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Ontario Field Ornithologists (OFO) is dedicated to the study of birdlife in Ontario

OFO was 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 this 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 OFO 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).

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Adult female with 13-day-old chick at Sauble Beach.
Brendan Toews

Piping Plovers in Ontario: A decade of recovery on the Great Lakes

John Brett

The soft piping and plaintive call of the Piping Plover (Charadrius melodus) was once heard on many beaches throughout the lower Great Lakes…

So began the article in the April 2008 issue of *Ontario Birds* that heralded the return of breeding Piping Plovers to the Canadian shores of the Great Lakes in 2007 after a 30 year absence (Toews *et al.* 2008). Since the article's publication, that plaintive call has been increasingly heard in Ontario as Piping Plovers have continued to expand and reclaim lost fragments of their former range throughout the Great Lakes, with historic breeding locations including Manitoulin Island and the shores of Lake Ontario once again supporting nesting pairs. The 2016 season marked the 10th year since the return of nesting Piping Plovers to the Ontario shores of the Great Lakes, and this article is a summary of annual breeding effort and recovery in the Canadian Great Lakes Population from 2007 to 2016.

Background

Piping Plovers are shorebirds in the family Charadriidae, which includes other plover species found in Ontario such as Killdeer (*C. vociferous*), Black-bellied Plover (*Pluvialis squatarola*) and American Golden-Plover (*P. dominica*). Their small size and proportions are similar to those of the closely related Semipalmated Plover (*C. semipalmatus*) — but the Piping Plover's pale face and upperparts, blending in with the dry sand on which it typically nests, are distinctive among Ontario's breeding plovers (Elliott-Smith and Haig 2004).

There are currently two subspecies of Piping Plover recognized: *C. melodus melodus*, which breeds along the Atlantic coast, and *C. m. circumcinctus*, which breeds further inland (COSEWIC 2013, NatureServe 2015). Within the *circumcinctus* subspecies, two populations are recognized in Canada: the Prairie Canada Population and the Canadian Great Lakes Population (Environment Canada 2013), which is part of the broader Great Lakes population that includes Michigan.

In the Great Lakes, Piping Plovers typically nest on wide sand and pebble beaches, often with dune, stream outlet, or beach pool components (Austen *et al.* 1994, Sandilands 2010, Environment Canada 2013, Government of Ontario 2013). Nests consist of a small scrape in the sand, in which a typical clutch of four eggs is laid over the course of a week. Once a complete clutch is laid, the

Sauble Beach territorial dispute.
Brendan Toews

Female from Toronto Islands, 2015. *David Beadle*

Predator exclosure to protect the nest from large predators. *Canadian Wildlife Service*

male and female will share incubation duties for approximately 26 to 28 days. Young Piping Plovers are precocial and are able to walk and forage shortly after hatching. Fledging typically occurs 21 to 35 days after hatch (Kirk 2013).

Habitat loss and degradation are ongoing threats for Piping Plovers on the Great Lakes as shoreline habitat continues to be lost due to development and shoreline hardening (COSEWIC 2013, Kirk 2013, Environment Canada and the U.S. EPA 2014), and the habitat that remains is vulnerable to recreational use and incompatible beach grooming which may make it unsuitable for nesting (COSEWIC 2013, Kirk 2013). Recreational use of beaches not only affects habitat suitability, but beach-goers, dogs and vehicles on the beach may cause direct disturbance to the birds (COSEWIC 2013). Predation is a significant threat throughout the plover's range (COSEWIC 2013), with Merlins (*Falco columbarius*), American Crows (*Corvus brachyrhynchos*) Ring-billed (*Larus delawarensis*) and Herring gulls (*L. argentatus*), Raccoons (*Procyon lotor*) and Red Foxes (*Vulpes vulpes*) among the most often-reported predators in Ontario (Kirk 2013).

Owing to these and other threats, the Great Lakes Piping Plover population declined throughout most of the 20th century and by the early 1980s, the population was reduced to as few as 12 pairs, all confined to Michigan (USFWS 2003).

Recovery Approaches

In 2006, the federal recovery strategy (Environment Canada 2006), which set goals and objectives for the recovery of the species in Canada, was posted on the

Species at Risk Public Registry (sararegistry.gc.ca). While nesting plovers had not yet returned to the Great Lakes shoreline of Ontario when the strategy was posted, it included approaches to prepare for their potential re-establishment. With the return of nesting birds in 2007, recovery measures were implemented, based on the approaches from decades of Piping Plover conservation in key U.S. Great Lakes states.

With the publication of the federal action plan for the Piping Plover in Ontario (Environment Canada 2013) and the Ontario government's response statement (OMNR 2014), specific actions to recover the Great Lakes Piping Plover in Ontario were formalized. High-priority measures in Ontario have largely fallen under three broad categories: protection and management, monitoring and assessment, and outreach and communication, and are aimed at addressing the key threats to Piping Plovers (Environment Canada 2013). Implementation of these measures has been led by staff at the Ontario Ministry of Natural Resources and Forestry (OMNRF), Environment and Climate Change Canada (ECCC) and Ontario Parks, with on-the-ground help from countless volunteers and organizations.

Protection and Management

In addition to the regulatory protection afforded to the Piping Plover through provincial and federal legislation, birds and their habitat are supported through on-the-ground conservation and management approaches designed to mitigate key threats. Nest disturbance and predation both reduce nesting success and are among the most significant threats to the Great Lakes population (USFWS 2003, COSEWIC 2013). To counter low productivity due to nest loss during the laying and incubation periods, a combination of predator exclosures and perimeter fencing has been used in the Great Lakes population consistently since 1988 (USFWS 2003), and in Ontario since the return of nesting in 2007 (Toews *et al.* 2008). Predator exclosures consist of a wire box built over the nest that prevents large predators from accessing the nest, with a mesh size (approximately 5 cm x 10 cm) large enough to allow adult plovers to pass freely. These large exclosures are typically installed over complete clutches and pairs are monitored following the installation to ensure that the normal incubation routine is resumed. Perimeter fencing has been used in concert with predator exclosures to provide a buffer that minimizes human disturbance to the nest and incubating adults. Between 1984 and 1999, the use of exclosures and fencing was found to increase hatching success from 37% to 72% (USFWS 2003).

Traditional beach management for aesthetic purposes, including raking and other grooming, can reduce the quality of habitat for nesting plovers (COSEWIC 2013, Kirk 2013). Land managers at beaches with breeding Piping Plovers help to develop and implement best management practices, including the preservation of natural beach cover and minimization of dune erosion, in order to maintain suitable habitat conditions (Heyens *et al.* 2012, 2014b). Encroaching invasive or woody species, including European Common Reed (*Phragmites*

australis) and willows (*Salix* spp.) have been removed from some beaches to ensure habitat remains suitable for nesting Piping Plovers (J. Benvenuti pers. comm., Davidson 2016).

Monitoring and Assessment

In addition to addressing the key threats, the Great Lakes recovery program includes a monitoring component. Monitoring is essential for assessing population trends and distribution at a range-wide scale and serves as a means of evaluating the success at individual sites. Individuals, pairs, nests and chicks are monitored and tracked, and the resulting information is utilized by the Great Lakes recovery program as a whole. Observations of Piping Plovers in Ontario, including those gleaned from Ontbirds and eBird reports, are compiled by the Canadian Wildlife Service and shared with partners in the United States for inclusion in Great Lakes-wide databases.

Central to the monitoring program is a banding scheme that aims to mark individuals in the Great Lakes population with colour band combinations for individual or brood-specific identification. Reports that include photos or descriptions of any observed bands are particularly useful for monitoring the population. Banding and subsequent sightings facilitate studies on breeding ecology (Roche *et al.* 2010), population modeling (Wemmer *et al.* 2001), migratory connectivity (Gratto-Trevor *et al.* 2012), survival (Ledee *et al.* 2010, Saunders *et al.* 2014) and site fidelity (Ledee *et al.* 2010), and allow agency staff and researchers to keep track of intra-population movements.

The International Piping Plover Census, which is conducted every five years throughout the Piping Plover's breeding and wintering ranges, provides a snapshot of distribution across the continent and allows biologists to estimate regional and global population sizes (Elliott-Smith *et al.* 2015). The breeding census consists of surveys in suitable habitat during a two-week period in June.

Outreach and Communication

Piping Plovers often nest in busy recreational areas, so communication with the public has been an essential part of recovery in the Great Lakes. Typically, the first points of contact for visitors to the beach are volunteers. Volunteers educate the public about the Piping Plover and its habitat needs, which helps minimize disturbance to breeding birds and their young. Volunteers serve as the eyes and ears of the recovery program by monitoring the birds from the moment they arrive in the spring (mid-April) until the last chicks depart in late summer (mid-August), thoroughly documenting and reporting breeding activity and any threats to the birds on the beach.

Results

An annual summary of nesting activity for the Great Lakes population of Piping Plover in Ontario from 2007-2016 is shown in Table 1.

2007

See Toews *et al.* (2008) for a complete synopsis of the 2007 nesting at Sauble Beach.

2008

The year 2008 saw the expansion of breeding Great Lakes Piping Plovers from Sauble Beach to two other sites. The season started with excitement as one of the birds that hatched in 2007 arrived at Wasaga Beach, accompanied by a banded adult from Grand Marais, Michigan (Heyens 2008). That initial pair was not relocated, but was replaced by two additional pairs at Wasaga, consisting of four banded birds from Michigan that nested adjacent to the highly developed beach strip area. The two nests marked the first documented nesting at the site since 1938 (Toews *et al.* 2008). Only one of eight chicks that hatched successfully fledged. Four chicks, including one in the process of hatching, were destroyed during a hail storm, two were killed by predators and one was believed to have died due to illness (Heyens 2008).

In early May, the nesting pair from 2007 at Sauble Beach was observed again near the 2007 nest location. Unfortunately, their first two nest attempts (two and three eggs) failed, with all five eggs taken by crows (Heyens 2008). A third attempt by the same pair yielded three eggs and fledged a single chick. An additional pair was located at nearby Oliphant Beach where a potential pair had been observed in 2002. The nest was successful and one chick fledged from a clutch of two eggs (Heyens 2008).

Table 1. Piping Plover breeding and success in the Canadian Great Lakes Population, 2007-2016.

Year	Breeding Locations[1]	Breeding Pairs[2]	Nests	Fledglings	Fledglings/Pair
2007	SB	1	1	3	3.00
2008	SB, WB, OB	4	6	3	0.75
2009	SB, WB, MI	7	7	15	2.14
2010	SB, WB	6	8	2	0.33
2011	SB, WB	5	5	9	1.80
2012	SB, WB	5	6	9	1.80
2013	SB, WB, MI	5	7[3]	11	2.20
2014	SB, WB, PE	8	11[4]	13	1.63
2015	SB, WB, MI, TI	10	10	13	1.30
2016	SB, WB, MI, DP, PP, GB	15	16	27	1.80
2007-2016 Totals		**66**	**77**	**105**	**1.59**

[1] SB: Sauble Beach; WB: Wasaga Beach; OB: Oliphant Beach; MI: Manitoulin Island; PE: Port Elgin; TI: Toronto Islands; DP: Darlington Provincial Park; PP: Presqu'ile Provincial Park; GB: Georgian Bay.

[2] Breeding pairs are defined as two birds exhibiting signs of breeding. If a nest is lost or abandoned and an individual pairs with a new partner, that is counted as an additional pair.

[3] While there were seven individual nests reported in 2013, it is likely that two of these were a single clutch that was interrupted by a storm event. See a description of this occurrence under the 2013 heading.

[4] While there were eleven individual nests reported in 2014, it is likely that two of these were a single clutch that was interrupted by a predation event.

