

# Early-winter population trends of gulls on western Lake Erie, 1950-1984

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**T**HE BREEDING POPULATION OF RING-BILLED GULLS (*Larus delawarensis*) was virtually exterminated from the Great Lakes region of North America by the early 1900s (Ludwig 1943, Southern 1974). The population recovered somewhat after about 1925, and remained fairly stable from 1940 to 1960. Since 1960, there has been a major increase in breeding populations on Lakes Ontario, Erie, Huron, and Michigan (Ludwig 1974, Scharf et al. 1978, Blokpoel and Tessier 1986). Many of these gulls concentrate along the south shore of Lake Erie in autumn before migrating to the southeastern coast of the United States. From October through December, the south shore of the western basin of Lake Erie usually supports the largest concentrations of Ring-billed Gulls in North America (Southern 1974).

We wanted to see if the reported increase in the breeding population of Ring-billed Gulls in the Great Lakes region was also reflected by an increased early-winter concentration of gulls along the south shore of Lake Erie. Of interest also were the population

trends of other gull species on Lake Erie at this time of year. We used Christmas Bird Count (hereafter C.B.C.) data, the only systematically collected census information available, to examine population trends.

## METHODS

An examination of past issues of Audubon Field Notes and American Birds revealed four C.B.C.s encompassing portions of the south shore of Lake Erie that have been run continuously from 1950 to 1984. These one-day counts, each covering a 24-kilometer diameter circle, are usually conducted during the last two weeks of December and almost always include the first few days of January. The four count locations extended from Toledo, Ohio at the western end of Lake Erie to Ashtabula, Ohio, 200 kilometers east at the central basin of the lake. The data on number of gulls by species and total party hours were extracted for each count from 1950 to 1984.



Our observations suggest that the peak premigratory concentration of gulls along the south shore of Lake Erie in Ohio usually occurs in late November and early December. Thus, C.B.C.s probably do not cover the usual period of maximum concentration of gulls. Western Lake Erie generally begins to freeze by early January and gull populations decline at this time. Undoubtedly, some of the year-to-year variability in gull numbers from C.B.C.s is related to December weather conditions. Because we were interested in long-term population trends and not annual fluctuations, we combined data into groups of 5-year and 10-year averages to reduce the short-term variability caused by annual weather fluctuations.

## RESULTS

The number of Ring-billed Gulls reported per C.B.C. increased spectacularly from the 1950s to the 1980s (Fig. 1). During the 10-year period 1950-1959, a mean of 3081 gulls (range 152 to 7813) was seen per year on the four counts combined. During the 10-year period 1975-1984, the four counts averaged 64,417 gulls (range 31,226 to 108,466), a 21-fold increase (Table 1). The increase began in the mid-1960s and continued through 1984. These four counts combined recorded 108,466 Ring-billed Gulls during the 1984 C.B.C.

All four C.B.C. locations have recorded significant ( $P < 0.05$ ) increases in Ring-billed Gulls during this 35-year period (Table 1) with Ashtabula showing the largest percentage increase (93-fold from 1950-1959 to 1975-1984) and Toledo the smallest (8-fold increase). Thus, there is an indication that the increase in Ring-billed Gull concentrations has been most pronounced moving eastward in Ohio.

Herring Gull (*L. argentatus*) numbers also increased significantly ( $P < 0.01$ ) from 1950 to 1984, but the increase was not as consistent and was only at about  $\frac{1}{3}$  the rate as for Ring-billed Gulls (Fig. 1). During the 10-year period, 1950-1959, a mean of 3532 Herring Gulls was annually recorded on the four counts combined, compared with 22,496 for 1975-1984. The increase for Herring Gulls, as for Ring-billeds, began in the 1960s.

