ONTARIO BIRDS

VOLUME 33 NUMBER 1
APRIL 2015

JOURNAL OF THE ONTARIO FIELD ORNITHOLOGISTS

ONTARIO BIRDS

VOLUME 33 NUMBER 1
APRIL 2015
PAGES 1 — 48

Cover Illustration: Little Gull *by Barry Kent MacKay*

ISSN 0822-3890
Publications Mail Agreement No. 40046348

Historical Overview, Seasonal Timing and Abundance of Little Gull at Point Pelee, Ontario

Alan Wormington

Introduction

The Little Gull (*Hydrocoloeus minutus*) is a widespread and relatively common species across much of Europe and Asia, but in North America it is generally categorized as rare and local. Large numbers, however, are occasionally reported in Ontario, and the province is often considered to be the epicentre of Little Gull abundance within the continent (*e.g.*, see Hoar and Weseloh 2012).

Following the discovery of the first nests of Little Gull in North America at Oshawa Second Marsh, *Durham,* in 1962 (Scott 1962, 1963; Richards 1973), there have been additional nestings in southern Ontario. With the year of first nesting, these include 1970 at Rondeau Provincial Park, *Chatham-Kent* (Goodwin 1971, Kelley 1978:40), 1971 at Cranberry Marsh, *Durham* (Richards 1973, Tozer and Richards 1974), 1977 at Bassett Island, *Lambton* (Kelley 1983) and 1979 at North Limestone Island, *Parry Sound* (Mills 1981:64, Weseloh 2007). Such nestings indicate that Little Gulls could be found breeding at any suitable location along the Great Lakes — including Point Pelee. However, despite the sporadic nestings in southern Ontario (and elsewhere in the Great Lakes Region), it is generally assumed that within North America most Little Gulls nest in the Hudson Bay Lowlands (McRae 1989, Ewins and Weseloh 1999).

There has been considerable debate over the decades concerning the increase of Little Gull sightings in Ontario (and North America); was this increase the result of a relatively recent colonization from the Old World as suggested by some

Figure 1. Western Lake Erie showing the location of the study area (Point Pelee Birding Area).

authors (Baillie 1963, Hutchinson and Neath 1978, Austen *et al.* 1994), or had the species been present all along but simply overlooked (McRae 1989)? That some birds are derived from the Old World has been proven by banding records, and this even includes a banded bird observed at Point Pelee. On 25 July 2001, the author observed a pair of adult Little Gulls at Sturgeon Creek, one of which was banded. With the aid of a telescope most of the band number was read, enough so that later it was determined the bird had been banded in Finland, almost certainly in the nest (as a chick) in 1998 (Anonymous 2001).

The purpose of this paper is to present a comprehensive account on the status of Little Gull at Point Pelee, to include detailed information on seasonal timing, abundance and the behaviour of the various age classes. In almost all respects, the migration and timing of Little Gull at Point Pelee (and southern Ontario generally) is essentially identical to that of Bonaparte's Gull, with only a few minor differences. These differences are detailed below in the seasonal accounts. "Point Pelee" refers to the official Point Pelee Birding Area, which is a standard Christmas Bird Count circle (24 km/15 mile diameter) centred just north of Point Pelee National Park; the area includes Wheatley and Wheatley Provincial Park to the northeast, and Leamington and Seacliff Beach to the northwest (Figure 1).

Methods and Sources of Information

Information for this paper is derived from multiple sources. Since the late 1970s, the author has consistently compiled seasonal summaries of bird sightings for the Point Pelee Birding Area; these include both personal sightings in addition to those of many visiting birders. For the period prior to the late 1970s, information on Little Gull was gleaned mostly from the published literature, and for both historical and recent records this included a complete review of the journals *Audubon Field Notes* (1947–1970), *American Birds* (1971–1993), *Field Notes* (1994–1998) and *North American Birds* (1999–2014). For Point Pelee specifically, much of the *useable* data for Little Gull pertains to recent times. On an annual basis, consistent and detailed reporting of all bird species at Point Pelee did not begin until the late 1970s, thus most of the data on Little Gull presented in this paper are based on that time period to the present.

The interpretation of records rests largely with the author, who has studied in detail the seasonal status of Little Gull at Point Pelee since the early 1980s. The interpretation of data can occasionally be subjective; however, over the longer term distinctive seasonal patterns have emerged that can support the various viewpoints that have evolved over time. To describe the various ages of Little Gull, for clarity I have elected to use an age-based system rather than a plumage-based system. Thus, various groups are discussed and categorized based on their age, even though plumage descriptors are sometimes added for additional clarity. Especially for gulls, the age-based system was first popularized by Grant (1982).

Historical Overview

The first Little Gull recorded at Point Pelee was on 25 April 1957. On that date an adult bird was seen in flight over Lake Erie opposite Sanctuary Pond (just south of the entrance to Point Pelee National Park); the observers were Robert A. Henry, Peter J. Hamel, Robert W. Stamp and P. Norman Chesterfield (Hamel 1958, Wormington 2007). Also in 1957, on 24 May, a first-summer Little Gull was observed at the Tip by John A. Crosby *et al.* This was the famous "Ross's Gull" as published by some authors (Stirrett 1973a:18, James *et al.* 1976:27, Speirs 1985:365), but the drawings of this bird are so superb, there is no question that they instead portray a Little Gull (James 1984, Wormington 2007). Little Gull was not recorded again at Point Pelee until 18 September 1961 (Stirrett 1973b:20); the species was then found almost annually through to the early 1970s, and then annually thereafter to the present.

The number of reported observations over the decades appears to match closely the increase of birder activity at Point Pelee during the same time period. Certainly in modern times at Point Pelee, it has consistently been noted that the majority of Little Gulls are still found by a minority of birders. This strongly suggests that the species is still overlooked by many birders and, as such, may explain why earlier visits to Point Pelee failed to record the species. Fewer birders, fewer visits, and overlooking the species (all in combination), could easily account for the apparent scarcity of early records.

The regularity of Little Gull today at Point Pelee can be attributed to a number of factors. The waters of the western basin

LITTLE GULL

Uncommon Spring and Fall Transient
Irregular Rare (Usually Absent) Summer Resident (Breeding Suspected)
Uncommon Summer Visitor (Non-Breeding)
Very Rare Winter Visitor

(Winter / February 13, 16, March 15) **March 20 – May 18** (May 30, June 3, 6 / Summer)
(Summer / June 28, July 9, 10) **July 15 – December 24** (January 11, 16, 23 / Winter)

Figure 2. A summary of the status of Little Gull at Point Pelee throughout the year. Dates in bold text indicate "normal" first and last dates for migration (spring and fall); dates not in bold text indicate extreme migration dates. (From Wormington 2015).

of Lake Erie are both shallow and rich in food sources, and this has always attracted huge numbers of various waterbirds. Point Pelee proper hosts a wide range of habitats that specifically attract large numbers of gulls. These include abundant offshore waters, long stretches of accessible shoreline (mostly sand beaches), large marshes (Hillman Marsh and Pelee Marsh), several harbours and marinas (Wheatley, Sturgeon Creek and Leamington), and expansive areas of large and very flat agricultural fields. All of these habitats are compacted into a relatively small area, and apparently provide excellent benefits for Little Gull — namely areas for both feeding and loafing.

Seasonal Status and Timing

The seasonal status of Little Gull at Point Pelee is rather complex. Occurrences at Point Pelee include both spring and fall migrants, in addition to numbers that also summer here (Figure 2). Depending on the time of year, the behaviour of adult and immature birds can be markedly different, and this further adds to the overall complexity. Also, immature birds form the bulk of the summering population, but this age class is essentially unknown during the few winters when the species has been recorded. Almost always, Little Gulls at Point Pelee are found in association with the much more numerous Bonaparte's Gull. The seasonal status and timing of Little Gull at Point Pelee is presented below in separate sections, for both spring and fall migrations, and for summer and winter seasons.

Spring Migration

Previously it was described that Bonaparte's Gulls at Point Pelee during spring (and fall) engage in what has been described as a "two-tier" migration (Wormington 2001a, 2013a; Tozer 2012:150-151), and this applies to Little Gull as well. After departing their wintering grounds, birds initially make a long-distance flight to a specific region, where at that general location they remain for some time while moulting into summer plumage. Later they then make another long-distance flight, this time essentially direct to their boreal breeding grounds.

The earliest three records for spring migrants at Point Pelee are as follows:

- **13 February 2001**: one adult, Wheatley Harbour (Alan Wormington, Henrietta T. O'Neill). This bird was with a flock of 27 adult Bonaparte's Gulls, which likewise were the earliest spring migrants of the species ever recorded at Point Pelee (Wormington 2013a). Prior to this observation, no wintering Bonaparte's Gulls had been present at Point Pelee, and the last fall migrants were reported in late December of the previous year (Wormington 2001b). Also, that winter it is known that no Bonaparte's Gulls wintered along the Lake Erie shoreline in Ohio, a location where wintering birds are often abundant (Wormington 2013a). The spring migration of 2001 started exceptionally early at Point Pelee, with 13 species (including Little Gull) found on record-early dates up to just 20 February alone (Wormington 2001c).

- **16 February 2006**: two adults, Wheatley Harbour (Alan Wormington). Despite the fact that numbers of Bonaparte's Gulls were wintering this season at Point Pelee, these Little Gulls are nonetheless considered spring migrants. Not only were the two birds together (suggesting a mated pair), but during the same week there was a major incursion of spring migrants of various species at Point Pelee (Wormington 2006).

- **15 March 1983**: one adult, NE Hillman Marsh (Alan Wormington). This bird was associating with 255 Bonaparte's Gulls, the first influx of that species for the spring (Runtz 1983:9).

The first spring migrants typically arrive at Point Pelee during the general time frame of late March to early April, but the first recorded arrivals tend to be erratic for the simple reason that the species is not overly common. In fact, the first migrants tend to be single birds only. Later, if any concentrations of Little Gulls develop at Point Pelee, it is usually during the period including the middle of April to the middle of May (Figure 3). During this time period the vast majority of birds are adults, since first-summer immatures do not normally put in a first appearance until late April or early May, and even then, single birds only are the norm (Figure 4). It is typical for adult Little Gulls to remain at Point Pelee until the middle of May (or occasionally later), but eventually there will be a quick exodus of adult birds and these departures generally correspond to a sudden increase in temperature (and associated south winds).

Spring migrants at Point Pelee spend a great deal of time foraging, and during this time they are apt to be found at several different locations. These include all shorelines, both inshore and offshore waters of Lake Erie, local harbours, marinas and marshes, and agricultural fields (especially those that are wet or flooded). At this time of year, most Little Gulls are typically found among concentrations of Bonaparte's Gulls.

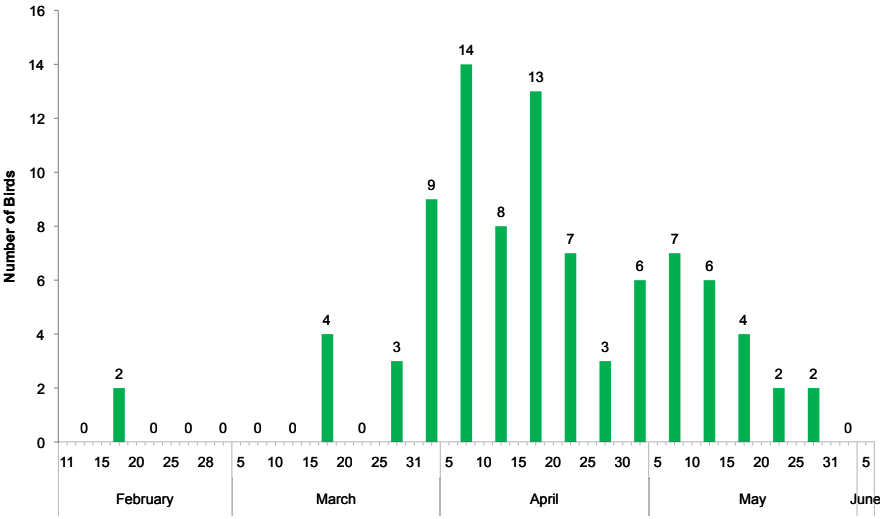


Figure 3. Maximum daily counts (two or more birds) for Little Gull during spring migration at Point Pelee, presented in 5-day intervals. For the period after 10 May, adult birds only are included since after that date it is not possible to determine if observed first-summer immatures are spring migrants or, instead, potential summering birds.

Figure 4. A first-summer (one-year-old) immature Little Gull at the Tip of Point Pelee National Park, on 8 May 2014. *Photo: Alan Wormington.*

The earliest four records for first-summer (one-year-old) immatures at Point Pelee are as follows:

- **25 March 2011**: one, Lake Erie at NE Hillman Marsh (Marianne B. Reid).
- **3 April 1983**: one, Wheatley Harbour (Alan Wormington).
- **10 April 1984**: one, Tip (Paul D. Pratt, Audrey S. Weir, Esther A. Cusick).
- **14 April 2013**: one, Concession Road E (Jeremy M. Bensette *et al.*).

The highest daily counts for spring migrants at Point Pelee are as follows (with adults-only included after 10 May):

- **14** — 9 April 1983: Wheatley Harbour (Alan Wormington, Michael J. Oldham); all of these birds were adults. At the same location 13 adults were also present on 18 April (Runtz 1983:9) and 9 birds (mixed ages) were present on 3 April (A. Wormington, unpublished data).
- **7** — 7 May 1971: Hillman Marsh (Joseph P. Kleiman, Jeffrey A. Greenhouse, Dennis F. Rupert).
- **7** — 25 April 1992: 6-Wheatley Harbour (Alan Wormington), 1-Onion Fields (Karl R. Overman, Warren A. Hall).
- **6** — 11 May 2001: 5-Hillman Marsh, 1-Tip (Dean J. Ware).
- **5** — 7 May 1998: Tip (David Smitley, J. Michael Tate *et al.*).
- **5** — 10 May 2000: 3-Wheatley Harbour (Alfred H. Rider), 2-Tip (Kevin A. McLaughlin)
- **4** — 17 May 1981: Hillman Marsh (Mike Parr *et al.*).
- **4** — 16 March 2002: Wheatley Harbour (Dean J. Ware)
- **4** — 16 May 2008: Wheatley Harbour to NW Hillman Marsh (Alan Wormington *et al.*).

