

## THE ORIGINS OF BANDED HERRING GULLS RECOVERED IN THE GREAT LAKES REGION

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Many researchers have examined the dispersal and migration of Herring Gulls (*Larus argentatus*) banded in the Great Lakes (Lincoln 1928, Eaton 1933, 1934, Hofslund 1959, Smith 1959, Southern 1968, Moore 1976, Gilman et al. 1977). However, to date there has been no published investigation of the origins (or banding locations) of Herring Gulls recovered in the Great Lakes.

Since 1972, the Canadian Wildlife Service has monitored toxic contaminants in Herring Gulls which nest on the Great Lakes (Gilbertson 1974, Gilman et al. 1977, 1979, Weseloh et al. 1979, Dauphiné 1980, Mineau et al. in press). The origins of the Herring Gulls breeding in the Great Lakes are of a practical concern to this monitoring program; if the gulls do not originate from the Great Lakes, the conclusion that the contaminant levels in their eggs are indicative of conditions in the Great Lakes may not be valid. In this paper I examine the banding locations of gulls recovered on the Great Lakes and show that movement into that area and, by inference, the occurrence of transient or immigrant Herring Gulls, has been almost nil.

### METHODS

I have considered two sample units: (1) the Great Lakes region (an area bounded by 41° and 50°N latitude and by 75° and 93°W longitude) and (2) elsewhere in the Western Hemisphere (Fig. 1). For each area, the total number of Herring Gulls banded (1955-1980) and the number of recoveries inside and outside the area (1933-1980) were obtained. Banding data were obtained for all Herring Gulls recovered in the Great Lakes region but banded elsewhere in the Western Hemisphere (i.e., away from the Great Lakes). To reduce bias from young-of-the-year and unfledged young recovered at the banding site, all first-year gulls recovered within 5 months of their date of banding and within the same 10' block of latitude/longitude as banded were eliminated from the sample.

### RESULTS

The banding and recovery totals for the 2 sample units are given in Table 1. Herring Gulls have been banded in all states and provinces within the Great Lakes region. Outside of that area, Herring Gulls have been banded in 26 states (including Alaska) of the United States, 11 provinces or territories of Canada, British Honduras, the Bahama Islands, and one "at sea" location in the Atlantic Ocean.

In all, 14,901 banded Herring Gulls were recovered in the Great Lakes region. Seventeen percent (2550) of these were omitted because