2009

In July, a pair with four chicks was observed on Manitoulin Island, which marked the first documented nesting there in almost 40 years (Toews *et al.* 2008, Heyens and Robinson 2009). All four chicks from this successful nesting attempt were presumed to have fledged (Heyens and Robinson 2009).

In an effort to combat the egg predation observed at Sauble Beach in 2008, small predator exclosures were placed over nests immediately after a single egg was laid, which resulted in no eggs being lost to predators at this site in 2009 (Heyens and Robinson 2009). The first nest was found on 6 May, but by 15 May it was declared to be abandoned and the four eggs were collected. The female from that nest paired with a new male, laid four eggs, and two additional pairs nested and laid four eggs each. Ten of the twelve eggs hatched (the two that didn't hatch were collected), but three chicks were lost to one or more Merlins before fledging. Seven chicks fledged from Sauble Beach in 2009 (Heyens and Robinson 2009).

At Wasaga Beach, two pairs nested (including two adults from 2008 that returned to the site and found new partners), but only the first nest successfully hatched and fledged four young. The second nest was abandoned by the female and male after 50 and 51 days of incubation, respectively (Heyens and Robinson 2009).

This was an exciting year for Piping Plover recovery (Heyens and Robinson 2009). Overall, 15 chicks fledged in 2009 (Table 1) — a notable increase over the three chicks fledged in each of 2007 and 2008.

2010

In terms of reproductive output at Ontario sites, 2010 was the least successful year on record in the last decade, with only 0.33 young fledged per pair (Table 1). At Sauble Beach, two pairs nested. In June, the first nest of four eggs was predated by an unidentified digging mammal, despite being protected by an exclosure. To counter this, a "fox apron," which extends the exclosure under the sand out from the main box, was developed and included in subsequent installations at Sauble Beach (Heyens and Robinson 2010). This pair re-nested, but the nest was abandoned after 28 days of incubation for unknown reasons (Heyens and Robinson 2010). The second pair successfully hatched four chicks, but only one survived to fledge. While predation by Merlins was a significant concern in 2009, only one Merlin incident was reported in 2010; the cause of chick predation in 2010 was largely undetermined (Heyens and Robinson 2010).

Four pairs nested at Wasaga Beach in 2010. The female of one pair did not resume incubation following the installation of a predator exclosure on 7 June; the exclosure was removed immediately and the pair resumed incubation. The unprotected eggs were predated by crows and gulls later that week (Heyens and Robinson 2010), but the pair re-nested and fledged one chick from a brood of four, which successfully bred in Michigan from 2012 to 2015 (J. Rutter, pers. comm., Heyens *et al.* 2012). This was the only chick to fledge from Wasaga Beach in 2010; the remaining three nests (seven eggs total) were abandoned following the disappearance of an adult from each of

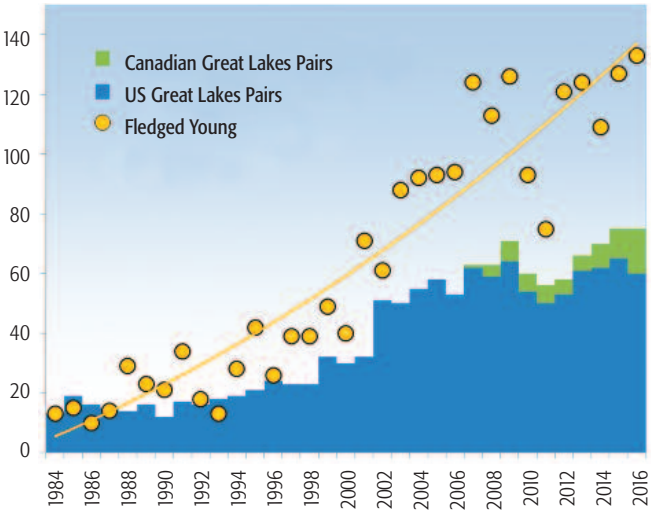

Figure 1. The number of observed breeding pairs and fledged young in the Great Lakes population by year and country, 1984 to 2016.

the three pairs. While the loss of these adults was not observed and the causes were not determined, most early-season nest abandonment has been shown to be due to the death of adults rather than desertion (Roche *et al.* 2010).

2011

Fifty-five pairs fledged 75 young across the entire Great Lakes in 2011, which was the lowest population-wide reproductive output from 2007 to 2016 (Figure 1). Despite the poor production overall, the five pairs in Ontario managed to fledge nine young (1.80 fledged per pair, 12% of the total Great Lakes output). At Wasaga Beach, three pairs nested and produced a total of five fledged chicks from three nests. Four fledged young were from a single nest and the fifth was the one chick to fledge from a brood of four that hatched on 9 June. The male from that pair was observed attacking one of his own chicks and by 21 June only the one chick remained. The clutch size for the third pair is not known; one chick was observed, but it was not relocated and was presumed not to have fledged (EC, unpublished data).Two pairs nested at Sauble Beach, and seven of the eight eggs hatched. Two chicks from each brood fledged.

The International Piping Plover Census was conducted in 2011, and agency staff and volunteers in Ontario surveyed 58 sites along the Great Lakes during the 4 to 17 June breeding census window. A potential additional pair at Wasaga Beach was observed during the census (Elliott-Smith *et al.* 2015), but the male from the pair was not relocated following the initial observation.

In 2011, a Piping Plover that had hatched in June 2009 at Wasaga Beach and was banded, was observed nesting at North Core Banks, North Carolina, USA. This is the first documented instance of a Piping Plover dispersing

from its subspecies range and successfully nesting in another subspecies range (Hillman *et al.* 2012).

2012

In 2012, nesting was once again limited to Wasaga and Sauble beaches. It was a season of high reproductive output, but was unfortunately one of high apparent adult mortality (Heyens *et al.* 2012). Six nests were initiated, yielding nine fledged chicks (three from Sauble Beach and six from Wasaga Beach), but six adults were lost over the course of the season. One adult was predated by a Merlin, another died following a territorial dispute with a neighbouring male, and the remaining four disappeared for unknown reasons (Heyens *et al.* 2012). The specimen from the territorial dispute, which was collected for analysis, showed signs of trauma associated with pecking (Heyens *et al.* 2012).

At Wasaga, the first nesting pair successfully fledged four young, after which they attempted to re-nest. Re-nesting after a successful nest is rare in Piping Plovers (Elliott-Smith and Haig 2004) and this was the first time that such an event was documented in Ontario (Heyens *et al.* 2012). Unfortunately, this second clutch of three eggs was not successful; the nest was abandoned for unknown reasons and the eggs were collected. The two other pairs laid four eggs each, but only five of these eggs hatched.

Twenty-nine day old chick at Sauble Beach. *Brendan Toews*

Of the three that hatched in one brood, two were able to fledge, and the third chick was predated by a gull. The two chicks from the last brood were also predated: one by a gull, and the other by a Merlin.

Two male birds that had hatched in Ontario were observed breeding in Michigan in 2012. The single bird that fledged from Wasaga in 2010 nested at Sleeping Bear Dunes, near Traverse City, and a bird that hatched in 2011 at Wasaga Beach fledged four chicks at Tawas Point State Park, near Tawas City (Heyens *et al.* 2012).

2013

The 2013 season was successful in southern Ontario, with "high chick recruitment and minimal loss of breeding adults" (Heyens *et al.* 2014a). Across Ontario, five breeding pairs fledged 11 chicks, the highest output since 2009, for an average of 2.2 fledged per pair (Table 1). In addition, three plovers that had hatched in Ontario were observed nesting in Michigan in 2013 (Heyens *et al.* 2014a).

After three consecutive years of nesting confined to Wasaga and Sauble beaches, 2013 saw the return of nesting birds to Manitoulin Island, where three young fledged from a nest of four eggs. The fourth chick died at the nest shortly after hatching.

Two pairs nested at Wasaga Beach, with seven of the eight eggs hatching. One chick was lost from each brood; one was reported to have been killed by an unidentified male Piping Plover, and the other disappeared for an unknown reason (Heyens *et al.* 2014a).

Six individual adult Piping Plovers were observed at Sauble Beach in 2013, and two pairs were formed. The first nest of the first pair, containing an unknown number of eggs, was washed away during a storm on 12 May. On 14 May, a single egg was found being incubated by the same pair in a scrape approximately 22 m from the original nest, and was likely part of the same clutch that was wiped out by the storm. This egg was abandoned around 16 May and was collected on 21 May. On 16 May, the pair was observed feeding, copulating and making scrapes at another location, and by 26 May a complete clutch of four eggs had been laid. Two of the eggs hatched (the other two were found broken outside the predator exclosure), but only one of those chicks was confirmed to have fledged; the fate of the other chick is unknown. The second pair hatched four chicks, but only two of those birds fledged. Predation was suspected for the other two chicks of that brood (Heyens *et al.* 2014a).

2014

Throughout the Great Lakes, 2014 was a successful year and there was overall high chick recruitment and low adult mortality in Ontario (Heyens *et al.* 2014b). A new breeding site was established at Port Elgin on Lake Huron, about 20 km southwest of Sauble Beach, where a complete brood of four chicks successfully fledged.

Despite the province-wide success, the four pairs (seven nests) at Sauble Beach were unable to fledge a single chick. A total of 23 eggs was laid, but nine were lost due to predation, three were abandoned after the female was presumed to

have been predated and five did not hatch for unknown reasons (Heyens *et al.* 2014b). The six remaining eggs (from three separate nests) hatched, but the young are suspected to have been predated — three of them by gulls in their first 24 hours (Heyens *et al.* 2014b).

Thirteen uniquely banded Piping Plovers were observed at Wasaga Beach, but only three pairs were formed. From the twelve eggs that were laid in three nests, nine chicks were successfully fledged (Heyens *et al.* 2014b).

In 2014, an analysis to assess contaminant burdens and toxicity risk was conducted on the unhatched eggs that had been collected from 2009 to 2013 in Ontario (Hughes *et al.* 2014). Twenty-eight eggs from Wasaga and Sauble beaches were analyzed for concentrations of contaminants including polychlorinated biphenyls (PCBs), which had been identified as a potential cause of reproductive impairment in the Great Lakes population (USFWS 2003, Environment Canada 2006). Eggs were analyzed as pools consisting of eggs collected from a single nest, with five and six pools collected from Sauble Beach and Wasaga Beach, respectively. Summed PCB concentrations were below 190 ng/g in all pools of eggs with the exception of one egg pool from Wasaga Beach in 2009 with a sum PCB concentration of 808 ng/g; the concentrations were determined to be below levels associated with adverse effects on reproduction in other bird species (Hughes *et al.* 2014).

2015

The 2015 season proved to be a milestone year for Piping Plover recovery in Ontario. After an absence of 81 years, nesting Piping Plovers returned to breed on the Canadian side of Lake Ontario with a four-egg nest at Hanlan's Point Beach on the Toronto Islands (Coady 2016). Unfortunately, the nest was washed out during a storm and the pair did not re-nest in Toronto. The year also marked the return of breeding Piping Plovers to the American side of Lake Ontario, where a pair of siblings that had hatched in 2013 at Wasaga Beach fledged a single chick in Jefferson County, near Watertown, New York (Mazzocchi and Truskowski 2015).

The initial nest at Manitoulin Island was lost to predation (S. Robinson, pers. comm.), but the pair re-nested and two of four chicks successfully fledged. Four pairs established four nests with four eggs each at Wasaga Beach, and twelve chicks hatched, producing eight that fledged. At Sauble Beach, 2015 was a slight improvement over the previous year as three chicks managed to fledge from four nests. Fifteen eggs were laid there, but only eight hatched; a clutch of four was washed out by a storm event, and a clutch of three was abandoned following the disappearance of the male (EC, unpublished data).

