca caerulea)  
11/10/2010  
http://www.prbo.org/calpif/htmldocs/species/riparian/blue_grosbeak.htm
II

SPECIES ACCOUNTS

PDF of Burrowing Owl account from:
Shuford, W. D., and Gardali, T., editors. 2008. California Bird Species of Special Concern: A ranked assessment of species, subspecies, and distinct populations of birds of immediate conservation concern in California. Studies of Western Birds 1. Western Field Ornithologists, Camarillo, California, and California Department of Fish and Game, Sacramento.
Current and historic (ca. 1944) breeding range of the Burrowing Owl in California. Numbers have declined at least moderately overall, though they are greatly augmented in the Imperial Valley, and the range has retracted in northeastern California and along the coast. During migration and winter, more widespread in lowland areas of the state and reaches more offshore islands.
**California Bird Species of Special Concern**

**Special Concern Priority**
Currently considered a Bird Species of Special Concern (breeding), priority 2. Included on both prior special concern lists (Remsen 1978, 2nd priority; CDFG 1992).

**General Range and Abundance**
Broadly distributed in western North America; also occurs in Florida, Central and South America, Hispaniola, Cuba, the northern Lesser Antilles, and the Bahamas (Haug et al. 1993). Two recognized subspecies in North America: *A. c. hypugaea* in the West, *A. c. floridana* in Florida and the Bahamas (Haug et al. 1993, Desmond et al. 2001). Owls in Florida and the southern portion of the western range generally are year-round residents (Haug et al. 1993), but elsewhere in North America they appear to migrate south in a leap-frog fashion (James 1992). Scant data on migration suggest that most Burrowing Owls that breed in North America winter in Mexico (G. Holroyd pers. comm.), Arizona, New Mexico, Texas, Louisiana, and California, which is considered one of the most important wintering grounds for migrants (James and Ethier 1989). A lack of genetic differentiation among migratory and resident owl populations in western North America suggests that these populations interbreed (Korfanta et al. 2005). These results are supported by recent stable isotope analyses (Duxbury 2004).

**Seasonal Status in California**
Year-round resident throughout much of the state. Seasonal status varies regionally, with birds retreat- ing from higher elevations such as the Modoc Plateau in winter (Grinnell and Miller 1944). Observations of color-banded and/or radiotagged owls demonstrate year-round residency in the Central Valley, San Francisco Bay region, Carrizo Plain, and Imperial Valley (Brenckle 1936, Coulombe 1971, Thomsen 1971, Catlin 2004, Johnson 1997b, L. Trulio et al. and D. K. Rosenberg et al. unpubl. data). Migrants from other parts of western North America may augment resident lowland populations in winter. The breeding season in California is March to August, but can begin as early as February and extend into December (Rosenberg and Haley 2004, J. A. Gervais unpubl. data).

**Historic Range and Abundance in California**
Grinnell and Miller (1944) described the historic range of this owl as throughout most of California and most of its islands, except the coastal counties north of Marin and mountainous areas. Noting that the species was originally common or even “abundant” in the state, they reported “large” numbers of owls still occurred in “favorable localities” but that owls were in decline in areas of human settlement. Grinnell and Wythe (1927) reported that Burrowing Owls were “fairly common in the drier, unsettled, interior parts of [the San Francisco Bay] region; most numerous in parts of Alameda, Contra Costa, and Santa Clara counties. Outside of this area has been observed sparingly” in Sonoma, Napa, Solano, and Marin counties (Grinnell and Wythe 1927).

**Recent Range and Abundance in California**
The Burrowing Owl’s overall breeding range in California has changed only modestly since 1945 (see map), but the local distribution of owls across the state has changed considerably. There are three primary patterns in the current distribution. First, declines and local extirpations have been mainly

**Breeding Bird Survey Statistics for California**

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along the central and southern coast (DeSante et al. 1997a, b; 2007), regions that are undergoing rapid urbanization. Second, sizable to very large breeding populations remain in agricultural areas in the Central and Imperial valleys, where Burrowing Owls have adapted to highly modified habitats (Coulombe 1971, Rosenberg and Haley 2004). Third, it appears that the vast majority of owls occur on private lands (DeSante et al. 1997a, 2004), largely because of the high densities in agricultural areas. These patterns will present distinct challenges and unique opportunities in the conservation of this species.

Numbers of Burrowing Owls on Breeding Bird Survey (BBS) routes in California increased significantly from 1968 to 2004 (Sauer et al. 2005). Conversely, Christmas Bird Count data, 1959–1988, show declines in midwinter numbers of Burrowing Owls in California (Sauer et al. 1996). Other recent evaluations conclude that declines have occurred in the Central Valley, San Francisco Bay region, and southern coast (DeSante et al. 1997a, 2007; Trulio 1997; Comrack and Mayer 2003). However, preliminary BBS analyses of regional patterns within California detected declines in some regions of California, but increases in the Imperial Valley (DeSante et al. 2007; C. Conway pers. comm.). Understanding the details of spatial patterns of changes in BBS data, and their limitations due to insufficient data, would help resolve the apparent inconsistencies.

Concern over declines on the coast and in urbanized areas of the Central Valley led to surveys of selected 5 x 5 km survey blocks within core areas of the state in 1992 and 1993 (DeSante et al. 1997a, b; 2007). Surveys failed to locate breeding owls in the coastal counties of Napa, Marin, San Francisco, Santa Cruz, and Ventura, and very few were located in Sonoma, San Mateo, Santa Barbara, and Orange counties. These surveys in selected blocks were not intended as a census of all owls. Many of these areas may never have supported sizable breeding populations (e.g., Grinnell and Wythe 1927), although data are generally lacking. There also appeared to be substantial reductions in numbers of breeding owls in other counties around San Francisco, San Pablo, and Suisun bays (DeSante et al. 1997a, 1997b, 2007; Klute et al. 2003). The south San Francisco Bay population, estimated at 103 breeding pairs, was considered to be declining sharply (DeSante et al. 1997a, 2007; Trulio 1997). Finally, the survey concluded that Burrowing Owls were in decline throughout the Central Valley, but this conclusion was based on mostly anecdotal data and not the actual survey (DeSante et al. 1997a). Several large populations (e.g., Naval Air Station Lemoore and Carrizo Plain National Monument) were severely underestimated or missed altogether, and previously undetected populations were also found (DeSante et al. 2007, D. K. Rosenberg et al. unpubl. data), largely due to the survey methods that often had low, but unestimated, detection probabilities (DeSante et al. 2004). In contrast, Burrowing Owls remain abundant in the Imperial Valley, where current densities in that agricultural system apparently far exceed those found in the native desert prior to agricultural conversion (DeSante et al. 2004, Rosenberg and Haley 2004).

Additional information from anecdotal sightings or multispecies surveys offer further insight into status and declines in other regions of the state as outlined below.

**Northeastern California.** Although its status in this region is poorly known, the species appears to be scarce and may have been so historically. To the west, a few owls are currently known from Shasta Valley, Siskiyou County, but they may have been extirpated as breeders from the Klamath Basin since the early 1990s (Summers 1993, Cull and Hall 2007, R. Ekstrom and K. Spencer [ide W. D. Shuford]). Burrowing Owls currently nest in small numbers in the Honey Lake basin of Lassen County and in the Plumas County portion of Sierra Valley, and they have been reported from most other large valleys in the region, including Big Valley, Lassen and Modoc counties, and at Modoc NWR and Surprise Valley in Modoc County (Cull and Hall 2007, F. Hall in litt.).

**Central and southern coast.** The Burrowing Owl has declined in Monterey County, with small populations remaining near Salinas and King City (Roberson 2002). It has been nearly extirpated as a breeding species from coastal San Luis Obispo, Santa Barbara, Ventura, Los Angeles, and Orange counties (Comrack and Mayer 2003); historic population sizes are not known. The San Diego region has apparently seen steady declines of owls, down from possibly sizable populations less than a century ago (Willett 1933, Unitt 2004). Elsewhere on the coastal slope, small numbers persist at scattered sites, many of which are threatened by further development. The largest numbers remaining in this region appear to be the minimum of 350 pairs known to be breeding in Riverside and San Bernardino counties, collectively (G. Short pers. comm.), followed by a lesser number in San Diego County (Unitt 2004). Sites occupied include the vicinity of San Bernardino, Chino, and Ontario, San Bernardino County; near Perris, Lakeview.
Canis taxidea taxus
Microtus californi
citellus tereticaudus
dens or holes (Ronan 2002).

Burrowing Owl low numbers in highly developed parcels, such as of Santa Clara County, Burrowing Owls persist in Gervais et al. 2003). In urban areas such as much ways and associated structures (Thomsen 1971, Rosenberg and Haley 2004). The over landscapes highly altered by human activity (Thomsen 1971, Rosenberg et al. unpubl. data), availability of burrows may not limit population size in that region. Owls in the Imperial Valley also use the small holes of Round-tailed Ground Squirrels (Citellus tibericatus) and Botta's Pocket Gophers (Thomomys bottae) as "starts" (Coulombe 1971, Rosenberg and Haley 2004). Structures such as culverts, piles of concrete rubble, and pipes also are used as nest sites (Rosenberg et al. 1998). Nest boxes are often used by owls, and their installation may be an important management tool in California (e.g., Trulio 1995, Rosenberg et al. 1998).

The diet of Burrowing Owls in California includes a broad array of arthropods (centipedes, spiders, beetles, crickets, and grasshoppers), small rodents, birds, amphibians, reptiles, and carrion, similar to their diet rangewide (Thompson and Anderson 1988, Green et al. 1993, Plumpton and Lutz 1993, Gervais et al. 2000, York et al. 2002). Although insects dominate the diet numerically, vertebrates account for the majority of biomass in some regions (Green et al. 1993). In California, there is evidence that rodent populations, particularly those of California Voles (Microtus californicus), may greatly influence survival and reproductive success (Gervais and Anthony 2003, Gervais et al. 2006). Food limits the number of fledged young in some years and at some sites (Haley 2002). This is not surprising given the large clutch size (up to 14 eggs; Haug et al. 1993, Todd and Skilnick 2002).

During the breeding season, owls forage close to their burrows but have been recorded hunting up to 2.7 km away (Haug and Oliphant 1990, Gervais et al. 2003). Over 80% of foraging observations in agricultural areas of the southern San Joaquin and Imperial valleys occurred within 600 m of the nest burrow (Gervais et al. 2003, Rosenberg and Haley 2004). Home-range size is likely related to food abundance (Newton 1979), but this relationship is unclear for Burrowing Owls. Owls in Saskatchewan appeared to avoid cropland in a mixed landscape in two instances,
and one owl avoided fallow land in the same study (Sissons et al. 2001); in the same region, owls avoided cropland in favor of grass-forb habitat (Haug and Oliphant 1990; but see Gervais et al. 2003 for methodological issues). Foraging owls in agricultural areas of California exhibited little or no selection for cover types; instead, foraging locations were best predicted by distance to nest (Gervais et al. 2003, Rosenberg and Haley 2004).

The Burrowing Owl is often considered a sedentary species (e.g., Thomsen 1971). A large proportion of adults show strong fidelity to their nest site from year to year, especially where resident, as in Florida (74% for females, 83% for males; Millsap and Bear 1997). In California, nest-site fidelity rates were 32%–50% in a large grassland and 57% in an agricultural environment (Ronan 2002, Catlin 2004, Catlin et al. 2005). Differences in these rates among sites may reflect differences in nest predation rates (Catlin 2004, Catlin et al. 2005). Despite the high nest fidelity rates, dispersal distances may be considerable for both juveniles (natal dispersal) and adults (post-breeding dispersal), but this also varied with location (Catlin 2004, Rosier et al. 2006). Distances of 53 km to roughly 150 km have been observed in California for adult and natal dispersal, respectively (D. K. Rosenberg and J. A. Gervais unpubl. data), despite the difficulty in detecting movements beyond the immediate study area (Koenig et al. 1996).

These large dispersal patterns likely were responsible for the lack of genetic differences among the three California populations that were analyzed for genetic structure (Korfanta et al. 2005). Although even Burrowing Owls from resident populations may disperse widely, inbreeding does occur (Johnson 1997a, Millsap and Bear 1997, D. K. Rosenberg et al. unpubl. data).

**Threats**

Habitat loss and degradation from rapid urbanization of farmland in the core areas of the Central and Imperial valleys is the greatest threat to Burrowing Owls in California. Ongoing urbanization in coastal regions, changes in agricultural practices, and continuing eradication of ground squirrels are also serious threats.

The importance of habitat loss is emphasized by the fact that most owl populations suffering either extirpation or drastic reduction have been in coastal counties that experienced tremendous urbanization in recent decades. The human population of the Central Valley alone is projected to reach well over 10 million by 2040; this valley is considered among the most threatened of all U.S. farmland regions (American Farmland Trust, www.farmland.org/programs/states/ca/default.asp). Loss of agricultural and other open lands will negatively affect owls. Because of their need for open habitat with low vegetation, Burrowing Owls also are unlikely to persist in agricultural lands dominated by vineyards and orchards. They nest in some of California’s urban environments, but in Florida, areas with higher densities of development supported fewer owls and were correlated with lower rates of nest success (Millsap and Bear 2000). However, urban development at moderate levels appeared to benefit owls by increasing prey availability (arthropods and lizards) near homes and reducing mortality from natural causes (Millsap and Bear 2000, Millsap 2002). This pattern may hold for California, but presently this is not known.

In addition to loss of nesting burrows from extermination of ground squirrels, developed environments pose a substantial risk to Burrowing Owls from mortality caused by traffic (Klute et al. 2003, D. K. Rosenberg et al. unpubl. data). Owls nesting along roadsides or parking lots are at greatest risk, although owls foraged along roads over 1 km from the nest burrow (Gervais et al. 2003). Wind turbines are a potential population-level threat to Burrowing Owls at Altamont Pass (Thelander et al. 2003), but sites appropriate for wind development will not be located in the lowland habitats where most Burrowing Owls occur. Migrating owls may be at risk, but this must be evaluated on a case-by-case basis, as many factors influence risk (e.g., Drewitt and Langston 2006). Burrowing Owl migration routes and patterns are still poorly understood. High-voltage electrical fences around prisons have caused mortality locally in the Imperial Valley (D. K. Rosenberg et al. unpubl. data), but the implications for populations are unknown.

Pesticides may affect Burrowing Owl populations in croplands and rangelands (James and Fox 1987, James et al. 1990). In the southern San Joaquin Valley, however, there was no indication that foraging owls either selected or avoided fields recently treated for pesticides, although owls did use crops extensively for foraging (Gervais et al. 2003). Although some individuals may be affected by persistent pesticides (Gervais et al. 2000, Gervais and Catlin 2004), the owls’ high densities and strong demographic rates provide evidence that pesticide impacts overall are not sufficient...
to offset the benefits of nesting in agricultural regions (Gervais and Anthony 2003, Rosenberg and Haley 2004, D. K. Rosenberg et al. unpubl. data). Pesticide impacts may be mediated by environmental conditions, however. Gervais and Anthony (2003) found that body burdens of DDE were associated with declines in productivity only during a year of prey scarcity. Although the proportion of the population affected was small, changes in prey abundance in the future or other stresses could modify the impact of DDE (Gervais et al. 2006).

Farming practices are likely a greater threat to Burrowing Owls in agricultural environments. Discing to control weeds in fallow fields may destroy burrows (Rosenberg and Haley 2004). Road and ditch maintenance in agricultural areas poses a threat to both owls and their nests, but these impacts can be minimized through management actions (Catlin and Rosenberg 2006). Burrowing Owls in the Imperial Valley may be affected by proposed plans to line ditches and fallow fields to increase water supplies to urban areas, and by efforts to alleviate increasing salinity in the Salton Sea (Molina and Shuford 2004).

Emerging diseases such as West Nile virus may be significant threats to Burrowing Owl populations, but few data currently exist. Given that West Nile virus is known to be particularly virulent in raptors, concern seems warranted as West Nile virus expands in California.

**MANAGEMENT AND RESEARCH RECOMMENDATIONS**

- Develop a conservation strategy with specific population goals, desired densities, and distribution that can be modified as more information is gained. Use risk-assessment modeling to identify populations critical for regional persistence.
- Place sizable tracts of grassland under conservation easements or agreements with agricultural (grazing) operations to maintain populations through best management practices, such as the elimination or restriction of small mammal poisoning.
- Also seek conservation agreements with landowners of row-crop agriculture to encourage appropriate management of water conveyance structures, roadsides, and field margins. It will be necessary to work closely with landowners to alleviate concerns that maintaining owls on their property is a liability in terms of flexibility in land management practices necessary to maintain economic viability.
- Maintain suitable vegetation structure through mowing, revegetation with low-growing and less dense native plants, or controlled grazing, as appropriate.
- Where nesting burrows are lacking, enhance habitat by using artificial burrows or encouraging the presence of ground squirrels.
- Control off-road vehicles and unleashed pets within occupied Burrowing Owl habitat.
- Develop prescriptions that mimic natural processes and that preferably do not require ongoing management for maintaining Burrowing Owls.
- Develop guidelines for maintaining Burrowing Owls and their burrows during management of agricultural water conveyance structures.
- Assess various strategies for maintaining owl populations in urbanizing areas.
- Determine owl distribution and abundance in publicly owned grasslands and other sites of known or likely occurrence that have not yet been well characterized.
- Assess the risk Burrowing Owls pose to aircraft operations safety, and develop management guidelines for owls at airports where they occur.
- Conduct research examining the factors that attract owls, and maintain them in locations from which populations were previously extirpated. In particular, rigorously evaluate translocation to determine when, if ever, it is an effective management tool.
- Determine patterns of long-distance dispersal.
- Identify the magnitude and source of wintering populations.

**MONITORING NEEDS**

Monitoring of changes in the abundance or demographic rates of Burrowing Owls should be linked with efforts both to identify the causes of any declines and to assess the response of the population to management actions (Noon 2003). Management strategies, and thus monitoring efforts, should be region-specific to account for the varied threats each region faces. Areas of the state with declining populations for which potential causes have been identified (such as urbanization) should have priority in the design and implementation of conservation strategies, whose effectiveness should be evaluated with...
subsequent monitoring. Monitoring itself can be effective only when population goals have been identified and the monitoring strategy evaluated to ensure that it is sufficiently sensitive to detect population changes considered noteworthy for management.

Effective methods for estimating actual or relative abundance of this species are clearly habitat specific. For example, call surveys have been effective in extensive grasslands (Haug and Didiuk 1993, Ronan 2002, Conway and Simon 2003), whereas counts of owls along edges of farm fields from vehicles are very effective in intensive agricultural areas (Rosenberg and Haley 2004). Methods that use counts need to account for the variable probability of detection among habitats if patterns of distribution and change are to be inferred from surveys. Data from large-scale surveys such as the BBS should be critically evaluated to identify regional patterns within California and to assess the effectiveness of this monitoring approach given the often small numbers of owls detected and the inconsistent observer effort.

ACKNOWLEDGMENTS


LITERATURE CITED


LARKS *Alaudidae*

- Species in family 92
- Species observed [DR] 25 (27%)
- Species photo'd [DR] 12

The Larks are a large family of ground-dwelling birds, most of them in open country habitats from desert to grassland to stony steppe. Larks are primarily Old World birds, and their center of distribution is in Africa (67 species, 52 of which are endemic to Africa). Over a third of the world's larks are in the genus *Mirafra*: often chunky, red-winged, buffy grassland birds of which the **Red-winged Lark** (left) of east Africa is an example. I must confess that when I took this photo in Kenya in 1981, and using the field guide available (Williams & Arlott 1980), I misidentified this bird as a "Flappet Lark *M. rufocinnamomea."" I've re-identified it as several things over the years, but only with the publication of Zimmerman et al. (1996) did I get this one correct. Note particularly the scaly back pattern and the neat anchor-shaped interior markings on the outer scaps and tertials (recalling similar patterns on juv. Red Knot or Curlew Sandpiper). My problems with this bird -- despite taking a decent enough photo -- illustrates just how poorly the identification of larks has been treated in the literature in the past.

Only one species of lark is found widely outside the Old World, and it nests on all larger continents (missing in Australia & Antarctica). It is the **Horned Lark** (right), a bird which is at home in open spaces from the tundra shores of Canada to the open grasslands of the Great Plains to the high meadows of the Andes. There are numerous subspecies; this adult is of the colorful cinnamon-backed Monterey County breeding race *E. a. actia*. It is called the "Shore Lark" in Europe, but the English name "Horned Lark" is a good one, and you can see the short feathered "horn" on the side of the crown in this shot.

Because they hide in grassland and open country, most larks tend to be muted in coloring, varying among grays and brown to buffy-pink, except the sparrow-larks (genus *Eremopterix*) which can be strongly patterned in blacks, whites, and chestnuts. What they lack in plumage, many of the larks make up in vocal abilities. The Sky Lark *Alauda arvensis* of Eurasia is known for its songs, cascading down from high in the sky, from dawn to dusk. [Because of its song (and because it is mentioned in Shakespeare), the nominate European race has been introduced widely, including to Vancouver I., British Columbia, Canada.] Many of the *Mirafra* larks sing while hovering high over the grasslands; the widespread *Mirafra* from north Africa to India is called the Singing Bushlark *M. cantilans* (fairly recently split from the Australasian Bushlark *M. javanica* which ranges from southeast Asia to Australia). The Red-winged Lark (top left photo) mimics numerous other species, incorporating calls of 20 other species in a 15-minute song in Tsavo West park, Kenya (Keith et al. 1992). John McAllister tells me that the South African endemic (except for a
small isolated population in central Zimbabwe) Melodious Lark *M. cheniana* deserves mention. It's been called "Singing Bush Lark," "Southern Singing Bush Lark" and "Latakoo Lark." It has been recorded imitating at least 57 species "including francolins, guinea fowl, plovers, coursers, louries, cuckoos, bee-eaters, swifts, larks, swallows, chats, warblers, pipits, longclaws, shrikes, starlings, sunbirds, ploceids, waxbills and canaries" (Maclean 1984). McAllister says that in the breeding season it sings in flight or continuously from a perch and is "quite wonderful to hear."

Another set of larks are desert-adapted species, ranging from the impressive thrasher-billed Greater Hoopoe-Lark *Alaemon alaudipes* of north Africa to west India to the various short-toed larks (genus *Calandrella*) who are camouflaged among arid steppes. Below is a small gallery of variations in the larks of eastern & south Africa: Pink-breasted Lark (top left), Pink-billed Lark (top right), Chestnut-headed Sparrow-Lark (bottom left), and Rufous-naped Lark (bottom right). If nothing else, note the variety in size of bills among this group.

![Image of larks](http://creagrus.home.montereybay.com/larks.html)
et al. 1992 for Botha's and not for Pink-billed, but the text gives this complex facial pattern to Pink-billed).

Indeed, there is so much contradictory information published on the Pink-billed vs. Botha's problem that I am not entirely sure this slide is correctly labelled (comments welcome).

A good number of larks are very local and some are rare to endangered. These include Ash's Lark *Mirafra ashi* (known only from six specimens taken in Somalia; surely the last place a birder would visit now), the Degodi Lark *M. degodiensis* and the Sidamo Lark *Heteromirafra sidamoensis* (both known from only a couple of specimens in Ethiopia), Archer's Lark *H. archeri* (restricted to a tiny strip of grasslands of only 200 sq.km. in northwest Somalia), and two larks endemic to small strips of coastal dunes: Dune Lark *Certhilauda erythrochlamys* of Namibia and Obbia Lark *Spizocorys obbiensis* of Somalia. For Rudd's Lark *M. ruddi*, a Transvaal endemic, 85% or more of the world population occurs within 100 km of the towns of Wakkerstroom and Memel in the high altitude (between 1600-1800 m) of eastern South Africa (Harrison et al. 1997). Clearly, anyone trying to see all the larks of the world will have a very difficult time.

**Identification problems:** There are many interesting identification problems among the larks, and between larks and other cryptic birds. One that is often overlooked is that presented by juvenal-plumaged Horned Larks which have been reported as numerous vagrant species of one ilk or another; a good discussion is in Lehman (1997). Perhaps the most famous debacle in California birding history was the state's first reported "Smith's Longspur" in 1979 -- chased and misidentified by most of the state's premier birders (including me) -- which proved to be an even better bird: California's first vagrant Sky Lark from Siberia (it was shown to be one of the northeastern Asian races). This individual returned to Pt. Reyes for the next six consecutive winters. Details of this fascinating detective story and the eventual unambiguous solution appear in Morlan & Erickson (1983). On-line, Joe Morlan posted shots of the Pt. Reyes lark and the state's actual first Smith's Longspur as a side-by-side photo quiz that still stumped many visitors who did not know the story of California's Sky Lark; you can see those photos on Joe Morlan's site [HERE](http://creagrus.home.montereybay.com/larks.html). My own detailed account of the event, retrieved from my field notes, appears in Joe Morlan's guestbook, but you will have to scroll down to the discussion of this photo quiz (bypassing the more recent discussion) to find it [and it will disappear eventually as more comments are added to the front of the guestbook].

**Photos:** The Red-winged Lark *Mirafra hypermetra* was in Tsavo West Nat'l Park, Kenya, on 26 Nov 1981. The Horned Lark *Eremophila alpestris* was photographed in Cholame Valley, Monterey Co., California, on 23 Feb 1982. The Pink-breasted Lark *Mirafra poecilosterna* was in Samburu Nat'l Park, Kenya; the Chestnut-headed Sparrow-Lark *Eremopterix signata* in Tsavo East Nat'l Park, Kenya; and the Rufous-naped Lark *Mirafra africana* in Masai Mara Nat'l Park, Kenya, all in Nov 1981. The Pink-billed Lark *Spizocorys conirostris* was near Wakkerstroom, Transvaal, South Africa, on 26 July 1996. All photos © D. Roberson.; all rights reserved.

Special thanks to John McAllister of Wakkerstroom, South Africa, for comments to an earlier version of this page.

**Bibliographic note**

There is no family book, or, if there is, I have not seen it. Despite some problems with the artwork, the *Birds of Africa* series (Keith et al. 1992) is quite useful for many of the world's larks, and the new East African guide by Zimmerman et al. (1996) is very good.

**Other literature cited:**


DISTRIBUTION, ABUNDANCE, AND SEASONALITY

A common to abundant resident in a variety of open habitats, usually where trees and large shrubs are absent. Found from grasslands along the coast and deserts near sea level to alpine dwarf-shrub habitat above treeline. Less common in mountain regions, on the North Coast (McCaskie et al. 1979), and in coniferous or chaparral habitats. Mostly leaves mountains in winter, but small flocks may remain to winter on windswept, snow-free areas at high elevations in the Sierra Nevada (Gaines 1977b). In winter, flocks in desert lowlands and other areas augmented by winter visitants, many migrating from outside the state (Garrett and Dunn 1981). Resident on the Channel Islands (Garrett and Dunn 1981).

SPECIFIC HABITAT REQUIREMENTS

Feeding: Mostly eats insects, snails, and spiders during breeding season; adds grass and forb seeds and other plant matter to diet at other seasons (Bent 1942). Walks along ground, searching for food.

Cover: Grasses, shrubs, forbs, rocks, litter, clods of soil, and other surface irregularities provide cover.

Reproduction: Builds grass-lined nest; cup-shaped in depression on ground in the open.

Water: Drinks freely from waterholes, but individuals have survived in captivity for 16-31 days without water (Airola 1980).

Pattern: Frequents grasslands and other open habitats with low, sparse vegetation.

SPECIES LIFE HISTORY

Activity Patterns: Yearlong, diurnal activity.

Seasonal Movements/Migration: Yearlong, resident within the state. After breeding, becomes very gregarious; often forms large flocks that forage and roost together. Migrants from outside of California join these wintering flocks, especially in the southeastern desert region of the state. Migrant status on the Farallon Islands indicates a latitudinal movement along the coast as well (DeSante and Ainley 1980).

Home Range: No data found.

Territory: Verbeek (1967) estimated typical territory as 1.6 ha (4 ac) in Wyoming alpine tundra. In midwestern farmland, territory reported as 0.6 to 3.2 ha (1.5 to 8 ac) (Beason and Franks 1974), 0.4 to 5.3 ha (1-13 ac) (Pickwell 1931), and 4.9 ha (12 ac) (Fitch 1958).
Reproduction: Breeds from March through July, with peak activity in May. Pair nests solitarily; lays 2-5 eggs, average 3-4. Frequently raises 2 broods in a season (Bent 1942). Incubation 10-14 days; altricial young tended by both parents. Young leave nest at 9-12 days, and can fly 3-5 days later (Harrison 1978).

Niche: Eggs and nestlings subject to predation from mammals and snakes. Adults are prey for falcons.

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California Bird Species of Special Concern

A Ranked Assessment of Species, Subspecies, and Distinct Populations of Birds of Immediate Conservation Concern in California

W. David Shuford and Thomas Gardali, Editors

With the Assistance of the Project Manager
Lyann A. Comrack

In Collaboration with the Bird Species of Special Concern Technical Advisory Committee
Edward C. Beedy, Bruce E. Deuel, Richard A. Erickson, Sam D. Fitton, Kimball L. Garrett, Kevin Hunting, Tim Manolis, Michael A. Patten, W. David Shuford, John Sterling, Philip Unitt, Brian J. Walton

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FOREWORD

The publication of *Bird Species of Special Concern: A Ranked Assessment of Species, Subspecies, and Distinct Populations of Birds of Immediate Conservation Concern in California* marks the culmination of a synergistic collaboration among California’s top field and museum ornithologists, wildlife biologists, and conservationists to produce a definitive treatment of the status of declining and vulnerable bird populations in California. Since 1978, when the Western Field Ornithologists’ J. V. Remsen Jr. prepared the first report on bird species of special concern for the Department of Fish and Game, information on the state’s bird populations has expanded exponentially. The current project grew out of recognition by the Department and its partners of the pressing need for a rigorous and comprehensive evaluation of this recent information. We offer this volume as a product of success in achieving that vision and believe it sets a new standard for assessing the status of bird populations in California.

Through commitment to technical excellence, this volume ties together the threads of bird conservation in California by capturing elements of the most important current bird conservation initiatives. From the habitat-based California Partners in Flight bird conservation plans to the fundamental baseline bird population studies conducted by the Department and its partners, *Bird Species of Special Concern* combines the best of our collective knowledge and stands as a testament to the enormous potential of collaboration.

In producing this monograph, the Department worked closely with PRBO Conservation Science and Western Field Ornithologists. This project would not have been completed, however, without the extraordinary dedication and participation of California’s ornithological and birding communities.

The Department remains committed to a continued investment in population assessment and adaptive management as tools for effective conservation of the state’s bird populations. *Bird Species of Special Concern* will focus these efforts on the varied, ongoing challenges facing at-risk birds and their habitats.

John McCamman
Acting Director
California Department of Fish and Game

Western Field Ornithologists is proud to unveil the first volume of its new monograph series, *Studies of Western Birds*, particularly with a work dedicated to the conservation of at-risk birds within California. We hope that this will stimulate other comparable works on at-risk birds elsewhere or additional lengthy treatises on any aspect of field ornithology within the region of interest of the organization—the Rocky Mountain and Pacific states and provinces, including Alaska and Hawaii, western Texas, northwestern Mexico, and the northeastern Pacific Ocean. Western Field Ornithologists strives for excellence in its publications. Of primary concern is the advancement of the long tradition of field ornithology in this region, both for pursuit of scientific understanding and to promote conservation of the region’s varied and stimulating avifauna. Such efforts, including the present publication, are possible only with the participation of our membership, readership, and many partners. We invite you to join us and we seek your insights and help to further these goals.

David Krueper
President
Western Field Ornithologists
The system used in this volume to rank the conservation needs of at-risk birds—Bird Species of Special Concern—in California is new for the state but builds on an impressive foundation of prior ranking schemes developed elsewhere in North America and the world. The diversity of such systems reflects not only the varying needs and scales for which they were devised but also the difficulty of crafting a system that will be universally accepted for any particular purpose. Just as gut-level impressions of what constitutes an at-risk bird in need of immediate conservation action can vary widely among knowledgeable biologists, so too can opinions of what elements are desirable in an objective ranking scheme meant to reduce the biases inherent in a purely subjective assessment of conservation need and priority. The present system, unlike most, supports the rankings by the inclusion of thorough species accounts for all birds on the ranked special concern list. Although the decision to include these accounts greatly lengthened the time required to prepare this document, we judge the extra effort well worth it, both to document the state of, and limits to, current knowledge relevant to the conservation of at-risk birds and to provide guidance in management, research, and monitoring that will enable effective actions beneficial to these birds and their habitats.

Serving as the technical editors of this volume has been a humbling experience on many levels. The knowledge contributed to this process by a technical advisory committee of our peers, dedicated managers and technical experts at California Department of Fish and Game, authors of species accounts, and a wide array of field, quantitative, and conservation biologists who provided unpublished information, insights, and thoughtful reviews has been deep and impressive, strengthening this document far beyond what our own capabilities would allow. Conversely, we have been struck by how limited our collective knowledge is for many at-risk birds in California, reflecting their biological characteristics—such as patchy distributions, occurrence in low densities, naturally fluctuating populations, or cryptic behaviors—and the limited resources allocated for their study or conservation.

During the course of the preparation of this document, climate change has become a household word and the dominant conservation issue discussed in the media. Although the present volume acknowledges the importance of the long-term effects of climate change on birds, it focuses rather on the short- and medium-term threats to birds, particularly habitat loss and degradation as the direct result of human endeavors. Such activities will continue to have readily visible and cumulatively enormous effects on many bird populations. To varying degrees, the predicted indirect effects of progressive climate change will further complicate and exacerbate matters.

Despite declining populations and continuing threats to many at-risk birds, there is cause for cautious optimism in the many new habitat- or taxonomic-based conservation initiatives for birds that have begun or expanded their reach in the last decade. In concert with these efforts, lists of at-risk species can be powerful drivers of conservation, especially when restoration and management measures take a species-to-ecosystem approach, the one typically championed by these newer initiatives. We hope this volume will support and inspire bold measures of conservation for at-risk birds and for others now less threatened so they will not one day too receive the dodosque distinction of being of special concern in California.

W. David Shuford
Thomas Gardali
Inverness, California
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The revision of California Department of Fish and Game’s (CDFG) Bird Species of Special Concern list was a collaborative effort between CDFG, the Bird Species of Special Concern Technical Advisory Committee, and PRBO Conservation Science (PRBO, founded as Point Reyes Bird Observatory). We especially thank all of the members of the advisory committee for their dedication to the conservation of California’s birds and for their many insights, without which this document would not have been possible. Brian Walton sadly did not live to see this work completed. Still, his contributions to the advisory committee will long be remembered, particularly his extensive knowledge of California raptors and his persistent emphasis of the importance of thorough species accounts to evaluate the conservation status of potentially at-risk birds. CDFG biologists Lyann Comrack and Kevin Hunting were indispensable in guiding the deliberations of the advisory committee, facilitating the production and revision of range maps, supporting the authorship of the overview text and species accounts of this document, and performing various behind-the-scenes but vital administrative duties (in which they were also aided by Esther Burkett and Bill Kindred). Notably, Lyann Comrack’s unswerving dedication to this project greatly elevated its overall quality. Advisory committee members and other authors contributed the heart of the document by writing the individual species accounts. Unpublished county breeding bird atlas data were kindly provided by Larry Allen (Los Angeles County), Bill Bousman (Santa Clara County), Tom Edell (San Luis Obispo County), Steve Glover (Contra Costa County), Bill Grummer (Napa County), John Hunter (Humboldt County), Rick Johnson (San Mateo County), Tim Manolis (Sacramento County), Rusty Sclaf (Alameda County), Dan Singer (San Francisco County), and Philip Unitt (San Diego County). From maps hand-drafted by species account authors, Kristi Fien, Nicholas Hansen, and Kiffanie Stahle of CDFG digitized distribution maps, summarized data from them, and prepared the cartography used in the final publication. Richard Erickson and John Sterling ensured the quality of these maps by serving as technical editors for their production. Kimball Garrett and Philip Unitt provided technical advice regarding taxonomic issues and distributions of subspecies. Tim Manolis and Michael Patten scored the bulk of the nominated taxa; Manolis also drafted a preliminary version of the ranking criteria. Sam Fitton provided a perspective on the use of state lists of at-risk species for management and conservation planning by federal agencies. Grant Ballard helped with computer and website support. Diana Stralberg and Lars Pomara prepared the maps for Bird Conservation Regions and geographic subdivisions of California. David Compton copy-edited the entire draft manuscript. Philip Unitt assisted by copy-editing some of the front matter added later and by providing invaluable insight throughout. On short notice, Jaime Jahncke kindly translated the abstract to a Spanish resumen, which was copy-edited by Karen Levy-Szpiro. Catherine Waters graciously provided moral support and help in resolving behind the scene issues related to publication and distribution of the monograph. Special thanks to Andy Birch and Tim Manolis for their splendid line drawings interspersed in the text and to Keith Hansen for the stunning color plate used on the cover. Tim Brittian expertly typeset the text and designed the layout and cover.

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# Acronyms and Abbreviations

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
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<tr>
<td>AB</td>
<td>American Birds</td>
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<tr>
<td>AFN</td>
<td>Audubon Field Notes</td>
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<tr>
<td>AI</td>
<td>area importance scores</td>
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<td>AOU</td>
<td>American Ornithologists’ Union</td>
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<td>BBA</td>
<td>breeding bird atlas</td>
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<td>BBS</td>
<td>Breeding Bird Survey</td>
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<td>BCR</td>
<td>Bird Conservation Region</td>
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<td>BLM</td>
<td>Bureau of Land Management</td>
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<td>BSSC</td>
<td>Bird Species of Special Concern</td>
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<td>CalPIF</td>
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<td>CAS</td>
<td>California Academy of Sciences</td>
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<td>CBC</td>
<td>Christmas Bird Count</td>
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<td>CBRC</td>
<td>California Bird Records Committee</td>
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<td>CDFG</td>
<td>California Department of Fish and Game</td>
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<td>CEQA</td>
<td>California Environmental Quality Act</td>
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<tr>
<td>CWHR</td>
<td>California Wildlife Habitat Relationships</td>
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<td>EN</td>
<td>percentage of entire range within California (ranking criterion)</td>
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<td>HCP</td>
<td>Habitat Conservation Plan</td>
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<tr>
<td>IPCC</td>
<td>Intergovernmental Panel on Climate Change</td>
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<td>GIS</td>
<td>Geographic Information System</td>
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<td>MAPS</td>
<td>Monitoring Avian Productivity and Survivorship</td>
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<td>MCZ</td>
<td>Museum of Comparative Zoology (Harvard University)</td>
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<td>MPCR</td>
<td>Middle Pacific Coast (Northern California) region of NAB</td>
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<td>MVZ</td>
<td>Museum of Vertebrate Zoology</td>
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<td>NAB</td>
<td>North American Birds</td>
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<td>North American Bird Conservation Initiative</td>
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<td>SPCR</td>
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<td>THR</td>
<td>impact of threats (ranking criterion)</td>
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<td>USDC</td>
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<td>WA</td>
<td>(state) Wildlife Area</td>
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<td>WFVZ</td>
<td>Western Foundation of Vertebrate Zoology</td>
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Cooper's Hawk

**Accipiter cooperii**

**Order:** Falconiformes  
**Family:** Accipitridae  
**Status:** Fairly common winter. Uncommon breeder.

**Listen:**

**General Description**

The Cooper's Hawk is the most widespread of the three North American accipiters. Females are up to one third larger than males, one of the largest sexual dimorphism size differences of any hawk. Adults have solid gray upperparts, barred with reddish-brown. Their long tails are barred gray and black, rounded at the ends, with a white band at the tips. Their eyes are red. Immature birds are brown above with brown streaking on their white underparts; they have yellow eyes. Cooper's Hawks have short, rounded wings that are set slightly farther back on their bodies than those of the smaller, but similar-looking, Sharp-shinned Hawk. Their heads are relatively larger and their gray caps are darker and a little more prominent than those of the Sharp-shinned. The white tip of the tail of the Cooper's Hawk is usually wider than that of the Sharp-shinned Hawk, especially in the fall. All of these differences are quite subtle, and with the size difference between males and females, it can be difficult to distinguish a male Cooper's Hawk from a female Sharp-shinned Hawk.

**Habitat**

Cooper's Hawks are generally found in forested areas up to 3,000 feet, especially near edges and rivers. Unlike the Sharp-shinned Hawk, which prefers conifers, the Cooper's Hawk prefers hardwood stands when they are available, but will use conifers too. The species prefers mature forests, but can be found in urban and suburban areas where there are tall trees for nesting. During the nesting season, Cooper's Hawks are
often more common in open areas than Sharp-shinned Hawks. In winter, Sharp-shinned Hawks are seen in more open areas.

**Behavior**
The hunting Cooper's Hawk approaches its prey stealthily, moving quietly through dense cover until it is close enough to overcome its target with a burst of speed. The secretive traits that allow the Cooper's Hawk to surprise its prey also make it difficult to observe. It is most easily seen during migration.

**Diet**
Medium-sized birds (robins and jays) and small mammals (squirrels and mice) make up the majority of the Cooper's Hawk's diet.

**Nesting**
Courtship is lengthy for Cooper's Hawks, and the male may feed the female for up to a month before she begins to lay eggs. They nest in a tree, 25-50 feet off the ground. The nest is often built on top of an old nest or clump of mistletoe. Both sexes help build the stick nest lined with pieces of bark. The female incubates the 3 to 5 eggs for 30 to 33 days. The male brings food and incubates the eggs when the female leaves the nest to eat. Once the 3 to 5 eggs hatch, the female broods for about two weeks. During this time, the male continues to bring food for the female and the young. He gives the food to the female, and she feeds it to the nestlings. The young start to climb about the nest at four weeks of age, and begin to make short flights soon after. The parents continue to feed the young for up to seven weeks.

**Migration Status**
Most of Washington's Cooper's Hawks probably migrate south for the winter, but are replaced by other birds from farther north. Fall migration is often along mountain ridges and coastlines. Most of the migrants that pass through Washington probably head to central and southern Mexico for the winter.

**Conservation Status**
Cooper's Hawk populations, especially in the East, declined significantly in the middle of the 20th Century, due to shooting, trapping, and pesticide contamination. They are still listed as endangered or threatened in several eastern states, but most populations have recovered well. Intentional killing is no longer an issue in most areas, although it does still occur. Pesticide contamination has less of an impact since the banning of DDT. The Washington Gap Analysis listed Cooper's Hawks on their at-risk list, although populations in the West appear to be relatively stable. Because Cooper's Hawks are inconspicuous, especially when they are nesting, it is difficult to get a clear picture of their status.

**When and Where to Find in Washington**
Cooper's Hawks are reclusive and can be difficult to spot, especially during the breeding season, but they can be found in appropriate habitat in both eastern and western Washington year round.

Click [here](http://www.seattleaudubon.org/birdweb/bird_details.aspx?id=101) to visit this species account and breeding-season distribution map in *Sound to Sage*, Seattle Audubon's on-line breeding bird atlas of Island, King, Kitsap, and Kittitas Counties.
### Abundance

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</table>

**ashington Range Map**

![Washington Range Map](image)

2005-2008 Seattle Audubon Society
Species Accounts - Birds
California brown pelican  

*Pelecanus occidentalis californicus*

**State**  
Endangered 1971  
Fully Protected

**Federal**  
Endangered 1970

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

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

**Status:**  
The California brown pelican currently nests on West Anacapa Island and Santa Barbara Island in Channel Islands National Park. West Anacapa Island is the largest breeding population of California. In Mexico, the pelicans nest on Islas Los Coronados and Isla San Martín. Historically, the brown pelican colony on Islas Los Coronados was as large as, or larger than, that of recent years on Anacapa Island. Continued human disturbance and possible fishery overexploitation caused near-abandonment of this colony in the 1980s. Breeding still occurs on Islas Los Coronados, but it has been inconsistent and the colony size is much reduced from historical numbers. After
breeding, the pelicans disperse northward along the coast of California to Oregon and Washington and occasionally as far north as British Columbia. Pelicans from the Mexico nesting colonies mix with the California birds during this period, resulting in large numbers of pelicans along the California coast in late summer and fall. During post-breeding dispersal, it is particularly important for the pelicans to have safe resting areas by day, and night roost locations free from predators and human disturbance.

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

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

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

Other factors affecting pelican population size include oil spill mortality, human disturbance, domoic acid poisoning, fish hook/line mortality, and direct shooting or maiming. For example, more than 100 pelicans were accidentally hooked by recreational fishermen in the Santa Cruz area when anchovies swarmed near the Santa Cruz pier in August 2001. An additional 50 birds had been found injured earlier in the summer. Other pelicans were observed with fishing line or hooks, but could not be captured. Because pelicans can mistake fishing lures for their natural food, this problem is most intense at fishing piers where pier fishing is very popular and where
pelicans often roost. A cooperative public education effort was undertaken after this large mortality event to better inform fishermen of ways to avoid pelican injury and mortality. In 2003, over 20 pelicans were found shot or maimed, primarily in the southern California area, and additional birds were found wounded in the San Francisco Bay Area. The International Bird Rescue Research Center and the International Fund for Animal Welfare stepped in to rehabilitate the injured birds.

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

**State:** Endangered 1971
Fully Protected

**Federal:** Endangered 1967

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

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

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

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

The total condor population from January 1, 2000 to September 1, 2003 grew from 159 to 222 birds; total wild population grew from 54 to 85. The wild population in California in that time span increased from 25 to 44 birds. The first eggs were laid in the wild in 1991 in California and Arizona but failed to hatch; first hatchings in the wild of wild-laid eggs occurred in three California nests in 2002, but all three chicks died. In 2003, one chick in
California and one in Arizona were being raised and may be the first to be fledged into the wild in 21 years.

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

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

Activities during 2003 included the following:

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

**State**
- Endangered 1971
- Fully Protected

**Federal**
- Endangered 1967
- Threatened 1995
- Proposed Delisted 1999

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

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

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

In 1999, DFG had data on 190 bald eagle breeding territories that were occupied in California sometime in the 1990s. From 2001 through 2003, at least 14 new territories were discovered. The southernmost successful breeding on the mainland was documented in 2003 at Lake Hemet, Riverside County. The breeding range has expanded from portions of eight counties in 1981 to at least 32 of the California's 58 counties by 2003.
Territory data are used in pre-harvest timber planning and other local management planning to minimize disturbance and other conflicts in eagle nesting areas. The bald eagle is included in several HCPs, 2081 agreements, and other planning documents across the State.

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

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

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

Status: Increasing number of territories and an expansion in the range in the state.
Swainson’s hawk  

*State:* Threatened 1983  
*Federal:* None  

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

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

**Status:**
The loss and conversion of native grasslands and agricultural lands to various residential and commercial developments is the primary threat to Swainson’s hawk populations throughout California. Additional threats are habitat loss caused by riverbank protection projects; conversion from agricultural crops that provide abundant...
foraging opportunities to crops such as vineyards and orchards, which provide fewer foraging opportunities; shooting; pesticide poisoning of prey animals and hawks on foraging and wintering grounds; competition from other raptors; and human disturbance at nest sites.