The increase in Herring Gulls did not occur at all four locations. Ashtabula, which had the greatest percentage increase (93-fold) in Ring-billed Gulls from 1950-1959 to 1975-1984, showed a non-significant ( $P > 0.05$ ) decline in Herring Gulls. Toledo, which had the smallest increase (8-fold) in Ring-billed numbers, showed the greatest increase (24-fold) in Herring Gulls of the four counts. Cleveland showed a significant ( $P < 0.01$ ) 8-fold increase and Lakewood a marginally significant ( $P < 0.06$ ) 6.5-fold increase. Thus, the geographic trend for Herring Gulls increases was opposite that of Ring-billed Gulls.

Table 1. Mean number of gulls per annual Christmas Bird Count for the 10-year periods 1950-1959 and 1975-1984 for four count locations on the south shore of Lake Erie in Ohio.

CBC	Gull species	Mean number of gulls (range) per annual CBC		Magnitude of increase (1975-1984/1950-1959)*
		1950-1959	1975-1984	
Ashtabula	Ring-billed	143 (1-845)	13,269 (2021-26,100)	92.8**
Cleveland		1020 (100-2991)	20,644 (4782-44,030)	20.2**
Lakewood		730 (35-1600)	20,829 (205-58,899)	25.5**
Toledo		1188 (0-3903)	9675 (139-38,652)	8.1*
Total		3081 (152-7813)	64,417 (31,226-108,466)	20.9**
Ashtabula	Herring	1746 (196-8050)	1136 (106-3806)	0.7
Cleveland		890 (40-2326)	7117 (1249-16,942)	8.0**
Lakewood		420 (60-1085)	2710 (19-7560)	6.5
Toledo		475 (75-2023)	11,533 (284-63,104)	24.3**
Total		3532 (707-8712)	22,496 (3140-73,104)	6.4**
Ashtabula	Bonaparte's	320 (0-2350)	3312 (0-15,215)	10.4*
Cleveland		455 (0-778)	6389 (951-25,650)	14.0**
Lakewood		862 (0-1686)	10,344 (55-18,150)	12.0**
Toledo		857 (0-4550)	2933 (2-15,972)	3.4
Total		2494 (3-5902)	22,978 (3595-38,977)	9.2**
Ashtabula	Great Black-backed	2.9 (0-12)	13.0 (2-43)	4.5**
Cleveland		0.2 (0-2)	16.1 (0-46)	80.5**
Lakewood		1.4 (0-6)	3.1 (0-9)	2.2
Toledo		6.7 (1-24)	53.5 (10-118)	8.0**
Total		11.2 (2-30)	85.7 (30-176)	7.7**

\* To test for significant ( $*P < 0.05$ ,  $**P < 0.01$ ) differences between the count numbers for the two 10-year periods, the annual counts for the two periods were ranked 1-20 and tested by Wilcoxon's two-sample nonparametric procedure (Steel and Torie 1960).

The ratio of Ring-billed to Herring gulls underwent a major change in the 35 years. Numbers of Ring-billed and Herring gulls were about equal in the period 1950-1959 for the combined four count locations (47% Ring-billed; 53% Herrings, Table 2). For 1975-1984, about 2.9 times more Ring-billed (74%) were counted than Herring Gulls (26%). Again, this change was not consistent across count locations. Ashtabula, at the central basin of Lake Erie, showed a major shift from 7% Ring-billed, 93% Herring Gulls in 1950-1959, to 92% Ring-billed, 8% Herring Gulls in 1975-84. At the western end of Lake Erie in Toledo, the ratio went from 71% Ring-billed, 29% Herring Gulls in 1950-59 to 46% Ring-billed, 54% Herring Gulls in 1975-1984.

Bonaparte's (*L. philadelphia*) and Great Black-backed Gulls (*L. marinus*) were the only other gull species reported consistently on these four counts. The Bonaparte's Gull population showed an overall trend similar to that of Herring Gulls, both numerically and in its rate of increase (Fig. 2). Again the increase began in the mid-1960s as for that of Ring-billed and Herring gulls. Overall, there was a 9-fold increase from 1950-1959 to 1975-1984. Toledo was the only location that did not show a significant increase in Bonaparte's Gulls (Table 1).