2016

The tenth year since the return of nesting Piping Plovers to the Canadian shores of the Great Lakes was an overall success for the recovery of the population. Based on reports of band combinations throughout the migration and breeding

season, at least 40 adults were observed in 2016 in Ontario (ECCC, unpublished data). Fifteen pairs were confirmed to have been formed, and a record 27 young fledged from 16 nests across a record six sites (Table 1). Young birds may be leading the expansion to new and historic breeding sites in Ontario; of the eight birds that bred at the three "new" sites in 2016, seven were birds that hatched in 2015 (87.5%). Only two of the 19 birds (10.5%) that bred at the previously established sites were hatched in 2015 (EC, unpublished data).

At Wasaga Beach, six pairs produced 21 eggs, of which 19 hatched (one disappeared during a storm and one was taken by a crow following the predation of the adult female). Fourteen young were confirmed to have fledged, which is the highest single-site output in Ontario since breeding plovers returned in 2007.

It was a poor year at Sauble Beach. Eighteen eggs were laid in five nests, but only six of those hatched. The first clutch of four eggs hatched, but the chicks were predated following the disappearance of the adult female. Three additional nests of four eggs each failed; the eggs from one nest were washed out and disappeared following a storm event, and the other two nests were abandoned following the disappearance of the male in each pair. The pair from the washed-out nest re-nested with a clutch of two eggs; they both hatched, but the young were predated by a crow and a gull.

Plovers once again returned to Lake Ontario in 2016, and the three successful nests at two provincial parks (Presqu'ile and Darlington) marked the first successful nestings on the Canadian shore of Lake Ontario since 1934 (Coady 2016). In June 2016, a nesting pair of Piping Plovers was observed on a small limestone island on Georgian Bay, bringing the total number of contemporary Ontario Great Lakes breeding sites to nine. The limestone bedrock on the shore of the island is not typical Piping Plover breeding habitat (Elliott-Smith and Haig 2004), and this appears to be the first time that nesting on a solid limestone substrate has been documented in the Great Lakes population (F. Cuthbert, pers. comm.). Two young from a clutch of four eggs were located and banded, but subsequent visits to this remote island were not made to confirm fledging success, so these chicks are not included in the count of fledged chicks for 2016.

Discussion

The last decade has been successful for both the province-wide recovery of Piping Plovers and for Ontario birds contributing to the overall growth and expansion of the Great Lakes population (Figure 1). In just ten years, the Canadian Great Lakes breeding population increased from one to 15 pairs and by 2016, 20% of all the pairs in the Great Lakes population were found in Ontario. At least 105 young have fledged in Ontario from 2007 to 2016, which represents 9.2% of the estimated total output across the Great Lakes in that period. An annual target of 1.25 fledged young per pair was identified in the federal recovery strategy for the *circumcinctus* subspecies (Environment Canada 2006); this total has been exceeded by the Canadian Great Lakes Population in

all but two of the last ten years (Table 1). In the U.S., the recovery criteria for the Great Lakes population includes a targeted five-year average fecundity between 1.50 and 2.00 fledged per pair (USFWS 2003); the current five-year average in Ontario (1.70 fledged per pair, 2012-2016) is within that range and is comparable to the U.S. average over the same period (1.79 fledged per pair).

Despite these successes, production has not been consistent at all sites in all years. Predation by gulls, crows, and raptors continues to be a problem throughout the Great Lakes and at Sauble Beach, in particular. While egg predation has been reduced and hatch success has increased with the use of predator exclosures, adults and chicks are still vulnerable to predation when outside of exclosures. Trials have been undertaken at Sauble Beach to test a variety of predator deterrent techniques (Hann 2014), each with limited success (C. Hann, pers. comm.). Although the loss of chicks to predators is difficult to control (USFWS 2003), options to mitigate the threat posed by predators going forward are being explored by MNRF and ECCC staff and other partners.

Opposite: Toronto and Region Conservation Authority staff setting up fencing at Hanlan's Point.
Canadian Wildlife Service

Toronto breeding male (left) and an unpaired female (right), 2015.
Jean Iron

With four nests in the last two years, the return of plovers to Lake Ontario appears to be well underway, yet some parts of the former range, including locations in Prince Edward County, remain unoccupied. Similarly, despite annual observations of plovers at sites such as Long Point (eBird 2016, ECCC, unpublished data), nesting has not yet been observed at any of Lake Erie's wide, sandy beaches. It is expected that the Canadian Great Lakes Population will continue to grow and plovers are anticipated to expand to other sites in Ontario, including these former breeding locations.

With one third of all North American bird species in need of urgent conservation action (NABCI 2016), it is refreshing to witness a recovery success story. It is hoped that the Piping Plover's call will continue to be heard throughout Ontario's Great Lakes shoreline in the decades to come.

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Finally, thanks to birders in Ontario for continuing to observe and report Piping Plovers on Ontario beaches each year. Their timely reports have allowed agency staff to keep a close eye on the expanding population and respond to protection and management needs quickly as new sites are occupied.

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The return of breeding Piping Plovers to the Ontario shores of Lake Ontario

Glenn Coady
Photos by Glenn Coady

Introduction

The Piping Plover (*Charadrius melodus*) is an endangered species of shorebird that inhabits wide, open beaches of the Atlantic coast, as well as alkali flats and wide expanses of sandflats inland along rivers, lakes and wetlands of the Canadian Prairies, northern Great Plains and the Great Lakes Basin. There are two subspecies described: the nominate subspecies *C. m. melodus* breeds exclusively along the Atlantic coast from southwestern Newfoundland to North Carolina and winters from North Carolina to the southern Atlantic coast of Florida with smaller numbers in the Bahamas and Greater Antilles. The second subspecies *C. m. circumcinctus* breeds primarily

at inland sites from southern Alberta eastward to the Lake-of-the-Woods area of Ontario and Minnesota and south to Kansas, Colorado and western Oklahoma. However, a much smaller, disjunct population of this subspecies is found in the Great Lakes Basin. This subspecies winters along the coast of the Gulf of Mexico from northeastern Mexico and across the Gulf states to the west coast of southern Florida (Elliott-Smith and Haig 2004) and on the Atlantic coast from North Carolina to Georgia (Gratto-Trevor *et al.* 2012). Band recoveries have shown minimal mixing between the Prairie/Great Plains and the Great Lakes populations.

Despite intensive management resources devoted to this species, efforts aimed at recovering its populations have met with mixed success (Haig *et al.* 2005). The species is managed in three management units: 1) the nominate subspecies of the Atlantic coast, 2) *C. m. circumcinctus* of the Prairies/Great Plains and 3) *C. m. circumcinctus* of the Great Lakes. Recent estimates have put the population of *C. m. melodus* at 3648 individuals (averaged over 2006-2010), a steady increase from 1580 in 1986 (Andres *et al.* 2012). The Prairie/Great Plains population of *C. m. circumcinctus* was estimated at 4662 individuals (Elliott-Smith *et al.* 2009). Population estimates fluctuate substantially based on the habitat-related detection rates during oscillations of wet/dry periods throughout the region, but on the whole this population is thought to be stable. The Great Lakes population of *C. m. circumcinctus* has rebounded from an all-time low of 12 breeding pairs in 1981 to a greatly improved 75 pairs in 2015 (Mazzocchi and Truskowski 2015). A detailed review of the history of the Piping Plover as a breeding bird in Ontario has recently been published (Toews *et al.* 2008) and its province-wide status from 2007-2016 is reviewed by Brett (2016).

From the 1930s, the numbers of Piping Plovers rapidly declined until they were extirpated from the Ontario shores of all the Great Lakes: Lake Ontario by the mid-1930s, Lake Huron by the early 1970s and Lake Erie by 1978, after the last known nesting attempt at Long Point in 1977 (Toews *et al.* 2008). Factors implicated in their dramatic decline include habitat loss, increased disturbance by human usage of preferred beaches, increased predation by rising populations of gulls and mammalian predators benefitting from human food subsidies, poor water level management practices, reduced water quality and increased environmental contaminants (Elliott-Smith and Haig 2004).

After 1978, the Piping Plover was not recorded as a breeder on the Canadian shores of the Great Lakes until 2007, when a pair nested at Sauble Beach (Toews *et al.* 2008). Until 2015, the last confirmed breeding on the Ontario shore of Lake Ontario was in 1934, when George North and Ott Devitt found a successful nest on Van Wagners Beach in Hamilton and G. Hubert Richardson located a successful nest on Hanlan's Point Beach at the Toronto Islands (Baillie and Harrington 1936). Anecdotal evidence suggests that Piping Plovers continued to be seen regularly on beaches at

Presqu'ile Provincial Park into the 1950s and early 1960s (D. McRae, pers. comm.); however, no nesting was ever confirmed. With a species that has such obvious courtship behaviours and such conspicuous fledged young, it would seem a remote possibility that active nesting occurred undetected at a site with such a busy human presence. The purpose of this paper is to document the return of the Piping Plover as a confirmed nesting species on the Ontario shores of Lake Ontario.

First nesting attempt at Toronto in 2015

Following its extirpation as a nesting species on Lake Ontario, migrant Piping Plovers, presumably from a small Michigan population, continued to stop over at favourable beach habitats on Lake Ontario, being seen at Hamilton, Toronto Islands, Darlington Provincial Park and Presqu'ile Provincial Park, among other sites, throughout the years. Over the past ten years, sightings increased to the point where they were observed nearly annually at Toronto Islands and occurred every spring at the beaches of Darlington Provincial Park, where in some years multiple birds were detected by Tyler Hoar (pers. comm.) and others (G. Coady and R. Smith, unpublished data).

On 24 May 2015, Gavin Platt (OntBirds, 24 May 2015) discovered three Piping Plovers (2 males and 1 female) on the beach at Hanlan's Point on Toronto Islands, immediately southwest of the Toronto Islands Airport. His assessment was that one of the males was displaying

Figure 1: Adult female Piping Plover protecting its first egg during a rain shower on 31 May 2015.

territorial aggression behaviour toward the other male. On 26 May, Norm Murr (OntBirds, 26 May 2015) found two birds and felt that they may be acting like a mated pair.

The next day, 27 May, I went to Hanlan's Point Beach in hopes I might find that these birds were about to nest in Toronto for the first time in 81 years. Upon arriving at the beach, I was surprised to find four Piping Plovers: two banded males, one banded female and one unbanded female. Even more intriguing was that two of the birds were observed copulating and they also demonstrated pronounced territorial aggression to the other two plovers, vigorously chasing them from a section of the beach. In very short order, personnel from the Toronto and Region Conservation Authority (TRCA), Ontario Ministry of Natural Resources and Forestry (OMNRF) and the Canadian Wildlife Service (CWS) came together to cordon off a large section of the beach with stakes and ropes, snow fences and interpretive signage to keep beach-goers from disturbing a potential nest.

When I returned to Hanlan's Point on 31 May 2015, I could only find three of the plovers at the site and no fourth bird was seen again in 2015. Two of the birds were conspicuously paired and defending an obvious territory from the third bird, often driving it away great distances. The male of this pair was banded as a chick in Michigan in 2014. The female was not banded. Between bouts of aggression against the third Piping Plover and a nearby pair of Killdeer (*Charadrius vociferous*), these paired birds were repeatedly seen copulating. Using the areas and directions where aggression displays were occurring, I attempted to back-project to a putative nest location. Just as I was about to make a search of an area that I strongly suspected as being a potential nest location, a brief rain shower began. I watched the female from a long distance as she slowly traveled back toward the area I had been watching. Within a minute she settled on what appeared to be a nest scrape, presumably to keep any eggs from being rained upon (Figure 1). This female stayed in this spot until the rain ceased after about 20 minutes and then left again to resume foraging. When she was more than 50 metres away, I left some cover and made a direct trip over to where she had presumably been incubating an egg or eggs. I found the one egg nest quickly (Figure 2) and by the time I got my camera on the nest to document it, the female was back and performing a vigorous distraction display. I took two quick photographs of the nest and left the area. Once I was more than 100 metres away, I looked back to find the pair copulating once again.