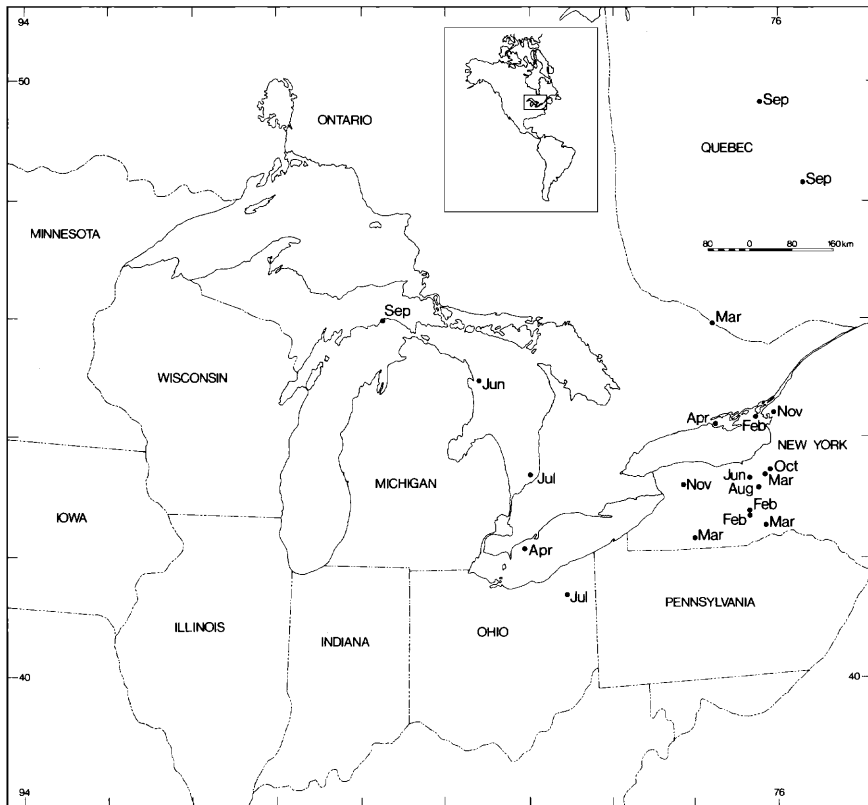


FIGURE 1. The Great Lakes region showing locations and months of recovery of the 20 adult Herring Gulls banded elsewhere but recovered in the Great Lakes region.

they represent young-of-the-year which may not have yet become independent of their colony (see above). Of the remaining 12,351, 99.4% (12,273) were banded in the Great Lakes region (Table 1). The outstanding 78, or .6%, were banded away from the Great Lakes region and represent "immigrants" to the Great Lakes.

The age at banding of those 78 immigrants was as follows: 56.4% nestlings, 23.1% juvenile, 12.8% immature, and 7.7% unknown. Of these, 33 (41.3%) had been banded in Quebec, 12 (15.0%) in New Brunswick, 7 (8.8%) each in Newfoundland and Maine, and 6 (7.5%) in Massachusetts. Smaller numbers had been banded in New York (5), Rhode Island (3), Manitoba (2), Vermont (2), and New Hampshire (1). Of the numbers of Herring Gulls banded within any political boundary away from the Great Lakes, the greatest percent recovered in the Great Lakes region was less than 1.14% (New Hampshire).

TABLE 1. The numbers of Herring Gulls banded and recovered in the Western Hemisphere.

Area	Bandings <sup>b</sup>	Recoveries <sup>a</sup>		
		Great Lakes	Elsewhere	Total
Great Lakes	281,929	12,273 <sup>c</sup>	2,318	14,591 <sup>c</sup>
Elsewhere	252,546	78	17,491	17,569
Total	534,475	12,351 <sup>c</sup>	19,809	32,160 <sup>c</sup>

<sup>a</sup> 1933-1980.

<sup>b</sup> 1955-1980.

<sup>c</sup> 2550 recoveries from same 10' block as banded within 5 months of banding have been omitted; see text.

Of the 68 immigrants for which I could determine age at recovery, 71% were less than 3 years of age, i.e., non-breeders. The remaining birds ranged up to at least 17 years of age. The mean age of Herring Gulls recovered as adults (3 or more years old) was 6.7 years (SD =  $\pm 3.5$ ,  $n = 20$ ). Adults were recovered in all months except January, April, and December; the greatest percent of recoveries was in March (20%) (see Fig. 1). Of the birds recovered as adults, 60% were associated with Lake Ontario (primarily the Finger Lakes region of New York), but no more than 10% were associated with any other lake region within the Great Lakes. The most western recovery was from near the Straits of Mackinac in northern Lake Michigan.

#### DISCUSSION

Slightly more Herring Gulls have been banded in the Great Lakes region than in the rest of the Western Hemisphere (1955-1980). This presumably reflects the relatively large size of the Herring Gull population in the Great Lakes and the large amount of banding activity in the area over the past several decades.

Earlier banding studies suggested that the proportion of band recoveries in the Great Lakes region attributable to birds banded within that area would be great (over 90%; see Moore 1976, Gilman et al. 1977). That it reached 99.4% shows that, in terms of immigration and recruitment, the adult Herring Gull population on the Great Lakes is essentially an isolated, closed system. The immigration rate was only .6% and, considering that approximately 71% of these immigrants died before reaching adulthood (i.e., recovered at less than 3 years of age), the maximum recruitment rate of immigrant gulls into the breeding population would be in the range of .1-.2%. This extremely low immigration rate is consistent with Gross (1940) who found that very few of the Herring Gulls banded in a large colony on Kent Island in the Bay of Fundy were recovered in the Great Lakes.

