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RAPTOR SURVEYS IN SOUTHCENTRAL NEVADA, 1991–95

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ABSTRACT.—We counted raptors using roadside surveys along two routes in southcentral Nevada from 1991–95. During 226 surveys, we observed a total of 232 raptors representing 12 species. Red-tailed Hawks (*Buteo jamaicensis*) were most commonly seen, followed by Golden Eagles (*Aquila chrysaetos*), Turkey Vultures (*Cathartes aura*), Northern Harriers (*Circus cyaneus*) and American Kestrels (*Falco sparverius*). The number of raptors observed did not differ between the two routes and was low compared to other surveys done in the western United States. However, few comparable data from the northern Mojave and southern Great Basin deserts are available.

KEY WORDS: *raptor abundance; roadside surveys; Nevada; Mojave Desert; Great Basin Desert.*

Estudio de aves rapaces en el centro-sur de Nevada, 1991–95

RESUMEN.—Contabilizamos las aves rapaces mediante conteos de carretera en dos vías de centro-sur de Nevada desde 1991–1995. Durante los 226 conteos, observamos un total de 232 aves rapaces representadoas por 12 especies. *Buteo jamaicensis* fue el más común, seguido por *Aquila chrysaetus, Cathartes aura, Falco sparverius y Circus cyaneus.* El número de aves rapaces observado no difirió entre las dos rutas y fue bajo comparado con otros estudios hechos en el oeste de los Estados Unidos. Sin embargo, existen pocos datos comparables del norte de Mojave y del desierto de Great Basin.

[Traducción de César Márquez]

Data on the seasonal abundance of raptors in desert habitats are lacking. The most comprehensive data on raptor abundance comes from U.S. Fish and Wildlife Service (USFWS) Breeding Bird Surveys (BBS) which are conducted annually in May or June. Data from these surveys are summarized by state and by physiographic region. For Nevada, data are sufficient for calculating population trends for only three raptor species, the Golden Eagle (*Aquila chrysaetos*), Red-tailed Hawks (*Buteo jamaicensis*) and American Kestrels (*Falco sparverius*) (Geissler and Sauer 1990, Sauer et al. 1997). Over the 30-yr period from 1966–96 in Nevada, populations of Golden Eagles and Red-tailed Hawks have increased in abundance, while American Kestrels have not changed (Sauer et al. 1997). For the Mojave and Great Basin desert physiographic regions, data from the BBS are sufficient only for Red-tailed Hawks, whose numbers have remained stable in both regions.

As part of a program to evaluate the impacts of U.S. Department of Energy activities at Yucca Mountain, Nevada, raptor surveys were conducted from 1991–95. In this paper, we summarize six years of results from these surveys to provide needed baseline information on seasonal abundance of raptors in desert habitats in southcentral Nevada.

METHODS

Our study area was located in Nye County, Nevada, an area of limited and erratic precipitation averaging <14 cm per year, low relative humidity and large daily temperature fluctuations. Two major floristic zones occur in the study area, a Mojave Desert zone at lower elevations, and a transition zone between the Mojave and Great Basin deserts at higher elevations (Beatley 1975). Dominant shrubs in the area include creosotebush (*Larrea tridentata*), white burrobush (*Ambrosia dumosa*), Anderson's wolfberry (*Lycium andersonii*), blackbrush (*Coleogyne ramosissima*) and Nevada jointfir (*Ephedra nevadensis*).