That evening I called John Brett at CWS to tell him that I had found a nest and gave him directions to find it so that a predator exclosure could be installed over it as quickly as possible to give this nest the best chance possible for success. The next day (1 June) personnel from TRCA, OMNRF and CWS set up a roughly rectangular perimeter fence (and more signage) around the nesting area and put a small predator exclosure on the nest (a temporary exclosure that is used before a clutch is complete).Within a

few days, a Plover Guardian Team was formed to provide added protection for the birds and interpretive services for the public. By 5 June, it was confirmed that a complete clutch of four eggs had been laid and the small predator exclosure was removed and replaced with a larger exclosure (J. Brett, pers. comm.).

The birds diligently incubated this clutch of eggs and defended the area from nearby Killdeer and the ever-present Ring-billed Gulls (*Larus delawarensis*) for more than three weeks and all concerned were looking forward to the hatching within another week. Unfortunately, on the evening of 22-23 June, the birds had

Figure 2: First egg of a Piping Plover on the Canadian shore of Lake Ontario since 1934. Photo taken on 31 May 2015.

to deal with a threat that simply could not be defended against. On that evening, a torrential rain storm with lightning and high winds lashed the Toronto area for hours and the beach was inundated with waves from the west which eroded the beach, flooded the nest and scattered the eggs which were later found roughly 5m from the nest site (J. Brett, pers. comm.) and within a few days, both adults of the pair abandoned the area.

Interestingly, just days later, on 1 July, the banded male and an unbanded bird assumed to be the female of the Hanlan's Point pair, were seen in the company of a lone Piping Plover in Oswego County, New York, on the southeast shore of Lake Ontario but no nesting occurred there (Mazzocchi and Truskowski 2015). However, a different pair of Piping Plovers nested in nearby Jefferson County, New York, in 2015. It was the first successful breeding pair on the New York shore of Lake Ontario (Mazzocchi and Truskowski 2015) since a pair had nested in 1984 at Sandy Pond in Oswego County after an absence of 29 years (Levine 1998).

Successful nesting at Darlington Provincial Park in 2016

Nest 1

On 10 May 2016, Charmaine Anderson and Betsy Smith (pers. comm.) found three banded Piping Plovers on the beach at Darlington Provincial Park. Two of these birds appeared to be territorial as they seemed to be working together to aggressively drive off the third bird. On 11 May, when Tyler Hoar, John Brett and I visited the site, all three birds were present and the presumed territorial pair had

Figure 3: Adult male Piping Plover from the first nest at Darlington Provincial Park on 11 May 2016.

begun copulating and the male had started making nesting scrapes all over the beach. Both birds of this pair continued to chase away the third bird which was a banded female.

Because all of the birds were banded, it was possible to obtain some of their histories. The male of this pair had been hatched and banded at Wasaga Beach, Ontario, in 2015 (Figure 3). The female of the pair (Figure 4) had been banded as a breeding adult at Sleeping Bear Dunes National Lakeshore near Traverse City, Michigan, in 2012. The third bird was a female that had been hatched and banded at Manistee, Michigan, in 2015. The male made nesting scrapes and copulated with the female for five days (11-15 May) and the third bird stayed around on the periphery of their territory throughout this time. On the afternoon of 16 May, I discovered the first nest at Darlington Provincial Park at the one egg stage. I informed John Brett of the find and the next day Ontario Parks and CWS cordoned off a large section of beach around the nest as a no entry zone and a predator exclosure was placed over the nest to protect the eggs from mammalian predators. By 22 May, this pair had a complete clutch of four eggs and undertook incubation for the next four weeks. A full size predator exclosure (Figure 5) was set up on 24 May (J. Brett, pers. comm.). A Plover Guardian Team of over 40 volunteers was assembled and trained to protect the area and educate beach users. Additionally, they began to condition locally loafing Ring-billed Gull flocks by routinely but gently scaring them if they entered the cordoned zone around the nest. It was hoped that

Figure 4: Adult female Piping Plover from the first nest at Darlington Provincial Park on 26 June 2016.

Figure 5: Nest exclosure over the first Piping Plover nest at Darlington Provincial Park on 31 May 2016.

Figure 6: Eleven day-old Piping Plover chick from the first nest at Darlington Provincial Park, 26 June 2016.

Figure 7: Thirty-eight day-old juvenile Piping Plover from the first nest at Darlington Provincial Park, 24 July 2016.

the gulls would recognize that they would be left undisturbed if they loafed well down the beach away from the nest. The guardian team rarely noted a serious threat of gull predation throughout the rest of the summer.

On the evening of 16 June, Joachim Floegel discovered that two chicks had hatched and when I visited at dawn on the morning of 17 June, all four chicks had hatched and shortly thereafter they began roaming the beach (Figure 6). On the afternoon of 20 June, only three chicks could be found and we presumed one was lost to the heavy shoreline wave action on this very windy day. The remaining three chicks were banded on 28 June. Both adults continued to watch over these young for the next week, but soon after this the female began leaving them in the care of the male alone. It is possible that she was concentrating on feeding in advance of her departure, as she was last seen feeding on the beach on the evening of 4 July. The three juvenile birds attained sustained flight by 16 July (Figure 7), but they remained under the protection of the adult male almost until the time they left. By 28 July, all three 42 day-old juveniles had fledged and were making periodic flights outside of the park where the guardians could no longer monitor them; however, they were still coming back to the natal beach to roost for the night through 1 August. Although none were seen at the evening roost on 2 August, on 3 August one of these 48 day-old juveniles was found freshly dead. Preliminary necropsy results from the Canadian Wildlife Health Cooperative revealed that it was emaciated and presumed to have died of starvation. It was not determined if this might be secondary to a pathogen such as Type E botulism or salmonella. Last seen on 7 August, the two other chicks produced from this nest apparently survived to undertake their post-hatch dispersal and subsequent migration.

Nest 2

On 21 May 2016, Audrey Nowicki and I were following the third banded Piping Plover at Darlington Provincial Park as it continued to encroach on the nesting pair's territory. Suddenly, it flew well out over the lake and to the west several hundred metres and as we followed to where we thought it had landed, we noticed there were two Piping Plovers about 700 metres to the west of the first nest. Both of these birds were banded with colour combinations that were different from the birds from the pair that had already initiated a nest. These two birds were behaving like a pair and appeared to be performing courtship displays.

Figure 8. Adult male from the second nest at Darlington Provincial Park, 17 June 2016.

Figure 9: Cordoned nest area of the second Piping Plover nest at Darlington Provincial Park on 31 May 2016.

By 22 May, the male (Figure 8) was initiating nest scrapes and the pair began frequent copulation. From their band combinations, we learned that the male was hatched and banded in 2015 at Whitefish Point in the Upper Peninsula of Michigan and that the female was hatched and banded in 2015 in Manistee, Michigan (see page 243, this issue). I found this pair's nest at the one egg stage on 27 May. Ontario Parks and CWS fenced a large perimeter exclusion zone on 28 May (Figure 9); a small predator exclosure was placed over the nest midday 29 May and a full-sized predator exclosure was installed 3 June (J. Brett, pers. comm.). The four egg clutch was complete by 3 June (Figure 10) and full-time incubation by both adults proceeded over the next four weeks.

On the morning of 28 June, I discovered that all four chicks from this nest had hatched and as soon as they were all dry they began exploring and feeding along the beach. The male from this nest was present on this day for the hatch of the chicks but was never seen thereafter. Failing a band recovery or a re-observation, we may never learn what happened to this bird. Speculatively, the possibilities include that this second-year, first time breeder could have simply lacked the parental motivation to stay with the brood, it could have been killed by a predator while feeding at Oshawa Second Marsh where it had earlier been observed, or perhaps it met up with another female and initiated another nest that was not found. In any event, the female was forced to be a single parent to this brood

for a month of brood rearing activity. By six days old, all four of these chicks were observed feeding at the algae mats near the shoreline zone of wave action. One of the greatest threats to these chicks actually turned out to be intra-specific aggression. When these chicks were only about a week old, I twice observed the adult male from the first nest seizing one of the young from the second nest by the neck. I presumed ill intent and rushed the adult bird, forcing it to drop the chick in each case.

At nine days old, the young from this second nest were banded (Figure 11). They attained sustained flight capability by 27 July. These birds did very well and all four chicks were still present as 40 day-old juveniles on 7 August. On 8 August, one of the 41 day-old juveniles was found freshly dead on the beach. As with the 48 day-old juvenile from the first nest that died, the necropsy showed this bird was emaciated, either due to a lack of food or possibly secondarily to a pathogen. Three of the four juvenile Piping Plovers from the second nest survived long enough to initiate their migration: they were last seen at Darlington two days apart (on 11 and 13 August) and two of them were seen together on 17-21 August on a Lake Ontario beach in Burlington in Halton Regional Municipality.

Below, Figure 10: Second nest of Piping Plovers at Darlington Provincial Park with a full clutch of four eggs on 8 June 2016.

Right, Figure 11: Nine day-old Piping Plover chick from the second nest at Darlington Provincial Park being banded on 7 July 2016.

Successful nesting at Presqu'ile Provincial Park in 2016

A nesting pair of Piping Plovers formed at Presqu'ile Provincial Park about the same time as the second pair at Darlington Provincial Park (18 May). A nest was discovered at the one egg stage on 27 May 2016 (J. Brett, pers. comm.). Three chicks hatched on 28 June. The chicks at this nest attained an average weight of 18 g at nine days old and grew at a faster rate than the chicks at Darlington. The chicks in the first Darlington brood did not attain the 18 g weight until 12 days of age. The chicks from the second nest at Darlington only attained a weight of 14 g at nine days old. The three Presqu'ile chicks apparently survived to begin their post-hatch dispersal in mid August. All three were observed on 15 August, only one on 16 August, and none on 17-18 August.

Conclusion

The three nests in 2016 on Lake Ontario at Darlington and Presqu'ile parks successfully fledged ten juvenile birds, of which eight survived and dispersed from their natal area. Since Great Lakes Piping Plovers have demonstrated a range of natal dispersal distances of 2-430 km (Price 2002) and annual adult survival rate is on the order of 73% (Wemmer *et al.* 2001), it is likely that these birds will help the Great Lakes population to continue to grow and to reclaim more nesting beaches on Lake Ontario and to resume nesting at sites like Long Point, Rondeau and Point Pelee on Lake Erie. After an absence of 81 years in the Greater Toronto Area and 100 years at Presqu'ile Provincial Park, the Piping Plover has once again been well-documented as a breeding species. This is an example of a conservation success story for an Ontario endangered species.

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More information on the nesting of Piping Plover at Darlington Provincial Park in 2016 is available in a video produced by Winnie Poon which is available at: https://vimeo.com/ 195213709/757b118f92

Consumption of amphibian prey by a Piping Plover

Glenn Coady

Introduction

The Piping Plover (*Charadrius melodus*) is a small migratory shorebird species that breeds in a widespread but scattered and thin distribution on wide, sandy or cobblestone beaches on alkali flats, reservoirs, rivers, lakes, bays and the Atlantic coast of Canada and the United States (Elliott-Smith and Haig 2004). It nests exclusively in North America and overwinters in the southern United States, Mexico and some of the islands of the Caribbean. It is listed as an endangered species under Ontario's *Endangered Species Act, 2007*, Canada's *Species at Risk Act* and the United States' *Endangered Species Act*.

