

## COMPOSITION OF RAPTORS ON ESPÍRITU SANTO ISLAND, GULF OF CALIFORNIA, MEXICO

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**ABSTRACT:** We surveyed raptors on Espíritu Santo Island, Gulf of California, bimonthly from November 1998 to October 1999. Visual surveys averaged 64 hours per visit. We collected two Elf Owls by mist net. Of the ten species of raptors recorded, five are resident (Turkey Vulture, Osprey, Red-tailed Hawk, Great Horned Owl, and Elf Owl), two are common visitors (Peregrine Falcon and American Kestrel), and three are rare visitors (Northern Harrier, Harris' Hawk, and Golden Eagle). Four species were previously unrecorded on the island (Northern Harrier, Harris' Hawk, Golden Eagle, and Elf Owl). Of the ten species, three are protected by the Mexican government.

The avifauna of the Baja California peninsula and the Gulf of California has attracted attention of ornithologists since the early 20th century. A number of investigators have documented the peninsular (e.g., Brewster 1902, Grinnell 1928, Wilbur 1987, Erickson and Howell 2001) and insular avifauna (Cody 1983); however, these expeditions have been limited in sampling time and intensity.

The importance of the Gulf of California to aquatic birds is well known (e.g., Anderson 1983, Carmona et al. 1994, Massey and Palacios 1994), but very few studies have focused on land birds of the islands of the southern gulf. Two studies (Emlen 1979, Cody 1983) found that among the islands in the Gulf of California Espíritu Santo supports the second greatest number of insular landbird species, after San José Island. Detailed information on the spatial and temporal composition of land birds on islands of the Gulf of California is needed to identify potential conservation issues.

Raptors play important roles in food webs of insular ecosystems and can be excellent indicators of habitat quality (Bildstein et al. 1998). It was for this reason that we chose to evaluate and monitor this functional group on Espíritu Santo Island.

### STUDY AREA

Espíritu Santo archipelago is formed by two large islands (Partida and Espíritu Santo) and four small islands (Los Islotes, La Ballena, El Gallo and La Gallina) (Figure 1). Our study site, Espíritu Santo Island, is located at the mouth of La Paz Bay, Baja California Sur, the largest protected water body

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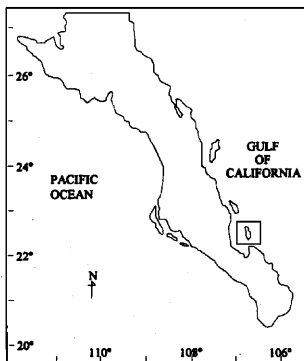


Figure 1. Location of Espiritu Santo Island in the Gulf of California.

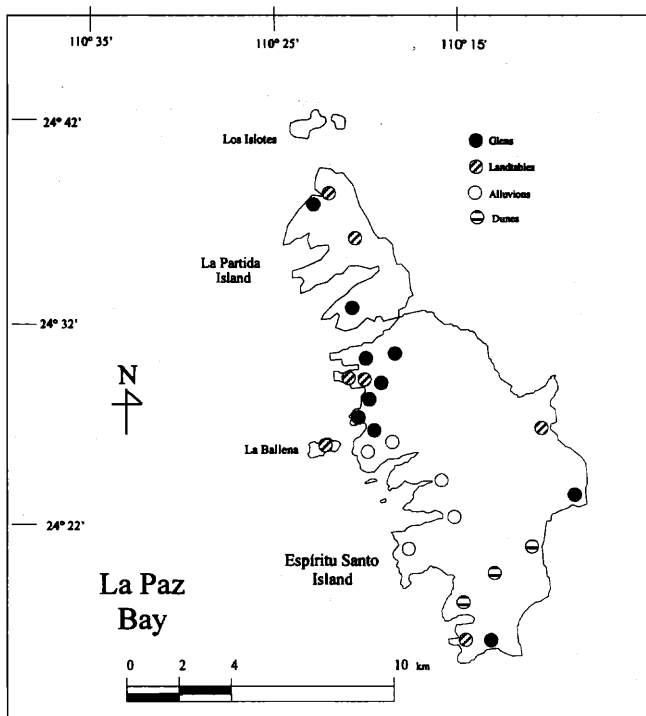


Figure 2. Location and habitat of survey sites on Espiritu Santo Island.