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

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

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

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

In 1997, the first six Swainson’s hawks from the Central Valley were fitted with satellite transmitters and tracked to determine routes of migration and the locations of wintering areas. Central Valley birds appear to winter in Mexico and Columbia, although a hawk from northeastern California was tracked to Argentina during the winter of 1996. The Central Valley birds were located wintering in a region north of Mexico City, Mexico, and near Bogota, Columbia. No birds from the Central Valley have been tracked further south. Die-offs of several thousand Swainson’s hawks and other raptors from 1996 to 1998 were attributed to pesticide use at agricultural fields in Argentina. Farmer education programs and restrictions on use of highly toxic organophosphate pesticides implemented by government and industry appear to have dramatically reduced the impacts of these compounds on wintering Swainson’s hawks. Continued monitoring will be required, however, to assess the long-term effectiveness of these measures.
Additional satellite transmitters were subsequently affixed in 1998 to 2001. A sample of 17 birds confirmed that the Swainson's hawks of the Central Valley migrate to a wintering area in Mexico. To date, results from this study suggest that the Swainson's hawks that winter in Mexico tend to use large, multi-site areas, and appear more nomadic in nature than migratory in the traditional sense. In addition, the birds seem to stage and roost in the same locations as they move south along the western Mexican coast; they take a great deal longer to get to their southern-most wintering areas than do individuals in other populations of North America.

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

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

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

The current status of the Swainson's hawk in California is declining.
American Peregrine falcon  
*Falco peregrinus anatum*

**State**  
Endangered  
1971  
Fully Protected

**Federal**  
Delisted  
1999

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

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

**Status:**
Beginning in the late 1970s, intensive efforts were made annually by federal and state agencies and cooperators to assess breeding population size and locations, and to collect information on breeding success. Comprehensiveness of statewide surveys of breeding status diminished since the late 1990s. A DFG-contracted statewide breeding survey was conducted during 1997 by the University of California, Santa Cruz Predatory Bird Research Group (SCPBRG), when observers checked nearly 150 known and suspected nesting areas and obtained data on at least 111 active territories (i.e., two courting adults present); productivity averaged about 1.5 young per pair. Owing to reduced availability of funding, only about half of the 193 known territories in the State could be
adequately monitored by the SCPBRG in 1998 and 1999. The Department ceased recommending projects for funding under ESA Section 6 after this species was delisted in 1999, in anticipation of post-delisting monitoring by USFWS. A 2003 national survey was supported financially by USFWS as part of its post-delisting monitoring plan.

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

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

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

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

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

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

**California black rail** *Laterallus jamaicensis coturniculus*

**State** Threatened 1971

**Federal** None

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

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

**Status:**
Historically, the California black rail occurred along the coast from Baja California, Mexico north to San Francisco. Inland, these rails occurred from the delta of the Colorado River north through the San Joaquin and Sacramento Valleys to eastern Oregon wetlands. Today, the California black rail is found at several locations in the Sacramento-San Joaquin River delta, the San Francisco Bay area, Bolinas Lagoon and Tomales Bay in Marin County, Morro Bay in San Luis Obispo County, White Slough in San Joaquin County, the Salton Sea area, and the Lower Colorado River Valley. Populations have also been found in Yuba, Butte, and Nevada Counties. An additional population was discovered in April 2003 in Placer County. The Placer County birds are thought to be non-migratory based on observations made throughout the year. A desert stronghold for this species appears to be along the lower Colorado River where over a hundred birds have been observed repeatedly during censuses in recent years.
Threats to black rail populations fall into three main categories: habitat loss, predation, and contamination. The loss of coastal and interior wetlands has greatly reduced the range of this species and is the principal threat to the California black rail. Impacts to the species include flooding of suitable habitat due to El Niño events, levee and road construction, filling of wetlands, and land subsidence due to groundwater pumping; cattle grazing in Sierra Nevada wetlands inhabited by the rail; habitat loss from invasive non-native plants such as perennial pepperweed and non-native cordgrass; predation by native and non-native animals; and contamination of wetlands by oil refineries, chemical plants, manufacturing, and urban runoff. Documented predators of California black rails include great blue heron, great egret, northern harrier, and owls. The red fox and rats are believed to prey on nests around San Francisco Bay. Predation of black rails can be intense in marshes that lack the transitional vegetation between the high marsh and upland cover.

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

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

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

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

The data from the PRBO study showed that factors affecting rail distribution were the size of marsh, distance to water, the size of the core area of the marsh, the amount of surrounding urban land, and vegetation height and species composition. The data indicated that the California black rail prefers large marshes that are close to water, away from urban areas, with saline to brackish water, and with a high proportion of pickleweed, three square, rush, and cattail.
The San Francisco Estuary Wetlands Regional Monitoring Program (WRMP) Plan was released in 2002. The mission of the WRMP, which is a product of the San Francisco Estuary Institute and wetland managers representing a variety of agencies including the DFG, “is to provide the scientific understanding necessary to protect, create, restore, and enhance wetlands of the San Francisco Bay Region, through objective and cost-effective monitoring, research, and communication.” A survey protocol developed by PRBO for the California black rail is included in the WRMP planning document. This protocol is designed to collect the following kinds of information about California clapper rails and black rails: an estimate of breeding population size, population trends, health and stability of populations, and rates of colonization at restoration sites.

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

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

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

**State**  
Endangered  
Fully Protected  

**Federal**  
Endangered  

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

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

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

Of the 193,800 acres of tidal marsh that bordered San Francisco Bay in 1850, only about 30,000 acres remain, a reduction of 84 percent. The remaining habitat is degraded. Industrialization and development of bay tidelands has resulted in linear remnant wetlands on the bay fringe. Many of these linear marshes are completely submerged during high tides and lack sufficient escape habitat. These wetlands also do not provide suitable nesting, foraging, or escape sites for the California clapper rail, and are highly susceptible to environmental perturbations. The East Bay shoreline is eroding from San Leandro to Calaveras Point. Habitat in the North Bay is fragmented, degraded,
and discontinuous. The once extensive salt marsh along Coyote Creek, Alviso Slough, and Guadalupe Slough has been converted to freshwater or brackish water marsh due to freshwater discharges from South Bay water treatment facilities. Mercury levels are high in the South Bay; its accumulation results in embryo mortality. Although small populations are found throughout San Pablo Bay, their occurrence is sporadic and in low numbers in Suisun Marsh. USFWS currently estimates about 600 birds in the South Bay.

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

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

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

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

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

*Rallus longirostris levipes*

**State**
- Endangered 1971
- Fully Protected

**Federal**
- Endangered 1970

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

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

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

Light-footed clapper rails were detected in up to 19 marshlands in the early 1980s, up to 14 in the late 1980s, up to 13 in the early 1990s, and from 11 to 17 in the past decade. The 1980-1992 population totals fluctuated from 142 to 277 pairs annually. Up to 300 breeding pairs were detected in annual surveys from 1993 to 1995, 325 pairs in 1996, and 307 pairs in 1997. In 1998 and 1999, populations numbered 222 pairs and 233 pairs respectively, some of the lowest populations counted since 1990, representing a significant decline from 1996. Only 217 pairs...
were detected in 2001.

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

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

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

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

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

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

**State**  Threatened  1971  
**Federal**  Endangered  1967

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

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

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

Habitat modeling was used to delineate suitable Yuma clapper rail habitat within the Coachella Valley Plan Area. Habitat consists of marshes dominated by cattail and California bulrush; along the Lower Colorado River, rails selected some combination of cattails and bulrush for breeding. Higher elevation sites provided post-breeding habitat at some locations. These areas were dominated by willow, arrowweed, common reed, and tamarisk. Water depth was an important habitat characteristic and optimal water depths varied between six and eight inches. In deeper water, vegetation mats provided access throughout the occupied habitat. Under the MSHCP, 643 acres (91%) of modeled habitat will be conserved although it is not known if this amount of Yuma clapper rail habitat is...
large enough to sustain a viable population. Additional surveys are needed as part of Coachella Valley Plan implementation to determine patch sizes and whether they are adequate to sustain a viable population. There are opportunities for habitat restoration and enhancement in the Plan area, and management of existing wetlands could expand suitable habitat for the rail in this area.

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

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

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

**State:** Threatened 1983
Fully Protected

**Federal:** None

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

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

**Status:**
In California, sandhill cranes establish territories in wet meadows that are often interspersed with emergent marsh. California birds tend to nest in rather open habitat; however, in certain areas, they nest in association with a dense cover of bulrush and bur-reed. Favorable roost sites and an abundance of cereal grain crops characterize the cranes’ Central Valley wintering ground. Rice is used extensively by cranes near the Butte Sink area of Butte County, and corn is the principal food source at most other Central Valley wintering areas, particularly in the Sacramento-San Joaquin Delta near Lodi, San Joaquin County. Irrigated pastures are chosen for resting sites throughout the wintering ground. A communal roost site consisting of an open expanse of shallow water is a key feature of wintering habitat.
When the greater sandhill crane was designated a threatened bird species in 1983, all populations of the threatened species breeding or wintering in the State were placed under the protections of CESA. This action represented the first step in the recovery of the species. The provisions of CESA ensure that a variety of activities that benefit or impact the species are scrutinized by the State to guard against harm to crane populations and their habitats. This species continues to experience threats on both wintering and breeding grounds due to agricultural and residential conversion of habitat, predation, human disturbance, and collisions with power lines. Greater demand for agricultural crops such as alfalfa could lead to private land conversions in the primary crane breeding areas of the State. Wintering sandhill cranes in the Central Valley currently are dependent on certain agricultural practices and cropping patterns that are compatible with their foraging and non-foraging activity needs. Cranes concentrate primarily on private lands and are therefore potentially vulnerable to land-use changes that alter their feeding, loafing, and roosting habitat.

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

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

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

Since 1978, the Department has participated, with other states within the Pacific Flyway, in the development of
planning that could be modified as a recovery plan. Specific management recommendations are contained in the Pacific Flyway Management Plans on all breeding and wintering California populations of greater sandhill cranes. The Pacific Flyway Plans contained several recommended research and management task categories that would also be necessary to effect recovery of the greater sandhill crane in California. In 1997, amendments to CESA directed the DFG to develop and implement a recovery strategy pilot program for the greater sandhill crane. Several years before the 1997 amendments of CESA called for a formal recovery planning strategy, the Department had taken some important initial steps toward the recovery of the greater sandhill crane by acquiring key habitats that studies had identified as important for nesting and wintering populations. Two winter roost sites were purchased by the WCB in 1985-87 based upon Department recommendations and the results of wintering ground studies in San Joaquin County. On the breeding ground, State WA's are to consider the needs of the crane population in management of those lands. The Ash Creek WA, Lassen and Modoc counties, was identified as a key breeding area and it is currently the largest State-owned facility supporting greater sandhill crane breeding populations.

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

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

The status in 2003 of the greater sandhill crane: Stable
California least tern *Sterna antillarum browni*

**State**  
Endangered  1971  
Fully Protected

**Federal**  
Endangered  1970

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

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

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

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

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

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

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

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

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

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

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

Reports of statewide efforts by the Department and all other cooperating agencies and individuals are prepared and disseminated to the public annually. The 2000 survey report is the latest one completed.
Marbled murrelet  \textit{Brachyramphus marmoratus}

State  Endangered  1992  
Federal  Threatened  1992  

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

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

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

Marbled murrelets are very secretive in their nesting behavior, usually flying inland in the dark before sunrise, and not vocalizing when accessing their nest site. Since they nest relatively high in large trees, have camouflaged
plumage, and fly quickly through the forest canopy, their nests generally remain hidden from view and are exceedingly difficult to find. Their nesting habits remained an ornithological mystery until 1974 when a tree trimmer found a nestling high in an old-growth Douglas fir tree in Big Basin Redwoods State Park in the Santa Cruz Mountains of central California. For this reason, traditional nest finding methods used for population monitoring of other bird species are not practical for murrelets.

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

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

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

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

In Zone 6, all the nests found via radio telemetry failed. A number of other nests found in Zone 6 without the aid
of telemetry have also failed. This data would appear to corroborate the decline in the inland detections at Big Basin Redwoods State Park as evidence of population decline. However, the at-sea surveys have yet to detect a population decline although the at-sea surveys have detected very few murrelet juveniles on the water, which is also indicative of population decline. For these reasons, the Zone 6 population is considered to be in decline and in serious need of recovery actions.

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

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

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

**State** Threatened 2002  
**Federal** None

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

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

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

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

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NPS File Photo

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

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

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

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

*Coccyzus americanus occidentalis*

**State** Endangered 1971  
**Federal** None

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

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

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

Two habitat models for the western yellow-billed cuckoo were developed by researchers at the Point Reyes Bird Observatory (PRBO). The models concluded that willow-cottonwood riparian habitat at least 325 feet wide with high humidity provided suitable habitat. Age classes of the vegetation did not appear to affect suitability. Additional research refined the original models and found that optimal sites for the cuckoo were larger than 200 acres and wider than 1950 feet. Habitat less than 38 acres in size and narrower than 325 to 650 feet wide were not suitable. Other studies found that the extent of habitat along a river, as well as the presence of low woody vegetation, were important factors in determining yellow-billed cuckoo distribution. Research at the South Fork Kern River characterized nesting habitat as having a high level of canopy closure, denser foliage, and intermediate tree heights.
In 2001, the USFWS commissioned a genetics study to help determine whether the yellow-billed cuckoo in the western United States should be added to the Federal List of Threatened and Endangered Species. The USFWS also reopened the comment period for the 12-month finding on a petition to list this species as endangered. Prior to that, USFWS announced that a petition seeking Endangered Species Act protection for the western yellow-billed cuckoo presented sufficient information to warrant a review of the bird’s current status. The Service initiated a comprehensive review to determine whether to list the western yellow-billed cuckoo as a distinct population segment, one that is separated from other populations by physical, physiological, ecological or behavioral factors. The genetics study, "Taxonomic and Evolutionary Significant Unit (ESU) Status of Western Yellow-billed Cuckoos (Coccyzus americanus)," was prepared by Robert Fleischer of the Smithsonian Institute’s National Zoological Park under contract with the USFWS and the U.S. Geological Survey. The study did not confirm the existence of an eastern and western subspecies of the western yellow-billed cuckoo. Later in 2001, the administration issued a decision to again delay listing the species despite a population decline of over 95% due to habitat loss. Instead, the cuckoo was placed on the "warranted but precluded" list.

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

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

**State:**  Endangered  1980  
**Federal:**

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

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

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

**Status:**
The elf owl is restricted to the scattered, mature, native riparian forest along the lower Colorado River. This habitat type has been reduced to less than four percent of its original acreage as a result of hydrologic changes on
the Colorado River, the historical use of riparian trees for firewood, loss of mature forest to wildfire, and introduction of the exotic salt cedar. Remaining habitat is threatened by recreational use (camping, hunting, OHVs). The elf owl was probably never a common or widespread species along the lower Colorado River where it is at the northern extent of its range. The reason for the scarcity of elf owls in California is unknown although the population status of the elf owl depends directly on available nesting holes and on sufficient rainfall and warmer temperatures that increase arthropod prey populations during the breeding season.

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

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

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

State: Endangered 1980
Federal: None

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

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

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

All 15 of the known breeding sites and 71 percent of the sites with multiple observations come from Mariposa and Tuolumne counties in the Yosemite area. Sites with multiple observations also come from Alpine, Calaveras, Fresno, Plumas, Sierra, and Tulare counties. This pattern indicates that great gray owls are mainly distributed in the scattered meadow-mature forest zone on the west slope of the central Sierra Nevada. Great gray owls also have been observed in 13 other counties, from the southern Sierra Nevada to Del Norte, Humboldt, Siskiyou, Shasta, and Modoc counties across the northern portion of the State. Owls seen in this part of the
State are probably vagrants from populations in Oregon. With few exceptions, those in other Sierran counties are probably individuals wandering from the main population. The DFG Resource Assessment Program has initiated a statewide survey for great gray owls. The focus of this survey is currently along the Sierra Nevada-Cascade Range axis in Tahoe, Plumas, and Sierra National Forests.

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

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

The current status of the great gray owl is unknown.
Gila woodpecker  
*Melanerpes uropygialis*

**State**  
Endangered  
1988

**Federal**  
None

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

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

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

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

DFG considers the population trend and status for the Gila woodpecker to be *Unknown.*
Gilded flicker  *Colaptes chrysoides*  
(*Colaptes auratus chrysoides*)

State  Endangered  1988  
Federal  None

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

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

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

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

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

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

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

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

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

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

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

Loss and degradation of riparian habitat is the principal reason for the decline of willow flycatcher population and the decrease in geographic range of the species. Impacts of livestock grazing to both the habitat and nests of breeding birds have also been implicated in the decline of the species. Nest parasitism by brown-headed cowbirds has contributed to population reductions. Livestock grazing the meadow systems of the Sierra Nevada have contributed to many detrimental impacts including loss of willow habitat, compaction and drying of meadows, and an increase in cow bird populations.
The USFWS listed a subspecies, the southwestern willow flycatcher with small populations in riparian scrub in southern California and other western states, as a federal endangered species in 1995. The southwestern form in California is found as a breeding species at the South Fork of the Kern River in Kern County, Santa Ynez River in Santa Barbara County, Santa Margarita and San Luis Rey Rivers in San Diego County, and several other locations in Southern California. It also is found in Arizona, Nevada, New Mexico, Utah, and Colorado.

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

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

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

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

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

*Riparia riparia*

**State:** Threatened 1989  
**Federal:** None

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

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

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

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

The range of bank swallows in California has been reduced by 50 percent since 1900. Bank swallows have been extirpated from southern California due to channelization of rivers and flood control projects. Historically, they...
occurred principally along the coast and bank swallow colonies thrived at the Los Angeles River, San Pedro, Oceanside, and Santa Cruz. Today, there remain only three coastal nesting areas, Smith River mouth, Ft. Funston in San Francisco, and Año Nuevo State Park, and a few colonies are known from Mono and Inyo Counties.

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

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

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

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

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

**Vireo bellii arizonae**

**State:**  Endangered  1988  

**Federal:**  

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

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

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

The vireo is one of the species addressed in the Lower Colorado River Multiple Species Conservation Program (MSCP) of which California, Nevada, and Arizona are signatories. The program area covers the mainstream of the lower Colorado River from below Glen Canyon Dam to the southerly International Boundary with Mexico. Participants have agreed to pursue an ecosystem-based approach to developing the MSCP for interim and long-term compliance with applicable endangered species and environmental laws, and to implement conservation and protection measures for included species and habitats. The program area includes the 100-year flood plain and reservoirs to full-pool elevations. Potential conservation measures will focus on the lower Colorado River from Lake Mead to the international boundary, while the partnership is also open to considering cooperative conservation efforts developed by the Grand Canyon management effort. Among the potential impacts to the Arizona Bell’s vireo identified in the MSCP with respect to flow reductions in two reaches of the Colorado River are degradation and removal of habitat and loss of prey species as a result of lowering groundwater elevations; disturbance in or near occupied habitat; and injury or mortality of individuals from the removal of occupied nest sites associated with the implementation of the plan. This plan still is still in a draft stage.
The DPR is restoring riparian habitat at Picacho State Recreation Area. To date, approximately 60 acres have been planted with willow, cottonwood, mesquite, and palo verde. At least three singing male Arizona Bell's vireos have been observed in 2003 at Picacho SRA and one pair of birds, believed to be nesting, has been observed yearly.

There have been no rangewide field surveys to determine the status of the vireo since the FGC listed the species and the vireo's current status is unknown.
Least Bell’s vireo  
*Vireo bellii pusillus*

**State:** Endangered  1980  
**Federal:** Endangered  1986

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

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

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

The USFWS designated critical habitat for the Least Bell’s vireo in 1994, including ten stream systems from Santa Barbara south to San Diego County, an area of 38,000 acres. Approximately 10,000 acres of critical habitat is located within the Santa Clara River drainage in Ventura County. The critical habitat designation includes riparian corridors, as well as some adjacent upland habitat. A draft recovery plan is currently being circulated. The recovery strategy focuses on stabilizing existing populations by protecting currently occupied habitat, securing and
restoring riparian habitat within the historical breeding range, re-establishment of the least Bell’s vireo in its historic range, modifying land uses where practicable and managing cowbird parasitism, monitoring and performing range wide surveys, and conducting research activities necessary to monitor and guide the recovery effort.

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

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

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

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

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

A 2002 study of least Bell’s vireos and their predators on the San Luis Rey River and Pilgrim Creek in San Diego
County used point counts and tracking stations with video photography to document potential predators. Four mammal and five bird species were identified as potential predators from point counts and tracking stations. Coyotes and yellow-breasted chats were the most abundant animals recorded. Twelve predation events were recorded on videotape. The western scrub jay was implicated in 67 percent of the predation events, Virginia opossum in two cases, gopher snake in one event, and argentine ants in one event. Although the coyote and yellow-breasted chat were recorded frequently by point counts and tracking stations, these methods did not identify actual nest predators. Similarly, the scrub jay was not recorded in high abundance during point counts, possibly due to the fact that they do not vocalize as much as the yellow-breasted chat. The use of video stations could improve predator detection and enhance management to benefit least Bell’s vireo. Once a major predator is identified, management could focus on methods to control its abundance, change its foraging behavior, or alter the landscape to decrease their abundance.

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

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

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

In San Bernardino County, the Old and Grand Prix fires affected approximately 3,000 acres of least Bell’s vireo habitat. Seventy-five percent burned at a low to moderate fire intensity, leaving areas of intact or lightly-burned
riparian vegetation. However, increased sedimentation and increased flows are anticipated until upslope hillsides revegetate; there is the potential for additional loss of riparian habitat due to high or severe stream flows and erosion. The Piru fire in Ventura County similarly burned areas of habitat at a low to moderate intensity. Long-term effects of the Piru fire are not expected to be adverse to the least Bell’s vireo. The Cedar, Otay and Paradise fires burned large areas of San Diego County. Of the three fires, the Paradise fire directly impacted the San Luis Rey River corridor which supported high densities of willow flycatchers and least Bell’s vireo. Approximately 80% of Rancho Jamul Ecological Reserve burned in the Otay fire and destroyed breeding habitat for the least Bell’s vireo. At this time, it is not known if birds will occupy stands of riparian vegetation that survived, areas in which they had not previously nested, or if they will occupy the adjacent Hollenbeck Canyon Wildlife Area, which did not burn.
Inyo California towhee  
*Pipilo crissalis eremophilus*

State  | Endangered  | 1980  
Federal | Threatened  | 1987  

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

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

**Status:**
The Inyo California towhee is a relict species whose range once extended from the southwestern United States into Mexico. It became isolated in its current range in the Argus Range following prehistoric climatic changes between 2.5 and 5.5 million year ago. The Inyo California towhee is threatened by loss and degradation of its habitat due to water diversions at springs, OHV activity, recreational use of its riparian habitat, grazing by feral...
burros, military activities, rural development, and mining. For example, willows were routinely burned around springs as recently as the 1970s to improve access for bighorn sheep. Habitat degradation further creates conditions favorable to colonization by species, such as carrizo and tamarisk, which are not used by the towhee.

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

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

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

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

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

*Passerculus sandwichensis beldingi*

State: Endangered 1974
Federal: None

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

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

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

**Status:**
The Belding's Savannah sparrow is restricted to mid and high elevations in coastal salt marshes of southern California. Historically, these marshes formed vast expanses of low-growing salt-tolerant vegetation suitable for nesting, in some places extending inland for miles. This marsh habitat is now greatly restricted, degraded, or eliminated in most areas as a result of filling, dredging, and development of wetlands, loss of regular tidal connection with the ocean. Continuing loss of habitat suitable for breeding and foraging is due to sedimentation,
changes in hydrology from upstream development and flood control, loss of natural tidal regimes in upper marsh habitat and degradation of pickleweed habitat, flooding from chronic closures of river-mouths, illegal trash dumping, human disturbance, and predation by native and non-native carnivores mainly in the upper levels of the marsh near developed areas.

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

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

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

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

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

Habitat improvement projects at several of the salt marshes have restored tidal flushing to the wetlands, eliminated exotic plants, and actively trapped and removed predators. Wetlands enhancement and restoration projects that benefit Belding’s Savannah sparrows also benefit the California least tern, the light-footed clapper rail, and the tidewater goby. At the Mugu Lagoon, Ventura County, site of the largest population of the species, twice as many pairs of sparrows were found in 2001 compared with 1996. That represents 28% of the state’s pair total. This substantial increase resulted from habitat restoration and predator control projects implemented by the Naval Air Weapons Station since the mid 1990s. The restoration projects reestablished tidal flow to formerly isolated patches of degraded salt marshes. Restoration of tidal processes and creation of estuarine conditions at
DFG’s San Dieguito Ecological Reserve, San Diego County, also benefited breeding birds. Subsequently, approximately 75 pairs were reported in 2001, twice the populations recorded in surveys in the 1980s and 1990s before restoration at the Ecological Reserve commenced. Habitat protection and enhancement projects, such as those at Batiquitos Lagoon and the mouth of the Santa Ana River, have resulted in improvements in habitat conditions. Some wetlands, such as Goleta in Santa Barbara County, have been fenced to prevent human access. Several habitat restoration efforts planned or underway in the Goleta Slough and Bolsa Chica wetlands can expand the foraging habitat of the Belding’s Savannah sparrow. Future management, under a Comprehensive Conservation Plan, of the South San Diego Bay Unit of the San Diego National Wildlife Refuge and the Sweetwater Marsh National Wildlife Refuge, San Diego County, will significantly improve habitat conditions for Belding’s Savannah sparrow. Eight state and federal agencies are proceeding with planning and environmental compliance requirements for the Bolsa Chica Wetlands Restoration Project, Orange County, one of the largest wetlands restoration projects in Southern California, which would restore potentially hundreds of acres of Belding’s Savannah sparrow pickleweed habitat.

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

The status in 2003 of the Belding’s Savannah sparrow: Stable to increasing (Trends: variable annual population size, increasing recently; promising increases in available habitat.)
PDF of Grasshopper Sparrow account from:
Shuford, W. D., and Gardali, T., editors. 2008. California Bird Species of Special Concern: A ranked assessment of species, subspecies, and distinct populations of birds of immediate conservation concern in California. Studies of Western Birds 1. Western Field Ornithologists, Camarillo, California, and California Department of Fish and Game, Sacramento.
GRASSHOPPER SPARROW (*Ammodramus savannarum*)

**Philip Unitt**

Current and historic (ca. 1944) breeding range of the Grasshopper Sparrow in California. Numbers of breeders have declined greatly, particularly in the Central Valley (where very local, especially on the valley floor) and along the southern coast. Retreats from northern areas in winter, when it appears to occur regularly in the state only on the southern coastal slope, though the winter range is ill-defined because of the species’ secretive habits.

**Criteria Scores**

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**Grasshopper Sparrow**

*Studies of Western Birds 1:393–399, 2008*
Studies of Western Birds

Special Concern Priority
Currently considered a Bird Species of Special Concern (breeding), priority 2. Not included on previous special concern lists (Remsen 1978, CDFG 1992).

General Range and Abundance
Occurs across North America and ranges from southern Canada disjunctly south to Ecuador. Of twelve subspecies currently recognized, four breed in North America (Vickery 1996). *A. s. perpallidus* occurs very patchily from the Pacific coast, including California, east to the Great Plains. Regarded as "rare" and local in Oregon (Gilligan et al. 1994) and endangered in British Columbia (Cannings 1991). Common only in the Great Plains, but numbers even there are declining with loss of habitat, conversion of pasture to row crops, and fire suppression (Vickery 1996).

Seasonal Status in California
The Grasshopper Sparrow occurs in California primarily as a summer resident from March to September (Garrett and Dunn 1981, McCaskie et al. 1979); the breeding season extends from mid-March to August (Collier 1994). The winter status of this secretive species is obscure, though it is generally considered rare and appears with greatest frequency on the coastal slope of southern California (Grinnell and Miller 1944; 55 winter records for San Diego atlas, Unit 2004; CBC maps). The Grasshopper Sparrow is at least partly migratory; the occasional birds seen in winter at breeding localities may not be the same individuals there in spring and summer.

Historic Range and Abundance in California
Grinnell and Miller (1944) described the Grasshopper Sparrow as a summer resident from Mendocino, Trinity, and Tehama counties south, west of the Cascade–Sierra Nevada axis and southeastern deserts, to San Diego County, from sea level to 4900 ft (1494 m), as in the San Jacinto Mountains. The only suggestion of breeding in the Great Basin is a 13 July 1928 record of a fully fledged young at 4500 ft (1372 m) in Pete’s Valley, Lassen County (Grinnell et al. 1930), which might have represented an extralimital breeding record or evidence of postbreeding dispersal across the mountains. Willett (1912) considered the Grasshopper Sparrow “fairly common” though local on the southern coast of California, but Grinnell and Miller (1944) designated it “sparse and irregularly distributed” overall in the state and noted its semicolonial nature and variable occurrence from year to year. They noted winter occurrence was mainly in the western lowlands, chiefly in southern California, with records extending north to Fresno County and perhaps to the San Francisco Bay region.

Recent Range and Abundance in California
Although further work has expanded areas of known occurrence, the overall outline of the breeding range today is probably similar to that in 1944 (see map). More thorough knowledge has extended the range farther northwest, into Humboldt (Hunter et al. 2005) and Del Norte counties (as far as Point St. George; Harris 2005), and north, into the Shasta Valley, Siskiyou County (R. Ekstrom pers. comm.), and has filled in many interstices among the locations listed by Grinnell and Miller (1944). Still, numbers have declined and the species has been extirpated locally and regionally, particularly on the floor of the Central Valley and in parts of the southern coast. Agricultural and urban development have left the Grasshopper Sparrow’s naturally patchy California range even more fragmented. However, the extent of grasslands in California before 1769 is unknown, and at least one author suggested that areas currently dominated by non-native annual grasses were formerly dominated by vegetation types other than grassland, such as various scrub communities (Hamilton 1997). Regardless, loss of grasslands, native or non-native, has been great (see discussion in CalPIF 2000). Breeding Bird Survey data suggest populations of this sparrow in California were stable from 1968 to 2004, but

Breeding Bird Survey Statistics for California

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Species Accounts
there appears to have been a marginally significant decline from 1980 to 2004 (Sauer et al. 2005). The Grasshopper Sparrow’s current breeding status is described below by subregion of the state, though information is very limited for some of them.

**Northeastern California.** Recent observations of Grasshopper Sparrows, including multiple individuals at single sites, indicate the species is a “rare” breeder in the Shasta Valley area of Siskiyou County (R. Ekstrom pers. comm.). It is unclear whether a record of three singing birds at McKenzie Meadow, Lassen County, on 5 July 1984 (H. Green in litt.) represents a regular outpost of the breeding range, an extralimital breeding attempt, or postbreeding movement to that area.

**Sierra Nevada.** Very little is known about the status on the west slope of these mountains. Gaines (1992) reported apparent nesting in the mid-1980s at 4600 ft (1402 m) at Akerson Meadow, Tuolumne County, and at 4400 ft (1341 m) at Big Meadow, Mariposa County, and speculated that birds probably usually nest at lower elevations and move to higher meadows during droughts. Grasshopper Sparrows occur regularly in the breeding season in the South Fork Kern River Valley, Kern County, at the base of the southern Sierra (B. Barnes pers. comm.).

**Central Valley and foothills.** Agriculture and urbanization have greatly reduced numbers of Grasshopper Sparrows in the Central Valley, but anecdotal evidence indicates they still breed very locally, primarily at the edges and in low foothills but also very sparingly on the valley floor. To the north, these sparrows have been recorded breeding in the past 10 years in the Igo/Ono and Parkville Road/Millville Plains areas of southern Shasta County (B. Yutzy in litt.). Three Grasshopper Sparrows were singing at a native grassland restoration site on the Llano Seco Unit of the Sacramento River NWR, Butte County, on 6 May 2006 (J. Silveira in litt.). The Sacramento County atlas project, covering portions of the southern Sacramento Valley and the Sacramento–San Joaquin River Delta, did not record this species during fieldwork 1988–1992 (T. Manolis in litt.). Starting in 1993 and 1994, numbers increased in Sacramento County (southeastern grasslands, Cosumnes) and elsewhere in the Central Valley (Manolis 1998). Breeding has been confirmed or suspected on the valley floor at Cosumnes River Preserve, Sacramento County, and the Yolo Bypass WA, Yolo County (fide T. Manolis, J. Davis). This sparrow also still occurs as a breeder on the floor of the San Joaquin Valley at Los Banos WA, North Grasslands WA, and San Luis NWR, Merced County, and at Mendota WA, Fresno County. A successful breeding attempt was documented in Los Banos WA in 2000 (B. Allen in litt.). A singing male and juvenile were photographed in an alfalfa field in Madera County about 13 km northeast of the town of Mendota, Fresno County, on 18 July 2006 (G. Woods fide J. Davis in litt.). To the south, there has been no evidence of breeding on the valley floor of the Tulare Basin in the southern San Joaquin Valley for decades.

Some representative locales of records on the margins of the Central Valley or in the adjacent foothills, not all of which are occupied annually, are Dye Creek Ranch, Tehama County (B. Deuel in litt.); northwest of Maxwell, Glenn County (fide B. Deuel); Spenceville WA, Yuba County (Manolis 1998); Corral Hollow, San Joaquin County (W. Holt in litt.); Del Puerto Canyon, Stanislaus County (fide J. Davis); near Porterville, Tulare County (R. Hansen in litt.); Tar Canyon above Avenal, Kings County (L. Cole in litt.); and Elk Hills, Kern County (J. Seay in litt.). Though Grasshopper Sparrows generally are still rare in the Central Valley, many more areas of occurrence likely would be documented with concerted effort.

**California coast.** Along California’s humid north coast, the Grasshopper Sparrow is found in prairies and pastures scattered in a largely forested landscape (Harris 2005, Hunter et al. 2005). Still, the Humboldt County atlas project found the species in 12% of the total atlas blocks, and the compilers judged that the county’s breeding population likely consisted of “at least many hundreds of birds” (Hunter et al. 2005). Suitable habitat becomes more widespread to the south.

Despite variable coverage and amounts of grassland from county to county, the multiple county atlases in the San Francisco Bay area and central coast provide good information on the relative distribution of this species in this region. Grasshopper Sparrows were recorded in 43% of all blocks in Marin (Shuford 1993), 11% in Sonoma (unrecorded in county until 1975; Rudesill 1995), 2% in Napa (1st county records; Berner et al. 2003), 20% in Contra Costa (unpubl. data), 20% in Alameda (unpubl. data), 0% in San Francisco (unpubl. data), 55% in San Mateo (Sequoia Audubon Society 2001), 26% in Santa Clara (unpubl. data), 8% in Monterey (Tenney 1993), and 8% in San Luis Obispo (unpubl. data). Collectively, these atlases show the species is still fairly widespread both along the coast and in the
Diablo, Gabilan, and Temblor ranges. Published assessments of relative abundance in this region range from “fairly common” (Shuford 1993) to “uncommon” (Tenney 1993).

In coastal southern California, the Grasshopper Sparrow has retreated greatly. Lehman (1994) considered the species “uncommon and local” in summer and noted declines in Santa Barbara County. In Ventura County, it occurs at least in the hills north of Simi Valley and in the Rancho Sierra Vista/Satwiwa unit of the Santa Monica Mountains National Recreation Area and is probably more widespread, with some possibly suitable habitat not readily accessible or recently surveyed (W. Wehtje pers. comm.). The Los Angeles County atlas found the species in only seven blocks: three in the extreme west near the Ventura County line, four in the southeast in the Whittier/Puente Hills (unpubl. atlas data; see Cooper 2000). In Orange County, Hamilton and Willick (1996) considered the Grasshopper Sparrow still “fairly common” and local in the extensive remaining grasslands, including portions of the San Joaquin Hills and foothills of the Santa Ana Mountains, but Gallagher (1997) noted that the species had already been eliminated from 4 of 20 (18% of total) atlas blocks where it was located in the late 1980s. It is gone from the northwestern half of Orange County. On the coastal slope of San Bernardino County, the Grasshopper Sparrow was probably extirpated by 2005, no longer found at the last known sites, the Crafton Hills north of Yucaipa and on the north side of California State University, San Bernardino. In western Riverside County, the Grasshopper Sparrow occurs most consistently at the Santa Rosa Plateau Ecological Reserve but also, at least irregularly, at Lake Matthews, Lake Skinner, Hidden Valley WA near Norco, Moreno Valley, Menifee, Murrieta, and Temecula. But as of 2005 many of those sites were being developed (C. McGaugh pers. comm.). The San Diego County bird atlas recorded the species as possibly breeding in 20% of total blocks, largely restricted to five disjunct areas (Unitt 2004). Many sites support only a few birds and many others have been lost to urbanization in the past 25 years. Much of the remaining population is on military bases, Camp Pendleton and Miramar Air Station.

**ECOLOGICAL REQUIREMENTS**

The Grasshopper Sparrow’s ecology varies substantially from region to region within its wide range, and although it has received substantial study elsewhere, it has received very little in California. Thus it is difficult to assess what aspects of the species’ biology apply here. In general, however, Grasshopper Sparrows in California prefer short to middle-height, moderately open grasslands with scattered shrubs. Grinnell and Miller (1944) listed a variety of generalized grassland-like habitats, including alfalfa. Dawson (1923) mentioned a nest near Escondido in an alkaline meadow covered with saltgrass (*Distichlis*). Often the sparrow’s habitat in this area is an ecotone between grassland and sage scrub, so there are scattered shrubs such as California Buckwheat (*Eriogonum fasciculatum*) or California Sagebrush (*Artemisia californica*), used by the birds as song perches (pers. obs.).

In some parts if the sparrow’s California range, native bunchgrasses appear to be important habitat components (e.g., San Diego, Unitt 2004), although this is probably not the case in most of the state, given that non-native annuals dominate most grasslands. In Riverside County’s Santa Rosa Plateau Ecological Reserve, the presence of native grasses was less important than the absence of trees (Collier 1994). These sparrows generally are absent from areas with extensive shrub cover, though some shrubbery is tolerated and perhaps preferred (Johnston and Odum 1956, Bock and Bock 1992, Vickery 1996). Patchy bare ground has also been noted as an important habitat component elsewhere (e.g., in Arizona, Bock and Webb 1984; in West Virginia, Whitmore 1981). The Grasshopper Sparrow is more likely to be found in large tracts of habitat than in small ones (Vickery et al. 1994); minimum area requirements are about 100 ha in Maine (Vickery et al. 1994), 30 ha in Illinois (Herkert 1994).

Much remains to be learned about the within- and between-year movement patterns of Grasshopper Sparrows. Shuford (1993) and Tenney (1993) suggested that birds arriving in early spring at dry inland sites may shift later in the season to more humid grassland near the coast. Possibly, the proportion of the population that is nonmigratory increases toward the south. Additionally, it has been noted that Grasshopper Sparrow populations fluctuate between years, perhaps shifting to take advantage of variable habitat suitability caused by annual differences in rainfall or disturbance such as grazing (Wiens 1974, Whitmore 1979).

The year-round diet of the Grasshopper Sparrow continent-wide is roughly 63% animal matter and 37% vegetable (Judd 1901, *n* = 170 stomachs). Animal matter primarily consists of grasshoppers (Orthoptera); in California plants whose seeds the species is known to eat include...
knotweed (Polygonum spp.), campion (Lychnis spp.), oats (Avena spp.), and pigweed (Amaranthus spp.; Martin et al. 1951). These sparrows forage primarily on the ground or from low vegetation; bare ground may be important (Vickery 1996).

Grasshopper Sparrows build nests domed with grasses and with a side entrance, typically well concealed in depressions at the base of grass clumps with the rim approximately level to the ground (Vickery 1996). Pairs can raise two broods and will renest following nest failure.

Studies of factors limiting the Grasshopper Sparrow population are lacking. These factors, however, may include amount and quality of existing habitat.

**Threats**

Urbanization is the primary current threat to the Grasshopper Sparrow. Much of its California habitat lies in the path of expanding cities, especially in southern California and the foothills surrounding the Central Valley. The great expansion of vineyards in the Central Valley and inner Coast Ranges (e.g., Merenlender 2000) is likely removing substantial habitat for this species. The effect of conversion from native to non-native grasslands on Grasshopper Sparrows is unknown, but in Oregon Grasshopper Sparrows prefer native bunchgrass (Janes 1983, Holmes and Geupel 1998). In the Santa Monica Mountains of Ventura County, W. Wehtje (pers. comm.) notes the invasion of Harding Grass (Phalaris aquatica) as a threat to Grasshopper Sparrow habitat.

Depending on degree, the effect of grazing can be negative (Saab et al. 1995) or positive. For example, in humid Oklahoma the species was found only in grazed tallgrass prairie, whereas in arid southeastern Arizona it was eliminated by grazing (Bock and Webb 1984). Behle et al. (1985) ascribed the species’ current rarity in Utah to a history of overgrazing. In the Lake Henshaw basin of north-central San Diego County, heavy grazing in combination with pumping out of groundwater confine the Grasshopper Sparrow to a few mesic microhabitats in an area where it would otherwise likely be widespread. Conversely, during the 1990s, the cessation of cattle grazing in Happy Camp Regional Park near Moorpark, Ventura County, led to Coyote Brush (Baccharis pilularis) replacing grass and Grasshopper Sparrows disappearing (W. Wehtje pers. comm.).

Fire suppression may also threaten Grasshopper Sparrows if it leads to grassland converting into unsuitable habitats such as dense scrub.

**Management and Research Recommendations**

- Negotiate conservation agreements (allowing limited grazing, for example, but preserving grassland) or favorable zoning on private land.
- Especially in southern California, ensure that the importance of grasslands is recognized in habitat-conservation plans.
- Redirect urbanization away from native and non-native grasslands.
- Manage as native grassland significant tracts of Grasshopper Sparrow habitat that come into public ownership (like Rancho Jamul in southern San Diego County).
- Minimize or prevent disturbance of the ground surface in native grassland, as this favors exotic weeds at the expense of native grasses. Develop means for restoring native grassland.
- Investigate the effects of fire, by season, on native grassland and Grasshopper Sparrows in California.
- Investigate the species’ population density and nesting success in native versus non-native grassland.
- Investigate possible movements of Grasshopper Sparrows in the middle of the breeding season.
- Initiate studies on the use of grazing to provide optimal habitat. For example, it would be good to know what intensity of grazing is most suitable to abundance, reproductive success, and site fidelity. Assess the relationships among grazing intensity, local rainfall, and Grasshopper Sparrow use of habitat.
- Initiate a study to determine the current distribution and relative abundance of Grasshopper Sparrows in the Central Valley. Further, determine which vegetation characteristics predict occurrence and abundance there.

**Monitoring Needs**

Because of the Grasshopper Sparrow’s widely dispersed distribution, a complete census is not possible. Rather, a network of survey routes, randomly selected, scattered throughout the species’ range is needed if the population level is to be monitored. The number of sites monitored should be large, to average out the effect of the species’ irregularity, and should include a range of habitats occupied under varying climatic conditions.
Monitoring of the birds should be linked to monitoring of habitat conditions so the effects of changes in these can be better identified. Ideally, monitoring will occur annually. The line transect method, ideal for open habitats (Burnham et al. 1980, Bibby et al. 1992), should be considered as the survey method for this species, and all species present in sampled grasslands should be surveyed simultaneously.

ACKNOWLEDGMENTS
Thanks to B. Allen for reviewing this account and to T. Gardali and W. D. Shuford for help with revisions.

LITERATURE CITED


The following shrikes and vireos are found in Central Oregon:

- Cassin's Vireo
- Loggerhead Shrike
- Northern Shrike
- Red-eyed Vireo
- Warbling Vireo

Cassin's Vireo (*Vireo cassinii*) B/M

**RANGE:** Breeds from central British Columbia east through central Canada to northern Ontario and Newfoundland, southwest of and through the Rockies to southern California and west Texas, south through Mexico to Honduras, and east of the Rockies to North Dakota, Illinois, and Massachusetts; in the Appalachian and Piedmont regions to eastern Tennessee, Alabama, Georgia, South Carolina, North Carolina, Virginia, and Maryland. Winters from southern California, central Texas, the northern portions of the Gulf States and North Carolina south to Costa Rica.

**STATUS:** Common.

**HABITAT:** Usually inhabits coniferous or coniferous-deciduous forests, especially spruce and tamarack swamps in parts of its range. Seems to prefer open mixed forests with considerable undergrowth.

**NEST:** Builds a deep cup nest that is suspended from the fork of a horizontal branch, generally 3 to 20 feet above the ground, often about midway in a small conifer, but occasionally in a small deciduous tree or shrub.

**FOOD:** Gleans most food from twigs and foliage but occasionally hawks for flying insects. Mostly eats insects, plus a few spiders and small fruits.
IN CENTRAL OREGON: Uncommon spring and fall migrant and summer resident, primarily in riparian habitats adjacent to ponderosa pine forest. Usually arrives in spring by mid-April and departs in fall by mid-September. Very few confirmed breeding records in the region, with most in mid-June, although the species is believed to nest widespread in the ponderosa pine forests. In more recent years, confirmed breeding regularly at Calliope Crossing. Regularly found along in fall migration along the Deschutes River, especially at Tumalo State Park. Also easily found in Shevlin Park.


Loggerhead Shrike (Lanius ludovicianus) Y

RANGE: Breeds from central Alberta, central Saskatchewan, southern Manitoba, Minnesota, central Wisconsin, central Michigan, and southeastern Ontario, south to Mexico and the Gulf Coast. Very rare or absent from most of the Appalachians, Pennsylvania, New York, and New England. Winters in the southern half of the United States and in Mexico.

STATUS: On the 1982 Blue List for declining species as a species of concern (mostly in the East); common in parts of the West.

HABITAT: Inhabits open country with scattered shrubs or small trees such as shelterbelts, cemeteries, farmsteads, or hedgerows in the plains country and Midwest. In the West, breeds in savannah, pine-oak woodlands, and chaparral types, and prefers very open stands. Strongest Oregon nesting habitat associations in (1) Sagebrush steppe, (2) Salt desert scrub shrubland, (3) Big sagebrush shrubland, and (4) Seasonally wet playa.

NEST: Builds a bulky, cup-shaped nest in a variety of shrubs and low, dense trees, rarely less than 3 feet or more than 25 feet above the ground. Hides the nest well below the crown of the bush or tree.

FOOD: Sometimes hawks for aerial insects, but takes most of its prey as it dives to the ground from an elevated perch. In the West, eats about 83 percent insects; in the East, 68 percent. Eats mostly grasshoppers and crickets, but also a variety of other insects, small mammals, birds, and reptiles.

IN CENTRAL OREGON: Uncommon to locally common summer resident, uncommon spring and fall migrant, and rare winter resident, primarily in the eastern half of the region. Most easily found in sagebrush habitats, especially at the edges of juniper woodland. Highest concentration of confirmed breeding in eastern Jefferson County in the Crooked River National Grasslands (CRNG). Confirmed as early as mid-May with fledglings observed between early June and mid-July. Detailed research on the species nesting in the CRNG has documented unusually high concentrations of the species. Most winter shrikes are Northern Shrike and any considered to be Loggerheads should be carefully documented.


Northern Shrike (Lanius excubitor) W

RANGE: Breeds in Alaska, the Yukon, southwestern Mackenzie, and northern parts of Manitoba, Quebec, and Labrador. Winters from southern Alaska and the southern half of Canada south to northern California, central Nevada, northern Arizona, northern New Mexico, Kansas, northern Missouri, central Illinois, Indiana, Ohio, Pennsylvania, and New Jersey.

STATUS: Locally common in summer range; uncommon in winter.
HABITAT: Inhabits a broad belt of coniferous forest or taiga across Canada and Alaska during summer; strongly prefers forest edges, open willow brush, and brush-bordered swamps and bogs. Prefers semi-open country with short grasses and scattered trees or shrubs during winter.

