

ORIGINS OF RING-BILLED GULLS AT A NEW COLONY

BY HANS BLOKPOEL AND GERARD T. HAYMES

INTRODUCTION

The Eastern Headland of the Toronto Outer Harbour is a man-made peninsula that extends about 5 km into Lake Ontario. Blokpoel and Fetterolf (1978) documented the rapid colonization of that area by gulls (Herring Gull, *Larus argentatus*, and Ring-billed Gull, *L. delawarensis*) and terns (Common Tern, *Sterna hirundo*, and Caspian Tern, *S. caspia*). From some 10 nests that failed in 1973, the Ring-billed Gull colony has grown to about 20,000 nests in 1977. As part of Canadian Wildlife Service studies of this new colony we sought to determine the origins of Ring-billed Gulls at the Eastern Headland. This paper reports on the colonies of origin of a small sample of the 20,000 pairs of Ring-billed Gulls nesting at the Eastern Headland in 1977.

METHODS

During a census of the colony (Fig. 1) in 1976, numerous banded gulls were noted even though no Ring-billed Gulls had been banded there. In 1977, we trapped 139 banded Ring-billed Gulls. They were caught by placing a walk-in trap over their nests. The trap was made of chicken wire (2.5 cm mesh size) using a design similar to that described by Weaver and Kadlec (1970). We read an additional 80 band numbers of nesting birds through binoculars.

Banding locations of the birds were provided by the Banding Offices of the Canadian Wildlife Service and U.S. Fish and Wildlife Service. Information on banding effort, i.e., the numbers of banded Ring-billed Gulls for Ontario and all states bordering on the Great Lakes, was provided by the CWS Banding Office. We define the "colony of origin" of a banded gull as that colony where the bird was banded as a chick. When describing the contribution of each colony of origin to the Eastern Headland we use the term "contribution index," defined as the number of 3-, 4- and 5-year-old banded birds nesting at the Eastern Headland in 1977 as a proportion of the number of birds banded in 1972, 1973, and 1974 and expected still to be alive in 1977. The number of banded birds expected to be alive in 1977 was estimated by applying mortality rates used by Southern (1977): 40% pre-fledge mortality, 60% mortality between fledging and two years and 12% annual mortality between ages 2 and 5. We did not use data on banding effort prior to 1972 because band loss due to wear becomes serious after the fifth year (Ludwig, 1967) nor did we use 1975 data on banding effort because not all 2-year-old Ring-billed Gulls nest (Ludwig, 1967).

RESULTS

Of the 219 (139 + 80) birds with known band numbers, all but five had been banded on a Ring-billed Gull colony. The five birds banded

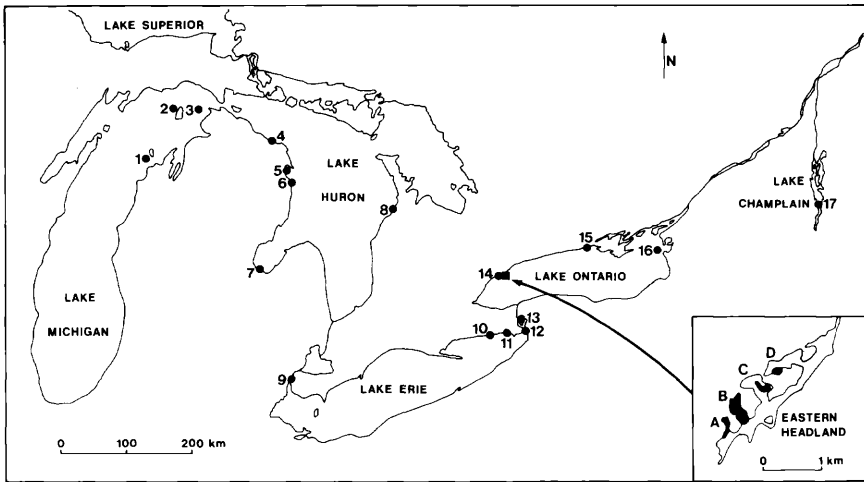


FIGURE 1. Locations of the colonies of origin of 200 banded Ring-billed Gulls nesting on the Eastern Headland in 1977. Numbers refer to Table 1. Insert shows in solid black the distribution of nesting Ring-billed Gulls in areas A-D.

outside a colony were not used in this analysis. Of the 214 birds banded on a colony, 200 (93%) had been banded as chicks and 14 (7%) had been banded as adults. The 17 colonies of origin in which Ring-billed Gulls nesting at the Eastern Headland had been originally banded are listed in Table 1 and plotted in Figure 1. Of the 17 colonies, 16 were on the Great Lakes and one was on Lake Champlain in New York state (17 on Fig. 1).

At the Eastern Headland, Ring-billed Gulls nested in four distinct areas (A-D, inset Fig. 1). Banded gulls from any particular colony of origin were spread fairly evenly over the four areas and did not nest in clusters.

