

Staging Little Gulls, *Larus minutus*, on the Niagara River, Ontario: 1987–1996

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Since its first definite sighting in Ontario in 1930, the Little Gull (*Larus minutus*) has become an uncommon, but increasingly regular, migrant in the Great Lakes region on its way to and from the wintering areas on the Atlantic seaboard and Mississippi River. Over a period of 10 years (1987–1996), Little Gulls and Bonaparte's Gulls (*Larus philadelphia*) were counted as they flew over the Niagara River, Niagara-on-the-Lake, to their nocturnal roost in Lake Ontario to document the timing of migration and to monitor gull numbers. Counts generally began in October or November (range 3 October – 21 November) and continued until the fly-past ceased for winter; counting was resumed in early spring to document spring migration return dates. Altogether, 768 Little Gulls were counted and the vast majority (64.9%) of these were in the 1994/1995 (214) and 1995/1996 (285) seasons. This was not due to variation in coverage; in 1994/1995 no counts were made in the autumn season and were made only from 13 January to 1 May ($n = 11$). In the seasons for which coverage was similar there was a marginally significant increase in numbers of Little Gulls counted during the spring season, whereas there was a decrease in autumn counts. A comparison of Little Gull counts made at the Niagara River with those made at other staging areas in Ontario indicated that the Niagara River and Long Point may be the most important staging areas on the continent. Recent declines at Long Point coincide with an increase on the Niagara River, suggesting that preferred feeding areas have changed.

Key Words: Little Gull, *Larus minutus*, Niagara River, staging, roost counts, Ontario.

Since the discovery of the first Little Gull (*Larus minutus*) nest in the New World, at Oshawa in Ontario in 1962 (Scott 1963), the numbers of breeding records and sightings of this species have increased markedly in both Canada and the United States (see Weseloh 1994 for a review; Ewins and Weseloh 1999). Whether this increase can be attributed to its recent colonization of the New World as proposed by most authors (e.g., Baillie 1963; Hutchinson and Neath 1978; Cramp and Simmons 1983; Godfrey 1986; Austen et al. 1994) or whether the Little Gull has been overlooked for decades, remains somewhat of an enigma (McRae 1989). In view of the discovery of nests in the Hudson Bay Lowlands during the Ontario Breeding Bird Atlas (Weseloh 1987), during waterfowl surveys in northern Ontario (Carpentier 1986), and studies of gull species in northern Manitoba (McRae 1984), the latter seems more likely. However, in contrast to its breeding status, the Little Gull has been known since 1930 as a "rare but regular" associate of the huge numbers of Bonaparte's Gulls (*Larus philadelphia*) that stage in the Great Lakes and eastern North America on their way to the Atlantic seaboard or Mississippi wintering areas (Baillie 1963; Beardslee and Mitchell 1965; Goodwin 1995). There are also increasing records of Little Gulls from the Prairie Provinces (e.g., Taylor 1991).

Little Gulls sometimes occur in fair numbers on autumn and spring migration in the Long Point region; McRae (1989) suggested that this was the most important staging area in North America. Another area where Little Gulls stage, in this instance in association with Bonaparte's Gulls, is on the lower Niagara River and adjacent Lake Ontario in southeastern Ontario. Prior to 1938, the Little Gull was unknown in this region (Beardslee and Mitchell 1965), perhaps because it was overlooked amongst the huge flocks of Bonaparte's Gulls. Not only were birders of that period unfamiliar with the species, but they also lacked the sophisticated optical equipment and field guides necessary for accurate gull identification (Weseloh 1994), at least until the 1960s. Perhaps more critically there are probably now at least 100 times more observers than there were historically and bird-watchers today spend much more time birding than previously.

