ROADSIDE RAPTOR CENSUS IN THE SAN JACINTO VALLEY OF SOUTHERN CALIFORNIA

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In recent years much emphasis has been placed on the conservation of raptors, which are generally low in numbers and tend to be highly sensitive to human activities such as shooting, pesticide use and habitat alteration (for a review see Newton 1979). Although the alteration and destruction of breeding habitat may currently be the greatest detriment to many bird species, the work of Fretwell (1977) on Dickcissels (*Spiza americana*) suggests that the loss of wintering habitat may, in some cases, be equally important. However, this aspect of raptor research has received comparatively little attention.

In 1981 we initiated a 2-year fall and winter study of raptors in the San Jacinto Valley to provide baseline data on populations in southern California and to quantify the importance of this valley as a wintering area for raptors.

STUDY AREA AND METHODS

The San Jacinto Valley of southern California is located in Riverside County approximately 25 km east of the City of Riverside. This rural valley consists predominantly of agricultural lands (alfalfa and grain crops) and dairy farms, with most urban development concentrated at the southeast end. Duck clubs, fallow fields and a small amount of riparian habitat make up most of the undeveloped land in the valley. The elevation of the valley floor averages approximately 425 m. During the winter months mean temperatures range from 1° - 21°C and mean levels of precipitation range from 2.6 - 6.4 cm per month.

Each census consisted of two observers driving a 43-km (38.8 km² as measured with a planimeter) route (Figure 1) recording all raptors seen with the unaided eye within 0.5 km of either side of the road. Species identification, age and sex (when possible), and perch site (description and height) were noted for most individuals. Habitat parameters were not considered as raptor distribution in the San Jacinto Valley appears to be heavily influenced by the occurrence of man-made perches. We maintained a vehicle speed of approximately 40 km/hr for most of the route, with occasional stops for positive identification when necessary. The open terrain and sparsity of trees along the route minimized duplicate sightings. During the 1981-82 study we drove the route approximately once every 5-10 days from 19 September 1981 through 8 March 1982 for a total of 20 censuses. In 1982-83 we drove the route approximately once per week from 5 September 1982 through 25 February 1983 for a total of 21 censuses. The duration of each census was approximately 2 hours (mean = 1.8 hr) ending at sunset.

RESULTS

Species composition and seasonal abundance were notably similar between the two years of study (Table 1). In 1981-82 we observed 1.5 rap-

tors/km (62.6 raptors/census or 1.61 raptors/km²) based on a cumulative total of 1252 raptor sightings in 860 km (776 km²). Similarly, in 1982-83 we observed 1.4 raptors/km (60.8 raptors/census or 1.57 raptors/km²) based on a cumulative total of 1276 raptor sightings in 903 km (814 km²).

Fourteen species used the valley during the two years of study. The only difference in species composition between years was the observation of a Merlin (*Falco columbarius*) in the second year. The two most abundant species during both years were the Red-tailed Hawk (*Buteo jamaicensis*) and American Kestrel (*Falco sparverius*). However, the abundance of Red-tailed Hawks was consistent between the two years (20.5/census ± 1.8 SE vs.

Table 1. Frequency of raptor sightings in the San Jacinto Valley, Riverside Co., California, fall-winter 1981-83.

Species	Number observed[a] 1981-82	1982-83
Osprey (*Pandion haliaetus*)	18(0.9)	5(0.2)
Black-shouldered Kite (*Elanus caeruleus*)	84(4.2)	72(3.4)
Bald Eagle (*Haliaeetus leucocephalus*)	1(0.1)	1(0.1)
Northern Harrier (*Circus cyaneus*)	38(1.9)	107(5.1)
Cooper's Hawk (*Accipiter cooperii*)	2(0.1)	5(0.2)
Red-shouldered Hawk (*Buteo lineatus*)	18(0.9)	20(1.0)
Red-tailed Hawk (*Buteo jamaicensis*)	409(20.5)	425(20.5)
Ferruginous Hawk (*Buteo regalis*)	20(1.0)	73(3.5)
Rough-legged Hawk (*Buteo lagopus*)	3(0.2)	6(0.3)
Golden Eagle (*Aquila chrysaetos*)	8(0.4)	16(0.8)
American Kestrel (*Falco sparverius*)	637(31.9)	513(24.4)
Merlin (*Falco columbarius*)	------	2(0.1)
Prairie Falcon (*Falco mexicanus*)	12(0.6)	10(0.5)
Burrowing Owl (*Athene cunicularia*)	2(0.1)	2(0.1)
Total	1252(62.8)	1276(60.8)

[a]Cumulative total of all censuses, with mean per census in parentheses.

