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THE FALL MIGRATION OF JAEGERS ON LAKE ONTARIO

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Abstract.—There is a regular annual fall migration of jaegers (*Stercorarius spp.*) over the Great Lakes. Data from shoreline observation sites show that higher numbers of jaegers have been reported from Lake Ontario. Parasitic Jaegers account for 80% of identified jaegers and 70% of these are juveniles. Peak migration of Parasitic Jaegers (*S. parasiticus*) occurs between 22 September and 27 October. Peak migration of Pomarine Jaegers (*S. pomarinus*) was 1–2 wk later. Approximately 70% of the days of high jaeger counts occurred on the day of or day after the passage of a cold front. Two weather conditions, one dominated by a strong low pressure system and the other by a strong high pressure system, are associated with 90% of the high-count days. Weather and occurrence data support the hypothesis that jaegers seen on Lake Ontario originate from James Bay.

MIGRACIÓN OTOÑAL DE ESTERCORARIOS EN EL LAGO ONTARIO

Sinopsis.—Ocurre una migración otoñal regular de estercorarios (*Stercorarius* spp.) sobre los Grandes Lagos. Datos obtenidos a través de observaciones desde la orilla muestran un gran número de informes de estercorarios para el Lago Ontario. El 80% de las aves identificadas pertenecen a la especie *Stercorarius parasiticus*, de las cuales el 70% corresponde a juveniles. El pico de la migración de ésta especie ocurre del 22 de septiembre al 27 de octubre. El pico de la migración para *S. pomarinus* ocurrió de 1–2 semanas después. Aproximadamente el 70% de las fechas de altos conteos ocurrieron el mismo día o uno después de pasar un frente frio. Dos condiciones climatológicas estuvieron asociadas al 90% de los días de altos conteos. Estas son: sistemas fuertes de baja y de alta presión. El patrón climatológico y las observaciones apoyan la hipótesis de que las aves que llegan al Lago Ontario provienen de la Bahía James.

Although jaegers have been known to carry out overland migration, this is an unusual occurrence and a poorly studied phenomenon. Dean et al. (1976) describe an inland spring migration of jaegers in Alaska through the Canning River valley. Furness (1987) points out that Parasitic Jaegers (*S. parasiticus*) undertake an overland fall migration across northern Russia to the Persian Gulf. It is recognized that jaegers regularly migrate inland through Lake Ontario (Bull 1974), as well as all the other Great Lakes. Because they appear annually in fall, the Great Lakes region provide an opportunity to observe inland jaegers.

The purpose of this paper is to quantify the timing, source, and influence of weather on the fall migration of jaegers seen on Lake Ontario. Sight records, taken over a relatively long period of time from shoreline observation sites, were used to develop a data base that was related to these three aspects of migration.

METHODS

Jaeger migration was quantified at three sites on Lake Ontario: Hamilton, Ontario (43°16′N, 79°50′W), Hamlin Beach State Park, New York (43°22′N, 77°54′W), and Derby Hill, near Mexico, New York (43°32′N,

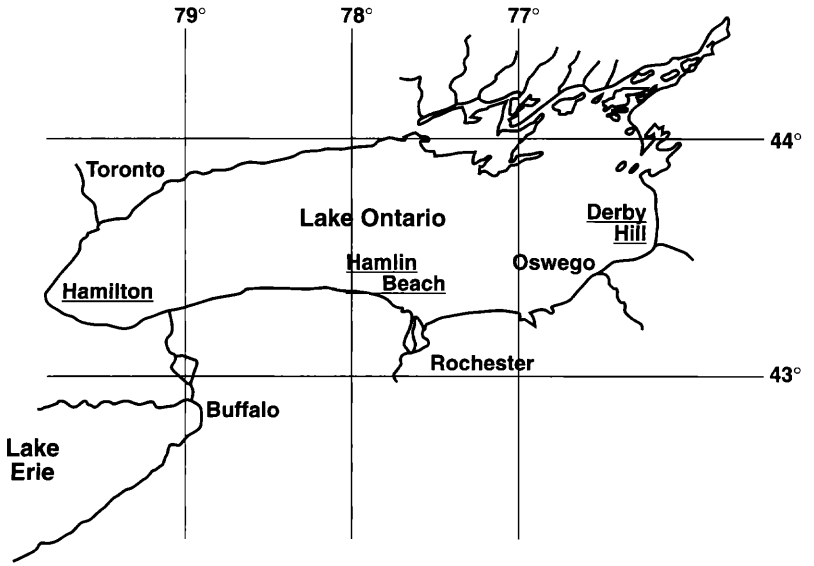

FIGURE 1. Lake Ontario observation sites.