The latest three records for spring migrants (adults) at Point Pelee are as follows:

- **6 June 1978**: one summer-plumaged adult (present since 24 May), Tip (Alan Wormington, Peter Whelan *et al.*).
- **3 June 2012**: one summer-plumaged adult, NW Hillman Marsh (Dean J. Ware).
- **30 May 1969**: one summer-plumaged adult, Tip (James L. Baillie *et al.*).

As I previously described for Bonaparte's Gull (Wormington 2013a), the latest spring migrants (adults) to be recorded at Point Pelee for that species are 26 May (1983), 25 May (1996) and 25 May (2008). In comparison, the latest spring occurrences for Little Gull are all later than those dates, which indicates that the species can be a slightly later spring migrant (on average) than Bonaparte's Gull.

Summer

Summer – Suspected Breeding

During the summer of 2009, there was a series of sightings involving adult birds, which suggested nesting at Point Pelee even though no direct evidence was obtained (Wormington 2009). This was the first time ever that any age-class other than first-summer immature had been recorded at Point Pelee during summer (Wormington 2015). The observation of adults included two at NW Hillman Marsh on 3 June (Marianne B. Reid). This was followed by the observation of single adults on 14 June at East Beach (Blake A. Mann) and 26 June at Concession Road E (Alan Wormington); both of these locations are immediately adjacent to Pelee Marsh. All of these sightings may have pertained to the same pair of adults, and the fact that later sightings were of single birds only suggests that the missing adult could have been attending a nearby nest. Within Pelee Marsh, the species could easily nest in association with the many pairs of Black Terns that are present here, where such a nesting would be very difficult to detect.

In 2013, an adult bird was seen at the Tip on 16 June (Alan Wormington, Stephen T. Pike, Cassandra L. Gagnon, Robert G. Hill) and presumably the same adult was also there on 22 June (Blake A. Mann); both times the bird was associating with summering, immature Bonaparte's Gulls (Wormington 2013b). Presumably this adult was a failed breeder, but its origin is unknown. Likely, however, it was engaged in breeding activity somewhere in the Great Lakes Region, but not necessarily close to Point Pelee.

Summer – Non-Breeding

All Little Gulls found summering at Point Pelee have been first-summer immatures, with the exception of adult birds recorded in 2009 and 2013 as described above. Summering immatures are invariably found associating with flocks of similar-aged Bonaparte's Gulls, which feed or congregate at such locations as the Tip, East Beach, Onion Fields (located directly north of Point Pelee National Park), Hillman Marsh, Seacliff Beach or Leamington Marina. The number of Little Gulls that are present during any single summer seems to be directly correlated to the population size of summering Bonaparte's Gulls.

First-summer (immature) Little Gulls are relatively late arrivals at Point Pelee, and are normally not detected for the first time until late April or early May. Keeping in mind that this age class (and the species as a whole) is not common, nonetheless it appears that first-summer Little Gulls arrive somewhat later (on average) than similar-aged Bonaparte's Gulls (Wormington 2013a). Tabulations for first-summer Little Gulls are presented for the middle of May through to late July (Figure 5), but not all birds during this period necessarily pertain to those that summered at Point Pelee. Numbers are sometimes present in the middle of May or late May, but many of these birds are likely spring migrants that will eventually depart the area. As to when the spring passage of first-summer immatures is over is not precisely known. However, certainly by the first of June all birds present at Point Pelee can be assumed to be

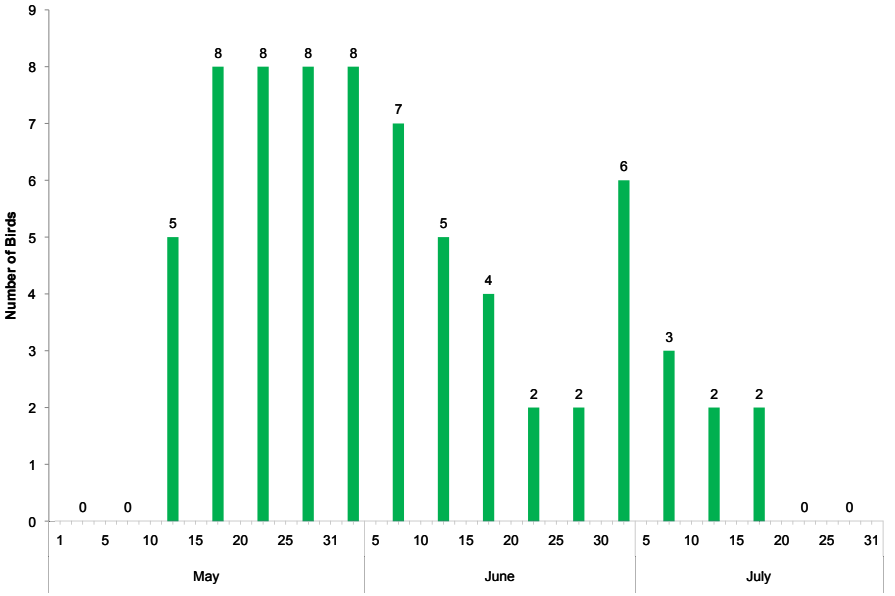


Figure 5. Maximum daily counts (two or more birds) for first-summer (immature) Little Gulls at Point Pelee, presented in 5-day intervals.

summering. Tabulations for first-summer immatures extend to late July only, after which this age class is difficult to find and in fact there are no observations pertaining to more than single birds only.

Although most summering records presumably refer to birds that have remained throughout the season (either at or near Point Pelee), numbers tend to peak in late May through to the middle of June and then gradually decrease thereafter (Figure 5); by July and August, summering birds can be exceedingly difficult to locate. This pattern of declining numbers may indicate that some birds continue to move northwards, perhaps not as true migrants but instead as nomadic wanderers. In any event, they appear to move away from Point Pelee during this time.

The highest daily counts for first-summer immatures at Point Pelee during specific summer seasons (on or after 1 June) are as follows:

- **8** — 5 June 1999: Onion Fields (Alan Wormington *et al.*).
- **7** — 8 June 2007: Hillman Marsh (Alan Wormington).
- **6** — 3 June 2000: Hillman Beach (Dean J. Ware).
- **6** — 1 July 2006: west side of Tip (Alan Wormington).
- **5** — 13 June 1989: 3-Onion Fields, 2-Tip (Alan Wormington).
- **5** — 10 June 1993: Northeast Beach (Alan Wormington).
- **5** — 9 June 1995: SW Hillman Marsh (Alan Wormington).

During some years, significant numbers of first-summer Little Gulls can be found summering at Point Pelee. During the summer of 2006 it was estimated that 15-20 different birds were recorded in the area (Wormington 2007). At least 12 birds were estimated for the summer of 2009 (Wormington 2009), and during the summer of 1992 at least 10 birds were probably present (Wormington 1992). Early in the summer it is not unusual to observe three or more birds per day; however, after the middle of June it becomes progressively more difficult to find summering birds, when a single bird per day, at most, is then the norm.

Fall Migration

Similar to Bonaparte's Gull (see Wormington 2013a), the fall migration of Little Gull at Point Pelee extends over a remarkable length of time, from the middle of July to late December — well over five months of the year (Figure 6). Adult birds initially arrive in breeding plumage, complete with a black hood; while at Point Pelee (or elsewhere) they then undergo a complete wing and body moult before eventually leaving the area in fresh winter plumage. Similar to spring migration, birds during fall again engage in a "two-tier" migration strategy as described previously. In referring to Bonaparte's Gull specifically, Howell and Dunn (2007:302-305) refer to this migration pattern as a "bimodal fall passage." The start of fall migration is very early and involves adult birds in immaculate summer (breeding) plumage. The earliest arrivals are presumably failed breeders. Throughout the entire fall migration of Little Gull at Point Pelee, adult birds are always encountered much more frequently than any other age class.

The earliest four records for fall migrants at Point Pelee are as follows:

- **28 June 2005**: one summer-plumaged adult (present to at least 3 July), NW Hillman Marsh (Dean J. Ware, Alan Wormington *et al.*). On both 29 June and 3 July, a second adult was also present, suggesting a probable pair was involved. In addition to these very early individuals, additional early fall migrants appeared at NW Hillman Marsh including three adults on 7 July (Alan Wormington); subsequently at least eight more adults were recorded at various Point Pelee locations up to 28 July inclusive, indicating that the fall migration of the species during 2005 was unusually early. Also on 28 June of the same year, record-early Bonaparte's Gulls were also observed at NW Hillman Marsh, when four adults were seen (Wormington 2005).

- **9 July 2009**: five summer-plumaged adults, West Cranberry Pond (Alan Wormington). Immediately after this observation, there was a series of additional sightings of adult birds, and by the end of the month at least 30 adults had been recorded (Wormington 2009). Similar to 2005, this indicates that the fall migration of the species in 2009 was unusually early.

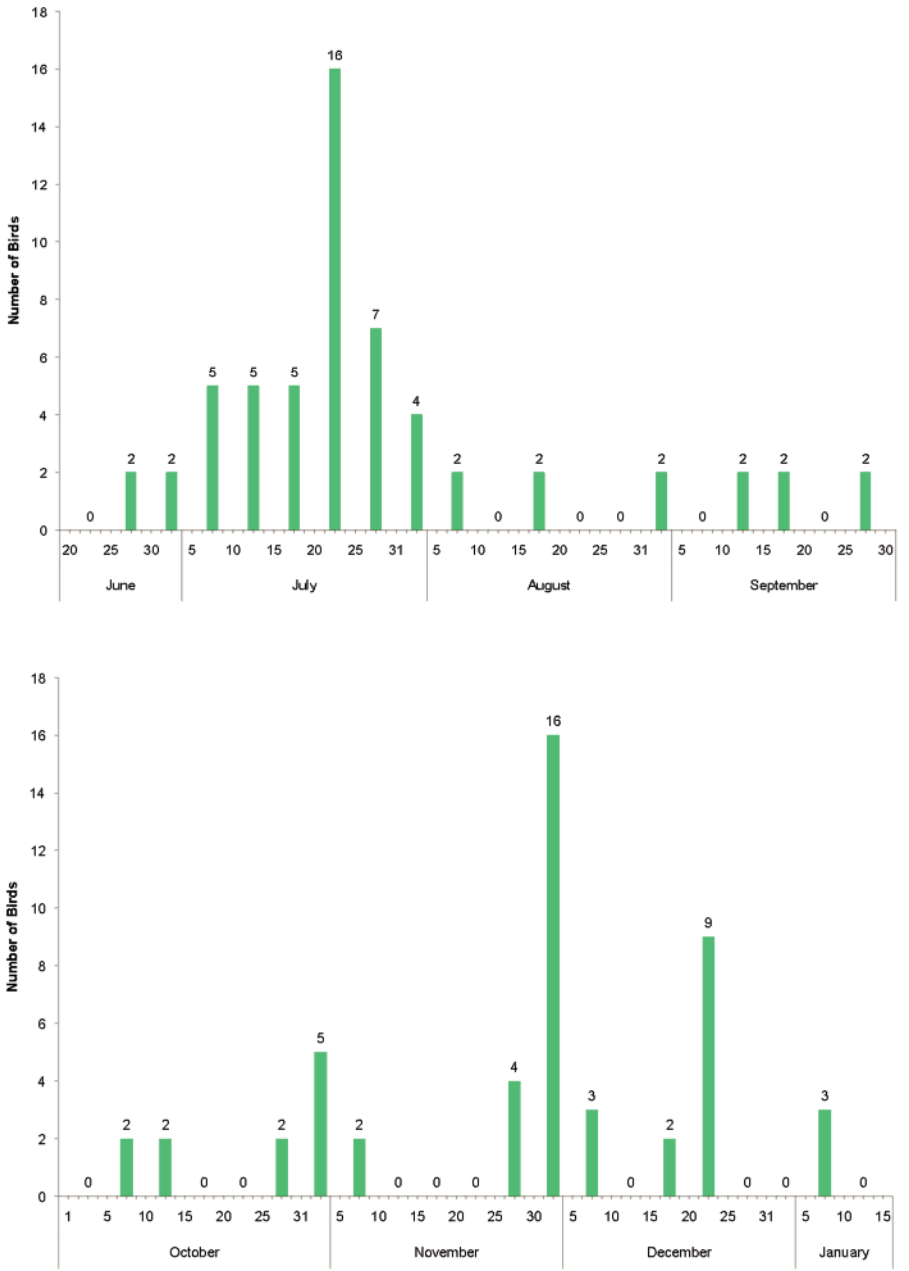


Figure 6. Maximum daily counts for Little Gull during fall migration at Point Pelee, presented in 5-day intervals.

- **10 July 2002**: two summer-plumaged adults (pair?), Lake Erie at Pelee Drive (Alan Wormington). These birds were associating with 14 adult Bonaparte's Gulls, also the first fall migrants of that species to be found at Point Pelee in 2002 (Wormington 2002).
- **10 July 2013**: one second-summer adult, Concession Road C (Alan Wormington).

The behaviour of fall migrants at Point Pelee is variable, depending on the time period involved. During the initial arrival of adult Little Gulls during July, birds will often congregate with similar-aged Bonaparte's Gulls. Huge flocks of Bonaparte's Gulls often congregate at specific sites where they remain for extended periods (Wormington 2013a), and it is here where numbers of Little Gulls can sometimes be found. Favoured sites during this time period may include Seacliff Beach, the Onion Fields, Pelee Marsh and the Tip (Figure 7).