SPECIAL HABITAT REQUIREMENTS: Elevated perches, short vegetation.

NEST: Builds a bulky, loose nest of twigs, in spruces, willows, or bushes, 5 to 20 feet above the ground.

FOOD: Attacks prey from an elevated perch by hawking or hovering, then diving and pouncing. Mostly eats small birds and mammals; also eats insects (especially grasshoppers and crickets), and some snakes, lizards, and frogs.

IN CENTRAL OREGON: Uncommon spring and fall migrant and winter resident, widespread in the eastern two-thirds of the region. Usually arrives by mid-October and departs by early May. Central Oregon's most common winter shrike, with birds most often reported from agricultural habitats.


Red-eyed Vireo (Vireo olivaceus) M

RANGE: Breeds from southwestern British Columbia and southern Mackenzie southeast to central Ontario and the Maritime Provinces, south to northern Oregon, eastern Colorado, western Oklahoma to central Texas, the Gulf Coast, and central Florida. Very rare in California, Arizona, and southern Texas. Winters in South America.

STATUS: Abundant; rare in the Southwest.

HABITAT: Inhabits open deciduous and mixed forests with dense understory of saplings, in wooded clearings, or borders of burns. Found in both upland and river-bottom forests, and sometimes in residential areas where abundant shade trees provide a continuous canopy. Seldom found where conifers make up 75 percent or more of the basal area.

SPECIAL HABITAT REQUIREMENTS: Deciduous trees with dense understory.

NEST: Builds nest in deciduous or coniferous trees or shrubs. Suspends deep cup nest from a horizontal fork of a slender branch, usually in dense foliage 5 to 10 feet above the ground, but sometimes as high as 60 feet.

FOOD: Consumes insects, gleaned from leaf surfaces in mid to upper tree canopies, for about 85 percent of the diet. Also eats spiders, a few snails, wild fruits, and berries.

IN CENTRAL OREGON: Rare spring and fall migrant and summer resident, primarily in dense riparian woodlands. Most records from early to mid-June, with the latest in early September. Reported singing in spring and early summer almost annually along Indian Ford Creek. Most frequently reported from Calliope Crossing, where Indian Ford crosses Pine Street, north of Sisters. Also found occasionally in Shevlin Park along Tumalo Creek, west of Bend.


Warbling Vireo (Vireo gilvus) B

RANGE: Breeds from southeastern Alaska, northern British Columbia, and southern Mackenzie southeast to southern Ontario and southern New Brunswick, south to northern Mexico, Alabama, and Virginia. Winters mostly in Mexico and Central America.

STATUS: Common and widespread.

HABITAT: Inhabits open deciduous and mixed deciduous-coniferous forests, especially streamside vegetation, but also in groves, scrubby hillside trees, and residential areas. In mixed forests, generally associated with the deciduous trees, and prefers forests with a substantial forb or shrub layer and low to
intermediate canopy cover.

**SPECIAL HABITAT REQUIREMENTS:** Scattered deciduous trees or wooded streamside. Strongest Oregon nesting habitat associations in (1) Red alder, (2) Western Oregon riverine woodland, and (3) Streamside wetland and shrubland.

**NEST:** Builds a cup nest that is usually suspended from a horizontal branch of a deciduous tree, often poplar or aspen, generally in branches well away from the tree trunk and higher than those of other vireos (20 to 90 feet above the ground).

**FOOD:** Gleans much of its food from the mid to upper canopy of deciduous trees. Eats mostly animal matter but includes some small fruits.

**IN CENTRAL OREGON:** Common spring and fall migrant and summer resident in forested riparian areas. Spring migrants usually arrive by late April or early May. Breeding confirmed between late May and early July, but usually in mid-June. Fall migrants linger until late September or early October. Easily found in summer at Shevlin Park and along Indian Ford Creek and slower reaches of the Deschutes River. Breeding confirmed primarily in Central Crook, southwest Jefferson, and northwest Deschutes counties. Migrants seen along any riparian corridor.

II

SPECIES ACCOUNTS

PDF of Loggerhead Shrike account from:
Shuford, W. D., and Gardali, T., editors. 2008. California Bird Species of Special Concern: A ranked assessment of species, subspecies, and distinct populations of birds of immediate conservation concern in California. Studies of Western Birds 1. Western Field Ornithologists, Camarillo, California, and California Department of Fish and Game, Sacramento.
Breeding range of mainland populations of the Loggerhead Shrike in California. Although the outline of the overall range generally is stable, numbers have declined greatly and the species is nearing extirpation in broad areas of coastal southern California. Breeding populations in the north are migratory (entirely resident south of 39º), hence resident populations to south are augmented in winter, when some birds also occupy areas locally where none breed.
**Special Concern Priority**

Currently considered a Bird Species of Special Concern (breeding), priority 2. Not included on the original prioritized list (Remsen 1978), but the full species was included on CDFG’s (1992) unprioritized list.

**General Range and Abundance**

Breeds in Canada in southern Alberta, Saskatchewan, and Manitoba; widely throughout the United States except portions of the Northwest, the Northeast, and higher elevations throughout; and in much of western Mexico (Phillips 1986, Howell and Webb 1995, Yosef 1996). Largest concentrations occur in areas of Texas and Louisiana. Winters throughout much of the United States, in portions of southern Canada (Sauer et al. 1996), and throughout much of Mexico (Howell and Webb 1995). Continent- and nationwide declines have been documented (Pruitt 2000, www.audubon.org/bird/cbc, Sauer et al. 2005).

Subspecies delineations have been much debated, with the number recognized ranging from 7 to 12 (summarized in Yosef 1996). Five subspecies occur in California. L. l. excubitorides is largely resident in southeastern California, L. l. gambeli is resident throughout much of state north and west of the range of L. l. excubitorides, and L. l. grinelli is resident in coastal San Diego County. Island (L. l. anthonyi) and San Clemente (L. l. mearnsi) Loggerhead Shrikes are excluded from this account, which is restricted to mainland populations.

**Seasonal Status in California**

Present year round throughout most of the California range; breeds from as early as January or February in southern California to July (Unitt 2004, PRBO unpubl. data). Breeding populations in north and possibly elsewhere are migratory; other populations primarily resident (entirely resident south of 39º; Grinnell and Miller 1944, Yosef 1996). Wintering individuals augment resident populations and occupy nonforested areas locally where none breed (Grinnell and Miller 1944, Unitt 2004).

**Historic Range and Abundance in California**

Grinnell and Miller (1944) mapped the breeding distribution as most of the state except for the primarily forested coastal slope, the Coast Ranges, the Klamath and Siskiyou mountains of northwestern California, the Sierra Nevada and southern Cascades, and high elevations of the Transverse Ranges. Known nesting elevations ranged from –250 ft (–75 m, Death Valley) to 7500 ft (2300 m). They described shrikes as “common” to “abundant” and noted that the largest populations, at least of those west of the southern deserts, occurred in the San Joaquin Valley and in the south coast region. Grinnell and Wythe (1927) described the species as an “abundant” resident in the San Francisco Bay region, with lower numbers toward the coast. Willett (1933) likewise considered the species to be “abundant” in southern California from the coast to the base of the mountains.

**Recent Range and Abundance in California**

The overall breeding range currently remains similar to what it was in 1944 (see map), though birds have been extirpated locally, reduced in numbers by habitat loss, or documented nesting in some outlying areas where previously unknown. Breeding Bird Survey (BBS) data for California’s mainland shrikes show a significant negative trend over the entire study period (1968–2004), reflecting a highly significant declining trend from 1968 to 1979 and relatively stable numbers from 1980 to 2004 (Sauer et al. 2005). Analyses of Christmas Bird Count (CBC) data documented a significant statewide decline from 1959 to 1988 (–1.3% annually; Sauer et al. 1996), which appears to have continued and to be accelerating in some regions (e.g., Hamilton and Willick 1996, Bolander and Parmeter 2000, Unitt 2004). Although Cade and Woods (1997) cautioned about possible problems with CBC data for this species, these trends for California are too strong to be ignored. Breeding abundance is highest in portions of the Central Valley, Coast Ranges, and the southeastern deserts.

**Breeding Bird Survey Statistics for California**

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(Sauer et al. 2005), and in winter throughout the San Joaquin Valley, the south-central and south coasts, and the southeastern deserts (Sauer et al. 1996).

**Northeastern California.** There has been an apparent increase in abundance in this region (BBS “trend map”; Sauer et al. 2005), though numbers can vary substantially by subregion. In shrub-steppe habitat in the Honey Lake basin, Lassen County, shrikes breed at a density of one pair per 61 ha (Humble et al. 2002), whereas in Sierra Valley, Plumas and Sierra counties, the species is a very rare breeder and not recorded most years at that season (W. D. Shuford pers. comm.). To the south in the Great Basin of Mono County, shrikes are “uncommon” breeders in the greater Mono Basin and Glass Mountain areas (Gaines 1992, Shuford and Metropulos 1996).

**Central coast.** Population declines have been observed in the San Francisco Bay region, including south of the bay (BBS “trend map”; Sauer et al. 2005), where oak savannah habitat in the foothills has been lost in recent years (CalPIF 2002). In southeastern Mendocino County, in 1981 a pair of shrikes nested in Crawford Valley between Hopland and Ukiah and another pair was present near Hopland (R. Keiffer in litt.); these outlying records have not been duplicated since. Loggerhead Shrikes are “uncommon” residents in Sonoma County, where numbers have been “considerably reduced” compared to their historic abundance (Grinnell and Wythe 1927, Stafford 1995, Bolander and Parmeter 2000), and they “maintain a tenuous presence” today in Napa County (Berner et al. 2003). Shrikes occur locally in Marin and San Mateo counties (Shuford 1993, Sequoia Audubon Society 2001). They are “uncommon” in Monterey County, where numbers have noticeably declined on the coastal slope both as a breeding and wintering bird (J. Green in litt.). In Orange County, they are “fairly common” in the remaining appropriate habitat on the coast and “uncommon” in the interior, with both areas showing declining winter trends on CBCs since the 1970s (Hamilton and Willick 1996). The loss of open and riparian habitat on the Santa Ana River is resulting in declines in the area (Gallagher 1997). Shrike populations are fragmented on the coastal slope of San Diego County, where a decline in numbers on CBCs since the 1980s “accelerated alarmingly” in the 1990s (Unitt 2004). Still, in winter the species occurs more widely than in summer, moving into many areas not occupied during the breeding season. BBS data suggest declines throughout the state’s southern coastal region but not in the south-central region (“trend map”; Sauer et al. 2005). Likewise, CBC data reveal a precipitous decline in wintering numbers throughout the south coastal region (NAB 56:224), even in many undeveloped areas (Unitt 2004).

**Southern deserts.** Shrikes generally are much more numerous in the southern deserts than toward the southern coast. Surveys for the Los Angeles County breeding bird atlas in 1995–2000 found shrikes in almost every block in the Mojave Desert region of the Antelope Valley–Lancaster area (unpubl. atlas data). In Deep Canyon near Palm Springs, Weathers (1983) reported a density of about one pair per 20 ha. Unitt (2004) described shrikes as “uncommon” overall in San Diego County but most numerous in the Anza-Borrego Desert, where “widespread” both on the desert floor and in desert-edge scrub on the east slopes of the mountains. Patten et al. (2003) described shrikes in the Salton Sink as “fairly common” during the breeding season but “more numerous” in winter, when numbers of breeding residents are augmented by migrants from other regions. Status is similar along the lower Colorado River valley, where shrikes are considered “fairly common” breeders and “common” winter residents, and populations were apparently stable in recent years through the 1980s (Rosenberg et al. 1991). Regional BBS data show a significant
decline in the Sonoran Desert but no trend in the Mojave Desert (Sauer et al. 2005).

ECOLOGICAL REQUIREMENTS

In California, Loggerhead Shrikes breed mainly in shrublands or open woodlands with a fair amount of grass cover and areas of bare ground. They require tall shrubs or trees (also use fences or power lines) for hunting perches, territorial advertisement, and pair maintenance; open areas of short grasses, forbs, or bare ground for hunting; and large shrubs or trees for nest placement. They also need impaling sites for prey manipulation or storage, which can include sharp, thorny, or multistemmed plants and barbed-wire fences (Yosef 1996, Pruitt 2000). These requirements are met on the east side of the Cascades and Sierra Nevada in shrub steppe and, to a lesser degree, in Western Juniper (Juniperus occidentalis) woodland; on the coastal slope and Coast Ranges in chaparral, oak woodland, or oak savannah (Bolander and Parmeter 2000, L. Allen pers. comm.); locally in the Central Valley in riparian edges and (in the south) desert scrub; in the southeastern deserts in desert scrub and sparse riparian woodland (Rosenberg et al. 1991); and occasionally throughout in rural and agricultural hedgerows.

Loggerhead Shrikes hunt by perching on appropriate substrates and scanning the area, taking prey primarily from the ground but occasionally in flight, and often impaling prey for easier manipulation or for storage for later consumption (Craig 1978, Morrison 1980, Yosef 1996). Consequently, their foraging habitat requirements are similar in the breeding and nonbreeding seasons. The diet of Loggerhead Shrikes varies seasonally and includes arthropods (especially grasshoppers, crickets, beetles and caterpillars), reptiles, amphibians, small rodents, and birds (Craig 1978, Yosef 1996).

In sagebrush steppe in northeastern California, Loggerhead Shrikes are most common in Wyoming Sagebrush (Artemisia tridentata ssp. wyomingensis) and Big Sagebrush (A. t. ssp. tridentata) communities, and are less frequently encountered at higher elevations in Mountain Sagebrush (A. t. ssp. vaseyana; Humple et al. 2002). Densities are also high in this region in Greasewood (Sarcobates vermiculatus) communities (pers. obs.). In San Diego County, shrikes are found primarily in desert washes containing some trees or shrubs, or in areas with patches of mesquite (Prosopis spp.) or saltbush (Atriplex spp.), but are absent in areas of thick chaparral or forest (Unitt 2004). In the lower Colorado River valley, birds use appropriate agricultural areas during the nonbreeding season (Rosenberg et al. 1991), as in much of California.

Shrikes place their nests at variable heights above ground, generally 1 to 2 m (see Yosef 1996). In California, average nest heights are 0.95 m ($n = 29$) in sagebrush steppe in northeastern California, where Big Sagebrush is the most common substrate (PRBO unpubl. data), and 3.15 m ($n = 12$) in riparian habitat in the San Joaquin Valley, with willows (Salix spp.) the most common substrate (PRBO unpubl. data). In southern California, they nest in many substrates, especially thorny or spiny ones when available, but most commonly in mesquite (Unitt 2004). Shrikes will renest persistently after failure, and while generally thought to be single-brooded this appears to be highly variable between populations (see Yosef 1996 for summary).

Population limiting factors are complex (e.g., migratory versus nonmigratory populations) and not well understood. In general, it appears habitat loss and degradation play a role in shrikes’ relatively low overwinter and postfledging survival (Brooks and Temple 1990, Yosef 1996, Pruitt 2000).

THREATS

The threats responsible for shrike declines in California and the West are poorly understood (Pruitt 2000). Habitat loss, on breeding and wintering grounds as well as along migratory routes, is undoubtedly a major threat to the species. Loss of oak savannah, coastal scrub, and riparian habitats (CalPIF 2002, 2004; RHJV 2004) to agriculture that does not meet the ecological requirements of the species (e.g., vineyards, orchards, row crops) is a continued threat in many regions, as is habitat conversion from increasing urbanization. Exotic grasses and forbs introduced by livestock grazing pose the greatest threat to shrikes in sagebrush-steppe habitats in the northeastern part of the state; the presence of Cheat Grass (Bromus tectorum) often results in altered fire regimes by increasing fire frequency and sagebrush loss, and ultimately results in conversion from a shrub- to grassland-dominated landscape (Brooks and Pyke 2001). At an Oregon site, Humple and Holmes (2006) documented a 50% decline in a shrike population and a decline in nest survival after a fire destroyed much of the sagebrush cover. Increased fire frequency and resulting exotic grass invasion is also an increasing threat to desert-scrub habitats in the Mojave and Colorado deserts in the southern part of the state (Lovich 1998).
In some areas in North America, seemingly appropriate habitat is unoccupied (Cade and Woods 1997, Pruitt 2000, Unitr 2004, L. Allen pers. comm.), suggesting other limiting factors or a missing piece in our understanding of critical habitat features.

Diminished quality of winter habitat may be lowering overwinter survival in migrant populations (Brooks and Temple 1990, Yosef 1996, Pruitt 2000). Postfledging mortality appears to be high in most Loggerhead Shrike populations (see Pruitt 2000 for review), suggesting that this period might be limiting, but further study is needed.

Pesticides are considered by many to be a likely cause of shrike population declines, but evidence is mostly circumstantial and exact impacts are not understood. Shrikes have a diet of pure animal matter, making them more vulnerable to pesticide ingestion than most passerines (Kridelbaugh 1981, Stevenson and Anderson 1994, Pruitt 2000). Still, no effect on nesting success has been documented. Eggshell thickness was negatively correlated with DDE concentrations in Illinois (Anderson and Duzan 1978) but not in California, where there was no difference between eggs collected before or after the ban on DDT (Morrison 1979). Cadman (1985) noted that the greatest population declines in Canada were in agricultural regions, and Blumton et al. (1990) noted a correlation between widespread Loggerhead Shrike declines and widespread use of organochlorine pesticides from the 1940s to the 1970s. Organochlorines have largely been banned since the 1970s, suggesting that if it did cause a decline other factors prevented recovery. In a laboratory setting, there were direct effects of dieldrin on juvenile mortality and on the development of hunting skills; pesticide exposure may also lengthen postfledging dependency by inhibiting mental development (Busbee 1977). Additional studies have detected pesticide concentrations in shrikes or shrike eggs (see Pruitt 2000 for summary).

Fatalities from vehicle collisions may be threatening some already declining populations (Flickinger 1995). In Virginia, collisions were second to predation as a cause of winter mortality (Blumton 1989); in Texas, shrike numbers were overrepresented among roadside fatalities relative to their local abundance (Flickinger 1995).

**MANAGEMENT AND RESEARCH RECOMMENDATIONS**

- Maintain and increase suitable habitat throughout the shrike’s range for use during all seasons. For example, continue efforts to curb conversion of shrub steppe and desert scrub to exotic plant communities.
- Investigate the effects of altered fire cycles and exotic grass invasion on shrike habitat and populations in desert scrub and open juniper woodland.
- Examine effects of habitat fragmentation on Loggerhead Shrike populations (Yosef 1996, Pruitt 2000) in coastal scrub, chaparral, and other habitats incurring such pressure (e.g., effects on nest predation and site selection, effect of distance from parcels of continuous habitat on occupancy of fragmented or isolated habitat patches).
- Study the effects of pesticides (on breeding and wintering grounds) on nest success and adult and juvenile survivorship, and examine levels of contamination in eggs.
- Conduct studies on productivity, postfledging survival, and annual survivorship in relation to land use and habitat to help identify the life stages limiting populations.
- Conduct studies on wintering ecology, degradation of wintering habitat, and connections between breeding and wintering populations (e.g., through DNA studies, stable isotope analysis).

**MONITORING NEEDS**

The Breeding Bird Survey appears to sample shrike populations well in California, but data from additional, independent, off-road surveys (e.g., large-scale point counts) in areas not well covered by the BBS would be useful. The Christmas Bird Count also appears to provide good data on population dynamics for the shrike. However, Cade and Woods (1997) discussed potential problems with interpretation of these data. Hence, it would be good to establish a large-scale winter-season population monitoring project including the use of transects. Population declines would be better understood if additional monitoring programs focused on vital demographic rates were established.

The Loggerhead Shrike was recently chosen as one of 15 “transboundary/migratory species of concern” on a pilot Commission for Environmental Cooperation project, which, if it is hoped, will result in more focused and increased conservation attention on this species in Mexico, the United States, and Canada (Pruitt 2000). Statewide, greater coordination is needed among biologists to compile and summarize data. As the
shrike is a California Partners in Flight (CalPIF) focal species for both sagebrush-steppe and desert habitats, researchers collecting data will soon be able to contribute to the CalPIF database (www.prbo.org/calpif/data.html), which serves as a repository for breeding status information for the state.

**ACKNOWLEDGMENTS**

I am especially grateful to A. Holmes for his helpful review and for first introducing me to Loggerhead Shrikes. I also thank T. Cade, K. Burton, W. D. Shuford, and T. Gardali for the very helpful reviews they provided.

**LITERATURE CITED**


**Long-billed Curlew**

*Numenius americanus*

**Order:** Charadriiformes  
**Family:** Scolopacidae  
**Status:** Uncommon summer east. Uncommon winter west.

**Listen:**

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**General Description**

The Long-billed Curlew is the largest North American shorebird. It has a very long, decurved bill, which is longer on adult females than on males and juveniles. It is mottled brown overall, with cinnamon underwings. Sometimes a striped head pattern is evident, but it is far less pronounced than the head stripes on the Whimbrel. It is similar in size, shape, and color to the Marbled Godwit, but the curlew’s decurved bill distinguishes it from the upturned bill of the Marbled Godwit.

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**North American Range**

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**Habitat**

Dry grasslands and shrub savannahs are the traditional breeding habitats of Long-billed Curlews. They also nest in grain fields and pastures. During migration and winter, they can be found on coastal mudflats and marshes, and less commonly in fields and grasslands.

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**Behavior**
These birds often gather in small flocks and forage by walking quickly along with their long bills extended forward, probing for food.

**Diet**
In summer, earthworms and other invertebrates are common prey. Berries may also be important food at certain times of the year. Birds in coastal areas eat crabs and other aquatic creatures.

**Nesting**
Males attract females and defend their territories with undulating flight displays, fluttering and gliding while calling. The nest is on the ground in the open, but is often located next to an object such as a rock, a shrub, or even a pile of cow manure. The nest itself is a shallow scrape, usually sparsely lined with vegetation, sometimes with a rim built up around the edge. Both parents help incubate the four eggs for 27-30 days. The young leave the nest shortly after hatching and feed themselves, although both parents tend them and lead them to a marshy or damp area to find food. The young begin to fly at 32-45 days.

**Migration Status**
This short-distance migrant is one of the earliest breeding shorebirds, returning from wintering grounds from California to Mexico in mid-March, before their nesting grounds dry out. The adults leave by mid-July, with the young of the year leaving in mid-August.

**Conservation Status**
Once abundant, Long-billed Curlews declined as a result of hunting in the 1800s. Protection has helped the birds rebound, and now habitat destruction is their biggest threat. As more and more native grassland is converted to agriculture, the amount of potential Long-billed Curlew nesting habitat is shrinking. The Canadian Wildlife Service estimates the current population at about 20,000 birds.

**When and Where to Find in Washington**
Long-billed Curlews breed in eastern Washington in the central Columbia Basin and up through the Okanogan valley. They are uncommon throughout the state during migration. They generally winter south of Washington, but a flock winters around Tokeland at Willapa Bay (Pacific County) every winter. Bill’s Spit at Ocean Shores is another place to look for them.

Click here to visit this species’ account and breeding-season distribution map in *Sound to Sage*, Seattle Audubon’s on-line breeding bird atlas of Island, King, Kitsap, and Kittitas Counties.

### Abundance

Abundance categories:
- **C** Common; **F** Fairly Common; **U** Uncommon; **R** Rare; **I** Irregular

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### Washington Range Map

[Map image with non-breeding, breeding, and migration symbols]

2005-2008 Seattle Audubon Society

**Merlin**
*Falco columbarius*

**Spanish name:** Esmerejón  
**French name:** Faucon émerillon  
**Other names:** Pigeon Hawk

**Size:** Length 24-30 cm; wingspan 53-68 cm; weight 129-236 g  
**Type migrant:** partial

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**Introduction**
The Merlin is a small, dark falcon once known as the “Pigeon Hawk” because it somewhat resembles a pigeon in flight. Merlins are widespread, but uncommon throughout their range. In North America, Merlins breed in a variety of habitats in and around open areas in Alaska, Canada, and parts of northern and western United States. The species also breeds in Europe and Asia. Recently, Merlins have begun to occupy suburban and urban areas as well. There are 10 subspecies worldwide, three of which (Taiga, Black, and Prairie) occur in North America. Taiga Merlins breed from Newfoundland west to Alaska and into the northern tier of the United States including the western mountain states, and are highly migratory. Most Black Merlins breed in the Pacific Northwest, and are sedentary. Prairie Merlins breed in south central Canada and in the northern Prairie states of the United States and are partial migrants.

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**Identification**
Merlins are slightly larger than American Kestrels. Like other falcons, they have long, thin wings and long tails, and typically engage in active flight. The species is a direct and deliberate flyer that flaps with short, powerful, piston-like wingbeats. Unlike many other falcons, merlins lack distinct mustache markings on their face.

Merlins exhibit six recognizably distinct plumages in North America. Adult males and females are distinguishable from each other, as are respective members of the three subspecies. Juveniles of both sexes resemble adult females. Prairie Merlins are lighter and Black Merlins are darker than Taiga Merlins. Adult males have bluish-gray backs and wings, and black tails with two to five thin, gray bands. Their underparts have heavy, dark streaking with a rufous wash along the sides of the breast. Female Merlins have dark brown backs and wings, dark brown tails with thin, buff-colored bands, and buff-colored underparts that are heavily streaked. Females are about 10% larger in size and 30% heavier than males.

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**Breeding Habits**
Merlins are typically monogamous. Members of breeding pairs winter separately, and each spring either a new pair bond is formed or an old bond is re-established. Merlins often return to the same breeding area, and many reoccupy the same nesting territory. Reuse of individual nest sites is less common. Males usually
return to the breeding grounds about a month earlier than females. In some instances females remain on the nesting territory throughout the year. Merlins do not build their own nests, but rather use the abandoned nest of other birds, mainly those of other raptors or magpies. The species also nests on cliff ledges, the ground, buildings, and in cavities in trees. When nesting on cliffs or on the ground, Merlins create a depression or “scrape” in the substrate. Unlike other North American falcons that do not bring nesting material to the nest, Merlins sometimes add greenery or other nesting materials.

Pairs begin to bond one to two months before egg-laying. Merlins engage in an array of aerial displays. Males use “power flying” (a display that involves flying with deep wingbeats and rolling from side to side while traveling in strong, flapping flight) to attract females and to discourage intruding males. Less and more intense versions of “power flying” are performed by males and females as well. Both members of a pair also soar and “high circle” to mark their territory. In “flutter flight” displays, males fly slowly with quick, shallow wingbeats in a circular or figure eight flight pattern near their perched mate. Courtship rituals also include food begging by the female, food transfers from the male to the female, and nest displays by both sexes.

Merlins lay three to five eggs per clutch. If a clutch is destroyed early in the nesting season, a replacement clutch may be laid. Females do most of the incubating during the 30-day incubation period. After the eggs hatch, the female broods the nestlings continually for seven days. Once the young are at least a week old, females only brood them during inclement weather. Throughout this period, the male provides food for the female and the young. During incubation, males bring food back to the nest, and briefly incubate the eggs while the female feeds while perched nearby. After the eggs hatch, males call to females when returning to the nest area, and females then fly to the males to receive the prey for the nestlings. The young fledge when they are 25 to 35 days old. Two weeks after leaving the nest, fledglings begin to catch insects on their own, even so most young Merlins remain dependent on their parents for about five weeks after fledging.

**Feeding Habits**

Merlins hunt both from perches and on the wing. Like *Accipiters*, Merlins employ surprise when hunting from concealed perches and when flying rapidly below the canopy in attempts to flush prey. Individuals sometimes use hills and other landscape features to hide their approach. Although the species sometimes dives on prey, Merlins do not typically execute high speed stoops from great heights. Hunting activity peaks in early morning and late afternoon. Merlins frequently cache surplus food both in winter and in the breeding season. Males cache surplus food near the nest, and females retrieve such items when the male is late in returning with food. Merlins feed primarily on birds. Although the species takes birds as large as pigeons and small ducks, it usually feeds on small- to medium-sized songbirds. In urban areas, House Sparrows are a major component of the diets of many Merlins. Merlins often prey on small shorebirds, particularly in winter. The species also feeds on small mammals, reptiles, amphibians, and on insects.

Overall, Merlins are opportunistic hunters that feed upon the most abundant and vulnerable prey available.
**Conservation Status**

The current world population of Merlins is between one-hundred thousand and one million birds.

In the 1800s Merlins declined in parts of their range as a result of persecution. The species suffered more serious declines in the 1950s, 1960s, and 1970s due to the widespread use of organochlorine pesticides including DDT. When Merlins consume prey containing pesticides such as DDT, these chemicals accumulate in a Merlin’s fatty tissues and subsequently reduce reproductive success through eggshell-thinning. Following bans on the widespread use of DDT in 1972, Merlin numbers began to increase in the 1970s and have continued to do so since. The species has experienced declines in some areas due to habitat loss and human disturbance. The species now breeds both in urban areas in the northern United States and in southern Canada. Urban areas are favorable breeding locations because they afford safe nest sites and abundant songbird prey.

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**Annual Fluctuations in Merlin Passage at Hawk Mountain Sanctuary (1934-2001)**

![Graph showing annual fluctuations in Merlin passage at Hawk Mountain Sanctuary (1934-2001).](image)

**Migration**

The Merlin is one of 26 North American raptor species that are partial migrants.

Like other falcons, Merlins often use flapping flight while migrating. The species also soars on mountain updrafts and on thermals, but apparently does not require them to complete its migratory journey. Merlins, which regularly undertake long water
crossings, fly in light rains as well as early and late in the day. In autumn, females precede males on migration. In spring, males precede females.

The migration patterns of the three North American subspecies differ considerably. Taiga Merlins are complete migrants. Each autumn, almost all members of this subspecies leave their breeding grounds and migrate to their wintering grounds in the western and southeastern United States, and the West Indies, Mexico, Central and northern South America. Black Merlins are typically sedentary. Only individuals breeding at the northernmost part of the subspecies range travel south, and these individuals generally overwinter within southern parts of the subspecies breeding range. Prairie Merlins are partial migrants. Many migrate to the southern United States and in Central America, but others, particularly individuals breeding in urban areas, where songbird prey are common in winter, remain on their breeding grounds.

Hawk Mountain’s long-term (1934-2002) average count for merlins is 46. The average count for the past ten years (1993-2002) is 134. The peak of the Merlin flight at the Sanctuary occurs in early October.
Top Ten List of Merlin Flight Days
at Hawk Mountain Sanctuary, 1936-2002

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<td>8 Oct 1941</td>
</tr>
<tr>
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Suggested Readings
II

Species Accounts

PDF of Northern Harrier account from:
Shuford, W. D., and Gardali, T., editors. 2008. California Bird Species of Special Concern: A ranked assessment of species, subspecies, and distinct populations of birds of immediate conservation concern in California. Studies of Western Birds 1. Western Field Ornithologists, Camarillo, California, and California Department of Fish and Game, Sacramento.
Breeding range of the Northern Harrier in California; numbers have declined at least moderately since 1944. Also occupies most remaining lowland areas of the state in the nonbreeding season, when numbers are swelled greatly by out-of-state migrants.
**Special Concern Priority**

Currently considered a Bird Species of Special Concern (breeding), priority 3. Included on both prior special concern lists (Remsen 1978, 2nd priority; CDFG 1992).

**General Range and Abundance**

Two subspecies: *C. c. cyaneus* in the Old World and *C. c. hudsonius* in the New World. Breeds widely but locally in North America from northern Alaska and Canada south to mid- and lower latitudes of the United States and northern Baja California. Occurs year round in much of its breeding range in the contiguous United States and locally in southwestern and southeastern Canada. Populations in Alaska, most of Canada, and much of the midwestern and northeastern United States are migratory and winter from southern Canada (locally) to Central America (MacWhirter and Bildstein 1996). As a breeder, appears to be most numerous in the prairies and plains from southern Canada to the Dakotas and Montana (Bildstein 1988). Using Christmas Bird Count (CBC) data, Johnsgard (1990) estimated the North American wintering population in 1986 to be 111,500 birds. This is likely a minimum estimate, because an unknown proportion of breeders within this range winter south of the United States, where CBC coverage is minimal, and because it excludes breeders in Baja California.

**Seasonal Status in California**

Occurs year round within breeding range in California. At least some breeding populations may be resident. The species occurs more broadly and in much greater numbers during migration and winter than during the breeding season, which extends from March through August (Loughman and McLandress 1994). The species appears to be nomadic, ranging widely, both within the breeding season and across years (Pavelka 1992, P. Bloom pers. comm.).

**Historic Range and Abundance in California**

The historic breeding range extended from the Modoc Plateau south to San Diego, mostly east and south of the humid northwest coast and west and north of the arid southeastern deserts (Grinnell 1915). Birds bred locally within this range, including near Mount Shasta City, Siskiyou County; at Point Reyes, Marin County; Pescadero, San Mateo County; Alviso, Santa Clara County; Modesto, Stanislaus County; near June Lake, Mono County; Los Banos, Merced County; near Salinas, Monterey County; Kings River (28 mi west of Tulare), Kings County; Dune Lakes, San Luis Obispo County; Buena Vista Lake, Kern County; Oxnard, Ventura County; Palos Verdes Hills, Los Angeles County; Corona, Riverside County; Chino, San Bernardino County; Bay City, Orange County; and San Diego, San Diego County (Grinnell and Miller 1944; CAS, MVZ, WFVZ egg set data). The known breeding range extended from about sea level near the coast to 8000 ft (2438 m) near June Lake. In the early 20th century, the species was considered a “common” breeder in California (Dawson 1923, Mailliard 1927, Willett 1912). Compared with winter, however, “relatively small numbers” remained in the state through summer to breed, and by the early 1940s the breeding population had declined substantially because of a great loss of suitable habitat (Grinnell and Miller 1944). Much of that suitable habitat was wetlands. Loss of California’s wetlands began in the mid-19th century, when farmers began diking and draining them for cultivation (Dahl 1990), and accelerated in the early 20th century, so that by 1939 at least 85% of the original acreage had been modified by levees, drainage, and water-diversion projects (Hartman and Goldstein 1994). Similarly, by 1945 about 70% of the state’s original native grasslands, another key habitat, had been lost to agriculture, urban development, livestock grazing, fire suppression, and exotic species invasion (Noss et al. 1995).

### Breeding Bird Survey Statistics for California

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Northern Harriers breed widely in this region. The centers of abundance are Shasta Valley, Butte Valley, Klamath Basin around Lower Klamath and Tule Lake NWRs, Modoc NWR and Pit River Valley, Surprise Valley, Big Valley, Honey Lake Valley, Sierra Valley, valleys of Mono and Inyo counties (Antelope, Adobe, Bridgeport, Long, Deep Springs, and Owens), and the Mono Basin. At Ash Creek and Honey Lake WAs in Lassen County, Loughman and McLandress (1994) located an average of 15 nests (13–18) per year in 1987–1989, for an average density of 8.2 nests per km².

Central Valley. Although most of its original habitat has been destroyed or degraded, this region still supports the majority of nesting harriers in California. Harriers there breed mainly at private or public wetlands or other reserves, as well as in some types of agricultural fields and pasturelands. In the Sacramento Valley at Gray Lodge WA and Sacramento, Delevan, and Colusa NWRs, Loughman and McLandress (1994) located 13 nests in 1987 and 11 nests in 1988, for a mean density of 5.0 nests per km². About 7–14 pairs of harriers breed annually at the Cosumnes River Preserve, Sacramento County (J. Trochet in litt.), and that county's BBA project (unpubl. data) found them in 69 widely scattered blocks.

In Suisun Marsh at Grizzly Island WA in Solano County, Loughman and McLandress (1994) located an average of 25 nests (12–72) per year in 1987–1992, for a mean density of 8.4 nests per km². Atlasters found harriers in 24 blocks in the Contra Costa County portion of this region and in 7 in the Alameda County portion (unpubl. data). In the San Joaquin Valley at Mendota WA in Fresno County, Loughman and McLandress (1994) found an average of 9 harrier nests (5–15) per year in 1987–1991, for a mean density of 5.9 nests per km². A recent decline in harrier abundance throughout the Central Valley is inferred by a significant loss of suitable breeding habitat (see “Threats” below).

Central coast. Harriers breed widely in this region. Atlasters found them in 48 blocks throughout the coastal lowlands in Marin County (Shuford 1993), in 13 blocks within the Sonoma County portion of this region, mostly along the Petaluma River and near Tubbs Island (Burridge 1995), and in 3 blocks, near the Napa Airport and Edgerley Island, in the Napa County portion of the region (Berner et al. 2003). Harriers were widespread in San Mateo, Contra Costa, and Alameda counties, where they occurred in 19, 9, and 16 atlas blocks, respectively (Sequoia Audubon Society 2001, unpubl. atlas data). In Santa Clara County, atlasters located harriers in 14 blocks along San Francisco Bay and in the Pajaro Valley (W. G. Bousman in litt.). In Santa Cruz County, harriers breed in coastal lowlands from near Swanton south to Wilder
Creek and in the foothills east of Watsonville (about 20 pairs, D. Suddjian in litt.). The only known breeding area in San Benito County is near San Felipe Lake (at least 1 pair, D. Shearwater in litt.). In Monterey County, where breeding numbers have declined in recent decades, atlarsers found harriers in 20 blocks, from Elkhorn Slough and the Salinas River mouth southeast through the Salinas Valley (Roberson 1993). The San Luis Obispo County BBA found harriers in 39 blocks, mostly inland (unpubl. data). In Santa Barbara County, harriers breed at Vandenberg Air Force Base (about 12 pairs) and at San Miguel Island (1–2 pairs, D. Compton in litt.).

Southern coast. The species’ range here is highly fragmented, and many local populations have been extirpated. In Ventura County, harriers are now restricted to a section of the Santa Clara River near Santa Paula, where they breed irregularly (<1 pair per year, W. Wehtje in litt.). In the Los Angeles County portion of the region, harriers were documented in 5 atlas blocks (unpubl. atlas data). In Orange County, harriers were found in 9 atlas blocks, primarily near the coast, and known breeding pairs have declined over the past 35 years, from about 10 to an average of <1 successful nest per year (Gallagher and Bloom 1997, P. Bloom pers. comm.). The species no longer nests in salt marshes (Sexton and Hunt 1979), at Seal Beach (Hall 1947), or the San Joaquin Hills (Hamilton and Willick 1996). Harriers breed irregularly in small numbers in western Riverside County (J. Green in litt.). An average of 3.2 birds per year were detected on the Moreno Breeding Bird Survey route (Sauer et al. 2005), from the Badlands through the Moreno Valley, and breeding was suspected at the San Jacinto WA in 2004 (J. Green in litt.) and Tripp Flats near Anza in 2003 (S. Myers in litt.). The region’s center of abundance is in San Diego County, where atlarsers found harriers in 75 blocks, primarily toward the coast and including Camp Pendleton, Los Peñasquitos Canyon, and the Tijuana River estuary (Unitt 2004).

Southern deserts. Suitable habitat is extremely limited in this region. Harriers breed in the Saline and Panamint valleys (1 pair each) and the Lake Grimshaw area near Tecopa (1 pair) in Inyo County (T. & J. Heindel in litt.) and in the Fremont Valley near Cantil in eastern Kern County (Heindel 2000). Although Harper Dry Lake in western San Bernardino County had long supported harriers, breeding has not been suspected there since the mid-1990s (S. Myers in litt.). The center of abundance in this region is northern Los Angeles County, where atlarsers found harriers in 8 blocks in the Antelope Valley and near Lancaster (unpubl. data).

**ECOLOGICAL REQUIREMENTS**

Northern Harriers breed and forage in a variety of open (treeless) habitats that provide adequate vegetative cover, an abundance of suitable prey, and scattered hunting, plucking, and lookout perches such as shrubs or fence posts. In California, such habitats include freshwater marshes, brackish and saltwater marshes, wet meadows, weedy borders of lakes, rivers and streams, annual and perennial grasslands (including those with vernal pools), weed fields, ungrazed or lightly grazed pastures, some croplands (especially alfalfa, grain, sugar beets, tomatoes, and melons), sagebrush flats, and desert sinks (MacWhirter and Bildstein 1996, J. Silveira in litt., J. Seay in litt.). Harriers nest on the ground, mostly within patches of dense, often tall, vegetation in undisturbed areas (MacWhirter and Bildstein 1996). Plant species composition varies by site, and the average height of vegetation surrounding nests varies regionally and annually (Loughman and McLandress 1994).

Harriers feed on a broad variety of small- to medium-sized vertebrates, primarily rodents and passerines. Species taken and the proportion of mammals to birds probably vary locally and annually with abundance and availability. In many areas, voles (Microtus spp.) are the most common prey (Bildstein 1988). Wet habitats, including irrigated agriculture, tend to support large numbers of California Voles (M. californicus; Krebs 1966), a key food item in California. Waterbirds, primarily American Coots (Fulica americana), are common prey in the Klamath Basin (D. Mauser in litt.). Of 438 food items delivered to four nests in San Luis Obispo County, 80.6% were birds (mostly blackbirds and sparrows), 18% mammals (mostly Brush Rabbits [Sylvilagus bachmani] and California Voles), and 1.4% reptiles (mainly Western Fence Lizards [Sceloporus occidentalis]; Selleck and Glading 1943).

Although generally monogamous, Northern Harriers may also be polygynous, with harems of two to five females, especially in years of high prey abundance (MacWhirter and Bildstein 1996).

**THREATS**

The primary threats to breeding harriers are loss and degradation of nesting and foraging habitat and nest failure from human disturbance, predator-control projects, agricultural practices, and...
Northern Harrier

unnatural predation pressure. California’s wetlands continue to be lost at an average rate of over 2000 ha per year (Noss et al. 1995). From 1992 to 1997, rural land in the state was lost to development at an average rate of 45,592 ha per year (American Farmland Trust 2004). Likewise, an average of 33,451 ha of agricultural land was converted to developed uses each year from 1992 to 1997. Conversion of pastureland and suitable crops, such as alfalfa, to unsuitable crops, such as vineyards and orchards, poses a substantial threat to nesting harriers in the Central Valley (e.g., Schweizer and Chesemore 1996) and has resulted in local extirpations in other areas (e.g., at Harper Dry Lake, S. Myers in litt.). In addition, overgrazing, haying, agricultural intensification, and the widespread use of rodenticides can degrade habitat by reducing numbers of small mammals on which harriers depend (MacWhirter and Bildstein 1996, Schweizer and Chesemore 1996). Decreasing water supplies may be a rising threat to harrier nesting habitats statewide. Recent water shortages in the Klamath Basin, for example, have reduced water allocations to federal wildlife refuges, resulting in diminished wetlands during the breeding season (D. Mauser in litt.).

Human disturbance is a source of nest failure throughout most of the species’ range in California. People walking or recreating near nests, off-leash dogs, and off-highway vehicles are the main sources (Burridge 1995, Unitt 2004). In coastal California, another important threat is predator management aimed at protecting imperiled Light-footed Clapper Rails (Rallus longirostris levipes), coastal Western Snowy Plovers (Charadrius alexandrinus nivosus), and California Least Terns (Sterna antillarum browni), which annually results in the loss of adult harriers and losses in their productivity (P. Bloom pers. comm., K. Neuman pers. comm.). Such management often occurs in areas where habitat loss, human disturbance, and unnatural predation levels have already taxed harrier populations (P. Bloom pers. comm.).

Ground nests of harriers are highly vulnerable to trampling by livestock, haying, plowing, flooding, and fire associated with some agricultural operations and management activities (MacWhirter and Bildstein 1996, Hunter et al. 2005, D. Shearwater in litt.). Predation of eggs and young by non-native Red Foxes (Vulpes vulpes) is a growing threat, and feral cats and dogs place increasing pressure on harriers attempting to nest near urban areas (Roberson 1993, Gallagher and Bloom 1997). Contamination of the food chain by organochloride pesticides, especially DDT, was a threat in the mid-20th century, when it resulted in reproductive failure and population declines in harriers in North America (MacWhirter and Bildstein 1996). Following the regulation of DDT in the early 1970s, however, harrier populations recovered relatively quickly.

**MANAGEMENT AND RESEARCH RECOMMENDATIONS**

- Minimize human disturbance near nesting areas, restricting public access as necessary during the breeding season.
- Reduce livestock impacts on nesting success by limiting their access to harrier nesting areas, especially during the breeding season.
- Maintain a mosaic of large undisturbed habitats for nesting and foraging, particularly of those with an abundant prey base, for example, abandoned fields, active alfalfa fields, wet grasslands, fields with dense green and residual vegetation.
- Practice rotational grassland management, leaving some sections idle each year.
- Delay haying and plowing when possible until after nestlings have fledged (ca. mid Jul).
- Avoid raising wetland water levels during the nesting season to prevent flooding nests of harriers and other ground-nesting species.
- Conduct long-term studies on survival, reproduction, dispersal, and other factors limiting harriers in California; especially determine whether reproduction and survival differ between birds using natural habitats (wetlands and grasslands) and those using anthropogenic habitats (croplands and pasturelands).
- Study the effects of patch size and fragmentation on habitat use and nest success.
- Investigate the effects of environmental contaminants, including insecticides and rodenticides, on harriers and on their prey populations.

**MONITORING NEEDS**

A reliable annual statewide monitoring program for harriers is needed because present methods are inadequate. The Breeding Bird Survey is insufficient for species such as the harrier that occur in relatively low abundance, and CBC data are coarse and do not cover the California breeding population, which is the one of concern. Harriers probably are best monitored using road or foot survey routes stratified by habitat. Routes should be surveyed at least once a month from March
through August to determine site occupancy and document breeding evidence. Reproductive success in high-density nesting areas (e.g., state and federal refuges) also should be monitored to gauge whether actions are needed to enhance success.

ACKNOWLEDGMENTS


LITERATURE CITED


Schweitzer, T., and Chesmore, D. L. 1996. Recent and historical raptor populations in Fresno, Madera, and...
California Bird Species of Special Concern


Formerly known as the “marshhawk,” the northern harrier (*Circus cyaneus*) is the only harrier found in the NWT. Similar in size (46-56 cm tall) to Swainson’s hawk, it can be identified by a distinctive white rump patch. The male is slate grey in colour while the dark brown plumage of the female allows her to remain camouflaged as she sits on her nest, which is located on the ground amongst marshland shrubbery.

Four to six eggs are laid in late May. Northern harriers are very sensitive to disturbance and will quickly desert their nests if they are bothered during the incubation period. The adults feed themselves and their offspring small rodents, frogs, birds and insects from the marshes. The eyasses learn to fly once they are 37 days old and precede the mature birds to the wintering grounds throughout southern Canada and the USA.
Informative site containing information on Osprey. This specialist raptor, also known as the Fish Eagle, Sea Hawk or Fish Hawk, Osprey are a medium sized raptor, Latin Name: Pandion Haliaetus.

The Osprey
(Pandion Haliaetus)

Food
When an Osprey spots a fish from the air, it hovers at a height of 10 to 30 m until the fish is in a suitable position. Then, in a dramatic performance, the bird, huge yet wonderfully light, dives from the sky with its wings half closed and claws stretched forward, and disappears under the surface in a great spray of water, usually reappearing a few seconds later with a fish firmly clutched in its claws. Fortunately, the

Distribution and Habitat
Osprey’s plumage is fine and dense, particularly on its feet, so that the bird does not get very wet.

The Osprey carries its catch headfirst in flight, using both feet to hold all but the smallest fishes. Ospreys can’t swim and have been known to drown, especially if they get their talons stuck in too large a fish and can’t take off.