76°13′W) (Fig. 1). Hamlin Beach State Park and Derby Hill provide elevated panoramic views of Lake Ontario. Derby Hill is on Mexico Bay, which forms the southeastern corner of Lake Ontario. Fall waterbird flights concentrate there with northwest winds (Crumb and Smith 1980). Hamlin Beach State Park is almost mid-way between the east and west end of Lake Ontario and is an excellent observation point because of its northern location with respect to the south shore. The prime viewing area at Hamilton is Van Wagner's Beach, which is the western apex of Lake Ontario.

At some sites, the time, weather conditions, and directions of migrant jaegers are recorded. Information reported included dates, number of individuals seen in one day, and separation by species. Details of observer coverage and data sources are available in New York State records (Sherony 1997). The daily sight records used for this study are for the following periods: Derby Hill 1966–1994; Hamlin Beach 1976–1994; Hamilton 1980–1994. For comparison purposes, the sight reports for jaegers at other regularly staffed observation sites across the Great Lakes were also collected covering the period of the past 10–20 yr. The four sites include: Duluth, Minnesota and Whitefish Point Bird Observatory (WPBO) on Lake Superior; Gary, Indiana on Lake Michigan; and Sarnia, Ontario on Lake Huron. Although jaeger identification can be difficult, identification of species at different sites was accepted as reported.

Weather conditions were analyzed for days when high numbers of jaegers were seen. A high number of jaegers was defined as more than ten in one day at Derby Hill and Hamilton or more than five at Hamlin

Beach. Local climatological data for Syracuse and Rochester, New York were obtained from NOAA and used to determine the timing of fronts. Barometric pressure data at Syracuse was used for Derby Hill and Rochester data used for Hamlin Beach. Derby Hill is 56 km north of Syracuse and Hamlin Beach is 38 km west of Rochester. Daily weather maps, also from NOAA, were used to track weather systems on the same dates as above.

RESULTS

When annual jaeger counts were high on the east side of Lake Ontario, they tended to be low on the west side of the lake and vice versa (Sherony 1997). This pattern was also apparent on days of high counts (Table 1). There were only two days when both Derby Hill and Hamlin Beach had a high-count on the same day. This suggests that the same birds are not being counted at the three different sites. Parasitic Jaegers dominated counts at all three sites (Sherony 1997). An average total of 80 Parasitic Jaegers was seen annually with peak migration from 22 September to 27 October; there was an average of about 12 birds/wk during the peak period (Fig. 2). The median date of passage was 3 October. A total of 394 jaegers at Derby Hill in 1973 suggests the number of jaegers using this migratory corridor annually. Only about 30 total individual Parasitic Jaegers were identified by age at Derby Hill and, of these, 70% were juveniles.

The mean annual total of Pomarine Jaegers (*S. pomarinus*) seen on all of Lake Ontario was 7.6, which was less than 10% of the number of Parasitic Jaegers. Pomarine Jaegers showed a broad peak in migration from 29 September to 3 November (Fig. 3). The median date of occurrence was 13 October. The Hamilton and Derby Hill data both indicate that 90% of the individuals that were aged were identified as juveniles. Although it is likely that some errors are being made in separating the two species, if we assume random identification errors over time, the data indicate that peak migration of Pomarine Jaegers is 1–2 wk later than that of Parasitic Jaegers. Parasitic Jaeger migration tended to end more abruptly than that of Pomarine.

There were few sight reports of Long-Tailed Jaeger (*S. longicaudus*) on Lake Ontario and most were from the west end of the lake. They include one from Derby Hill (Smith 1977), one from Hamlin Beach, and eleven from Hamilton.

Annually, higher numbers of jaegers were seen on Lake Ontario than on the other Great Lakes (Fig. 4). The mean annual total jaeger count from the three sites on Lake Ontario and the four sites previously mentioned showed an increasing trend from west to east. An average of 130 jaegers are reported annually from all seven sites.

For Hamlin Beach and Derby Hill combined, 30% of 37 high-count days occurred on the day a low pressure system passed, 41% one day later, and 14% two days later (Table 1). Fifteen percent of high-count days did not show a relationship between the passage of low pressure at the study site.

TABLE 1. Dates for jaeger high-count days at three reporting sites on Lake Ontario.