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on the west side of the Gulf of California. The climate of La Paz Bay region is semi-arid, with an annual average rainfall of 200 mm, evaporation of 210 mm, and temperature of 24° C (García and Mosiño 1969). The rainy season extends from July to September and is directly related to the hurricane period (García and Mosiño 1969). Winds are predominantly from the northwest from November to March, from the southeast from April to October (García and Mosiño 1969).

Espíritu Santo Island is about 19 km long and 5.5 km wide. On its protected western section, where several ephemeral creeks meet, there are sandy beaches. The exposed eastern coast is characterized by high cliffs. Emlen (1979) recognized four environmental units on the island: (1) dunes, located on flats at low elevations; (2) glens, which are small, densely vegetated ephemeral creeks with bottoms of gravel and rocks transported by runoff; (3) landtables, which are flat uplands of hard substrate, relatively poor in vegetation; and (4) alluvions, which are sedimentary deposits formed in the mouths of glens.

### METHODS

We systematically sampled six to ten sites on the island bimonthly between November 1998 and October 1999, covering various habitats (Figure 2). A total of 25 sites were sampled during the study period. Two observer teams of three persons each surveyed 0600 to 1000 and from 1600 to 2000, completing an average of 64 hours of observation per four-day sampling period. The teams used binoculars (12 × 50) and telescopes (20–50 × 50). In addition, we used two mist nets to collect nocturnal species during two nights per visit.

### SPECIES ACCOUNTS

#### Turkey Vulture (*Cathartes aura*)

A common resident of lowlands along the peninsula and on adjacent islands. In summer, this species congregates in the northern mountains. There are several nesting records from the cape district, particularly near the town of Miraflores (Wilbur 1987). On Espíritu Santo Island, this scavenger was the only species found to be abundant during the study period, ranging from 28 individuals detected in November to 45 in August (Table 1). Several juveniles (one photographed) were seen in October and November, and local residents reported Turkey Vulture nests on the high parts of the island. The presence of this species was previously reported for the island by Banks (1963a), Cody (1983), and Rodríguez-Estrella et al. (1995).

#### Osprey (*Pandion haliaetus*)

A common breeding resident of the peninsula and adjacent islands (Wilbur 1987, Howell and Webb 1995), including Espíritu Santo (Banks 1963a). We saw this species commonly on the island (one to three individuals per visit), except in June (Table 1). A pair was observed in aerial courtship at the north

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**Table 1** Counts of Raptors on Espíritu Santo Island, Bahía de La Paz, November 1998–October 1999

Species	Nov	Jan	Mar	Jun	Aug	Oct
Turkey Vulture	28	35	30	41	45	32
Osprey	3	3	1		2	3
Northern Harrier						1
Red-tailed Hawk	7 <sup>a</sup>	10 <sup>b</sup>	4	2	3	4
Harris' Hawk					1	
Golden Eagle	1 <sup>c</sup>					
Peregrine Falcon	4	1	3			
American Kestrel	2	5	2			5
Great Horned Owl		2			1	
Elf Owl					2	
Number of species	6	6	5	2	6	5

<sup>a</sup>Four adults, three juveniles.

<sup>b</sup>Eight adults, two juveniles.

<sup>c</sup>Same individual observed two consecutive days.

end of the island (11 November 1998), and an active nest was detected in March. Carmona et al. (1994) observed three nests of this species on the island in 1984, 22 in 1986. From that time, the number of nests has decreased, to six in 1988 and one in 1999 (Carmona et al. 1994; this study). Human disturbance and fluctuations in food availability may have caused reduction of reproductive success of this species.