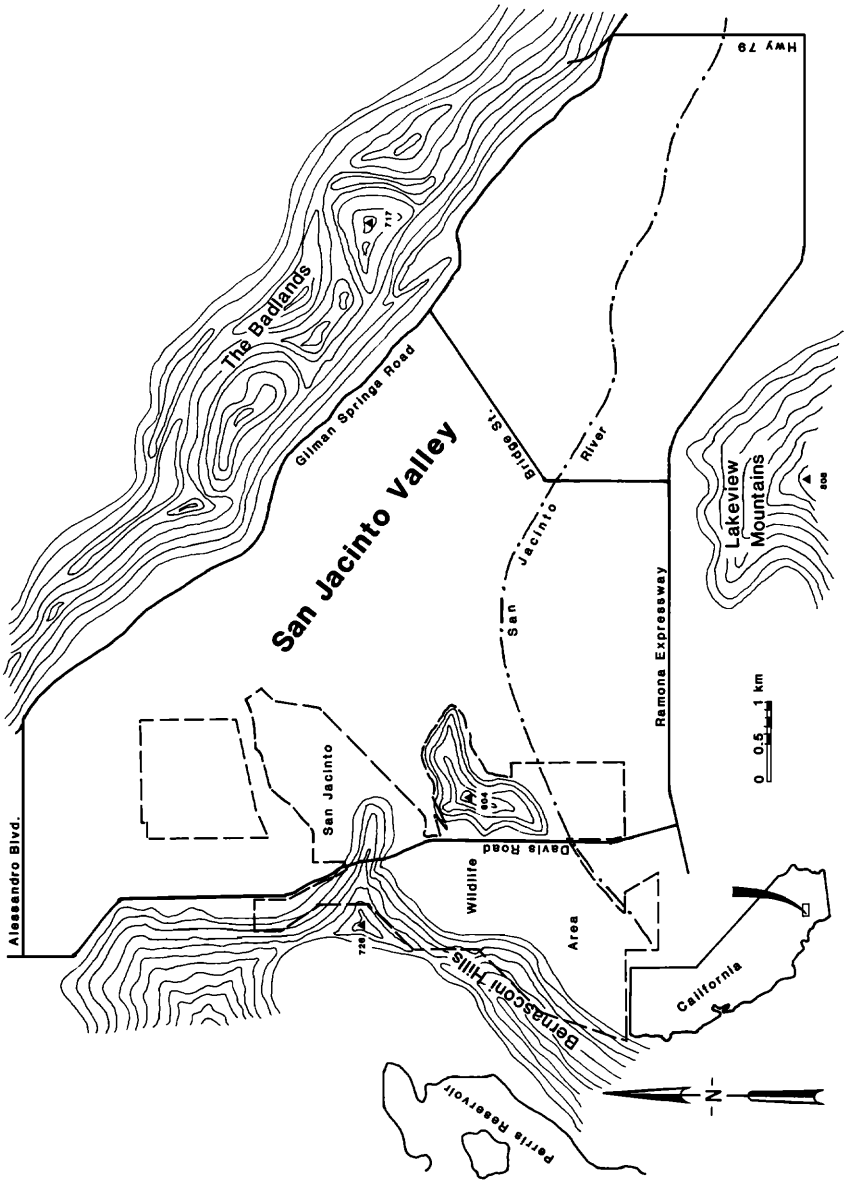

Figure 1. San Jacinto Valley raptor census route.