Locations	Date of high count	No. jaegers seen	Days after low pressure passes observation pt.	Weather cond. supporting migration[a]
Hamlin Beach	11/11/76	5	1	A2
	10/14/79	5	1	A2-B1
	10/26/80	14	0	A1
	11/2/80	5	2	B2-B1
	9/29/81	28	1	B1
	9/3/82	6	1	A1
	9/16/82	10	0	A1
	10/16/82	14	0	A1
	9/1/83	11	1	B2
	8/23/84	11	0	B1
	9/1/84	6	2	possibly B1
	10/29/84	5	1	B1
	8/27/85	12	2	A1
	9/12/85	6	—	B1
	9/13/85	5	—	B1
	9/27/85	6	0	F
	10/10/87	5	—	B1
	10/22/89	5	1	A1
Hamilton	10/30/83	10	—	A2
	9/24/88	7	—	A2
	10/20/91	8	—	B2
	10/28/91	12	—	A2
	11/1/91	18	—	B2
	11/17/91	15	—	B2
	9/12/92	10	—	B1
	9/16/93	12	—	B2
	10/25/93	25	—	A2
	9/24/94	7	—	B1
	9/25/94	10	—	B2-B1
Derby Hill	10/5/73	189	1	A1
	10/14/73	90	—	A1
	11/3/73	93	2	A1
	10/6/75	21	0	C
	10/10/76	31	1	A1
	9/3/77	29	—	B1
	10/10/77	13	1	A1
	10/7/78	15	1	A1
	10/7/79	202	0	A2
	10/12/80	19	0	A1
	10/19/80	38	1	C
	10/26/80	40	0	A1
	9/29/81	55	2	C-B1
	10/7/81	23	0	A1
	10/15/82	21	0	A1
	10/27/83	12	1	A2
	10/6/85	14	1	C

TABLE 1. Continued.

Locations	Date of high count	No. jaegers seen	Days after low pressure passes observation pt.	Weather cond. supporting migration[a]
	10/25/87	10	—	A1
	11/18/88	10	1	C

[a] A1 = The trailing edge of a strong low pressure cell passes just east of a line from James Bay (JB) to Lake Ontario (LO) (with a possible high pressure system to the west) on the day of high count, A2 = Strong low pressure cell east of a line from JB to LO on the day before high count, B1 = The leading edge of a strong high pressure cell reaches just west of a line from JB to LO on the day of high count, B2 = Strong high pressure cell west of a line from JB or LO on the day before high count, C = Low pressure cell north of JB on the day of high count, F = No correlation with weather pattern.

Analysis of NOAA daily weather maps showed that high-count days occurred on the day of or day after certain weather patterns (Table 1).

From the data in Table 1, 52% of the high-count days occurred when a strong low pressure system was east of a line from James Bay to Lake Ontario and 35% occurred when a strong high pressure system was west of the same line. Eight percent of high-count days occur when a low pressure cell is located to the north of James Bay; this condition can also produce a southward moving cold front. Finally, two percent (one high-count day), are not clearly related to the daily weather pattern on the day of or before high count.

DISCUSSION

The frequency of occurrences of Parasitic Jaegers (Fig. 2) implies two peaks: the first week of September and second week of October. It is expected that the earlier peak would have a higher percentage of adults but there are inadequate sight records for verification. Pittaway and Burke (1995) reported that juvenile Parasitic Jaegers outnumber adults in Hamilton and that two-thirds of the jaegers seen at Sarnia, Ontario are juveniles. Although the occurrence data indicates a high percentage of immature jaegers, separation of sub-adults and juveniles is almost beyond the scope of shoreline observation for distant birds. But at least some jaegers are seen at close range at all three sites. Sub-adults are rarely ever reported in observations of close birds. Dark-phase Parasitic adults are seen and they are less frequent than light-phase adults (Pittaway and Burke 1995). Although the sample size is small for the frequency of occurrences of Pomarine Jaegers (Fig. 3), the shape of this distribution is different from that of Parasitic Jaegers in that it indicates proportionately more late migrants. The lack of sight records of Long-tailed Jaeger in central and eastern Lake Ontario may be due to the fact that these birds are being overlooked. There are two fall specimens of Long-tailed Jaeger