Since that time there has been a gradual increase in the number of sightings of Little Gulls on spring and fall/early winter migration (Andrle 1977), although reports of sightings were greatly under-represented in the regional summaries for American Birds from 1948–1956 (Weseloh 1994). Weseloh (1994) suggested that increases in Little Gulls took place over three distinct time periods. (1) Between 1955–1970 Little Gull sightings were reported annually,

with a maximum count of 21 individuals; (2) There was a six-fold increase in the number of reported sightings between the beginning and end of the second period (1971–1984) with a maximum count of 121 birds and a four-fold increase in numbers of Little Gulls reported on Christmas Bird Counts (CBCs) between 1971 and 1984; (3) Since 1985 the rate of Little Gull sightings overall has increased three fold, and the number of sightings on CBCs has increased five fold compared to the period 1971–1984.

In 1986, GB began making autumn and spring counts of gulls (particularly Bonaparte's Gulls) flying along the Niagara River to roost on Lake Ontario, in order to document the importance of this region for staging gulls, and to determine temporal and seasonal variation in numbers (Kirk and co-workers, unpublished manuscript). This provided a unique opportunity also to document the numbers of Little Gulls staging in the area. Interestingly, the period during which GB counted Little Gulls coincides closely with the third period of increase reported by Weseloh (1994). In this paper, we use counts of Little Gulls made on the Niagara River between 1986 and 1996 to test two hypotheses. First, we compare autumn and spring counts in count seasons with similar coverage to see if a prediction that significantly more gulls were counted in the spring is valid. Second, we examine whether Little Gull numbers have increased in the Niagara River over the 10-year count period and whether there were any changes in the temporal pattern of occurrence of the species in this region. We also compare the season totals with counts made at Long Point, which is believed to have the highest concentration of Little Gulls on migration in Ontario (McRae 1989).

Methods

During the autumn (October–January) and spring (March–May) staging periods many small gulls (almost entirely Bonaparte's Gulls) fly north over the lower Niagara River each late afternoon/evening to roost on Lake Ontario (0.75 to 1 km north of Fort Niagara). On the following morning, many Bonaparte's Gulls fly up river to feed, as demonstrated by a dawn count conducted by P. J. Ewins and DVW in December 1994.

The observations on which this paper is based were made (almost entirely by GB) from a stationary car parked at the edge of the Niagara River (Yacht Club). Although GB generally began counting before the first gulls flew down the river, on some occasions gulls had already started flying to the roost when he arrived. If large numbers of gulls were thought to have been missed in this way then no count was made. Although GB attempted to standardise timing of counts, the exact time periods depended on time of year and the weather condi-

tions. For the autumn count period the timing of counts was 15:30–17:55 (median 16:15), whereas in the spring it was from 17:00–19:50 (median 18:00). Counts were ended when no gulls flew by for a 10–15 minute period or when it became too dark to identify gulls accurately (Kirk and co-workers, unpublished manuscript).

Weather conditions had two important effects. First, they determined whether gulls could be identified accurately. During southerly winds, gulls flew in loose flocks over the river and above the tree line on the United States side of the river, making it difficult or impossible to separate Bonaparte's and Little Gulls, particularly in poor light conditions (Bellerby 1994; see Grant 1982 for identification of these two species). By contrast, when winds were northerly, gulls flew in more compact flocks at lower altitude (Bellerby 1994). Weather also determined the time at which gulls came to roost; gulls went to roost later during bright sunny conditions than in dull cloudy weather.

For the eight seasons with most complete coverage, the numbers of visits when gulls were counted varied from 12 to 43 (median = 20). Coverage was designed to coincide with the staging period for Bonaparte's Gull; hence when the fly-past of Bonaparte's Gulls ended, GB stopped counting. Thus, in the early years of study (1987, 1987/1988) the spring return was not documented at all as no counts were made after February. In the 1986/1987 and 1994/1995 seasons, no counts were made in the autumn (1986 and 1994) and counts only began in January (1987 and 1995). Also GB did not begin counts until October, although Bonaparte's and Little Gull movements began as early as late July or early August (Beardslee and Mitchell 1965). We defined the autumn and early winter staging period (the fly-past — Bellerby 1994) as 3 October to 18 February based on inspection of counts of Bonaparte's Gulls (Kirk and co-workers, unpublished manuscript). It was not possible to do this simply by inspection of Little Gull counts because of the very low numbers involved.