Great Black-backed Gulls also showed an increase from 1950-1959 to 1975-1984, but these gulls still are a very minor component of the early-winter gull population on Lake Erie. In 1950-1959, a mean of

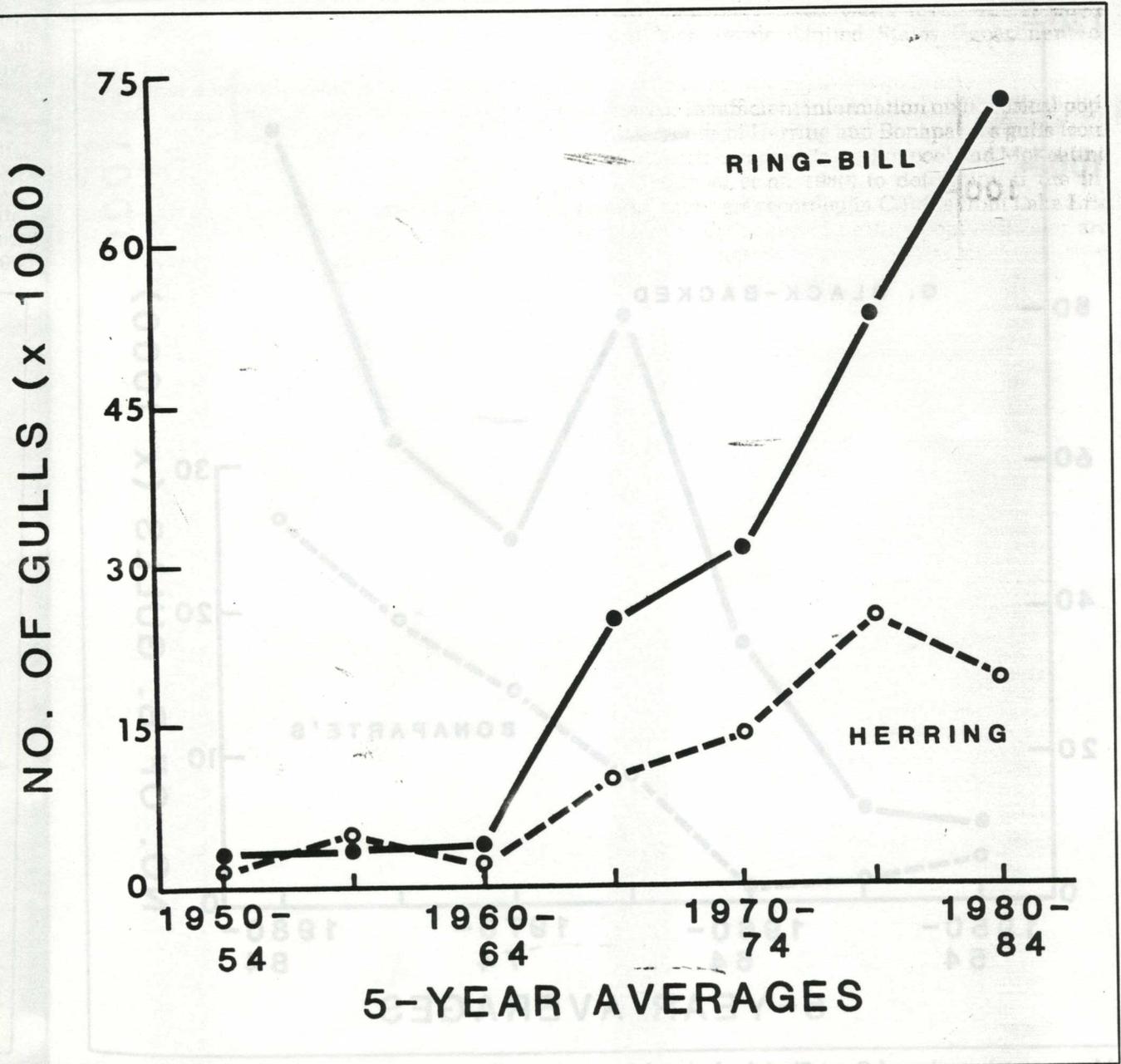


Figure 1. Mean annual number of Ring-billed and Herring gulls recorded for four Christmas Bird Count locations on the south shore of Lake Erie in Ohio, 1950-1954 through 1980-1984.

