

Observations of the Summer Birds of Tukarak Island (Belcher Islands, Nunavut), Nastapoka Islands (Nunavut), and Lac Guillaume-Delisle (Northern Quebec)

CHRISTOPHER W. SWARTH^{1,3} and WOUTER BLEEKER²

¹Natural Reserve System, University of California, Merced, California 95343 USA

²Geological Survey of Canada, Ottawa, Ontario Canada

³Corresponding author: cswarth@ucmerced.edu

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In a survey of land and water birds of Tukarak and Nastapoka Islands and Lac Guillaume-Delisle in summer 2011, we recorded 22 of the 30 species known to breed on the Belcher Islands, as well as five non-breeding species, and we observed 32 species in Lac Guillaume-Delisle. In all areas surveyed, we observed a total of 43 species: 10 waterfowl, 2 gallinaceous birds, 3 loons, 2 hawks, 3 shorebirds, 1 auk, 3 gulls, 2 falcons, and 17 songbirds. In this area of Hudson Bay, a number of species reach the southern or northern limit of their breeding distribution in eastern Canada. In light of the impact that climate change may have on bird distribution in northerly latitudes, the Belcher Islands and adjacent mainland areas could be particularly useful locations for monitoring changes in the breeding range of birds.

Key Words: Breeding birds; Hudson Bay; Belcher Islands; Tukarak Island; Lac Guillaume-Delisle; Nastapoka Islands

Introduction

The breeding avifauna of the Belcher Islands, Nunavut, has been documented by Twomey (1942), Todd (1963), Freeman (1970), and Manning (1976). Twomey was the first to make systematic bird observations on the Belcher Islands, which he described in general terms in *Needle to the North* (Twomey 1942). On Tukarak and Flaherty Islands, Twomey collected 19 bird species (273 specimens and 59 clutches of eggs); his collection is held at the Carnegie Museum of Natural History, Pittsburgh, Pennsylvania. Freeman (1970) spent the summers of 1959 and 1960, and March and April 1961 in the area. Most of his observations were made in the southwest region of Flaherty Island near the mouth of the Kasegalik River, although he also visited Tukarak Island. Manning (1976) visited the islands from May to September 1971, principally to study polar bears, but he also collected birds and estimated the size of breeding populations. More recently, information on Common Eiders was summarized by Abraham and Finney (1986) and by Robertson and Gilchrist (1998). Arctic Tern and gull population trends on the Belcher Islands were described by Gilchrist and Robertson (1999). A checklist of the bird life of Nunavut (Richards and White 2008) is based on recent sightings from throughout this vast territory. A report by the Kativik Regional Government (KRG 2007) on plans to create national parks in the western Ungava Peninsula includes a list of birds of Lac Guillaume-Delisle. The Quebec Breeding Bird Atlas (www.atlas-oiseaux.qc.ca/index_en.jsp), now in its fifth year, is mapping recent sightings by birdwatchers to Lac Guillaume-Delisle.

This report summarizes bird observations made from 17 to 30 July 2011 in eastern Hudson Bay, Canada, specifically on Tukarak Island (Belcher Island group, Nunavut), on the Nastapoka Islands (Nunavut), and in Lac Guillaume-Delisle (northern Quebec). Considering the long periods between visits by ornithologists to these remote areas, our observations augment the earlier more lengthy surveys and contribute new knowledge of the bird life of this region.

Study Area

The Belcher Islands (56°00' to 57°30'N, 79°30' to 80°00'W) comprise 1500 islands and islets covering almost 3000 km² in eastern Hudson Bay (Figure 1a). They are located about 120 km off the eastern shore of Hudson Bay. This region is well north of the tree line. The only trees we observed on the Belcher Islands were low-growing willows (*Salix* spp.) and Paper Birch (*Betula papyrifera* Marshall). Also, the area around the town of Umiujaq on the mainland is mostly treeless. In contrast, Lac Guillaume-Delisle (Figure 1b) has extensive groves of spruce (*Picea* spp.), willow, and Green Alder (*Alnus viridis* [Chaix] de Candolle), especially in ravines and along the lower sections of streams.

