

JOURNAL OF FIELD ORNITHOLOGY

Formerly BIRD-BANDING

A Journal of Ornithological Investigation

VOL. 51, No. 1

WINTER 1980

PAGES 1-100

SITE TENACITY IN A NEW RING-BILLED GULL COLONY

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INTRODUCTION

"Site tenacity" is a term that was defined by Austin (1949) with respect to Common Terns (*Sterna hirundo*) nesting on the coast of Massachusetts as "that tendency for each tern to return for its first breeding to the site where it was hatched, and once having established a breeding site, to return to the same place all following years." Subsequently, several investigators have studied one or more aspects of site tenacity in other larid species (e.g., Herring Gull, *Larus argentatus*, Tinbergen, 1961; Drost et al., 1961; Ludwig, 1963; Black-headed Gull, *L. ridibundus*, Beer, 1961; Glaucous-winged Gull, *L. glaucescens*, Vermeer, 1963; Laughing Gull, *L. atricilla*, Bongiorno, 1970; and Ring-billed Gull, *L. delawarensis*, Ludwig, 1974; Southern, 1977). In this paper we consider three aspects of site tenacity in a sample of banded Ring-billed Gulls nesting at the Eastern Headland, Toronto Outer Harbour in 1977 and 1978. These aspects are: (1) the tendency to return to the colony of previous breeding, (2) the tendency for site tenacity to increase with age, and (3) the tendency of individuals to nest at or close to the same nest location year after year.

STUDY AREA AND METHODS

The Eastern Headland is a man-made spit of clean fill and dredged spoil extending about 5 km from the Toronto waterfront into Lake Ontario. The Ring-billed Gull colony began in 1973 and expanded to over 23,000 nesting pairs in 1978. Distribution of nesting Ring-billed Gulls in 1978 is shown in Fig. 1. Blokpoel and Fetterolf (1978) gave further details on the study area.

In 1977, we trapped 139 banded nesting Ring-billed Gulls and read an additional 80 bands of nesting gulls with binoculars (Blokpoel and Haymes, 1979). Of this total of 219 banded birds, 200 had been banded as chicks before fledging and 3 after fledging sometime during their hatching year. Hence for those 203 birds we could determine their exact ages from the banding data (provided by the Bird Banding Laboratory). In addition, 13 birds had been banded as adults in 1973 and 1 bird had been banded as an adult in 1971. Although their ages were not known exactly, those 14 birds were all six or more years old in 1977. We could not determine the ages of the remaining two birds from the banding data.