Table 2. Number of Ring-billed and Herring gulls (and percent of total for both species) per annual Christmas Bird Count for the 10-year periods, 1950-1959 and 1975-1984 for four count locations on the south shore of Lake Erie in Ohio.

CBC	Number of gulls per annual CBC (% of total for both species)			
	1950-1959		1975-1984	
	Ring-billed	Herring	Ring-billed	Herring
Ashtabula	143 (7%)	1746 (93%)	13,269 (92%)	1136 (8%)
Cleveland	1020 (53%)	890 (47%)	20,644 (74%)	7117 (26%)
Lakewood	730 (63%)	420 (37%)	20,829 (88%)	2710 (12%)
Toledo	1188 (71%)	475 (29%)	9675 (46%)	11,533 (54%)
Total	3081 (47%)	3532 (53%)	64,417 (74%)	22,496 (26%)

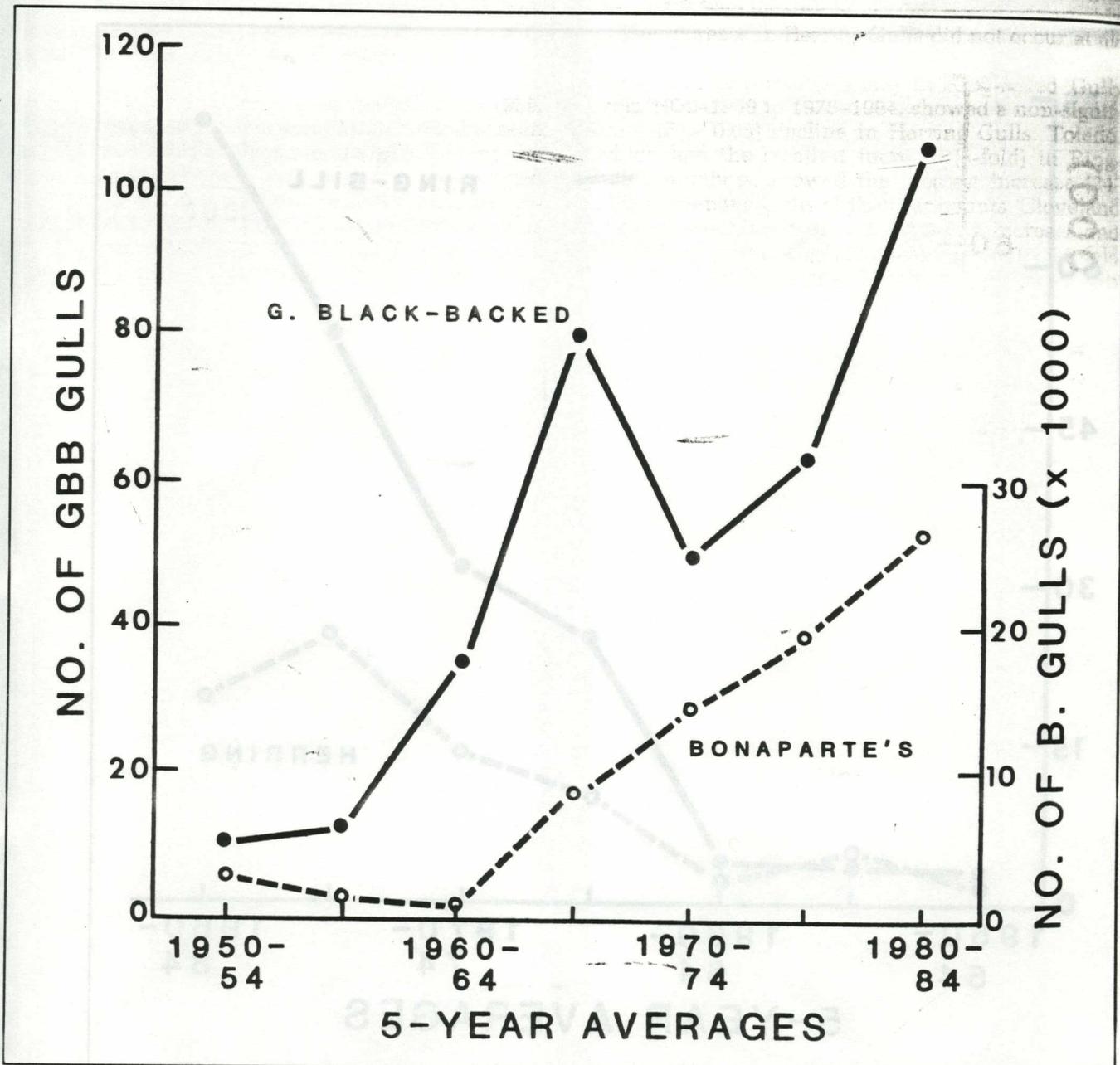


Figure 2. Mean annual number of Great Black-backed and Bonaparte's gulls recorded for four Christmas Bird Count locations on the south shore of Lake Erie in Ohio, 1950-1954 through 1980-1984.

11.2 Great Black-backs was recorded annually on the four counts combined. In 1975-1984, this had increased to 85.7, an 8-fold increase, but it still represented less than 0.1% of the gulls recorded on the four counts (Fig. 2, Table 1).

Overall, these four C.B.C. locations have had an increase in total gull numbers recorded from 9118/year in 1950-1959 to 109,977/year in 1975-1984, a 12.1-fold increase. We doubt that this increase was significantly influenced by any changes in observational effort, measured by party-hours per C.B.C., over the years. While there was a 12.1-fold increase in gull numbers from 1950-1959 to 1975-1984, the party-hours per C.B.C. increased only 1.5-fold (Fig. 3). In fact, party-hours per C.B.C. declined 40% from the mid-1960s to the 1980s when gull numbers showed their greatest increases. In addition, the high visibility of gulls and their tendency to congregate in open water make them unlikely candidates to be overlooked even in a count with minimal effort.