Methods

In 2011, we visited Tukarak Island in the Belcher Islands group (17–24 July), Lac Guillaume-Delisle (25–30 July), and several of the Nastapoka Islands near Umiujaq (25 and 30 July). Our primary purpose was to investigate geological formations in this region; however, each day we made a concerted effort to identify, count, and record all the birds in every area we visited.

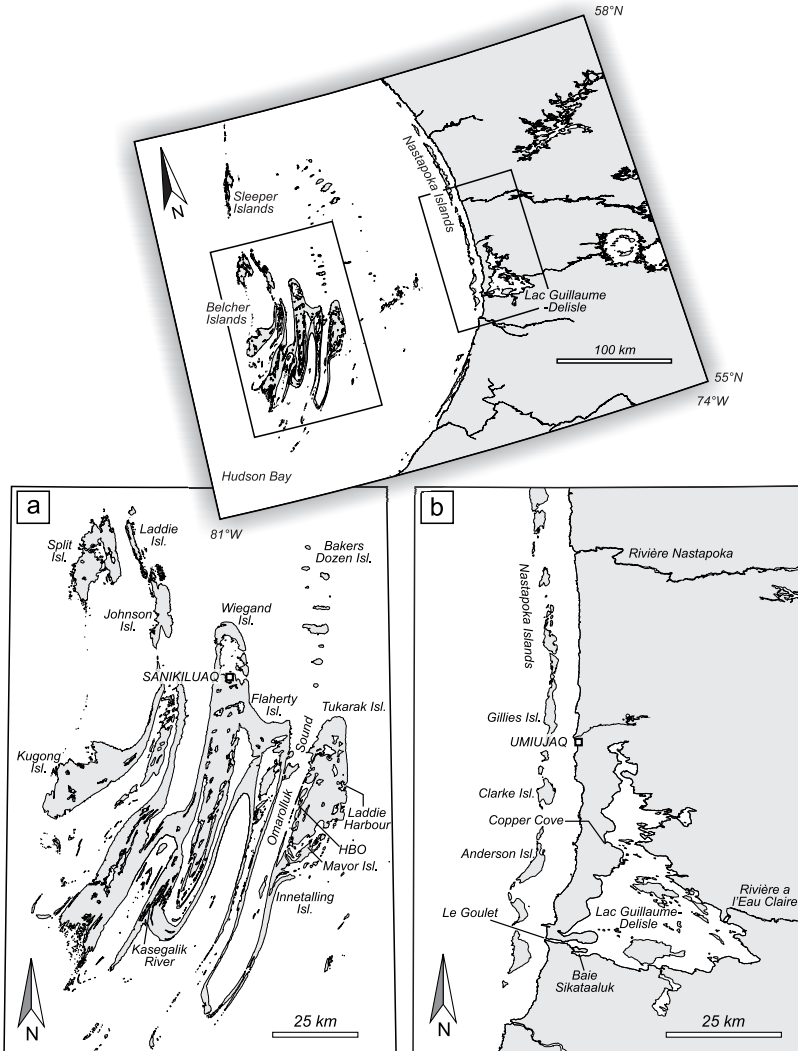


FIGURE 1. Locations of 2011 fieldwork in eastern Hudson Bay: Tukarak Island (Belcher Island group), Nunavut (a); Lac Guillaume-Delisle, Quebec; and the Nastapoka Islands, Nunavut (b). HBO = Hudson Bay outpost.

We traveled to and between the islands on the fishing boat, *Kakivak*, skippered by Inuit fishermen from Inukjuak, Quebec. While traveling across open water between shore-based sites, we maintained a constant watch and tallied all waterbirds visible from the boat. At night we anchored near shore, which provided excellent views of the rocky shorelines and beaches. Each day, we covered about 5–10 km on foot across a variety of habitats: dry and moist tundra, exposed rock formations, small streams, willow-covered ravines, and lakes, which we circumnavigated. We observed birds with 8× binoculars and a 20–60× spotting scope. The figures in the tables represent the sum total of independent daily surveys that were often, but not always, made separately by the two observers. We took care to avoid com-

bing duplicate counts of the same birds. On the boat, the observers scanned the open waters from opposite sides of the boat. C.W.S. devoted about 12 hours each day to bird observations and W.B. about 6 hours.

Observations on Tukarak Island were concentrated in three areas: the southeast region; around the old Hudson Bay outpost along Omarolluk Sound on the west side; and at Laddie Harbour on the east-central side of the island (Figure 1a). We did not visit any of the small coastal islets.