Because counts were low and Little Gulls were seen infrequently in most years, there were insufficient data to model statistically the effects of season, time of year, weather conditions and count duration as we did for Bonaparte's Gull (Kirk and co-workers, unpublished).

Because the number of visits varied between periods we used a randomization test written in FORTRAN (B. T. Collins, personal communication) to test whether counts differed significantly between the spring and autumn periods after correcting for the number of counts. We examined trends in numbers of Little Gulls in the autumn and spring periods separately, and for all data combined to see if there were statistically significant increases or decreases in the numbers of birds. For these analyses we

TABLE 1. Autumn/early winter counts of Little Gulls on the Niagara River between 1987–1996.

Year	Autumn/early winter count duration	Maximum count	Date of maximum count	Autumn/early winter total	N ¹ (% of counts)
1987	8 January–13 February ¹	22	31 January	74 ^a	13 (61.5)
1987/1988	10 October–18 February	7	4 February	34	43 (20.9)
1988/1989	7 October–3 February	7	2 November	44	25 (52.0)
1989/1990	3 October–9 February	5	9 February	18	24 (33.3)
1990/1991	30 October–5 February	3	1 November	10	23 (34.8)
1991/1992	4 November–13 February	2	31 January/3 February	9	26 (26.9)
1992/1993	22 October–2 February	1	17 January	1	14 (7.1)
1993/1994	11 October–17 January	3	23 December	6	15 (20.0)
1994/1995	13 January–6 February	11	29 January	18 ^a	6 (50.0)
1995/1996	21 November–19 January	3	19 January	5	11 (27.3)
Overall ²	3 October–18 February	22	31 January		

^aNote there were no autumn counts (October to December in these years)

¹N = number of counts per season

²Overall row shows range or median date/count

combined data from different counts; strictly speaking this may not be valid statistically because many of the same individuals staged on the Niagara River for an unknown period, and GB therefore may have counted the same individuals two or more times.

Some researchers have suggested that the number of Little Gulls counted is positively correlated with counts of Bonaparte's Gulls (Burger and Brownstein 1968); we use Spearman rank correlation coefficients to test whether there was any significant association between the two species. Finally, we attempted to compare counts made on the Niagara River with those made at Long Point on the north shore of Lake Erie to assess the relative importance of these two regions for staging Little Gulls. For data handling and analyses we used SAS PC software (SAS Institute 1989).

Results

Altogether, a cumulative total of 768 Little Gulls was counted during the autumn/early winter staging

period (3 October to 18 February) and the spring return over the 10-year study period. By far the majority of gulls (64.6%) was counted in the 1994/1995 and 1995/1996 seasons (see Figure 1). This was not just due to differences in coverage (Table 1); for example counts in the 1994/1995 season were made only from 13 January to 5 May, yet that season had the second highest count total.

The date of the maximum count varied from 2 November to 20 April; discounting the first two study seasons when no spring counts were made (1987 and 1987/1988), in two other of the early study years the date of maximum count was in the fall/early winter, whereas in later years the maximum count was always made in March or April. Spring return dates ranged from 24 February (which probably involved overwintering birds) to 13 April (the median spring return date was midway between 28 March and 3 April; Table 2).

Considering seasons with similar coverage only, 127 Little Gulls were counted in the autumn/early

TABLE 2. Spring counts of Little Gulls on the Niagara River between 1987–1996.