## DISCUSSION

Ludwig (1974) estimated that the breeding population of Ring-billed Gulls on the Great Lakes increased from 37,000 pairs in 1945 to 335,000 in 1967, a 9.1-fold increase. He felt that most of this increase

occurred during the 1960s, the population remaining relatively stable during the 1940s and 1950s. This estimated increase in the breeding population corresponds well with the approximate 10-fold increase in the premigratory Ring-billed Gull population on the south shore of Lake Erie from the early 1950s to the late 1960s (Fig. 1). The C.B.C. data also indicated that the population remained relatively stable during the 1950s and that the major increase began in the 1960s.

Ludwig (1974) contended that a major reason for the increase in Ring-billeds in the early 1960s was that declining water levels on the Great Lakes increased the amount of breeding territory available. However, population increases continued through the 1970s (Fig. 1, see also Sharf *et al.* 1978, Blokpoel and Tessier 1986) when water levels increased to record high levels (United States Department of Commerce 1982). Obviously, factors other than the water level are driving this population increase.

There is insufficient information on historical population trends of Herring and Bonaparte's gulls from interior North America (e.g., Blokpoel and McKeating 1978, Blokpoel *et al.* 1980) to determine if the increased numbers recorded in C.B.C.s from Lake Erie correlate with increased nesting populations or are related to changes in migratory patterns. Angehrn *et al.* (1979) used C.B.C. data to examine Great Black-