Among the many factors that influence population growth in Piping Plovers, habitat quality and the associated abundance of food resources have been shown to be significant determinants of reproductive success and annual survival rates (Loegering and Fraser 1995, Cohen *et al.* 2009). Despite the obvious importance of diet and food abundance to population recovery, the diet of Piping Plovers is still rather poorly studied. This is due, in part, to the endangered status of the species placing restrictions on the collection of specimens or disturbance of live birds, resulting in difficulty in direct assessment of species' dietary choices (Elliott-Smith and Haig 2004). Necropsies of salvaged Piping Plover chicks in northern Michigan that died naturally of unknown causes showed that prey items consisted entirely of insects including Coleoptera, Diptera and Hymenoptera (Cuthbert *et al.* 1999).

Observational studies of birds foraging have shown a diet preference for arthropods and marine invertebrates (Elliott-Smith and Haig 2004). A study of plover fecal samples done on the Atlantic coast of Canada revealed prey items to be exclusively invertebrates consisting of scuds (Amphipoda), beetles (Coleoptera) and flies (Diptera) (Majka and Shaffer 2008). Neither of two of the leading researchers on Piping Plovers could recall a published or anecdotal reference to this species including vertebrate prey items in its diet (F. Cuthbert, pers. comm.; S. Haig, pers. comm.). The

This female Piping Plover was observed foraging on very small, newly emerged American Toads. *Glenn Coady*

purpose of this note is to describe an observation of an adult Piping Plover consuming a vertebrate prey item, specifically an American Toad (*Anaxyrus americanus*).

Observation

On 25 July 2016, I was observing an adult female (Figure 1) and four juvenile birds at Darlington Provincial Park in Durham Regional Municipality, Ontario, when I noticed the adult female foraging at the back of a dune near a vegetated edge of the beach. From a distance, she appeared to be capturing small dark prey items that were jumping to evade her, giving me the initial impression of some type of cricket or beetle. However, when I approached the bird more closely, I could tell with binoculars that she was, in fact, capturing and consuming very small and newly emerged American Toads. Earlier that day, I had noticed a mass emergence of them in the woods near the edge of the marsh at McLaughlin Bay. I observed the adult plover capture and consume three of these toads in rapid succession before it moved back down toward the juvenile birds to feed at the shoreline algae mats. I then found and captured a toad on the beach. I had little for reference to compare it with, but its length was slightly less than half the diameter of a dime (therefore, ca. 8 mm). These early stage toads seemed to be easily caught and dispatched by the plover. Pellet casting has not been described for the Piping Plover (Elliott-Smith and Haig 2004). I continued to observe this adult female for several more hours, but never saw any indication of it forming or casting a pellet. Presumably the plover digestive system is capable of dealing with a skeleton this small and pliable in similar fashion to larger arthropod exoskeletons.

Discussion

My initial investigations led me to believe that I may have witnessed a novel occurrence of a Piping Plover consuming a vertebrate prey item. However, a recent note has been published on consumption of dead fish, specifically Bay Anchovy (*Anchoa mitchilli*), by Piping Plover chicks and adults nesting on New York barrier islands (Monk *et al.* 2016). In one case, these may have been dropped prey items from a nearby Least Tern (*Sternula antillarum*) colony. In other cases, the fish had washed up dead in the wrack line. Further study will be needed to determine if this was opportunistic foraging or whether plovers regularly consume small fish as a dietary item.

Similarly, the mass emergence of small toads might be nothing more than an opportunistic feeding event at a time when other prey items like midges (Chironomidae) are around in lower numbers than earlier in the season. Interestingly, this female lost its mate the day after its clutch of eggs hatched and had been a sole parent for close to a month at that point (Coady 2016), so perhaps the extra energy demands may have encouraged it not to pass up any potential available prey items. Additionally, two of the juvenile Piping Plovers at the site (one from each of two different nests) were found dead on this beach very late in the season (at 41 days and 48 days old). Necropsies indicated that both were emaciated and likely died of starvation, either due to inadequate food availability or secondarily to pathogens like botulism or salmonella. Their state of emaciation raises the questions of whether the habitat at Darlington offered low food abundance and if so, if that might explain the consumption of non-traditional prey items.

Recent advances in DNA analysis of avian fecal samples provide new non-invasive options for delineating a more complete picture of the variety of dietary items in shorebirds (Pompanon *et al.* 2011). Perhaps in the future, such studies will provide answers to the question of how commonly this species includes vertebrate prey in its diet. Conservation measures and beach maintenance practices that can serve to maximize invertebrate prey abundance in the beaches chosen by Piping Plovers for breeding will be enhanced by additional diet information.

It remains to be determined how commonplace vertebrate prey selection is among Piping Plovers throughout their summer and winter range. This appears to be only the second published instance of Piping Plover selecting a vertebrate prey item and the first observation involving such a widespread and ubiquitous freshwater amphibian prey option.

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The role of European Starlings in the decline of Red-headed Woodpeckers in Ontario

Mathew Mair and Sarah E. Jamieson

Introduction

Over the past 20 years, Red-headed Woodpecker (*Melanerpes erythrocephalus*) populations have been declining dramatically across their range (COSEWIC 2007, Berl *et al.* 2015). The species continues to decline despite being widespread with a natural distribution spanning southern Canada and the eastern and central United States. In Canada specifically (the northern limit of the range), Red-headed Woodpeckers have declined 48% since 1994 (COSEWIC 2007). The most often suggested reasons for the decline are those pertaining to negative impacts on the species' breeding ecology. Lack of open habitat through the suppression of brush fires, fewer nesting snags, shifting agricultural methods (e.g., destruction of woodlots and conversion

European Starling.
Homer Caliwag

Red-headed Woodpecker. *P. Allen Woodliffe*

of old fields), loss of mast-producing trees and competition for limited nesting sites with conspecifics have all been suggested as reasons for the observed population crash (COSEWIC 2007, Berl *et al.* 2015). Usurpation of nesting holes by other cavity nesting species is another potential cause of decline, particularly when coupled with additional stress factors (Koenig 2003, Frei *et al.* 2015).

The European Starling (*Sturnus vulgaris*) is a highly competitive cavity nester that has been implicated in the usurpation of nests for at least 27 species of primary and secondary cavity-nesting birds (Koenig 2003). The starling has the added detraction of being a non-native species, having been introduced from Europe intentionally to North America in 1890 and has since become abundant throughout the continent (Cable 1993). Woodpecker species throughout North America have been affected by the starling's introduction and subsequent spread, including Northern Flickers (*Colaptes auratus*) and Red-bellied Woodpeckers (*M. carolinus*) (Ingold 1994, Wiebe 2003). Starlings have been found to compete for breeding sites with Red-headed Woodpeckers, with successful nest cavity usurpation having been directly observed (Frei *et al.* 2015). Despite the known threat that starlings pose to the Red-headed Woodpecker, scant research has been implemented to better understand the significance this competition has on the woodpecker's corresponding abundance.

An increasing number of studies have been conducted using citizen science sources such as the Breeding Bird Survey and Christmas Bird Count which allow open access to data on distribution and abundance of birds across a wide temporal scale; one of the few studies examining the effects starlings have on breeding cavity-nesters was conducted by Koenig (2003) using long-term citizen science data. Decades of data were analyzed, including examining the mean densities of cavity-nesters before and after starling invasion throughout North America. Ultimately, few cavity-nesters, either primary or secondary, were reported by Koenig (2003) to be negatively affected, if at all, by starlings. However, in this correlational study, the size of the study area (North America) and inclusion of winter submissions (a time when woodpeckers and starlings do not compete for nests) may understate the importance of site specific and breeding-centric cases of competition among cavity nesters. Few studies have focused specifically on Red-headed Woodpecker and starling competition, especially in an Ontario-wide spatial scale with a recent study by Frei *et al.* (2015) being a notable example. Additionally, to our knowledge, no studies have examined the relationship between the abundances of European Starlings and Red-headed Woodpeckers using data available through eBird, a popular citizen science initiative which allows open access to a large repository of distribution and abundance data spanning decades.

For this study, we compiled the relative abundance of Red-headed Woodpeckers and European Starlings in important breeding areas of the woodpeckers in southern Ontario during the breeding season. Abundance dynamics of Red-headed Woodpeckers were compared to those of starlings to explore the possible correlations between starling demography and Red-headed Woodpeckers. We hypothesise that Red-headed Woodpecker abundance is impacted by starling abundance in Ontario and predict that Red-headed Woodpecker-starling abundance will have a significant interaction with time (year) being a significant predictor variable.

Methods

The study sites selected for analysis were derived from data on important breeding locations for the Red-headed Woodpecker in Ontario provided through a comprehensive report on the species' Canadian status (COSEWIC 2007). Abundance data were compiled for Red-headed Woodpeckers and European Starlings using eBird submissions within Chatham-Kent, Durham, Elgin, Essex, Frontenac, Haliburton, Hastings, Kawartha Lakes, Leeds and Greenville, Middlesex, Muskoka, Norfolk, Northumberland, Peterborough and Simcoe counties (eBird 2016a). Abundance was based on the mean number of birds reported on all submitted checklists within the region for each year's breeding season.

Abundance data were compiled from 1974-2015 to allow for submissions before the 48% decline reported up to 1994 (COSEWIC 2007) and during the major decline in Ontario ongoing since then. All data were used to compute weekly means within the known breeding season of the Red-headed Woodpecker in Ontario (16 weeks from 1 May to 31

August to account for any possible breeding) to keep the study breeding-centric and to avoid comparison of starling-woodpecker abundance during woodpecker migration out of the province (winter months). An annual breeding season abundance value was found by taking an overall average of the weekly mean sightings of Red-headed Woodpeckers and European Starlings within the study area and time specified previously. Having only been launched in 2002, much of the eBird data used in this study comes from historic pre-launch checklists. Historic data are subjected to the same vetting process as post launch data including potential questioning from regional editors (most of Ontario eBird records are at present subjected to regional editors) and automatic flagging of unusual sightings and count numbers (Burrell 2012, eBird 2016b). Historic data are largely sourced from dedicated birders and monitoring programs such as those submitted from regional partners including Bird Studies Canada, which helps maintain the eBird Canada regional portal (Bird Studies Canada 2016). To explore whether there was a relationship between Red-headed Woodpecker and European Starling abundance, we ran a general linear model (dependent variable: abundance, independent variables: year and species, interaction: year x species).

Results

A total of 72,276 checklists was submitted within the fifteen specified counties

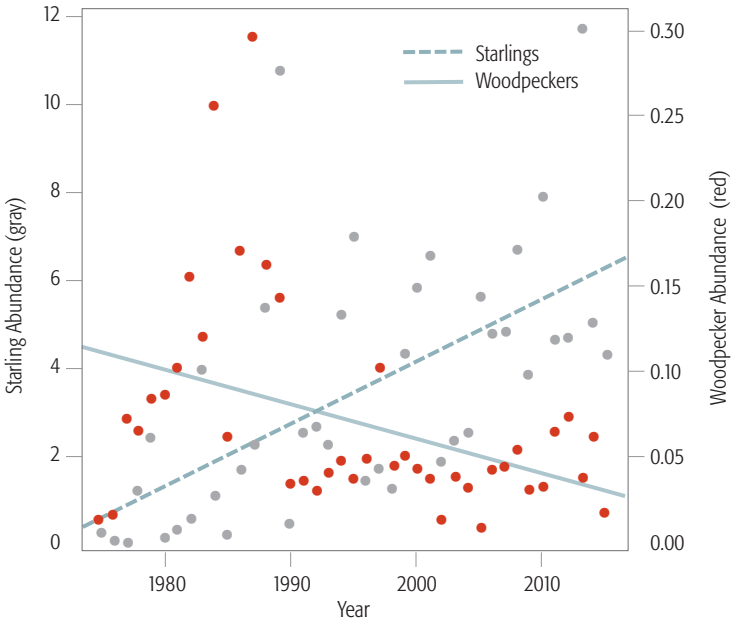

Figure 1: In southern Ontario, the relative abundance of Red-headed Woodpeckers (red) during the breeding season (May-August) declined significantly while European Starling (grey) increased in abundance from 1974 to 2015 ($F_{1,80} = 21.566$, $p < 0.0001$).

during the May-August spring-summer season from 1974 to 2015. Of the checklists submitted, 22,944 were from before the 2002 launch of eBird. Peak Red-headed Woodpecker abundance was reported during the 1986 breeding season with an average of 0.3 birds recorded per checklist. The lowest abundance for Red-headed Woodpeckers was found during 2004 with an average of 0.007 birds per checklist. European Starling abundance peaked in 2012 with an average of 11.7 birds recorded per checklist. The lowest abundance, with an average of 0.004 birds per checklist, was reported for 1976.