Year	Spring return ¹	Date of maximum count	Maximum count	Cumulative total	N ² (% of counts)
1987	a
1987/1988	a
1988/1989	3 April–13 April	3 April	3	3	2 (50.0)
1989/1990	8 Mar.–13 April	8/12 March	1	2	5 (40.0)
1990/1991	28 March–11 April	28 March	13	18	4 (75.0)
1991/1992	13 April	13 April	26	26	1 (100.0)
1992/1993	12 April–24 April	12 April	20	26	3 (100.0)
1993/1994	12 April–20 April	20 April	5	8	2 (66.7)
1994/1995	22 March–1 May	7 April	37	162	13 (92.3)
1995/1996	24 February–17 April	5 April	78	280	16 (81.3)

^aThere were no spring return dates documented in these seasons

¹Spring return indicates arrival of first Little Gull, last date is end of spring count

²N = number of counts per season



FIGURE 1. The number of Little Gulls observed per week at the evening fly-past at Niagara-on-the-Lake, autumn-winter-spring 1986–1996. Weekly totals commence with 3–10 October and continue through 1–7 May. The total number of surveys conducted during each season (N) and the mean number of surveys per week, when at least one survey was conducted, are given following the “month” caption below the x-axis. Data are plotted for all weeks in which at least one survey was conducted, including weeks during which no Little Gulls were observed; e.g., during the first week of November 1987/88 no surveys were conducted and no data are plotted, during the second week at least one survey was conducted and one Little Gull was observed, during the third week at least one survey was conducted and zero Little Gulls were observed.