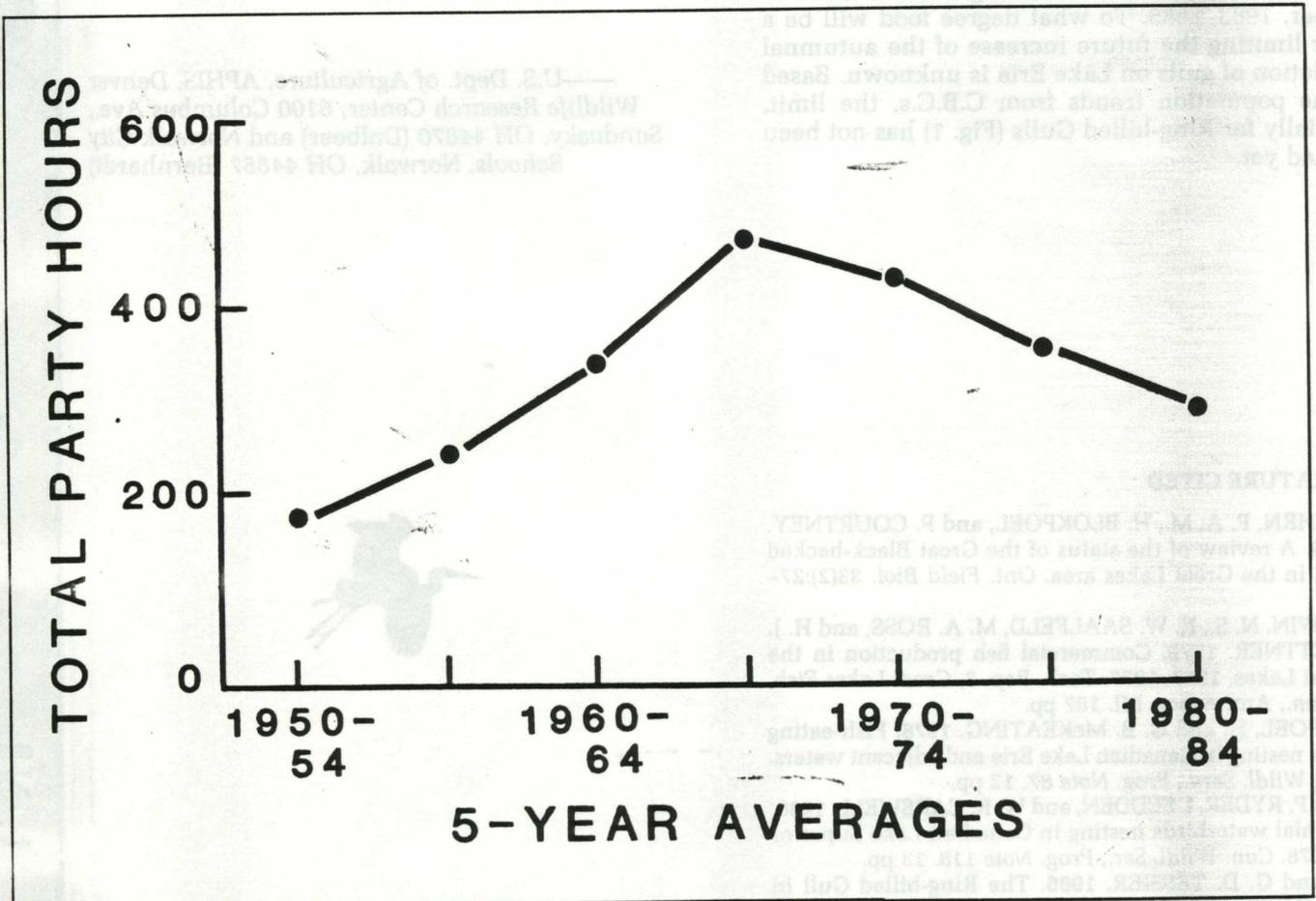


Figure 3. Total annual party-hours for four Christmas Bird Counts on the south shore of Lake Erie in Ohio, 1950-1954 through 1980-1984.

backed Gull population trends on the lower Great Lakes (1946–1977) and found a trend similar to that in our study. Although there has been a minor increase in nesting and wintering Great Black-backed Gulls, the Great Lakes have not yet experienced a major influx of this species as predicted by Ludwig (1968).