For the remainder of fall migration (through to December), Little Gulls at Point Pelee tend to be highly nomadic. Most observations pertain to birds in transit, and rarely will the same bird be seen on subsequent days. Single birds flying past the Tip of Point Pelee represents a typical sighting of this nature. Here they are apt to be found in association with Bonaparte's Gulls, where large numbers of that species may pass the Tip in a short period of time during any given day.

Figure 7. An adult Little Gull in second-summer plumage at Seacliff Beach, a regular loafing location for this species at Point Pelee. This bird, photographed on 12 July 2008, was the first fall migrant to be recorded at Point Pelee that season. *Photo: Alan Wormington*

Presumably these daily flights are related to feeding, with changing winds and other unknown factors dictating their direction and intensity. Very late in the season, Bonaparte's Gulls may concentrate at various marinas and harbours, particularly Wheatley Harbour which is a favoured location; it is amongst these concentrations where the occasional Little Gull will also be found (Figure 8). During the late-fall time period, Little Gulls are rarely encountered in local marshes or in agricultural fields (in contrast to earlier in the season).

The highest daily counts for fall migrants at Point Pelee are as follows:

- **16** — 4 December 1990: Wheatley Harbour (Alan Wormington); this total included 13 adults, 2 first-winter birds, and one second-winter bird.
- **16** — 23 July 2009: SE Onion Fields (Alan Wormington); all of these birds were adults.
- **9** — 22 December 1984: this total was attained during the Christmas Bird Count that was conducted on this date; three birds were at Leamington, three at the Tip and singles at East Beach, Hillman Marsh and Wheatley Harbour (multiple observers).
- **7** — 21 July 2006: Seacliff Beach (Alan Wormington); all of these birds were adults.
- **7** — 28 July 2014: Seacliff Beach (Alan Wormington); all of these birds were adults.

Figure 8. An adult Little Gull on 12 December 2014 at Wheatley Harbour, a location where this species may appear during late-fall migration with some regularity. *Photo: Lev A. Frid*

- **5** — 1 November 1992: 3-Tip, 2-Leamington Marina (Alan Wormington, Jon L. Dunn, Sue Tackett); all of these birds were adults.
- **5** — 5 November 2007: 3-Lake Erie at NE Hillman Marsh, 2-Tip (Kevin A. McLaughlin, Alan Wormington); all of these birds were adults.
- **5** — 9 July 2009: West Cranberry Pond (Alan Wormington); all of these birds were adults.
- **5** — 15 July 2009: flying south off Tip (Alan Wormington); all of these birds were adults.

Similar to Bonaparte's Gull (see Wormington 2013a), Little Gulls can linger exceptionally late during fall migration in southern Ontario. At Point Pelee, fall migrants have been recorded to the middle and late December with some regularity, with 24 December considered a "normal" last date for fall migration (as shown in Figure 2); the very latest fall migrants have been recorded into January.

The latest three records for fall migrants at Point Pelee are as follows:

- **23 January 2010**: one adult, Tip (Blake A. Mann). Also at the Tip on the same date were an exceptional 900 Bonaparte's Gulls, the last fall migrants of that species to be recorded; in adjacent Ohio waters it is known that most Bonaparte's Gulls had departed by the middle of January, with very few birds present thereafter (Wormington 2010).
- **16 January 1983**: one adult, Wheatley Harbour (Alan Wormington); this bird was associating with 250 Bonaparte's Gulls, and the last fall migrants of that species were six birds on 22 January at the same location (Wormington 1983).
- **11 January 1985**: one adult, Wheatley Harbour (Alan Wormington); this bird was associating with 400 Bonaparte's Gulls, and it was just two days later on 13 January when the last fall migrants of that species (3 birds) were recorded (Wormington 1985).

Juvenile Birds

Observations of Little Gull in true juvenile plumage at Point Pelee are relatively few. Most years the first immature birds are not recorded until late September or later, when they have already moulted into first-winter plumage. Thus, the migration of juvenile Little Gulls is distinctly different from those of Bonaparte's Gull, even though fall adults of both species arrive at Point Pelee at essentially the same time (Wormington 2015). Juvenile Bonaparte's Gulls arrive exceptionally early at Point Pelee, where they are recorded annually by late July (Wormington 2013a). Shortly thereafter numbers may build up rapidly, indicating that many birds begin their southward journey immediately upon leaving the nest. An example of an exceptional concentration of early juvenile Bonaparte's Gulls is the 120 birds present on 29 July 2010 (Wormington 2015). In contrast, juvenile Little Gulls arrive considerably later at Point Pelee, and are generally not detected most years until late September or later. The differential between the earliest-ever arrival of a juvenile Bonaparte's

Gull at Point Pelee on 19 July (Wormington 2013a) and the earliest-ever juvenile Little Gull on 20 August (Wormington 2014) is a significant 32 days. Excluding the very early 20 August record of a juvenile Little Gull, the next earliest record is 2 September, which creates a differential arrival (compared to the earliest-ever juvenile Bonaparte's Gull) of 45 days. The pattern of late-arriving juvenile Little Gulls suggests that after leaving the nest they remain relatively close by, rather than quickly migrating south, as is the case with many juvenile Bonaparte's Gulls. At least in Ontario, juvenile Little Gulls are routinely seen during the month of August on James Bay, where nesting is presumed to be widespread within the Hudson Bay Lowlands; an example of this includes the several juveniles that were seen by the author and others at Netitishi Point, southern James Bay, during the period of 13-26 August 2011 inclusive (Wormington 2011).

The earliest four records for juvenile birds at Point Pelee are as follows:

- **20 August 2014**: one, Seacliff Beach (Richard P. Carr).
- **2 September 1981**: one, Tip (Robert G. Finlayson).
- **3 September 1980**: one, Tip (Alan Wormington, Ron Ridout).
- **3 September 2003**: one, Tip (Sarah E. Rupert).

Winter

Similar to Bonaparte's Gull (see Wormington 2013a), true overwintering of Little Gull in Ontario is a relatively rare event. Speirs (1985:336-337) provided a long series of records categorized as "winter" records for multiple locations in southern Ontario, but virtually all of these pertain to late-fall migrants within the time frame of early December to early January inclusive. The only location in the province where Little Gull is somewhat regular as a true overwintering species is the Niagara River, where very small numbers might be present during some winters (Bellerby *et al.* 2000).

At Point Pelee the overwintering of Little Gull is likewise a rare event, even though fall migrants may linger into the middle or late December with some regularity (Figure 6). In total, Little Gull has been recorded as wintering at Point Pelee during only three winter seasons. I previously reported that Bonaparte's Gull had been recorded as wintering at Point Pelee during only eight winter seasons (Wormington 2013a); all wintering records of Little Gull pertain to three of these eight seasons.

The first true winter record of Little Gull for Point Pelee involved a second-winter immature that was present at Wheatley Harbour on 12 February 1991 (Alan Wormington); this bird appeared with a flock of 75 Bonaparte's Gulls (Wormington 1991), an unusual concentration for mid-winter.

In 1998, a single adult was observed at Wheatley Harbour on 26 and 28 February (Alan Wormington *et al.*); on 27 February of the same year, two adults were found at the Tip amongst an exceptional concentration of 550 over-wintering Bonaparte's Gulls (Alan Wormington). Although impossible to determine with certainty, it is assumed that three different Little Gulls were involved in these sightings.

During the winter of 2001-2002, there was a series of Little Gull observations that pertained to birds that were over-wintering at Point Pelee. These included two adults at Wheatley Harbour on 10 February (Blake A. Mann); two adults (perhaps the same) were also at Wheatley Harbour on 28 February–2 March (Alan Wormington *et al.*). Then on 9 March, two separate adults were seen — one at Wheatley Harbour, and another flying over fields just north of Hillman Marsh (Karl R. Overman, James B. Lesser); perhaps these were the same two birds once more. Finally, from 28 February–8 March, a first-winter immature was also present at Wheatley Harbour (Alan Wormington *et al.*).

When describing the status of wintering Bonaparte's Gulls at Point Pelee (Wormington 2013a), I noted that there is often an uptick in numbers very late in the season, namely during the period of late February to the middle of March. Such late-winter increases were documented in four different years (1998, 2002, 2006 and 2012), out of the eight years in total in which wintering of the species has taken place at Point Pelee. Of the three winter seasons in which Little Gull has been recorded at Point Pelee, two have been during the four years thus described for wintering Bonaparte's Gull. These late-winter increases are typically triggered by warm weather and thus melting of ice cover on Lake Erie, and the source of these birds is presumed to be from the Lake Erie shoreline of Ohio, where large numbers are known to be wintering. Thus these late-winter concentrations are derived from birds that are already wintering elsewhere on Lake Erie (predominately in Ohio waters), and they simply shift to Point Pelee when conditions become favourable.

Little Gull concentrations elsewhere on Lake Erie

Point Pelee is a significant location for Little Gull in southern Ontario, but elsewhere on Lake Erie there are several additional locations that are also significant. Below is a tabulation for Little Gull concentrations elsewhere on Lake Erie, at selected Ontario sites. Included are actual record-high counts, in addition to other high counts of note that pertain to various times of the year.

Rondeau Birding Area, Chatham–Kent Regional Municipality

- **56** — 27 March 1983: Erieau to Shrewsbury (Alan Wormington, Keith J. Burk, P. Allen Woodliffe); all of these birds were adults.
- **35** — 6 July 1974: Erieau (Joseph P. Kleiman).
- **17** — 5 July 1975: Erieau (Joseph P. Kleiman).
- **13** — 16 August 1974: Erieau (Keith J. Burk).
- **12** — 8 July 1970: Rondeau Marsh (Robert C. Simpson, John A. Kelley); this total included 4 adults and 8 juveniles (at two nests).
- **12** — 29 November 1985: Rondeau Provincial Park (Joseph L. Bartell, Judy Bartell); all of these birds were adults.
- **12** — 25 July 2009: Rondeau Provincial Park (Blake A. Mann); this total included 11 adults and one first-summer immature.
- **11** — 12 October 2014: Rondeau Provincial Park (Blake A. Mann, James T. Burk); this total included 9 adults and 2 first-summer birds.
- **10** — 3 April 2009: Erieau (James T. Burk); all of these birds were adults.
- **9** — 26 May 2006: Shrewsbury (David A. Martin, Linda Wladarski); all of these birds were first-summer immatures.

Elgin County

- **22** — 5 October 2011: Port Burwell (Kenneth G.D. Burrell); this total included 14 adults, 4 second-winter, and 4 first-winter birds.
- **17** — 28 August 2011: Port Burwell (Kenneth G.D. Burrell).
- **15** — 11 September 2005: Port Burwell (David A. Martin, Linda Wladarski, Ross C. Snider); this total included 8 juveniles and 7 adult birds.
- **15** — 28 March 2007: Port Bruce (Bruce de Boer, Christine de Boer).
- **14** — 19 July 2001: Port Burwell (David A. Martin, Linda Wladarski *et al.*); this total included 11 adults, two first-summer, and one second-summer bird.
- **10** — 4 August 2003: Port Burwell (David A. Martin, Linda Wladarski); this total included 8 adults and 2 first-summer birds.
- **10** — 16 December 2012: Port Burwell (Jeffrey H. Skevington).

Long Point Birding Area, Norfolk County

- **266** — 6 November 1988: Inner Bay at Port Rowan (Ron Ridout, Donald A. Sutherland); these birds were virtually all adults.
- **250** — 25 November 2002: Inner Bay at Port Rowan (Richard Joos).
- **145** — 11 March 2012: Turkey Point (Barbara N. Charlton, Robert Z. Dobos, Ron Ridout) — virtually all of these birds were adults, with the exception of 2 first-summer immatures.
- **130** — 26 October 2013: Inner Bay at Port Rowan and Long Point Causeway (Stuart A. Mackenzie, Ron Ridout); all of these birds were adults, with the exception of 6 first-winter immatures.

- **106** — 14 December 1991: Inner Bay at St. Williams (Alan Wormington, Claudia A. Schaefer, Mark W. Jennings); all of these birds were adults.
- **92** — 31 March 2013: Turkey Point (Ron Ridout).
- **73** — 28 July 1985: Long Point Flats (Alan Wormington, Alan W. McTavish, Tim Sabo); this total included 45 adults, 23 first-summer, and 5 second-summer birds.
- **50** — 21 August 1997: Courtright Ridge (David Geale, Gavin C. Platt) — the majority of these birds were adults.
- **45** — 11 April 1999: Turkey Point (Ron Ridout).
- **40** — 17 July 1976: Long Point Flats (B. Eaton, Rob Copeland).
- **37** — 29 June 1975: Long Point Flats (Alan Wormington); this total included 19 juveniles, 9 adults, and 9 first-summer birds; the presence of so many juveniles on the very early date undoubtedly indicates breeding at this site.

Port Dover, Norfolk County

- **120** — 3 November 1996: Port Dover (Long Point Bird Observatory).
- **30** — 4 April 2009: Port Dover (Philip D. Taylor).

Acknowledgements

All birders who have made observations at Point Pelee over the years, and who have later reported those observations by any one of a number of methods, deserve special recognition. Without such sightings, compilations as presented here for Little Gull would simply not be possible. Jeffrey Costa prepared some of the figures, and his time devoted to this task was much appreciated. Thanks to P. Allen Woodliffe, who provided Little Gull compilations for the Rondeau Birding Area. Likewise, David A. Martin researched Little Gull high counts for both Elgin County and Long Point. The writing of this paper was sponsored by Environment Canada, with a contract awarded to the author. D.V. "Chip" Weseloh and David J. Moore, Canadian Wildlife Service, were the Departmental Representatives for the contract.

Literature Cited

Anonymous. 2001. Point Pelee Little Gull Banded in Finland! Point Pelee Natural History News 1:82.

Austen, M.J.W., **M.D. Cadman** and **R.D. James**. 1994. Ontario Birds at Risk: Status and Conservation Needs. Federation of Ontario Naturalists and Long Point Bird Observatory. 165 pp.