### Northern Harrier (*Circus cyaneus*)

The Northern Harrier is an uncommon resident in northwestern Baja California, with winter records in the southern part of the peninsula (Wilbur 1987, Howell and Webb 1995). Recently, Castillo and Carmona (2001) recorded the Northern Harrier on the east coast of the Baja California peninsula. On Espíritu Santo Island we noted (and photographed) this hawk only once, in flight on an alluvion in front of Islote El Gallo on 19 October 1999 (Table 1). Our record constitutes the first report of this species on any island of the lower Gulf of California.

### Red-tailed Hawk (*Buteo jamaicensis*)

The Red-tailed Hawk is a common resident throughout the peninsula and its adjacent islands (A.O.U. 1983, Wilbur 1987, Howell and Webb 1995), recorded previously on Espíritu Santo Island by Cody (1983). Local populations are increased in winter by the arrival of migrants (Wilbur 1987). We found the Red-tailed Hawk to be a common permanent resident of the island, two to ten individuals detected per visit (Table 1). Although we did not find direct evidence of local nesting, a juvenile on 14 November 1998 and adults throughout the year suggest reproduction in the study area (Table 1).

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This hawk was frequently seen hunting during our field surveys. Other occupied islands in the Gulf of California include Carmen (Gaviño et al. 1984) and Cerralvo (Banks 1963b).

### Harris' Hawk (*Parabuteo unicinctus*)

Considered as specially protected by the Mexican government (N.O.M. 2002). This hawk inhabits savannas and semiopen areas, especially in or near riparian vegetation. It is a common resident of the central and southern peninsula (Wilbur 1987, Howell and Webb 1995). An adult was hunting an adult Purple Martin (*Progne subis*) in flight on the eastern part of Ballena Island on 21 August 1999 (Table 1). The hawk attacked the martin three times, without success. The only previous record of Harris' Hawk for islands of the Gulf of California was from San José Island, on 23 May 1928 (Wilbur 1987).

### Golden Eagle (*Aquila chrysaetos*)

The Mexican government considers this eagle threatened (N.O.M. 2002). On the peninsula, it is a sparse resident north of latitude 30° 30' N (Wilbur 1987, A.O.U. 1983), with winter records south through Baja California Sur (Howell and Webb 1995). During our study, a juvenile was seen twice on 11 and 13 November 1998 (Table 1). On both occasions, a pair of Peregrine Falcons assaulted the eagle. The last record of the Golden Eagle for islands of the Gulf of California, and the only known record south of 26° N (Wilbur 1987), was of a juvenile observed on 26 October 1961 on Cerralvo Island (Banks, 1963b).

### Peregrine Falcon (*Falco peregrinus*).

This falcon, considered as specially protected by the Mexican government (N.O.M. 2002), is an uncommon resident throughout the peninsula and on islands of the Gulf of California (Howell and Webb 1995). We found it to be common winter visitor to Espíritu Santo Island, with one to four individuals noted per day from November to March (Table 1). We observed it regularly near the coast, hunting storm-petrels (*Oceanodroma* spp.) and Bonaparte's Gulls (*Larus philadelphia*). Banks (1969) reported a breeding pair at Espíritu Santo Island in 1962.

### American Kestrel (*Falco sparverius*)

This falcon is a fairly common to uncommon resident on the peninsula and adjacent islands (Howell and Webb 1995); a concentration of 182 along 217 km of highway between La Paz and Cabo San Lucas 12 December 1983 (S. N. G. Howell pers. comm.) suggests a winter influx to the cape district (cf. Grinnell 1928). We found the American Kestrel to be a common visitor to Espíritu Santo Island (Table 1), with one to five individuals per day during four of the six survey periods. Previous insular records for the American Kestrel in the Gulf of California are from Cerralvo Island (Banks 1963b) as well as Espíritu Santo (Cody 1983). This species was apparently absent from Espíritu Santo Island from June to August, when prey abundance was low (Carmona 2000).