20.2/census ± 1.9 SE), whereas that of the American Kestrel was significantly lower (Student's t-test, $p < 0.01$) during the second year (31.9/census ± 2.1 SE vs. 24.4/census ± 1.6 SE). Of the other species recorded along the census route, Black-shouldered Kite (*Elanus caeruleus*), Red-shouldered Hawk (*Buteo lineatus*) and Prairie Falcon (*Falco mexicanus*) also occurred in similar numbers both years. Northern Harrier (*Circus cyaneus*) and Ferruginous Hawk (*Buteo regalis*) were the only two species to have notably increased in the second year (Table 1).

A substantial number of raptors were already present within the valley on the first census in both September 1981 and 1982, indicating that many raptors, but predominantly American Kestrels, had already migrated into the area from their breeding grounds (Figure 2). In general, American Kestrels occurred in relatively high numbers from September through January, decreasing to a much lower breeding population in February and March (Figure 2). Heavy rains causing major flooding and road washouts in the valley during late winter prevented further censusing after February 1983. Casual observations in March 1983, however, indicated that the abundance of raptors had markedly declined as had occurred in 1982. The high number of Red-tailed Hawks which were observed in February 1983 may have been a result of the unusually harsh winter in northern California that year.

A relatively early record for the most northerly breeding migrant, the Rough-legged Hawk (*Buteo lagopus*), occurred in 1981, when an individual was observed along the census route on 3 October. In contrast, during 1982 this species was not recorded until 2 December.

In addition to the raptors recorded during roadside counts, we observed several other species at other times of day or just off the census route. These species were Turkey Vulture (*Cathartes aura*), Swainson's Hawk (*Buteo swainsoni*), Sharp-shinned Hawk, (*Accipiter striatus*), Common Barn-Owl (*Tyto alba*), Great Horned Owl (*Bubo virginianus*) and Short-eared Owl (*Asio flammeus*). Additionally, in January 1983 McKernan saw an immature Peregrine Falcon (*Falco peregrinus*) during casual observations along the census route.

Although only one Bald Eagle (*Haliaeetus leucocephalus*) was observed during each year of censusing, several other individuals also wintered in the valley. During the winter of 1981-82 we recorded at least four individuals just off the census route, and four Bald Eagles were also recorded on 27 December 1982 (McKernan 1983).

Of the 866 Red-tailed Hawks recorded during the two years, 63.4% were adults, 27% were immatures and 9.6% were unclassified. Immature plumaged birds made up a significantly greater (chi-square test, $p < 0.01$) proportion of the population in 1982-83 when 33.2% were immatures as compared to 20.2% in 1981-82. In both years the proportion of immatures in the population was much lower than in the Sacramento Valley where 46% of those wintering Red-tailed Hawks for which age was determined were immatures (Wilkinson and Debban 1980).

Of the 1161 American Kestrels recorded during the two years, 26.9% were males, 64.2% were females, and 9% were unclassified. This greater abundance of females is similar to that found in other studies of wintering American Kestrels (Koplin 1973; Mills 1975, 1976; Wilkinson and Debban

1980) and may reflect the selection of open habitats, such as the San Jacinto Valley, by females (Koplin 1973, Mills 1976).

Perch site selection by raptors in this study was heavily influenced by the scarcity of trees in the San Jacinto Valley. Of the 2157 raptors for which flight behavior and perch type were recorded, 23.2% were flying, 11.1% were on natural structures (tree, rock, ground, etc.), and 65.7% were on man-made structures. Although controversial (see Olendorff et al. 1981), the view that utility poles and lines are beneficial to at least some raptors appears to be supported by the results of this study in which 76.8% of all perched raptors were on utility poles or wires.