In the Nastapoka Island group, we visited Clarke, Anderson, and Gillies Islands. In Lac Guillaume-Delisle, fieldwork took place in Baie Sikutaaluk near the Gulf (“Le Goulet”), south of the mouth of the

Rivière à l'Eau Claire, and at Copper Cove on the west-central shore (Figure 1b).

Results

On the Belcher Islands, we observed 22 of the 30 species that are regular or occasional breeders there (Table 1). Breeding species not observed were King Eider (*Somateria spectabilis*), Long-tailed Duck (*Clangula hyemalis*), Semipalmated Sandpiper (*Calidris pusilla*), Red-necked Phalarope (*Phalaropus lobatus*), Parasitic Jaeger (*Stercorarius parasiticus*), Arctic Tern (*Sterna paradisaea*), Snowy Owl (*Bubo scandiacus*), and Common Redpoll (*Carduelis flammea*). We also observed five migrant, non-breeding species. The summer avifauna of the Lac Guillaume-Delisle region, in contrast, is richer than that of the Belcher Islands. In the former, we observed 22 species that breed in this region (including Umiujaq and the Nastapoka Islands) and 10 migrants (Table 2). In all areas surveyed, we observed a total of 43 species: 10 waterfowl, 2 gallinaceous birds, 3 loons, 2 hawks, 3 shorebirds, 1 auk, 3 gulls, 2 falcons, and 17 songbirds. Several sightings represent extra-limital records of birds well north of their regular breeding range. The notes that follow summarize details about these observations.

On Tukarak Island, we observed flocks of 164 and 200 flightless Canada Geese (*Branta canadensis*), adults and goslings, and a flock of about 200 on Clarke Island (Nastapoka Island group). We observed adult Tundra Swans (*Cygnus columbianus*) swimming on lakes on Tukarak Island, but we did not see any cygnets.

We saw Common Eiders (*Somateria mollissima sedentaria*) daily in the coastal waters around Tukarak Island and in Lac Guillaume-Delisle. No eiders were seen on any inland lakes and we saw no nests. In the waters around Tukarak Island, over 90% of males were in breeding plumage, and we observed many females there with broods of various ages. The first male seen in eclipse plumage near Tukarak Island was on 21 July, whereas all the males we identified in Lac Guillaume-Delisle were in eclipse plumage.

Three male Harlequin Ducks (*Histrionicus histrionicus*) were seen at Copper Cove, Lac Guillaume-Delisle, on two days; presumably the same group was seen each day.

Scoters were seen almost daily. Of those we were able to identify to species, Surf Scoters (*Melanitta perspicillata*) were the most abundant. The largest single flock of 1200 unidentified scoters was seen on Lac Guillaume-Delisle on 27 July. Black Scoters (*M. americana*) were seen on Lac Guillaume-Delisle, but not on Hudson Bay proper. The 30 Red-breasted Mergansers (*Mergus serrator*) in Lac Guillaume-Delisle on 27 July were flightless and in a single flock.

Two female Northern Harriers (*Circus cyaneus*) were seen on Lac Guillaume-Delisle on 27 July, and one female flying with prey was in Umiujaq on 30 July.

Spotted Sandpipers (*Actitis macularius*) were seen on four days along the shores of Lac Guillaume-Delisle.

An adult was attending three, one-third-grown chicks on 26 July.

Two Purple Sandpipers (*Calidris maritima*), the only ones seen during our trip, flew in and briefly mobbed us on Tukarak Island on 17 July.

Black Guillemots (*Cephus grylle*) were observed around Tukarak Island and on Lac Guillaume-Delisle on 10 of 15 days for a mean of 27 per day. The highest daily counts were 88 near Tukarak Island and 61 on Lac Guillaume-Delisle. The guillemots were often in pairs, or in groups of 10 or fewer, and all were in breeding plumage. No birds were perched on rocks or cliffs, nor were any carrying food, and we saw no juveniles. These observations suggest that they were not nesting in these areas at this time.