Baillie, J.L. 1963. Three Bird Immigrants from the Old World. Transactions of the Royal Canadian Institute 34:95-105.

Bellerby, G., **D.A. Kirk** and **D.V. Weseloh**. 2000. Staging Little Gulls, *Larus minutus*, on the Niagara River, Ontario: 1987-1996. The Canadian Field-Naturalist 114:584-590.

Ewins, P.J. and **D.V. Weseloh**. 1999. Little Gull (*Hydrocoloeus minutus*), The Birds of North America Online (A. Poole, Editor). Ithaca: Cornell Laboratory of Ornithology; retrieved from: http://bna.birds.cornell.edu/bna/species/428

Goodwin, C.E. 1971. Ontario–Western New York Region. American Birds 25:851-854.

Grant, P.J. 1982. Gulls: a guide to identification. T. and A.D. Poyser Ltd.: Calton, Staffordshire, England. 280 pp.

Hamel, P. 1958. A trip to Point Pelee. Bulletin of the Federation of Ontario Naturalists 80:17-19.

Hoar, T. and **D.V.C Weseloh**. 2012. The Importance of one Great Lakes wetland to the continental population of one species: The Little Gull, *Larus minutus*, at Oshawa Second Marsh. Poster Presentation. Ontario Wetlands Conference: Toronto, Ontario.

Howell, S.N.G. and **J. Dunn**. 2007. Gulls of the Americas. Houghton Mifflin Company: Boston and New York. 516 pp.

Hutchinson, D. and **B. Neath**. 1978. Little Gulls in Britain and Ireland. British Birds 71:563-582.

James, R.D., **P.L. McLaren** and **J.C. Barlow**. 1976. Annotated Checklist of the Birds of Ontario. Royal Ontario Museum: Toronto. 75 pp.

James, R.D. 1984. Ontario Bird Records Committee Report for 1983. Ontario Birds 2:53-65.

Kelley, A.H. 1978. Birds of Southeastern Michigan and Southwestern Ontario. Cranbrook Institute of Science. Bloomfield Hills, Michigan. 99 pp.

Kelley, A.H. 1983. Birds of S.E. Michigan and S.W. Ontario: Notes on the Years 1975-1981. Jack-Pine Warbler 61:3-12.

McRae, D. 1989. Little Gull: Immigrant or Elusive Resident? Seasons 29(1):44-45.

Mills, A. 1981. A Cottager's Guide to The Birds of Muskoka and Parry Sound. Privately published, Toronto. 209 pp.

Richards, J.M. 1973. Little Gull Nestings. Ontario Naturalist 13(2):38-41.

Runtz, M. 1983. Sixth Annual (1983) Spring Migration Report: Point Pelee National Park & Vicinity. Parks Canada. 21 pp.

Scott, G. 1962. First recorded nesting of the little gull in the New World. The Naturalist 8:6-7.

Scott, G.A. 1963. First nesting of the Little Gull (*Larus minutus*) in Ontario and in the New World. Auk 80:548-549.

Speirs, J.M. 1985. Birds of Ontario. Natural Heritage / Natural History Inc.: Toronto, Ontario. 986 pp.

Stirrett, G.M. 1973a. The Spring Birds of Point Pelee National Park. Parks Canada: Ottawa. 32 pp.

Stirrett, G.M. 1973b. The Autumn Birds of Point Pelee National Park. Parks Canada: Ottawa. 36 pp.

Tozer, R. 2012. Birds of Algonquin Park. The Friends of Algonquin Park: Whitney, Ontario. 474 pp.

Tozer, R.G. and **J.M. Richards**. 1974. Birds of the Oshawa-Lake Scugog Region, Ontario. Alger Press Limited: Oshawa, Ontario. 384 pp.

Weseloh, D.V.C. 2007. Discovery and Nesting of the Little Gull on North Limestone Island, Georgian Bay, Lake Huron, 1979-1991. Ontario Birds 25:90-103.

Wormington, A. 1983. Point Pelee National Park & Vicinity – Winter Season 1982/1983. Unpublished. 6 pp.

Wormington, A. 1985. Point Pelee National Park & Vicinity – Winter Season 1984/1985. Unpublished. 6 pp.

Wormington, A. 1991. Point Pelee Observations – Winter 1990-91. Unpublished. 9 pp.

Wormington, A. 1992. Point Pelee Observations – Summer 1992. Unpublished. 6 pp.

Wormington, A. 2001a. Early Fall Migration of Bonaparte's Gull at Point Pelee. Point Pelee Natural History News 1:38-40.

Wormington, A. 2001b. Point Pelee Observations – Winter 2000-2001. Unpublished. 11 pp.

Wormington, A. 2001c. Early Migrants at Point Pelee: Spring 2001. Point Pelee Natural History News 1:9-11.

Wormington, A. 2002. Point Pelee Observations – Summer 2002. Unpublished. 8 pp.

Wormington, A. 2005. Point Pelee Observations – Summer 2005. Unpublished. 17 pp.

Wormington, A. 2006. Point Pelee Observations – Winter 2005-2006. Unpublished. 13 pp.

Wormington, A. 2007. Gulls of Point Pelee: Record 18 Species in 2006. OFO News 25(1):2-6.

Wormington, A. 2009. Point Pelee Observations – Summer 2009. Unpublished. 7 pp.

Wormington, A. 2010. Point Pelee Observations – Winter 2009-2010. Unpublished 6 pp.

Wormington, A. 2011. Southern James Bay – Fall 2011. Unpublished. 20 pp.

Wormington, A. 2013a. Historical Overview, Seasonal Timing and Abundance of Bonaparte's Gull at Point Pelee, Ontario. Ontario Birds 31:101-119.

Wormington, A. 2013b. Point Pelee Observations – Summer 2013. Unpublished. 7 pp.

Wormington, A. 2014. Point Pelee Observations – Fall 2014. Unpublished.

Wormington, A. 2015. The Birds of Point Pelee. Unpublished manuscript.

Alan Wormington
R.R. #1, Leamington, Ontario N8H 3V4
E-mail: wormington@juno.com

Avian window strikes at a Toronto office building, with regular opportunistic scavenging by American Crows (*Corvus brachyrhynchos*)

Emily Giles, Peter J. Ewins and Sarah Zachariah

Introduction

Bird mortalities caused by collisions with buildings is now known to be a leading cause of direct human-induced avian mortality in North America, second only to predation by domestic cats (Dunn 1993, Klem *et al.* 2004, Blancher 2013, Loss *et al.* 2014). In Canada alone, it is estimated that between 16 and 42 million birds die annually from collisions with buildings (Machtans *et al.* 2013). Large cities like Toronto, Ontario, pose a particular problem for migratory birds. Toronto contains over 950,000 registered buildings that have the potential to kill an estimated 1 to 9 million birds annually (FLAP 2015).

Although window strikes can occur during any time of day or night, many studies show that the majority of collisions occur during daylight hours (Gelb and Delacretaz 2006). Many migratory birds die in head-on collisions with glass during the day due to the reflective and/or transparent qualities of glass windows (Hager *et al.* 2008). Birds cannot detect glass, but instead see the reflection of vegetation in the window, mistaking the deadly glass window as habitat or a safe passageway (Klem *et al.* 2004).

Although substantial anecdotal evidence suggests that daytime window collisions are a significant issue in Toronto, very few published scientific studies in peer-reviewed journals exist. Bird collisions have been noted by staff working at

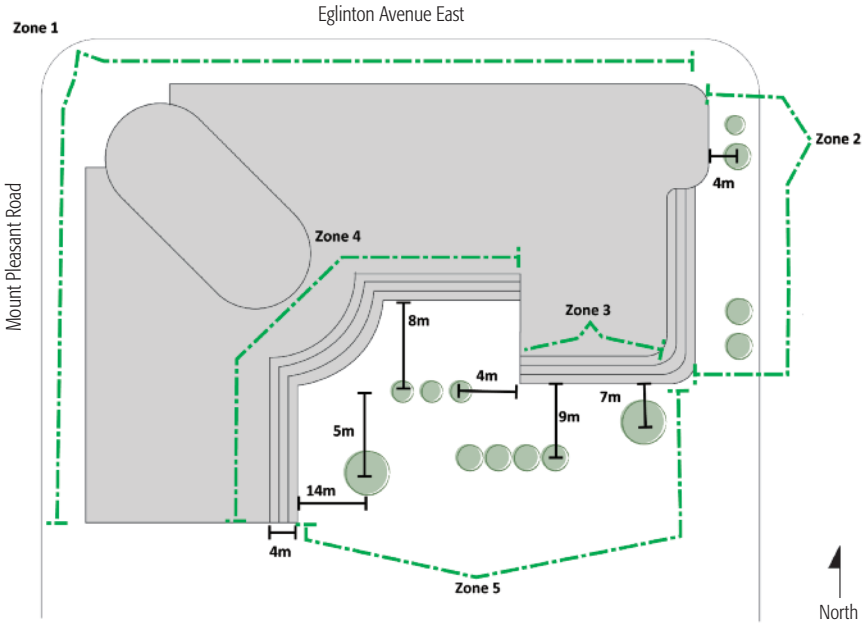


Figure 1. Plan of the WWF office building at 245 Eglinton Avenue East, Toronto, with location of the main nearby trees. Zones for the surveys conducted refer to those detailed in Table 2. Overall dimensions of the building are not drawn to scale.

the World Wildlife Fund Canada (WWF) head office in mid-town Toronto for a number of years. Staff at Fatal Light Awareness Program Canada (FLAP) — a non-profit, Toronto-based organization that works to safeguard migratory birds in urban environments — confirmed that their research indicated that this neighbourhood appeared to be a particular hotspot for bird collisions in Toronto (FLAP 2015). As a conservation-driven organization, WWF staff wanted to actively find a solution to this issue. Other initiatives that had been previously tested by WWF staff at the office, such as lowering blinds over the windows during both day and night time, were not demonstrating successful results (FLAP 2015).

The purpose of our study was to quantify the bird collisions that are occurring at the WWF office building during peak fall migration and to determine whether or not specific façades of the building or time of day were of particular concern. We also wanted to determine what species of birds were hitting the windows to see whether or not it was primarily fall migrants that were being affected. We wanted to investigate the possibility that more collisions were occurring where vegetation was reflected in the glass windows. It is hoped that the results of this study can be used to suggest solutions to building management to help mitigate this problem during subsequent migration seasons.

Methods

We conducted our study over a six-week period during fall migration season, from 18 September – 23 October 2014 at the WWF head office. The office is located in mid-town Toronto, in a four story building (Figure 1). We recognize that for some bird species significant fall migration is already underway in Ontario in August. The building is approximately 20 m high and has a flat roof. It is bordered by two busy streets — Eglinton Avenue to the north of the building and Mount Pleasant Road to the west. The WWF offices are located on the 4th floor of the building along the east and south sides of the building. A 1.2 m ledge extends beyond the windows along the 2nd, 3rd and 4th floors along parts of the south and east sides of the building (Figure 2). Most of the window panes on the building are 1.8 m in height and 1.4 m wide (area = 2.52 m^2) and are all double-glazed, tinted and highly reflective. All the windows of this building are of the same reflective type. Apart from four panes of glass that have micro-dot film attached to the exterior, from a past attempt to reduce bird collisions, there are no bird-scaring silhouettes or other modifications to any of these highly reflective windows. The south side of the building is enclosed by a garden, which contains both flower gardens as well as large deciduous trees, providing substantial cover and feeding grounds for birds

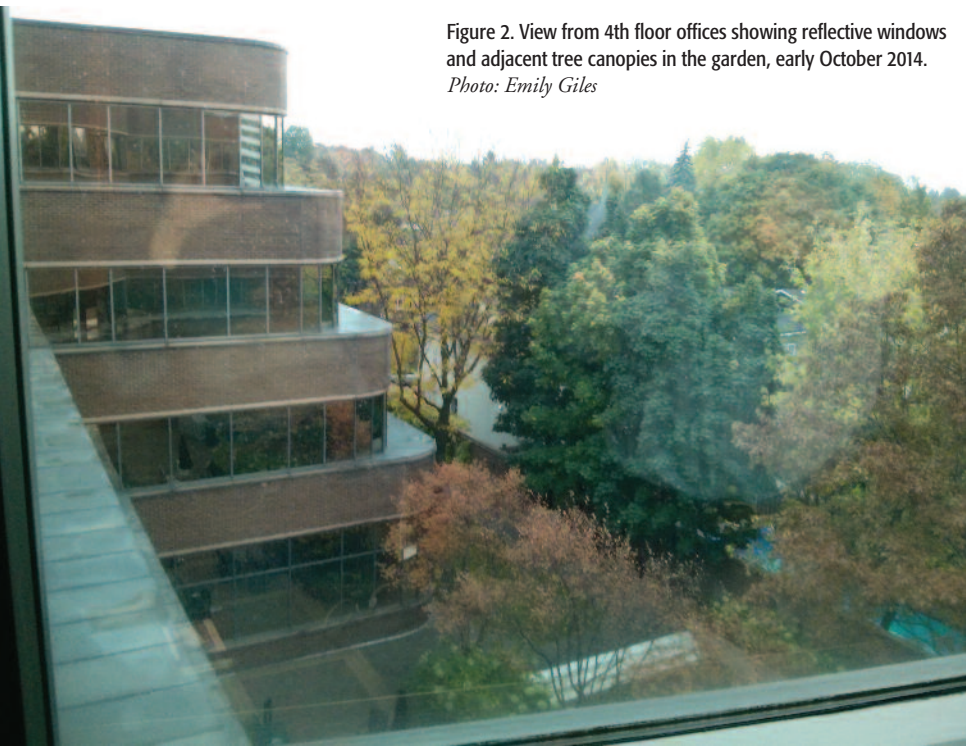


Figure 2. View from 4th floor offices showing reflective windows and adjacent tree canopies in the garden, early October 2014. *Photo: Emily Giles*

and other wildlife species. Approximately 55% of the southern face of the building is made up of uninterrupted horizontal glass panels (see Figure 2). The north and west sides of the building are on busy streets and have no adjacent trees or vegetation.