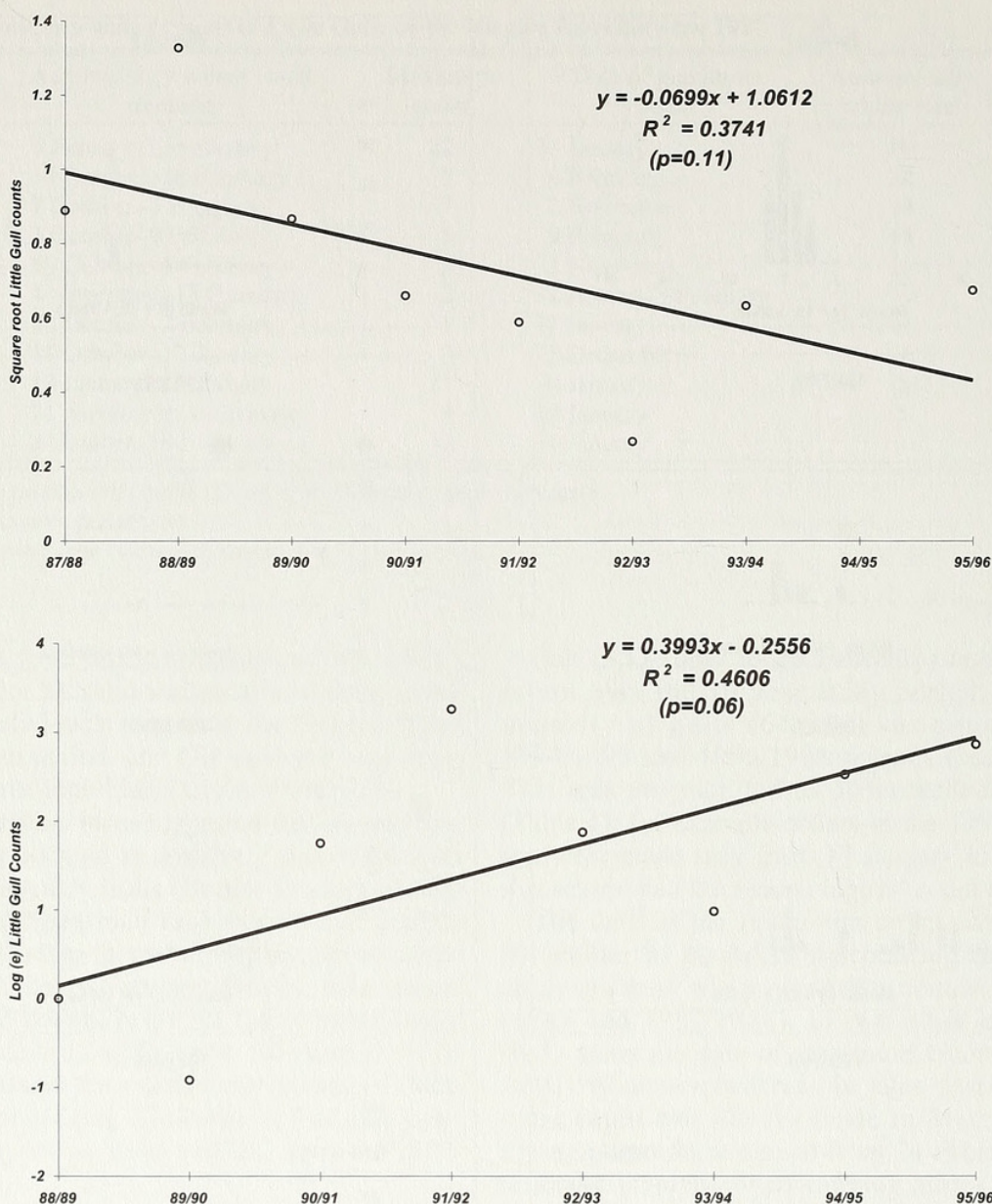


FIGURE 2. Linear regression of Little Gull counts (corrected for number of visits) in relation to year of count: (above) Autumn; (below) Spring.

winter period and 529 during the first part of the spring return. Maximum counts ranged from 1–22 in the autumn/early winter period and 1–78 in the spring return period (Tables 1–2). Thus combined totals were lower in the autumn/early winter than in the spring (Figure 1).

There was a tendency for more Little Gulls to be counted during the autumn/early winter in the first few years of study (i.e. 1988/1989 and 1989/1990) than later, when more Little Gulls were counted in the spring. That was partly because more spring counts were made in recent years (e.g., two counts in spring 1988/1989 compared to 16 counts in spring 1995/1996; Table 1). However, when we adjusted counts for the number of visits (log-transformed data) the linear regression of spring counts on year demonstrated a marginally significant increase in gull numbers (SLR; $F_{1,6} = 5.27$, $r^2 = 0.468$, $P =$

0.0614; Figure 2a). Conversely, there was a non-significant decline in counts of Little Gulls made during the autumn period ($F_{1,6} = 3.61$, $r^2 = 0.376$, $P = 0.1066$; Figure 2b). Although most correlations between autumn/early winter counts of Bonaparte's Gulls and Little Gulls were negative, in only two seasons did they approach statistical significance (1990/1991 $r_s = -0.396$, $n=23$, $P = 0.0616$ and 1991/1992, $r_s = -0.396$, $n=26$, $P = 0.0616$). For the combined spring and fall counts only one of 10 tests was significant ($r_s = 0.566$, $n=18$, $P = 0.0143$).

Discussion

Relative importance of the Niagara River

Our results suggest that the Niagara River is a very important staging area for Little Gulls, as it is for Bonaparte's Gulls (Kirk and co-workers, unpublished manuscript), particularly during the spring.

The recent increase in spring counts of Little Gulls at the Niagara River is supported by a comparison with Ontario seasonal summaries for spring (1 March to 31 May) and autumn (1 August to 30 November) reported in National Audubon Society Field Notes (ASFN; Ridout 1994, 1995a,b, 1996a,b). A maximum of only five Little Gulls was counted at the Niagara River in 1994, or less than 10% of the provincial total of 52 Little Gulls; the maximum count (16 birds) was at Whitby (east of Toronto) on 29 April (Ridout 1994). By contrast, out of a total of 121 Little Gulls counted throughout the entire province during the spring season of 1995, 54 (44.6%) were from the Niagara River alone (Ridout 1995b). Although Ridout (1996b) did not give provincial totals for the spring of 1996, a maximum of 78 Little Gulls was counted on the Niagara River (5 April), and 60 at Oshawa Marsh (29 April). We could not compare autumn totals province-wide with those made at the Niagara River because of lack of coverage for the months prior to October.