Glaucous Gulls (*Larus hyperboreus*) were seen on eight days on Hudson Bay. The largest group was 10 at Laddie Harbour on 22 July, where several half-grown chicks were seen on rocks near the water's edge. No Glaucous Gulls were seen on Lac Guillaume-Delisle. Great Black-backed Gulls (*Larus marinus*) were observed on five days. An adult pair was seen at Tukarak Island on 18 July and five (four adults and one third-year bird) were seen near the Nastapoka Islands on 25 July. We saw nothing to suggest that they had nests, and we saw no chicks.

Peregrine Falcons (*Falco peregrinus*) were seen at two locations on Tukarak Island. On 19 July one flew along the cliffs at the south end of the island. On 23 and 24 July, we observed a pair closely for several hours and photographed them at their nest at Laddie Harbour. The nest site was on a sparsely vegetated ledge on a vertical cliff, 7–10 m above the water at the head of a small cove. The nest held two downy young, which appeared to be several weeks old based on their size and white downy plumage, and a single egg. At one point, the male arrived clutching an adult Horned Lark (*Eremophila alpestris*).

Single Hermit Thrushes (*Catharus guttatus*) were seen and heard singing in a wooded area along the south shore of Lac Guillaume-Delisle on 25 and 27 July.

Discussion

Many bird species currently reach the northern or southern limit of their breeding range in the eastern Hudson Bay region (Godfrey 1986), making this area especially interesting from a zoogeographic perspective. However, range boundaries are rarely static and arctic regions are changing rapidly in response to climate change (Serrizze *et al.* 2000; Comiso 2003). Bird populations, especially those at high latitudes, could undergo significant range shifts in the near future (Jetz *et al.* 2007).

Few ornithologists have visited the Belcher Islands, in part because of their remote location and the associated logistics and costs that make access difficult. Lac Guillaume-Delisle is also remote, although plans to create a national park there could increase visits in

TABLE 1. Species and daily counts of birds observed on the Belcher Islands, Nunavut, in July 2011.

Species	Status: breeding (B) or migrant (M)	Tukarak Island (east side)			Tukarak and Mavor Islands 19 July	Tukarak Island (old Hudson Bay outpost) 20 July	Omarolluk Sound to (Laddie Harbour) 21 July	Tukarak Island Laddie Harbour		Tukarak Island (Laddie Harbour) and Umiujaq 24 July	Days observed
		17 July	18 July	19 July				22 July	23 July		
Canada Goose (<i>Branta canadensis</i>)	B	12		20	62	2		200	164	6	
Tundra Swan (<i>Cygnus columbianus</i>)	B	3	2					4	1	4	
Northern Pintail (<i>Anas acuta</i>)	B	2								1	
Common Eider (<i>Somateria mollissima sedentaria</i>)	B	6	11	180	523	260	1	26	1	7	
Surf Scoter (<i>Melanitta perspicillata</i>)	M	200		50	46	5				4	
White-winged Scoter (<i>Melanitta fusca</i>)	M			6	38	25		10		3	
Unidentified scoter (<i>Melanitta</i> sp.)	—			100	150	1 (F)		1 (M)		3	
Common Goldeneye (<i>Bucephala clangula</i>)	M					21		26	17	5	
Red-breasted Merganser (<i>Mergus serrator</i>)	M	1 (M)		1		2				1	
Rock Ptarmigan (<i>Lagopus muta</i>)	B		1							2	
Red-throated Loon (<i>Gavia stellata</i>)	B		2		2	2				2	
Pacific Loon (<i>Gavia pacifica</i>)	B							3		1	
Common Loon (<i>Gavia immer</i>)	B								1	1	
Rough-legged Hawk (<i>Buteo lagopus</i>)	B								1	1	
Semipalmated Plover (<i>Charadrius semipalmatus</i>)	B	4		2	1	2			1	5	
Purple Sandpiper (<i>Calidris maritima</i>)	B	2								1	
Herring Gull (<i>Larus argentatus</i>)	B	2			12	6			2	5	
Glaucois Gull (<i>Larus hyperboreus</i>)	B	1	1	3	8	6		10	5	8	
Great Black-backed Gull (<i>Larus marinus</i>)	M		2	6	88	11			1	3	
Black Guillemot (<i>Cepphus grylle</i>)	B	20	1.5					2 (M,F)	2 (M,F)	5	
Peregrine Falcon (<i>Falco peregrinus</i>)	B			1						4	
Common Raven (<i>Corvus corax</i>)	B		1	2	2					3	
Horned Lark (<i>Eremophila alpestris</i>)	B							3	1	3	
American Pipit (<i>Anthus rubescens</i>)	B	1	2	1	10			20	5	6	
Lapland Longspur (<i>Calcarius lapponicus</i>)	B							3		1	
Snow Bunting (<i>Plectrophenax nivalis</i>)	B	1							1	2	
Savannah Sparrow (<i>Passerculus sandwichensis</i>)	B				4			4		2	
White-crowned Sparrow (<i>Zonotrichia leucophrys</i>)	B				5					1	

Note: M = male, F = female.