During the study period, the entire building perimeter was surveyed by a volunteer team of WWF staff members once to twice daily, depending on staff availability. The time of day for these surveys also varied slightly depending on volunteer availability, with the goal of surveying once early in the morning at first light (0700h - 0800h) and once again in late afternoon before nightfall (1630h-1730h). One or two staff per survey searched for evidence of bird window strikes from both inside the building from the 4th floor looking down along all three levels of the building's ledges, as well as outside the building around the perimeter and in the back gardens. On each survey the entire area of the ledges was surveyed from different vantage points in the 4th floor WWF offices.

Evidence of a window strike was determined by the presence of a bird body or the presence of a pile of bird feathers which likely indicated that a bird death had occurred and was consumed by a scavenger (following approaches taken by Klem *et al.* 2004). Dead birds found along the window ledges or on the ground in close proximity to the building (≤ 10m away) were recorded as window strikes. Live birds found with visible trauma, such as those found fluffed up along the ledges close to windows, sometimes with their heads tilted back or wings outstretched, were also documented and counted as a window strike. The type of evidence, as well as the location in relation to the building, were recorded and identified to species when possible. Feathers and carcasses were removed (where accessible to the surveyor) in order to prevent double counting. If they could not be removed, the precise location was recorded on the observation sheets in order to prevent double counting by the next volunteer. Weather conditions were also recorded.

Observed strikes that occurred at other times of day outside of the survey times were reported to the volunteer team and documented. The time to which the bird either recovered and flew off, was scavenged, or succumbed to its injuries was recorded whenever possible.

We divided the building into five different segments (Figure 1), to investigate whether or not there were any 'hot spots' with high incidence of bird window strikes.

Results

Overall results and temporal variations

During the six week period, we conducted 37 systematic surveys around the office building and documented evidence indicating that a total of 93 window strikes had occurred. A total of 11 species was identified, involving 19 individual birds, with the remainder being classed simply as passerine spp., warbler spp. or kinglet spp. (Table 1). The majority of bird remains we detected were from smaller migratory passerine species, with the largest being a Swainson's Thrush (*Catharus ustulatus*). The only species

Table 1. Breakdown of species and categories of bird collisions at 245 Eglinton Avenue East, Toronto, 18 September – 23 October 2014. Scientific names can be found in AOU (2015).

	WEEKLY SURVEY DATES						
SPECIES	18-19 Sept	22-26 Sept	29 Sept – 3 Oct	6-10 Oct	14-17 Oct	20-23 Oct	TOTAL
# surveys	**2**	**8**	**7**	**7**	**8**	**5**	**37**
Passerine sp.	3	12	13	11	9	15	63
Warbler sp.		3	3				6
Golden-crowned Kinglet				1	2	2	5
Kinglet sp.			1	2	1	1	5
Yellow-rumped Warbler			1	1	1		3
Red-eyed Vireo		1	1				2
Dark-eyed Junco					1	1	2
Black-throated Blue Warbler			1				1
American Redstart			1				1
Orange-crowned Warbler				1			1
Ruby-crowned Kinglet			1				1
Swainson's Thrush	1						1
Red-breasted Nuthatch			1				1
American Goldfinch		1					1
TOTAL #	**4**	**17**	**23**	**16**	**14**	**19**	**93**
%	**4.3**	**18.3**	**24.7**	**17.2**	**15.1**	**20.4**	

identified which we knew to be nesting in the neighbourhood was one American Goldfinch (*Spinus tristis*).

Although we were not able to maintain systematic daily surveys and removal of carcasses and piles of feathers, our observations indicated a fairly even distribution of new window collisions across the September-October migration period (Table 1).

Of our 37 surveys, 22 (60%) were in the morning — most within one hour of sunrise, and 15 (40%) were in the late afternoon. On the morning surveys, we recorded evidence of 77 strikes (85%), whereas on the afternoon surveys we noted only 14 new strikes (15%).

We examined daily and overnight local weather conditions in relation to our recorded numbers of new window collisions, but could not detect any obvious relationships. The four highest numbers of recorded new collisions were all on our morning surveys, and all but one of these

Table 2. Location of bird collisions in different sections around the office building at 245 Eglinton Avenue East, Toronto, 18 September – 23 October 2014.

	WEEKLY SURVEY DATES						
ZONE	18-19 Sept	22-26 Sept	29 Sept –3 Oct	6-10 Oct	14-17 Oct	20-23 Oct	TOTAL
# surveys	**2**	**8**	**7**	**7**	**8**	**5**	**37**
1 (N+W street)			1			2	3
2 (East)	1		2			2	5
3 (SE ledges)		4	2				6
4 (main ledges)	1	8	5	11	7	10	42
5 (ground)	2	5	13	5	7	5	37
TOTAL	**4**	**17**	**23**	**16**	**14**	**19**	**93**
Within Zone 4:							
Ledge 4th	1	4	3	6	3	9	26 (65%)
Ledge 3rd		1	2	2	4	1	10 (25%)
Ledge 2nd		1		3			4 (10%)
	1	**6**	**5**	**11**	**7**	**10**	**40**

days were dry and mild (8-17^{o}C) with little cloud cover and no precipitation: ten new strikes on 3 October; eight on 9 October; nine on 14 October; eight on 23 October. We recorded no new evidence of a strike on four of the morning surveys and on six of the afternoon surveys.

Window collisions around the building

The location of strikes was linked closely to the presence of trees near to the building's reflective windows (Table 2, Figure 1). Of the 93 passerine remains we found, only three were noted along the street sides of the building. Remains of 48 birds (52%) were noted on the main south-southeast facing three ledges with the large reflective windows, immediately adjacent to the trees within the garden. Remains of 37 (40%) were recorded on the ground in the garden area (Zone 5 in Table 2 and Figure 1).

Among strikes recorded on the three ledges on the southerly aspect of the building (Zone 4 in Figure 1), the majority (65%) were on the 4th floor ledge (Table 2, see example at Figures 2 and 3).

Behavioural observations

On eight occasions (all in the mid-late mornings), we observed birds colliding with the 2nd-4th floor windows, and then timed to either recovery, death, or removal by a scavenger. Two died instantly, one

(a Golden-crowned Kinglet, *Regulus satrapa*) lay stunned and gyrating for about 5 minutes and then removed to another location to be eaten by an American Crow (*Corvus brachyrhynchos*). The remaining five recovered (63%) and the mean time to recovery was 14 minutes (range 0-30 minutes). Observations of post-collision birds on the ledges revealed the main pattern of standing motionless often with a drooping wing (or often lying on one side and sometimes shaking rapidly), then eventually righting themselves and, if successful, flying off towards the garden trees (see Figure 3).

Among the eight observed window strikes, three were different Golden-crowned Kinglets flying from the canopy of the 19 m high tree in the adjacent garden and striking the 4th floor windows that were about 18m from the peak of the tree. Of these three strikes, only one kinglet survived. On another occasion, a Red-breasted Nuthatch (*Sitta canadensis*) was observed flying from the canopy of the same tree about 18m from the 4th floor windows, but it appeared to bounce and then fly uninjured back to the tree canopy.

In the gardens at the south side of the building, we found feces of both Raccoons (*Procyon lotor*), and Norway Rats (*Rattus norvegicus*), although none were seen in daylight hours and we assume that their activity was mainly nocturnal. Up to four domestic cats (*Felis catus*) regularly frequented the garden area in daylight hours, and presumably also at night, and on one occasion a cat surveyed the entire first floor ledge and sniffed the feathers still present (see Figure 1).

Figure 3. Dark-eyed Junco stunned after collision with East-facing windows on 4th floor of study building, October 2014. *Photo: Pete Ewins.*

On one occasion, at around 0830h we witnessed two American Crows chasing a kinglet spp. out of the crown of the adjacent 19 m-high tree, which appeared to have caused the kinglet to fly straight into the south-east facing window approximately 18 m from the tree. The kinglet fell to the ledge partly stunned after striking the window and then continued to be pursued by the two crows. Within 10 seconds the kinglet was captured and then plucked until the bird was eaten with only feathers remaining.

Discussion

Our findings are consistent with other studies of office building collisions, as the majority of strikes that occurred were migratory passerine species (Gelb and Delacretaz 2006, Borden *et al.* 2010). Our systematic surveys support the FLAP observations that the Yonge and Eglinton neighbourhood in Toronto constitutes a hotspot for bird-building collisions. However, we accept that our surveys were not started until part-way through the migration season and that we did not complete surveys every day. For these reasons, and in consideration of other biases outlined below, we feel it is premature to attempt any roll-up estimation of the total numbers of bird strikes that may have occurred at this building in the fall 2014 migration season.

The large number of collisions that we observed in the morning hours (85%) are consistent with the daily activity patterns of migratory birds passing through a treed urban neighbourhood. During the study period, we noted fairly regular large numbers and daily activity of different migrant passerines in the trees of nearby gardens. On some days before and just after sunrise, we noted up to ten passerines calling and foraging in trees adjacent to the building, consistent with general increased numbers of staging birds in the Toronto area on those days. We have no evidence to suggest that a significant number of strikes are occurring during the nighttime at our building. These findings are similar to studies on other low rise buildings that are dark during the night (Gelb and Delacretaz 2009).

Although we were surprised by the high number of collisions that occurred during the time period, overall we believe that the recorded evidence of 93 collisions likely represents a substantial underestimate of the actual number of window strikes that occurred. We think this is due to a number of biases, notably: 1) complete removal of a stunned or dead bird by a scavenger with no evidence left behind; and 2) birds that may have struck the window then recovered and flew off without being observed directly by office staff would leave no evidence of the strike behind.

We found 40% of the collision evidence located on the ground in the back garden of the building (Zone 5). These mortalities may not have all been related to window strikes, although for the purposes of this paper we assumed that all of them were. The majority of the bird remains found in Zone 5 were in the garden, either beneath or adjacent to shrub vegetation which had been planted for landscaping purposes. We often found fresh piles of feathers on the patio stones adjacent to these herbaceous beds, but there was usually no sign of any bones or

other body parts. We presume that all of these feather piles were from bird window strikes that fell to the ground and were scavenged overnight by mammals. However, this could be a potential source of overestimation as the birds may have died from other causes in this region, whereas bird carcasses found along the ledges of the building in Zone 3 and 4, were almost certainly victims of window strikes.

Although 63% of the observed strikes were documented as recoveries, we acknowledge that some of these birds may have recovered only temporarily. A proportion of these birds could have sustained an injury which weakened them and caused them to die shortly after our observation period, or to be more vulnerable to predation in the immediate time period that followed. This could result in an underestimation in the number of window collisions that resulted in mortalities.

The significant number of collisions that we recorded in Zones 4 and 5 (85%) supports our initial theory that more collisions occur in areas of high vegetation and is likely related to the tree canopy being reflected in large windows (Gelb and Delacretaz 2009). This hypothesis is further supported by the low number of collisions that were documented along Zone 1 (3%) and Zone 2 (5%), which contain little to no adjacent vegetation. We suspect that the configuration of large tree canopies close to the large facades of south and east facing windows represents a dead-end for migratory birds. Once birds entered the garden, the apparent next tree is often in fact a reflection of the tree canopy in a window. We believe that the garden area and adjacent windows formed a kind of 'dead-end' or 'cul-de-sac' for migrant passerines moving through this area. Of the collisions that occurred within Zone 4, 65% were recorded from the 4th floor windows and ledge. These 4th floor highly reflective windows were at a similar elevation (15-20 m above ground) to the crown of the six main trees in the garden (estimated tree heights = 18-19m). The trunks of these six largest

Figure 4. American Crows plucking a fresh victim (kinglet spp.) of a window collision, on a 4th floor ledge, October 2014. *Photo: Pete Ewins*

trees in the adjacent garden were a distance of from 11m – 18 m from the 4th floor windows (see Figure 1). Overall we believe that these windows within 20 m of significant tree canopies provide a very high risk of fatal collisions for migratory passerine species.

The ledges encompassing the windows provided a unique opportunity to observe post-collision response of the affected bird, as well as scavenger behaviour. Throughout the study period, three American Crows clearly scavenged large numbers of passerines that had struck the building's windows (see Figure 4). Our observations indicated that this was a pair of adults with one first-year auxiliary family member. On numerous occasions

(particularly in the first 4-5 hours of daylight), we noted these crows flying along the ledges and then quickly swooping down if a new bird carcass was present. Although we did not conduct any continuous watches over the area, incidental observations suggest that in the mornings especially, these crows scanned the ledge area and garden trees every 5 minutes or so, either by flying over, or simply by perching on the edge of the roof to the building.

Upon spotting a new carcass, the crows would either pick it up and fly off to the rooftop or a nearby large tree to pluck and eat, or they would kill and partially pluck and then consume on the ledge. On two occasions where a passerine had just struck a window, we observed a crow fly down to the ledge and then remove the whole carcass — leaving no feathers or body remains at all from the window collision.

The observation of crows appearing to chase the kinglet into the window could potentially be the first documented evidence of crows showing a learned killing technique, utilizing the windows as a stun agent. We found no mention of this behavior in the Birds of North America account for this crow species (Verbeek and Caffrey 2002). At this stage, we cannot discount the possibility that these intelligent creatures were doing this more frequently than we recorded.

Currently there is a growing realization that building design and regulatory codes must address the issue of bird collisions. For example, in Toronto, FLAP has developed the BirdSafe™ Building Standards and Risk Assessment and provide consulting to anyone looking to make their building BirdSafe™ in a more cost-effective way by zeroing in on the façades where the majority of collisions occur at a structure (FLAP 2015). In addition, a recent legal precedent has been set in Toronto, by Ontario Nature and Ecojustice, requiring building owners to adhere to the provisions under Ontario's Environmental Protection Act. It is now an offense to harm migratory birds with light reflected from building windows (Ecojustice 2015).