Fish production in Lake Erie probably equals or exceeds the combined production of the other four Great Lakes (Hartman 1973), and the large concentration of gulls in the shallow western basin in autumn is dependent upon this abundant fishery resource. Our observations during the early 1980s indicated that young-of-the-year Gizzard Shad (*Dorosoma cepedianum*) are an important food for gulls on Lake Erie in autumn. There have been strong year classes of Gizzard Shad in the western basin of Lake Erie in recent years (Ken Muth, unpubl. data). Smelt (*Osmerus mordax*), another important prey species for gulls (Ludwig 1974), have also increased substantially in numbers in Lake Erie since the late 1950s (Baldwin *et al.* 1979). Besides eating fish, Ring-billed Gulls also forage in large numbers in plowed agricultural fields near Lake Erie after the autumn harvest of corn and soybeans. Sanitary landfills are also heavily exploited. For example, we have recorded at least 5000 gulls (mainly Ring-billed) on several occasions at the Erie County, Ohio landfill, 5 miles south of Lake Erie, during October and November, 1983–1985. To what degree food will be a factor limiting the future increase of the autumnal population of gulls on Lake Erie is unknown. Based on the population trends from C.B.C.s, the limit, especially for Ring-billed Gulls (Fig. 1) has not been reached yet.

- HARTMAN, W. L. 1973. Effects of exploitation, environmental changes, and new species on the fish habitats and resources on Lake Erie. Tech. Rep. 22, Great Lakes Fish. Comm., Ann Arbor, MI. 43 pp.
- LUDWIG, F. E. 1943. Ring-billed gulls of the Great Lakes. *Wilson Bull.* 55:234–243.
- LUDWIG, J. P. 1968. Dynamics of ring-billed gulls and Caspian tern populations of the Great Lakes. Unpubl. Ph.D. Dissert., Univ. of Michigan, Ann Arbor, MI. 73 pp.
- 1974. Recent changes in the ring-billed gull population and biology in the Laurentian Great Lakes. *Auk* 91:575–594.
- SCHARF, W. C., G. W. SHUGART, and M. L. CHAMBERLIN. 1978. Colonial birds nesting on man-made and natural sites in the U.S. Great Lakes. U.S. Dept. Int., Fish and Wildl. Serv., FWS/OBS-78/15, Washington, D.C. 167 pp.
- SOUTHERN, W. E. 1974. The annual range of ring-billed gulls in the eastern United States: with comments on potential bird/aircraft collision problems. Pp 149–190 in *Proceedings of Conference on Biological Aspects of the Bird/Aircraft Collision Problem* (S. A. Gauthreaux, ed.), Dept. of Zoology, Clemson Univ., Clemson, SC.
- STEEL, R. G. D. and J. H. TORIE. 1960. Principles and procedures of statistics. McGraw-Hill, New York. 481 pp.
- U.S. DEPARTMENT OF COMMERCE. 1982. Great Lakes Water Levels, 1860–1980. NOAA-NOS. Rockwell, MD. 258 pp.

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#### LITERATURE CITED

- ANGEHRN, P. A. M., H. BLOKPOEL, and P. COURTNEY. 1979. A review of the status of the Great Black-backed Gull in the Great Lakes area. *Ont. Field Biol.* 33(2):27–33.
- BALDWIN, N. S., R. W. SAALFELD, M. A. ROSS, and H. J. BUETTNER. 1979. Commercial fish production in the Great Lakes, 1867–1977. Tech. Rep. 3, Great Lakes Fish. Comm., Ann Arbor, MI. 187 pp.
- BLOKPOEL, H. and G. B. McKEATING. 1978. Fish-eating birds nesting in Canadian Lake Erie and adjacent waters. *Can. Wildl. Serv., Prog. Note* 87. 12 pp.
- , J. P. RYDER, I. SEDDEN, and W. R. CARSWELL. 1980. Colonial waterbirds nesting in Canadian Lake Superior in 1978. *Can. Wildl. Ser., Prog. Note* 118. 13 pp.
- , and G. D. TESSIER. 1986. The Ring-billed Gull in Ontario: a review of a new problem species. *Can. Wildl. Serv., Occas. Paper* 57. 34 pp.