The miniscule amount of immigration into the Great Lakes that was

noted between 1933 and 1980 came almost exclusively from adjacent areas to the east. However, the number of Herring Gulls banded in the Arctic (only 121 in the whole of the Northwest Territories) probably is not adequate to reliably detect any immigration from that area. Immigrants were predominantly young birds but it is not known how long birds recovered as adults had been in the Great Lakes system. Most of the adult immigrant gulls were recovered in the vicinity of Lake Ontario.

The recovery locations of Herring Gulls banded in the Great Lakes, and hence their seasonal movements, have been analyzed in detail by Moore (1976). He found that with increasing age a greater percentage of the Herring Gull population became sedentary, thus spending the breeding and non-breeding season on the Great Lakes. Approximately 36% of juvenile, 64–70% of 1- and 2-year-old, and over 90% of adult Herring Gulls were resident on the Great Lakes; the rest migrated to points along the Atlantic and Gulf coasts and inland eastern North America. Moore's data showed that only during their first year of life did more than half of the Great Lakes Herring Gulls migrate to points outside of the Great Lakes; and as adults only about 10% did so.

The evidence presented here suggests that there are no populations of Herring Gulls, born or raised outside of the Great Lakes area, that are known to come into the Great Lakes area on a regular basis for any purpose, e.g., to breed, to overwinter, or even for post-breeding dispersal. Thus there is little possibility that gulls born or raised outside the Great Lakes area (and hence a source of outside contamination) have been included in, let alone comprised a significant portion of, any Herring Gull samples collected for monitoring purposes in the Great Lakes. The only other sources of "outside" contamination for Great Lakes Herring Gulls of which I am aware occur: (1) with the small portion (10%) of the adult Herring Gull population which annually moves (migrates) out of the Great Lakes (Moore 1976) and returns to breed in the spring and; (2) with the approximately 30% of the 4th year Herring Gull age class which returns to the Great Lakes to breed after having been away from the lakes during the previous winter (Moore 1976). This latter group is actually smaller than stated because, according to a recent study (G. A. Fox pers. comm.), only a maximum of 25% of the breeding population on a stable Herring Gull colony in any year were "new" birds (i.e., previously unmarked adults). Hence only a maximum of approximately 8% (25% of 30%) of the breeding population could be 4th year birds which had just spent the winter outside of the Great Lakes. Even these considerations may be inconsequential because it is not known if adult and near adult birds which leave the Great Lakes during the winter actually do secure a territory and breed upon their return to the Great Lakes the subsequent spring.

The questions of foreign ("outside") contaminants in immigrant Herring Gulls in the Great Lakes and exposure by Great Lakes Herring Gulls to conditions outside the Great Lakes are both rather moot points as biota from the Great Lakes have been shown to be among the most

contaminated in North America. Gulls, cormorants, and herons from the Great Lakes are known to carry contaminant burdens several times greater than their Atlantic coast, prairie province, or southern U.S. counterparts (Gilbertson and Reynolds 1974, Vermeer and Peakall 1977, Ohlendorf et al. 1979, Pearce et al. 1979, Weseloh et al. 1983).

## SUMMARY

Nearly 15,000 band recoveries of Herring Gulls from 1933–1980 from within the Great Lakes area were examined. Over 99% of the recoveries were of birds banded within the Great Lakes. Most of the immigrant gulls came from areas to the east of the Great Lakes as birds of the year and died before reaching breeding age. The maximum recruitment rate of immigrant adult Herring Gulls into the Great Lakes population was in the range of .1–.2%. The presence of this miniscule percentage of immigrant Herring Gulls in the Great Lakes population does not appear, in any way, to jeopardize the use of this species as an indicator of toxic chemical contamination in the food web of the Great Lakes ecosystem.

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