After taking off with fish locked in talons, the Osprey will turn the fish so that the aerodynamic head of the fish is facing forward.

The Osprey are truly a global bird inhabiting all continents except Antarctica. Their diet consists solely of fish, therefore they live close to water ways. Osprey's have a wide distribution because they are able to live almost anywhere where there are safe nest sites and shallow water with abundant fish. Nests are generally found within 3 to 5 km of a water body such as a salt marsh, mangrove swamp, cypress wamp, lake, bog, reservoir or river. The frequency with which each of these habitat types is used varies by geographic region.

Because the osprey's habitat is always closely associated with bodies of water; nests are most commonly in dead or open-topped trees, barring artificial nesting sites, they will need on artificial purpose built platforms, as well utility poles.
OSPREY *Pandionidae*

- Species in family 1
- Species observed [DR] 1 (100%)
- Species photo'd [DR] 1

The Osprey (left, in a fine shot by John Van de Graaff) has traditionally been considered to belong to its own monotypic family, the Pandionidae. This arrangement emphasizes several unique features of this "fish-hawk:" numerous adaptations for a life of fishing (reversible outer toe, spiny foot pads, nasal valves that close underwater, and more). Its fossil record goes back 15 million years (Poole 1994), and its adaptations as a fish-eating specialist have made it one of the most successful birds on earth. It has one of the widest ranges of all birds — it is found on every continent (except Antarctica). In the Old World it breeds as far north as Norway and as far south as Australia, and winters widely in Africa. In the New World it breeds from Alaska to the Caribbean, and winters in South America. It eats both freshwater and saltwater fish, permitting it to exist in a very wide range of water-margin habitats.

Because it is so widespread and is conspicuous around the margins of lakes, swamps, and on coastlines, Ospreys have been widely studied, and much is known about their ecology, behavior, biology, and migrations. Bretagnolle & Thibault (1993), for example, conducted a two year study on Osprey communications on Corsica. The identified 11 visual displays that are used to communicate in a semi-colonial environment without feeding territories. Protecting the young in the large exposed nests (bulky nests built atop drowned trees in many cases) is a key element in these communications.

Poole (1994) lists four subspecies of Osprey: migratory populations in North America and Asia (*P.h. carolinensis* and nominate *halietus*, respectively) and two non-migratory populations (*P.h. ridgwayi* in the Caribbean; *cristatus* from Java and New Guinea through Australia). Poole (1994) points to an interesting fact: despite its long history, Osprey has not evolved into different species. The fish-eating *Haliaeetus* sea-eagles, in contrast, have evolved into 8 separate species over a range nearly identical to that of the Osprey. Most of these eagles are, however, non-migratory, allowing for isolation and speciation. The long-distance migration of much of the Osprey population has permitted interchange between populations and less chance for subspecies to become isolated and evolve as species over time. As it is a worldwide bird, this is surely the easiest of all monotypic families to locate!
The Osprey's wings are long and rather narrow (right), and held sharply angled at the carpal joints. This wing structure allows for long migrations on strong wingbeats and short glides, rather than a reliance of thermals. The large black carpal patches and the black line through the eye to the hindneck are its most distinctive plumage patterns. It is always very impressive to watch an Osprey hunting low over a lake, and then grabbing a large fish with its feet! Sometimes it then has to battle aerial pirates — including Bald Eagles — to bring the fish to a favored perch for consumption.

The local status of Osprey has been of some concern in many locales. Major declines in the northeastern United States in the 1960s-1970s were tied to DDT and other pesticides. After the banning of DDT, there were major efforts to re-establish Ospreys in coastal lagoons along all of the east coast by building nesting structures; today an International Osprey Society continues these efforts (webcams at nest sites are featured from time to time. Where I live in Monterey County, California, Osprey is a scarce but widespread migrant and winter visitor. A few winter on Elkhorn Slough every year. This is near where nesting was known, just over the border in Santa Cruz County, a century ago. Efforts to have nesting Ospreys in Monterey County (e.g., by building nest platforms at Elkhorn Slough Estuarine Reserve) have yet to succeed, but I wouldn't be surprised to learn of a nest here or somewhere on Lake San Antonio sometime in the future (see Roberson 2002 for more on local status).

Photos: The headline Osprey Pandion haliaetus photo was taken by John Van de Graaff in the Florida Everglades in Dec 2001. The photo of the Osprey in flight was at San Blas, Mexico, in Mar 1987. All photos © D. Roberson except that photo © John Van de Graaff; all rights reserved.

Bibliographic note

Poole (1989) is an entire book on the life history and ecology of Osprey; we might think of it as a family book. An excellent introduction to this family, incorporated much research and extensively illustrated with great photos, is in Poole (1994).

Other literature cited:


Osprey
*Pandion haliaetus*

**Status:** LOWER RISK

**Population Trend:** Stable.

**Other Names:** American Osprey (*carolinensis*), Bahama Osprey (*ridgwayi*), Eastern Osprey (*Pandion cristatus*), Fish Hawk.

**Distribution:** Afrotropical/Australasian/Indomalayan/Neartic/Neotropical/Oceanian/Palearctic. Virtually cosmopolitan, breeding throughout most of northern Palearctic with smaller populations in southwestern Europe and outlying islands, throughout most of the Neartic from northcentral Alaska to northern coastal MEXICO (Nayarit), CUBA, BAHAMAS, and off BELIZE, throughout the Middle East and coastal areas of northern Africa, and in most coastal areas of the Indomalayan and Australasian regions. Non-breeding individuals occur south to Central and South America, West Indies, throughout sub-Saharan Africa, and various Pacific islands. more....

**Subspecies:** 4 races. *P. h. carolinensis*: North America (ALASKA east to Labrador and south through UNITED STATES to Florida and northwestern MEXICO); CUBA, BAHAMAS; winters from MEXICO south to PERU and southern BRAZIL and West Indies; *P. h. cristatus*: SULAWESI and JAVA east to SOLOMONS and NEW CALEDONIA and south to NEW GUINEA and coastal AUSTRALIA; *P. h. haliaetus*: SCANDINAVIA and SCOTLAND east through Europe and Asia to Russian Far East, KAMCHATKA, and JAPAN (Hokkaido) south to the Mediterranean, Red Sea, and CAPE VERDE ISLANDS; winters south to SOUTH AFRICA, INDIA, western INDONESIA, and PHILIPPINES; *P. h. ridgwayi*: Caribbean region, including CUBA (offshore islands, Zapata Swamp), southern BAHAMAS, and keys off BELIZE. more....

**Taxonomy:** The Osprey has often been placed in its own monotypic family, Pandionidae (American Ornithologists’ Union 1983, del Hoyo et al. 1994, Ferguson-Lees et al. 2001), but other authorities have treated it as a subfamily within the Accipitridae (Stresemann and Amadon 1979, Sibley and Monroe 1990, Dickinson 2003, AOU 2008). The latter treatment was supported by the analysis of Seibold and Helbig (1995), based on molecular sequences of the the mitochondrial cytochrome b gene. In contrast, the cytochrome b DNA studies of Wink and Sauer-Gürth (2000, 2004) indicated that *Pandion* is sufficiently distinct to be maintained in its own family, and this was also the recommendation of Lerner and Mindell (2005), using both mitochondrial and nuclear DNA sequences. Wink and Sauer-Gürth (op
cit.) found "substantial genetic differences" between New World, Eurasian, and
Australasian Ospreys, and they suggested that they might be treated as three
separate species. This recommendation has been followed so far only by Christidis
and Boles (2008), who recognized *P. cristatus* as a full species to be called the
"Eastern Osprey." more....

**Movements:** Complete migrant (Bildstein 2006). Northern populations are long-
distance, trans-equatorial migrants, and the satellite transmitter tracking of the
movements of European and North American Ospreys breeding populations has
provided a wealth of information about their migratory routes and winter ranges.
juveniles and a few older birds often spend their entire first and second years in
tropical portions of Africa, South America, and probably Southeast Asia. The
breeding population in Europe winters in sub-Saharan Africa, except for a few that
remain in the Mediterranean Basin. Most of the birds breeding in the
Mediterranean basin and northern Africa are probably sedentary (Thévonnot et al.
2003). The breeding population in the eastern United States tends to migrate
through the West Indies to Panama and South America (Henny and Van Velzen
1972, Kennedy 1973), and birds from the western United States typically migrate
along the Pacific coast of Central America (Melquist et al. 1978). Ospreys are
largely sedentary in Australia, but adults occasionally leave coastal areas to travel
along inland waters during autumn (Blakers et al. 1984). more....

**Habitat and Habits:** Occurs around bodies of still or slow-flowing water,
including fresh water and salt water, of any size. Generally, most birds in the
northern portion of the Palearctic range are dependent on freshwater feeding, and
those at lower latitudes and in warmer waters tend to forage in the sea (Marquiss
et al. 2007). In Australia, it occurs in mangroves, coastal islands, reefs, estuaries,
and occasionally along larger inland rivers and billabongs (Olsen et al. 1993).
Perches in conspicuous locations on trees or power poles. Usually seen singly, or
in pairs, and rarely in small parties. Largely diurnal, but also may hunt by moonlight
(Olsen et al. op cit.). more....

**Food and Feeding Behavior:** Almost entirely piscivorous, but occasionally
takes other prey, including snakes, birds, frogs, reptiles, marine and terrestrial
mammals, crustaceans, and other invertebrates (Olsen et al. 1993). Ospreys
generally search for fish in soaring or flapping flight, swooping down to take prey,
and they rarely search from perches. They often hover with dangling legs at a
moderate height before plunging into water to take a fish with their long, curved
talons. The final approach is not vertical, but rather at virtually parallel planes to the
water surface (Remsen 1990). They may also fly low over calm water surfaces with
their legs extended and feet dragging in the water intermittently, a maneuver which
apparently causes fish to move or jump (Dunstan 1974). Captured prey is carried
to a perch, where it is consumed, or to the nest, which is used as a feeding
platform during the non-breeding season (Debus 1998). more....

**Breeding:** Territorial and nests in dispersed pairs. Builds a large stick nest lined
with seawood, bark, leaves, or grass and placed in a deciduous or coniferous tree,
or on a power pole, rocky promontory, offshore stacks of rocks, or on the ground.
The same nest is re-used each season with both birds adding material, and some
structures reach enormous size. Clutch size is 2-4 eggs, which are white with bold
reddish-brown and dark brown spots and blotches. They are laid at intervals of one
to three days, and incubation is largely by the female. The incubation period in
Australia is 35-38 days (Debus 1998, Kennard and Kennard 2006), and the
nestling period is 71-76 days (Clancy 2006, Kennard and Kennard op cit.). The
female broods the young and feeds them, and the male parent brings fish to the
nest when the chicks are small. Juveniles remain dependent on their parents for
two or three months after fledging and then disperse widely (Debus op cit.). There
is only one brood, but new nesting attempts may be made after early failures.

http://www.globalraptors.org/grin/SpeciesResults.asp?specID=8308

11/17/2010
Conservation: The Osprey suffered significant population declines in many parts of its range during the 1950s-1960s as a result of DDE-induced eggshell thinning, but it is now relatively common and still increasing in many areas. However, the wholesale shooting of birds wintering in tropical countries, especially Latin America and the West Indies, remains a serious problem. The Osprey is classified globally as a species of "Least Concern" by BirdLife International.

Population Estimates: Poole (1989) estimated the world population at 25,000-30,000 breeding pairs, but the population obviously far exceeds those figures by now. The European population was estimated at 8,000 to 10,000 breeding pairs by BirdLife International (2000) and later at 7,500 to 11,000 breeding pairs (BirdLife International 2004). Mebs (2002) estimated the European breeding population at ca. 9,000 pairs, of which more than 80% were in Fennoscandia and eastern Europe, especially Sweden, Russian and Finland.

Important References:

Sites of Interest:
The Osprey Foundation
Devoted to the Osprey in Finland.
The International Osprey Foundation
A non-profit, U.S.A.-based group devoted to education about the Osprey and its conservation; nice photo gallery.
LPO Mission Rapaces, Balbuzard Pecheur

http://www.globalraptors.org/grin/SpeciesResults.asp?specID=8308
As a team from the League for the Protection of Birds (LPO), this group is dedicated to the maintenance, restoration, and conservation of birds of prey in France.

**Rutland Ospreys**
A project to reintroduce Ospreys to Central England.

**Xeno-canto**
Vocalizations.

**Aves de Rapina do Brasil**
Species account, with emphasis on the Osprey in Brazil.

**Lake District Osprey Project**
Follows the fortunes of the breeding Ospreys at Bassenthwaite Lake.

**VIREO**
Osprey photos.

**Highland Foundation for Wildlife**
Supports a wide variety of conservation projects and research studies on Ospreys.

**Osprey migration maps**
A fascinating site created by Rob Bierregaard to monitor the migration routes of young Ospreys satellite-tagged at nests in Massachusetts and other Eastern states.

**Michigan Osprey webcam**
An Osprey nest webcam located at Ferris State University, Big Rapids, Michigan.

**EuropeanRaptors.org**
Species account, emphasizing European populations.

**Loch Garten Ospreys**
Details on satellite tracking of Ospreys fledged from the Loch Garten area of Scotland.

**Finnish Museum of Natural History**
Details of tracking the movements of a Finnish Osprey.

**Researchers:**
- Afan, Donald
- Baquero Palma, Fernando Hernandez
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- Bierregaard, Richard O. "Rob"
- Dabhi, Pratik
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- Goodrich, Laurie
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- Henny, Charles ("Chuck")
- Koskimies, Pertti
- Le Manh, Hung
- Mealey, Brian
- Meyburg, Bernd-U.
- Moore, Stan
- Schröpfer, Libor
- Sharpe, Peter

*Last modified: 11/3/2010*

**Recommended Citation:** Global Raptor Information Network. 2010. Species account: Osprey *Pandion haliaetus*. Downloaded from [http://www.globalraptors.org](http://www.globalraptors.org) on 17 Nov. 2010
MEASUREMENTS: The Prairie Falcon has a body length of 15 - 20 inches, a 3 1/2 foot wingspan, and weighs 1 - 2 pounds.

HABITAT: Prairie Falcons inhabit hills, canyons, and mountains of arid grasslands and shrub-steppes of southwestern Canada, western United States, Baja California, and northern Mexico.

DIET: The primary food of Prairie Falcons is small mammals, especially ground squirrels, but they will also hunt birds, reptiles, and insects. This falcon actively searches for prey during flight. Prairie Falcons catch prey on or close to the ground after a low angled swoop from above.

REPRODUCTION: Typically, Prairie Falcons nest on a cliff face using a ledge, cavity, crevice, or an abandoned nest of eagles, hawks, or ravens. Prairie Falcons lay 3 - 6 eggs with an incubation time of about 34 days. Young falcons leave the nest 5 - 6 weeks after hatching.

NAME DERIVATION: The scientific name comes from the Latin word falco, meaning hook-shaped (falcate) and may refer to the beak and claws, and the Latinized name for Mexico, where the bird was first collected for scientific study. The common name mistakenly refers to the habitat in which this bird may be found. True prairies are mostly outside this bird’s range.

INTERESTING FACTS:

- Prairie Falcons are probably just as fast as Peregrine Falcons, but do not typically use the same hunting strategy.

- Prairie and Peregrine Falcons are similar in size and can be distinguished from each other by color. The Prairie Falcon is brown and has dark “armpits” or dark patches under the wings, while the Peregrine is blue-gray and has a uniform underwing color pattern.
II

SPECIES ACCOUNTS

PDF of Purple Martin account from:
Shuford, W. D., and Gardali, T., editors. 2008. California Bird Species of Special Concern: A ranked assessment of species, subspecies, and distinct populations of birds of immediate conservation concern in California. Studies of Western Birds 1. Western Field Ornithologists, Camarillo, California, and California Department of Fish and Game, Sacramento.
Current and historic (ca. 1944) breeding range of the Purple Martin in California; occurs more widely in migration. Breeding generally is highly localized, especially inland and along the central and southern coast. Mapped range includes potential habitats (mostly forested areas with few European Starlings) where breeding may be possible now or in the future as a result of habitat creation through intense fire. Numbers have declined greatly and the range has retracted moderately, particularly in lowland areas such as the Central Valley and the southern coast; never known to breed on the floor of the central and southern San Joaquin Valley.
**Studies of Western Birds**

**Special Concern Priority**

Currently considered a Bird Species of Special Concern (breeding), priority 2. Included on both prior special concern lists (Remsen 1978, 2nd priority; CDFG 1992).

**General Range and Abundance**

The Purple Martin is broadly distributed throughout much of eastern North America and occurs locally in the Rocky Mountains, Sonoran Desert, Central Mexico, and Pacific Coast states and provinces. Of three recognized subspecies, *P. s. arbo ricola* was described from the Great Basin ranges (Behle 1968) and has been assumed to occur in the southern Rocky Mountains and Pacific states and British Columbia (Brown 1997). Pacific martins are considered *P. s. arboricola* by some (Phillips 1986, Pyle 1997), *P. s. subis* by others (Unitt 1984, Browning 2002). Recent mitochondrial DNA analysis shows strong differentiation between Pacific martins and eastern birds designated as *P. s. subis* (Baker et al. in press.), but subspecific taxonomy of western populations remains unclear. Regardless, about 3500 pairs breed in the Pacific states and British Columbia (WPMWG 2005). No comprehensive estimates exist for the Rocky Mountain and Intermountain regions, but 250–500 pairs are estimated to nest in Colorado (Kingery 1998). All subspecies apparently winter in South America.

**Seasonal Status in California**

Occurs as a summer resident and migrant, primarily from mid-March to late September. Breeds from May (rarely late Apr) to mid-August (Williams 1998).

**Historic Range and Abundance in California**

Grinnell and Miller (1944) described martins as “fairly common” and widely but irregularly scattered throughout California west of the Great Basin, Mojave, and Colorado deserts and from sea level to 5900 ft (1798 m) elevation. They noted “some indication of spreading to occupy certain districts built up by people in recent years” and that total numbers of martins were probably increasing. Populations presumably remained stable or increased from the 1940s to 1960s and 1970s, during which time occurrence was more extensively documented.

Based on William’s (1998) review of historical records, until the 1960s to 1970s martins occurred locally in greatest abundance in coastal portions of northwestern California, and breeding was confirmed at scattered localities throughout the region. Martins bred locally in the Modoc Plateau, Cascade Range, and Sierra Nevada, and throughout most of the central coast region. They occurred through much of the northern Central Valley, where they nested in riparian habitats and in urban buildings. Lack of nesting records from south of Stockton suggests they were rare or absent on the floor of the San Joaquin Valley. Martins were reported as regular in the Tehachapi Mountains and numerous locally in southern coastal counties, where they nested in conifer, woodland, and urban areas.

**Recent Range and Abundance in California**

Purple Martins are widely but locally distributed in forest and woodland areas at low to intermediate elevations throughout much of the state. The BBS shows no significant long-term population trend for California (Sauer et al. 2005), possibly in part because martins are too rare to be reliably surveyed by this technique (i.e., recorded on only 19 routes, 1968–2004, and averaging <6 individuals per year on all surveys). The decline during 1968–1979, the period of increase of the non-native European Starling (*Sturnus vulgaris*) is marginally significant, and martin detections ceased on southern California routes during this period. Populations are densest in central and northern coastal conifer forests and smaller and more localized in the Sierra Nevada, interior foothills, and southern California. The species’ range has contracted substantially on the central and southern coastal slope and in the Central Valley (see map), and probably,

**Breeding Bird Survey Statistics for California**

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294 **Species Accounts**
at least locally, in the Sierra Nevada and Cascades. Its abundance has declined substantially from that described by Grinnell and Miller (1944) in these regions and, to a lesser degree, in the Tehachapi Mountains and interior portions of the current range in northwestern California. Several regional populations have shrunk substantially, and martins are now virtually extirpated from most interior and south coastal lowland areas, presumably by nest competition from the European Starling. A significant remnant population in Sacramento, however, appears to be generally stable (Airola et al. 2004), although declines occurred annually during 2005–2007 (Airola and Kopp 2005, 2007; Airola unpubl. data).

This status discussion is based on Williams’s (1998) review, unless otherwise noted. Records before about 1980 do not reliably indicate current status because of the substantial recent effects of starling competition, except perhaps in forested regions where starlings are still not abundant. The starling arrived as a breeding species in the state in the early 1960s (Garrett and Dunn 1981) and increased rapidly in many areas through the 1970s but has since remained relatively stable or declined slightly in the state overall (Sauer et al. 2005). This summary reports only individual occurrences of martins that support substantial populations (especially those since Williams’s summary) and those that illustrate larger patterns of status and occurrence.

Our statewide population estimate of 900 to 1350 pairs is rough because martins are widely but locally distributed and occupy some sites that are suitable only temporarily (i.e., recently burned and logged areas). The ranges for population estimates for the state and its subregions are based mainly on records from 1980 to 1994, summarized by Williams (1998), supplemented with limited later information. The lower end of the range for each region is the known number of recent nesting pairs; the upper end is the potential nesting population. The latter is based on the availability of suitable unsurveyed habitat (Williams 1998) and the potential for underestimating numbers during casual surveys (Airola and Grantham 2003).

Northwestern California. With a population currently totaling 350–800 pairs from 14 counties, martins are more numerous and uniformly distributed in this region than elsewhere in the state. They are concentrated in Redwood (Sequoia sempervirens) forests near the coast but occupy many inland areas except at the highest elevations and the inner Coast Ranges. Most martins here breed as pairs or small groups, larger concentrations (>8 pairs) have been reported since 1980 at Red Hills Road, Lake County (Woodward and Woodward 2005); the Highway 1 bridge at Gualala River, Sonoma County; Howell Mountain and Palisades, Napa County; and Shelter Cove, Humboldt County. The Humboldt Breeding Bird Atlas found martins in 18% of all blocks, with most at low to mid elevations in the coast Redwood zone in the west-central portion of the county (Hunter et al. 2005).

Northeastern California. This area supports about 18–80 pairs, with recent breeding records only in Siskiyou, Shasta, and Modoc counties. The major nesting area is Lava Beds National Monument, Siskiyou County, where 21 pairs were recorded in 1979, but not more than 14 pairs were recorded since in limited surveys (Hill et al. 2002, D. Larson pers. comm.). Otherwise, only one or a few pairs have occurred at a few sites since the 1990s, and martins may have disappeared from several known sites (e.g., Eagle Lake and Willow Creek Valley, Lassen County).

Central Valley. Martins nested in buildings and riparian habitats from Stockton in the Sacramento–San Joaquin River Delta north through the Sacramento Valley through the 1960s to early 1970s. Following the arrival and increase of the European Starling, they were extirpated in this region except in the city of Sacramento, where they have persisted by nesting in hollow-box bridges. The Sacramento colonies probably represent some of the species’ largest in the western United States. From 1992 to 2004, the known Sacramento population increased 65%, from 105 pairs at 4 colonies to 173 pairs at 11 colonies (Airola and Grantham 2003, Leeman et al. 2003, Airola et al. 2004). A decline of 40% during 2005–2007 to 106 pairs (Airola and Kopp 2007, Airola unpubl. data), however, has raised renewed concerns for these urban colonies.

Cascade Range, Sierra Nevada, and Tehachapis. Currently, the total for the Cascades is about 35–125 pairs from seven counties. Recent breeding sites are primarily in Shasta County, including the Pit River arm of Shasta Lake (which consistently supported at least 14–19 pairs from 1978 to 2001; Williams 1998, Hill et al. 2004), near Burney, and a few other sites.

Martins have nested continuously in the Sierra Nevada in very small numbers and currently total about 10–140 pairs. Recent known nesting sites are widely scattered, and each supports few individuals.

The Tehachapi Mountains, with 100–200 pairs, may represent the last place in California
where martins regularly nest in oak woodland. The southern Tejon Ranch/Grapevine area supported an estimated 40–100 pairs in 1982; a partial survey of the Bear Mountain area found 56 pairs in 2000 (Williams 1998, 2002), and martins were absent in former nesting areas where starlings are now abundant.

Central and southern coast. Martins are very local now on the central coast and confined to conifer regions, primarily on the immediate coastal slope. Currently, the regional population totals about 100–220 pairs. Nesting occurs on coastal ridges of Marin County, few or no pairs still breed in the East Bay, and very few pairs still nest at various sites in the Santa Cruz Mountains. In Monterey County, martins nest mainly in the coastal Redwood forest and in bridges along Highway 1, but are gone from all other former sites (Roberson 2002). A few sites in Monterey, San Luis Obispo, and Santa Barbara counties appear to be the last places where martins still nest in Western Sycamore (Platanus racemosa) woodland.

In southwestern California, martins are very rare in the Transverse Ranges (western Transverse Ranges, San Gabriel, and San Bernardino Mountains). In the Peninsular Ranges, they are rare in the Santa Ana and San Jacinto mountains and most abundant in the Palomar Mountains and, particularly, the Laguna and Cuyamaca mountains of San Diego County. A county-wide survey in Los Angeles County in 2002 detected only two martins (K Garrett pers. comm.). Currently, the regional population totals about 130–190 pairs from eight counties; during the 1997–2000 San Diego County atlas, an estimated 100 pairs were confined to 7% of all atlas blocks (Unitt 2004). Use of sycamores by martins was last reported in Orange County at Irvine Park in 1962 and O’Neill Park in Trabuco Canyon in 1981, and the small lowland population of San Diego County, where nesting was in sycamores at least near San Onofre, was last reported extant in 1978 (Unitt 2004). Recent large fires in forested areas in San Diego County and elsewhere in southern California, particularly in 2003, may increase nesting habitat, but wetland habitats that produce abundant martin prey have been eliminated from much of this region.

ECOLOGICAL REQUIREMENTS

Martin requirements have been deduced from their distributional patterns and recent studies in habitat selection (Williams 1998, 2002; Airola and Grantham 2003). Common to all nesting areas are concentrations of nesting cavities, relatively open air space above accessible nest sites, and relatively abundant aerial insect prey. Martin distribution and abundance is most consistently determined by nest-site availability. New locations are colonized following an increase in nest sites, and local extirpations usually result from loss of nest sites or competition from starlings. Martins use a wide variety of nest substrates (e.g., tree cavities, bridges, utility poles, lava tubes, and, formerly, buildings), but nonetheless are very selective of habitat conditions nearby. Typical of all sites is low canopy cover at the nest height (usually <20% within 100 m). Also, most tree nest sites are located in the upper slopes of hilly and mountainous terrain. Martins seldom use snags along canyon bottoms or sites with dense vegetation at or above nest height.

Martin distribution also appears to be influenced by the availability of aerial insects, especially large ones such as dragonflies. Thus, martins are most abundant in mesic regions, near large wetlands and other water bodies, and at upper slopes and ridges, which likely concentrate aerial insects. Starlings must be present in low densities or absent, or nest sites that discourage starling use must be available (e.g., in bridges; Airola and Grantham 2003). In conifer regions, martins are most numerous in low- to midelevation forests (from sea level to 6000 ft [1829 m]) such as Redwood, yellow pine (Pinus ponderosa, P. jeffreyi), and mixed conifer. Conifer snags (occasionally dead-top trees and hardwood snags) are the most common nesting substrate, used by perhaps >70% of the California population; martins select very tall, large trees (medians for height = 22 m and diameter [at breast height] = 119 cm; Williams 1998). Stand-replacing fire is the main process that creates martin habitat by creating snags and open terrain. In coastal areas, however, martins also use remnant Redwoods that stand above regenerating forest or are made accessible by logging, including clear-cutting (B. Williams pers. obs.). Population persistence in forested areas appears to depend on the presence of clusters of large snags or individual very large snags that can support multiple pairs.

Nearly all woodland nesting sites support concentrations of very large trees, primarily Valley Oaks (Quercus lobata) and sycamores. However, martins have disappeared from nearly all otherwise suitable foothill and lowland Valley Oak and sycamore riparian habitats, presumably because of starling competition. Martins persist in oak habitats only in the Tehachapi Mountains, where
large oaks occur at relatively high elevations and in prominent positions, and where starling numbers are low (Williams 2002).

Systematic data have been collected at bridge nesting areas only in Sacramento (Airola and Grantham 2003). Bridge sites are of steel and concrete box girder design that support an abundance of vertical “weep holes” on the undersides, which martins use to enter large interior chambers. Occupied bridge sites in Sacramento are longer spans (mean = 301 m, minimum = 85 m) with at least 6.5 m of vertical space beneath weep holes. They also are in open areas that provide adequate flight access and perches on utility wires, fences, and light poles (seldom trees). None are above freeways or other roadways with high traffic volumes. Starlings are absent from, or nest only in small numbers at, all occupied bridge sites. By readily using interior holes, Sacramento martins appear to avoid competition with starlings, which strongly favor holes near the outer edges of bridges (Airola and Grantham 2003, Airola unpubl. data). Coastal bridge sites along State Route 1 are generally near suitable forest habitat but are not overgrown and thus provide ample flight access.

On the Modoc Plateau, martins nest in collapsed lava tubes (Hill et al. 2002). No systematic habitat data have been collected, but martins may respond to opening size, depth, surrounding vegetation height, availability of cavities, and landscape position.

**Threats**

In midelevation forests in much of the state, removal of large snags in suitable ridge and upper slope areas continues to reduce opportunities for martin establishment. Incidence of stand-replacing fire, which is increasing following years of fire suppression, is probably sufficient to create widespread habitat for martins if adequate numbers of large trees are retained in suitable sites. Postfire salvage logging, snag removal to reduce lighting ignitions, and, due to shortened logging rotations, lack of creation of large trees reduce martins’ nesting opportunities in most of their range (Williams 1998). Awareness of the importance of retaining snags and residual large trees has increased, but safety and fire considerations often appear to override nest habitat protection in upper slope and ridge areas of greatest value to martins.

Competition from starlings (Airola and Grantham 2003) is the main threat to remnant martin populations in lowland woodlands, making recolonization of most areas unlikely. Human development of more remote areas occupied by martins may increase competition by starlings (Williams 2002). Incremental loss of sycamore woodland from age and lack of regeneration is a long-term threat in the few remaining areas occupied by martins, although starlings are also a significant threat at most of these sites.

Although some bridge nest sites are reasonably protected by underlying land uses (roads, rail lines, parking lots, rivers), some areas have been eliminated in the past and some current sites are susceptible to leasing for uses that restrict airspace or flight access (i.e., parking garages, storage facilities, bus parking; Airola and Grantham 2003). Nesting exclusion during construction projects and landscaping that restricts access also has reduced populations and suitability of occupied sites. Collisions with trains, cars, and trucks and predation by human-maintained feral cat colonies also are potentially significant sources of mortality (Airola and Kopp 2007). Otherwise, martins in urban areas are not highly sensitive to human activities and tolerate substantial levels of human presence (Airola and Grantham 2003). The relatively few sites in urban areas at which bridge-nesting martins are concentrated (e.g., 10–12 colonies in Sacramento; Airola and Kopp 2007) are not institutionally protected, leaving them susceptible to habitat changes that may reduce site suitability.

No major threats are known for martins in other habitat types. Declines have been reported, but not well documented, for the population nesting uniquely in collapsed lava tubes at Lava Beds National Monument (Laymon 1979). Casual observations suggest that martins may not use the lava tubes most frequently visited by humans (B. Williams pers. obs.).

**Management and Research Recommendations**

- Retain an adequate supply of large snags on forested lands, especially on upper slopes and ridgetops, by incorporating martin habitat considerations into National Fire Plan projects, postfire burn recovery plans, and other salvage, roadside hazard tree removal, and general timber harvest plans.
- Protect occupied and suitable bridge sites from uses that restrict air space and martin access or that cause excessive human disturbance.
- Retain large trees in oak and sycamore woodlands occupied by martins, and con-
trol adjacent development that may increase starlings.

• Establish nest-box programs (see Fouts 1996, Copley et al. 1999, Horvath 2000) to diversify nesting habitats where nest-site competition threatens or has eliminated martins and where commitment to long-term management is certain. Do not foster complete conversion to nest boxes for populations that are successfully nesting in trees, bridges, or power poles.

• Evaluate martin occurrence in recently burned forests and protect occupied sites and other suitable sites in formerly occupied areas.

• Investigate and implement measures to reduce the effects of starlings on martins, through direct control locally at nest sites and by land-use protection and modifications.

• Evaluate the effects of bridge site characteristics on nest success of martins, use levels by starlings, and changes in species’ use patterns over time.

• Continue to evaluate mortality factors, including vehicle collisions and predation by feral cats, that affect martins nesting under urban bridges.

• Study characteristics of lava tubes used by martins, including human visitation effects.

• Clarify systematics of martin populations within California and adjacent states.

• Acquire demographic and productivity data on California martins, for comparison with other populations, to identify sensitive reproductive parameters and limiting factors.

• Acquire information on locations, characteristics, and potential threats to premigratory communal roost sites and wintering areas.

**Monitoring Needs**

Existing bird monitoring programs do not adequately sample for martins. Performing systematic surveys to track population trends reliably is challenging because of martins’ dispersed distribution, occurrence in many remote areas, tendency to occupy some ephemeral habitats (e.g., recent burns), and use of inaccessible hole nesting sites. Broad-scale monitoring to detect population trends may best be conducted through annual surveys of recently known colonies and areas of suitable habitats (i.e., recent burns). Local and regional monitoring efforts should employ methods adopted by the Western Purple Martin Working Group (Cousins and Airola 2005) to increase consistency and allow comparison between study sites. Key natural habitats (coastal Redwood forest and oak woodlands in Tehachapi) should receive priority for periodic monitoring. It would be valuable to evaluate the use of low-level aerial surveys to identify colonies, especially in the Redwood regions, as potential nest trees are usually widely scattered but conspicuous. Geographic information system (GIS) analysis should be conducted to characterize landscape features at existing nest areas and to identify similar areas on which to focus surveys. Inventories are needed at key unstudied sites, particularly Lava Beds National Monument (including historical review of nest populations) and coastal bridge sites. Lastly, monitoring of bridge-nesting martins should be continued in the Sacramento region and expanded to look for colonization of other bridge sites elsewhere in the Central Valley.

**Acknowledgments**

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**Literature Cited**


Rufous-crowned Sparrow
(Aimophila ruficeps canescens)

A. r. canescens is one of five subspecies of Rufous-crowned Sparrow that occur in the United States. It is a medium-sized sparrow ranging 13-15 cm and weighing 15-23 grams. This subspecies is a permanent, non-migratory resident of coastal southern California, and adults remain on their territories throughout the year (Collins 1999). Males and females are similar in coloration, with a rusty crown, whitish throat, thin rufous eyeline, and distinct whitish eye ring (Stokes and Stokes 1996).

Habitat

The Rufous-crowned Sparrow exhibits a distinct preference for rocky hillside and steep slopes in open grass and coastal sage scrub in areas ranging from roughly 200-4,500 feet in elevation. They also thrive in areas that have recently been burned, and sometimes remain in these grassy, successional habitats for a number of years. In general, pairs nest on the ground in rock hollows or under clumps of grass or low brush (Collins 1999).

Status and Distribution

The southern California subspecies of Rufous-crowned Sparrow is listed as a California Department of Fish and Game species of special concern as well as a federal species of concern. In addition, it has been listed on the Audubon Society California Watch List (Dudek and Associates 2002). Historically, four of the subspecies of Rufous-crowned Sparrow bred in coastal California from Mendocino County south through northwestern Baja California Norte (Thorngate and Parsons 2005). Fifty years ago the range and distribution of A. r. canescens was thought to be limited to a narrow band of coastal sage scrub and chaparral from Santa Barbara south to the northwestern corner of Baja California (Grinnell and Miller 1944). More recent distribution information in southern California indicates a range from San Luis Obispo County south through San Diego County (Kimball and Dunn 1981).

In Riverside County, the majority of reported occurrences have been in the southwestern corner and central portion of the county. Some key population areas lie along the Interstate 15 corridor south to Temecula (Lake Skinner area) and north to the Badlands (Dudek and Associates 2002). Sightings by SAWA biologists in Riverside County have occurred in San Timoteo Canyon, Sycamore Canyon, Temescal Canyon (at the 3M plant), and a pair at Mt. Rubidoux in the city of Riverside. Rufous-crowned Sparrows have also been detected at Cottonwood Canyon in Lake Elsinore (Peter Beck, pers. comm.).

Threats

The largest threat to the Rufous-crowned Sparrow in southern California is habitat loss, degradation, and fragmentation. Populations are becoming increasingly isolated due to urbanization and agricultural development in Los Angeles, Orange, Riverside, San Diego, and San Bernardino counties. Over the last one hundred years fire suppression has also led to loss of habitat, as Rufous-crowned Sparrows prefer more open scrub areas as opposed to dense tracts of scrub or chaparral (Collins 1999).

Rufous-crowned Sparrows are rare hosts of Brown-headed Cowbirds, possibly because cowbirds are uncommon in the dry scrub habitat preferred by the sparrows during the breeding season. There have been no documented cases of brood parasitism by Brown-headed Cowbirds in southern California, however data on nesting success is lacking for this species (Collins 1999).
Research and Management Needs

There is still a great deal to be learned about the Rufous-crowned Sparrow. Information regarding demography, breeding, and behavior is necessary to understand the biology and ecology of this species. Further research is essential for assessing population trends, as well as for the development of conservation plans that facilitate preservation of coastal scrub and chaparral habitat.

Who to contact

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Photo credit

Photo by Peter LaTourrette. Retrieved from http://nationalzoo.si.edu

References


Rufous-crowned Sparrow  (*Aimophila ruficeps*)

Illustration by Adrienne Olmstead

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**RECOMMENDED CITATION:**


**SHORTCUTS:**

http://www.prbo.org/calpif/htmldocs/species/scrub/rufous_crowned_sparrow.htm
SUBSPECIES STATUS:

There are currently 17 recognized subspecies of the Rufous-crowned Sparrow, five that occur in the United States and 12 that occur in Mexico (Collins 1999). Of the five subspecies that occur in the U.S., two inhabit the desert southwest (A. r. scottii and A. r. eremoeca) and four are found in California (A. r. canescens, A. r. obscura, A. r. ruficeps and A. r. scottii). A. r. ruficeps is a year-round resident of central California from the coast to the western slopes of the Sierra Nevada. A. r. obscura inhabits Santa Cruz Island, Anacapa Island and formerly Santa Catalina Island. A. r. canescens is a resident of southwest California on the slopes of the Transverse and Coastal ranges from Los Angeles County south to Baja California Norte. A. r. canescens can also be found on San Martin Island. California populations of A. r. scottii are found only in isolated portions of the desert mountain ranges of southeastern California (Grinnell and Miller 1944, Collins 1999).

MANAGEMENT STATUS:

A. r. canescens is listed as a California Department of Fish and Game species of special concern (CDFG 2004).

DISTRIBUTION:

Rufous-crowned Sparrows are year-round residents throughout their range, although they descend to lower elevations outside their normal range during severe winters. The species range is discontinuous, including many small and isolated populations throughout the western United States and Mexico (Collins 1999).

HISTORICAL DISTRIBUTION:

California: Four subspecies of Rufous-crowned Sparrow bred historically in coastal California from Mendocino County south through northwestern Baja California Norte, in the coastal slopes, foothills and interior valleys of the Coast, Transverse, and Peninsular ranges. Inland, Rufous-crowned Sparrows could be found breeding from Shasta County south through the western Cascade and Sierra Nevada foothills, southwestern Kern County, and in Joshua Tree National Monument's Coxcomb Mountains. In southeastern California, populations were documented in the Granite, Providence, and New York Mountains of eastern San Bernardino County. Additionally, the subspecies A. r. obscura bred on Santa Cruz, Anacapa and Santa Catalina Islands off the coast of southern California (Grinnell and Miller 1944, Collins 1999).

Outside of CA: Throughout the United States, the Rufous-crowned Sparrow was resident in Washington County in southwestern Utah; throughout Arizona; southern through northeastern New Mexico; in Otero, Bent, Las Animas, and Baca Counties of southeastern Colorado; in Cimarron County and throughout central Oklahoma; throughout much of northwestern Texas; and at Lehman Caves in Great Basin National Park, in White Pine County, and in the Spring Mountains west of Las Vegas in Clark County, Nevada (Miller 1941, Collins 1999).

In Baja California and Mexico, Rufous-crowned Sparrows were resident in the northwest portion of Baja California Norte (north of 30 N latitude) and in the Sierra de la Laguna Mountains of Baja California Sur, as well as on Isla de Todos Santos and Isla de San Martin and from eastern Sonora, western Chihuahua, and north-central Coahuila, south through much of Mexico to central Oaxaca, with an isolated population in southern Tamaulipas (Collins 1999).

CURRENT BREEDING DISTRIBUTION:
The current breeding distribution largely matches the historical breeding distribution, with the following exceptions:

Southern California populations of Rufous-crowned Sparrow are increasingly restricted due to urbanization and agricultural development in Los Angeles, Orange, Riverside, San Diego, and San Bernardino counties (Collins 1999). Island populations have suffered significant declines although it appears that members of the species have colonized Anacapa Island in the Channel Islands in recent years (Power 1994). Rufous-crowned Sparrows (A. r. obscursa) have not been observed on Santa Catalina Island since 1863 (Grinnell and Miller 1944), and populations on Todos Santos Island in Baja California have not been observed since the 1970's (Collins 1999). Rufous-crowned Sparrows have not been observed on Baja California's Islas de San Martin since they were first detected there in the early 1900's (Collins 1999).

ECOLOGY:

AVERAGE TERRITORY SIZE:

Average territory size in California chaparral ranges from 0.89 ha to 1.5 ha (NatureServe 2005, Collins 1999). Seven years after a fire in southern California chaparral there were 12 territories per 40 ha (Collins 1999). Plots of burned chaparral three to five years after a fire in southern California supported 2.5-5.8 territories per 40 ha, while coastal scrub plots of similar size supported 3.9 to 6.9 full season territories per 40 ha (Collins 1999).

TIME OF OCCURRENCE AND SEASONAL MOVEMENTS:

Rufous-crowned Sparrows are generally year round residents that do not exhibit true migratory behavior (Collins 1999, DeSante and Geupel 1987). Few data exist on the timing of the onset of breeding; the earliest report of birds carrying nesting material was March 2 in southern California (Collins 1999). Little information exists on juvenal dispersal; young have been observed dispersing into adjacent marginal habitat during fall to early winter (Collins 1999).

FOOD HABITS:

FORAGING STRATEGY:

Rufous-crowned Sparrows forage on or very near the ground while walking or hopping under shrubs or within dense grass or herbaceous cover (DeSante and Geupel 1987). They occasionally forage in weeds and low bushes, but rarely in open areas. Occasionally, Rufous-crowned Sparrows have been observed foraging in the foliage and on the branches of taller woody vegetation such as shrubs and short oaks. During the breeding season, they glean insects from low shrubs, grasses and herbaceous vegetation. Rufous-crowned Sparrows actively forage throughout the day, typically obtaining most of their food by pecking or rarely by scratching through leaf litter (Collins 1999). Occasionally, Rufous-crowned Sparrows obtain food from grasses and the low branches of shrubs by hopping. They will sometimes forage in pairs during the breeding season and in family-sized flocks in late summer and early fall. In winter they can occasionally be found foraging in loose-knit mixed-species flocks (Collins 1999).

DIET:

During fall and winter, Rufous-crowned Sparrows primarily eat small grass and forb seeds, fresh grass stems and tender plant shoots. Insects such as ants, grasshoppers, ground beetles, and scale insects make up only a small percentage of the fall/winter diet (11.6%) (Collins 1999). During the spring and summer the diet remains largely the same; however, insects make up a larger percentage of the diet (21%) and the species taken are more diverse (Collins 1999).

DRINKING:
It is unknown whether this species obtains adequate water from its diet or if dietary water must be supplemented by drinking. Individuals have been observed drinking from and bathing in pools of water in rock crevices following rainstorms (Collins 1999).

**BREEDING HABITAT:**

Rufous-crowned Sparrows are colloquially known as Rock Sparrows because of their distinct preference for open shrubby habitat on rocky, xeric slopes (Bolger 2002, Rising 1996a, DeSante and Geupel 1987). Throughout their range, they are typically found between 3,000 and 6,000 feet in elevation (Borror 1971). In California, they breed in sparsely vegetated scrubland on hillsides and canyons ranging from 60-1,400 meters in elevation (Rising 1996a, Collins 1999). Rufous-crowned Sparrows appear to prefer coastal sage scrub dominated by California sagebrush (*Artemisia californica*) (Grinnell and Miller 1944), but they can also be found breeding in coastal bluff scrub, low-growing serpentine chaparral, and along the edges of tall chaparral habitats. Rufous-crowned Sparrows thrive in areas that have recently been burned, and will stay in such open, disturbed habitats for years (Rising 1996a, Collins 1999). Rufous-crowned Sparrows exhibit high nest-site fidelity, returning to the same location to nest in subsequent years (Morrison et al 2004).

**NEST SUBSTRATE:**

Rufous-crowned Sparrow nests are primarily constructed of coarse dried grasses and rootlets, sometimes with small twigs, weed stems, or strips of bark (Myers 1909, Rising 1996a, Collins 1999).

**HEIGHT OF NEST:**

Rufous-crowned Sparrows are ground-nesters (Rising 1996a, DeSante and Geupel 1987). Infrequently a nest will be situated in a low bush up to 45 cm from the ground (Wolf 1977).

**NEST CONCEALMENT:**

Nests are usually well hidden, often situated at the base of a low bush, grass tussock, or overhanging rock with the overhanging vegetation or rock concealing its location (Rising 1996a, Collins 1999).

**VEGETATION SURROUNDING THE NEST:**

In California, Rufous-crowned Sparrow nests were found under California sagebrush, deer weed (*Lotus scoparius*), giant rye (*Leymus condensatus*), white sage (*Salvia apiana*), manzanita (*Arctostaphylos* spp.), poison oak (*Toxicodendron diversiloba*), coastal goldenbush (*Isocoma menziesii var vernonioides*), morning glory (*Calystegia macrostegia*), and bunchgrass (Collins 1999).

**NEST TYPE:**

The nests of Rufous-crowned Sparrows are loosely constructed, bulky, thick-walled open cups (Rising 1996a).

**BREEDING BIOLOGY:**

**TYPICAL BREEDING DENSITIES:**

Male Rufous-crowned Sparrows defend territories year-round; in the breeding season, one territory supports approximately one pair of birds, although unattached individuals have occasionally been documented in territories with established pairs (Collins 1999).

**DISPLAYS:**
Male Rufous-crowned Sparrows maintain territories throughout the year (Collins 1999). The male will sing persistently on territory throughout the breeding season, especially at song posts defining territory boundaries. During interactions between males either at territory boundaries or during territory intrusions the males occasionally raise their crowns and face the ground to exaggerate their head patterns. In lengthier encounters the males will exhibit an aggressive display in which each assumes a posture in which the body stiffens, wings droop, feathers (especially on the rump and flanks) are erected, tail is cocked at a 45 degree angle, and the head is extended straight out or pointed upwards to accentuate the markings on throat for the other bird (Collins 1999).

Three decoy displays have been recorded for the Rufous-crowned Sparrow: tumbling off a bush, rodent runs, and broken wing displays (Collins 1999).

MATING SYSTEM:

Rufous-crowned Sparrows are apparently monogamous; there are currently no reports of polygamy. Pair bonds appear to be maintained throughout the breeding season and possibly year round (Rising 1996b), with an apparent majority of birds staying paired for multiple breeding seasons (Morrison et al 2004).