The six colonies of origin nearest to the Eastern Headland (10-15, Table 1) contributed a total of 150 (or 75%) of the 200 birds banded as chicks. The relatively large contribution of the Calcite Pier colony (4 on Fig. 1, estimated population size 7,916 breeding pairs in 1977; Scharf et al, 1978) and the relatively small contribution of the Little Galloo Island colony (16 on Fig. 1, estimated at 27,308 pairs in 1977; Scharf et al, 1978) may appear somewhat surprising. However, the number of birds banded at a certain colony but nesting at the Eastern Headland in 1977 would presumably depend on (1) the number of birds banded at that original colony and alive in 1977, and (2) the distance between that colony and the Eastern Headland.

The contribution indices for the different colonies showed great variability (Table 1). Most of this variability could be accounted for by differences in distances between colony of origin and the Eastern Head-

TABLE I.
Number of banded birds nesting at Eastern Headland in 1977, distance from the Eastern Headland, banding effort during 1972 to 1974, and Contribution Index (see text) for the colonies of origin.

Colony of origin (see Fig. 1)	Number of banded birds at Eastern Headland in 1977	Distance between Eastern Headland and colony of origin (km)	Number of birds banded in 1972 to 1974	Estimated number of banded birds alive in 1977 ¹	Number of 3-, 4- and 5-year-old banded birds at Eastern Headland in 1977	Contribution Index	
						b	a
1—South Manitou I.	4	554	3,834	730	4	5.48	
2—High I.	1	548	2,070	353	1	2.83	
3—Île aux Galets	4	510	9,146	1,704	3	1.76	
4—Calcite Pier	13	401	9,376	1,778	8	4.50	
5—Sulphur I.	1	352	314	52	0	0	
6—Black River I.	2	339	1,254	205	2	9.76	
7—Channel/Shelter I.'s	3	360	978	189	3	15.87	
8—Chantry I.	3	189	395	70	1	14.29	
9—Mud I.	2	342	353	58	2	34.48	
10—Mohawk I.	9	87	764	135	8	59.26	
11—Port Colborne	20	84	909	173	20	115.61	
12—Donnelly Pier	10	89	597	109	10	91.74	
13—Buckhorn I.	38	69	1,864	365	38	104.11	
14—Muggs I.	31	4	1,261	217	25	115.21	
15—Gull I.	56	139	7,960	1,454	48	33.01	
16—Little Galloo I.	2	239	752	159	2	12.58	
17—Four Brothers I.'s	1	488	81	17	0	0	

¹ Sum of those banded in: 1972 × 0.1636, 1973 × 0.1859 and 1974 × 0.2112; see text.

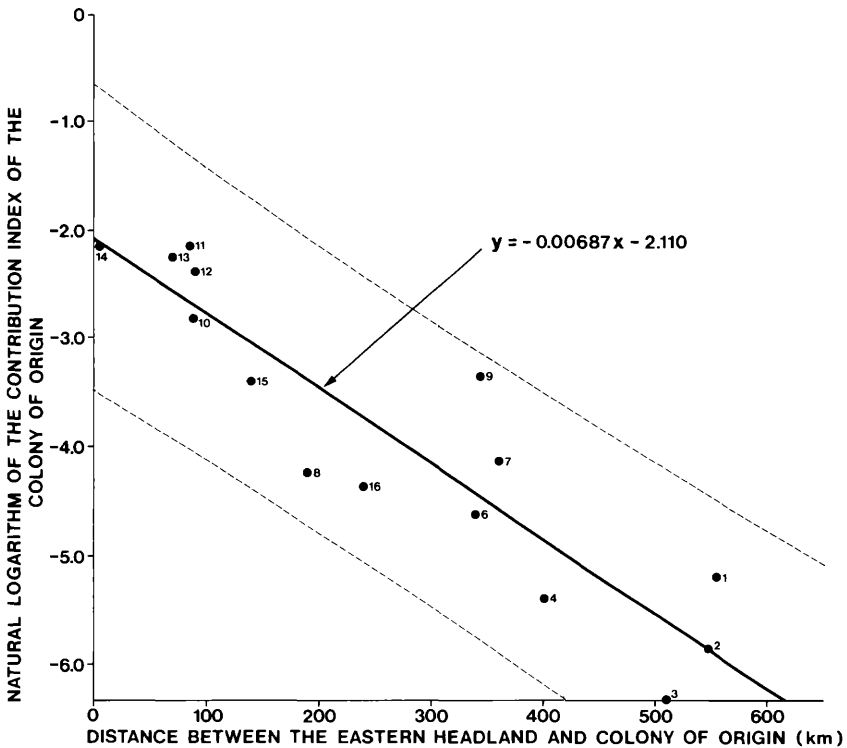


FIGURE 2. Relationship between natural logarithm of contribution index (see Table 1) and distances between the Eastern Headland and the colonies of origin. Numbers refer to Table 1. Dashed lines show the 95% confidence interval for individual data points.

land. The natural logarithm of the recruitment indices for the different colonies was plotted against the distance of the colonies from the Eastern Headland (Fig. 2). Analysis of these data yielded a significant correlation ($r = -0.915$, $P < 0.001$, $F = 66.85$, d.f. = 1 and 13).