We conducted raptor surveys at Yucca and Bare moun-

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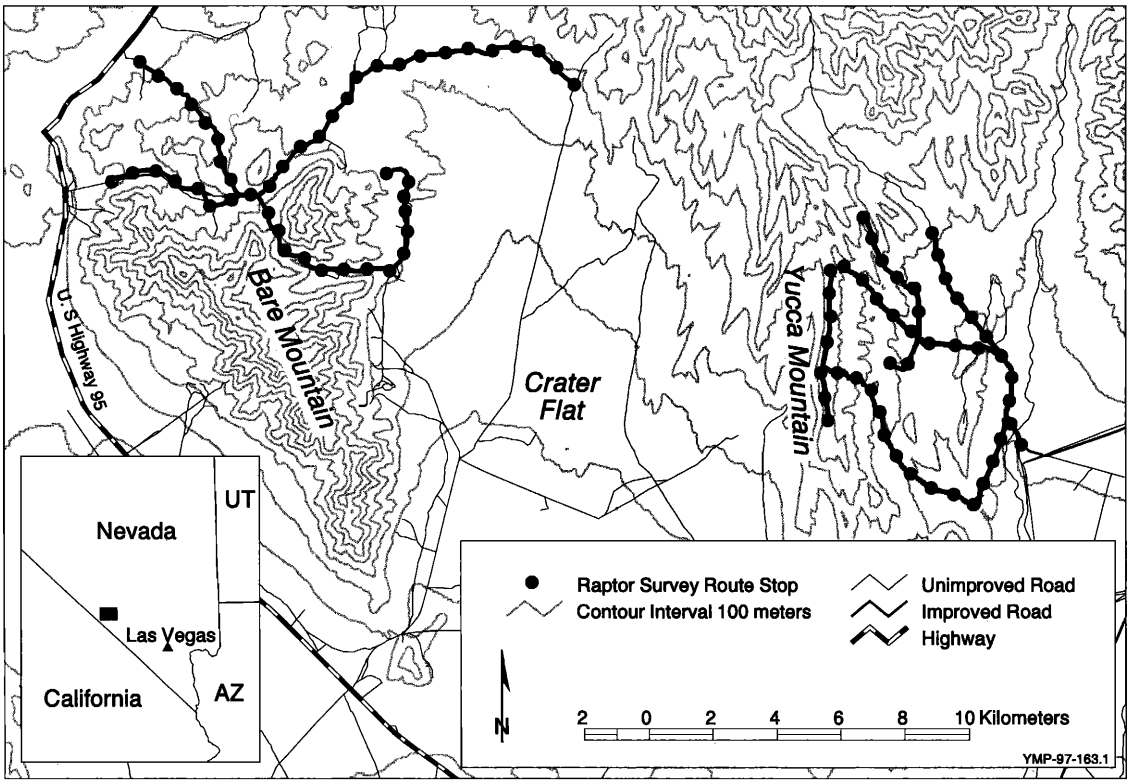

Figure 1. Locations of routes and stops for roadside-count raptor surveys conducted in southcentral Nevada, 1991–95.

tains along routes that were each 37.6 km long and included 47 stops spaced 0.8 km apart (Fig. 1). There was similar vegetation, elevation (994–1789 m), topography, climate and lengths of road along both routes. Distance between the routes ranged from 10.5–32 km.

We used roadside-count surveys (Fuller and Mosher 1987) to count raptors because large areas can be surveyed using this technique. Surveys were conducted every other month on five randomly-selected days from August 1991 through August 1994, and on three randomly-selected days from October 1994 through August 1995. The surveys at Yucca Mountain and Bare Mountain were conducted simultaneously, beginning 4 hr after sunrise and ending 4–5 hr later. At each stop, the observer exited the vehicle for 1 min and counted all raptors seen. Binoculars were used only to positively identify birds once sighted. Double counting could not be discounted in this study, but we assumed it was minimal because of the low numbers of raptors observed and the open habitat where the surveys were conducted.

Differences in methodology among survey types precludes quantitative comparisons to most other studies. For example, results from our surveys and the BBS are recorded as the number of observations per stop, whereas other roadside surveys have recorded observations without stopping and results have been reported as the number of observations per km traveled (e.g., Woffinden and Murphy 1977, Knight and Kawashima 1993). In addition, BBS surveys include 3-min stops and only one survey per year is conducted. Depending on the comparison, we report our results as the number of raptors observed per survey stop, the number observed per km of survey route, or both.

Results and Discussion

We conducted 226 surveys, equally divided between the two routes, and observed 232 raptors representing 12 species for a mean of 1.02 raptors per survey or 0.022 raptors per survey stop. Differences between the two survey routes were minimal; we counted 121 raptors (11 species) at Yucca Mountain and 111 (10 species) at Bare Mountain. Red-tailed Hawks, Turkey Vultures (*Cathartes aura*) and American Kestrels were seen more frequently at Yucca Mountain, and Golden Eagles and Northern Harriers (*Circus cyaneus*) were seen more frequently at Bare Mountain (Table 1). Combining routes, Red-tailed Hawks (N = 103 observations)

Table 1. Numbers of raptors observed during three seasons (winter = December–February, spring/summer = April–June and summer/fall = August–October) at Yucca and Bare Mountains during 1991–95.