CLUTCH SIZE:

Rufous-crowned Sparrows usually lay clutches of three to four eggs, occasionally two or five (NatureServe 2005). Average clutch size over the entire range is 3.5 +/- 0.68. Clutch size varies geographically, with the largest average clutch size in southern California at 3.7 and the smallest clutch sizes in Arizona and New Mexico at 3.1 eggs per clutch (Collins 1999).

INCUBATING SEX:

Only the female incubates (Rising 1996a). It is unknown whether the female begins incubation immediately after laying the first egg, or if incubation is delayed until the entire clutch has been deposited.

INCUBATION PERIOD:

Based on limited observations in southern California, incubation appears to last 11 to 13 days.

DEVELOPMENT AT HATCHING:

Chicks are altricial. On day three nestlings are still naked but with wing quills beginning to show (Myers 1909). There is currently no information available on the growth of contour and flight feathers or length of time after hatching when the eyes open. No quantitative data exists on weight or linear measurements of nestlings.

NESTLING PERIOD:

No quantitative data is available but the nestling period is estimated to be eight to nine days (Collins 1999).

PARENTAL CARE:

The female begins brooding immediately after hatching occurs and is the only parent to brood. Both parents bring whole adult insects to feed the young (Collins 1999). The entire insect is shoved into the gaping mouth of the nestling. Frequency and duration of food delivery visits and the number of items delivered per visit are unknown.

POST FLEDGING BIOLOGY OF OFFSPRING:

http://www.prbo.org/calpif/htmldocs/species/scrub/rufous_crowned_sparrow.htm
Fledglings are incapable of flight upon departure from nest, and spend their first days out of the nest running on the ground under the cover of vegetation (Collins 1999). Both parents continue to feed the young for some time after they have left the nest, but the exact duration of post-fledging parental care is unknown. Parents and juveniles probably remain together as a family unit through the post-fledging period and possibly well into winter. Most young birds are capable of feeding themselves by early fall (Collins 1999).

**POST BREEDING SOCIAL BEHAVIOR:**

Males maintain territories year-round. After chicks have fledged they forage in small family groups.

**DELAYED BREEDING:**

Age at first breeding is unknown. Young establish pairs the spring before their first breeding season, but it is unknown whether this occurs during their hatch year or later. Adult birds breed annually (Collins 1999).

**NUMBER OF BROODS:**

Rufous-crowned Sparrows are typically a single-brood species; second and third broods have only been reported in southern California. Replacement clutches are laid within one week of nest failure (Collins 1999). In areas with summer monsoonal rains (Arizona, New Mexico, Texas and Mexico), Rufous-crowned Sparrows can exhibit a bimodal breeding pattern. In such cases nesting occurs in April through May and then again during the summer rainy season from July to early September (Collins 1999, Rising 1996a).

**BROOD PARASITISM:**

Rufous-crowned Sparrows are rare hosts of Brown-headed Cowbirds, which are uncommon in the dry scrub habitat favored by the sparrows during the breeding season. There are only two records of parasitism by Brown-headed Cowbirds on Rufous-crowned Sparrows; one in a nest near San Antonio, TX and one in a nest in the Santa Catalina Mountains northeast of Tucson, AZ. Additionally, an unidentified cowbird chick was found in a nest at Madera Canyon, AZ. There is no evidence of brood parasitism by Brown-headed Cowbirds in southern California (Collins 1999).

**LANDSCAPE FACTORS:**

**ELEVATION:**

Rufous-crowned Sparrows inhabit suitable habitat from sea level to 3,000 meters (Collins 1999).

**FRAGMENTATION:**

Rufous-crowned Sparrows appear to be exceedingly sensitive to edge effects; Bolger (2002) found that Rufous-crowned Sparrows were abundant in larger tracts of habitat away from edges, and were quite rare in small isolated fragments of habitat.

**PATCH SIZE:**

Studies on the effects of patch size on Rufous-crowned Sparrow populations have focused on southern California populations. In an urbanized area of coastal San Diego County, Rufous-crowned Sparrows were more abundant in larger patches than in smaller, more fragmented patches (Bolger et al. 1997).

**DISTURBANCE (natural or managed):**

Rufous-crowned Sparrows are known to invade areas recently swept by fire or other disturbances. This species...
prefers open stands of chaparral and coastal sage scrub and will abandon an area if brush cover becomes too
dense or too uniform. Episodic disturbances, including those caused by fire or light to moderate grazing, open
up dense stands of chaparral and coastal sage scrub, improving habitat for Rufous-crowned Sparrows (Collins
1999, Bolger 2002; but see Stanton 1986).

ADJACENT LAND USE:

In southern California, habitat loss, degradation and fragmentation resulting from urban and agricultural
development are restricting the range of Rufous-crowned Sparrows (Bolger 2002).

CLIMATE:

There is a significant positive correlation between Rufous-crowned Sparrow abundance and warm, dry weather
(Bock and Leptihien 1976). In the Southwest, the occurrence of spring and summer monsoonal rains regulates
the onset of breeding. However, it remains unknown to what degree the amount and duration of rainfall
influences the breeding success of Rufous-crowned Sparrows (Collins 1999). Rainfall may indirectly affect
breeding success through its influence on production of insect and seed crops as well as growth of herbaceous
cover (Wolf 1977).

PESTICIDE USE:

One report exists of Rufous-crowned Sparrows being poisoned by the rodenticide warfarin (Collins 1999).
More research is needed to explore the impact of small- and large-scale pesticide use on sparrow populations.

PREDATORS:

There have been no direct observations of predation on adults, eggs or nestlings. Rufous-crowned Sparrows are
likely susceptible to avian predators that target passerines, as well as various reptilian and mammalian
predators. In Arizona, Rufous-crowned Sparrows have been observed exhibiting aggressive vocal responses to a
Mexican Jay and a tiger rattlesnake, suggesting that these species are likely nest predators (Collins 1999).

DEMOGRAPHY AND POPULATION TREND:

AGE AND SEX RATIOS:

No information is available.

PRODUCTIVITY MEASURE(S):

In southern California the seasonal fecundity estimates for one population of sparrows was 3.98 in 1996 and
4.86 in 1997. Of 35 nesting attempts, 17 (48.6%) successfully produced at least one fledgling (Collins 1999).
No information is available on annual or lifetime breeding success.

SURVIVORSHIP:

Limited information exists on survivorship of Rufous-crowned Sparrows. In a four-year study in southern
California, Morrison et al (2004) found that female Rufous-crowned Sparrows exhibited an annual survival
probability of 0.69, while males had a slightly higher annual probability of survival, at 0.74. The study found no
differences in survivorship between edge and interior habitats (Morrison et al 2004). Further studies throughout
the range would elucidate clinal variations in survivorship.

DISPERAL:
Birds generally remain on or near preferred breeding habitat during the fall and winter. Some post-breeding wandering of young birds and some adults to nearby non-breeding habitat has been observed (Collins 1999).

**MANAGEMENT ISSUES:**

**HABITAT LOSS:**

Loss of habitat due to agricultural and urban development is the largest threat to Rufous-crowned Sparrows, particularly in southern California (Bolger 2002). Larger interconnected blocks of open coastal sage scrub on moderate slopes should be protected in order to insure population health. Rufous-crowned Sparrow habitat has been converted to range land for cattle throughout the species range (Collins 1999). Limiting the duration and intensity of grazing will ensure Rufous-crowned Sparrows are still able to use this habitat. Fire suppression has also led to habitat loss, as Rufous-crowned Sparrows abandon dense, uniform stands of chaparral and coastal sage scrub. Controlled burn programs across the species range would benefit the species significantly.

**ASSOCIATED SPECIES:**

Greater Roadrunner (*Geococcyx californianus*), California Gnatcatcher (*Polioptila californica*), Sage Sparrow (*Amphispiza belli*).

**MONITORING METHODS AND RESEARCH NEEDS:**

A review of existing literature on the Rufous-crowned Sparrow in California reveals several areas where the need for further research exists. Although Rufous-crowned Sparrows can be quite difficult to monitor given their preference for high rocky slopes covered in chaparral, comprehensive studies of demography and nesting behavior must be conducted in order to develop a clear understanding of the biology and ecology of this species. In particular, information regarding age and sex ratios, survivorship, mating systems, nest success, incubation, nesting and fledging periods, and juvenile dispersal is still lacking for this species, as well as details of predation on nests and adults, and the impacts of invasive species and pesticide usage.

Constant-effort mist netting and observation of color-marked populations will elucidate demographic trends, while nest monitoring will be necessary in order to answer the many remaining questions about the reproductive behavior of the Rufous-crowned Sparrow.

**ACTION PLAN SUMMARY**

**SPECIES:** Rufous-crowned Sparrow, *Aimophila ruficeps*

**STATUS:**

There are 17 recognized subspecies of Rufous-crowned Sparrows, three of which (*A. r. canescens, A. r. obscura, and A. r. ruficeps*) occur in California. Rufous-crowned Sparrow populations within California are declining, largely due to habitat degradation, and the *canescens* subspecies is listed as a species of special concern by the state of California (CDFG 2004).

**HABITAT NEEDS:**

Rufous-crowned Sparrows require open coastal scrub and chaparral on medium to steep slopes, at elevations ranging from 60 to 6,000 meters. This species will abandon areas where sage scrub or chaparral has become too dense or uniform. They nest in shrubs such as California sagebrush (*Artemesia californica*), manzanita.
(Arctostaphylos spp.), and poison oak (Toxicodendron diversiloba), as well as morning glory (Calystegia macrostegia) and native bunch grasses. Edge effects do not appear to have an impact on reproductive success of Rufous-crowned Sparrows; however, birds apparently avoid edges and small fragments of habitat (Bolger 2002).

CONCERNS:

There is still a great deal to be learned about the breeding biology, behavior and demography of the Rufous-crowned Sparrow. Details about reproductive timing, nestling growth, and dispersal will be vital for the development of conservation plans that encourage appropriate Rufous-crowned Sparrow breeding habitat, and standardized abundance, productivity and survivorship data are necessary in order to detect population declines, and to evaluate the effects of habitat alteration and management regimes. The preeminent threat to Rufous-crowned Sparrow populations in California is habitat loss. Large areas of coastal sage scrub and chaparral, particularly in southern California, are being converted to urban and agricultural land. Additionally, fire suppression practices over the last one hundred years have led to dense, uniform stands of sage scrub and chaparral unsuitable for the Rufous-crowned Sparrow, which prefers more open scrub habitat.

OBJECTIVES:

1. Preserve and increase available habitat

2. Identify healthy populations, and elucidate long-term trends

ACTIONS:

1. Preserve areas of coastal scrub and chaparral that currently provide appropriate habitat for Rufous-crowned Sparrow by acquiring lands currently held by private landowners, and by encouraging active conservation and restoration on public lands.

2. Preserve and restore contiguous tracts of scrub habitat that have been altered by fire suppression, invasive plant species or other anthropogenic factors. This will require land acquisition and intensive restoration efforts. Although the productivity of Rufous-crowned Sparrows does not appear to be affected by patch size, Bolger (2002) found that the sparrows showed a preference for larger patch sizes. Ensuring the protection of contiguous tracts of coastal scrub and chaparral will encourage healthy populations of Rufous-crowned Sparrows. Restoration of altered habitats might entail prescribed burning, limited grazing, or removal of exotic plant species.

3. Establish long-term demographic monitoring for the species in order to assess the health of California populations. Because Rufous-crowned Sparrows are sedentary, color-marking and re-sighting individuals and conducting nest monitoring will be the most appropriate methods for tracking abundance, productivity and survivorship.

4. Provide outreach and education in suburban and urban areas adjacent to coastal scrub and chaparral habitats to encourage native plant landscaping and low-impact building. Encouraging public buy-in is an essential ingredient in successful habitat conservation and restoration. Developing pamphlets and other informational materials encouraging the use of native plant landscaping, removal of non-native plant species and active management of remaining coastal scrub and chaparral habitats will allow individual stakeholders to participate in the conservation process.

SCIENTIFIC REFERENCES:


Wolf L.L. 1977. Species relationships in the avian genus Aimophila. Ornith. Monogr. 23
MEASUREMENTS: The Sharp-shinned Hawk has a body length of 10 - 14 inches, a wingspan of 20 - 27 inches, and weighs 3 - 8 ounces.

HABITAT: This hawk occupies a wide variety of forests throughout North America and on some Caribbean Islands. These woodland areas range from boreal coniferous, mixed deciduous, bushy and riparian areas, tropical cloud forests, mountainous pine forests, savanna woodlands, and urban areas. Birds in the northern extent of their range migrate south as far as Panama, while birds at higher elevation move to lower elevation during the winter.

DIET: Birds make up to 90% of this hawk’s diet, but they may also take small mammals, frogs, lizards, and insects. Sharp-shinned Hawks use a fast bursting flight to chase down their prey.

REPRODUCTION: The bark and greenery-lined stick nest is usually built each year in a dense stand of trees. The female lays 2 - 5 eggs that are incubated for 30 - 32 days. The young hawks are flying 3 - 4 weeks later, and may be capable of breeding their first year.

NAME DERIVATION: The scientific name comes from the Latin words accipere, meaning to take or seize and refers to a hawk or bird of prey, and striatus, meaning striped and refers to the striped breast of the immature bird. The common name refers to the exposed thin shin or lower leg. Sharp-shinned Hawks have been referred to as Bird Hawk, Bullet Hawk, Little Blue Darter, Pigeon Hawk, and Sparrow Hawk.

INTERESTING FACTS:

- The Sharp-shinned Hawk’s prey is usually taken to a special location near the nest to be plucked of its feathers or fur. This perch is referred to as a plucking post or butcher’s block.

- Sharp-shinned Hawks are often seen chasing and feeding on songbirds at backyard bird feeders.

- All North American accipiters have red eyes as adults.
Sharp-shinned Hawk

http://www.peregrinefund.org/explore_raptors/hawks/sshnhawk.html
PDF of Short-eared Owl account from:
Shuford, W. D., and Gardali, T., editors. 2008. California Bird Species of Special Concern: A ranked assessment of species, subspecies, and distinct populations of birds of immediate conservation concern in California. Studies of Western Birds 1. Western Field Ornithologists, Camarillo, California, and California Department of Fish and Game, Sacramento.
SHORT-EARED OWL (*Asio flammeus*)

Don Roberson

Current and historic (ca. 1944) breeding range of the Short-eared Owl in California. Breeding is most regular in northeastern California and in Suisun Marsh, and mainly irregular or extralimital elsewhere, particularly on the immediate southern coast. Breeding numbers have declined at least moderately, but sparse historical information on the species’ distributional limits, and cyclic or episodic breeding in many areas, make it difficult to assess changes in the overall breeding range. Although fluctuating greatly annually, numbers are generally greatest during migration and winter, when birds occur more widely in lowland areas of the state.
**SPECIAL CONCERN PRIORITY**
Currently considered a Bird Species of Special Concern (breeding), priority 3. Included on both prior special concern lists (Remsen 1978, 2nd priority; CDFG 1992).

**BREEDING BIRD SURVEY STATISTICS FOR CALIFORNIA**
Data inadequate for trend assessment (Sauer et al. 2005).

**GENERAL RANGE AND ABUNDANCE**
Breeds over much of northern North America; additional populations occur in Eurasia and South America and on many oceanic islands (Holt and Leasure 1993). Many northern populations are migratory; North American breeders winter south to northern Mexico and Florida. Numbers fluctuate dramatically in response to periodic “bust or boom” cycles of the owls’ primary prey; the breeding range dramatically expands and contracts following these prey cycles, making it difficult to give any general geographic statement about range or abundance. North American owls are attributed to *A. f. flammeus*; other named subspecies are from oceanic islands.

**SEASONAL STATUS IN CALIFORNIA**
Year-round resident in certain areas within California; the breeding season stretches from March through July (Dixon 1934, Gill 1977, Collins and Jones in press). Influxes of birds from the north, which increase the number of owls within the state tenfold or more during some winters, are highly variable but generally occur between late October and early March (Fisler 1960, Garrett and Dunn 1981).

**HISTORIC RANGE AND ABUNDANCE IN CALIFORNIA**
Grinnell and Miller (1944) described Short-eared Owls as breeding intermittently the entire length of the state west of the southern deserts “in very small numbers.” They knew of nesting at Lava Beds National Monument, Siskiyou County; June Lake and McGee Creek, Mono County; Redwood City, San Mateo County; New Hope, Fresno County; Newport, Orange County; and National City, San Diego County. Additional historical nest records are from Wasco, Kern County (WFVZ egg set data), and Laws, Inyo County (J. Dixon field notes, MVZ). Also notable for the south coast is a 2 July 1920 record for the “Estero” in Santa Barbara, Santa Barbara County (Lehman 1994), and observations by J. B. Dixon (in Willet 1933) of birds at San Diego Bay and at Santa Margarita, San Diego County, “during summer months.” By contrast, Grinnell and Miller (1944) described winter visitants as “common and widely distributed.” They considered the species formerly “abundant in winter,” and attributed a notable reduction in “late years” to shooting by duck hunters.

**RECENT RANGE AND ABUNDANCE IN CALIFORNIA**
The cyclical nature of range expansion and retrac-
tion can make it difficult to distinguish between areas of regular versus irregular breeding. While small resident populations of Short-eared Owls remain in the Great Basin region and locally in the Sacramento–San Joaquin River Delta (see map), most recent breeding from coastal central California and the San Joaquin Valley has been episodic. Breeding in mainland southern California is now exceptional and limited to years of unusual incursions. Recent incursions occurred from 1983 through 1984 and from 1987 to 1992 after El Niño winter rains produced bumper crops of herbaceous cover that coincided with peak cycles of vole productivity. The breeding range of the Short-eared Owl retracts dramatically in drought conditions and during prey reductions.

Both the large fluctuations in owl numbers and the nature of the fragmentary and anecdotal data make it very difficult to compile any reasonable population estimates for this cyclical species. In poor years with few microtine prey and when marsh habitat is reduced by drought, very few breeding owls are left in resident areas, and numbers likely total fewer than 50 pairs statewide. In wet years that bring substantial cover and coincide with peaks of prey cycles, local nest density may exceed 7 nests per 40 hectares of appropriate habitat (Larsen 1987), and the statewide owl population may exceed 500 pairs.

Below, key information is described by subregions of the state for nesting and for the state as a whole for winter.

**Northeastern California.** This region, including mainly the Klamath Basin, Modoc Plateau, and Great Basin of California, contains the largest populations of nesting Short-eared Owls. In Siskiyou, Modoc, and Lassen counties, Short-eared Owls breed at major refuges such as Lower Klamath NWR, Tule Lake NWR, Modoc NWR,
Honey Lake WA, and Ash Creek WA, but no reliable population estimates have been made (Larsen 1987, R. Ekstrom, F. Hall, T. Rickman, J. Sterling in litt.). In good years, dozens of pairs likely nest at Lower Klamath NWR, Modoc NWR, and Honey Lake WA (P. Bloom, W. D. Shuford in litt.). Spring road kills found in the Surprise Valley, Modoc County, suggest nesting there. In some years, Short-eared Owls nest in Fall River Valley, Shasta County (B. Yutzy in litt.), and Sierra Valley, Sierra County (MPCR files, W. D. Shuford in litt.). Birds suspected of nesting in Mono County were pairs in Bridgeport Valley in May 1984 (Gaines 1992) and along the east shore of Mono Lake in June 1996 (T. Beedy in litt.), and an adult at Fish Slough on 4 June 2006 (W. D. Shuford in litt.). A 20 June 1978 record from about 10 mi southeast of Bishop near the Warm Springs Rd. (T. Heindel in litt.) suggests occasional nesting south to Inyo County.

Sacramento Valley and Sierra foothills. In some years, these owls nest at Table Mountain in western Butte County (T. Beedy in litt.). Pairs occasionally nest in the Sacramento Valley in irregularly grazed wetlands west of the Sutter Buttes, Sutter County (R. Hasey in litt.), although none are known to breed in the federal and state wildlife refuges in the Sacramento Valley (B. E. Deuel in litt.) despite a few summer records there (MPCR files). One nest was found southwest of Lincoln, Placer County, in 1998 (J. Ranlett, B. Williams in litt.). There is a record of nesting near Davis in 1976 (Remsen 1978) and recent possible breeding nearby at the Yolo Bypass wetlands, Yolo County (S. Hampton in litt.).

Suisun Marsh and Sacramento–San Joaquin River Delta. Grizzly Island WA, Solano County, in Suisun Marsh supports the only resident population of owls in this region. In the spring 1987, 39 nests and 100 fledglings were documented (Larsen 1987), apparently in response to upland management that led to major increases in microtine prey. By contrast, observers found only 3–6 owls on surveys there the previous two years. Management to provide habitat and prey annually has resulted in a few resident owls at Grizzly Island ever since, and larger numbers some years (C. Fien in litt.). There was also a nest from west Pittsburg, Contra Costa County, in May 1979 (MPCR files).

In the Sacramento–San Joaquin River Delta, there are nest records from the Cosumnes River Preserve, Sacramento County, in the late 1990s (J. Buck fide J. Trochet in litt.) and a summer observation suggesting nesting at Byron, Contra Costa County, in 1980 and 2002 (S. Glover in litt.). San Joaquin Valley and adjacent Coast Range valleys. Nesting by Short-eared Owls in this region is generally episodic, particularly after wet winters. A nesting pair was observed on Santa Fe Grade, Merced County, sometime in the 1980s (D. Shearwater in litt.). Following the El Niño rains of 1998, a vole population explosion in the Panoche Hills of Fresno County was apparently responsible for several Short-eared Owl broods where none are usually found (S. Fitton in litt.). About a dozen owls have been resident near Mendota WA, Fresno County, since 2000, with three nests found in 2002, and individuals were resident at another restoration site, near Alpaugh, Tulare County (K. Kreitinger in litt.). The species may also nest regularly in alfalfa and grain fields in the Tulare Basin of the southern San Joaquin Valley (R. Hansen in litt.). Ten nests were in alfalfa fields during the summer of 1983 near Wasco, Kern County (R. Hansen in litt., MPCR files). On the Carrizo Plain, San Luis Obispo County, rodent numbers rebounded following rains in March 1991, and by the spring of 1992 nesting Short-eared Owls were observed there (S. Fitton in litt.). A Breeding Bird Survey route in the CarrizoPlain recorded 17 and 15 birds in 1992 and 1993, respectively, but none in any other year from 1981 to 2001 (Sauer et al. 2005).

Coastal California. Following the winter of 1989–90, when up to 24 owls remained into April in ungrazed pastures with high rodent populations, at least one owl pair was feeding young in early June 1990 near what is now the Mad River Slough WA in the Arcata bottoms, Humboldt County (Harris 2005, Hunter et al. 2005). The compilers of the Humboldt County breeding bird atlas project, 1995–1999, found it difficult to distinguish between wintering birds, migrants, and prospective summering birds in early spring (Hunter et al. 2005). Their records of possible breeding included sightings at Mad River Slough WA of three owls, 7–19 April 1998; two, 13 April 1999; and one, 14 July 1999 (one post-atlas, 9 Apr 2005, D. Fix in litt.), and at Fay Slough WA of one owl, 19 April 1998, and three, 23 March 1999. Strongly suggestive of breeding were records of one to six birds at Humboldt Bay NWR from 27 March to 18 April 2001, including a pair performing courtship displays at the Salmon Creek Unit on 14 April (D. Fix in litt.). To the south, an observation of three fledged young at Point Reyes National Seashore, Marin County, in late June 1979 coincided with a 1978–1979 vole outbreak (Shuford 1993), and a fledged young was picked up injured at Annadel State Park, Sonoma County, that same spring (Burridge 1995).
Breeding was known from the Palo Alto Baylands, Santa Clara County, in 1966 and 1972 (Remsen 1978), and there is a midsummer record from the Napa County marshes in 1970 (MPCR files). Owls nested annually on Bair Island, San Mateo County, from 1971 to 1973 (Gill 1977) and periodically thereafter to 1994 (MPCR files), but apparently not since (P. J. Metropulos in litt.). Predation by non-native Red Foxes (Vulpes vulpes) and lowered microtine populations may account for the loss of this population over the past decade (P. J. Metropulos in litt.).

At the Salinas River mouth in Monterey County, which held summer birds as early as 1959, one or two pairs nested most years from 1974 to 1981; breeding behavior was also observed at a site on Elkhorn Slough (Roberson and Tenney 1993). The Salinas-Elkhorn population was apparently extirpated by non-native Red Foxes in the 1980s (Roberson 2002). Predator control programs initiated for the Snowy Plover and other species since 1990 have made the site suitable again, and subsequently there have been a few winter birds most years and one summer record in 1992 (Roberson 2002).

Short-eared Owls apparently breed along the southern California coast only very irregularly, except at Santa Barbara Island in the Channel Islands. Garrett and Dunn (1981) reported a 20 July 1947 record at Huntington Beach, Orange County, as the “most recent summer record for the coast.” Following observations of courtship in 1979, these owls were documented breeding on Santa Barbara Island in 1980 to 1983, 1992, 1996, and 2001 (they possibly bred in 1993 and 1994); the hiatus in breeding in 1984 coincided with a decline in the island’s mouse population (Collins and Jones in press). Egg dates on Santa Barbara Island from 20 March to 15 April suggest the possibility of breeding by adults seen on San Miguel Island 6–31 May 1999 (Collins and Jones in press) and on the mainland at Seal Beach NWR, Orange County, 16 April 1995 (Hamilton and Willick 1996). In San Diego County, one was observed at the Santa Margarita River mouth 23 May and 12 June 1972. No potential breeders were reported again until sightings at the Tijuana River estuary in 1998, of one 28 May and two 16 June, and at the Chula Vista Wildlife Reserve in south San Diego Bay 12 and 19 April 2000 (Unitt 2004). Mojave Desert. Nesting was suspected in the Antelope Valley, Los Angeles County, in the spring of 1992 (Garrett and Molina 1998). At Harper Dry Lake, San Bernardino County, a recently fledged young was present in mid-June 1978, and three nests, which fledged up to 12 young, were discovered the following spring (BLM nest record cards). More nests were present in May 1980, when one nesting was banded. At the time, nests were in a marsh adjacent to alfalfa fields experiencing a rodent boom (P. Bloom in litt.). Although agricultural fields in this area have been out of production for about the past 10 years (S. Meyers in litt.), one to two of these owls were seen in the Harper Dry Lake area on 30 May 2005 (T. Manolis in litt.).

Winter status. Numbers of wintering Short-eared Owls also vary widely. Annual numbers on all California Christmas Bird Counts combined (www.audubon.org/bird/cbc) in the past 30 years varied from a high of 152 to a low of 32; the highest generally coincided with the best years for breeding. Christmas Counts do not include many of the better habitats for owls in winter, when hundreds may appear in northeastern California (MPCR files), with good numbers (20–30 per site) occasionally as far south as Pixley NWR, Tulare County, and Kern NWR, Kern County (J. Engler, J. Govan pers. comm.), and east to marshes and fields in the desert of San Bernardino County (e.g., up to 150 at Harper Dry Lake in 1987; Garrett and Molina 1998). In such exceptional winters, it is possible that several thousand owls are present statewide; more typically, the number is probably in the hundreds.

ECOLOGICAL REQUIREMENTS

Nesting Short-eared Owls require open country that supports concentrations of microtine rodents and herbaceous cover sufficient to conceal their ground nests from predators (Holt and Leasure 1993). Suitable habitats may include salt- and freshwater marshes, irrigated alfalfa or grain fields, and ungrazed grasslands and old pastures. Tule marsh or tall grasslands with cover 30–50 cm in height can support nesting pairs (Holt and Leasure 1993). In restoration areas in the San Joaquin Valley, appropriate habitat may consist of short weedy vegetation with native Atriplex or Allenrollea interspersed (K. Kreitinger in litt.). Short-eared Owls are primarily crepuscular hunters (Holt and Leasure 1993), and often 99% of their diet is small mammals (e.g., Fisler 1960, Clark 1975). In years of high microtine productivity, a cyclical phenomena apparently related to food availability and cover (Krebs 1966, Batzli and Pitelka 1971), Short-eared Owls respond by producing many more young and expanding
their range (Lockie 1955, Clark 1975, Holt and Leasure 1993). In California, the owls are particularly attuned to the three-to-four-year cycle of the California Vole (Microtus californicus; Krebs 1966). These voles breed year round, producing 2–6 litters, but numbers reach a peak whenever both food and cover are abundant, most dramatically in ungrazed fields following unusually heavy rains (Krebs 1966, Batzli and Pitelka 1971). Short-eared Owls will resort to other prey when vole numbers ebb (Fisler 1960).

**Threats**

Historically, the primary threats to Short-eared Owls were shooting, and habitat loss and degradation (Grinnell and Miller 1944, Holt and Leasure 1993, Garrett and Molina 1998). Today, the primary threats are continued habitat loss and degradation, aggravated to an unknown extent by grazing, invasive exotic weeds, water management, and disease.

Productive habitat for resident owls is now almost entirely limited to wildlife refuges and management areas. Management of refuges and restoration areas for herbaceous cover has been successful in maintaining resident owls, even when prey dwindle (Larsen 1987, K. Kreitinger pers. comm.). The availability of appropriate habitat on private land in good years is often random and dependent on crop rotational schemes.

Biologists suspect that grazing cattle causes significant losses each year in northeastern California (P. Bloom, R. Ekstrom, J. Sterling in litt.). Areas that could be prime nesting habitat (e.g., Surprise Valley in Modoc County) have few or no nesting owls because little appropriate wetland or grassland habitat there is left ungrazed (J. Sterling in litt.). Vole populations often increase in California grasslands in response to the reduction or cessation of livestock grazing (Saab et al. 1995, Jones 2000); thus the reduction of grazing benefits not only the owls directly (by reducing loss of eggs and nestlings) but indirectly by increasing their prey.

Water management practices can affect nesting success if grasslands are flooded in spring (especially Apr–May; P. Bloom pers. comm.). Likewise, habitat can be lost if water deliveries are delayed or inadequate and productive grasslands dry up, reducing the vole population. Invasive exotic weeds can reduce the productivity of prime habitats. From the Klamath Basin to Lassen County, for example, incursions of non-native Peppergrass (Lepidium latifolium) have degraded numerous hay meadows that have been abandoned by hay farmers, resulting in loss of habitat for Short-eared Owls (F. Hall in litt.).

Losses of eggs and nestlings to ground predators can be a serious local problem, and predation by the non-native Red Fox likely led to the extirpation of nesting owls in the San Francisco Bay area (P. J. Metropolis in litt.) and in coastal Monterey County (Roberson 2002). Other potentially problematic ground predators include domestic dogs and cats, skunks, Raccoons (Procyon lotor), and corvids, especially increasing numbers of Common Ravens (Corvus corax) along the coast and in the deserts (Roberson 2002, Garrett and Molina 1998). Short-eared Owls are also susceptible to collisions with automobiles where paved roads cross wetland or grassland habitats (Garrett and Molina 1998). In addition, Short-eared Owls are one of four native owls known to have been infected with West Nile virus in the Midwest (Fitzgerald et al. 2003), and may be at particular risk with the spread of this infection in California.

**Management and Research Recommendations**

- Implement and monitor management practices on wildlife refuges and agricultural lands that are conducive to both vole and Short-eared Owl productivity, taking into account that, because of the cycles of both, obvious benefits may not be realized every year.
- Maintain a mosaic of habitats with lush herbaceous vegetation, including sufficient areas of weedy abandoned fields and wet grasslands; as appropriate, leave some areas ungrazed.
- Implement predator-control programs where necessary, particularly to eliminate non-native ground predators such as the Red Fox.
- Avoid flooding fields or wetlands where owls are known or suspected to be nesting.
- Encourage rotational schemes on cattle-grazed or agricultural fields that leave some land in lush herbaceous vegetation each spring.
- Minimize hay mowing and crop harvesting during the breeding season (particularly Mar–May) in fields that have sufficient cover (30–60 cm high) to support breeding owls, or mow around known nests if they are found.
- Protect coastal salt and interior freshwater marshes and grasslands.
• Educate the public on the cyclical nature of these owls and their prey and on the owls' value in the ecosystem.
• Vigorously enforce hunting requirements on refuges to reduce nontarget losses by hunting.
• Consider losses to owls from vehicle collisions in planning for roads across grasslands, marshes, and agricultural lands that have current or historic owl use.
• Study the relationships between management practices and owl breeding success, taking into account the cycles of both predator and prey.

**MONITORING NEEDS**

No current monitoring efforts (e.g., Breeding Bird Survey) are adequate to monitor annual or long-term population changes in breeding Short-eared Owls. Standardized surveys in California, sampling areas of both regular and irregular breeding, should be implemented. Ideally, surveys should be conducted at dusk and early in the breeding season (Mar-Apr), when owls make aerial courtship flights (Holt and Leasure 1993). All monitoring should consider the cyclical nature of the population and avoid drawing conclusions from short-term data.

**ACKNOWLEDGMENTS**


**LITERATURE CITED**


Short-eared Owl


Andy Birch
Swainson's Thrush

*Catharus ustulatus*

**Order:** Passeriformes  
**Family:** Turdidae  
**Status:** Common summer resident.

Listen: 

**General Description**

There are three species of spot-breasted thrushes found in Washington. All three - the Swainson’s Thrush, the Veery, and the Hermit Thrush - have solid brownish upperparts (back, wings, and tail), light-colored bellies, whitish eye-rings, and varying degrees of spotting on their breasts. All are similar in shape to a robin, but smaller. Males and females appear similar in most species. The spots on the Swainson’s Thrush appear more faded than those of the Hermit Thrush, but more distinct than those of the Veery. Swainson’s Thrushes also have distinct buff-colored eye-rings.

**North American Range**

The Swainson’s Thrush occupies forested habitat at low to mid-elevations, overlapping with the Veery below and the Hermit Thrush above. Although it is found mostly in dense hardwood and mixed forests, young conifer forests, and forest openings, the Swainson’s Thrush does not require as dense an understory as does the Veery. They are attracted to salmonberry stands as nesting sites.

**Behavior**

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Photo courtesy of Greg Lavaty

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Pictures

Habitat

[Image: Swainson's Thrush - BirdWeb]
Although the Swainson’s Thrush does much of its feeding on the ground, it spends more time foraging in trees than do the other spot-breasted thrushes in Washington. They hover while gleaning insects from foliage, and also catch flying insects. In spring and summer, when they feed predominantly on insects and other invertebrates, they forage mostly on the ground. As the season progresses and they eat more berries, they forage farther off the ground. The song and call of the Swainson’s Thrush are quite distinctive, and may help a birder to locate this thrush that usually stays under cover.

**Diet**
The diet of the Swainson’s Thrush changes seasonally from insects to berries. Berries are important year round, making up over one third of the summer diet.

**Nesting**
The male establishes a territory and attracts a mate by singing. The female builds the nest on a horizontal branch of a deciduous tree or shrub 2-10 feet above the ground. The nest is a bulky, open cup of twigs, bark strips, moss, grass, leaves, and mud. It is lined with fine, soft materials including animal hair and lichen. The female lays 3 to 4 eggs, which she incubates by herself. Both parents feed the young, which leave the nest 10 to 13 days after hatching.

**Migration Status**
Swainson’s Thrushes are highly migratory, and none winter in Washington. They arrive late in spring, and migration is spread out, with spring migrants appearing in late May in eastern Washington. Fall migration takes place during August and September. Migration is mostly at night. The birds migrate to tropical forests for the winter.

**Conservation Status**
Two subspecies of Swainson’s Thrush occur in Washington, the russet-backed form in western Washington and the southeast Cascades, and the olive-backed form found in eastern Washington and the northeast Cascades. Swainson’s Thrushes appear to benefit from the extensive logging of low-elevation west-side forests because logging leaves brushy, early-successional habitat. They are currently the most abundant and widely distributed spot-breasted thrush in Washington. They are, however, still vulnerable to loss of habitat on breeding and wintering grounds. The Breeding Bird Survey shows a small, not statistically significant decline in the Washington population between 1980 and 2002.

**When and Where to Find in Washington**
Swainson’s Thrushes are common in forested regions throughout the state, especially at low to moderate elevations in western Washington. They are abundant in early-successional shrub habitats and in salmonberry thickets. East of the Cascades, they are found at higher elevations than in the west, because eastern forests are more open, and have more understory, than the dense, west-side forests. Spring migrants appear in late May in eastern Washington.

Click [here](http://www.seattleaudubon.org/birdweb/bird_details.aspx?id=352) to visit this species account and breeding-season distribution map in *Sound to Sage*, Seattle Audubon’s on-line breeding bird atlas of Island, King, Kitsap, and Kittitas Counties.
### Abundance

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### Washington Range Map

- **Breeding**
- **Migration**

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STATE (CSS) AND LOCAL (LC) SPECIES OF CONCERN THAT MAY OCCUR IN THE PROGRAM AREA
BIRDS

- Black swift
- Bell's sage sparrow
- Blue grosbeak
- Burrowing owl
- California horned lark
- Cooper's hawk
- Grasshopper sparrow
- Loggerhead shrike
- Long-billed curlew
- Merlin
- Northern harrier
- Osprey
- Prairie falcon
- Purple martin
- Sharp-shinned hawk
- Short-eared owl
- Southern California rufous-crowned sparrow
- Swainson's thrush
- Tricolored blackbird
- Vaux’s swift
- Warbling vireo
- Western meadowlark
- Wilson’s warbler
- Yellow breasted chat
- Yellow warbler

- Cypseloides niger
- Amphispiza belli belli
- Athene cunicularia
- Eremophila alpestris actia
- Accipiter cooperi
- Ammodramus savannarum
- Lanius ludovicianus
- Falco columbarius
- Circus cyaneus
- Pandion haliaetus
- Falco mexicanus
- Progne subis
- Accipiter striatus
- Asio flammeus
- Aimophila ruficeps canescens
- Catharus ustulatus
- Agelaius tricolor
- Chaetura vauxi
- Vireo gilvus
- Sturnella neglecta
- Wilsonia pusilla
- Icteria virens
- Dendroica petechia brewsteri
Black swift
Cypseloides niger

Current Geographic Range: Breeds widely but locally throughout western North America, from southeastern Alaska to southern California, as far east as central Colorado, throughout Mexico to Costa Rica. Despite this extensive range, less than 100 nesting locations have been documented. The entire world population apparently winters in northern South America.

The entire coastal population in California has been in recent severe decline. This portion of the historic breeding range will be lost if the current trend continues. The entire California population appears to be composed of perhaps 200 pairs at 40–45 sites. At nearly half of these, three or fewer pairs are suspected of nesting annually.

General Habitat Requirements: Black Swift is considered primarily a mountainous species, occurring over a range of highland habitats, particularly over rugged terrain and coastal cliffs. Nests on canyon walls near water and sheltered by overhanging rock or moss, preferably near waterfalls or on sea cliffs. It occasionally occurs in lowlands during migration or in bad weather conditions. It breeds in California from May to September. Autumn migration from northern portions of the breeding range begins as early as late August. The species’ wintering grounds are not definitively known. The nests are shallow cups made of moss bound with mud. Lays one to two eggs. Feeds on flying insects.

Life Cycle: Key aspects of the Black Swift breeding biology appear to be adaptations to a distant, relatively limited, and unpredictable food supply: a single large egg, lengthy incubation and nestling periods, and a nestling fed by both parents on high-fat insect prey so that by the time it fledges the young outweighs them. Studies in southern California show that both adults and young leave the nesting vicinity at fledging and presumably migrate south immediately.

Studies in southern California found that over 90% of the diet fed to nestlings was winged ants. These flying ants occur patchily in localized outbreaks during the summer. Foraging adults in summer cruise far from nesting locales and over a wide variety of habitat types to locate these swarms.

Threats: Few threats to these swifts are documented. The inaccessibility of most nesting sites and that many of these are located on protected lands greatly reduces potential threats at nesting locales. Coastal and cliff-face erosion probably destroys and creates suitable nesting sites; presumably this has no long-term net effect.
Bell’s sage sparrow
Amphispiza belli belli

Habitat requirements: Generally prefers semi-open habitats with evenly spaced shrubs 1-2 m high. Prefers dry chaparral and coastal sage scrub. Less common in tall, dense, old chaparral. Diverse shrub species including: brittlebush, black sage, California buckwheat, California sagebrush, bush mallow, chamise, white sage, valley cholla, ceonothus, willow; bunchgrasses used as well. Occasionally nests on ground. Mean nest height is 42.3 cm. They prefer taller shrubs with larger canopies. Nests are placed in densest part of nest site vegetation. Where shrub cover is a sparse, nests are found in denser clumps of shrubs. The nest is typically placed away from southwest side of shrubs. Open cup nest type.

Ground-foraging omnivore during breeding season, ground gleaning granivore during non-breeding season. Diet during the breeding season: adult and larval insects, spiders, seeds, small fruits, and succulent vegetation. Fall, winter, and early spring: small seeds, plant material, insects when available. Drinks occasionally but obtains most of water through diet.

Life History: Mating system is monogamous. Sings from perches to establish territory. Mean clutch size is 3.54. Incubating sex is female predominately. Incubation period is 10-16 days. Both parents feed young. In winter, belli seen moving in small mixed species flocks with other sparrow species.

Threats: Disturbances that reduce shrub cover, such as frequent fire, mechanical disruption, livestock grazing, and off-highway vehicle use appear to have negative effects on Sage Sparrows. Sage Sparrows are extremely vulnerable to nest predation, which can strongly reduce reproductive success and threaten population persistence. Loggerhead Shrikes, snakes and ground squirrels can be nest predators. The invasion of exotic weeds can cause reductions in Sage Sparrow populations. Sage Sparrows are highly sensitive to habitat fragmentation. Habitat preservation should focus on inland coastal sage scrub associations and chaparral that contains chamise.

Current Geographic Range: The belli subspecies was described as a "common resident of the Upper Sonoran zone west of the desert divides" where it "adheres closely to the chamisal (Adenosostoma fasciculatum) association." Fairly common to common resident in semidesert scrub in eastern Santa Barbara County (A. b. canescens) and very uncommon and rare residents in coastal areas of this county. A. b. belli is generally non-migratory, although some populations move down-slope to lower elevations in winter.
Blue grosbeak
Guiraca caerulea

Habitat Requirements: Grosbeaks in CA occur mainly in riparian woodland and fresh-water marshes. They are riparian edge species, occurring at forest/field edges or at forest/gravel-bar interfaces. The Blue Grosbeak will readily nest in Tamarix chinensis, orchard trees, or native willow/cottonwood habitat. They prefer herbaceous annuals and young, shrubby willows and cottonwoods, such as those regenerating after a flood. Plant growth form is likely more important than plant species. Blue Grosbeaks prefer upright growing herbs for nest placement.

Nest height ranges from .15 m to 8 m, at elevations below 1,500 feet. Blue Grosbeaks prefer open areas with higher ground cover. Forages in agricultural fields and nests along roadsides and cultivated fields. Nest type is open cup, made of stems, thin twigs, bark strips, rootlets, dead leaves, corn husks, cardboard, cotton, paper, plastic/cellophane, shed snakeskin, lined with fine rootlets, tendrils, hair, fine grasses.

Current Geographic Range: Three subspecies occur in the U.S. G. c. caerulea - SE and S central U.S. G. c. interfusa – SW U.S. and N Mexico. G. c. salicaria - Central Valley, CA and SE deserts/valley floors, from Oasis, Mono and Owens Valley, Armagosa River, SW CA to NW Baja and east to the Virgin River in SW Utah and the Colorado River, AZ.

Life History: Males arrive in California from early April to mid-May. Few females arrive before May. Departure date from breeding grounds is late Aug. through early Sep. in Coastal CA. Extent of wintering in CA: stragglers through mid-Oct. and mid-Nov.

Fall migrants in U.S. gather in flocks in grasslands, rice fields and grain fields. May hover and glean, fly-catch, walk or hop on the ground. Large bill allows for manipulation of large grains such as corn, and insects such as grasshoppers, crickets, and mantids. Insects are eaten during the breeding season. Seeds of wild and cultivated grains are also eaten in the winter. Snails, other invertebrates, and fruits are also eaten.

Clutch size ranges from 2-5, but is usually 4. Altricial young attended by both male and female, females re-nest while males attend fledglings. First eggs in California occur from mid April to mid July.
**Burrowing owl**
*Athene cunicularia*


**Habitat Requirements:** The Burrowing Owl is primarily a grassland species, but it persists and even thrives in some landscapes highly altered by human activity. The overriding characteristics of suitable habitat appear to be burrows for roosting and nesting and relatively short vegetation with only sparse shrubs and taller vegetation. Owls in agricultural environments nest along roadsides and water conveyance structures (open canals, ditches, drains) surrounded by crops. Nest and roost burrows are most commonly dug by ground squirrels, but they may use badger, coyote, and fox dens or holes. Nest boxes are often used by owls, and their installation may be an important management tool.

The diet includes a broad array of arthropods (centipedes, spiders, beetles, crickets, and grasshoppers), small rodents, birds, amphibians, reptiles, and carrion. In California, there is evidence that rodent populations, particularly those of California Voles, may greatly influence survival and reproductive success. Food limits the number of fledged young at some sites. This is not surprising given the large clutch size of up to 14 eggs.

**Current Geographic Range:** Broadly distributed in western North America. Two recognized subspecies in North America: *A. c. hypugaea* in the west, *A. c. floridana* in Florida and the Bahamas. Most Burrowing Owls that breed in North America winter in Mexico, Arizona, New Mexico, Texas, Louisiana, and California, which is considered one of the most important wintering grounds for migrants. The Burrowing Owl has been nearly extirpated as a breeding species from coastal San Luis Obispo, Santa Barbara, Ventura, and Los Angeles counties.

**Life History:** Year-round resident throughout much of CA. Seasonal status varies regionally, with birds retreating from higher elevations in winter. Migrants from other parts of western North America may augment resident lowland populations in winter. The breeding season in CA is March to August, but can be February to December.

**Threats:** Habitat loss and degradation from rapid urbanization of farmland is the greatest threat to Burrowing Owls in California. Ongoing urbanization in coastal regions, changes in agricultural practices, and continuing eradication of ground squirrels are also serious threats.
Habitat Requirements: A common to abundant resident in a variety of open habitats, usually where trees and large shrubs are absent. Found from grasslands along the coast and deserts near sea level to alpine dwarf-shrub habitat above treeline. Less common in mountain regions, on the North Coast, and in coniferous or chaparral habitats. Mostly leaves mountains in winter. In winter, flocks in desert lowlands and other areas augmented by winter visitants, many migrating from outside the state. Resident on the Channel Islands.

Mostly eats insects, snails, and spiders during breeding season; adds grass and forb seeds and other plant matter to diet at other seasons. Walks along ground, searching for food. Grasses, shrubs, forbs, rocks, litter, clods of soil, and other surface irregularities provide cover. Builds grass-lined nest; cup-shaped in depression on ground in the open. Drinks freely from waterholes, but individuals have survived in captivity for 16-31 days without water. Frequents grasslands and other open habitats with low, sparse vegetation.

Current Geographic Range: Occupies open spaces from the tundra shores of Canada to the open grasslands of the Great Plains to the high meadows of the Andes.

Life History: Yearlong resident within the state. After breeding, often forms large flocks that forage and roost together. Migrants from outside of California join these wintering flocks.

Threats: Eggs and nestlings subject to predation from mammals and snakes. Adults are prey for falcons.
Cooper's hawk
Accipiter cooperi

Identifying Characteristics: Females are up to one third larger than males. Adults have solid gray upperparts, barred with reddish-brown. Their long tails are barred gray and black, rounded at the ends, with a white band at the tips. Their eyes are red. Immature birds are brown above with brown streaking on their white underparts and yellow eyes.