In 1978, we obtained 347 band numbers of nesting gulls mostly by

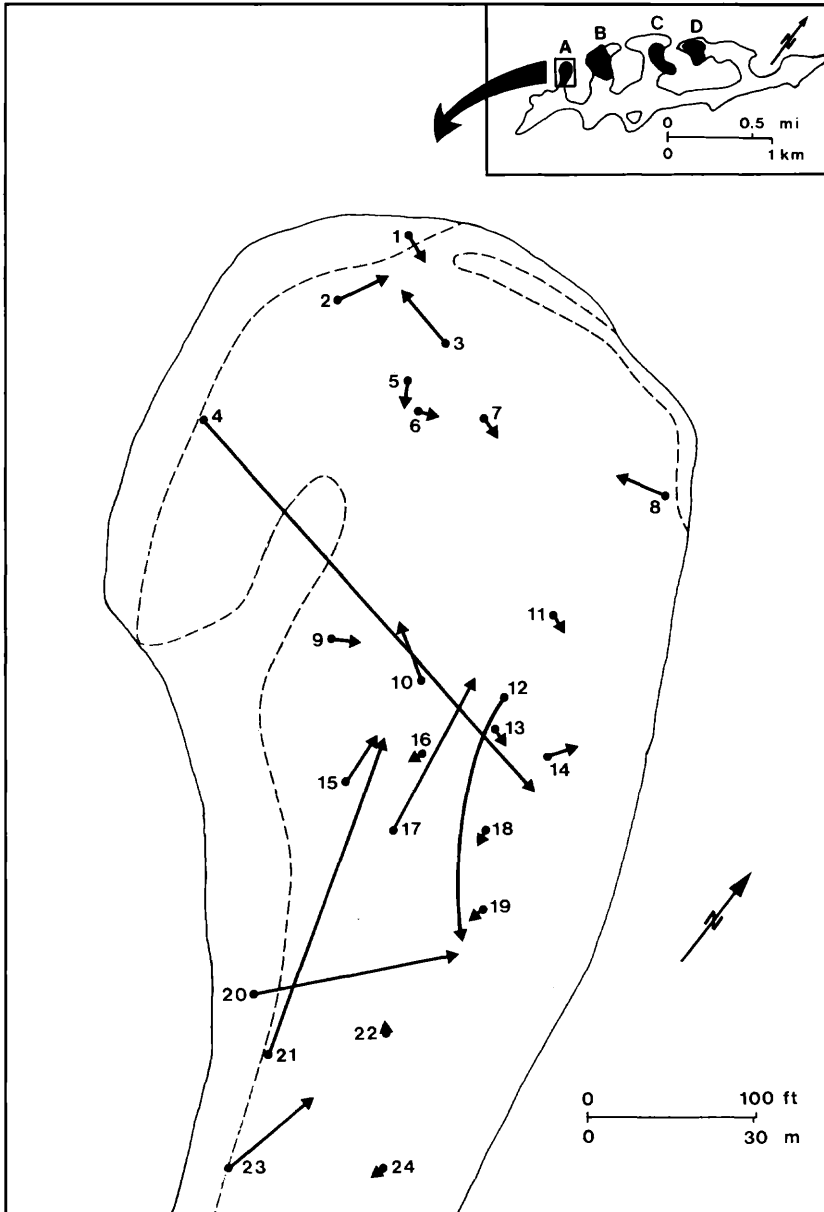


FIGURE 1. Main concentrations of nesting Ring-billed Gulls at the Eastern Headland in 1978 (inset) and nest locations of the 24 banded gulls that nested in sub-area A in both 1977 and 1978. Arrowheads indicate the 1978 locations. Solid and broken lines show approximate shoreline in 1977 and 1978, respectively.

reading the bands with binoculars (however, birds wearing worn bands were trapped). For all banded gulls we recorded the particular peninsula (or sub-area; see Fig. 1) where they were nesting. For sub-area A we mapped the nest locations in both 1977 and 1978. We estimate that our maximum error in measuring and plotting nests is 6 m.

RESULTS

Of the 219 banded birds encountered in 1977, 83 were re-encountered in 1978. Of the 217 banded birds of known age in 1977, 82 were re-encountered in 1978. Correcting for annual mortality and band loss (cf., Ludwig, 1967) we estimate that those 82 re-encounters represent an overall re-encountering rate of approximately 54% (Table 1).

Our re-encountering rates (Table 1) were related to age, because we had increasingly higher re-encountering success for older birds ($r_s = 1$, $P = 0.01$, $n = 5$).

Of the total of 83 re-encounters, 71 (or 85.5%) were found nesting in the same sub-areas in both 1977 and 1978. Of the 12 that moved between sub-areas, 4 probably did so because their 1977 nest sites were inundated in 1978. The minimum and maximum nest site displacement for our sample of banded Ring-billed Gulls that had moved to a different sub-area in 1978 was 275 and 1,295 m, respectively.

The available data on exact nest site displacement between 1977 and 1978 are shown in Fig. 1. Of 24 cases, 13 (or 54.2%) showed a change in nest site location of less than 6 m. In five of the remaining 11 cases where displacement was greater than 6 m, the birds probably moved because their 1977 sites were inundated in 1978 (i.e., nests 1, 4, 20, 21, and 23; see Fig. 1).

DISCUSSION

Regarding the tendency in Ring-billed Gulls to return to the colony of previous breeding, Ludwig (1974) found that of "the 154 banded adults recaptured when nesting a second or third time, 46 (30%) had moved to a new colony. Three birds nested in three different colonies in 3 successive years." Although his data clearly show that adult Ring-billed Gulls move to other colonies, his estimate of site tenacity did not take into account banding effort and re-encountering effort at the colonies involved. Hence, his and our estimates cannot be compared properly.