New types of windows can be made which break up the reflection in the window so that birds do not mistake the reflection for a tree (FLAP, pers. comm.). New informed guidance for landscape design could also help address the issue.

Acknowledgements

We thank FLAP staff members Paloma Plant and Michael Mesure, Chris Wedeles of ArborVitae Environmental Services and York University graduate student Sean Chin, for ongoing discussions and reviews of previous draft manuscripts. We are grateful to the WWF volunteer bird survey team (Olivia Fernandez, Robert Badley, Maya Ahmad, and Jessica Park), and to the building management team for help with recording and recovering bird carcasses. We also thank Alana Young who helped prepare Figure 1.

Literature Cited

American Ornithologists' Union (AOU). 2015. Checklist of North and Middle American Birds. http://checklist.aou.org/

Blancher, P.J. 2013. Estimated number of birds killed by house cats (*Felis catus*) in Canada. Avian Conservation and Ecology 8(2):3.

Borden, W.C., **O.M. Lockhart**, **A.W. Jones**, and **J.S. Lyons**. 2010. Seasonal, taxonomic, and local habitat components bird-window collisions on an urban university campus in Cleveland, OH. Ohio Journal of Science 110 (3):44-52.

Dunn, E.H. 1993. Bird mortality from striking residential windows in winter. Journal of Field Ornithology 64:302-309.

Ecojustice. 2015. http://www.ecojustice.ca/case/migratory-birds-building-collision/

FLAP. 2015. Fatal Light Awareness Program Canada. http://www.flap.org/faqs.php

Gelb, Y. and **N. Delacretaz**. 2006. Avian window strike mortality at an urban office building. Kingbird 56(3):190-198.

Gelb, Y. and **N. Delacretaz**. 2009. Windows and vegetation: primary factors in Manhattan bird collisions. Northeastern Naturalist 16(3):455-470.

Hager, S.B., **H. Trudell**, **K.J. McKay**, **S.M. Crandall** and **L. Mayer**. 2008. Bird density and mortality at windows. Wilson Journal of Ornithology 120(3):550-564.

Klem, D., Jr., **D.C. Keck**, **K.L. Marty**, **A.J. Miller Ball**, **E.E. Niciu**, and **C.T. Platt**. 2004. Effects of window angling, feeder placement, and scavengers on avian mortality at plate glass. Wilson Bulletin 116:69–73.

Loss, S.R., **T. Will**, **S.S. Loss** and **P.P. Marra**. 2014. Bird-building collisions in the United States: Estimates of annual mortality and species vulnerability. Condor: Ornithological Applications 116:8-23.

Machtans, C.S., **C.H.R. Wedeles** and **E.M. Bayne**. 2013. A first estimate for Canada of the number of birds killed by colliding with building windows. Avian Conservation and Ecology 8(2):6. http://www.ace-eco.org/vol8/iss2/art6/

Verbeek, N.A.M. and **C. Caffrey**. 2002. American Crow (*Corvus brachyrhynchos*). *In:* The Birds of North America, No. 647 (A. Poole and F. Gill, eds.). The Birds of North America, Inc., Philadelphia, PA.

Emily Giles, *Pete Ewins*
and *Sarah Zachariah*
WWF-Canada
Suite 410, 245 Eglinton Avenue East
Toronto, Ontario M4P 3J1
E-mail: egiles@wwfcanada.org.

An early spring influx of Acadian Flycatchers (*Empidonax virescens*) into southern Ontario, April 2014

Kenneth G.D. Burrell, Mike V.A. Burrell and Brandon R. Holden

Introduction

The Acadian Flycatcher (*Empidonax virescens*) (Figure 1), one of Canada's rarest breeding songbirds, is found almost exclusively in the Carolinian life zone (COSEWIC 2010). While rare in its Canadian range (Martin 2007), it is globally stable and common within the bulk of its range (Whitehead and Taylor 2002, Sauer *et al.* 2014), breeding primarily in the eastern US and wintering in southern Central America (Nicaragua, Costa Rica and Panama) and northwestern South America (Columbia, Ecuador and Venezuela) (Whitehead and Taylor 2002). Within southern Ontario, the Acadian Flycatcher is predominantly found in mature deciduous forests with interspersed Eastern Hemlock (*Tsuga canadensis*) in wooded ravines and swamps (Martin 2007, COSEWIC 2010). In recent years, Bird Studies Canada has conducted extensive surveys for this species throughout Norfolk and Elgin counties (J. Allair pers. comm.). Largely because of these surveys and the most recent Ontario Breeding Bird Atlas, the Canadian population has been estimated to be between 25 and 75 pairs with additional unmated males (COSEWIC 2010). This population estimate has invariably fluctuated in any given year and the estimate is more precisely in the range of 35 to 50 pairs (COSEWIC 2010, J. Allair pers. comm.). Core strongholds have been identified in the following Important Bird Areas: Port Franks Forested Dunes, Skunk's Misery Complex, Southwest Elgin Forest Complex, Clear Creek, Greater Rondeau Area and Norfolk Forest Complex (COSEWIC 2010, Bird Studies Canada and Nature Canada 2014).

Figure 1. Acadian Flycatcher, (*Empidonax virescens*), 2 May 2014. Point Pelee National Park, Essex County, Ontario. This individual was a new arrival, having been first detected the previous day.
Photo: Brandon R. Holden.

Like many Tyrant Flycatchers in Ontario, Acadian Flycatchers are regarded as late spring migrants, typically arriving in Ontario in mid-May (COSEWIC 2010, eBird 2014a). In recent years (*i.e.* post-2000), extremely early spring Acadian Flycatchers have been noted (along with other unseasonably early Neotropical migrants) with April records occurring in three of the past seven years (including 2014). Older males tend to arrive earlier than females and young birds (Whitehead and Taylor 2002, Kokko *et al.* 2006) with the latest spring migrants recorded as late as 10 June at non-breeding locations (eBird 2014a, R. Ridout pers. comm.).

In April 2014 an unusually high number of early spring Acadian Flycatchers were reported in southern Ontario between 25 and 30 April (eBird 2014a, B. Holden and K. Burrell pers. obs.). The purpose of this paper is to examine the magnitude of the early influx of this species into Ontario in 2014 and the associated weather patterns.

Methods

Sightings of Acadian Flycatcher in Ontario in April, 1900 to 2014, were gathered from eBird (2014a, 4b), North American Birds (and its predecessors), the ONTbirds listserve and personal communication (see Acknowledgements). April records of Acadian Flycatchers from the continental US in 2014 were also gathered from eBird (2014b). Only records from eBird that were included in the public outputs (*i.e.* which have been vetted by regional editors) were included in these analyses. In analyzing the records from Ontario in April 2014, the authors

undertook an appropriately conservative approach for discerning the number of individuals observed. For example, if two birds were seen in two relatively widely separate areas (at Point Pelee National Park) less than an hour apart, we assumed they were different individuals. eBird records were plotted by five-day period on a map of North America using ArcGIS 10.2 ESRI. Records were also analyzed using Microsoft Excel to compare the latitude of each sighting to the date.

Meteorological events were observed in real time as they unfolded (*i.e.* online) and afterwards from archived information from Environment Canada's Canadian Weather products and the National Oceanic and Atmospheric Administration's National Weather Service (2014a, b, c).

Results

In our analysis, we concluded that a minimum of six different Acadian Flycatchers (out of a total of 12 separate sightings) were observed and reported in Ontario in April 2014, with all but one occurring at Point Pelee National Park (Table 1). This is as many as was recorded previously (pre-2014) in April in all of Ontario, with the earliest being 24 April 1994 (Table 2).

A total of 1,191 eBird records of Acadian Flycatcher from April 2014 in the US was accepted by regional editors as of 15 July 2014. Acadian Flycatcher reports ranged from 4-30 April and covered approximately the southeastern quarter of the US (Figure 2). There was a positive relationship between latitude and date of sightings; at higher latitudes Acadian Flycatchers arrived later in April (Figure 3).

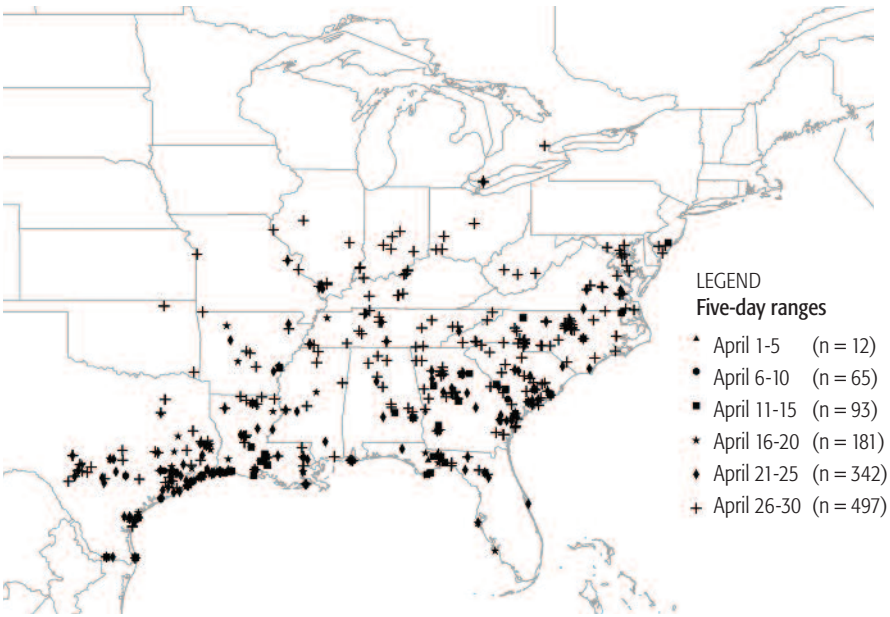


Figure 2. April 2014 Acadian Flycatcher records in the United States and Canada from eBird (2014b) by five-day period.

TABLE 1. Records of Acadian Flycatchers throughout Ontario in April 2014. All records have been vetted and are from eBird (2014a) and ONTbirds. PPNP denotes Point Pelee National Park.

Date	Location	Finders	Details
25 April	PPNP (halfway between the tip and the Visitors Centre on main road), Essex County	Kenneth G.D. Burrell and Brandon R. Holden	1 bird photographed
26 April	Milton (8th Line and Britannia Road), Regional Municipality of Halton	David I. Pryor	1 bird photographed This is an exceptionally early individual, particularly considering the location (away from the Great Lakes)
29 April	PPNP (Group Campground), Essex County	Brandon R. Holden and Eric W. Holden	1 bird observed and photographed
29 April	PPNP (West Beach), Essex County	Brandon R. Holden and Eric W. Holden	1 bird observed
30 April	PPNP (Tilden's Woods), Essex County	Brandon R. Holden, Eric W. Holden, Lev A. Frid, and Murray A. Shields	1 bird observed and photographed
30 April	PPNP (Tip area), Essex County	Brandon R. Holden and Eric W. Holden	1 bird observed

TABLE 2. April records (pre-2014) of Acadian Flycatchers throughout Ontario. PPNP denotes Point Pelee National Park.

Date	Location	Observers	Details
24 April 1994*	Long Point Provincial Park, Norfolk County	Robert Z Dobos, Kevin McLaughlin, Bill Lamond, George Naylor and Paul Rose	1 individual observed
26 April 2008	PPNP (Tilden's Woods), Essex County	Alan Wormington, Robert J. Cermak and J. Michael Tate	1 individual observed
26-27 April 2011	Pelee Island (Fish Point), Essex County	Kenneth G.D. Burrell	1 individual observed singing
27 April 2011	PPNP (Woodland Nature Trail), Essex County	David G. McNorton	1 individual observed
29 April 2009	PPNP (Sparrow Field), Essex County	Brandon R. Holden and Lauren F. Rae	1 individual observed
30 April 1984	PPNP (Tilden's Woods), Essex County	Kevin McLaughlin and Paul Pratt	1 individual observed

*Earliest spring record for Ontario.

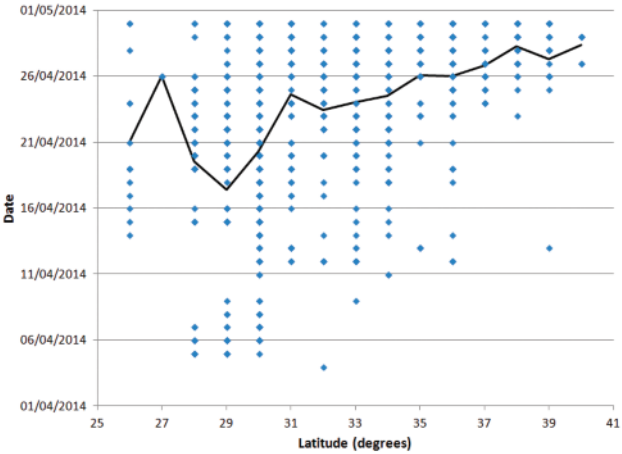


Figure 3. April 2014 eBird (2014b) records of Acadian Flycatcher in the US by date and latitude, rounded to the nearest degree. The solid line indicates the mean date for each degree of latitude. Individual data points may represent more than one record.

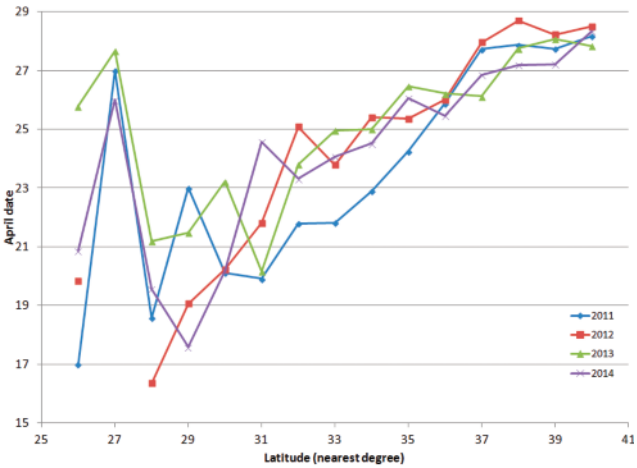


Figure 4: Mean April date by latitude (rounded to nearest degree) for eBird records of Acadian Flycatcher in the US for 2011-2014.