Cooper’s Hawks have short, rounded wings that are set slightly farther back on their bodies than those of the smaller, but similar-looking, Sharp-shinned Hawk. Their heads are relatively larger and their gray caps are darker and a little more prominent than those of the Sharpshinned. The white tip of the tail of the Cooper’s Hawk is usually wider than that of the Sharp-shinned Hawk, especially in the fall.

Habitat Requirements: Cooper’s Hawks are generally found in forested areas up to 3,000 feet, especially near edges and rivers. Unlike the Sharp-shinned Hawk, which prefers conifers, the Cooper’s Hawk prefers hardwood stands when they are available. The species prefers mature forests, but can be found in urban and suburban areas where there are tall trees for nesting. During the nesting season, Cooper’s Hawks are often more common in open areas than Sharp-shinned Hawks. In winter, Sharp-shinned Hawks are seen in more open areas. Medium-sized birds (robins and jays) and small mammals (squirrels and mice) make up the majority of the Cooper’s Hawk’s diet.

Current Geographic Range: The Cooper’s Hawk is the most widespread of the three North American accipiters.

Life History: Courtship is lengthy for Cooper’s Hawks. The male may feed the female for up to a month before she begins to lay eggs. They nest in a tree, 25-50 feet off the ground. The nest is often built on top of an old nest or clump of mistletoe. Both sexes help build the stick nest lined with pieces of bark. The female incubates the 3-5 eggs for 30-33 days. The male brings food and incubates the eggs when the female leaves the nest to eat. Once the eggs hatch, the female broods for about two weeks. During this time, the male continues to bring food for the female and the young. The young start to climb about the nest at four weeks of age, and begin to make short flights soon after. The parents continue to feed the young for up to seven weeks.


Photo Credit: Patricia Lott
Grasshopper sparrow
Ammodramus savannarum

Habitat Requirements: In general, Grasshopper Sparrows in California prefer short to middle-height, moderately open grasslands with scattered shrubs. In some parts of the sparrow’s California range, native bunchgrasses are important habitat components. These sparrows generally are absent from areas with extensive shrub cover, though some shrubbery is tolerated and perhaps preferred. Patchy bare ground has also been noted as an important habitat component. This species is more likely to be found in large tracts of habitat than in small ones.

The diet of the Grasshopper Sparrow is roughly 63% animal matter and 37% vegetable. Animal matter primarily consists of grasshoppers; in California plants whose seeds the species is known to eat include knotweed, campion, oats, and pigweed. These sparrows forage primarily on the ground or from low vegetation. Grasshopper Sparrows build nests domed with grasses and with a side entrance, typically well concealed in depressions at the base of grass clumps with the rim approximately level to the ground.

Current Geographic Range: A. s. perpallidus occurs very patchily from the Pacific coast, including California, east to the Great Plains. The Grasshopper Sparrow occurs in CA primarily as a summer resident from March to September; the breeding season extends from mid-March to August. The Grasshopper Sparrow is at least partly migratory. In coastal southern California, the Grasshopper Sparrow has retreated greatly. Lehman (1994) noted declines in Santa Barbara County.

Threats: Urbanization is the primary current threat to the Grasshopper Sparrow. Much of its California habitat lies in the path of expanding cities. The great expansion of vineyards in the inner Coast Ranges is likely removing substantial habitat for this species.
Loggerhead shrike
Lanius ludovicianus

Habitat Requirements: In California, Loggerhead Shrikes breed mainly in shrublands or open woodlands with a fair amount of grass cover and areas of bare ground. They require tall shrubs or trees (also use fences or power lines) for hunting perches, territorial advertisement, and pair maintenance; open areas of short grasses, forbs, or bare ground for hunting; and large shrubs or trees for nest placement. They also need impaling sites for prey manipulation or storage, which can include sharp, thorny, or multistemmed plants and barbed-wire fences. These requirements are met on the coastal slope and Coast Ranges in chaparral, oak woodland, or oak savannah.

Builds a bulky, cup-shaped nest in a variety of shrubs and low, dense trees, rarely less than 3 feet or more than 25 feet above the ground. Hides the nest well below the crown of the bush or tree. Sometimes hawks for aerial insects, but takes most of its prey as it dives to the ground from an elevated perch. In the West, eats about 83 percent insects. Eats mostly grasshoppers and crickets, but also a variety of other insects, small mammals, birds, and reptiles.

Current Geographic Range: Breeds from Canada, Minnesota, Wisconsin, Michigan, south to Mexico and the Gulf Coast. Winters in the southern half of the United States and in Mexico.

Life History: Present year round throughout most of the California range; breeds from as early as January or February in southern California to July. Breeding populations in north and possibly elsewhere are migratory; other populations primarily resident (entirely resident south of 39°). Wintering individuals augment resident populations and occupy nonforested areas locally where none breed.

Threats: Habitat loss on breeding and wintering grounds as well as along migratory routes, is a major threat to the species. Loss of oak savannah, coastal scrub, and riparian habitats to agriculture that does not meet the ecological requirements of the species is a continued threat in many regions, as is habitat conversion from increasing urbanization.

**Long-billed curlew**  
*Numenius americanus*

Identifying Characteristics: The Long-billed Curlew is the largest North American shorebird. It has a very long, decurved bill, which is longer on adult females than on males and juveniles. It is mottled brown overall, with cinnamon underwings. Sometimes a striped head pattern is evident. It is similar in size, shape, and color to the Marbled Godwit, but the decurved bill distinguishes it from the upturned bill of the Marbled Godwit.

Habitat Requirements: Dry grasslands and shrub savannahs are the traditional breeding habitats of Long-billed Curlews. They also nest in grain fields and pastures. During migration and winter, they can be found on coastal mudflats and marshes, and less commonly in fields and grasslands.

Males attract females and defend their territories with undulating flight displays, fluttering and gliding while calling. The nest is on the ground in the open, but is often located next to an object such as a rock, a shrub, or even a pile of cow manure. The nest itself is a shallow scrape, usually sparsely lined with vegetation, sometimes with a rim built up around the edge. Both parents help incubate the four eggs for 27-30 days. The young leave the nest shortly after hatching and feed themselves, although both parents tend them and lead them to a marshy or damp area to find food.

These birds often gather in small flocks and forage by walking quickly along with their long bills extended forward, probing for food. In summer, earthworms and other invertebrates are common prey. Berries may also be important food at certain times of the year. Birds in coastal areas eat crabs and other aquatic creatures.

Life History: This short-distance migrant is one of the earliest breeding shorebirds, returning from wintering grounds from California to Mexico in mid-March, before their nesting grounds dry out. The adults leave by mid-July, with the young of the year leaving in mid-August.

Threats: Habitat destruction is their biggest threat. As more and more native grassland is converted to agriculture, the amount of potential Long-billed Curlew nesting habitat is shrinking.
Merlin
Falco columbarius

Source: <http://www.hawkmountain.org/media/merlin.pdf>

Identifying Characteristics: Length 2 is 4-30 cm; wingspan 53-68 cm; weight 129-236 g. They have long, thin wings and long tails, and typically engage in active flight. The species is a direct and deliberate flyer that flaps with short, powerful, piston-like wingbeats. Unlike many other falcons, merlins lack distinct mustache markings on their face. Adult males have bluish gray backs and wings, and black tails with two to five thin, gray bands. Their underparts have heavy, dark streaking with a rufous wash along the sides of the breast. Female Merlins have dark brown backs and wings, dark brown tails with thin, buff-colored bands, and buff-colored underparts that are heavily streaked. Females are about 10% larger in size and 30% heavier than males.

Habitat Requirements: Merlins hunt both from perches and on the wing. Hunting activity peaks in early morning and late afternoon. Merlins feed primarily on small- to medium-sized songbirds. Merlins often prey on small shorebirds, particularly in winter. The species also feeds on small mammals, reptiles, amphibians, and on insects. Overall, Merlins are opportunistic hunters that feed upon the most abundant and vulnerable prey available.

Current Geographic Range: Three of the 10 subspecies (Taiga, Black, and Prairie) occur in North America. Taiga Merlins breed from Newfoundland west to Alaska and into the northern tier of the United States including the western mountain states. Most Black Merlins breed in the Pacific Northwest, and are sedentary. Prairie Merlins breed in south central Canada and in the northern Prairie states of the United States and are partial migrants.

Life History: Merlins are typically monogamous. Merlins often return to the same breeding area, and many reoccupy the same nesting territory. Males usually return to the breeding grounds about a month earlier than females. In some instances females remain on the nesting territory throughout the year. Merlins do not build their own nests, but rather use the abandoned nest of other birds, mainly those of other raptors or magpies. The species also nests on cliff ledges, the ground, buildings, and in cavities in trees. Unlike other North American falcons that do not bring nesting material to the nest, Merlins sometimes add greenery or other nesting materials. Merlins engage in an array of aerial displays. Males use “power flying” (a display that involves flying with deep wingbeats and rolling from side to side while traveling in strong, flapping flight) to attract females and to discourage intruding males. Both members of a pair soar and “high circle” to mark their territory. In “flutter flight” displays, males fly slowly with quick, shallow wingbeats in a circular or figure eight flight pattern near their perched mate. Courtship rituals also include food begging by the female, food transfers from the male to the female, and nest displays by both sexes. Merlins lay three to five eggs per clutch. Females do most of the incubating during the 30-day incubation period. The young fledge when they are 25 to 35 days old.

The migration patterns of the three North American subspecies differ considerably. Taiga Merlins are complete migrants. Each autumn, almost all members of this subspecies leave their breeding grounds and migrate to their wintering grounds in the western and southeastern United States, and northern South America. Black Merlins are typically sedentary. Prairie Merlins are partial migrants. Many migrate to the southern United States and in Central America, but others remain on their breeding grounds.
Northern harrier
*Circus cyaneus*

**Identifying Characteristics:** Similar in size (46-56 cm tall) to Swainson’s hawk, it can be identified by a distinctive white rump patch. The male is slate grey in color while the dark brown plumage of the female allows her to remain camouflaged on her nest.

**Habitat Requirements:** Northern Harriers breed and forage in a variety of open (treeless) habitats that provide adequate vegetative cover, an abundance of suitable prey, and scattered hunting, plucking, and lookout perches such as shrubs or fence posts. In California, such habitats include freshwater marshes, brackish and saltwater marshes, wet meadows, weedy borders of lakes, rivers and streams, annual and perennial grasslands, weed fields, some croplands (especially alfalfa, grain, sugar beets, tomatoes, and melons), and sagebrush flats. Harriers nest on the ground, mostly within patches of dense, tall vegetation in undisturbed areas.

Harriers feed on a broad variety of small- to medium-sized vertebrates, primarily rodents and passerines. Wet habitats, including irrigated agriculture, tend to support large numbers of California Voles, a key food item in California. Of 438 food items delivered to four nests in San Luis Obispo County, 81% were birds (mostly blackbirds and sparrows), 18% mammals (mostly Brush Rabbits and California Voles), and 1% reptiles.

**Current Geographic Range:** Breeds in North America from northern Alaska and Canada south to northern Baja California. Breeds widely in the CA central coast region. The San Luis Obispo County BBA found harriers in 39 blocks. In Santa Barbara County, harriers breed at Vandenberg Air Force Base and San Miguel Island.

**Life History:** Occurs year round within breeding range in CA. At least some breeding populations may be resident. The breeding season extends from Mar. - Aug. Four to six eggs are laid. Although generally monogamous, they may also be polygynous, with harems of two to five females. Northern harriers are very sensitive to disturbance and will quickly desert their nests if bothered during the incubation period.

**Threats:** The primary threats to breeding harriers are loss and degradation of nesting and foraging habitat and nest failure from human disturbance, predator-control projects, agricultural practices, and unnatural predation pressure.
Osprey
Pandion haliaetus

Identifying Characteristics: Females are 60-66 cm, males 50-55 cm. Wingspan is 183 cm. Color: Body, dark brown above and white below. Head, white except for a brown stripe from the eye to the back of the head. The tail has medium-sized, alternating, dark brown and white bands. The female Osprey had a larger band of mottling across chest. Other things to look for: Barring on underwings and tail, voice plaintive whistles. Eyes are Yellow in color, feet appear oversized. Unlike other raptors, the Osprey has four equal toes. The outer one is reversible, enabling the bird to seize its prey with two toes pointing forwards and two pointing backwards.

Habitat Requirements: Their diet consists solely of fish, therefore they live close to water ways. Ospreys are able to live almost anywhere where there are safe nest sites and shallow water with abundant fish. Nests are generally found within 3 to 5 km of a water body such as a salt marsh, mangrove swamp, cypress swamp, lake, reservoir or river. Nests are most commonly in dead or open-topped trees.

Current Geographic Range: Ospreys inhabit all continents except Antarctica. In the New World it breeds from Alaska to the Caribbean, and winters in South America. It eats both freshwater and saltwater fish, permitting it to exist in a very wide range of water-margin habitats.

Life History: Territorial and nests in dispersed pairs. Builds a large stick nest lined with seawood, bark, leaves, or grass and placed in a deciduous or coniferous tree, or on a power pole, rocky promontory, offshore stacks of rocks, or on the ground. The same nest is re-used each season with both birds adding material. Clutch size is 2-4 eggs, which are white with bold reddish-brown and dark brown spots and blotches.
Identifying Characteristics: The Prairie Falcon has a body length of 15 - 20 inches, a 3 1/2 foot wingspan, and weighs 1 - 2 pounds. Prairie and Peregrine Falcons are similar in size and can be distinguished from each other by color. The Prairie Falcon is brown and has dark “armpits” or dark patches under the wings, while the Peregrine is blue-gray and has a uniform underwing color pattern.

Habitat Requirements: Prairie Falcons inhabit hills, canyons, and mountains of arid grasslands and shrub-steppes.

The primary food of Prairie Falcons is small mammals, especially ground squirrels, but they will also hunt birds, reptiles, and insects. This falcon actively searches for prey during flight. Prairie Falcons catch prey on or close to the ground after a low angled swoop from above.

Current Geographic Range: Priarie Falcons can be found in southwestern Canada, western United States, Baja California, and northern Mexico.

Life History: Typically, Prairie Falcons nest on a cliff face using a ledge, cavity, crevice, or an abandoned nest of eagles, hawks, or ravens. Prairie Falcons lay 3 - 6 eggs with an incubation time of about 34 days. Young falcons leave the nest 5 - 6 weeks after hatching.
Purple martin
Progne subis


Habitat Requirements: Common to all nesting areas are concentrations of nesting cavities, relatively open air space above accessible nest sites, and relatively abundant aerial insect prey. Martins use a wide variety of nest substrates (e.g., tree cavities, bridges, utility poles, lava tubes, and, formerly, buildings), but nonetheless are very selective of habitat conditions nearby. Typical of all sites is low canopy cover at the nest height. Also, most tree nest sites are located in the upper slopes of hilly and mountainous terrain. Martins seldom use snags along canyon bottoms or sites with dense vegetation at or above nest height.

Martins are most abundant in mesic regions, near large wetlands present in land other water bodies, and at upper slopes and ridges, which likely concentrate aerial insects. Starlings must be low densities or absent. In conifer regions, martins are most numerous in low- to mid-elevation forests (0 - 6000 ft) such as Redwood, yellow pine, and mixed conifer. Conifer snags (occasionally dead-top trees and hardwood snags) are the most common nesting substrate, used by >70% of the California population; martins select very tall, large trees. Stand-replacing fire is the main process that creates martin habitat by creating snags and open terrain. Population persistence in forested areas appears to depend on the presence of clusters of large snags or individual very large snags that can support multiple pairs.

Nearly all woodland nesting sites support concentrations of very large trees, primarily Valley Oaks and sycamores. However, martins have disappeared from nearly all otherwise suitable foothill and lowland Valley Oak and sycamore riparian habitats, presumably because of starling competition. Martins persist in oak habitats only in the Tehachapi Mountains, where large oaks occur at relatively high elevations and in prominent positions, and where starling numbers are low.

Current Geographic Range: Purple Martins are widely but locally distributed in forest and woodland areas at low to intermediate elevations throughout much of the state. Populations are densest in central and northern coastal conifer forests. A few sites in Monterey, San Luis Obispo, and Santa Barbara counties appear to be the last places where martins still nest in Western Sycamore woodland.

Life History: Occurs as a summer resident and migrant in California, primarily from mid-March to late September. Breeds from May (rarely late Apr) to mid-August.

Threats: Competition from starlings is the main threat to remnant martin populations in lowland woodlands, making recolonization of most areas unlikely.
**Sharp-shinned hawk**

*Accipiter striatus*


- **Identifying Characteristics:** The Sharp-shinned Hawk has a body length of 10 – 14 inches, a wingspan of 20 – 27 inches, and weighs 3 – 8 ounces.

- **Habitat Requirements:** This hawk occupies a wide variety of forests, ranging from boreal coniferous, mixed deciduous, bushy and riparian areas, tropical cloud forests, mountainous pine forests, savanna woodlands, and urban areas.

Birds make up to 90% of this hawk’s diet, but they may also take small mammals, frogs, lizards, and insects. Sharp-shinned Hawks use a fast bursting flight to chase down their prey. The Sharp-shinned Hawk’s prey is usually taken to a special location near the nest to be plucked of its feathers or fur. This perch is referred to as a plucking post or butcher’s block.

- **Current Geographic Range:** The sharp-shinned hawk can be found throughout North America and on some Caribbean Islands.

- **Life History:** The bark and greenery-lined stick nest is usually built each year in a dense stand of trees. The female lays 2 - 5 eggs that are incubated for 30 - 32 days. The young hawks are flying 3 - 4 weeks later, and may be capable of breeding their first year.

Birds in the northern extent of their range migrate south as far as Panama, while birds at higher elevation move to lower elevation during the winter.
Habitat Requirements: Nesting Short-eared Owls require open country that supports concentrations of microtine rodents and herbaceous cover sufficient to conceal their ground nests from predators. Suitable habitats may include salt- and freshwater marshes, irrigated alfalfa or grain fields, and ungrazed grasslands and old pastures. Tule marsh or tall grasslands with cover 30–50 cm in height can support nesting pairs.

Often 99% of their diet is small mammals. In California, the owls are attuned to the three-to-four-year cycle of the California Vole, and produce more young and expand their range in years of high vole productivity.

Current Geographic Range: Breeds over much of northern North America. Many northern populations are migratory; North American breeders winter south to northern Mexico and Florida.

Life History: Year-round resident in certain areas within California; the breeding season stretches from March - July.

Threats: Today, the primary threats are continued habitat loss and degradation, aggravated to an unknown extent by grazing, invasive exotic weeds, water management, and disease.

Losses of eggs and nestlings to ground predators can be a serious local problem, and predation by the non-native Red Fox likely led to the extirpation of nesting owls in the San Francisco Bay area and in coastal Monterey County. Other potentially problematic ground predators include domestic dogs and cats, skunks, Raccoons, and corvids, especially increasing numbers of Common Ravens along the coast and in the deserts.
**Southern California rufous-crowned sparrow**

*aimsophila ruficeps canescens*

**Identifying Characteristics:** A. r. canescens ranges from 13-15 cm and weighs 15-23 g. Males and females are similar in color with a rusty crown, whitish throat, thin rufous eyeline, and distinct whitish eye ring.

Rufous-crowned Sparrows forage on or very near the ground while walking or hopping under shrubs or within dense grass or herbaceous cover. During the breeding season, they glean insects from low shrubs, grasses and herbaceous vegetation. They actively forage throughout the day. They sometimes forage in pairs during the breeding season and in family-sized flocks in late summer and early fall. In winter they can occasionally be found foraging in looseknit mixed-species flocks.

**Habitat Requirements:** The Rufous-crowned Sparrow exhibits a distinct preference for rocky hillsides and steep slopes in open grass and coastal sage scrub in areas ranging from roughly 200-4,500 feet in elevation. They also thrive in areas that have recently been burned, and sometimes remain in these grassy, successional habitats for a number of years.

They primarily eat small grass and forb seeds, fresh grass stems and tender plant shoots. Insects such as ants, grasshoppers, ground beetles, and scale insects make up 12-21% of the diet. Rufous-crowned Sparrows are ground-nesters. Nests are primarily constructed of coarse dried grasses and rootlets, sometimes with small twigs, weed stems, or strips of bark. Nests are usually well hidden, often situated at the base of a low bush, grass tussock, or overhanging rock.

**Life History:** Rufous-crowned Sparrows are generally year round residents that do not exhibit true migratory behavior. Few data exist on the timing of the onset of breeding; the earliest report of birds carrying nesting material was March 2 in southern CA. Rufous-crowned Sparrows are apparently monogamous, and usually lay clutches of three to four eggs. Only the female incubates. Males maintain territories year-round. After chicks have fledged they forage in small family groups. Adult birds breed annually.

**Threats:** The largest threat to the Rufous-crowned Sparrow is habitat loss, degredation, and fragmentation. Populations are becoming increasingly isolated due to urbanization and agricultural development in Los Angeles, Orange, Riverside, San Diego, and San Bernardino counties. Over the last one hundred years fire suppression has also led to loss of habitat, as Rufous-crowned Sparrows prefer more open scrub areas as opposed to dense tracts of scrub or chaparrall.

**Current Geographic Range:** Four subspecies are found in CA (A. r. canescens, A. r. obscura, A. r. ruficeps and A. r. scottii). A. r. ruficeps is a year-round resident of central California from the coast to the western slopes of the Sierra Nevada. A. r. obscura inhabits Santa Cruz Island and Anacapa Island. A. r. canescens is a resident of southwest California from San Luis Obispo County south to Baja California Norte. A. r. scottii are found only in isolated portions of the desert mountain ranges of SE California.
Identifying Characteristics: Swainson’s Thrush has solid brownish upperparts (back, wings, and tail), light-colored bellies, whitish eye rings, and varying degrees of spotting on their breasts. It is similar in shape to a robin, but smaller. Males and females appear similar in most species. Swainson’s Thrushes also have distinct buff-colored eye-rings.

Habitat Requirements: The Swainson’s Thrush occupies forested habitat at low to mid-elevations. It is found mostly in dense hardwood and mixed forests, young conifer forests, and forest openings. They are attracted to salmonberry stands as nesting sites.

The diet changes seasonally from insects to berries. Berries are important year round, making up over one third of the summer diet. The male establishes a territory and attracts a mate by singing. The female builds the nest on a horizontal branch of a deciduous tree or shrub 2-10 feet above the ground. The nest is a bulky, open cup of twigs, bark strips, moss, grass, leaves, and mud. It is lined with fine, soft materials including animal hair and lichen. The female lays 3 to 4 eggs, which she incubates by herself. Both parents feed the young, which leave the nest 10 to 13 days after hatching.

Life History: The Swainson’s Thrush does much of its feeding on the ground, but spends some time foraging in trees. They hover while gleaning insects from foliage, and also catch flying insects. In spring and summer, when they feed predominantly on insects and other invertebrates, they forage mostly on the ground. As the season progresses and they eat more berries, they forage farther off the ground. The song and call of the Swainson’s Thrush are quite distinctive, and may help a birder to locate this thrush that usually stays under cover.

Swainson’s Thrushes are highly migratory. They travel north late in spring, and migration is spread out. Fall migration takes place during August and September. Migration is mostly at night. The birds migrate to tropical forests for the winter.

Threats: They are vulnerable to loss of habitat on breeding and wintering grounds.
Tricolored blackbird
Agelaius tricolor

Habitat Requirements: As many as 20,000 to 30,000 nests have been recorded in cattail marshes of 4 ha or less, with individual nests <0.5 m from each other. Nest heights range from a few cm to about 1.5 m above water or ground at colony sites in freshwater marshes and up to 3m in the canopies of willows and other riparian trees. The species’ basic requirements for selecting breeding sites are open accessible water; a protected nesting substrate, including either flooded or thorny or spiny vegetation; and a suitable foraging space providing adequate insect prey within a few kilometers of the nesting colony.

The most important prey for adults provisioning nestlings include beetles, grasshoppers, locusts, true bugs, other larval insects, and spiders and allies.

Ideal foraging conditions for this species are created when shallow flood-irrigation, mowing, or grazing keeps the vegetation <15 cm tall. Preferred foraging habitats include crops such as rice, alfalfa, irrigated pastures, and ripening or cut grain fields, as well as annual grasslands, cattle feedlots, and dairies. These blackbirds also forage in remnant native habitats, including wet and dry vernal pools, riparian scrub habitats, and open marsh borders. Vineyards, orchards, and row crops do not provide suitable nesting substrates or foraging habitats. Proximity to suitable foraging habitat appears to be extremely important for the establishment of colony sites.

Current Geographic Range: Except for some small nesting colonies, the Tricolored Blackbird is native to CA. Tricolored Blackbirds are permanent residents of CA, but birds make extensive migrations and movements, both in the breeding season and in winter, within their restricted range.

Life History: Wintering Tricolored Blackbirds often congregate in huge, mixed-species blackbird flocks that forage in grasslands and agricultural fields with low-growing vegetation and at dairies and feedlots. In February, however, this species segregates into pure Tricolored Blackbird flocks.

Threats: The greatest threats to this species are the direct loss and degradation of habitat from human activities.
Habitat Requirements: In CA the highest densities of swifts are found in the Redwood zone, the lowest in the Douglas-fir and other forest types found further inland.

These swifts nest in cavities in a variety of trees and less frequently in artificial structures, particularly chimneys. Nests are an open half circle made of small twigs or conifer needles fastened together and to the cavity wall by sticky saliva. Birds may locate nests above or below the opening to the cavity, which they enter via a side hole or an open top. Cavities apparently need to be large enough to allow the birds to fly while within the cavity and place the nest at a distance from the opening that provides a dark, sheltered environment. Many tree species are acceptable for nest sites as long as they grow large enough, persist long enough, and have decay, fire, or primary excavators such as woodpeckers, or otherwise develop large and accessible cavities.

During the breeding season, Vaux’s Swifts forage in a variety of habitats (especially over water) and at various heights, with small flying arthropods the primary prey.

Current Geographic Range: C. v. vauxi breeds in western N America from SE Alaska, S British Columbia, N Idaho, and W Montana south to central CA. Migrates in breeding range and to east from Idaho, Nevada, and Utah south through the southwestern United States, Baja California, and western Mexico. Winters from central Mexico south throughout the breeding range of the other subspecies in Middle America and in Venezuela. The breeding range on the northern and central coast of CA contains most of California’s population., and generally follows the distribution of Redwoods.

Life History: Occurs primarily as a migrant and summer resident in CA from mid-April to mid-October; breeds from early May to mid-August. Occurs rarely and irregularly in winter in southern CA.

Threats: Loss of potential nest and roost sites are probably the primary threats to the Vaux’s Swift.
**Identifying Characteristics:** The Warbling Vireo is a small bird, greenish-gray above, whitish below in spring, lightly washed with yellow below in fall. It has no wing-bars. It has a prominent white line above the eye and a faint grayish line below it.

**Habitat Requirements:** The Warbling Vireo’s typical habitat is open deciduous or shrubby mixed woodlands, especially where large trees are present. Warbling Vireos are often found in willow or cottonwood stands along rivers. They are not found in large, unbroken tracts of woods, but prefer smaller patches and edges, including logged areas, rural woodlots, and parks. They do not breed in conifer stands, but can be found in small patches of hardwood trees or shrubs within conifer forests. During migration they can be seen in a variety of lowland habitats, especially in red-osier dogwood.

Warbling Vireos forage mostly high in the treetops, where they move along twigs and branches, looking for food among the leaves. Insects make up 95% of the diet. Spiders and small berries make up the remaining 5%, with most berry eating confined to the late summer and fall.

**Life History:** Warbling Vireos are monogamous. Nests are located in the periphery of deciduous trees and shrubs. Birds of the western subspecies place their nest within 30 feet of the ground. Both members of the pair build the nest, which is suspended from a horizontally forked branch. The nest is made of bark strips, grass, leaves, plant fibers, hair, and lichen. Both parents incubate the four eggs for 12 to 14 days. Both feed and tend the young for the 13 to 14 days they are in the nest and for up to two weeks after they leave it. Some pairs raise a second brood.

This highly migratory species winters in western Mexico and northern Central America. Warbling Vireos begin arriving in Washington in April and continue to arrive throughout May. They start to leave in August, with the last few remaining until mid-September.
Western meadowlark
*Sturnella neglecta*

**Habitat Requirements:** Meadowlarks are open-country birds. They inhabit meadows, grasslands, plains, prairies, shrub-steppe, and agricultural areas. During winter, they can often be found in cultivated fields and wet grasslands.

During the summer, insects like caterpillars and grasshoppers make up most of the diet. In fall and winter, seeds and waste grain become more important.

Western Meadowlarks nest on the ground, often in small dips or hollows, such as those created by cow footprints. Nests are typically under dense vegetation and can be very difficult to find. Western Meadowlarks are polygamous. Successful males generally mate with two females at a time. Females build the nests, which are grass domes with side entrances. The nest materials are often interwoven with adjacent growth, and small trails may form through the grass to the nests. Females incubate 4 to 6 eggs for 13 to 14 days. The females brood the young after they hatch and provide most of the food, although the male may help. The young leave the nest 10 to 12 days after hatching. They cannot fly at this age but can run well, and, with the help of cryptic plumage, can hide successfully in the grass. Females often raise two broods a season.

**Current Geographic Range:** The western meadowlark is a short distance migrator. Its breeding range stretches from British Columbia, Michigan, and northwestern Ohio south to Missouri, central Texas and northern Mexico.

**Life History:** Western Meadowlarks flock in winter in single-species groups, or with other blackbirds and starlings. Meadowlarks forage mostly on the ground, running or walking, and probing the soil with their bills. In early spring, Western Meadowlarks sing continually from shrub tops, fence posts, utility poles, or any other high structure in their open-country habitat.

**Threats:** Primary threats include habitat destruction from livestock grazing, mowing, and development, and contamination from pesticides. Western Meadowlarks are extremely sensitive to human disturbance during the breeding season and will abort nesting attempts if they are flushed while incubating eggs.
Wilson’s warbler
Wilsonia pusilla

Identifying Characteristics: Wilson’s warbler is a small songbird with underparts entirely yellow, an olive green back, and a yellow face. It has plain dark wings and tail. Males have a black cap.

Habitat Requirements: Breeds along edges of alpine meadows to 3000 meters. Wilson’s Warblers are common migrants in almost all woodland and shrub habitat on the coast and in the interior. Wilson’s Warblers are common to abundant migrants in the lowlands during the spring and in mountains and lowlands during the fall. Post-breeding Wilson’s Warblers forage along forest edges and within dense coniferous forests. In migration, woodlands with a shrub understory and chaparral are used, and low thick vegetation is preferred. Prefers deciduous over non-deciduous sites for feeding during breeding season. Wilson’s Warblers find breeding cover in willows, alders and shrub thickets.

Forages mainly below 2 m in height, and also eats insects gleaned from foliage low in the canopy or understory. Flycatching is a primary mode of foraging. Wilson’s Warblers often forage at habitat edges. A small amount of seed, fruits and berries are taken also. Animal matter makes up 93% of the diet, with vegetable matter making up < 7%. The most common insects eaten are Black Olive Scale, leafhoppers, wasps and ants.

A bulky open cup nest is constructed of dry leaves, bark shreds, thin dead weed stems, grass blades and stems and is lined with fine dry grasses, rootlets and hair. Nesting substrates include shrub or grass. Blackberry vines are preferred along the CA coast. Plant species commonly chosen as the nesting substrate also include nettles, wild rose, and ferns. The height of the nests ranges from 0 - 3 m.

Current Geographic Range: W. p. pieolata breeds in the Warner and White mountains of central eastern CA. W. p. chryseola is a widespread breeding species in CA. It breeds west of the crest of the Cascades and Sierra Nevada, as far south as the San Bernardino mountains. Both pileolata and chryseola migrate through CA. It is very rare in winter in CA. Leaves breeding grounds starting early August.

Life History: Arrive from Mexico in April and early May. These birds breed from late April into early August with peak activity in June. Often nest in loose colonies of several pairs. These birds exhibit breeding site fidelity. Individuals which have bred in previous years tend to return to territories that they established previously. The clutch size is of 4-6 eggs with an average of 5. Females incubate. Both adults feed young.

Threats: The Wilson’s Warbler has disappeared from most coastal lowlands south of Santa Barbara County probably due to the elimination of lowland riparian thickets in southern CA and the effects of Brown-headed Cowbird parasitism.
Identifying Characteristics: The yellow-breasted chat is a medium-sized songbird. With a bright yellow chest and throat, an olive-green back, and white spectacles. It has a long tail, and a white belly and undertail.

Habitat Requirements: Nesting Yellow-breasted Chats occupy early successional riparian habitats with a well-developed shrub layer and an open canopy. Vegetation structure appears to be the important factor in nest-site selection. Nesting habitat is usually restricted to the narrow border of streams, creeks, sloughs, and rivers and seldom forms extensive tracts. Blackberry, wild grape, willow, and other plants that form dense thickets and tangles are frequently selected as nesting strata. The nest is typically placed within 1 m of the ground but may range up to 2.4 m. Taller trees, such as cottonwood and alder, are required for song perches. Chats establish and defend individual territories, but pairs tend to congregate, suggesting loose coloniality. Chats will nest in tamarisk, Himalayan Blackberry, Russian Olive, and other non-native plants that provide dense shrub layers. Adults feed predominantly on insects and spiders; wild fruits and berries are also important.

Current Geographic Range: *I. v. auricollis* breeds from southern British Columbia east to southern Saskatchewan and North Dakota, south Baja California, west Texas; winters from southern Baja California and south Texas south to western Mexico through central Guatemala. Chats are considered “uncommon to locally fairly common” in the interior of San Luis Obispo County, where breeding is highly likely along the Salinas River, Trout Creek, and Arroyo Grande Creek above Lopez Lake. In Santa Barbara County, chats have declined markedly and now nest mainly at Barka Slough on Vandenberg Air Force Base, the Santa Ynez River, and Mono and Agua Caliente creeks.

Life History: In CA, occurs as a migrant and summer resident primarily from late March to late September; breeds from late April through early August.

Threats: Destruction of riparian woodland was implicated in the early decline of the Yellow-breasted Chat in California, but the species’ absence from seemingly suitable habitat suggests additional pressures. Chats are frequent hosts to nest parasitism by the Brown-headed Cowbird through much of their range.
Yellow warbler
Dendroica petechia brewsteri

Identifying Characteristics: The Yellow Warbler is a small songbird with a thin pointed bill. It is yellow overall, and has chestnut streaks on chest of male. Although many warblers are yellow, the Yellow Warbler is the most extensively yellow of any species. This widespread species of willows and mangroves is the only warbler with yellow tail spots.

Habitat Requirements: Yellow Warblers generally occupy riparian vegetation in close proximity to water along streams and in wet meadows. Throughout, they are found in willows and cottonwoods, and in California they are found in numerous other species of riparian shrubs or trees, varying by region. Also occupies woodland habitat. Breeds in wet, deciduous thickets, especially in willows, as well as in shrubby areas and old fields.

Eats Insects and other arthropods, occasionally fruit. Captures insects by gleaning, flycatching, and hovering

Nest is a deep cup of grasses and bark, covered on the outside with plant down and fine fibers, lined with fur or fine plant fibers. Placed in upright fork of shrub or tree.


Life History: Occurs principally in CA as a migrant and summer resident from late March through early October; breeds from April to late July.

Yellow Warblers have shown a high degree of site fidelity, with many birds returning to their previous year’s breeding grounds and many to the same territory.

Threats: The nests of the Yellow Warbler are frequently parasitized by the Brown-headed Cowbird. The warbler often builds a new nest directly on top of the parasitized one, sometimes resulting in nests with up to six tiers.
PDF of Tricolored Blackbird account from:
Shuford, W. D., and Gardali, T., editors. 2008. California Bird Species of Special Concern: A ranked assessment of species, subspecies, and distinct populations of birds of immediate conservation concern in California. Studies of Western Birds 1. Western Field Ornithologists, Camarillo, California, and California Department of Fish and Game, Sacramento.
TRICOLORED BLACKBIRD (*Agelaius tricolor*)

Edward C. Beedy

Breeding range of the Tricolored Blackbird in California. Overall outline of the range is stable, though numbers of breeders have declined dramatically. Colonies typically are largest in the Central Valley and are patchily distributed throughout, but particularly in the Coast Ranges and on the coastal slope.

Criteria Scores

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*Tricolored Blackbird*  
Studies of Western Birds 1:437–443, 2008
Studies of Western Birds

Special Concern Priority
Currently considered a Bird Species of Special Concern (breeding), priority 1. Included on the previous special concern list (CDFG 1992).

Breeding Bird Survey Statistics for California
Data inadequate for trend assessment (Sauer et al. 2005).

General Range and Abundance
Except for small nesting colonies found locally in Oregon, Washington, Nevada, and coastal Baja California, the Tricolored Blackbird is native to California. Of a global population estimated at about 163,000 adults in 2000, >99% were in California; in most years, the Central Valley alone holds >90% of all breeding adults (Hamilton 2000). The species also breeds locally in other lowland areas of California west of the Cascade-Sierra axis and in valleys at higher elevations in northeastern California, as described in greater detail in sections below. During winter, virtually all birds from outside the state, except a few in Oregon, withdraw to concentrate in the California breeding range (Beedy and Hamilton 1999).

Although no subspecies are recognized (AOU 1957, Pyle 1997), banding studies (Neff 1942, DeHaven and Neff 1973, DeHaven et al. 1975a) indicate that birds from Santa Barbara County south to Baja California and east to the Sonoran Desert remain within that area year round and could represent a separate metapopulation.

Seasonal Status in California
Tricolored Blackbirds are permanent residents of California, but birds make extensive migrations and movements, both in the breeding season and in winter, within their restricted range (DeHaven et al. 1975a, Hamilton 1998). Banding studies (Neff 1942, DeHaven and Neff 1973) and observations of unbanded birds (Payne 1969, Orians 1961), however, demonstrate that some Tricolored Blackbirds reside in the Central Valley throughout the year. Breeding extends from mid-March through early August (Beedy and Hamilton 1999); autumnal breeding (Sep through Nov) has been documented at several sites in the Central Valley (Orians 1960, Payne 1969) and at Point Reyes, Marin County (Jul through Sept; Stallcup 2004). During the breeding season, the species often exhibits itinerant breeding (Hamilton 1998). Individuals usually move north after first nesting efforts (Mar–Apr) in the San Joaquin Valley and Sacramento County to new breeding locations in the Sacramento Valley, northeastern California, and rarely Oregon, Nevada, and Washington. Although later nesting is typical in the north, small colonies may form during April to June throughout the breeding range.

Historic Range and Abundance in California
The Tricolored Blackbird’s known historic breeding range in California (see map) included the Sacramento and San Joaquin valleys, the foothills of the Sierra Nevada south to Kern County, the coastal slope from Sonoma County south to the Mexican border, and, sporadically, the Modoc Plateau (Dawson 1923, Neff 1937, Grinnell and Miller 1944). Historical surveys, however, did not include large areas of the species’ currently known breeding range and consequently did not document its full extent at the time (see below).

Few 19th-century accounts exist of the abundance of Tricolored Blackbirds in California. Heermann (1859:53) described fall flocks of thousands in the Shasta region and a wintering flock in Solano County “numbering so many thousands as to darken the sky for some distance by their masses.” Belding (1890) observed an “immense” colony in San Joaquin County. According to J. G. Cooper, the Tricolored Blackbird was “the most abundant species near San Diego and Los Angeles, and not rare at Santa Barbara” (Baird 1870:266; Baird et al. 1874:166). Grinnell (1898) reported them in “considerable numbers” throughout the year in Los Angeles County.

Neff (1937) conducted the first systematic surveys of the species’ population status and distribution. In 1934, he observed as many as 736,500 adults in just eight Central Valley counties. From 1931 to 1936, he found 252 colonies in 26 California counties. The largest colony, in Glenn County, contained >200,000 nests (about 300,000 adults) and covered almost 24 ha; several others in Sacramento and Butte counties contained >100,000 nests (about 150,000 adults). Most large colonies were associated with freshwater emergent wetlands in rice-growing areas of the Sacramento Valley.

Recent Range and Abundance in California
The overall range of the species is little changed since the mid-1930s (Beedy and Hamilton 1999), though more recent surveys have documented
Typha
Scirpus
Sambucus
Tricolored Blackbird
Tricolored Blackbird
Tricolored Blackbird
al. 1975b). Nest heights range from a few centimeters to about 1.5 m above water or ground at colony sites in freshwater marshes (Neff 1937) and up to 3 m in the canopies of willows (Salix spp.) and other riparian willows; rarely, they are built on the ground. The species’ basic requirements for selecting breeding sites are open accessible water; a protected nesting substrate, including either flooded or thorny or spiny vegetation; and a suitable foraging space providing adequate insect prey within a few kilometers of the nesting colony (Beedy and Hamilton 1999).

The colonial breeding system of the Tricolored Blackbird probably evolved in the Central Valley, where the locations of surface waters and rich sources of insect food were ephemeral and varied annually (Orians 1961). Before its rivers were dammed and channelized, the Central Valley flooded ed in many years, forming a vast mosaic of seasonal wetlands, freshwater marshes, alkali flats, native grasslands, riparian forests, and oak savannas. Virtually all these habitats once supported nesting or foraging Tricolored Blackbirds. The evolution of a colonial breeding system enabled this species to assess changing local conditions rapidly and exploit outbreaks of locusts and other ephemeral insects over large areas to meet their food demands. Nomadic, colonial social organization in birds evolves most frequently in semiarid areas with great annual fluctuations in climate (Orians 1961).

Historically, most colonies were in freshwater marshes dominated by cattails or tules (Scirpus spp.), but some were in nettles (Urtica spp.), thistles (Cirsium spp.), and willows (Salix spp., Neff 1937). However, the use of freshwater marshes as breeding colony sites decreased from 93% (n = 252 colonies) in the 1930s (Neff 1937) to 54% (n = 158 colonies) in the 1970s (DeHaven et al. 1975b). An increasing percentage of colonies since the 1970s have been reported in Himalayan Blackberry (Rubus discolor) and thistles (DeHaven et al. 1975b, Cook 1996), and some of the largest recent colonies were in silage and grain fields near dairies in the San Joaquin Valley (Hamilton et al. 1995, Meese 2006). Other less commonly used nesting substrates include Safflower (Carthamus tinctorius), tamarisk (Tamarix spp.), elderberry/Western Poison Oak (Sambucus spp. and Toxicodendron diversilobum), Giant Reed (Arundo donax), and riparian scrublands and forests (e.g., Salix spp., Populus spp., Fraxinus spp.; Beedy and Hamilton 1999).

Wintering Tricolored Blackbirds often congregate in huge, mixed-species blackbird flocks that forage in grasslands and agricultural fields with low-growing vegetation and at dairies and feedlots. In February, however, this species segregates occurrence in some areas lacking extensive prior coverage that likely were occupied historically (Hamilton et al. 1995; Beedy and Hamilton 1997; Hamilton 2000, 2004; Green and Edson 2004). This mostly includes documentation of local populations at the periphery of the range, such as those on the coast north to Humboldt County, in northeastern California, and in the western Mojave desert, and of new colony sites within the overall historic range (see map). Since 1980, active breeding colonies have been observed in 46 California counties; all of the largest (>20,000 adults) were in the Central Valley or at the Toledo Pit, Riverside County.

Recent statewide censuses have shown dramatic declines in Tricolored Blackbird numbers in the Central Valley (Beedy and Hamilton 1997, Hamilton et al. 1999, Hamilton 2000, Green and Edson 2004, Cook and Toft 2005). Statewide totals of adults in four late-April surveys covering all recently known colony sites were 369,359 in 1994, 237,928 in 1997, 104,786 in 1999, and 162,508 in 2000 (Hamilton 2000). In April 2004, statewide surveys focused on only those colonies that had supported >2000 adults in at least one previous year. Of 184 sites surveyed, only 33 supported active colonies at the time of the survey (Green and Edson 2004). Of the 33, 13 held >2000 adults each, collectively representing >96% of the census total.

Although resident in California, wintering Tricolored Blackbird populations move extensively throughout their range in the nonbreeding season. Major wintering concentrations occur in and around the Sacramento–San Joaquin River Delta and coastal areas, including Monterey and Marin counties, where they are often associated with dairies. Small flocks also may appear at scattered coastal locations from Sonoma County south to San Diego County, and sporadically north to Del Norte County (Beedy and Hamilton 1999, Unitt 2004). They are rare in winter in the southern San Joaquin Valley and in the Sacramento Valley north of Sacramento County (Beedy and Hamilton 1999).

ECOLOGICAL REQUIREMENTS

The Tricolored Blackbird forms the largest breeding colonies of any North American landbird (Cook and Toft 2005). As many as 20,000 to 30,000 nests have been recorded in cattail (Typha spp.) marshes of 4 ha or less, with individual nests <0.5 m from each other (Neff 1937, DeHaven et al. 1975b). Nest heights range from a few centimeters to about 1.5 m above water or ground at colony sites in freshwater marshes (Neff 1937) and up to 3 m in the canopies of willows (Salix spp.) and other riparian willows; rarely, they are built on the ground. The species’ basic requirements for selecting breeding sites are open accessible water; a protected nesting substrate, including either flooded or thorny or spiny vegetation; and a suitable foraging space providing adequate insect prey within a few kilometers of the nesting colony (Beedy and Hamilton 1999).

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Wintering Tricolored Blackbirds often congregate in huge, mixed-species blackbird flocks that forage in grasslands and agricultural fields with low-growing vegetation and at dairies and feedlots. In February, however, this species segregates
into pure Tricolored Blackbird flocks, which may subdivide further into age- and sex-specific flocks. At this time, foraging flocks roam across the landscape until they find a suitable nesting substrate with an abundant insect source nearby. The most important prey for adults provisioning nestlings include Coleopterans (beetles), Orthopterans (grasshoppers, locusts), Hemipterans (true bugs), other larval insects, and Arachnids (spiders and allies; Crase and DeHaven 1977).

With the loss of a natural flooding cycle and most native wetland and upland habitats in the Central Valley, Tricolored Blackbirds now forage primarily in artificial habitats. Ideal foraging conditions for this species are created when shallow flooding, irrigation, mowing, or grazing keeps the vegetation at an optimal height (<15 cm). Preferred foraging habitats include crops such as rice, alfalfa, irrigated pastures, and ripening or cut grain fields (e.g., oats, wheat, silage), as well as annual grasslands, cattle feedlots, and dairies (Beedy and Hamilton 1999).

These blackbirds also forage in remnant native habitats, including wet and dry vernal pools and other seasonal wetlands, riparian scrub habitats, and open marsh borders. Vineyards, orchards, and row crops (tomatoes, sugar beets, corn, peas, beets, onions, etc.) do not provide suitable nesting substrates or foraging habitats for Tricolored Blackbirds.

Most Tricolored Blackbirds forage within 5 km of their colony sites (rarely up to 13 km; Orians 1961, Beedy and Hamilton 1997). Proximity to suitable foraging habitat appears to be extremely important for the establishment of colony sites, as Tricolored Blackbirds usually forage, at least initially, in the field containing the colony site (Cook 1996). However, often only a minor fraction of the area within the commuting range of a colony provides suitable foraging habitat (Beedy and Hamilton 1999).