Trends in Little Gull numbers

Our results suggest that the number of Little Gulls staging on the Niagara River has increased in recent years, and dramatically so in the last two years of study. However, there was a suggestion that numbers had decreased in the autumn/early winter period and increased in the spring. We do not believe our data are sufficiently robust in themselves to support such a conclusion, but the decrease in fall numbers is supported by an analysis of Christmas Bird Counts (CBC) in 1920–1989 (Weseloh 1994). Albeit from a short time span (December–January), that analysis indicated that the autumn/early winter distribution of Little Gulls was previously centred on the Niagara River [e.g., Speirs (1985) cited a report of 29 Little Gulls on 4 November 1973], but has shifted to Long Point. For example, there were eight and 21 Little Gull on 4 November 1973) but has shifted to Long Point. For example, there were eight and 21 Little Gulls counted at Long Point for the CBC in 1993–1994 and 1994–1995, respectively at Long Point, whereas for the Niagara River the counts were only two and one birds (LeBaron 1994, 1995). However, there were no Little Gulls on the 1995–1996 Little Gull CBC at Long Point (LeBaron 1996). We caution that CBC data may be misleading for monitoring trends in Little Gull numbers because whether or not gulls are counted depends on whether water bodies are frozen.

Conversely, the more recent increases in spring counts on the Niagara River coincide with a decrease in Little Gulls at Long Point (J. D. McCracken, personal communication). For example, in 1996 the spring season count of Little Gulls was 78 on the Niagara River, but none were reported for Long Point (Ridout 1996b). This suggests that Little Gulls may have different spring and autumn migration

routes; interestingly, in the Camargue (southern France), the overland route is used more in the spring, particularly by adults, than in the autumn (see Cramp and Simmons 1983 for references).

Timing of staging

Because GB did not begin counting until October, he probably missed large numbers of Little Gulls that arrive with Bonaparte's Gulls in late summer and early autumn (July–September). Although the earliest autumn record for the Niagara Region in the period 1938–1960 was 23 August (1953), the normal staging period was considered by Beardslee and Mitchell (1965) to be 1 September to 11 January. During the 1960s, in the western New York region, the Little Gull occurred from 8 August to 21 January (Burger and Brownstein 1968). Weir (1989) recorded the average autumn arrival date in the Kingston area as 29 September (earliest was 8 August 1960) but this is not representative of southern Ontario in general. In southern Ontario the first autumn migrant Little Gulls arrive with the first waves of Bonaparte's Gulls, typically on 26 July at Point Pelee (A. Wormington, personal communication); the four earliest dates for Point Pelee for Little Gulls are 14 July 1983; 16 July 1978, 18–20 July 1995, and 22–23 July 1994.

Furthermore, Burger and Brownstein (1968) suggested that there were two peaks in numbers of Little Gulls on their autumn/early winter migration. While that may be true, judging by the low numbers counted it seems difficult to ascertain and the authors may have been referring to the well-known bimodal migration pattern of Bonaparte's Gulls during autumn/early winter staging (Beardslee 1944). In the spring, the earliest recorded in the Niagara Frontier Region was 7 April (1946), followed by a bird at Dunkirk Harbour on the 10 April (Beardslee and Mitchell 1965). A review of seasonal dates is presented by Speirs (1985) for other sites in the province, as well as the Niagara River.

Our results suggest that either Little Gull populations increased in recent years and/or there has been a shift in staging areas (from Long Point to the Niagara River area, at least in spring). If continued, standardized counts may be useful for examining population trends or shifts in movements/feeding patterns or wintering areas in Little Gulls, as recommended for Bonaparte's Gull (Kirk and co-workers unpublished manuscript). The Niagara River provides a unique opportunity to count gulls on the way to their nocturnal roosts.

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