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SPECIES ACCOUNTS



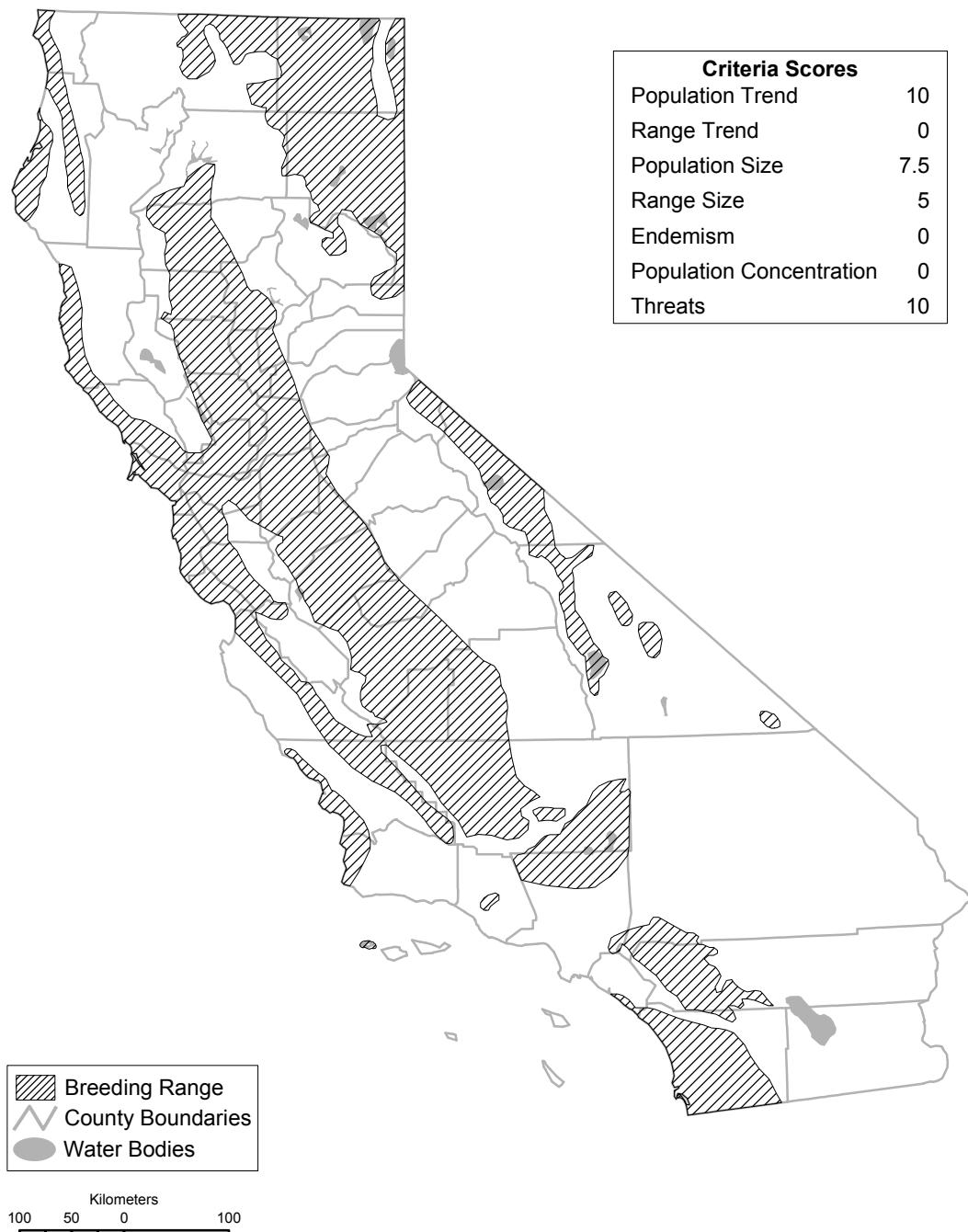
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NORTHERN HARRIER (*Circus cyaneus*)

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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 mid-western 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, WVFZ 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

1968–2004						1968–1979			1980–2004			All data from Sauer et al. (2005)	
Trend	P	n	(95% CI)	R.A.	Trend	P	n	Trend	P	n	Credibility		
2.2	0.31	56	-2.0, 6.4	0.52	6.8	0.15	31	1.9	0.49	45	Medium		

RECENT RANGE AND ABUNDANCE IN CALIFORNIA

The outline of the breeding range has changed little since the mid-1940s (see map), and harriers breed from sea level near the coast to at least 9000 ft (2743 m) in the Glass Mountain region of Mono County (Shuford and Metropulos 1996). Regardless, overall numbers have been reduced and some local populations have been extirpated. Still, breeding densities in some regions of the state (see below) currently are higher than anywhere else in North America (highest density outside California, approximately 2 nests per km²; MacWhirter and Bildstein 1996). While local declines in breeding numbers have been documented in some regions of California, declines elsewhere in the state can only be inferred by loss or degradation of suitable breeding habitat. Notably, California lost 26% of its remaining native grasslands between 1945 and 1980 (Noss et al. 1995) and 34% of its remaining wetlands between 1954 and 1985 (Hartman and Goldstein 1994). Using CBC data from 1986, Johnsgard (1990) estimated California's wintering population at 13,200 birds. Because harriers are much more numerous in the state in winter than summer, the breeding population is surely many fewer. Actual breeding numbers vary greatly from year to year with rainfall and prey abundance, probably because the species' primary habitats, marshes and grasslands, vary annually in quality and extent (MacWhirter and Bildstein 1996).

Northwestern California. Harriers breed locally in this region, largely within the coastal lowlands, from Lake Earl in Del Norte County (Barron 2001) south to Bodega Head in Sonoma County (Burridge 1995), but also inland at Lake Berryessa in Napa County (Berner et al. 2003). The Humboldt County breeding bird atlas (BBA) found harriers in 31 blocks, mostly along the coast from Clam Beach south through the Humboldt Bay lowlands (Hunter et al. 2005). In Mendocino County, the species breeds along the coast near Fort Bragg and at MacKerricher and Manchester state beaches (<12 pairs, R. Keiffer in litt.). Within this region, atlasers found harriers in eight blocks in Sonoma County, half at Bodega Head (Burridge 1995), and in two blocks in Napa County at Lake Berryessa (Berner et al. 2003).

Northeastern California. 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. Atlasers 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. Atlasers 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, atlasers located harriers in 14 blocks along San Francisco Bay and in 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, atlasers 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 Angles 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 atlasers 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 atlasers

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

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.

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