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### Great Horned Owl (*Bubo virginianus*)

The Great Horned Owl is a common resident of the peninsula, using a wide variety of habitats (Grinnell 1928, Wilbur 1987, Howell and Webb 1995). On 27 January 1999, we observed one resting in a hollow that is apparently a regular roost; another individual was found on 3 August 1999 (Table 1), perching on a rock in a glen. Cody (1983) previously reported this species from Espíritu Santo Island. Because this nocturnal species may be overlooked, we consider it a resident on the island.

### Elf Owl (*Micrathene whitneyi*)

On the peninsula a population of this owl is resident in the cape district (Grinnell 1928, Wilbur 1987, Howell and Webb 1995). In the Gulf of California, the Elf Owl has been found only on Tiburón Island in the northern gulf (Cody 1983). We captured two Elf Owls on 5 August 1999 within dune vegetation in the southern part of the island (Table 1). These are the first specimens for any island of the Gulf of California. Specimens are deposited in the bird collections of the UABC (catalog number 1033) and UABCS. A previous lack of nocturnal sampling may account for the absence of records of this species and possibly others at Espíritu Santo Island.

## DISCUSSION

Four species (Northern Harrier, Harris' Hawk, Golden Eagle, and Elf Owl) reported here were previously unreported on Espíritu Santo Island. The number of raptor species now recorded from Espíritu Santo Island exceeds the totals known from nearby islands such as San José (with a larger area; Cody 1983) and Cerralvo (Banks 1963b), which have six and eight species, respectively. Of the islands of the Gulf of California, only the much larger Tiburón Island has been found to support an equal richness of raptor species (Cody 1983). Since no other island in the Gulf of California has been sampled for raptors throughout the year, however, such a comparison should be interpreted with caution.

The number of species noted on the island per survey was relatively constant (five or six species) except in June. The highest species numbers (in August and November) coincided with the arrival of migrants and the fledgling of local young, while lowest numbers (June) are probably associated with a shortage of prey during the drought season (Carmona 2000). It is probable that most individual raptors at Espíritu Santo Island move occasionally to the peninsular mainland in search of prey and other resources (Carmona 2000).

A current problem on the Espíritu Santo Island is the presence of exotic fauna, especially cats and goats. Cats and raptors are in direct competition for prey, while goats cause modifications in the vegetation that may decrease the availability of prey for the raptors.

Given the high conservation priority that the Mexican government (N.O.M., 2002) places on raptors, continued monitoring of this group is needed in order to determine the population dynamics of the species and their relationships with anthropogenic effects. Such effects include fishing, ecotourism, and exotic animals.

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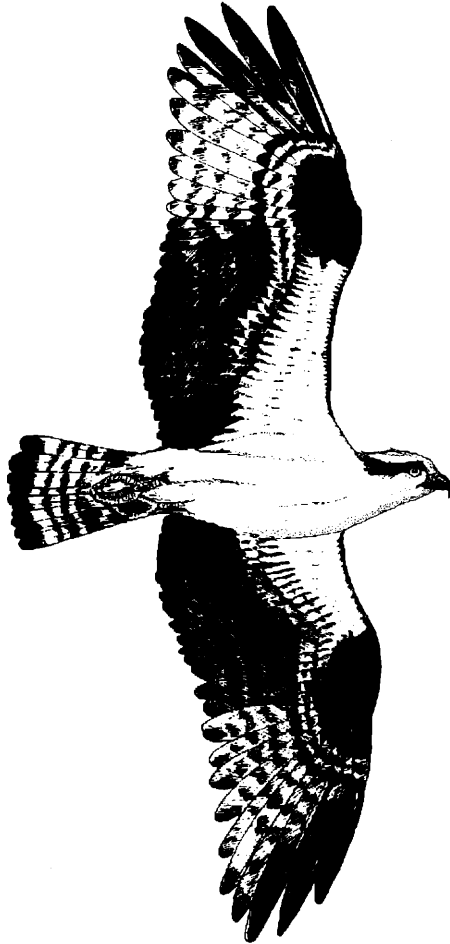
### LITERATURE CITED