**THREATS**

The greatest threats to this species are the direct loss and degradation of habitat from human activities (Beedy and Hamilton 1999). Most native habitats that once supported nesting and foraging Tricolored Blackbirds in the Central Valley have been replaced by urbanization and agricultural croplands unsuited to their needs. In Sacramento County, a historic breeding center of this species, the conversion of grassland and pastures to vineyards expanded from 3050 ha in 1996 to 5330 ha in 1998 (DeHaven 2000) to 6762 ha in 2003 (Calif. Agri. Statistics Serv., www.nass.usda.gov/ca/). Conversions of pastures and grasslands to vineyards in Sacramento County and elsewhere in the species’ range in the Central Valley have resulted in the recent loss of several large colonies and the elimination of extensive areas of suitable foraging habitat for this species (Cook 1996, DeHaven 2000, Hamilton 2004, Messe 2006).

Entire colonies (up to tens of thousands of nests) in cereal crops and silage are often destroyed by harvesting and plowing of agricultural lands (Beedy and Hamilton 1999, Hamilton 2004, Cook and Toft 2005, Messe 2006). Concentration of a high proportion of the known population in a few breeding colonies increases the risk of major reproductive failures, especially in vulnerable habitats such as active agricultural fields.

Historical accounts documented the destruction of nesting colonies by a diversity of avian, mammalian, and reptilian predators (Beedy and Hamilton 1999). Recently, especially in permanent freshwater marshes of the Central Valley, entire colonies have been lost to Black-crowned Night-Herons (Nycticorax nycticorax) and Common Ravens (Corvus corax). Some large colonies (up to 100,000 adults) may lose >50% of nests to Coyotes (Canis latrans), especially in silage fields, but also in freshwater marshes when water is withdrawn (Hamilton et al. 1995). Thus, water management by humans often has the effect of increasing predator access to active colonies.

Various poisons and contaminants have caused mass mortality of Tricolored Blackbirds. McCabe (1932) described the strychnine poisoning of 30,000 breeding adults as part of an agricultural experiment. Neff (1942) considered poisoning to regulate numbers of blackbirds preying upon crops (especially rice) to be a major source of mortality. This practice continued until the 1960s, and thousands of Tricolored Blackbirds and other blackbirds were exterminated to control damage to rice crops in the Central Valley.

Beedy and Hayworth (1992) observed a complete nesting failure of a large colony (about 47,000 breeding adults) at Kesterson Reservoir, Merced County, and selenium toxicosis was diagnosed as the primary cause of death. At a Kern County colony, all eggs sprayed by mosquito abatement oil failed to hatch (Beedy and Hamilton 1999). Hosea (1986) attributed the loss of at least two colonies to aerial herbicide applications.

**MANAGEMENT AND RESEARCH RECOMMENDATIONS**

The maintenance of a viable, self-sustaining population distributed throughout the current range
of the species will require a coordinated mix of management, monitoring, and research activities implemented on both public and private lands. Because the species’ population is distributed in various habitats and landownerships, public and private partnerships to fund and implement these activities will be crucial. The Tricolored Blackbird Conservation Plan (TBWG 2007) includes many of the following management and research recommendations:

- Incorporate population and habitat conservation actions for the Tricolored Blackbird in habitat conservation plans, natural communities conservation plans, and other multispecies conservation plans and in ongoing private land agricultural and conservation easement programs.
- Restore habitat by promoting the growth of secure nesting substrates (e.g., nettles, thistles, and other naturally armored native plants) near productive foraging habitats to increase the potential carrying capacity for this species. Restored nesting habitats should be situated on protected public and private lands, especially in agricultural areas of the Central Valley and surrounding foothills.
- On refuges and other public lands that support Tricolored Blackbird colonies in irrigated pastures, manage irrigation to permit a sequential flooding regime in adjacent land parcels at the time they are breeding to enhance insect productivity. Incorporate carefully managed grazing of these parcels to maintain an average vegetation height of 15 cm to provide optimal Tricolored Blackbird foraging habitat.
- Lure nesting Tricolored Blackbirds, when possible, away from dairies and other agricultural operations to secure habitats where they are more likely to succeed; where colonies establish, defer harvest of grain and silage crops, if feasible, until after the breeding season.
- Investigate predator-prey relationships, especially the ongoing effects of Black-crowned Night-Herons and Coyotes and the responses of individuals and colonies to predators.
- Perform demographic research to determine whether reproductive success of freshwater marsh colonies varies with respect to wetland size and spatial relationships with other wetlands.
- Use genetic studies to determine the taxonomic status of the southern California breeding population.
- Analyze depletion of food resources by blackbirds near breeding colonies and quantify the extent and character of foraging habitats near colonies.
- Evaluate habitat selection mechanisms and the relative value of alternative foraging habitats to breeding birds.
- Use banding and radiotelemetry to measure adult and juvenile dispersal from several colonies.
- Evaluate the distribution, resource utilization, and survival of wintering birds.

**MONITORING NEEDS**

The Breeding Bird Survey is inadequate for monitoring changes in the population size and distribution of the Tricolored Blackbird (Sauer et al. 2005). The ongoing volunteer surveys, initiated in 1994 and sponsored by California Department of Fish and Game and U.S. Fish and Wildlife Service, have been useful for documenting long-term population trends of this species. The primary objectives of a Tricolored Blackbird monitoring program are to track annual distribution and population trends; document the presence (or absence), location, and size of breeding colonies throughout the historic range; and monitor reproductive success to assess population viability and determine habitat characteristics associated with nesting success.

The volunteer survey should be conducted at least once every three years. Participants should visit previously documented colony locations, explore other potentially suitable nesting habitats, and gather data on specific colony location, acreage, vegetative substrate, breeding behavior, and total number of adults (estimated from about 25 m from the nesting area). Repeat visits later in the breeding season are recommended to determine the fate of active colonies; entry into active colonies is discouraged. The surveys will be especially valuable if conducted over a period of years, using consistent methods and an increasing core of experienced observers, thereby documenting new breeding localities and lost habitats, increasing observer skills in species and habitat identification, and enhancing public awareness of this unique species.

**ACKNOWLEDGMENTS**

This account benefited from reviews by W. J. (Bill) Hamilton III, R. DeHaven, R. Meese, and W. D.
Shuford. It is dedicated to the memory of Bill Hamilton, an inspired teacher and researcher who worked tirelessly on behalf of Tricolored Blackbirds.

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PDF of Vaux’s Swift account from:
Shuford, W. D., and Gardali, T., editors. 2008. California Bird Species of Special Concern: A ranked assessment of species, subspecies, and distinct populations of birds of immediate conservation concern in California. Studies of Western Birds 1. Western Field Ornithologists, Camarillo, California, and California Department of Fish and Game, Sacramento.
VAUX’S SWIFT (*Chaetura vauxi*)

**John E. Hunter**

Breeding range of the Vaux’s Swift in California; the species is far more numerous in the coastal Redwood zone in the northwestern portion of the state than elsewhere. Outline of the overall breeding range is stable, but numbers of breeders have declined at least moderately. Occurs more widely during migration, when birds may congregate at large communal roosts.

Criteria Scores

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SPECIAL CONCERN PRIORITY
Currently considered a Bird Species of Special Concern (breeding), priority 2. Included on the previous special concern list (CDFG 1992).

GENERAL RANGE AND ABUNDANCE
One of seven subspecies, C. v. vauxi is the only one known to occur north of Mexico, where it breeds in western North America from southeastern Alaska, southern British Columbia, northern Idaho, and western Montana south to central California. Migrates in breeding range and to east from Idaho, Nevada, and Utah south through the southwestern United States, Baja California, and western Mexico. Winters from central Mexico south throughout the breeding range of the other subspecies in Middle America and in Venezuela (AOU 1998). There are no reliable quantitative estimates of abundance for the species.

SEASONAL STATUS IN CALIFORNIA
Occurs primarily as a migrant and summer resident from mid-April to mid-October; breeds from early May (Bent 1940) to mid-August (Hunter et al. 2005). Occurs rarely and irregularly in winter in southern California (Garrett and Dunn 1981).

HISTORIC RANGE AND ABUNDANCE IN CALIFORNIA
Grinnell and Miller (1944) described the Vaux's Swift as "common" in summer and breeding in a narrow coast belt from the Oregon border in Del Norte County south to Santa Cruz, Santa Cruz County. Historic locations of confirmed breeding in the coast belt include sites in Humboldt and Santa Cruz counties (Bendire 1895, Taylor 1905). Observations of birds at other possible breeding locations included locations in Sonoma, Marin, and San Mateo counties (Grinnell and Wythe 1927).

Grinnell and Miller (1944) also reported this species as "occasional" in summer in the Sierra Nevada but lacked evidence of nesting; observations of birds at possible breeding locations along the Cascade-Sierra axis were from Siskiyou, Tehama, Lassen, Plumas, Sierra, and Fresno counties. Grinnell and Miller (1944) noted migrants occurred practically statewide, with reports of flocks sometimes numbering in the hundreds to tens of thousands (Sheldon 1922, Michener 1933, Watson 1933).

RECENT RANGE AND ABUNDANCE IN CALIFORNIA
The breeding range on the northern and central coast appears to have changed little since 1945 (see map); this area still contains most of California's population (Sterling and Paton 1996). It is uncertain whether recent records in northeastern California or coastwise in Santa Clara and Monterey counties (Roberson and Tenney 1993, Sterling and Paton 1996, FN 52:500) represent a range expansion, better observer coverage, or the latter after recolonization by swifts following regrowth of logged forests; if the former, it may reflect displacement of birds by habitat removal in the Redwood (Sequoia sempervirens) zone.

The range of the Vaux's Swift in coastal California generally follows the distribution of Redwoods, but probably is patchy because of forest fragmentation. Although lacking prior to 1945, confirmed breeding records now exist for Del Norte, Mendocino, Sonoma, Marin, San Mateo, and Santa Clara counties (Sibley 1952, Sterling and Paton 1996, Hunter and Mazurek 2003, FN 51:1050). Breeding bird atlas projects confirmed breeding by swifts in 18 (4.2%) of 425 and 9 (4.6%) of 195 survey blocks in Humboldt and Sonoma counties, respectively (Burridge 1995, Hunter et al. 2005). Possible or probable breeding was recorded in 12 (5.4%) of 221 and 3 (0.8%) of 385 blocks in Marin and Monterey counties, respectively (Roberson and Tenney 1993, Shuford 1993). Observations of birds along the Big Sur coast and in the Santa Lucia Mountains, Monterey County, may represent the southernmost breeding locations in the Coast Ranges.

Outside the Redwood zone, small numbers of swifts probably breed locally in an arc from Trinity and western Siskiyou counties east to the Warner

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Vaux's Swift
Mountains, Modoc and Lassen counties, and on the west slope of the Sierra Nevada south to Tulare County (Sterling and Paton 1996). The only confirmed breeding locations for these inland areas are in Modoc, Mariposa, and Tulare counties (AB 28:945, AFN 22:573, FN 52:500). Most breeding season records from the Sierra are at 1500–4500 ft (457–1433 m), with the southern limit of confirmed breeding for the region being at Log Meadow, Sequoia National Park, Tulare County (Sterling and Paton 1996, AB 28:945).

During migration, roosting flocks in coastal counties may number in the hundreds to tens of thousands (Huey 1960, Unitt 1984, Burridge 1995, K. Garrett pers. comm., T. Wodetzki pers. comm.). Many of these migrants undoubtedly nest north of California.

Breeding Bird Survey (BBS) trends in California for the periods 1968–2004, 1968–1979, and 1980–2004 are all negative but not statistically significant, and of medium credibility (Sauer et al. 2005). The loss, however, of about 95% of the original old-growth Redwood forests in California (L. Fox pers. comm.) has undoubtedly reduced swift numbers substantially. Longtime observers consider a decline of this species likely reflects logging of old-growth habitats (S. Harris pers. comm.). Other observers have either predicted or observed that the increasing use of chimneys by swifts for nesting or roosting was a result of the loss of suitable nest trees (Finley and Finley 1924, Bent 1940, Stager 1965). The degree, however, to which this possible shift in habitat use has offset population declines from tree removal is unknown.

**Ecological Requirements**

The ecology of this species is poorly known in California, but Bull and Collins (1993) summarized studies from elsewhere, mostly northeastern Oregon. These swifts nest in cavities in a variety of trees and less frequently in artificial structures, particularly chimneys. Nests are an open half circle made of small twigs or conifer needles fastened together and to the cavity wall by sticky saliva. Birds may locate nests above or below the opening to the cavity, which they enter via a side hole or an open top. Cavities apparently need to be large enough to allow the birds to fly while within the cavity and place the nest at a distance from the opening that provides a dark, sheltered environment.

Of 33 live or dead Grand Firs (Abies grandis) used as nest trees in northeastern Oregon, 20 averaged 25.4 m tall and 67.5 cmdbh (diameter at breast height) and had hollow chambers averaging 28.4 cm in diameter and 5.7 m in length (Bull and Cooper 1991); 13 others averaged 83 cmdbh (Bull and Hohmann 1993). Many tree species are acceptable for nest sites as long as they grow large enough, persist long enough, and have decay, fire, or primary excavators such as Pileated Woodpeckers (Dryocopus pileatus), or otherwise develop large and accessible cavities. Other nests outside California have been in large broken-top Western Hemlock (Tsuga heterophylla) and hollow Big-leaf Maple (Acer macrophyllum). Tree species used for nesting in California include Western Sycamore (Platanus racemosa; Bendire 1895), California Red Fir (Abies magnifica; AFN 22:573), pine (Pinus sp.; B. Williams pers. comm., FN 52:500), and Redwood. While published details are limited, most California nests have been in burned-out and hollow Redwood snags or stumps. One was situated about 0.6 m above the ground in a hollow “stub” that was not over 9 m tall (Taylor 1905). Dawson (1923) also mentioned nesting in hollow Redwood stumps and snags in areas logged and burned over. Bent (1940) mentioned four nests from Eureka, all in hollow Redwood stubs ranging from 5.5 to 18.3 m tall, some of which were burned out and one of which was 3 m in diameter at its base. Nests in California are also located in basal hollows of large-diameter living Redwood trees (Hunter and Mazurek 2003), formed when repeated fires incrementally enlarge the cavity by burning out rotten wood (Fritz 1931). Some such nest trees are in campgrounds, clear-cuts, or other open areas; average canopy closure at nests in northeastern Oregon was 70.8% (Bull and Cooper 1991).

Numerous studies have shown a strong positive association between the presence of Vaux’s Swifts and old-growth forests (Bull and Collins 1993), presumably reflecting the swifts’ requirement of large cavities for nesting. In California, the highest densities of swifts are found in the Redwood zone, the lowest in the Douglas-fir (Pseudotsuga menziesii) and other forest types found further inland (Sterling and Paton 1996). The relationship between swifts and Redwood forests may be explained by characteristics of these trees that favor the formation of large and long-lasting cavities. Redwoods can live over 2000 years and reach >7 m dbh (Sawyer et al. 2000). They are also resistant to fire and decay and will remain standing for very long periods while declining or completely dead. The presence of swifts in second-growth Redwood forests may be explained by the presence of remnant or residual...
Vaux's Swifts currently appear to nest in chimneys and other man-made structures more than in the past. Nine of the 12 nests reported in Humboldt County from 1995 to 1999 were in chimneys or other man-made structures (Hunter et al. 2005). These breeding bird atlas data, however, were undoubtedly biased toward the more easily observed chimney nest sites. This bias has also led to many published accounts of chimney and smokestack nesting (e.g., Finley and Finley 1924, Bent 1940, Baldwin and Zaczkowski 1963, Thompson 1977). Vaux's Swifts also occasionally nest in other man-made structures, such as in expansion cracks in a highway bridge in Mendocino County (G. Hazard and J. Hunter pers. obs.), an underground water transfer structure in Humboldt County (Hunter et al. 2005), and under the roof of a water tank in British Columbia (Bent 1940).

During the breeding season, Vaux's Swifts forage in a variety of habitats (especially over water) and at various heights, with small flying arthropods the primary prey; radio-tagged birds have been recorded foraging up to 5.4 km from nests (Bull and Collins 1993).

Vaux's Swifts require trees, snags, chimneys, or smokestacks with large hollows or cavities for nighttime roosting. Large numbers of swifts will roost together, especially during overcast or inclement weather during migration. Birds roost close together, presumably to conserve body heat. Roost sites are found in a variety of forested and urban environments. In northeastern Oregon, three roost sites were in broken-top Grand Fir trees averaging 19 m tall and 115 cm dbh. Eighteen other roost trees in northeastern Oregon were in either Grand Fir or Pacific Ponderosa Pine (Pinus ponderosa) and averaged 26 m tall and 77 cm dbh (Bull and Blumton 1997). Other tree species used for roosting include cottonwood (Populus sp.; Bendire 1895) and Redwood (Hunter and Mazurek 2003). Although roosting in the open is quite rare, Stager (1965) photographed numerous swifts roosting on the external trunk of a tree near Davis Dam, Arizona.

**Threats**

Loss of potential nest and roost sites are probably the primary threats to the Vaux's Swift. Although most of the remaining old-growth Redwoods are in protected areas, hazard tree removal and fire-control programs destroy potential nest and roost trees and preclude their development. Within intensively managed second-growth forests, the current high value of old-growth Redwood lumber encourages harvest of residual old-growth trees, though only a small proportion may actually be merchantable (Hunter and Bond 2001). California Forest Practice Rules afford no protection for these trees and allow cutting of snags for a variety of reasons, including safety, fire prevention, and the presence of merchantable wood. In addition, the recruitment of new large trees generally does not occur in lands managed for Redwood lumber, and the burned out stumps and snags that remain after the initial harvest of old-growth Redwood stands are becoming increasingly rare with time. The Northwest Forest Plan does provide some protection for late seral habitats on Forest Service and Bureau of Land Management lands, but the bulk of the state's swift population occurs to the west, in the largely private Redwood zone.

Modernization and fire safety improvements to chimneys and smokestacks (e.g., installation of insulated pipe and spark arresters) make their continued availability to swifts questionable (Bull and Collins 1993). Following the 1992 earthquake in Scotia, California, several old brick chimneys apparently used for nesting were damaged or destroyed. During repairs, they were replaced with modern stovepipes, and swifts are no longer seen in these areas (S. Chinnici pers. comm.). This suggests that single stochastic events can lead to potentially significant loss of nesting and roosting structures.

Another threat to the Vaux's Swift is direct mortality at man-made roost sites. There are numerous anecdotal accounts in California of mass mortality events in which hundreds to perhaps thousands of swifts roosting in chimneys or smokestacks were killed when furnaces or stoves were fired up or when the birds somehow became trapped inside a home or other structure (AB 31:1044, K. Garrett and P. Unitt pers. comm.). These incursions are sometimes misinterpreted as attacks by swallows or bats, with detrimental results for the hapless swifts. The majority of these events undoubtedly go unreported, but see Michener (1933) and Huey (1960) for additional
accounts. A mortality event at a roost containing many thousands of birds could be disastrous for swift populations.

Threats to C. v. vauxi in winter south of the U.S. border are unknown. Impacts from pesticides, roost-site destruction, and mortality at roost sites are possible.

**MANAGEMENT AND RESEARCH RECOMMENDATIONS**

- Locate and protect traditional nest and roost sites.
- Require the retention of residual old-growth trees and snags in managed forests.
- Provide for the recruitment of new nest and roost structures in managed and old-growth forests.
- Install devices such as grills on hazardous smokestacks and other facilities (Candor 1995).
- Educate the public about chimney nesting, migratory roosts, and mortality events (see Kellogg 2000).
- Conduct basic research on habitat use and breeding biology of the Vaux's Swift in California.
- Evaluate habitat-use patterns and threats on the winter range.

**MONITORING NEEDS**

Although Vaux's Swifts are not well sampled by its methods, the BBS provides the only monitoring data available for this species. Hence, there is a need to develop standardized surveys to monitor the state population annually and to devise protocols to survey for nests and roosts at sites proposed for habitat alteration.

**ACKNOWLEDGMENTS**

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**LITERATURE CITED**


Breeding Birds of Monterey County, California. Monterey Peninsula Audubon Soc., Carmel, CA.


Vaux's Swift

**Chaetura vauxi**  |  ORDER: APODIFORMES  |  FAMILY: APODIDAE

**IUCN Conservation Status: Least Concern**

A bird of the Pacific Northwest, Vaux's Swift spends almost all of daylight hours in the air foraging for insects. It is very similar to the Chimney Swift, a common species of the eastern United States, in appearance and habits.

**Cool Facts**

- Vaux's Swift is the smallest swift in North America.
- Vaux's Swifts roost communally, by the hundreds or sometimes the thousands, presumably to conserve heat. They let their body temperature drop and become torpid on cold nights, reviving in the warmth of day.
- Vaux's Swifts descend into their roost tree essentially at once, spiraling down in a very dramatic rush at nightfall.
- Vaux's Swift is named for William S. Vaux, a member of the Academy of Natural Sciences and a friend of John K. Townsend, who first described the species. The name is pronounced "vawks," not "voh."

**Measurements**

Both Sexes  
Length  
4.3 in  
11 cm  
Wingspan  
11 in  
28 cm  
Weight  
0.5–0.8 oz  
15–22 g

**Other Names**

- Martinet de Vaux (French)
- Vencejo de Vaux (Spanish)

**Range Map**

Visit [Birds of North America](http://www.allaboutbirds.org/guide/Vauxs_Swift/lifehistory) for more on this species
Habitat
Nest in coniferous or mixed forest. Forages in forest openings, especially above streams.

Food
Flying insects and some spiders.

Nesting
**Nest Description**
Half-cup made of small twigs glued to vertical surface with the bird's sticky saliva. Nests communally, usually in hollow trees, less commonly in chimneys.

**Nest Placement**

**Nesting Facts**
- **Clutch Size**: 3–7 eggs
- **Egg Description**: White.
- **Condition at Hatching**: Naked and helpless.

Behavior
Forages in the air, taking insects in its bill.

Conservation
Declining throughout range. Logging of large-diameter trees in old-growth forest eliminates nest sites.

Conservation status via IUCN: Least Concern
Credits

The Warbling Vireo is a small bird, greenish-gray above, whitish below in spring, lightly washed with yellow below in fall. It has no wing-bars. It has a prominent white line above the eye and a faint grayish line below it.

**Habitat**

The Warbling Vireo's typical habitat is open deciduous or shrubby mixed woodlands, especially where large trees are present. Warbling Vireos are often found in willow or cottonwood stands along rivers. They are not found in large, unbroken tracts of woods, but prefer smaller patches and edges, including logged areas, rural woodlots, and parks. They do not breed in conifer stands, but can be found in small patches of hardwood trees or shrubs within conifer forests. During migration they can be seen in a variety of lowland habitats, especially in red-osier dogwood.

**Behavior**
Diet
Insects make up 95% of the diet. Spiders and small berries make up the remaining 5%, with most berry-eating confined to the late summer and fall.

Nesting
Warbling Vireos are monogamous. Nests are located in the periphery of deciduous trees and shrubs. Birds of the western subspecies place their nest within 30 feet of the ground, lower than those of the eastern subspecies. Both members of the pair build the nest, which is suspended from a horizontally forked branch. The nest is made of bark strips, grass, leaves, plant fibers, hair, and lichen. Both parents incubate the four eggs for 12 to 14 days. Both feed and tend the young for the 13 to 14 days they are in the nest and for up to two weeks after they leave it. Some pairs raise a second brood.

Migration Status
This highly migratory species winters in western Mexico and northern Central America, sometimes in shade-grown coffee plantations. Warbling Vireos begin arriving in Washington in late April and continue to arrive throughout May. They start to leave in early August, with the last few remaining until mid-September.

Conservation Status
Despite being a major host for Brown-headed Cowbirds, Warbling Vireos have increased in Washington since 1966. Forest clearing for logging and development has dramatically increased the amount of Warbling Vireo habitat in Washington, and Warbling Vireos are probably more common today than they were before European settlement.

When and Where to Find in Washington
Most Warbling Vireos arrive by late April and can be found in appropriate habitat until the end of August. During spring and fall migration, they are frequently seen in the lowlands. Look for Warbling Vireos feeding on red-osier dogwood berries in late August and early September as they fatten up prior to migration. This is one of the most common species in streamside deciduous forests in the Cascades. Warbling Vireos are also common in the shrubby hillsides east of the Cascades and in old higher-elevation clear-cuts (at least 3,000 feet) that have grown up to mid-successional size.

Click here to visit this species account and breeding-season distribution map in Sound to Sage, Seattle Audubon’s on-line breeding bird atlas of Island, King, Kitsap, and Kittitas Counties.
### Abundance

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### Washington Range Map

[Image of the Washington Range Map]

©2005-2008 Seattle Audubon Society

Western Meadowlark

*Sturnella neglecta*

**Order:** Passeriformes  
**Family:** Icteridae  
**Status:** Common summer east, uncommon west. Fairly common winter, mostly west.

Listen: 

### General Description

Western Meadowlarks look distinctively different from other members of the blackbird family in Washington. They have streaked brown upperparts and solid yellow underparts with a distinct black collar. The yellow and black are both more intense during the breeding season. They have long legs and short tails with white outer tail-feathers that are obvious in flight.

### North American Range

Western Meadowlarks are open-country birds. They inhabit grasslands, shrub-steppe, and agricultural areas. During winter, they can often be found in cultivated fields and wet grasslands.

**Behavior**
Western Meadowlarks flock in winter in single-species groups, or with other blackbirds and starlings. Meadowlarks forage mostly on the ground, running or walking, and probing the soil with their bills. In early spring, Western Meadowlarks sing continually from shrub tops, fence posts, utility poles, or any other high structure in their open-country habitat.

**Diet**
During the summer, insects make up most of the diet. In fall and winter, seeds and waste grain become more important.

**Nesting**
Western Meadowlarks nest on the ground, often in small dips or hollows, such as those created by cow footprints. Nests are typically under dense vegetation and can be very difficult to find. Western Meadowlarks are polygynous. Successful males generally mate with two females at a time. Females build the nests, which are grass domes with side entrances. The nest materials are often interwoven with adjacent growth, and small trails may form through the grass to the nests. Females incubate 4 to 6 eggs for 13 to 14 days. The females brood the young after they hatch and provide most of the food, although the male may help. The young leave the nest 10 to 12 days after hatching. They cannot fly at this age but can run well, and, with the help of cryptic plumage, can hide successfully in the grass. Females often raise two broods a season.

**Migration Status**
Western Meadowlarks are resident throughout much of their range, but when deep snow covers food sources they may move into sheltered valleys. Some populations appear to be long-distance migrants.

**Conservation Status**
Western Meadowlarks are abundant and widespread, but breeding populations have declined slightly throughout their range in recent years, a trend seen in Washington in both the winter and breeding seasons. Most of this decline can probably be attributed to habitat destruction from livestock grazing, mowing, and development, and contamination from pesticides. In northeastern Washington, the conversion of forested river valleys to agricultural uses may be increasing available habitat, but western Washington populations have declined significantly in recent years as the remaining prairie in this part of the state is developed, degraded by invasive plants, or altered by fire suppression. Western Meadowlarks are extremely sensitive to human disturbance during the breeding season and will abort nesting attempts if they are flushed while incubating eggs.

**When and Where to Find in Washington**
During the breeding season, Western Meadowlarks can be found in open lowlands throughout the state, but are most abundant in eastern Washington. Western Washington breeders are rare to uncommon, and are locally distributed in the Puget Trough, the Vancouver lowlands, and Sequim, where they remain year round, and are joined in winter by birds from the north and east. Most leave eastern Washington locations, although some may overwinter near feedlots in the Columbia and Snake River valleys. They start to return to the shrub-steppe zone in late February, and are common by mid-April.

Click here to visit this species account and breeding-season distribution map in Sound to Sage, Seattle Audubon's on-line breeding bird atlas of Island, King, Kitsap, and Kittitas Counties.
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**ashington Range Map**

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[Western Meadowlark - BirdWeb](http://birdweb.org/birdweb/bird_details.aspx?id=440)
Western Meadowlark - *Sturnella neglecta*

**Characteristics**

- **Range**: The western meadowlark is a short-distance migrator. Its breeding range stretches from British Columbia, northern Michigan, and northwestern Ohio south to Missouri, central Texas, and northern Mexico.

- **Habitat**: The western meadowlark lives in meadows, prairies, and other open grasslands.

- **Diet**: The meadowlark's diet is mostly insects like caterpillars and grasshoppers, although it will sometimes eat seeds.

The western meadowlark is about nine inches long. It has a brown and black back and wings and a bright yellow chest with a black V on it. The meadowlark's colors may be a little duller in winter. It has a long pointed bill. The western meadowlark is very similar to the eastern meadowlark. The western meadowlark's yellow color extends a little further onto its cheek. The songs of the two meadowlarks are the easiest way to tell them apart. The song of the western meadowlark is a series of flute-like gurgling notes that go down the scale. The eastern meadowlark's call is a simpler series of whistles.

- **Classification**
  - **Phylum**: Chordata
  - **Class**: Aves
  - **Order**: Passeriformes
  - **Family**: Emberizidae
  - **Genus**: Sturnella

**Range**

The male meadowlark uses **visual display** behaviors to attract a mate. When he finds a female that he wants to mate with, he points his bill in the air, puffs out his yellow throat and flaps his wings above his head. If that doesn't get the female's attention, he hops up and down. The western meadowlark builds its nest on the ground. The female finds a depression in the ground and shapes it by digging in the dirt with her bill. She lines the depression with soft grass and makes a roof by pulling grass and plants over the depression. She then weaves in grass to make a waterproof dome, leaving enough space for an opening. The female lays between three and seven eggs. It takes about 12 days for the eggs to hatch. The meadowlark usually has two broods a year. The male protects the nest by noisily chasing intruders away.

**Behavior**

The male meadowlark arrives at the breeding ground a couple of weeks before the female. It likes to perch on fences, poles, and wires to claim and guard its territory. A male's home range is usually about six to seven acres. If another male invades his territory, he may get into a fight with the intruder. Fighting meadowlarks lock their feet together and peck at each other with their beaks. The western meadowlark uses its distinctive song and call to claim territory.

**Image Credits:**

Clipart.com unless otherwise noted.
Western Meadowlark - Sturnella neglecta - NatureWorks

http://www.nhptv.org/natureworks/westmeadowlark.htm

8/13/2010
MEASUREMENTS: The White-tailed Kite has a body length of 14 - 17 inches, more than a 3-foot wingspan, and weighs 9 - 10 1/2 ounces.

HABITAT: White-tailed Kites favor agricultural areas, grasslands, marshes, savannas, and other open land or sparsely wooded areas from the West Coast and Gulf Coast of the United States into Central America and eastern South America.

DIET: These kites prefer small mammals such as mice and voles, but will also occasionally hunt birds, reptiles, and amphibians. White-tailed Kites search for prey from soaring, flapping, or hovering flight, then swoop down onto their prey.

REPRODUCTION: White-tailed Kites build a platform of sticks in the fork of a tree or bush. They lay 3 - 5 eggs that are incubated for 30 - 32 days. The young kites fledge at 5 - 6 weeks of age. If prey is abundant, then a second clutch of eggs may be laid.

NAME DERIVATION: The scientific name comes from the Greek words elano, referring to a kite, and means to press forward, dive onto, or harass; leuko, meaning white; and oura, indicating a tail. The White-tailed Kite was formerly considered to be the same species as the Black-shouldered Kite of Africa and Asia.

INTERESTING FACTS:

- The word kite comes from the Old English word cyta. Cyta is derived from skut meaning to shoot or go swiftly, and refers to the way these birds swoop onto their prey. The name also refers to this bird’s light buoyant flight. The child’s toy made of wood and paper was named for these birds.

- Many of the North American kites have an eye color that is some shade of red.

- The White-tailed Kite has a similar hunting strategy and prey preference as the American Kestrel.
California Partners In Flight Species Range Maps and Habitat Maps: Current Wildlife Habitat Relation Map (WHR) provided courtesy of California Department of Fish and Game WHR and California Interagency Task Group. To advise of suggested changes to current range contact: Monica Parisi (MParisi@dfg.ca.gov). Address comments regarding historic range, current monitoring sites, or to contribute data, contact Grant Ballard (gballard@prbo.org). Note: these maps are not comprehensive and are not intended for use as definitive range maps. Please read disclaimer.
Wilson's Warbler
PIF Monitoring Sites
- confirmed or probable breeding
- possible breeding
- no sign of breeding
- no data yet

Map legend:
- Current Range (CWHR 1995)
- Bioregions (CBC 2000)
- Major Rivers

Interactive Version

2001 Version

2002 Version

Species Account

Return to riparian page

References:


Wilson's Warbler

*Wilsonia pusilla*  
ORDER: PASSERIFORMES  
FAMILY: PARULIDAE  

IUCN Conservation Status: Least Concern

A common warbler of willow thickets in the West and across Canada, the Wilson's Warbler is easily identified by its yellow underparts and black cap.

**Appearance**

**Adult Description**
- Small songbird.
- Underparts entirely yellow.
- Back olive green.
- Face yellow.
- Plain dark wings and tail.
- Male with black cap.

**Immature Description**
Similar to adult, but duller and with smaller or absent black cap.

**Field Marks**
Similar Species

- **Yellow Warbler** has yellow edges to wings and yellow tail spots.
- Female **Hooded Warbler** has white tail spots.
- **Orange-crowned Warbler** is more drab overall, has a proportionally shorter tail, longer, more pointed bill, and often inconspicuously streaked underparts.
Wilson's Warbler (Wilsonia pusilla)

Prepared by Chris Otahal (chrisotahal@planet-save.com)

21 Vineyard Court
10845 Rancho Bernardo Road
Hollister, CA 95023

RECOMMENDED CITATION

SHORTCUTS
range map
references

SUBSPECIES STATUS:
Three subspecies recognized: one in the east W. p. pusilla and two in the west W. p. pileolata and W. p. chryseola. In California W. p. pusilla does not occur. However, it is listed as a vagrant to Washington and Oregon (A.O.U. 1957). The form W. p. pileolata breeds in the Warner and White mountains of central eastern California (A.O.U. 1957). The final race, W. p. chryseola is a widespread breeding species in California. It breeds west of the crest of the Cascades and Sierra Nevada, as far south as the San Bernardino mountains (A.O.U. 1957). Both pileolata and chryseola migrate through California. The Wilson's Warbler is very rare in winter in California, but specimens of both pileolata and chryseola have been collected during this season (Dunn and Garrett 1997).

MANAGEMENT STATUS:
No special management status.

HISTORICAL DISTRIBUTION

CURRENT DISTRIBUTION

ECOLOGY

AVERAGE TERRITORY SIZE

In oak-bay-laurel habitat in Marin County, Stewart (1973) found 24 territories averaging 0.57 ha (1.3 ac) and ranging between 0.2-1.3 ha (0.5-3.2 ac). In willow-scrub habitat in Marin County, Stewart (1973) found territories averaging 0.48 ha and ranging from 0.3 to 1.0 ha. Males may wander up to 300 meters from their normally defended territories (Stewart 1973).

**TIME OF OCCURRENCE AND SEASONAL MOVEMENTS**

Arrive from Mexico in late April and early May (USDA Forest Service 1994). These birds breed from late April into early August with peak activity in June (USDA Forest Service 1994). At a central coast location, territorial males begin to arrive in mid-March, females arrive one to two weeks later, and pair formation begins an average of 15 days after the arrival of the males (Stewart 1973). In the latitude of the San Francisco Bay area, migrants arrive slightly earlier along the coast of San Mateo County than they do inland in Santa Clara County (Jaramillo pers. obs.). Males appeared earlier and their numbers peaked earlier during spring migration, relative to females, at a migratory stopover site in Santa Clara County (Otahal 1995). Arrive on breeding grounds from late March in the south west, a month to six weeks later in the north (Curson et al. 1994). The subspecies *chryseola* arrives significantly earlier on territory than *pileolata* (Dunn and Garrett 1997). Older males appear to return earlier than second-year males and females (Stewart 1973).

Leaves breeding grounds from early August (Curson et al. 1994). The race *chryseola* is an earlier migrant than the other two subspecies (Dunn and Garrett 1997). Individuals of *chryseola* may be found in areas away from the breeding grounds as early as July 10, but more typically during mid-August (Dunn and Garrett 1997). Fall migration peaks in late August and early September (USDA Forest Service 1994). Fall migration occurs from 1 August through late October with slight peaks in late August and mid-September in the South San Francisco Bay Area (Otahal 1995). Males and females did not show a differential migration pattern in fall migration at a migratory stopover site in the southern San Francisco Bay Area (Otahal 1995).

**Extent of wintering in California:**

A winter range map based upon Christmas bird counts is available at the BBS web site and probably should be included in the species account. Wilson’s Warblers winter on the coast and in the interior of southern California (Zeiner et al. 1990). They are rare winter residents along the coast and interior (Grinnell and Miller 1944). Winter residents are rare in southern California (McCaskie et al. 1979).

**MIGRATION/STOPOVER CHARACTERISTICS**

Wilson’s Warblers are common migrants in almost all woodland and shrub habitat on the coast and in the interior (USDA Forest Service 1994). Wilson’s Warblers are common to abundant migrants in the lowlands during the spring and in mountains and lowlands during the fall (Zeiner et al. 1990). Beedy (1975) reports that post-breeding Wilson’s Warblers forage along forest edges and within dense coniferous forests. In migration, woodlands with a shrub understory and chaparral are used (USDA Forest Service 1994). Riparian habitat was documented as being utilized as a stopover site where some individuals were making multi-day stays and putting on fat prior to the continuation of their migration (Otahal 1995). Uses all kinds of woodland and tall scrub with undergrowth on migration (Curson et al. 1994). Western birds follow the coast and mountain ranges to Central America (Curson et al. 1994). In migration stays close to the ground within the protecting plant cover (Grinnell and Miller 1944). In seasons of migration, low thick vegetation is preferred but not solely in the vicinity of water (Grinnell and Miller 1944).

Stopover periods were found to be the same (average of 4 days) for males and females during spring migration in riparian habitat located at the south end of San Francisco Bay (Otahal 1995). Mass change at a riparian stopover site in Santa Clara County was the same (average of 0.4 grams) for males and females during spring migration (Otahal 1995).

**FOOD HABITS**

**FORAGING STRATEGY**
Forages mainly low in height, usually below 2 m in height (Bent 1953). Wilson's Warblers are known to eat insects gleaned from foliage low in the canopy or understory (USDA Forest Service 1994, Curson et al. 1994). Also are known to flycatch in the canopy (USDA Forest Service 1994, Curson et al. 1994), in fact flycatching is a primary mode of foraging (Bent 1953). Stewart (1973) found individuals ranging 125-300 m (410 -984 ft) from the nest while foraging. Wilson's Warblers often forage at habitat edges (Timossi 1990). Males were frequently observed foraging 10-17 meters from the ground, confirming that this species is not necessarily restricted to low vegetation for its foraging habitat (Stewart 1973). Prefers deciduous over non-deciduous sites for feeding during breeding season (Morrison 1981). In Wyoming willow thickets it feeds most commonly at 0.6 -1.2 meters from the ground but feed at all levels; feeds at slightly higher levels (mostly at 2.4-4.9 meters) later in the summer (Hutto 1981).

**DIET**

Eat insects gleaned from foliage low in the canopy or understory (USDA Forest Service 1994). A small amount of seed, fruits and berries are taken also (Zeiner et al. 1990). Bent (1953) states, based on 52 stomach samples, that animal matter makes up 93% of the food of the Wilson's Warbler, with vegetable matter making up less than 7%. The most common insect eaten (35% of the animal matter) are Hemipterans, mainly Black Olive Scale and leafhoppers. The Hymenoptera come in second (31%), mainly wasps and ants. The Tipulidae (Crane Flies) made up a good number of the prey items and 9% of the animal matter was comprised of assorted species of beetles, mainly Chrysomelidae. Finally, caterpillars made up 5% of the animal matter ingested. The vegetable matter was made up largely of fruit pulp ingested during September and October.

**DRINK IN**

**BREEDING HABITAT**

**NEST SUBSTRATE**

Chosen nesting substrates include shrub or grass (USDA Forest Service 1994) as well as on the ground (Zeiner et al. 1990). In Stewart’s (1978) study along coastal California, blackberry (Rubus sp.) vines provided support 74% of the nests. Plant species commonly chosen as the nesting substrate include nettles (Urtica sp.), wild rose (Rosa californica) and ferns (Stewart et al. 1978). In Marin County, the primary nesting substrate was blackberry (Rubus sp.) which provided horizontal runners for support, overhanging leaves for concealment and growth style in of a dense tangle, sometimes so thick that ground predators would find it hard to penetrate (Stewart 1973). Bent (1953) lists Skunk Cabbage as a substrate as well as Azaleas (Rhododendron sp.) in the Yosemite region and Salal (Gaultheria shallon) and Bracken (Pteridium aquilinum) in the Seattle, Washington region.

**HEIGHT OF NEST**

The height of the nests ranges from 0.3- 3 meters (USDA Forest Service 1994) as well as on the ground (Zeiner et al. 1990). Typically, nests are located at ground level (DeGraaf and Rappole 1995), although occasionally they are found 0.9 meters from the ground (Zeiner et al. 1990). It appears that ground nesting is more common in the more eastern races pileolata and chryseola, while higher nests are more common in the Pacific form chryseola (Dunn and Garrett 1997). Mean height for nests in blackberries is 69 cm (Stewart et al. 1978).

**PLANT SPECIES CONCEAL THE NEST**

In the Sierra Nevada, the typical nest is at the base of from on to four horizontal willow branches, under which the nest is placed for concealment (Stewart et al. 1978). In Marin county, nests in blackberry are often concealed by other blackberry fronds above the nets (Stewart 1973). Bent (1953) describes a nest which was overhung by Azalea stems. Further concealment is usually provided by a thick growth of perennial herbs (USDA Forest Service 1994).

Often nest is placed at the base of a shrub or in grass hummock for cover (Curson et al. 1994). Often in dense blackberry plants with overhanging leaves concealing the top of the nest (Stewart 1973). Quantitative measures of nest cover are not available, or unknown.

**CANOPY COVER**

60-100% (Timossi 1990).

**AVERAGE TOP CANOPY HEIGHT**

The mean height of cover vegetation was estimated to be 15 meters and 5.5 meters in two Marin County study sites (Stewart 1973).

**DOMINANT PLANT SPECIES IN CANOPY**

Wilson's Warblers find breeding cover in willows, alders and shrub thickets (USDA Forest Service 1994). Bent (1953) states that in the Lassen Peak region of California, the presence of willows and alders appear to be the chief factors influencing habitat choice, rather than any other plants associated with them. The Wilson's Warbler is more abundant in younger (40-75 yr) than older (>105 yr) Douglas-fir stands (*Pseudotsuga menziesii*) in the Pacific Northwest (Manuwal and Huff 1987). Noted as breeding in the following habitats: Douglas-fir, Western hemlock (*Tsuga heterophylla*) -Sitka Spruce (*Picea sitchensis*), Redwood (*Sequoia sempervirens*), ponderosa pine (*Pinus ponderosa*), larch (*Larix* sp.)- white pine (*Pinus* sp.), Lodgepole Pine (*Pinus contorta*), fir (*Abies* sp.)-spruce (*Picea* sp.), aspen (*Populus* sp.)- hardwoods, mountain meadows, alpine meadows, subalpine marshes, riparian areas but avoids chaparral and pinyon (*Pinus* sp.)- juniper (*Juniperus* sp.) associations (DeGraaf and Rappole 1995). Willows (*Salix* sp.), alders (*Alnus* sp.), and dogwoods (*Cornus* sp.) are also favoured by this species (Grinnell and Miller 1944).

**CO-DOMINANT PLANT SPECIES IN CANOPY**

The relative density of the cover vegetation, based upon the point quarter method of vegetation analysis, in a breeding site in Marin County was California Bay *Umbellularia californica* (41%), Coast Live Oak *Quercus agrifolia* (24%), California Buckeye *Aesculus californica* (19%), Canyon Oak *Quercus chrysolepis* (9%) and five other species (7%) (Stewart 1973).

**AVERAGE SHRUB COVER**

Shrub layer is considered essential for reproduction (Timossi 1990). Quantitative measures of required shrub cover are not available.

**DOMINANT SHRUB SPECIES**

Most commonly found in dense tangles of blackberry in riparian woodland along the central coast (Stewart et al. 1978). Coyote Bush (*Baccharis pilularis*), California Sage (*Artemisia californica*), Coffeeberry (*Rhamnus californica*) and Thimbleberry (*Rubus parviflorus*) shrubs make up the majority of the shrub species in a Marin County site (Stewart 1973).

**AVERAGE FORB COVER**

No quantitative or qualitative measures available.

**DOMINANT FORB SPECIES**

Poison oak (*Rhus diversiloba*), blackberries (*Rubus* sp.), and ferns form thickets favorable to this species (Grinnell and Miller 1944). California blackberry (*Rubus californica*), nettle (*Urtica* sp.), Western Sword Fern (*Polystichum munitum*), Lady Fern (*Athyrium filix-femina*) and Poison Oak were dominant understory plants in Marine County site (Stewart 1973).
Logs:
No known attraction to logs.

Grass/sedge:
Nest often well concealed in a grass hummock (DeGraaf and Rappole 1995, Curson et al. 1994).

Water:
Nests near water or in wet meadows (Zeiner et al. 1990).

Tree DBH
Sapling-sized trees are used for breeding (Timossi 1990).

Distance to Water
Prefers to nest near water (Timossi 1990).

Nest Type
An open cup nest (USDA Forest Service 1994, Curson et al. 1994). The nest is a bulky cup of dry leaves, bark shreds, thin dead weed stems, grass blades and stems and is lined with fine dry grasses, rootlets and hair (Harrison 1978, Curson et al. 1994). The form *chryseola* places the nest between 0.3 and 0.9 meters from the ground, while *pileolata* and *pusilla* tend to place their nests on or near the ground (Dunn and Garrett 1997).

Breeding Biology
Often nest in loose colonies of several pairs (DeGraaf and Rappole 1995, Harrison 1984, Curson et al. 1994). Harrison (1984) reports that breeding birds from the previous season are the first arrivals the following spring suggesting site fidelity. These birds exhibit breeding site fidelity, individuals which have bred in previous years tend to return to territories that they established previously (Stewart 1973).

Displays
There are no flight displays in this species. Males advertise by singing from a perch, often semi-concealed from view. Rarely sings higher than six feet from the ground (Grinnell and Miller 1944).

Mating System
Mostly monogamous although polygyny (bigamy) has been reported (13% of pairs) in the Sierra Nevada (Stewart et al. 1978). The relatively high incidence of polygyny creates problems for accurate counts as the number of singing males may not be cleanly related to the number of breeding females in the area.

Clutch Size
The clutch size is of 4-6 eggs with an average of 5 (USDA Forest Service 1994, Curson et al. 1994).

Incubation
Female only (USDA Forest Service 1994).

http://www.prbo.org/calpif/htmdocs/species/riparian/wilsons_warbler.htm
INCUBATION PERIOD

11-13 days (USDA Forest Service 1994).

DEVELOPMENT AT HATCHING

Altricial (USDA Forest Service 1994).

NESTLING PERIOD

10-13 days (Harrison 1978), 8-10 days (Curson et al. 1994), 8-10 days (Stewart 1973).

PARENTAL CARE

Both adults feed young but males usually don't begin feeding young until they are three to four days old (Stewart 1973).