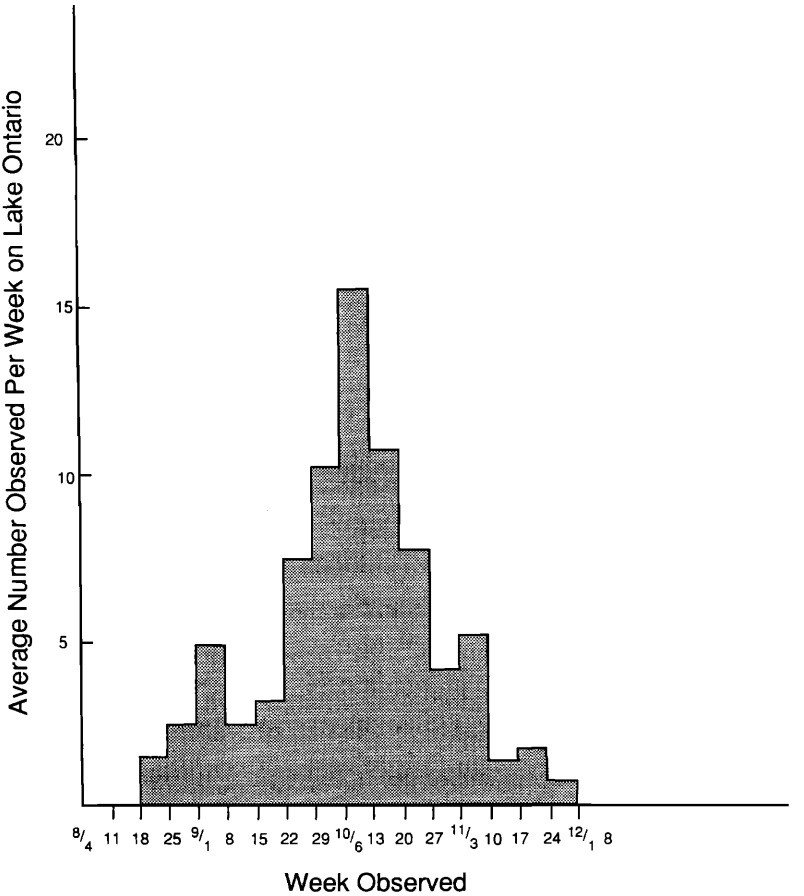

FIGURE 2. Historical average number of Parasitic Jaegers seen per week over the three reporting sites on Lake Ontario.

found dead in the Finger Lakes region south of Derby Hill, and another found at Sandy Ponds which is in the southeast corner of Lake Ontario near Derby Hill. Two of these specimens are mentioned in Bull (1974). Although there are too few reports to draw any conclusions, it is clear that small numbers of Long-tailed Jaegers do migrate over Lake Ontario.

The weather patterns that are strongly associated with jaeger high-count days are the logical source of migration events. These conditions produce strong northerly winds for 90% of the high-count events (see also Sherony and Brock 1997). Weather patterns with pressure systems following one another are recognized to induce autumnal southbound migration (Alerstam 1990). Olsen and Larsson (1997) state that shoreline observations of fall pelagic jaeger migration in northern Europe occur with low pressure systems but make no mention of migration with high pressure cells.

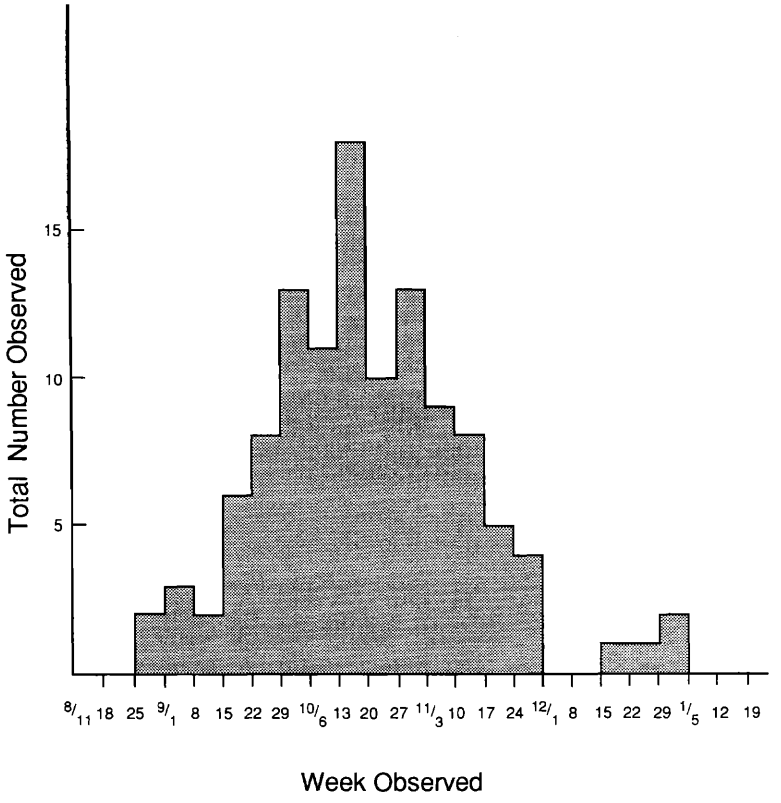

FIGURE 3. Total number of Pomarine Jaegers observed versus time from the three reporting sites on Lake Ontario.