- Anderson, D. W. 1983. The seabirds, in *Island Biogeography in the Sea of Cortéz* (T. J. Case and M. L. Cody, eds.), pp. 246–264. Univ. of Calif. Press, Berkeley.
- Banks, R.C. 1963a. Birds of the Belvedere expedition to the Gulf of California. *Trans. San Diego Soc. Nat. Hist.* 13:49–60.
- Banks, R. C. 1963b. Birds of Cerralvo Island, Baja California. *Condor* 65:300–312.
- Banks, R. C. 1969. The Peregrine Falcon in Baja California and the Gulf of California, in *Peregrine Falcon Populations: Their Biology and Decline* (J. J. Hickey, ed.), pp. 81–91. Univ. of Wisc. Press, Madison.
- Bildstein, K. L., Schelsky, W., Zalles, J., and Ellis, S. 1998. Conservation status of tropical raptors. *J. Raptor Res.* 32:3–18.
- Brewster, W. 1902. Birds of the cape region of Lower California. *Bull. Mus. Comp. Zool.* 41:1–241.
- Carmona, R. 2000. Riqueza específica de aves terrestres en Isla Espíritu Santo, Baja California Sur, México. *Insulario* 11–12:2–12.
- Carmona, R., Guzmán, J., Ramírez, S., and Fernández, G. 1994. Breeding waterbirds of La Paz Bay, Baja California Sur, México. *W. Birds* 25:151–157.
- Castillo-Guerrero, J. A., and Carmona, R. In press. Distribución de aves acuáticas y rapaces en un embalse dulceacuícola artificial de Baja California Sur, México. *Biol. Trop.* 49:1131–1142.
- Cody, M. 1983. The land birds, in *Island Biogeography in the Sea of Cortez* (T. J. Case and M. L. Cody, eds.), pp. 210–245. Univ. of Calif. Press., Berkeley.
- Emlen, J. T. 1979. Land bird densities on Baja California islands. *Auk* 96:152–167.
- Erickson, R. A., and Howell, S. N. G., eds. 2001. *Birds of the Baja California Peninsula: Status, distribution, and taxonomy.* Am. Birding Assoc. Monogr. Field Ornithol. 3.
- García, E., and Mociño, P. A. 1969. Los climas de Baja California. *Inst. Geofís. Univ. Nacl. Autónoma Mex. Memorias, 1966–1967*, pp. 29–56.
- Gaviño, G., Aguilar, F., and García, L. C. 1984. Abundancia relativa, reproducción y actividad diurna de aves terrestres en la Isla Carmen, Baja California Sur, México. *An. Inst. Biol., Univ. Nacl. Autónoma Méx.* 55, Ser. Zool. 2:263–284.
- Grinnell, J. 1928. A distributional summation of the ornithology of Lower California. *Univ. Calif. Publ. Zool.* 32:1–300.
- Howell, S. N. G., and Webb, S. 1995. *A Guide to the Birds of Mexico and Northern Central America.* Oxford Univ. Press, Oxford, England.
- Massey, B. W., and Palacios, E. 1994. Avifauna of the wetlands of Baja California, México: Current status. *Studies Avian Biol.* 15:45–57.

## RAPTORS ON ESPÍRITU SANTO ISLAND

- N.O.M. [Norma Oficial Mexicana]. 2002. Norma Oficial Mexicana NOM-059-ECOL-2001, Protección ambiental—especies nativas de México de flora y fauna silvestres— categorías de riesgo y especificaciones para su inclusión, exclusión o cambio—lista de especies en riesgo. Diario Oficial de la Federación, México, D. F., 6 mayo 2002.
- Rodríguez-Estrella, R., Donázar, J. A., and Hiraldo, F. 1995. Yellow-footed Gulls attack Turkey Vultures on Isla Espíritu Santo, Baja California, Mexico. *Colonial Waterbirds* 18:100–101.
- Wilbur, S. R. 1987. *Birds of Baja California*. Univ. of Calif. Press, Berkeley.

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Osprey

*Sketch by George C. West*