

in 1905 (A.O.U. Check-list 1957), but this was apparently the last record for the island (Bourne 1957).

The regional increase in sightings and especially the frequent local occurrence of the birds strongly suggest that our discovery does not represent an isolated phenomenon, but rather may be the first reported instance of a significant breeding range extension for the Manx Shearwater.

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Roadrunner predation on ground squirrels in California.—The Roadrunner (*Geococcyx californianus*) is an omnivorous bird that includes a variety of plant and animal materials in its diet (Bryant 1916, Sutton 1940). Nearly 10% of its diet is of plant origin, and about 90% is animal. Mammals account for approximately 3% of the total food intake (Bryant 1916).

Mammals known to be preyed upon by Roadrunners include cotton rats (*Sigmodon* sp.), woodrats (*Neotoma* sp.), harvest mice (*Reithrodontomys megalotis*),

white-footed mice (*Peromyscus* sp.), juvenile cottontails (*Sylvilagus audubonii*), voles (*Microtus* sp.), and gophers (Anthony 1896, Lantz 1907, Bryant 1916, Sutton 1940). Bats have also been reported in its diet (Herreid 1960, Wilkes and Laughlin 1961), and Johnson et al. (1948) reported a Roadrunner that had a young white-tailed antelope squirrel (*Ammospermophilus leucurus*) in its beak when it was shot. This paper reports observations that may indicate a higher incidence of Roadrunner predation on spermophiles than previously recognized.

At 13:15 on 10 July 1971, 3 miles north of Salton View, Joshua Tree National Monument, Riverside County, I saw a Roadrunner 40 m west of my car walking slowly northward parallel to the roadway and carrying something in its beak. I stopped my car, the Roadrunner ran across the road, and I immediately set out in pursuit. After a short chase (100 m) the bird dropped the object, which was a young white-tailed antelope squirrel. The carcass was so fresh it was apparently killed only seconds before. No external wounds were evident, but dissection showed a large hematoma at the base of the skull that could have been caused by a blow from a Roadrunner's beak. A woodrat retrieved from a Roadrunner exhibited a similar injury (Anthony 1896). The obvious recency of death, the nature of the wound, and the fact that the Roadrunner was moving towards, not away from the road, indicate the squirrel was captured by the bird and not a road-kill. Also I saw no other vehicles traveling this road. Measurements taken in the field and compared with specimens in the Bird and Mammal Museum, California State University, Long Beach, showed the squirrel was not an adult (total length 180 mm, tail 51, hind foot 35, ear 09).

At 09:49 on 29 August 1973 some 22 miles southeast of Essex, San Bernardino County, I saw another Roadrunner carrying something in its beak. Closer examination with binoculars showed the object was a white-tailed antelope squirrel, and from its relatively small size probably a juvenile. The bird went off with its prey and I did not pursue it. As no other vehicles were in the vicinity, that the squirrel was a scavenged road-kill was highly unlikely. Other potential prey species noted in the same place included three western whiptails (*Cnemidophorus tigris*), two zebra-tailed lizards (*Callisaurus draconoides*), and a horned lizard (*Phrynosoma* sp.). The Roadrunner apparently had a selection of food sources to choose from when it caught the squirrel.

At 16:00 on 26 July 1973 near San Onofre, San Diego County, I watched a Roadrunner for several minutes as it stalked a small California ground squirrel (*Spermophilus beecheyi*). Holding its body parallel to the ground with its head and tail extended, it slowly approached to within 5 m of the squirrel and then ran rapidly towards it. The squirrel scampered into a nearby burrow and the bird did not pursue it further. Because of its relatively small size, the squirrel was probably a juvenile. Although a score or so other squirrels were in the immediate vicinity, the Roadrunner made no attempt to catch any.

As the distributions of the Roadrunner and many species of spermophiles are congruent over much of the southwestern United States, ground squirrels are possibly a more important factor in the diet of *G. californianus* than previously recognized, because both predator and prey are basically diurnal. Probably the Roadrunner captures mostly young, inexperienced squirrels, particularly as they begin to break parental ties.

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Mate fidelity and nesting site tenacity in the Killdeer.—Although the Killdeer (*Charadrius vociferus*) is a common breeding bird throughout much of temperate North America, little information is available about its breeding. Brief, general accounts of Killdeer nesting behavior have been published by Pickwell (1925), Hiatt and Flickenger (1929), Furniss (1933), and Davis (1943). Recently Phillips (1972) published detailed observations of sexual and agonistic behavior. As none of the above studies used banded birds, many aspects of Killdeer biology are still unknown.

For the past 4 years we studied Killdeer nesting on and next to the St. Paul campus of the University of Minnesota. The study area comprised 300 acres within which approximately 30 pairs of Killdeer nested (Mace 1971). We gathered new information about the life history of this species by studying birds marked with colored leg bands. This note presents a summary of our banding data as well as observations on mate fidelity and site tenacity, and compares these findings with other plovers of the genus *Charadrius*.

Banding data.—Our banding data for birds marked as adults are summarized in Table 1. In addition, 30 chicks were banded in 1970, 2 in 1971, and 16 in 1972. In 1971 only partial banding return data were collected. For 1972 and 1973, however, we have complete return information based on censuses of the entire study area and its environs. The data indicate that male Killdeer have a greater tendency to return to previous breeding sites than do females ($\chi^2 < 0.05$). None of the birds banded as chicks have bred on or near the study area. In 1971 two banded yearling birds returned to the study area. Both were defeated in aggressive encounters with older banded birds and were not seen again.

Mate fidelity.—The Killdeer, a monogamous species, shows a tendency to retain the same mate for more than one breeding season. One pair remated for two consecutive seasons and another for three. The presence of unmarked birds in the population made it impossible to tell in all cases if a mate change had taken place. Nine birds changed mates at least once during the 4 years. Three birds were mated to unmarked birds each year.

Site tenacity.—Killdeer tend to nest in approximately the same territory occupied