NUMBER OF BROODS

Few second clutches were laid after successful fledging of first broods (Stewart 1973). This appears to be more common in chryseola than in pileolata or pusilla (Dunn and Garrett 1997).

BROOD PARASITISM

Wilson's warblers in the west are common Brown-headed Cowbird hosts, which has resulted in extirpation in some lowland areas (Garrett and Dunn 1981). However, DeGraaf and Rappole (1995) states that Wilson's Warblers are not normally parasitized by cowbirds. The Wilson's Warbler has been known to successfully raise a cowbird and a warbler nestling in one nest (Friedmann et al. 1985).

LANDSCAPE FACTORS

ELEVATION

Breeds along edges of alpine meadows to 3000 meters (Curson et al. 1994). Altitudes of nesting range from near sea level, as at Point Lobos, Monterey County, up to at least 2900 meters on east slope of Mount Whitney, Inyo County (Grinnell and Miller 1944).

FRAGMENTATION

Dunn and Garrett (1997) mention that the Wilson's Warbler has disappeared from most coastal lowlands south of Santa Barbara County. They attribute this disappearance to the elimination of lowland riparian thickets in southern California and the effects of Brown-headed Cowbird (Molothrus ater) parasitism. Because Wilson's Warblers frequent wet meadow and riparian areas with much natural edge, the effects of habitat fragmentation on these birds is unknown and it is possible that habitat variables, such as shrub layers, are more important than fragmentation per se (USDA Forest Service 1994). In fact, fragmentation of forested areas and the subsequent second growth scrub that grows up may be beneficial to Wilson's Warblers. However, local disappearances of breeding populations may be related to increased susceptibility of Wilson's Warblers to cowbird parasitism due to fragmentation of habitat (USDA Forest Service 1994). The effect of cowbird parasitism on the Wilson's Warbler particularly with respects to population decreases has not been adequately studied or published on.

PATCH SIZE

Presumably, the minimum patch size is probably within the range of territory sizes of 0.4-1.2 hectares (USDA Forest Service 1994).

http://www.prbo.org/calpi/htmldocs/species/riparian/wilsons_warbler.htm
The loss of herbaceous cover, especially during the breeding season, may increase vulnerability to nest parasitism and predation (USDA Forest Service 1994). The effects of disturbance on Wilson's Warblers are largely unknown but their ground-nesting habits and susceptibility to cowbird parasitism suggests that disturbance could have negative effects (USDA Forest Service 1994). Prefers wet clearings in early stages of regeneration (DeGraaf and Rappole 1995). Sensitive to removal of deciduous tree species (Morrison 1981).

Because of Wilson's Warblers susceptibility to Brown-headed Cowbird parasitism, cattle and equestrian staging areas near breeding habitat may have negative impacts.

Prefers moderately cool climate (Grinnell and Miller 1944). Locally the temperature is moderately low and the humidity normally high (Grinnell and Miller 1944).

Dependence on insects for food resources makes this species susceptible to direct effects of insect control measures.

Wilson's Warblers are depredated by accipiters, small mammals, weasels and snakes (USDA Forest Service 1994). Possible predators observed near the nest where the Western Scrub Jay (Aphelocoma californica), the Steller's Jay (Cyanocitta stelleri) and the garter snake (Thamnophis sp.) (Stewart 1973).

A total of 53.7% males and 36.8% females (9.5% could not be reliably sexed) mist netted from a central coast population between 1979 and 1995 (Chase et al. 1997).

Estimated annual adult survival of summer residents was 50.3% derived from banding at Point Reyes Bird Observatory (Chase et al. 1997). Male survival was found to be slightly (but statistically insignificantly) higher than females (Chase et al. 1997). Adult survival ranged from 22.2% to 89.1% over a ten year period of time (Chase et al. 1997). Stewart et al. (1978) observed a return rate of 60.8% for color banded males. Based on Stewart et al. 1978 63 nests examined, 60.3% nests fledged at least one young, 34.9% of nests lost to predation, no nests were paracitized by cowbirds, 4.8% of the nests were lost to adverse weather.

In California, the Wilson's Warbler experienced a 1.6% annual decline between the period 1966 - 1996. This trend was significant (P 0.03). British Columbia and Washington state also showed a decreasing, albeit not statistically significant trend. In contrast, Oregon positive but not significant trend (Sauer et al. 1997).
Riparian vegetation and wetlands should be retained and restored to manage for this species as it requires riparian or wet meadow sites for reproduction (USDA Forest Service 1994). During the breeding season, nest sites would be susceptible to damage by herbivory or other activities which might remove the dense herbaceous layer required by the Wilson’s Warbler. As well, these activities may increase vulnerability to nest parasitism and predation (USDA Forest Service 1994). Water diversions, shrub and willow removal and cattle grazing have been suggested as having negative effects on Wilson’s Warblers (USDA Forest Service 1994). Since Wilson’s Warblers appear to be highly susceptible to cowbird parasitism, management that results in aggregations of livestock or humans during the nesting season within 5 - 10 km (3-6 miles) of areas managed for nesting Wilson’s Warblers should be avoided (Verner and Ritter 1983).

**SCIENTIFIC REFERENCES**


http://www.prbo.org/calpif/htmldocs/species/riparian/wilsons_warbler.htm


II

SPECIES ACCOUNTS

PDF of Yellow Warbler account from:
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YELLOW WARBLER (*Dendroica petechia*)

SACHA K. HEATH

Current and historic (ca. 1944) breeding range of the Yellow Warbler in California; occurs much more widely in migration. Breeding numbers have declined greatly, particularly in lowland areas west of the Cascade–Sierra Nevada axis, and the range has retracted broadly in the Central Valley and locally in the Owens Valley.

Criteria Scores

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<td>Threats</td>
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SPECIAL CONCERN PRIORITY

Currently considered a Bird Species of Special Concern (breeding), priority 2. Included on both prior special concern lists (Rensm 1978, 2nd priority; CDFG 1992).

GENERAL RANGE AND ABUNDANCE

Breeding widely in the New World, the Yellow Warbler comprises three subspecies groups: aestiva (continental North America), petechia (extreme southern Florida and Caribbean), and erithachorides (coastal Mexico to northern South America; Lowther et al. 1999). The aestiva group migrates to winter mainly from northern Mexico south to central South America. Overall considered one of the most abundant warblers in North America; published breeding density estimates range from 0.7 to 14.4 pairs per ha (Lowther et al. 1999).

Four subspecies of the aestiva group have previously been considered to occur in California: breeding D. p. brewsteri, D. p. morcomi, and D. p. sonorana, and transient D. p. rubiginosa (Grinnell and Miller 1944). Because D. p. brewsteri and D. p. morcomi are not consistently distinguishable (Patten et al. 2003), brewsteri is best considered synonymous with morcomi (P. Unitt pers. comm.). Sonorana, found only along the lower Colorado River and ranked independently as a species of special concern (see relevant account), is not considered further here.

SEASONAL STATUS IN CALIFORNIA

Occurs principally as a migrant and summer resident from late March through early October; breeds from April to late July (Dunn and Garrett 1997).

HISTORIC RANGE AND ABUNDANCE IN CALIFORNIA

Grinnell and Miller (1944) described the Yellow Warbler as a “common” to “locally abundant” breeder throughout California, except for most of the Mojave Desert (it occurred locally only in the Panamint and Grapevine mountains and the Mojave River) and all of the Colorado Desert. Known elevational limits of breeding were 7000 ft (2134 m) on the western and 8500 ft (2591 m) on the eastern flank of the Sierra Nevada. With few exceptions, Grinnell and Miller (1944) mapped locations of individuals reported or collected during the breeding season in every county within this general range. Quantitative estimates of historic breeding abundance are scant and mostly unreliable. For example, estimates of 10 birds per 3 river mi (4.8 km) in the Sacramento Valley region (Grinnell et al. 1930) did not discern between singing migrants and breeders, both of which likely occurred during the late May surveys (T. Manolis in litt.).

RECENT RANGE AND ABUNDANCE IN CALIFORNIA

Despite many local declines, Yellow Warblers currently occupy much of their former breeding range, except in the Central Valley, where they are close to extirpation (see map). Broad-scale significant declines have been documented for the U.S. Pacific Northwest region (1979–1999, Ballard et al. 2003) and declines approaching significance in California (1968–2004, Sauer et al. 2005). Both local abundance and long-term trends, however, vary greatly by region.

Northwestern California. This species breeds locally throughout Del Norte, western Siskiyou, Humboldt, Trinity, Mendocino, and Sonoma counties, except at lower elevations along the coast in Mendocino and Sonoma (Bolander and Parmeter 2000, Harris 2005, Hunter et al. 2005, D. Tobkin pers. comm.). Breeding Bird Survey (BBS) averages vary widely, from 1.00 birds per route at Bartlett Springs, Lake County, to 71.89 birds per route at Horse Creek, Siskiyou County (Sauer et al. 2005). Breeding density was only 0.26 pair per ha at Clear Creek, Shasta County, in the northern interior Coast Ranges (PRBO unpubl. data). Breeding bird atlases found Yellow Warblers in 16% of blocks (66 of 425, 6 confirmed) in Humboldt County (Hunter et al. 2005) and in 43% of blocks (34 of 79, 11 confirmed) in Napa County (1989–1993; Berner et al. 2003). Recent

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efforts in Napa, however, failed to locate the species at most of its historic breeding sites—most notably at Napa River, Mill Creek, and Suisun Creek—perhaps because of wine industry thinning of riparian habitat in the Napa Valley (R. Leong and B. Grummer pers. comm.).

**Northeastern California.** The species breeds widely in this region. In the Modoc National Forest, the Yellow Warbler was the most numerous species detected on breeding season surveys (T. Ratcliff in litt.); it is also numerous throughout Shasta County (B. Yutzy in litt.). BBS averages ranged from 0.56 to 4.67 birds per route where the species was sampled on the Modoc Plateau, Surprise Valley, and Madeline Plain (Sauer et al. 2003). The Susan River, Lassen County, held 1.05 birds per ha (PRBO unpubl. data). On Atastra Creek in the Bodie Hills, Mono County, density was 0.26 birds per ha in 1979 (Weston and Johnston 1980), but the species was absent in 2000–2003 (PRBO unpubl. data). At Mono Lake, densities on the lower reaches of Rush and Lee Vining creeks have been as high as 2.74 and 1.71 pairs per ha, respectively, and are increasing annually (PRBO unpubl. data), presumably as a result of rewatering, removal of livestock grazing, and riparian restoration. The Glass Mountain area and the White-Inyo Range hold small and localized breeding populations (PRBO unpubl. data, Johnson and Cicero 1991).

**Central Valley.** The Yellow Warbler is largely extirpated as a breeder in the Sacramento Valley. Numbers were already low by the 1970s, when Gaines (1974) found the species at only 4 of 20 sites in the upper, and at none in the lower, Sacramento Valley. Intensive coverage along the Sacramento River in Glenn, Butte, and Tehama counties from 1993 to 1999 found only five nests of three pairs (PRBO unpubl. data, T. Manolis in litt.). In Placer County, individuals occur on the valley floor during the breeding season (Webb 2003). Extensive surveys in 1998 and 1999, however, failed to locate breeding Yellow Warblers along the Sacramento River and its lower tributaries in Colusa, Sutter, Yolo, and Sacramento counties, and no breeding records exist for Sacramento County as a whole (PRBO unpubl. data, T. Manolis in litt.).

The species is largely extirpated as a breeder in the Sacramento–San Joaquin River Delta and San Joaquin Valley region. Extensive surveys in 1998 and 1999 failed to locate breeders along the San Joaquin River and its lower tributaries in San Joaquin, Stanislaus, Merced, Madera, Fresno, and Kings counties. In 2002 and 2003, however, five nests were located at Hospital Creek, Stanislaus County, on the San Joaquin River NWR (PRBO unpubl. data), and in 2005 one nest and at least three confirmed territories were found on San Luis NWR, Merced County (PRBO unpubl. data).

**Cascade Range and Sierra Nevada.** Yellow Warblers breed widely in this region in both riparian habitat and chaparral shrub fields (CalPIF 2003, J. Snowden and B. Williams in litt.). Abundance estimates ranged from 0.04 to 1.14 birds per ha among eight Sacramento River sites above Shasta Dam (PRBO unpubl. data) and 0.83 to 0.97 pairs per ha at one site along Gurnsey Creek, Tehama County (1998–1999; PRBO unpubl. data). A density of 0.95 birds per ha was found in xeric montane shrub fields of Lassen Volcanic National Park (PRBO unpubl. data).

On the west slope of the Sierra Nevada, Yellow Warblers breed from foothill woodlands up to the mixed-conifer zone, and at select sites in the north they may be as abundant in montane chaparral as in riparian habitat (B. Williams, J. Steele in litt.). Verner and Boss (1980) considered them “fairly common” summer residents in the late 1970s, and Beedy and Granholm (1985) reported declining numbers. They are increasing in postfire chaparral in El Dorado County (E. Harper in litt.) and have averaged 12.4 birds per BBS route since the 1992 fire (Sauer et al. 2003). In the southern Sierra, mixed-conifer forests at 5600–6601 ft (1707–2012 m) harbor small breeding populations (0.34 birds per ha; K. Purcell in litt.). Probable breeders occur in meadows around 7000 ft (2134 m) on Greenhorn Mountain, Kern County (J. Wilson in litt.). In the Kern River Valley, 142 males were counted on a valley-wide 10 July 1999 survey, far exceeding the estimated 14 pairs for the entire valley in 1985 (B. Barnes in litt.). Yellow Warblers have probably benefited from restoration and Brown-headed Cowbird (*Molothrus ater*) trapping to aid Southwestern Willow Flycatcher (*Empidonax traillii extimus*) recovery in the area (B. Barnes and S. Laymon in litt.).

On the east slope of the northern Sierra, density was 0.29 pairs per ha in postfire chaparral and regenerating conifers at Sagehen Field Station, north of Truckee (Raphael et al. 1987); numbers are higher in riparian habitat nearby at Perazzo Meadows and the upper Truckee River system (Lynn et al. 1998, J. Steele in litt.). Gaines (1992) considered Yellow Warblers “common” summer residents in the eastern Sierra of Mono County, where surveys found them at 121 (54%) of 224 riparian stations along 12 streams (Heath and Ballard 2003b). Abundance estimates were
Yellow Warblers

0.17–1.73, 0.22–0.83, and 0.48–1.64 birds per ha, respectively, at the headwaters of the West and East Walker rivers, at 7159–7799 ft (2182–2377 m) on Mono Lake’s feeder streams, and at 9318 ft (2840 m) on tributaries of the Owens River (PRBO unpubl. data). At elevations <6634 ft (2022 m), mostly in Inyo County, only 15 (6%) of 256 riparian stations had breeding Yellow Warblers (Heath and Ballard 2003b). Not only were they less numerous at these elevations but they also bred inconsistently (Heath and Ballard 2003a).

Central and southern coast. Yellow Warblers breed locally in small numbers in Sonoma, Marin, Alameda, San Mateo, Santa Clara, Santa Cruz, Monterey, and San Luis Obispo counties, and there is some anecdotal evidence of historic declines (Roberson and Tenney 1993, Shuford 1993, Bolander and Parmeter 2000, Alameda, San Mateo, Santa Clara, San Luis Obispo unpubl. atlas data). Numbers have declined markedly on the Palo Alto Summer Bird Count (1981–2005), from as many as 15 during the first five years to 0 during the past two (W. G. Bousman in litt.). At several well-surveyed riparian sites in Marin County, observers found one nest and detected few to no individuals during the breeding season (PRBO unpubl. data), and Olema Marsh held 0.06 birds per ha (Evans and Stallcup 1992). Roberson and Tenney (1993) roughly estimated the total population in Monterey County at 500–900 pairs. Singing males are “locally common” on Pacheco Creek and the San Benito and Pajaro rivers, San Benito County (M. Paxton and K. Van Vuren in litt.). In Santa Barbara County, these warblers are widespread and vary by subregion from “uncommon” to “common”; numbers likely have declined historically (Lehman 1994). Densities in three drainages on Vandenberg Air Force Base, Santa Barbara County, ranged from 0.69 to 1.31 birds per ha (Gallo et al. 2000).

Yellow Warblers have been confirmed breeding widely in the Transverse and Peninsular ranges; they are less numerous overall in coastal lowlands, where they were nearly extirpated from that portion of Orange County by 1990 (Garrett and Dunn 1981, Gallagher 1997, Unitt 2004, Los Angeles County unpubl. atlas data). Density was 0.32 pairs per ha at Big Morongo Preserve, San Bernardino County (Cardiff 1992), and 1.79 pairs per ha at Fallbrook, San Diego County (Weaver 1992). In the latter county, Yellow Warblers have increased greatly on the coastal slope since the late 1980s, apparently in response to habitat restoration and cowbird trapping to aid Least Bell’s Vireos (Vireo bellii pusillus; Unitt 2004). In Los Angeles County, the species expanded its range after the 1995–2000 atlas; as of 2005, there were 6–10 pairs nesting along the channelized Los Angeles River just northwest of downtown Los Angeles (K. Garrett in litt.). Similarly, the species’ range has expanded in Orange County since the early 1990s (D. Erickson fide D. R. Willick pers. comm.).

Southern deserts. Yellow Warblers occur very locally in low densities on the Owens Valley floor, Inyo County. Extensive surveys along 113 km of the lower Owens River found no breeding Yellow Warblers downstream of the Los Angeles Aqueduct intake, but density upstream was 0.32 birds per ha (2001–2004; PRBO unpubl. data). Elsewhere, the species continues to breed extremely locally as in the past. Yellow Warblers are thought to breed in canyons of the Panamint Mountains (Garrett and Dunn 1981), but infrequent excursions to the mostly inaccessible Grapevine Mountains have failed to produce any recent breeding records (T. & J. Heindel in litt.). In Death Valley, three to four breeding pairs are found annually at Scotty’s Castle, but other seemingly suitable habitat is unoccupied (T. & J. Heindel in litt.). Nesting densities were 0.18 pairs per ha along the Amargosa River, Inyo County, and 25–30 pairs along the Mojave River near Victorville, San Bernardino County (2005 PRBO unpubl. data, S. Koonce in litt.).

ECOLOGICAL REQUIREMENTS

Yellow Warblers generally occupy riparian vegetation in close proximity to water along streams and in wet meadows (Lowther et al. 1999). Throughout, they are found in willows (Salix spp.) and cottonwoods (Populus spp.), and in California they are found in numerous other species of riparian shrubs or trees, varying by biogeographic region (Grinnell and Miller 1944, Beedy and Granholm 1985, Lehman 1994, Harris 2005, PRBO unpubl. data). In northern California, willow cover and Oregon Ash (Fraxinus latifolia) are important predictors of high Yellow Warbler abundance (PRBO unpubl. data, Alexander 1999). East of the Sierra crest, the combined effect of elevation, percent riparian graminoid cover, and riparian corridor width was positively correlated with Yellow Warbler occurrence (Heath and Ballard 2003b).

In the Cascades and northern and western Sierra Nevada, Yellow Warblers also breed in xeric montane shrub fields and occasionally in
the shrubby understory of mixed-conifer forest (Grinnell et al. 1930, Beedy and Granholm 1985, Raphael et al. 1987, Gaines 1992). Nests have been found in Bush Chinquapin (Chrysolepis sempervirens) nowhere near water in the Lassen region, and in Snow Bush (Ceanothus cordulatus) 30 m from water in the southern Sierra (PRBO unpubl. data, K. Purcell in litt.).

At Clear Creek, Shasta County, in the interior northern Coast Ranges, Yellow Warbler nests were more successful when surrounded by a high number of large White Alders (Alnus rhombifolia; PRBO unpubl. data). In willow meadows of the northern Sierra, nests were more successful the farther they were from forest edges or trees (Cain et al. 2003). East of the Sierra crest, 56%, 29%, and 6% of 1086 nests were in willow, Woods’ Rose (Rosa woodsii), and Black Cottonwood (P. trichocarpa), respectively, but daily nest survival was significantly higher for rose nests (PRBO unpubl. data). It is likely that habitat features associated with higher nest success are reducing exposure to predators and cowbirds (Staab and Morrison 1999, Cain et al. 2003).

As a generalist, the Yellow Warbler appears to adapt its foraging to variation in local vegetation structure (Petit et al. 1990). Its diet in California contained over 97% animal matter, including ants, bees, wasps, caterpillars, beetles, true bugs, flies, and spiders (Beal 1907).

Yellow Warblers have shown a high degree of site fidelity, with 60%–64.5% of males and 32%–44% of females returning to their previous year’s breeding grounds and many to the same territory (Studd and Robertson 1989, Knopf and Sedgwick 1992). In California, they will make several nesting attempts throughout the season and will typically produce only one brood per year, although double brooding has been documented (PRBO unpubl. data).

Annual apparent adult survival probability for Yellow Warblers was 48% for the southwest region of the United States and 57% for the northwest region (IBP 2005).

**Threats**

Human population growth and resulting habitat degradation in California will likely continue to pose a threat to Yellow Warblers given their sensitivity to decreases in deciduous habitat, riparian habitat heterogeneity, and riparian corridor width (Saab 1999, Tewksbury et al. 2002, Heath and Ballard 2003b). Large-scale habitat restoration projects in lowlands are sure to assist populations in the next few decades, and the warblers are reoccupying restoration sites with and without cowbird trapping (PRBO unpubl. data; S. Laymon, B. Barnes, and P. Unitt in litt.). Conversely, in heavily populated coastal areas, increasing human demands are taxing water resources and degrading riparian drainages (Gallagher 1997, R. Leong, B. Bousman, and M. Paxton in litt.). New human dwellings and associated fire prevention activities that clear or limit regrowth of montane chaparral will likely reduce Yellow Warbler numbers in that habitat.

Brown-headed Cowbird parasitism is a commonly reported cause of Yellow Warbler declines in California (e.g., Gaines 1974, Garrett and Dunn 1981, Beedy and Granholm 1985, Johnson and Cicero 1991), though this conclusion typically is not supported by regional data on cowbird parasitism or nest success rates. The dramatic recovery of Yellow Warbler numbers in San Diego County and the South Fork Kern River Valley has coincided with cowbird trapping and restoration efforts (Unitt 2004, S. Laymon in litt.). By contrast, Yellow Warbler densities at Mono Lake restoration sites are not only the highest recorded in the state but are steadily increasing despite relatively high parasitism rates and a lack of cowbird management (PRBO unpubl. data).

Cowbirds parasitized 49% of 836 Yellow Warbler nests east of the Sierra; a minimum of 20% of 51 at Clear Creek, Shasta County; 70% of 23 at Amargosa Canyon, Inyo County; and 9% of 78 in the northern Sierra (Cain et al. 2003, PRBO unpubl. data). Yellow Warblers are somewhat resistant to the demographic effects of brood parasitism, and California birds employ antiparasite strategies such as cowbird egg burial (Clark and Robertson 1981, Sealy 1995). East of the Sierra crest, Yellow Warbler young fledged from 36% of parasitized nests, and predation accounted for the loss of 38% of 412 of parasitized nests (PRBO unpubl. data). These data suggest that even where parasitism rates are relatively high, Yellow Warblers fledge young (though fewer than in unparasitized nests) and predation also limits productivity.

Predation was the leading cause of Yellow Warbler nest failure in the northern and eastern Sierra, accounting for 93% of 40 and 76% of 521 failed nests in those regions, respectively (Cain et al. 2003, PRBO unpubl. data). In the wet willow meadows of the northern Sierra, Yellow Warbler nest success was negatively associated with the activity indices of Douglas Squirrels (Tamiasciurus douglasii), Steller’s Jays (Cyanocitta stelleri), and Brown-headed Cowbirds, and nest proximity to.
trees and forests edges likely increased exposure to predators (Cain et al. 2003).

MANAGEMENT AND RESEARCH
RECOMMENDATIONS

- Protect, manage, and restore dynamic riparian systems that provide the mechanisms (e.g., seasonal flooding) to create early successional as well as more structurally complex vegetative components (e.g., herbaceous cover, shrub cover, and riparian tree canopy).
- Focus management and restoration efforts primarily on identifying and maintaining source populations capable of producing young in excess of adult mortality.
- Eliminate or manage cowbird feeding sites near Yellow Warbler breeding habitat.
- Cowbird trapping may be a viable option to aid warblers in some areas, but criteria outlined by experts (e.g., Smith 1999) should be met prior to the initiation of any trapping program.
- In montane meadow willow habitats, actively flood meadows and restore water tables to limit access for predators (see Cain et al. 2003).
- Initiate landscape-level studies on the ecology of nest predators and parasitism within various habitat types (including chaparral) to identify the most effective management options for increasing reproductive output at a regional level.

MONITORING NEEDS

Because Yellow Warblers quickly respond to management (e.g., cowbird trapping, removal of livestock) and habitat restoration, monitoring is likely to validate the success of rehabilitation efforts (Taylor and Littlefield 1986, Krueper et al. 2003). Statewide BBS routes are effective but should be complemented by off-road standardized point counts and habitat assessments (Ralph et al. 1993) that target reference and restoration or managed sites. To avoid counting migrants, surveys should be conducted in June and coupled with documentation of breeding behaviors. Nest monitoring (e.g., Martin et al. 1997) should be conducted at reference sites of high warbler abundance stratified by bioregions to assess regional threats, and accompanied by assessments of habitat features at nest sites that may ease predation or parasitism pressures. If cowbird control measures are deemed necessary, they should be preceded by baseline studies and accompanied by concurrent nest monitoring.

ACKNOWLEDGMENTS


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Yellow Warbler

*Dendroica petechia*  
**ORDER:** PASSERIFORMES  
**FAMILY:** PARULIDAE  
**IUCN Conservation Status:** Least Concern

Although many warblers are yellow, the Yellow Warbler is the most extensively yellow of any species. This widespread species of willows and mangroves is the only warbler with yellow tail spots.

**Appearance**

**Adult Description**
- Small songbird.
- Thin pointed bill.
- Yellow overall.
- Chestnut streaks on chest of male.

**Male Description**
Face, throat, and underparts bright yellow. Streaked with chestnut below throat. Upperparts yellow-green to olive. Wings edged in yellow. Yellow tail spots.

**Female Description**

**Immature Description**
Immatures similar to adult female, but paler and duller, usually without chestnut chest streaks. Yellow tail spots reduced.

**Field Marks**
Similar Species

- **Palm Warbler** is only other warbler with red streaks on chest, and it has a rusty cap and a dark eyestripe.

- **Orange-crowned Warbler** has dark eyeline and pale eye crescents, no yellow on edge of wing feathers, and no tail spots.

- Female and immature **Yellow Warblers** easily confused with female and immature Hooded and Wilson's warblers; all have plain yellow face and entirely yellow underparts. Neither has yellow edging to wing feathers or yellow tail spots.

- **Yellow Warbler** may sing songs that are nearly identical to those of **Chestnut-sided Warbler**.
II

SPECIES ACCOUNTS

PDF of Yellow-breasted Chat account from:
Shuford, W. D., and Gardali, T., editors. 2008. California Bird Species of Special Concern: A ranked assessment of species, subspecies, and distinct populations of birds of immediate conservation concern in California. Studies of Western Birds 1. Western Field Ornithologists, Camarillo, California, and California Department of Fish and Game, Sacramento.
YELLOW-BREASTED CHAT (*Icteria virens*)

Lyann A. Comrack

Current and historic (ca. 1944) breeding range of the Yellow-breasted Chat in California; occurs more widely, though secretively, during migration. Numbers have declined in many areas, and the species is extirpated from much of the floor of the Central (especially San Joaquin) Valley, and from parts of the central and southern coast.

Criteria Scores

- Population Trend: 10
- Range Trend: 10
- Population Size: 7.5
- Range Size: 5
- Endemism: 0
- Population Concentration: 0
- Threats: 10
**Special Concern Priority**
Currently considered a Bird Species of Special Concern (breeding), priority 3. Included on prior special concern lists (Remsen 1978, 2nd priority; CDFG 1992).

**General Range and Abundance**
Two subspecies restricted to the New World: *I. v. auricollis* nests in western and *I. v. virens* in eastern North America. *I. v. auricollis* breeds from southern British Columbia east to southern Saskatchewan and North Dakota, south to south-central Baja California, west Texas, and (at least formerly) southern Tamaulipas; winters from southern Baja California and south Texas south to western Mexico through central Guatemala (AOU 1957, Eckerle and Thompson 2001). Patchily distributed throughout its breeding range, with highest concentrations in the Klamath region of California and Oregon, southern Nevada, southeastern Arizona, southwestern Texas, and eastern Montana and western North Dakota (Sauer et al. 2005).

**Seasonal Status in California**
Occurs as a migrant and summer resident primarily from late March to late September (Garrett and Dunn 1981, Unitt 2004); breeds from late April through early August (Eckerle and Thompson 2001, Unitt 2004).

**Historic Range and Abundance in California**
Grinnell and Miller (1944) described the Yellow-breasted Chat as a “fairly common to common” summer resident that bred the length and breadth of mainland California up to about 5000 ft (1520 m) elevation. It was most numerous toward the interior, but status varied regionally and locally.

**Northeastern California.** Chats were reported widely in this region. Representative breeding season localities included Requa, Del Norte County; Hayfork, Trinity County; Scott River at Callahan, Siskiyou County; Ukiah, Mendocino County; Clear Lake, Lake County; and Sonoma and Santa Rosa, Sonoma County (Grinnell and Miller 1944, MVZ specimens or egg sets). Records extended east to Hornbrook, Siskiyou County, and the McCloud River, Shasta County.

**Central Valley and west slope of Sierra Nevada.** Apparently numerous in the Sacramento Valley, chats were recorded at Paines Creek near Dale’s, Tehama County; Rumsey and Woodland, Yolo County; Sacramento, Sacramento County; and elsewhere. They also were found throughout the San Joaquin Valley, where representative localities were the Tuolumne River near Modesto, Stanislaus County; Los Banos and Snelling (where 20 individuals were recorded in an hour-and-a-half survey of bottomlands), Merced County; near Tarpey, Fresno County; and Bakersfield, Kern County (Grinnell and Storer 1924, Grinnell and Miller 1944, Calif. Nat. Diversity Database [CNDDDB] unpubl. data, MVZ and WFVZ egg sets). Chats were reported from several specific sites in the Sierra Nevada foothills (e.g., Nevada City, Nevada County; Smith River east of Coulterville, Mariposa County; Dry Creek near Badger, Tulare County) and were considered “common” along the west base of the Sierra Nevada and at Kernville, Kern County (Fisher 1893, Grinnell and Storer 1924, Grinnell and Miller 1944, CNDDDB unpubl. data, MVZ specimens).

**Central and southern coast.** Grinnell and Wythe (1927) noted that chats were “fairly common in the warm interior valleys” of the San Francisco Bay region; many records exist for Solano, Contra Costa, Alameda, and Santa Clara counties (Grinnell and Miller 1944, CNDDDB unpubl. data, MVZ egg sets). They were considered “rare” in any season in Marin County (Shuford 1993). Along the central coast, chats nested at San Lorenzo, Santa Cruz County; “North San Benito County”; and Paso Robles, San Luis Obispo.

**Breeding Bird Survey Statistics for California**

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Species Accounts
County (Grinnell and Miller 1944, MVZ and WVFZ egg sets). Pemberton and Carriger (1915) considered chats to be “fairly common” along the San Antonio River, Monterey County. The species was described as a “common” breeder in coastal southern California (Willett 1912), with records for Ventura, Ventura County; El Monte, Los Angeles County; near Colton, San Bernardino County; Temecula, Riverside County; and Campo, San Diego County (Unit 1984, MVZ and WVFZ egg sets).

Southern deserts. Fisher (1893) described the chat as “moderately common” in the Owens Valley (e.g., Independence Creek, Olancha, Morans) and “tolerably common” in Death Valley; the species was also found in the Panamint (Willow Creek, 22 May, thus of uncertain breeding status) and Inyo (Hunter’s arastra to the bottom of the Saline Valley) mountains, Inyo County. The chat occurred locally throughout the Mojave and Colorado deserts, with representative breeding sites including Yermo and Big Morongo Valley, San Bernardino County; Mecca, Riverside County; and Niland, Imperial County (CNNDDB unpubl. data, MVZ egg sets). Grinnell (1914) considered it to be one of the five most common breeding bird species along the lower Colorado River.

RECENT RANGE AND ABUNDANCE IN CALIFORNIA

Although still widely distributed, the Yellow-breasted Chat is now rare or absent as a breeder in much of the Central Valley and parts of the southern coastal slope. The current breeding range is estimated to be about 35% reduced from its historic extent (see map). Chat populations may be rebuilding along the Colorado River, but this gain is more than offset by declines elsewhere. Numbers of Yellow-breasted Chats were relatively stable on Breeding Bird Survey (BBS) routes in California from 1968 to 2004 (Sauer et al. 2005). These data are of medium credibility, being deficient in having low abundance (<1.0 bird per route).

Northwestern California. Chats are still numerous in this region, especially in Humboldt and western Siskiyou and Shasta counties. BBS data indicate that northwestern rivers, including the Klamath and Trinity, support the highest densities in the state (Sauer et al. 2005). The Humboldt County breeding bird atlas found chats in 80 blocks (10 confirmed), representing 19% of all blocks surveyed (Hunter et al. 2005). Further, singing chats were recorded at all point count stations (n = 70) in a survey of gravel bars on the lower Eel River, Humboldt County in 1999 (R. Hewitt pers. comm.). Chats are regularly reported on BBS routes in Mendocino County (e.g., Longvale and Laytonville) and Lake County (e.g., Hullville, rarely Bartlett Springs; Sauer et al. 2005). The Sonoma County breeding bird atlas confirmed nesting only at Annadel State Park, but chats were also found in 18 other atlas blocks, suggesting breeding along Santa Rosa Creek at Spring Lake, Russian River at Guerneville, Rio Nido, Dry Creek, and elsewhere (Parmeter 1995, M. Ricketts pers. comm.).

Northeastern California. Chats were likely never established breeders in far northeastern California (see above). The few recent records for Modoc County (J. Sterling, B. Stovall pers. comm.) appear to represent migrants, though perhaps some remain to breed. Despite no confirmation of nesting in Lassen County, chats occurred regularly at about 4590 ft (1400 m) on Secret Creek between Ravenendale and Litchfield in the 1970s (T. Manolis in litt.); a fire recently destroyed suitable habitat (B. Stovall in litt.). Chats used to occur annually in the Susan River Canyon above Susanville in the 1980s (B. Stovall pers. comm.), but they were not recorded on point counts there in 2002 and 2003 (D. Humple/PRBO unpubl. data). In Mono County, Gaines (1992) suggested possible sporadic breeding on the west shore of Mono Lake. Recent riparian bird surveys, however, did not find chats breeding in the Mono Basin or at 10 higher-elevation tributaries to the east and west of the Walker River drainage (Heath and Ballard 2002).

Central Valley and west slope of Sierra Nevada and Cascade Range. Yellow-breasted Chats have declined in the Sacramento Valley, with most recent confirmed nesting observations concentrated to the north, where the species still seems to be doing well. At Clear Creek, Shasta County, densities reach 6 territories per 10 ha (R. Burnett/PRBO unpubl. data; the 11 HY and 8 AHY birds caught during one year of mist-netting represented a high productivity ratio of 1.37; Gardali et al. 1999). Gaines (1974) found singing males to be “common” along the upper Sacramento River of Colusa County and “uncommon” on the Feather River from Oroville, Butte County, to Verona, Sutter County. Other recent locations with chats include Bidwell Park and Oroville WA, Butte County; Stillwater, Glenn County; and Little Stony Creek at East Park Reservoir, Colusa County (Holmes et al. 2000, PRBO unpubl. data 1998–1999). The Sacramento County breeding bird atlas estimated a total of 20–30 pairs.
of chats in 11 atlas blocks (T. Manolis pers. comm.), and the Contra Costa County atlas (unpubl. data) recorded chats in three blocks in the western Sacramento–San Joaquin River Delta. The species is now found in only a few places in the San Joaquin Valley (Small 1994), including White Slough and the Mokelumne River at the Camanche Reservoir dam, San Joaquin County, and the Stanislaus River at Horseshoe Bend Recreation Area, Stanislaus County (PRBO data 1998, D. Gifford pers. comm.).

Chats nest locally but regularly along low- and midelevation streams in the Sierra Nevada (e.g., South Yuba River, Nevada County; Tuolumne River downstream from Don Pedro Reservoir, Tuolumne County; Kaweah River west of Terminus Dam, Tulare County; T. Beedy pers. comm.). Two pairs on Finegold Creek northeast of O’Neals, Madera County, in 2006 were at a previously undocumented location (J. Davis in litt.). BBS data show them numerous only in the Gold Hills and Folsom areas of El Dorado County in the north (Sauer et al. 2005) and the South Fork Kern River Preserve, Kern County, in the south, where an estimated 30 to 45 nesting pairs occur (M. Whitfield pers. comm.). In the northern Sierra, a few chats are found east to 3300 ft (1006 m) on Spanish Creek in Quincy and at 3500 ft (1037 m) on Indian Creek in Indian Valley, Plumas County (H. Green in litt.). Lower down (mainly 400–2000 ft [122–610 m]), chats are more numerous. They are considered “very common” along Butte Creek, Chico Creek, and the Feather River drainage in the Oroville area (T. Manolis in litt.) and “fairly common” in the Lassen area of the Cascades on Battle, Dye, Deer, and Mill creeks as well as main rivers (R. Burnett in litt.). By contrast, Siegel and DeSante (1999) noted the drastic decline of the species on the west slope of the Sierra over the past 50 years and considered it “rare” at best.

Central and southern coast. In the San Francisco Bay region, there are relatively few records of chats from recent breeding bird atlas projects. They occurred in six atlas blocks (1 confirmed) in Napa County (mostly in Napa Valley, where numbers have declined since the 1980s; Berner et al. 2003), two in Marin County (Shuford 1993), and two in Alameda County (unpubl. data). By contrast, the Santa Clara County atlas confirmed breeding in 7 blocks distributed in two general areas: the southern Santa Clara Valley and the San Antonio Valley at 2000+ ft (610+ m) in the Diablo Range (W. G. Bousman in litt.). Chats also breed on the east slope of this range in Del Puerto Canyon, Stanislaus County (J. Gain in litt.). The chat is a rare and local breeder in Monterey County, where the current population of about 40 pairs is distributed patchily along the Salinas and Carmel river systems and along the San Antonio River where it enters San Antonio Reservoir (Roberson 1993). Chats are considered “uncommon to locally fairly common” in the interior of San Luis Obispo County, where breeding is highly likely along the Salinas River, Trout Creek, and Arroyo Grande Creek above Lopez Lake (T. Edell unpubl. atlas data). In Santa Barbara County, chats have declined markedly and now nest mainly at Barker Slough on Vandenberg Air Force Base, the Santa Ynez River, and Mono and Agua Caliente creeks (Lehman 1994).

Garrett and Dunn (1981) described the chat as having “greatly declined as a breeder in recent years” in southern California. On the basis of surveys during 1994–1999, the chat was judged to be a “fairly common” breeder on the Santa Clara River, where found consistently, in appropriate habitat, from east of Fillmore to Victoria Avenue in Ventura County, plus at a few locations eastward to Interstate 5 in Los Angeles County (J. Greaves in litt.). Chats remain rare and localized in Los Angeles (L. Allen unpubl. atlas data) and Orange (Hamilton and Willick 1996) counties. Chats have become “increasingly rare” in Orange County, where the atlas recorded them in 17 blocks (Gallagher 1997). Chats still nest locally in Riverside County, particularly at the Prado Basin, Santa Ana River, San Timoteo Creek, Temescal Canyon, Canyon Lake, Temecula Creek, and Vail Lake (L. Hays pers. comm.). Despite no formal census of the Prado Basin and adjacent Santa Ana River, L. Hays (pers. comm.) estimated that about 400 pairs occur there. In San Diego County, chats are faring better than elsewhere on the southern coast. Counts of 20 to 50 in a day have been made along the Santa Margarita River north of Fallbrook, along the San Luis Rey River between Interstate 15 and Pala, in the San Pasqual Valley down to Lake Hodges, in the lower Los Peñasquitos Canyon, along the Sweetwater River in the Jamacha area, and in the Tijuana River Valley. Chats occur locally along many small creeks as well as main rivers (Unitt 2004).

Southern deserts. In Inyo County, chats breed along the Owens River (north to Birchim Canyon; T. & J. Heindel in litt.), but were present at only 1 (Hogback Creek) of 18 of its tributaries surveyed in 1998–2000 (Heath et al. 2001). Chats are “rare and local” in the White Mountains, with an exceptionally high-elevation record of 6750 ft (2060 m)
at Wyman Canyon (Johnson and Cicero 1986, 1991; MVZ specimens). Other current locations in Inyo County of known or probable chat breeding are the Deep Springs ponds, Saline Valley salt marsh, Scotty’s Castle and Furnace Creek Ranch in Death Valley, and Tecopa/Amarogosa River area (T. & J. Heindel in litt.). Breeding chats are few and widely scattered in the Mojave Desert of San Bernardino County (Myers 1998): Mojave River at Victorville (6–10 pairs), Morongo Valley (2–7 pairs), and Cushenberry Springs (1 pair). They also possibly nest in Afton Canyon and Camp Cady. Breeding chats have declined in the Salton Sea area, where in the 1990s a total of at most six pairs was known from only four sites (Patten et al. 2003). Rosenberg et al. (1991) estimated that chats numbered about 700 individuals along the lower Colorado River in 1986, representing a decline of 30% since 1976 attributable to habitat loss from flooding in the 1980s. While surveying Southwestern Willow Flycatchers (Empidonax traillii extimus) along the lower Colorado in 1996–2001, R. McKernan (pers. comm.) confirmed nesting by chats at Headgate Dam (15 pairs), San Bernardino County; Hall Island (15 pairs), Riverside County; and several sites in Imperial County, including Cibola NWR (10 pairs on California side), Walker Lake (15 pairs), Draper Lake (20 pairs), Paradise Valley (20 pairs), Clear Lake (15 pairs), Picacho State Recreation Area (30 pairs), Ferguson Lake (15 pairs), and below Laguna Dam (10 pairs). Chats’ ability to nest in tamarisk (Tamarix spp.) accounts for recent population rebounds there of an unknown magnitude (Hunter 1984, S. Laymon pers. obs.).

ECOLOGICAL REQUIREMENTS

Nesting Yellow-breasted Chats occupy early successional riparian habitats with a well-developed shrub layer and an open canopy. Vegetation structure, however, more than age appears to be the important factor in nest-site selection (Eckerle and Thompson 2001). Nesting habitat is usually restricted to the narrow border of streams, creeks, sloughs, and rivers and seldom forms extensive tracts. Blackberry (Rubus spp.), wild grape (Vitis spp.), willow, and other plants that form dense thickets and tangles are frequently selected as nesting strata (Grinnell and Miller 1944). The nest is typically placed within 1 m of the ground but may range up to 2.4 m (Ehrlich et al. 1988). Taller trees, such as cottonwood (Populus spp.) and alder (Alnus spp.), are required for song perches (Dunn and Garrett 1997). Chats establish and defend individual territories, but pairs tend to congregate, suggesting loose coloniality (Eckerle and Thompson 2001).

Chats will nest in tamarisk, Himalayan Blackberry (Rubus discolor), Russian Olive (Elaeagnus angustifolius), and other non-native plants that provide dense shrub layers. Hunter et al. (1988) found chats using Tamarix chinensis preferentially to native vegetation along the Pecos River, Texas. Brown and Trosset (1989), however, reported that along the Colorado River in the Grand Canyon, Arizona, they nest in tamarisk and native shrubs in direct proportion to their frequency of occurrence in a given area. At Clear Creek, Shasta County, most chat nests found were in exotic Himalayan Blackberry rather than in the less abundant native California Blackberry (R. ursinus). Chat abundance was highly correlated with the presence of the native blackberry but not significantly with the exotic blackberry (Burnett and DeStaebler 2001).

Diet studies of chats are lacking in California. Elsewhere, adults feed predominantly on insects and spiders; wild fruits and berries are also important. Adults feed nestlings primarily soft-bodied insects (orthopterans and larval lepidopterans; Eckerle and Thompson 2001).

THREATS

Destruction of riparian woodland was implicated in the early decline of the Yellow-breasted Chat in California (Remsen 1978), but the species’ absence from seemingly suitable habitat suggests additional pressures. Chats are frequent hosts to nest parasitism by the Brown-headed Cowbird (Molothrus ater) through much of their range (Ehrlich et al. 1988). Hanna (1928) documented chat nests parasitized by cowbirds in southern California, but the extent of parasitism in the state is still poorly understood. Gaines (1974) supposed the chat’s susceptibility to parasitism in the Sacramento Valley was moderate. At Clear Creek, Shasta County, the 1 of 14 chat nests parasitized still fledged three chats (Burnett and DeStaebler 2001). Chats have become quite numerous on Camp Pendleton, San Diego County, where intensive cowbird trapping has been conducted for years (P. Unitt pers comm.), suggesting a causal effect. Large-scale cowbird trapping at the Prado Basin, Riverside County, has likely increased its chat population (L. Hays pers. comm.). In each case, however, habitat restoration and exotic plant control may have played critical roles in enhancing conditions for chats.
Chats’ dependence on understory and shrubby riparian vegetation for nesting makes them vulnerable to habitat loss from vegetation removal along river channels during flood-control maintenance and from urban and agricultural development. The species is sensitive to grazing and hence may be a good indicator of its effects on riparian birds (Sedgwick and Knopf 1987). Chat densities increased fourfold over a six-year period in response to the cessation of livestock grazing along the San Pedro River, Arizona (Ohmart 1994).

**MANAGEMENT AND RESEARCH RECOMMENDATIONS**

- Preserve existing, and restore degraded, riparian habitat. Advocate a multispecies approach to restoration to help both chats and other riparian obligates (Brown and Trosset 1989, RHJV 2004).
- Manage riparian habitat to maintain and/or promote a dense shrub layer; install a shrub layer in the early stages of restoration projects.
- Time removal of exotic plants from riparian areas used by nesting chats to avoid disturbance during breeding, and proceed only after careful assessment and mitigation for any potential detrimental effects to chats.
- Identify and protect areas with healthy breeding populations of chats and conduct ecological studies needed to increase and expand their populations.
- Compare chats’ reproductive success in native versus non-native vegetation.
- Examine the effects of cowbird nest parasitism, and its control, on chats by region, and take appropriate management actions as needed.

**MONITORING NEEDS**

The BBS is inadequate for monitoring fluctuations in populations of the Yellow-breasted Chat. BBS data are too few to detect population trends in the Great Basin, San Joaquin Valley, coastal southern California, and the Mojave and Sonoran deserts. Improved BBS coverage, while desirable, would not in itself be enough to monitor chats adequately in their linear or patchy habitats. A statewide population monitoring program should be conducted once every 3–5 years using standardized off-road point counts or constant-effort mist-netting (Ralph et al. 1993).

**ACKNOWLEDGMENTS**


**LITERATURE CITED**


Gardali, T., Smith, Z., and Geupel, G. R. 1999. Neo-tropical and resident songbird populations in the lower Clear Creek floodway restoration project:
Yellow-breasted Chat


Despite its bright yellow chest, loud song, and conspicuous display flights, the Yellow-breasted Chat is easily overlooked because of its skulking nature and the denseness of its brushy haunts. Long considered the largest of the wood-warblers, genetic data suggest that it is not a warbler at all.
Similar Species

- **Yellow-throated Vireo** is smaller and has two white wingbars.