In the general linear model analysis, there was a significant interaction between year and species ($F_{1,80}$= 21.566, p<0.0001). The abundance of European Starlings increased consistently throughout the study period, while the abundance of Red-headed Woodpeckers decreased (Figure 1).

Discussion

The interaction between year and species abundance was found to be significant, consistent with our hypothesis that there was a negative correlation between Red-headed Woodpecker abundance and European Starling abundance and that starlings are a likely contributing factor to the ongoing decline of Red-headed Woodpeckers. Frei *et al.* (2015) found evidence that starlings were having a significant negative impact on Red-headed Woodpecker nesting success: aggressive interactions with starlings were recorded frequently and no less than six out of the sixteen nest failures were due to starling usurpation. Additionally, failed nests were found to be more than twice as likely to have a high density of starlings present within the vicinity of the active cavity (Frei *et al.* 2015). Their study indicates the mechanisms that help explain the inverse population trends correlation we found.

A sudden crash in the average abundance of Red-headed Woodpeckers recorded on checklists after 1990 (before which it appears to be increasing alongside starling abundance) suggests the presence of additional decline factors in addition to starling nest usurpation and other forms of competition (Figure 1). A consistent decline in abundance from the start of this study period would be expected if starlings were the primary or lone factor in such a drastic population decline over a short period of time, as starlings had already been well-established in the study area by 1974. The study by Koenig (2003) examining the effects starlings have on primary and secondary cavity nesters found that only three species showed declining trends in density as starling density increased. Mean Red-headed Woodpecker density did not significantly differ after the first record and subsequent establishment of starlings on selected breeding sites examined in that study, suggesting as in our case, that additional factors were contributing to the overall decline of the species.

Both intra- and inter-specific competition for nests have been described in Red-headed Woodpeckers. Red-headed Woodpeckers are bold and highly territorial, a behavior which leads to common

Red-headed Woodpecker.
P. Allen Woodliffe

instances of conspecific conflict. Persistent and aggressive territorial behaviours between breeding Red-headed Woodpeckers were observed frequently during a study of the species in New York (Berl *et al.* 2013). Notable among the conspecific territorial events observed was an attempted theft of the nest site (which would likely have resulted in the destruction of any eggs or young contained within). The intruding bird was observed on seven occasions landing within one metre of the cavity with one of those landings resulting in it entering the nest cavity briefly before retreating (Berl *et al.* 2013). Suggested explanations for the attempted nest theft include limitation of breeding sites. Red-headed Woodpeckers typically take longer than other woodpeckers to excavate a nest cavity (up to two weeks) which may incite intraspecific nest theft for the benefit of increased fitness for the invading individual, particularly if nesting trees and surrounding breeding habitat are at low densities (Lindell 1996, Berl *et al.* 2013). In contrast, a study by Atterberry-Jones and Peer (2010) found that cooperative breeding was adopted in some mated pairs of Red-headed Woodpeckers, possibly as a response to a high density of conspecifics within ideal breeding habitat compared to more sparsely inhabited surrounding areas. The helpers in that study largely assisted the breeding pair by defending the nesting area from conspecifics, because heightened levels of territorial conflict was thought to be a significant stress on overall breeding success (Atterberry-Jones and Peer 2010). Out of 28 Red-headed Woodpecker nests followed in an Illinois study (Hudson and Bollinger 2013), only a single case of usurpation was documented; the usurper was not a starling but rather a Pileated Woodpecker (*Dryocopus pileatus)*, a native species. Another woodpecker species, the Red-bellied Woodpecker, has increased in population and expanded its breeding range in Ontario within the same general time that the Red-headed Woodpecker has declined (Kirchman and Schneider 2014). Despite this recent expansion, the Red-bellied Woodpecker is an unlikely source of interspecific competition with the Red-headed Woodpecker as both species co-exist throughout much of their range further south and have significantly different choices in breeding habitat including site location and the condition of the nesting snag (Jackson 1976).

Predation has also been found to be a significant cause of mortality and nest failure of Red-headed Woodpeckers. Hudson and Bollinger (2013) found that five out of the seven nest failures in the sample of 28 nests were due to predation, more than any other contributing factor. In South Carolina, 19 of 80 radio-tagged Red-headed Woodpeckers were killed by predators, the only documented cause of mortality and the most significant source of nest failure (17 were killed by raptors while the remaining two were killed by snakes) (Kilgo and Vukovich 2012). Kilgo and Vukovich (2012) also found that the abundance of patches of dense tree or brush stands was significantly related to predation rates and suggested that the lack of ideal habitat was the overall most significant factor for survival. Limited high quality breeding habitat in Ontario has been suggested to lead to

maladaptive breeding site selection (Frei *et al.* 2013). Some Red-headed Woodpeckers have been found to select nest sites based on availability of food resources as the defining factor as opposed to predation avoidance; yet predator avoidance is a characteristic of successful sites (Kilgo and Vukovich 2012). The selection of relatively dangerous nesting sites was viewed as a possible ecological trap for the southern Ontario population, with anthropomorphic changes to habitat suggested as the factor driving the use of less than ideal sites with fewer surrounding cover patches and more open canopies around the nest snag where food is abundant alongside predators (Frei *et al.* 2013). The bright and conspicuous colouration, bold nature and preference for breeding in open habitat likely contribute to the high predation rate. Further studies using eBird or other citizen science data but focusing on avian predator abundance and its correlation with woodpecker abundance may support the suggestion of the importance of predation as a contributing factor to the decline.

Perhaps the most compelling explanation for the species decline in abundance in Ontario is the overall loss of suitable breeding habitat. Studies that have examined the breeding habitat of Red-headed Woodpeckers have found similar requirements for ideal breeding conditions including a certain snag density, nesting tree height, diameter at breast height of the nesting snag, and proximity to open habitat (Kilgo and Vukovich 2012, Berl *et al.* 2015). Additionally, tree decay state was one of the characteristics deemed important for nest location; trees were deemed suitable for nesting when they exceeded a decay value "corresponding to trees with > 33% decadent canopies" (Berl *et al.* 2015). The high decay factor may have to do with Red-headed Woodpeckers preferring softer wood because they are relatively poor cavity excavators when compared to other woodpeckers (Berl *et al.* 2013).

This has important implications in habitat management for this species which, based on data from the Berl *et al.* (2015) study, would require sites with trees well into their natural decay within grassland tree stands. Such sites are increasingly lacking in Ontario as old fields, tallgrass prairie and woodlots are increasingly converted into intensive agricultural lands and urbanized areas (COSEWIC 2007). It has been suggested that there was a minor resurgence of the population in the 1970s - 1980s following the spread of Dutch elm disease which resulted in additional decaying trees for nesting and foraging (Woodliffe 1987). Systematic suppression of brush fires, a significant contributing factor to large snag and open habitat creation, may also be a major contributing factor to the loss of ideal breeding habitat (Davis *et al.* 2000, Brawn 2006).

Overall, our study and conclusions from related studies suggest European Starlings are a contributing factor to the decline of Red-headed Woodpeckers in Ontario. Starling abundance, alongside other stressors including predation and competition with other cavity nesters and conspecifics are likely worsened by province-wide alteration of breeding habitat, which is perhaps the most important single factor in the decline of the Red-headed Woodpecker.

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Red-throated Loon. *P. Allen Woodliffe*

Migration of the Red-throated Loon on Lake Ontario

Geoff Carpentier

Introduction

The Red-throated Loon (*Gavia stellata*) is not generally considered to be a social species, particularly during the breeding season (Barr *et al.* 2000). However, it is well-documented (Powers and Cherry 1983, D'Anna 1995, Sherony *et. al.* 2000, eBird, OntBirds) that during spring and autumn migration, large flocks may gather at key staging areas. These areas include the Canadian and US Atlantic and Pacific coasts and select inland locations (e.g., Presqu'ile Provincial Park, the Regional Municipality of Durham and Toronto waterfronts, the west end of Lake Ontario and near Whitefish Point Bird Observatory (WPBO), near Paradise, Michigan, on Lake Superior). These areas are utilized as staging and resting areas (e.g., sites on Lake Ontario) or passage points for migrating loons (e.g., WPBO).

In this note, I report on five observations that I made of a total of 112 Red-throated Loons in the last week of May 2015 and May 2016 and the first week of November 2016 and relate them to what is known of their spring and autumn migration in the lower Great Lakes. There is very little published material on their

migration beyond dates and numbers, which may be due to two factors: (1) lack of observer encounters and (2) a limited understanding of migration timing and behaviour.

Migration Timing, Distribution and Abundance

Historically, the Red-throated Loon was considered uncommon in both spring and autumn migration throughout much of southern Ontario (Tozer and Richards 1974, Speirs 1985, Weir 1989, LaForest 1993). Weir (1989) speculated that the species may have been more common historically and that it was simply overlooked until the migration timing was better understood. Interestingly, however, McIlwraith (1894, cited in Curry 2006) reported it as common in spring passage and Bull (1985) described it as a common to locally abundant migrant on Lake Ontario, but highly variable in numbers in any given year. D'Anna (1995) reported that aggregations and movements may be quite localized, which may partially explain why some observers see large concentrations in some places, while others see them much less commonly, and may also, in part, explain the differential reporting of the regional status of the Red-throated Loon.

The Red-throated Loon is now considered a regular spring and autumn migrant on the lower Great Lakes and on Lake Ontario, in particular. Numerous reports (eBird and OntBirds) have shown large concentrations in the autumn near Hamilton, Oshawa, Kempenfelt Bay (Barrie), Presqu'ile Provincial Park and Darlington Provincial Park in Ontario. They are also reported commonly in April and May from Monroe, Niagara and Orleans counties in New York (eBird and OntBirds). On 1 April 2016, D'Anna reported 345 birds at Niagara (eBird); he also reported that Kemnitzer recorded 500 near Webster Park (Monroe County) on 14 April 1952 (D'Anna 1995). At Hamlin Beach State Park, near Rochester, New York, several large counts have been reported: Griffith reported 1,008 on 28 November 1986, Listman reported over 2,000 on 31 October 1989, Ewald reported 1,200 on one autumn day in 1993 and other observers recorded 1,390 birds there on a single day in November 1993 (D'Anna 1995). W. D'Anna (pers. comm.) explained that these Hamlin Beach State Park counts are conducted by a stationary person or persons for variable periods of time but high counts like these are typically tallied over a period of a few hours from just after sunrise to noon.

The loons come by at variable rates, usually flying east to west. They don't come through in tight flocks, like ducks, but typically in loose lines. The migration usually slows down after mid-morning but on really good days may continue at a moderate pace into the afternoon. Distance from shore is often fairly consistent on a given morning. Unlike Common Loons (*Gavia immer*), Red-throated Loons rarely fly high but stay low over the water. D. Sherony (pers. comm.) reported that the annual count at Hamlin Beach State Park averaged 9,800 per year (1993-1999) with a high year count of 19,800 in 1997. Harrison (1983) indicated that the peak autumn numbers on the Great Lakes reached 1,200 birds. Barr *et al.* (2000) and Dunne (2006) reported that the spring migration along Lake Ontario peaks in

the latter part of April. However, based on my observations (below) and eBird records, migration appears to extend well into the 3rd or 4th week of May and may involve two peaks, one in early to mid-April and another in late May.