Southern (1977) found that 60.2% of color-marked Ring-billed Gulls at the stable Calcite Pier colony (northern Lake Huron) nested there during at least two consecutive years. Assuming no loss of color markers during the first year and 13% adult mortality, Southern's corrected re-encountering rate is 69%. That figure is an underestimate because his re-encountering operations were incomplete, as were ours. Possible reasons for the difference between our results and those of Southern (54% and 69%, respectively) are: (1) difference in re-encountering effort. Southern's re-encountering operations may have been more intensive

TABLE 1.

Estimates of re-encountering rates of banded Ring-billed Gulls nesting at the Eastern Headland in both 1977 and 1978.

Banded birds of known age encountered in 1977		Estimated number of bands lost between 1977 and 1978 ¹	Banded birds re-encountered in 1978			Re-encountering rate (b/a × 100%)
age (yr)	number		age (yr)	expected number (a)	actual number (b)	
2	15	2	3	13	6	46.1
3	63	11	4	52	26	50.0
4	80	27	5	53	29	54.7
5	34	16	6	18	10	55.6
≥6	25 ²	10	≥7	15	11	73.3
all ages	217	66		151	82	54.3

¹ Resulting from annual adult mortality (13%; Ludwig, 1967) and annual band loss (6% during fourth year, 24% during fifth year, and 38% thereafter; from Table 3 in Ludwig, 1967). Example: for 100 birds banded as chicks, the band loss during their sixth year (i.e., from age 5 to age 6) would be: $(100 \times 0.13) + (100 \times 0.38) - (100 \times 0.13 \times 0.38) = 46$ bands lost.

² This number includes the 14 birds that had been banded as adults. Hence, band loss was calculated separately for those 14 birds and the remaining 11 birds banded as chicks. The combined band loss is presented in the table.

than ours, (2) difference in age of the birds. Our data indicate that the tendency to return to the colony of previous nesting increases with age of the birds. We dealt with a sample of banded birds of relatively young age (banded as chicks and still retaining their bands), whereas Southern dealt with a sample of color-marked birds that were marked as adults, and that were, therefore, likely to have been older, on the average, than the birds in our sample; and (3) difference in habitat stability. McNicholl (1975) suggested that site tenacity in larids is stronger developed in highly stable habitats than in habitats of low stability. Plant succession and inundation have reduced available nesting space at the Eastern Headland, whereas the Calcite Pier colony is not affected by these factors.

Regarding the tendency for older birds to have a higher degree of site tenacity, as reported for Common Terns by Austin (1949), our data show a significant correlation between rate of return to colony of last nesting and age in the Ring-billed Gulls nesting at the Eastern Headland.

Regarding the tendency for individuals to nest from year to year at or close to the same nest location, Austin (1949) reported that this phenomenon occurs in Common Terns as long as the ecological conditions

remain favorable. Vermeer (1963) found that 47 (69%) out of 68 adult Glaucous-winged Gulls returned to within 5 m of the previous nest site. Our data show that this trait is well developed in Ring-billed Gulls.

SUMMARY

Band numbers of nesting Ring-billed Gulls were obtained and their nests located in four sub-areas at the Eastern Headland, Toronto Outer Harbour during 1977 and 1978. An estimated 54% of the birds that nested there in 1977 returned to nest in 1978. The rate of return to the colony of previous breeding increased with age. Of those birds that returned, 86% returned to the same sub-area. Of those birds that returned to sub-area A, 54% nested within 6 m of their 1977 nest location.

ACKNOWLEDGMENTS

We are grateful to the Toronto Harbour Commissioners for allowing us to work at the Eastern Headland and to the Bird Banding Laboratory for providing us with information on the banded birds. We thank R. Prins, G. D. Tessier, and L. Weseloh for their help in the field; P. A. M. Angehrn for drafting the figure; and J. E. Bryant and S. G. Curtis for comments on an earlier draft of the manuscript.

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