We compared the mean April arrival date by latitude in 2014 with the same information from the previous three years (Figure 4) and found that the overall pattern was similar in each year from 2011-2014.

Weather Analysis: A review of weather patterns during the study period in 2014 yielded two distinct events that may have set the stage for the early arrival of Acadian Flycatchers into Ontario. There was a marked complex series of low pressure centres and frontal boundaries on 25-26 April (Figure 5) that likely aided nocturnal migration for Neotropical migrants throughout the eastern continental US (CONUS); their northernmost extent reached extreme southern Ontario. The systems were short lived, providing ideal southerly winds before quickly retrograding to the northeast.

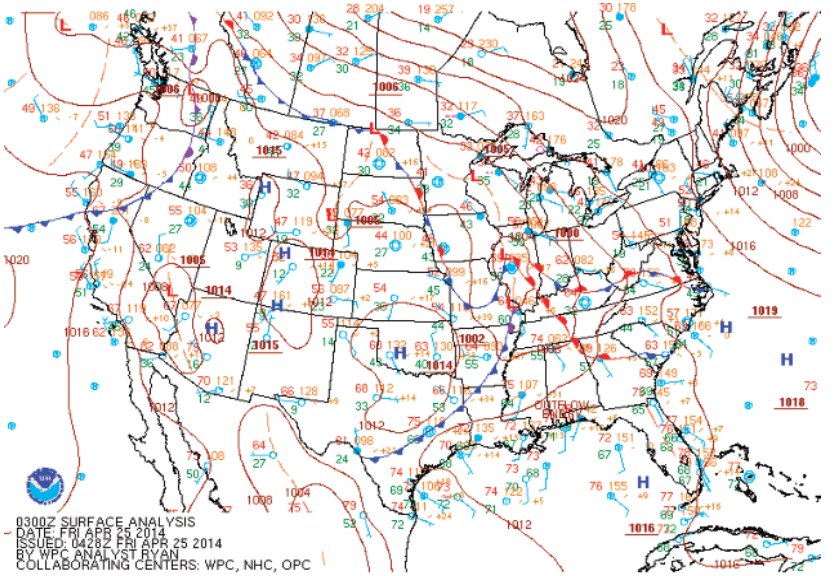


Figure 5. Surface analysis for the continental US at 0300UTC on 25 April 2014 (NOAA 2014a). Elevated warm southerly winds are occurring over SW Lake Erie at this time. UTC denotes Coordinated Universal Time.

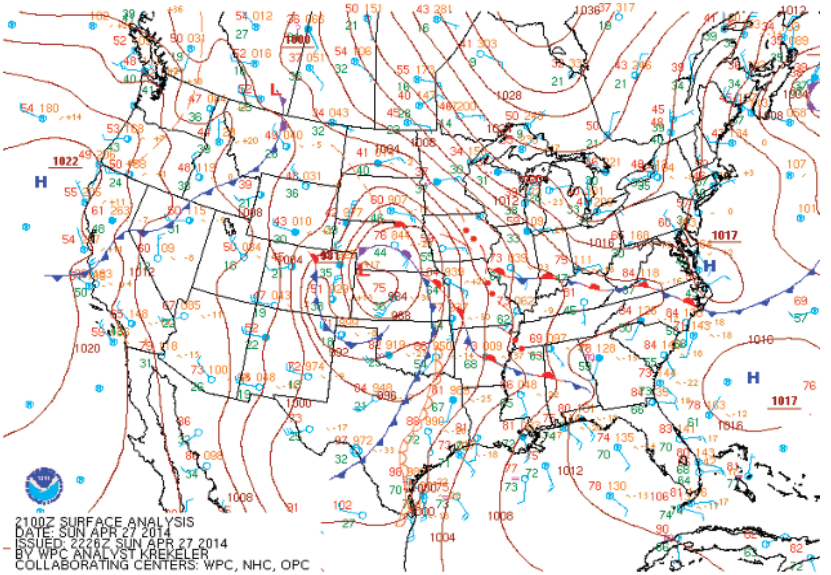


Figure 6. Surface analysis for the continental US at 2100UTC on 27 April 2014 (NOAA 2014b). The newly formed extratropical cyclone (*i.e.* a low-pressure cell) with a peak intensity of 981mb. Elevated southerly warm air is once again reaching extreme SW Ontario (as winds associated with a low pressure cell blow counter clockwise). UTC denotes Coordinated Universal Time.

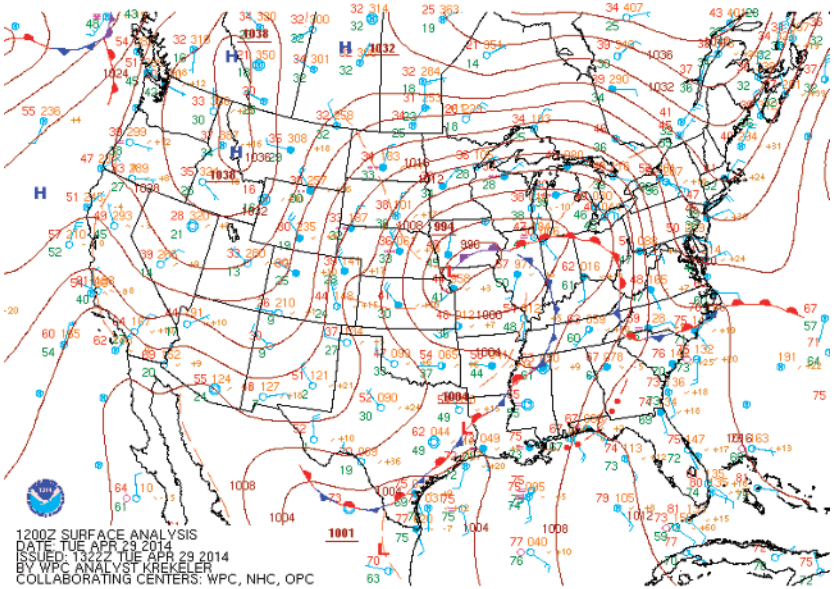


Figure 7. Surface analysis for the continental US at 1200UTC on 29 April 2014 (NOAA 2014c). The blocking pattern continues to hold the weakening low pressure centre in an effective position for northward migration over extreme SW Ontario. UTC denotes Coordinated Universal Time.

On 27 April, cyclogenesis occurred over the central CONUS reaching a peak intensity of 981mb a short time thereafter (Figure 6). Large and powerful, this new low pressure centre was halted almost immediately by a blocking ridge of high pressure, barely moving to the ENE through 1 May and slowly losing strength as time passed. Similar to the previous event (25-26 April), the position of the frontal boundaries likely aided nocturnal migration, with increased wind intensity and storm duration (Figure 7). By 2 May, the blocking pattern was lifted and the remnant low centres moved northeastwards, no longer affecting the CONUS or Great Lakes region.

Discussion

Based on our analysis, April 2014 was exceptional in the sheer number of Acadian Flycatcher records from southern Ontario. The number of individuals from April 2014 equaled the total of all previous April records (1984-2011). The arrival of Acadian Flycatchers in southern Ontario in late April 2014 occurred simultaneously with their arrival across much of the northeastern extent of their range in the US, as would be expected from the phenology and the broad front migration of this species (Whitehead and Taylor 2002, eBird 2014a).

In comparing the 2014 Acadian Flycatcher mean April dates by latitude with the same information from the previous three spring migrations, it is apparent

that 2014 progressed as usual for this species in the US. Hence, we can conclude that given the right meteorological conditions in late April, Acadian Flycatchers (as well as other early neotropical migrants) are to be expected, at least in small numbers, in southwestern Ontario.

Despite the historical tendency for relatively few observers, late April is one of the best times for passerine rarities of significance to occur in southern Ontario (K. Burrell, M. Burrell, and B. Holden pers. obs.), as well as the first month in which Neotropical migrants reach the province. Based on the weather conditions observed in late April 2014, influxes of overshooting spring migrants (*e.g.*, Worm-eating (*Helmitheros vermivorus*), Hooded (*Cardellina citrina*) and Yellow-throated warblers (*Setophaga dominica*) as well as normally early migrants were to be expected throughout southern Ontario (eBird 2014a). Prolonged southerly winds originating from the Gulf of Mexico, particularly at altitudes associated with diurnal passerine migration (*i.e.* 500-1,800m) (Kerlinger and Moore 1989, Weidensaul 2000), were likely the driving force behind these birds (including the Acadian Flycatchers) arriving in Ontario and adjacent regions (Earth Wind Map 2014). As Acadian Flycatchers are known to arrive en masse in the Gulf states of the US in late April (Whitehead and Taylor 2002, eBird 2014a), extratropical cyclones and their associated warm southerly wind flow can advance early migrants (and southern overshoots) originating in the Gulf region to the northeast (*e.g.*, Ontario) ahead of anticipated arrival dates. The prolonged weather event observed in April 2014 gives credence to this idea, as ideal conditions in southern Ontario led to this record arrival of Acadian Flycatchers.

It is likely that some observers are particularly cautious with identifying Acadian Flycatchers given their overall scarcity in Canada and known challenges separating *Empidonax* flycatcher species (COSEWIC 2010). Based on data from south of the Canadian border, this species should be expected to occur again in late April, particularly during weather events favourable for migration. Increased awareness and the ability to rapidly report observations will better serve our knowledge of the species' migration in Canada, including late-April; when Acadian Flycatchers may not previously have been expected to occur.

Conclusion

In late April 2014, there was a notable arrival and unusually high number of Acadian Flycatchers observed in southern Ontario. Historically, only six previous records of this species have occurred in Ontario in April. That total was matched with the six observations in 2014. Unusual weather events associated with warm southerly winds have the potential to displace birds in notable numbers ahead of their traditional arrival dates, such as the case in late April 2014 for Acadian Flycatchers. With the predicted likelihood of increased anthropogenic impacts on climate and the correlated increase in storm size and intensity (Emanuel 2005, Anthes *et al.* 2006, Bender *et al.* 2010), it is reasonable to predict increased frequency in the types of events which took place in late April 2014. Examining and studying the impacts of these storm systems on spring avifauna will provide significant information for climate scientists, as well as ornithologists, professional and amateur alike.

Acknowledgements

We thank the numerous field observers, particularly those who have submitted records to eBird. Rob Dobos, Kevin McLaughlin, Pete Read, Ron Ridout and Alan Wormington provided information pertaining to previous April sightings of Acadian Flycatchers in southern Ontario. Jody Allair provided information on the Canadian population of the Acadian Flycatcher.

Literature Cited

Anthes, R.A., **R.W. Corell**, **G. Holland**, **J.W. Hurrell**, **M.C. MacCracken** and **K.E. Trenberth**. 2006: Hurricanes and Global Warming—Potential Linkages and Consequences. Bulletin of the American Meteorological Society 87:623–628.

Bender, M.A., **T.R. Knutson**, **R.E. Tuleya**, **J.J. Sirutis**, **G.A. Vecchi**, **S.T. Garner** and **I.M. Held**. 2010. Modeled Impact of Anthropogenic Warming on the Frequency of Intense Atlantic Hurricanes. Science 327(5964):454-458.

Bird Studies Canada and **Nature Canada**. 2014. Important Bird Areas Canada [Site Catalogue Query]. (http://www.ibacanada.ca/explore.jsp?lang=EN).

Cornell Lab of Ornithology. 2014. [BirdCast] Regional Migration Forecast: 18-25 April 2014. Retrieved from: (http://birdcast. info/forecast/regional-migration-forecast-18-25-april-2014/).

COSEWIC. 2010. COSEWIC assessment and status report on the Acadian Flycatcher *Empidonax virescens* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. x + 38 pp. (www.sararegistry.gc.ca/status/status_e.cfm).

Earth Wind Map. 2014. [Interactive] Wind Map. Retrieved from: (http://earth.nullschool.net/#current/wind/isobaric/1000hPa/orthographic=-79.72,39.01,3000).

eBird. 2014a. eBird: An online database of bird distribution and abundance [web application]. Cornell Lab of Ornithology, Ithaca, NY. Available: (http://www.ebird.org).

eBird. 2014b. eBird Basic Dataset. Version: EBD_relMay-2014. Cornell Lab of Ornithology, Ithaca, NY. May 2014.

Emanual, K. 2005. Increasing destructiveness of tropical cyclones over the past 30 years. Nature 436:686-688.

Kerlinger, P., and **F.R. Moore**. 1989. Atmospheric structure and avian migration. *In*: Power, D.M. (Ed.), Current Ornithology, vol. 6. Plenum Press. New York, NY. pp. 109-142.

Kokko, H., **T.G. Gunnarsson**, **L.J. Morrell** and **J.A. Gill**. 2006. Why do female migratory birds arrive later than males? Journal of Animal Ecology 75(6):1293-1303.

Martin, D. 2007. Acadian Flycatcher, pp.344-345 *in* Cadman, M.D., D.A. Sutherland, G.G. Beck, D Lepage, and A.R. Couturier, eds. Atlas of the Breeding Birds of Ontario, 2001-2005. Bird Studies Canada, Environment Canada, Ontario Field Ornithologists, Ontario Ministry of Natural Resources, and Ontario Nature, Toronto, xxii + 706 pp.

National Oceanic and Atmospheric Administration. 2014a. National Weather Service - Weather Prediction Center. WPC Surface Analysis Archive for the United States (CONUS) for 0300Z 25 April 2014. Retrieved from http://www.wpc.ncep.noaa.gov/archives/web_pages/sfc/sfc_archive.php. Accessed September 2014.