Behaviour of Migrants

W. D'Anna (1995; pers. comm.) noted that the birds moving along the south shore of Lake Ontario in the spring usually travel westward in lines of widely spaced single birds, with very little overland movement reported, while on the north shore, spring movement is both east to west and south to north (pers. obs.). It is always difficult to determine if directions of flight or movements of birds are linked to migration, but in the case of the Red-throated Loon, the window for migration is relatively short; they do not linger for long periods of time so movements involving large numbers of birds are often linked to migration as opposed to simply movements between feeding areas. In Ontario, notable movements of Red-throated Loon are often coincident with those of other species of similar waterbird migrants, such as Common Loon, Red-necked Grebe (*Podiceps grisegena*) and various waterfowl (T. Hoar, pers. comm.) leading credence to the suggestion that the loons are undertaking a movement related to migration, rather than feeding, since these species have different feeding preferences.

Red-throated Loons are known to leave singly from staging areas in the autumn but frequently gather on the water into small flocks, called clusters by Sherony *et al.* (2000). Bent (1963) referred to these clusters as "loon caucuses", so named by gunners who followed their movements to try to shoot them. While many observations of them migrating in the spring have been reported in eBird over the years, generally the observers have not commented on direction of flight, flock size or overland migration. B. Curry (pers. comm.) reported that he observed Red-throated Loons migrating westward at great altitude at Dundas Valley in Hamilton, Ontario, with 52 noted on 21 April 1996 and 48 on 5 April 1997. During the peak of migration, they sometimes form tighter assemblages of a few to 20 or more birds. He also indicated that he never has observed them flying overland nor has he seen them fly northward. So where were these birds and those from the south shore of Lake Ontario going? T. Hoar (pers. comm.) speculates that they may be following the Niagara Escarpment.

Red-throated Loons.
Christine Kerrigan

Table1: Recent observations of migrating Red-throated Loons from Lake Ontario.

Date	No. of Birds	Details	Location	Observers
24 May 2015	28	Single flock of basic plumaged birds flew in from west, circled overhead then over the lake and then headed north in a fairly tight flock. Time was ~6:15 a.m.	Darlington Provincial Park	G. Carpentier, Peter Hogenbirk and Tony Bigg
24 May 2016	20	18 birds in a single flock and 2 singles on the water. Flock lifted off the water well offshore and then headed north overland and out of sight remaining in the flock. Time was ~6:30 a.m.	Darlington Provincial Park	G. Carpentier and Peter Hogenbirk
24 May 2016	14	Prior reported hearing the distinctive quacking at ~6 a.m. and spotted a loose flock of 14 loons circling overhead but didn't record their direction of travel.	Ajax waterfront	Paul Prior
26 May 2016	44	4 flocks noted flying north: 19 birds at 05:52, 13 at 05:52, 7 at 05:53 and 5 at 06:33 in fairly tight flocks. No single birds observed.	Scugog Twp.	G. Carpentier
09 Nov. 2016	6	5 birds in a single loose flock at 07:37 and a single bird at 07:39	Scugog Twp.	G. Carpentier

One clue to their destination might lie in the fact that they are regularly counted in good numbers at WPBO on the south shore of Lake Superior, e.g., in spring 2016, 369 were recorded and WPBO counters indicate this is a low number for that site (http://wpbo.org/ spring-2016-waterbird-count-summary/).

Recent Observations

Recent observations of Red-throated Loons during spring and fall migration at Darlington Provincial Park, Scugog Township and Ajax, Ontario (Table 1), support the migration behaviour reported by Sherony *et al.* (2000) and others.

These Ontario observations are notable in that they report two phenomena that are not well-documented in the literature — flock sizes near the high end of reported numbers and flocking behaviour including flock cohesion at departure and loons migrating as a flock away from the lakeshore. The two events at Darlington Provincial Park document instances where 28 and 20 birds, respectively, were noted to flock and depart the area northbound with the flocks remaining intact at least until they were out of

sight. The Ajax event indicates flocking as well but the observer did not comment on whether the flock moved off intact or broke up. The 26 May 2016 Scugog Township event was unique in that the flocks either remained intact about 25 km north of their presumed departure from the Lake Ontario shore or they formed at some point after the birds left Lake Ontario. The November 2016 Scugog sighting is an interesting report of a flock of loons migrating in a loose formation southbound. Stone (1965)and Sibley (1993, cited in Barr *et. al.* 2000) reported that Red-throated Loons usually fly in flocks of <15 birds during migration events, while Dunne (2006) reported migrating flocks of up to 60 birds, with feeding and resting aggregations numbering in the hundreds. Both Scugog Township observations also align with Dunne's (2006) observations in that the birds flew in loose formation, at varying altitudes and with non-uniform spacing between birds. The years when these larger movements were documented appear not to be unusual in the sense of weather patterns, so this likely is an annual event that requires further study.

D'Anna (1995) speculated as to why the numbers observed in adjacent regions vary so much. He reported that his experience shows that Red-throated Loons generally migrate and feed much further offshore than other loons, so they may be overlooked by many observers; migrating flocks are closer to shore in some areas, particularly those with landforms that jut out into the lake, so the loons are more easily identified. He also noted that observers spend more time watching at selected sites on Lake Ontario than in other less 'birdy' spots.

Based on my observations and those of others, it appears that birders should watch for this flocking phenomenon in April and the 3rd to 4th weeks of May along the Lake Ontario shore and from mid-October to late November or early December. Along the north shore of Lake Ontario, fall observations of Red-throated Loon movements are sparse and poorly documented. Generally, nothing has been reported that substantiates a directional migration (T. Hoar, pers. comm.) However, one interesting observation was made on 19 November 2011 by Mark Peck and Tyler Hoar at Niagara-on-the-Lake where 811 Red-throated Loons were observed flying west past the mouth of the Niagara River (eBird 2011).

Although aggregation of birds on Lake Ontario is an annual spring and autumn event, not enough data have been collected to substantiate if birds staging along the north shore of Lake Ontario are moving off in migrating flocks and if so, whether they remain intact for specified distances north or west (i.e., in spring) or south, east or west (i.e., in autumn) of Lake Ontario. The observations I made may not be unique but rather may be a factor of observer experience and circumstance. I hope that others will note loons' behaviour and direction of movement to help increase our knowledge of their migration.

Acknowledgements

I would like to thank Bob Curry, Willie D'Anna, Kurt Fox, Tyler Hoar and Dominic Sherony sharing their data, ideas and observations that made this paper more fulsome and representative. The editors of *Ontario Birds* provided many useful and helpful suggestions to improve this paper.

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Jean Iron accepting the Distinguished Ornithologist Award from Ken Abraham. *Ron Pittaway*

Distinguished Ornithologist Jean Iron

Kenneth F. Abraham

The Ontario Field Ornithologists' (OFO) 2016 Distinguished Ornithologist Award was presented to Jean Iron. Jean has been a constant presence and leading figure in OFO for almost 25 years. She's been at the head of the line when something needed doing and she seems to always have been present when things were happening. From her service on the OFO Board and her presidency, to her role on OFO's publications, to representing OFO on provincial committees, to being among the first to acknowledge and thank our partners and patrons, Jean is someone we have come to depend upon. Although Jean needs little introduction to OFO, her life and her contributions to OFO, ornithology in Ontario and beyond deserve elaboration here.

Jean was born in Wales into a family who loved nature and the countryside, giving her a foundation for her life to come. She emigrated to Canada in 1967 where she obtained a Masters of Education at the University of Toronto. She put her education to work as a teacher, consultant and school principal for the Toronto Catholic School Board from 1967 to 1999 when she retired from the teaching profession. Despite her family's

love of the outdoors, Jean's interest in birds did not begin until the latter stages of her teaching career. In about 1989, she met Dave Milsom and Jim Coey, who owned Flora and Fauna Field Tours. They took Jean on birding excursions in Ontario and to Churchill, Manitoba, which were then followed by trips to Costa Rica and Argentina. Jim and Dave also introduced Jean to the Ontario Field Ornithologists. She became a member in 1991 and quite quickly became a part of OFO activities, taking part in the publication project that culminated in *Ornithology in Ontario* in 1994 and was elected President immediately thereafter.

During Jean's presidency of OFO (1995-2004), the organization developed substantially and her roles in annual conventions set a benchmark for that task. She also excelled as the "unofficial" OFO convention photographer. During and after Jean's presidency, she served OFO in numerous external capacities as well, including representing our interests on many birding and conservation committees. Jean represented OFO on the Ontario Shorebird Conservation Plan committee from 2000-2003, on the Ontario Landbird Conservation Plan team in 2008 and as a member of the Ontario Breeding Bird Atlas Management Committee from 2000 to 2007. Following her departure from the President's position, Jean stepped directly into a position serving on the Ontario Bird Records Committee (OBRC) as a voting member from 2005 to 2009 and chaired the OBRC in 2008. Here she applied her extensive expertise in identification of and knowledge about shorebirds, gulls, geese and other bird groups.

Jean proudly lists her special interest in a number of bird families, but those which draw the greatest amount of her attention are gulls, shorebirds, geese, finches and grassland birds. Her love of gulls is apparent to all who know her. One of her notable contributions was the documentation of Ontario's first Heermann's Gull and an article about its molts and plumages, co-authored with Ron Pittaway. She has introduced countless people to the joys (and pitfalls!) of gull watching and plumage cycle identification, and shared her knowledge about gulls in other ways, one of the most significant being her leadership of annual Niagara Gull Watch field trips which she has co-led from 2000 to 2016. She also organized and presented pre-field trip gull identification workshops in 2014, 2015 and 2016.

Jean's special interest in shorebirds is also well known and it has kept her busy in both southern and northern Ontario. One of her most impressive and well-used publications is her S*horebirds of Southern Ontario* photographic identification guide. Her expertise in photography as well as on molts and plumages shines through in the images throughout the book. During spring migration season, she gives identification workshops at the Point Pelee National Park Visitor Centre timed to coordinate with the OFO shorebird trips at Hillman Marsh. In northern Ontario, she has volunteered on a variety of research and monitoring projects since 2002, many specifically aimed at gaining better information and knowledge about shorebird migration ecology. She assisted with Ontario Ministry of Natural Resources (OMNR) shorebird monitoring and climate change studies at Shegogau,

northwest of Moosonee, in 2005, with shorebird surveys in spring and late summer at Akimiski Island in 2008, and with shorebird and climate change surveys at Burntpoint Creek in Polar Bear Provincial Park in 2012. She's been in the field in all eight years of the Southern James Bay Shorebird project (2009-2016) at one or sometimes two month-long sessions, contributing substantially to data gathered for this, a multi-organization program whose aim is to document the critical importance of James Bay to migrating shorebirds which may eventually lead to habitat protection. A highly valued spinoff of this annual participation has been her weekly postings to OntBirds via remote communications methods in partnership with Ron Pittaway. These postings have allowed Ontario birders and those beyond its borders to experience in near-real-time the phenomenal migration of shorebirds in James Bay. Participating in OMNR goose research at Burntpoint in 2002, 2003 and 2006 caused Jean to fall in love with the Hudson Bay Lowlands.