The relationship between high-count days and the passage of a cold front can be explained, at least in part, from overall weather maps. When low pressure systems move from west to east, north of the Great Lakes, jaeger high-count days usually occur on the day of lowest pressure. When low pressure systems move from south to north, high-count days occur on the day after the passage of the lowest pressure. High-count days that occur in the absence of a cold front are induced by high pressure systems or tropical low pressure systems.

The conclusion that James Bay is the primary source of jaegers seen on Lake Ontario is inferred from the weather and occurrence data. The weather data, which shows that 52% of high-count days occur on the day a low pressure system is east of a line from James Bay to Lake Ontario, rules out jaeger migration onto the Great Lakes from east of James Bay. It is also known that jaegers do not follow the St. Lawrence River. Steeves, et al. (1989) carried out a 14-yr study on the migration of larids on the St. Lawrence River at Beauharnois, Quebec. Over this period, larids were

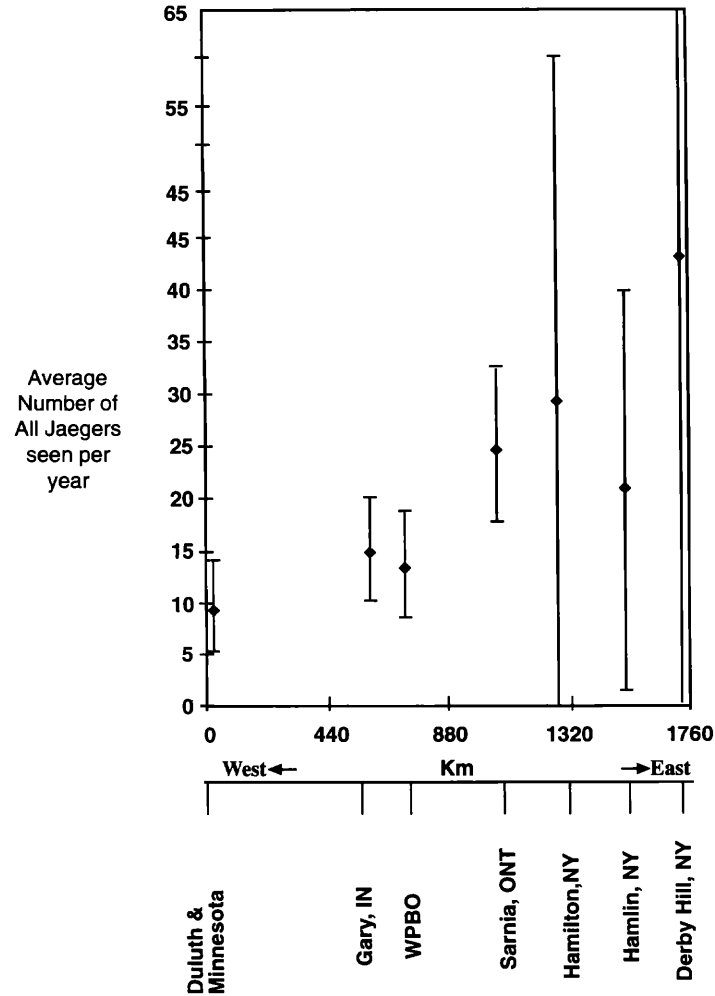

FIGURE 4. Mean (±SD) number of all jaegers sighted annually for seven reporting sites versus distance across the Great Lakes.

counted on 591 days. In this time, a total of 9 jaegers were seen. The association between the position of weather systems and high-count days favor a James Bay source. The distribution of jaegers seen across the Great Lakes is also supportive of this premise.

In summary, sight records from three locations on Lake Ontario give an indication of the timing of jaeger migration. The occurrence data for all jaegers taken over the entire lake would indicate that fall jaegers are relatively common on Lake Ontario and that more jaegers are seen on the eastern side of the Great Lakes. The concept of jaeger high-count

days was used to identify migration dates that were then related to weather systems that create favorable winds and imply a James Bay source.

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