	Yucca Mountain				Bare Mountain			
Species	Winter	Spring/ Summer	Summer/ Fall	Total	Winter	Spring/ Summer	Summer/ Fall	Total
Red-tailed Hawk	13	35	10	58	23	11	11	45
Golden Eagle	4	3	1	8	6	5	6	17
Turkey Vulture	0	4	11	15	0	2	7	9
American Kestrel	4	7	3	14	0	3	0	3
Northern Harrier	3	1	0	4	6	5	1	12

were seen most frequently, accounting for 44% of all observations. Golden Eagles ($N = 25$), Turkey Vultures ($N = 24$), American Kestrels ($N = 17$) and Northern Harriers ($N = 16$) were the next most frequently observed raptors during our surveys. We also observed Prairie Falcons (*Falco mexicanus*, $N = 6$), Cooper's Hawks (*Accipiter cooperii*, $N = 4$), Swainson's Hawks (*Buteo swainsoni*, $N = 4$), Sharp-shinned Hawks (*Accipiter striatus*, $N = 3$), Ospreys (*Pandion haliaetus*, $N = 2$), a Ferruginous Hawk (*Buteo regalis*, $N = 1$) and a Rough-legged Hawk (*Buteo lagopus*, $N = 1$). We also saw 26 raptors that we were unable to identify positively, generally because they were observed at great distances.

Combining routes, Red-tailed Hawks were observed at a rate of 0.01 hawks per stop (0.01 per km of survey route). Numbers of Red-tailed Hawks observed were within the range of values reported (0.008–0.145 per km) by Knight and Kawashima (1993) for surveys in the Mojave Desert and they were lower than values obtained along BBS routes in Nevada (0.03 hawks per stop or 0.04 hawks per km; Sauer et al. 1997) and surveys conducted in southwestern New Mexico (0.14 hawks per km; Eakle et al. 1996).

Red-tailed Hawks are a common resident in Nevada and have been observed during all months of the year (Alcorn 1988). When grouped by season, Red-tailed Hawks were observed more frequently at Bare Mountain (23 of 45 observations) during winter (December and February surveys combined) (Table 1). At Yucca Mountain, they were observed more frequently (35 of 58 observations) during the spring and early summer (April and June surveys). These seasonal differences between the two areas may have been due to subtle differences in habitat or variability associated with migration routes.

Golden Eagles were seen during all seasons (Table 1), and were observed less frequently on the Yucca and Bare mountain routes combined (0.002 eagles per stop or 0.003 eagles per km) when compared to the BBS survey results in Nevada (0.01 eagle per stop; Sauer et al. 1997) or to the eastern Great Basin in Utah (0.01 eagles per km; Woffinden and Murphy 1977). These differences may have been related to the fact that some of the BBS routes were in the northern part of the state, where Alcorn (1988) has reported that most Golden Eagles nest in the state. Although Golden Eagles have been observed on the Nevada Test Site (just east of our survey routes) during all seasons, there are no nesting records for that area (Hayward et al. 1963).

Turkey Vultures were observed only during the spring/summer and summer/fall surveys, and were never observed during winter surveys (Table 1). This seasonal pattern is consistent with observations from the Nevada Test Site which ranged from April through September (Hayward et al. 1963). Few sightings of Turkey Vultures have been recorded in Nevada during winter (Alcorn 1988).

American Kestrels also were observed during all seasons. They nest on the northern portions of the Nevada Test Site, approximately 45 km northeast of where our surveys were conducted (Hayward et al. 1963). American Kestrels were observed less frequently on the Yucca and Bare mountain routes combined (0.002 kestrels per stop, 0.002 kestrels per km) compared to BBS routes in Nevada (0.003 kestrels per stop; Sauer et al. 1997) or to a survey in southwestern New Mexico (0.141 kestrels per km; Eakle et al. 1996).

Although Northern Harriers were observed during all seasons, most sightings occurred during winter and spring/summer at Bare Mountain (Table 1). Most sightings on the Nevada Test Site were recorded during October–March, and no sightings

were recorded there in June (Hayward et al. 1963). Northern Harriers were observed less frequently in our study (0.002 harriers per km) compared to a study in the Great Basin of eastern Utah (0.01 harriers per km; Woffinden and Murphy 1977).

Based on the results of our surveys over six years, we concluded that raptor abundance was low in this portion of Nevada compared to other areas in the western United States (e.g., Woffinden and Murphy 1977, McCrary et al. 1985, Eakle et al. 1996, Sauer et al. 1997). Because of human population growth, urbanization, agricultural development and increasing recreation opportunities, human impacts on the desert regions of the United States are increasing. The only routine raptor survey efforts in these regions are the Breeding Bird Surveys which are conducted only during the spring. The data presented here provide useful baseline information for relatively undisturbed areas of southcentral Nevada. Similar long-term surveys are needed to evaluate the impacts of increasing human activities on raptor abundance in other desert regions.

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