One of Jean's most enduring and significant accomplishments for bird conservation in Ontario has been her work on the initiative to protect the Carden Alvar for its value to this rare habitat and the grasslands and wetlands bird communities it supports. She served on the committee with Nature Conservancy of Canada, Toronto Ornithological Club and Couchiching Conservancy to plan land purchases and raise funds which eventually led to the establishment of Carden Alvar Provincial Park in 2014. Jean continues to advocate for protection of the Carden Alvar's grassland bird habitat, including that of the endangered Loggerhead Shrike (*Lanius ludovicianus)*. She took a hands-on approach to the task in 2012 serving as the Celebrity Birder for the Couchiching Conservancy's Carden Challenge fund-raising effort for Carden Alvar. In 2016, she accepted a position on the Advisory Council of the Couchiching Conservancy, a land trust in the Lake Simcoe and Carden area.

Jean is an author or co-author of over 50 articles and notes about birds and bird conservation (See Selected Publications). She is a regular (almost annual) contributor to OFO's two publication outlets, *OFO News* and *Ontario Birds*. She was editor of *OFO News* from 1994-2007 and continues to serve as an editorial assistant. In addition, she has published many articles in the Toronto Ornithological Club Newsletter and *Toronto Birds* and was a co-author of the *Ontario Shorebird Conservation Plan*.

Jean seems never to be idle and that energy is often directed at things to do with birds. In addition to all of the above-noted projects, she also participated in field work for the Ontario Breeding Bird Atlas (2001-2005), was a surveyor of Red Knots and other shorebirds on the Mingan Archipelago, Quebec, for the Royal Ontario Museum in 2007, has been a Lake Ontario Winter Waterfowl Survey participant every January for over 20 years, a Whimbrel Watch participant at Colonel Sam Smith Park in Toronto annually since 2007, a Cranberry Marsh Hawkwatch participant from September to November since 1999 (including as official counter one day per week), a Plover Guardian for the Piping Plovers nesting on Toronto Islands in June 2015

and sometimes she even gets paid (e.g., she had contract bird survey positions with the Toronto and Region Conservation Authority from 2001 to 2004). She is also an active member of the Toronto Ornithological Club, the American Birding Association, the Nature Conservancy of Canada and the Brodie Club.

Jean has introduced or influenced the birding habits of hundreds of people through her workshops and annual OFO trips and as a mentor throughout her eight years of volunteering on the James Bay shorebird project, particularly to young Moose Cree First Nations participants. She has informed and delighted thousands through her superb photography by sharing it on her website which is wonderfully informational and educational. Prominently featured are her annual trip photo essays which have recently been enhanced with videos. The content she provides on research and monitoring programs is worth its weight in helicopter fuel; I have personally highlighted this unique contribution to a succession of Ontario government senior managers and communications officers. It is an innovative means of communicating what OMNR does with taxpayers' money in support of the conservation of migratory bird populations and habitats through research and monitoring.

She is also a regular presenter at birding and nature clubs and other organizations throughout Ontario. She has been invited to be keynote speaker at several festivals of birds, including Point Pelee Festival of Birds (2009), Ruthven Park National Historic Park Festival (2010), Huron Fringe Festival of Birds (2011), Rondeau Provincial Park Festival of Birds (2011) and has traveled to give similar presentations in Buffalo, New York, Pittsburgh, Pennsylvania and to the Roger Tory Peterson Institute of Natural History in Jamestown, New York. Her presentation topics include Arctic Wildlife of Canada, Iceland and Greenland, gull watching in Ontario, shorebird migration, Hudson Bay and James Bay shorebirds and wetlands, Akimiski Island natural history, the Carden Alvar, the Northwest Passage, High Arctic expeditions from Greenland to Nunavut, and the birds and natural history of Costa Rica, Panama, Peru and the Galapagos.

Another way Jean has contributed to the public's awareness and knowledge has been as a naturalist tour leader. She has led tours since 1999 to locations in Ontario including: Point Pelee and Georgian Bay (a cruise) as well as beyond Ontario's borders to Cuba, Honduras, Belize, Guatemala, Costa Rica, Panama, the Canadian Arctic, Greenland, Svalbard (in the Norwegian Arctic), Japan, French Polynesia, Iceland, Ecuador and Peru.

It is safe to assume that Jean's list of special interest birds will only grow longer as she is introduced to new groups through her travels, because it is characteristic of Jean to dive deeply into subjects that pique her interest, and we all benefit from that inner drive. She is an integral part of the success story of Ontario Field Ornithologists and is greatly deserving of this award. She is now a life member of OFO and for many of us, "OFO" and "Jean Iron" have become nearly synonymous.

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In Memoriam Alan Wormington

Bill Lamond

Alan Wormington at the Tip of Point Pelee, his favourite place on earth, 12 May 2015. *Jean Iron*

The Ontario birding community received a severe blow with the passing of Alan Wormington on 3 September 2016. Alan had been diagnosed with bone cancer in December 2013 but was able to lead a fairly normal life until a couple of weeks before he finally succumbed. Alan was likely the most accomplished birder of his generation in Ontario. Jim Richards of Orono said "Ontario ornithology has lost the single most important figure since the passing of James L. Baillie in 1970." I couldn't agree more.

Alan Wormington was born on 20 June 1954 in Hamilton. His interest in nature began very early on with an intense interest in butterflies in his early teenage years. He remembered his mother dropping him off in rural areas of Hamilton for him to explore and collect butterflies. A friend of Alan's sister remembers that his bedroom was "an absolute disaster, covered in butterfly boards and books." Soon after, he became interested in birds and from then on they occupied him constantly. He was expelled from high school when he was 15 because

Alan Wormington at Moosonee, 24 September, 2014. *Josh Vandermeulen.*

of recurrent truancy, much to the chagrin of his parents. However, this was delightful news to Alan as it allowed him to look for birds whenever he wanted (which was most of the time). He never went back to school.

Hamilton birder Bob Curry notes that people assume he was a mentor to Alan. Although Alan did get 'training' from Bob, George North and Alf Epp, Curry reminds us that "Alan was a wunderkind who almost immediately could find more birds and 'better birds' than any of us." And what birds! Over his life he found seven species new to Ontario: Lesser Nighthawk (*Chordeiles acutipennis*) (1974), Royal Tern (*Thalasseus maximus*) (1974), Fish Crow (*Corvus ossifragus*) (1978), Cave Swallow (*Petrochelidon fulva*) (1989), Plumbeous Vireo (*Vireo plumbeus*) (1997), Sooty/Short-tailed Shearwater (*Puffinus grisea/tenuirostris*) (2010) and Kelp Gull (*Larus dominicanus*) (2012). Most of us would be lucky to find and add one new species to the Ontario list in our lifetime. Not surprisingly, he also found the first nests of both Chuck-will's-widow (*Antrostomus carolinensis*) and Cinnamon Teal (*Anas cyanoptera*) in Ontario.

Within a few years, Hamilton birding was not satisfying enough and Alan was looking for more. He wondered if there were areas in the north that might be outstanding 'migrant traps'. Veteran birder Doug McRae remembers that "In many ways [Alan] was a pioneer. While he wasn't necessarily the first to visit James Bay or the north shore of Superior for birding, I think he was the first to realize the incredible vagrant potential in the 'off' season and where to find [birds]." In late

August 1971, a 17-year-old Alan, along with Mark Jennings, made his first trip to Moosonee. Mark, on replying to my question of why Moosonee, responded, "You know how Alan's mind worked. He probably noticed how Hudson Bay and James Bay created a funnel south and realized Moosonee, being at the narrow end, would be a good birding trap." Soon after, this area was broadened to other areas of southern James Bay, especially Netitishi Point between Moosonee and the Quebec border. At this time, Alan also began exploring the north shore of Lake Superior on an almost annual basis and even once explored Caribou Island in Lake Superior, a small island about 85 km offshore from Agawa Bay.

However, to most birders Alan will always be linked with Point Pelee, a place which he called home after moving there in 1979. He wanted to live in the best place in Ontario for birding and he more or less adopted Point Pelee as his 'kingdom'. His meticulous record keeping of Point Pelee birds is legendary, as his many annual summaries of Point Pelee birds bear out. There is no one who has birded more within Point Pelee National Park and its environs — not even close. Not surprisingly, his Pelee list is head and shoulders above anyone else's, and at 368 species, is 94% of all the species ever recorded there (393).

Alan was not strictly an Ontario birder and he 'adopted' Texas as one of his favourite places to bird outside of the province. He made dozens of trips to Texas over the years and many birders have fond memories of accompanying Alan on these trips. For a long time, he had the highest Texas list for an out-of-state birder — something of which he was quite proud. Of course, Alan was not solely a birder. He had an intense interest in butterflies. He probably had a better understanding of the status and distribution of Ontario's butterflies than anyone else. He had seen almost all the resident butterfly species in Ontario and a good percentage of the strays that have occurred in the province. His personal collection of butterflies is possibly the finest of any lepidopterist in the province. Alan was also a fine photographer of birds in the analog photo era. His collection of black and white photographs of rare Ontario birds is simply amazing in scope and quality.

Alan never liked to be called a 'lister' but his achievements are hard to deny as he has the top Ontario list (447) and top (by far) all-time winter list (295). Some of Alan's expeditions to see rare Ontario birds are legendary, including his death-defying "race" to see the Lesser (Mongolian) Sand-Plover (*Charadrius mongolus*)

Mark Jennings, Bob Curry and Alan Wormington, Ship Sands Island, James Bay, August 1977.
Mark Jennings (timer)

at Presqu'ile Provincial Park and his expedition to see a reported Clark's Nutcracker (*Nucifraga columbiana*) in Dryden — in the dead of winter — which turned out to be only a mockingbird.

To me, listing was his hobby. His career was field ornithology, especially his pursuit of understanding the status and distribution of birds in Ontario. There was no one who could evaluate a bird record better than Alan; such was his devotion to the documentation of Ontario's bird life. Alan was instrumental in the formation of the Ontario Bird Records Committee (OBRC) in 1982. Glenn Coady has remarked that "He almost single-handedly raised the bar on the adequate documentation of rarities. By doing such an exemplary job himself, Alan provided the impetus for everyone to 'improve their game'. He truly led the way in 'moving the yard-sticks' in the documentation of rarities." He served on the OBRC for 19 years and for six years he wrote or co-authored the OBRC annual reports that were published in *Ontario Birds*. He also wrote many seasonal summaries of the Ontario region for North American Birds right up until the present. Alan wrote numerous papers outlining the status of Ontario's birds many of which have been published in *Ontario Birds*. He had been working on his 'life's work', namely the *Birds of Point Pelee* for many years. Unfortunately, although all the data have been assembled into paper files, it was not close to being finished at the time of his death. It is hoped that it can be published in some form in the coming years.

Alan had an intriguing persona. He could be a contrarian, often taking opposing views from the mainstream. He never met a conspiracy theory he didn't like and he was always ready to question commonly held views. He would have been pleased by the Trump election but he in no way held the disturbing views of Donald Trump. His support of this candidacy was more in the vein of upsetting the apple cart. There are certainly birders around who have told unflattering stories about Alan. However among those who really knew him, Alan was well-liked and respected, as shown by the number of friends surrounding his deathbed. I think Willie D'Anna said it well: "Alan was great, in many ways, and I have been a fan of his almost since I started birding. I met him at Pelee on my first trip there in the mid-eighties. Like all of us, he had his faults as well and he could be off-putting to people who did not appreciate his blunt honesty. However, I think he appreciated those people who were just as honest and upfront with him."

He will be profoundly missed by many birders across the continent and by his sister Janne Hackl (husband Leo), nephew Jonathan Hackl (wife Elizabeth), and great nephews Ethan and Ryan and great niece Julia.

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Correction

August 2016, Volume 34(2), page 144. **How biochemical indicators can be used to detect changes in food webs of gulls** by Craig Hebert. On the Y-axis of the lower graph, 'd13N' value should read 'd13C'.

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