National Oceanic and Atmospheric Administration. 2014b. National Weather Service - Weather Prediction Center. WPC Surface Analysis Archive for the United States (CONUS) for 2100Z 27 April 2014. Retrieved from http://www.wpc.ncep.noaa.gov/archives/web_pages/sfc/sfc_archive.php. Accessed September 2014.

National Oceanic and Atmospheric Administration. 2014c. National Weather Service - Weather Prediction Center. WPC Surface Analysis Archive for the United States (CONUS) for 1200Z 29 April 2014. Retrieved from http://www.wpc.ncep.noaa.gov/archives/web_pages/sfc/sfc_archive.php. Accessed September 2014.

Sauer, J. R., **J. E. Hines**, **J. E. Fallon**, **K. L. Pardieck**, **D. J. Ziolkowski, Jr.** and **W. A. Link**. 2014. The North American Breeding Bird Survey, Results and Analysis 1966-2012. Version 02.19.2014 USGS Patuxent Wildlife Research Center, Laurel, MD.

Searchable Ornithological Research Archive. 2014. SORA 2.0 [web application]. University of New Mexico, NM. (https://sora.unm.edu/).

Weidensaul, S. 2000. Living on the Wind: Across the Hemisphere with Migratory Birds. North Point Press Inc. New York, NY.

Whitehead, D.R. and **T. Taylor**. 2002. Acadian Flycatcher (*Empidonax virescens*), The Birds of North America Online (A. Poole, Ed.). Cornell Lab of Ornithology, Ithaca, NY.; Retrieved from the Birds of North America Online: (http://bna.birds.cornell. edu/bna/species/614).

Kenneth G.D. Burrell
Natural Resource Solutions Inc.
225 Labrador Drive
Waterloo, Ontario N2K 4M8
E-mail: kenneth.gd.burrell@gmail.com

Mike V.A. Burrell
Bird Studies Canada
PO Box 160, 115 Front Road
Port Rowan, Ontario N0E 1M0
E-mail: mburrell@bsc-eoc.org

Brandon R. Holden
Stantec Consulting Ltd.
200 – 835 Paramount Drive
Stoney Creek, Ontario L8J 0B4
E-mail: peregrine13@gmail.com

The Cave Swallow, *Petrochelidon fulva*, in Ontario, 1989-2014: a Summary using eBird Records

Brandon R. Holden and Kenneth G.D. Burrell

This note documents the occurrence of the Cave Swallow (*Petrochelidon fulva*) in Ontario, looking back through 25 years of data from eBird, which contains the complete set of accepted records from the Ontario Bird Records Committee (OBRC). This is not a comprehensive look at all published occurrences of the species in Ontario, but an overview of some easily accessible electronic data. With this information, we examine a brief history of occurrence, identification, trends in the data and some thoughts on what the future may hold for the species in the province.

The Cave Swallow was first documented in Ontario at Point Pelee National Park on 21 April 1989 by Alan Wormington (Wormington and Curry 1990), which remains an exceptional spring record. Nine years later, Alan would document the second provincial record, only about seven kilometres from the first, from 7-9 December 1998 (Dobos 1999). The next chapter of the species' history in Ontario began on 2 November 1999 when Kevin A. McLaughlin recorded an astonishing five Cave Swallows flying together at Point Pelee National Park (Roy 2000). This was the first of fifteen records from 1999 accepted by the OBRC, constituting a total of 86 individuals from 2-6 November, capping off the province's first "invasion".

Identification of the Cave Swallow can be straightforward, often aided by the calendar as much as visual field marks. A medium-sized swallow with a square tail, the Cave Swallow has a buffy throat, forehead and rump, dark wings and tail, with a white belly (Figure 1). Late in the fall, young-of-the-year are readily recognized by their suspended primary molt, with fresh dark inner primaries contrasting against the more faded outer primaries. (Figure 2)

While all swallows found in Ontario are fundamentally similar, confusion generally exists between Cave Swallows and

Figure 1. A first basic Cave Swallow at Point Pelee National Park, 13 November 2012.

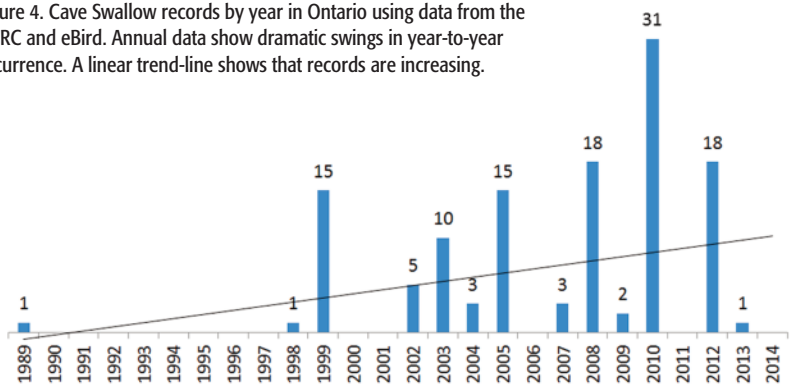
Photos: Brandon R. Holden.

Figure 2. A first basic Cave Swallow at Point Pelee National Park, 13 November 2012, showing light outer primaries contrasting with dark inner primaries.

the more common and closely related Cliff Swallow (*P. pyrrhonota*). Adult Cliff Swallows are distinguished by a combination of their dark throat, pale foreheads and generally more contrasting appearance (Figure 3). Adult Cliff Swallows from the southwestern regions (*P. p. melanogaster*) of their range show rusty foreheads, much like Cave Swallows although this subspecies is currently unrecorded in the province. These "southwestern" birds should be considered (especially in spring) when potentially encountering a vagrant Cave Swallow. Here it would be important to note the finer plumage details of a potential vagrant, as the southwestern Cliff Swallow will have a darker throat than the Cave Swallow. In the fall, juvenile Cliff Swallows can show dark or dusky foreheads with pale throat patterns. They are generally less buffy-orange than Cave Swallows and do not show the contrasting primaries expected by the young-of-the-year Cave Swallows that have been recorded in Ontario in late fall. As noted, the majority of Cave Swallow records in Ontario occur from late October through November, long after most Cliff Swallows have left our borders. A large group of *Petrochelidon* swallows observed in November is likely to be Cave Swallows. It is with single or observations outside of the traditional late-fall window that require extended study and careful consideration when separating these species, subspecific vagrant or late Cliff Swallows must be considered when documenting a sighting.

Figure 3. An alternate Cliff Swallow at Point Pelee National Park, 9 May 2010.

Figure 4. Cave Swallow records by year in Ontario using data from the OBRC and eBird. Annual data show dramatic swings in year-to-year occurrence. A linear trend-line shows that records are increasing.



Since the initial records (1989, 1998) and the invasion (1999), Ontario birders have recorded Cave Swallows in ten of the subsequent 15 years. Large invasions have been observed in 1999, 2005, 2008, 2010 (the largest) and 2012. When compiling records from the OBRC database from 1990-2009, we found a total of 63 accounting for 188 individuals documented. In 2010, the Cave Swallow was formally removed from the OBRC review list for southern Ontario, ceasing documentation from 2010-present. For these years, an additional 50 records were taken from eBird for 2010-2014 (eBird 2015). Total records by year (not individual birds) are graphed in Figure 4.

Figure 5. This record breaking extratropical cyclone in late October 2010 was responsible for bringing many Cave Swallows to Ontario (NOAA 2015).

Thanks to documentation provided in OBRC reports, eBird and associated materials, we have a better understanding of the factors involved with these spectacular invasions. Powerful and far reaching southerly winds, with associated warm temperatures in October and November, have been a precursor to these irruptions. The record high count for Ontario (148 individuals) occurred on 26 October 2010 at Fifty Point Conservation Area in Grimsby, which was remarkable in that all birds passed east to west within three hours of observation that morning (eBird 2015). The flight abruptly stopped as a cold front swept through causing the skies to cloud over, a shift to westerly winds and temperatures to drop. The record event in 2010 was associated with an exceptional extra-tropical storm over the western Great Lakes (Figure 5), where the all-time North American land-based record for low pressure was broken (NOAA 2015). Long Point seemed to be the epicenter of the 2010 event, where counting exact numbers proved difficult as large numbers passed through the entire area. Once large numbers of Cave Swallows have reached our borders, there is occasionally a "return" flight as north winds blow birds back to the northern shores of the lower Great Lakes. Prince Edward County, Erieau and Point Pelee National Park have been notable locations to receive such birds (B. Holden pers. obs.).

Determining noteworthy geographic patterns can be challenging in a province as large as Ontario, where the human population is heavily situated around the lower Great Lakes. Yet, here a pattern emerges, with the majority of records

Figure 6. General distribution of Cave Swallow records in Ontario (in red).

occurring along the shorelines of the lower Great Lakes throughout the various invasions. Locations of records, not accounting for total numbers of individuals, have been plotted in Figure 6.

We predict that Cave Swallows will continue to appear in Ontario whenever powerful weather systems bring appropriate surges of warm southerly air during late fall. Numbers have seemingly risen since the initial invasion in 1999, but having very few birds in recent years (2011, 2013 and 2014) makes it difficult to determine if the increase in numbers will continue. Without a doubt, our knowledge of the species will continue to grow with observers ready to detect new arrivals more readily than ever. Outside of the "traditional" late fall window are

three spring records of single birds (fide Wormington), which is perhaps a timeframe when birders are not expecting the species to occur and may be under recorded. We encourage birders to contribute records to readily accessible databases such as the OBRC and eBird, which were instrumental in the creation of this account.

Literature Cited

Dobos, R.Z. 1999. Ontario Bird Records Committee Report for 1998. Ontario Birds 17(2):62-83.

eBird. 2015. Cave Swallow for Ontario from 2010 to 2015. http://ebird.org/ebird/map/cavswa?negtrue&env.minX=142.27311799286292 &env.minY=-20.12861076876384&env. maxX=34.69499299286292 &env.max Y=65.15052821266531&zh=true&gp=false&ev=Z&mr=112&bmo=1&emo=12&yr=range&byr=2010 &eyr=2015. eBird data accessed February 2015

NOAA. 2015. National Oceanic and Atmospheric Association, October 26-27th, 2010 Record Low Pressure, Strong Winds, and Early Season Snowfall. Available online at http://www.crh.noaa.gov/mpx/?n=10oct2627. Accessed on 9 February 2015.

Roy, K.J. 1990. Ontario Bird Records Committee Report for 1989. Ontario Birds 18(2):53-72.

Wormington, A. and **R.H. Curry**. 2000. Ontario Bird Records Committee Report for 1999. Ontario Birds 8(1):4-33.

Brandon R. Holden
1709-301 Frances Ave.
Stoney Creek, Ontario L8E 3W6
E-mail: peregrine13@gmail.com

Kenneth G.D. Burrell
Natural Resource Solutions Inc.
225 Labrador Drive,
Waterloo, Ontario N2K 4M8
E-mail: kenneth.gd.burrell@gmail.com

Editor's Note: There are additional references with observations of Cave Swallow in Ontario in print journals:

Wormington, A. 1992. Cave Swallow: New to Ontario and the Great Lakes Region. Birders Journal 1:176-180

Wormington, A. 1999. Cave Swallow: Second Record for Ontario and the Great Lakes Region. Birders Journal 8:35-37.

Curry, B., and **K.A. McLaughlin**. 2000. The November 1999 Cave Swallow Invasion in Ontario and Northeastern North America. Ontario Birds 18:13-26.

Wormington, A. 2002. Another Cave Swallow Invasion: The Fall of 2002. Point Pelee Natural History News 2:53-55.

Wormington, A. 2003. More Cave Swallows: The Fall of 2003. Point Pelee Natural History News 3:63.

Ontario Field Ornithologists

President: Lynne Freeman
president@ofo.ca

Ontario Field Ornithologists is an organization dedicated to the study of birdlife in Ontario. It formed in 1982 to unify the ever-growing numbers of field ornithologists (birders/birdwatchers) across the province, and to provide a forum for the exchange of ideas and information among its members. The Ontario Field Ornithologists officially oversees the activities of the Ontario Bird Records Committee (OBRC); publishes a newsletter (*OFO News*) and a journal (*Ontario Birds*); operates a bird sightings listserv (ONTBIRDS), coordinated by Mark Cranford; hosts field trips throughout Ontario; and holds an Annual Convention and Banquet in the autumn. Current information on all of its activities is on the OFO website (www.ofo.ca), coordinated by Doug Woods. Comments or questions can be directed to OFO by e-mail (ofo@ofo.ca).

All persons interested in bird study, regardless of their level of expertise, are invited to become members of the Ontario Field Ornithologists. Membership rates can be obtained from the address below. All members receive *Ontario Birds* and *OFO News*.

Please send membership enquiries to:
Ontario Field Ornithologists, PO Box 116,
Station F, Toronto, Ontario M4Y 2L4.

Printing: DTP Inc., Richmond Hill, Ontario

© Mixed Sources
Product group from well-managed forests, controlled sources and recycled wood or fibre
www.fsc.org Cert no. SW-COC-003090
© 1996 Forest Stewardship Council

bullfrogpowered
Printing by DTP & bullfrogpowered

Ontario Birds

The aim of *Ontario Birds* is to provide a vehicle for documentation of the birds of Ontario. We encourage the submission of full length articles and short notes on the status, distribution, identification, and behaviour of birds in Ontario, as well as location guides to significant Ontario birdwatching areas, book reviews, and similar material of interest on Ontario birds.

Submit material for publication by e-mail attachment (or CD or DVD) to either:
chip.weseloh@ec.gc.ca
glenn_coady@hotmail.com
chris.risley@ontario.ca

Please follow the style of this issue of *Ontario Birds*. All submissions are subject to review and editing and may be submitted to peer review beyond that of the editors. For photographic material used in *Ontario Birds,* the copyright remains in the possession of the photographers.