TABLE 2. Species and daily counts of birds observed in Lac Guillaume-Delisle (Copper Cove, Rivière à l'Eau Claire, Baie Sikutaalik), Quebec, and Nastapoka Islands (Umiujaq, Clark Island), Nunavut, in July 2011.

Species	Status: breeding (B) or migrant (M)	Umiujaq, Clarke Island, and Lac Guillaume-		Baie Sikutaalik and near Rivière à l'Eau Claire		Near Rivière à l'Eau Claire and Copper Cove		Copper Cove and Nastapoka Islands		Nastapoka Islands and Umiujaq 30 July	Days observed
		25 July	26 July	26 July	27 July	28 July	29 July	29 July			
Canada Goose (<i>Branita canadensis</i>)	B	200									1
Common Eider (<i>Somateria mollissima sedentaria</i>)	B	230	28		80			78		36	5
Harlequin Duck (<i>Histrionicus histrionicus</i>)	M				3 (M)			3			2
White-winged Scoter (<i>Melanitta fusca</i>)	M	200						4			2
Black Scoter (<i>Melanitta americana</i>)	M		60					3			2
Unidentified scoter (<i>Melanitta</i> sp.)	-				1200					80	2
Common Goldeneye (<i>Bucephala clangula</i>)	M							1 (F)			1
Red-breasted Merganser (<i>Mergus serrator</i>)	B	16			30			4			3
Spruce Grouse (<i>Falcapennis canadensis</i>)	B				1						1
Pacific Loon (<i>Gavia pacifica</i>)	M				1						1
Common Loon (<i>Gavia immer</i>)	B	5			2	2		1			4
Northern Harrier (<i>Circus cyaneus</i>)	M				2 (F)					1	2
Semipalmated Plover (<i>Charadrius semipalmatus</i>)	B				1						1
Spotted Sandpiper (<i>Actitis macularius</i>)	B	2	4		1			2			4
Black Guillemot (<i>Cepphus grylle</i>)	B	61	5		55			5		2	5
Herring Gull (<i>Larus argentatus</i>)	B	18	82		16			23		1	6
Glaucous Gull (<i>Larus hyperboreus</i>)	M	2						1			2
Great Black-backed Gull (<i>Larus marinus</i>)	M	5								1	2
Merlin (<i>Falco columbarius</i>)	B				1			1			1
Gray Jay (<i>Perisoreus canadensis</i>)	B				1						1
Common Raven (<i>Corvus corax</i>)	B	4								6	2
Tree Swallow (<i>Tachycineta bicolor</i>)	B	2									1
American Pipit (<i>Anthus rubescens</i>)	B	9						3			3
Hermit Thrush (<i>Catharus guttatus</i>)	M	1			1			1			2
American Robin (<i>Turdus migratorius</i>)	B				2						1
Orange-crowned Warbler (<i>Oreothlypis celata</i>)	M		1		1						2
Yellow Warbler (<i>Setophaga petechia</i>)	B							1			1
Savannah Sparrow (<i>Passerculus sandwichensis</i>)	B	8						10		6	3
Fox Sparrow (<i>Passerella iliaca</i>)	B									1	1
White-throated Sparrow (<i>Zonotrichia albicollis</i>)	B		1					2			2
White-crowned Sparrow (<i>Zonotrichia leucophrys</i>)	B	8	1					9		12	4
Dark-eyed Junco (<i>Junco hyemalis</i>)	B				12						1
Common Redpoll (<i>Acanthis flammea</i>)	B	3	2					40		2	5

Note: M = male, F = female.