In addition to colonies on the Great Lakes (Table 1) that contributed 3-, 4-, and 5-year-old banded birds to our sample, 19 other colonies on the Great Lakes where gulls had been banded during 1972 to 1974 did not contribute banded birds to the Eastern Headland. Also five inland colonies in the U.S. and province bordering the Great Lakes, where Ring-billed Gulls had been banded during 1972 to 1974, did not contribute banded birds to our sample. In total, 5,587 gull chicks were banded at those 24 colonies during 1972 to 1974. Using the regression equation in Figure 2 we calculated for each colony the number of banded 3-, 4- and 5-year-old birds that one would expect to find nesting at the Eastern

Headland in 1977 based on banding effort and distance from the Eastern Headland. For 22 of those 24 colonies the expected number of birds at the Eastern Headland was less than one. For the other two colonies the expected numbers were 2.82 and 2.04, respectively. At the lower limit of the 95% confidence interval of the sample points (Fig. 2), the expected numbers for those two colonies were 0.78 and 0.60, respectively. Hence it is not surprising that no banded 3-, 4- and 5-year-old birds from those 24 colonies were encountered nesting at the Eastern Headland in 1977.

In addition to the 200 birds banded as chicks, 14 banded birds at the Eastern Headland in 1977 had been banded as adults in a Ring-billed Gull colony. During 1972 to 1976, only six colonies existed at which 10 or more Ring-billed Gulls had been banded as adults: Calcite Pier (4 on Fig. 1), Ile aux Galets (3), Port Colborne (11), Muggs Island (14), Gull Island (15), and Little Galloo Island (16). All of the 14 birds banded as adults and encountered at the Eastern Headland were banded in the three nearest colonies: 12 at Muggs Island and one from each of Port Colborne and Gull Island.

DISCUSSION

Most banded gulls at the Eastern Headland had been banded as chicks at an existing colony. The variability in numbers of those banded Ring-bills at the Eastern Headland could be explained by banding effort and distance from colony of origin to the Eastern Headland.

Ludwig (1974) stated that 87% of the banded gulls in his conglomerate sample in Lakes Michigan and Huron had returned to the lake in which they were reared. Southern (1967, 1977) reported that most banded Ring-billed Gulls encountered at the Calcite Pier colony in Lake Huron were from Calcite Pier or from colonies within 65 km of Calcite Pier. He suggested that Ring-billed Gulls tend to return to a range of coordinates possibly representing the lake where reared. Neither of those investigators considered banding effort at the colonies concerned. From 1955 to 1970 about 2.5× as many Ring-billed Gull chicks were banded in Lakes Huron and Michigan as in Lakes Erie and Ontario. Thus it would appear that the results of Ludwig and Southern were in part due to the larger numbers of banded Ring-billed Gulls from the upper Great Lakes.

About 40,000 Ring-billed Gulls nested at the Eastern Headland in 1977. It is unknown what proportion of those birds was banded. The sample of 214 banded birds used in this study was only 0.5% of the 40,000 birds nesting at the Eastern Headland in 1977. It is difficult to determine from what colonies the other 99.5% of the birds may have come. However, unless banding affects the subsequent movements of the banded gulls, our results indicate that the contribution from any colony on the Great Lakes is largely determined by the number of chicks fledged at that colony and its distance from the Eastern Headland.

SUMMARY

Band numbers of Ring-billed Gulls nesting in the recently established colony on the Eastern Headland of the Toronto Outer Harbour were obtained by trapping banded birds on their nests or by reading bands through binoculars. Analysis of the banding information showed that the number of birds contributed to the Eastern Headland from any particular colony of origin was largely determined by a function of (1) the distance between that colony of origin and the Eastern Headland and (2) the number of chicks fledged at the colony of origin.

ACKNOWLEDGMENTS

We gratefully acknowledge the efforts of the many banders who have banded Ring-billed Gulls in the Great Lakes area during the last 12 years, in particular M. S. W. Bradstreet, and the late A. Bunker, A. R. Clark, D. J. T. Hussell (Long Point Bird Observatory), H. Krug, C. H. Richards, R. Rogers, W. E. Southern, R. B. Sutherland, R. R. Tasker, and D. V. Weseloh. The Toronto Harbour Commissioners allowed us to work on the Eastern Headland and provided field accommodations. T. Hince and R. J. Prins provided valuable field assistance. The Banding Offices of the Canadian Wildlife Service and the U.S. Fish and Wildlife Service provided the banding data. S. M. Teeple helped with the data analysis, G. E. J. Smith gave statistical advice, and P. A. M. Angehrn drew the figures. J. E. Bryant and S. G. Curtis commented on an earlier version of the manuscript.

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Canadian Wildlife Service, Ontario Region, 1725 Woodward Drive—5th Floor, Ottawa, Ontario, K1G 3Z7 and Ontario Hydro, Research Division, 800 Kipling Avenue, RC-15, Toronto, Ontario, M8Z 5S4. Received 15 May 1978, accepted 2 November 1978.