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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

TABLE 1
BANDING DATA ON ADULT KILLDEER 1970-1973¹

Year banded	Total banded		Returned 1972		Returned 1973	
	M	F	M	F	M	F
1970	11	10	7	3	4	1
1971	1	2	1	—	1	—
1972	4	3	—	—	1	—

¹ M = males, F = females.

in previous years. We define "return to the same territory" as nesting within 200 feet of a nest of previous years. One male occupied the same territory for 4 years. Four birds (three males and a female) occupied the same territory for 3 years and eight other birds (six males and two females) did likewise for 2 years. A return to the same territory did not necessarily involve retention of a previous mate. Five of the six males that held the same territory for 2 years changed mates and the one male that held the same territory for 4 years changed mates each year. We were unable to trap the mates of the remaining birds. It may be that in the Killdeer, as in the Piping Plover (*C. melodus*, Wilcox 1959) and the Mountain Plover (*Eupoda montana*, W. Gaul pers. comm.), males tend to return to the same territory whether or not they retain the same mate, whereas females are more apt to change territories with a change in mates. In the two instances in which a female was known to have changed mates she also changed territories.

Comparison with other Charadrius plovers.—The low return of banded chicks is comparable to results from banding studies of other plovers of the genus *Charadrius*. The percentage of chicks breeding in the region of hatching is 4.4% for the Ringed Plover (*C. hiaticula*, Laven 1940), 5.5% for the Snowy Plover (*C. alexandrinus*, Rittinghaus 1956), and 4.7% for the Piping Plover (Wilcox 1959).

Only occasional mate fidelity has been reported for the Ringed and Piping Plovers. In a 4-year study, Laven (1940) found only two pairs out of 54 banded adult Ringed Plovers that were mated for two breeding seasons. Wilcox (1959) banded 1173 adult Piping Plovers over a 20-year period. Of these, 37 pairs were mated for two seasons and two pairs for three. Mate fidelity is considerably more common in the Snowy Plover. Of 96 banded adults, 14 pairs were mated for at least two seasons and some pairs stayed together for up to 6 years (Rittinghaus 1956).

All of the above mentioned species show some tendency to nest near nest sites of the previous year. This tendency is the least pronounced in the Ringed Plover. In this species distances of 3 km between successive nests were common (Laven 1940). In the Piping Plover, males usually nest closer to nest sites of previous years than do females. Furthermore females were more apt to move longer distances with a change in mates than were males (Wilcox 1959).

Mortality estimates for some shorebird species have been computed using banding returns of both sexes combined (Boyd 1962). This is based on the assumption that there is an equal probability that males and females, if alive, will return to the censusing area. This review of the banding return information indicates that for some species of plovers there may be a higher probability that males will be nesting within the censusing area than will females. If death rates are equal for the two sexes, more accurate mortality information may be based on returns of males alone.

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Copulatory behavior of a pair of Yellow-billed Cuckoos.—On 19 July 1973 while driving some of the back roads just south of Bartlesville, Washington County, Oklahoma, I paused to observe a Yellow-billed Cuckoo (*Coccyzus americanus*) that flew across the road in front of me. The bird (later determined as a male) landed in a dead tree beside the road about 10 m from me. As I watched he moved across a thick branch and snapped off a small twig about 7 cm long with his bill. He then flew back across the road with the twig in his bill and landed directly on the back of another Yellow-billed Cuckoo (assumed to be a female) perched on a branch about 15 m up in a tree. He placed the twig crosswise in the female's bill while maintaining a firm hold himself, his head being oriented over her right shoulder. Coition lasted about 3 sec, during which time both birds maintained their holds on the twig. The male then flew off, with the twig, to another tree. The female remained perched in her original position. After a 20-sec interval the male returned with the twig and repeated the entire procedure. Following coition he flew off, leaving the twig in the female's bill. She held the twig for another 5 sec before dropping it, after which she fluffed her feathers and then flew off in the direction the male had taken.

The exact function of the twig in this unusual performance can only be speculated, but two possibilities come to mind. First the twig acted as an offering by the male to the female, in place of a food item such as that described in Bent (1940, U.S. Natl. Mus. Bull. No. 176: 68). Second the twig was used as a device that helped the male maintain his balance during copulation with a minimum of fluttering, which would be another interesting and, so far as I know, unique use of a tool by a bird.—D. PAUL HENDRICKS, 305 East Maplewood Avenue, Littleton, Colorado 80121. Accepted 20 Dec. 73.