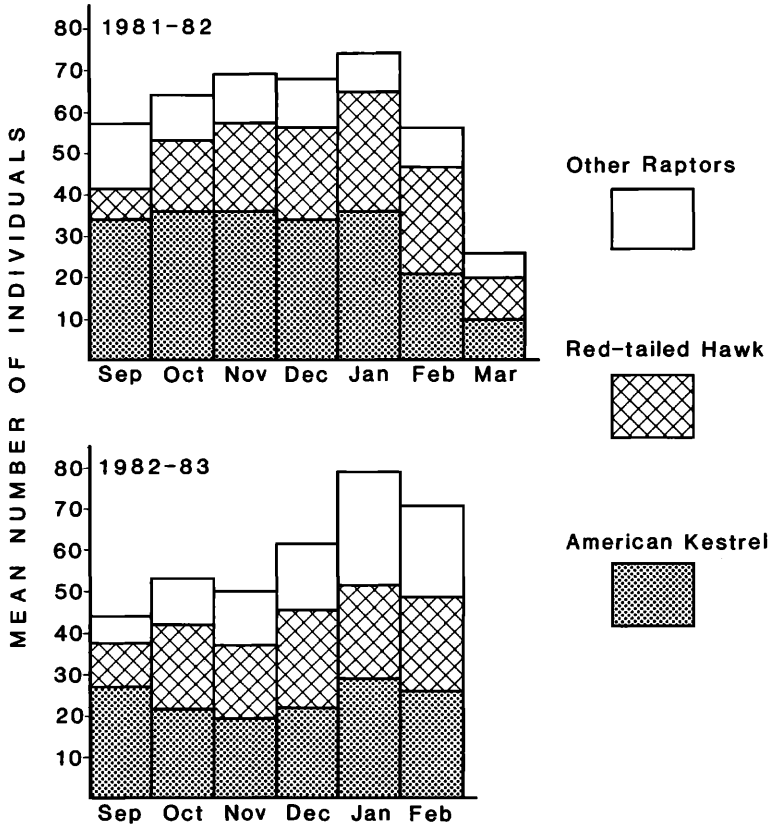

Figure 2. Mean monthly population of raptors in the San Jacinto Valley, Riverside Co., California.

DISCUSSION

Although comparative data for other areas in southern California are lacking, the mean numbers of raptors observed during two years of study, 1.5/km and 1.4/km, indicate that the San Jacinto Valley and similar surrounding areas are of major importance to wintering birds of prey.

Most areas outside southern California studied in a similar fashion (Table 2) are characterized by much lower raptor densities. This indication is especially true for Red-tailed Hawks and American Kestrels. Our study indicates that raptor densities in the San Jacinto Valley are from 5 to 17 times higher than those reported for other areas. However, the areas listed in Table 2 differ in species composition, with Rough-legged Hawks, Golden Eagles (*Aquila chrysaetos*) and Prairie Falcons being among the most common species. In northern California, density estimates for Red-tailed Hawks and American Kestrels (Wilkinson and Debban 1980) were similar to those in this study indicating that these two areas are probably similar in overall raptor densities.

The future existence of areas important to wintering raptors in Riverside County is dubious. Since 1950, the human population of the county has more than quadrupled, and almost all development has occurred in the rich agricultural lowlands west of San Jacinto Valley. Currently, development is expanding into the physiognomically similar Moreno Valley to the north of San Jacinto Valley and into Perris Valley to the southwest. Although it is difficult to assess the impact of the eventual loss of habitat in these interior

Table 2. Partial results of seven wintering raptor census studies.

	Individuals/km driven				
Study area	Rough-legged Hawk	Red-tailed Hawk	American Kestrel	All species	Number of species
California (San Jacinto)	0.01	0.5	0.7	1.5	14
California[a] (Sacramento V.)	0.061	0.54	0.54	---	13
Colorado[b] (El Paso Co.)	0.022	0.011	0.018	0.11	8
Utah[c] (Cache Valley)	0.055	0.053	0.068	0.3	14
Utah[d] (Provo)	0.014	0.002	0.003	0.1	12
Idaho[e]	0.048	---	0.019	0.085	---
Michigan[f]	0.059	0.085	0.026	0.32	6

[a]Wilkinson and Debban 1980
[b]Bauer 1982
[c]Gessaman 1982
[d]Woffinden and Murphy 1977
[e]Craig 1978
[f]Craighead and Craighead 1956

valleys upon wintering raptors, it seems likely that their utilization of other probably suboptimal areas will reduce survivorship. We encourage the initiation of similar raptor studies in other portions of California which may identify important wintering areas and point out population trends.

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Prairie Falcon and Brittlebush *Sketch by Narca Moore-Craig*