the near future. Knowledge of the summer bird life of the Belcher Islands and Lac Guillaume-Delisle is, therefore, based on just a few reports and publications that span many decades. Twomey's observations, summarized in a popular book (Twomey 1942), provide fascinating details about the bird life, but unfortunately the results of his extensive study were not published in the scientific literature. The reports of Thomas Manning (1946, 1976) were especially thorough, and the sightings by Freeman (1970) are also useful. Based on these publications, the regular breeding avifauna is considered to consist of about 30 species. The Quebec Breeding Bird Atlas project (www.atlas-oiseaux.qc.ca/index_en.jsp) is compiling recent bird records from Lac Guillaume-Delisle, although there are few mapped sightings to date from this region. Our observational records add to the limited number of reports from eastern Hudson Bay and, especially, augment knowledge of the birds that breed or spend the summer around the Belcher Islands. Conversely, the lack of sightings of some probable breeding species such as Red-necked Phalaropes and Common Redpolls does not mean those species were not present during our visit.

We were not able to determine the age of the flightless Canada Geese in the flocks we observed on Tukarak Island and the Nastapoka Islands. Populations in late spring and summer are likely made up of both local breeders and of migrants from southern populations. Based on satellite radio telemetry, it is known that some geese that breed on the Atlantic flyway in eastern North America migrate in June to northern Quebec and the east coast of Hudson Bay (Sheaffer *et al.* 2007) where they undergo a complete annual molt.

Tundra Swans are irregular or uncommon breeders on the Belcher Islands, which are near the southern limit of their breeding range (Godfrey 1986). Freeman (1970) saw only one pair on the Belcher Islands in mid-June 1960, and he cites a report by Burwash (1927) that suggests that swans were scarce in this region by the mid-1920s. Tundra Swans were common breeders along southern Hudson Bay in the 1800s, but heavy hunting greatly reduced their numbers thereafter. Swans did not begin to re-inhabit these areas until the 1960s (Lumsden 1975).

The sighting of three male Harlequin Ducks was fortuitous, but not unexpected as they are known to nest around Lac Guillaume-Delisle and north to the Nastapoka River (Robertson and Goudie 1999; KRG 2007).

The breeding ranges of the Surf Scoter and the Black Scoter in North America are imperfectly known (Savard *et al.* 1998); however, in eastern Canada the centre of abundance of both species is the Ungava Peninsula. White-winged Scoters breed to the south and west. There are no records of scoters breeding on the Belcher Islands and we saw nothing to suggest that they might have been nesting during our visit.

The three Northern Harriers observed represent extralimital records, well north of their published breeding

range (Godfrey 1986; Smith *et al.* 2011). In the Lac Guillaume-Delisle region, there is at least one recent nesting record (KRG 2007) and a single "possible nesting" record in the Quebec Breeding Bird Atlas. The female we observed in Muiujaq was carrying prey, which suggests that a nest may have been nearby.

Purple Sandpipers were first documented as breeding on the Belcher Islands by Twomey (1942). In 1938, he collected 44 adults and 13 complete clutches (35 specimens and 7 clutches were from Tukarak Island). Clutch collection dates ranged from 9 June to 25 July 1938 (data courtesy of the Carnegie Museum of Natural History). Freeman (1970) discovered a nest containing four eggs on 8 July 1959 on an island in the Kasegalik River. Manning (1976) estimated that there were 4000 Purple Sandpipers on Kugong Island, the westernmost of the Belcher Islands. Freeman (1970) wrote (restated by Jehl 2004) that the Purple Sandpiper, along with the Semipalmated Plover, is "probably the commonest [breeding] shorebird" on the Belcher Islands. The fact that we saw just two birds suggests that large numbers may not breed regularly in the areas of Tukarak Island that we visited. Tukarak is a large island, and the areas we visited may not have been ideal breeding habitats for this and other shorebird species. Alternatively, the dates when we visited (mid to late July) are near the end of the breeding season for many sandpipers, and birds may have already departed the island. However, Twomey collected a full clutch on 25 July 1938, and Manning (1976) saw flocks of up to 150 Purple Sandpipers on Split Island (about 70 km to the northwest of Tukarak Island) in early August 1973, and he collected a male with four downy young there on 3 August. A thorough survey of all the Belcher Islands would be required to develop a clear understanding of their current breeding status. The Semipalmated Plover, Semipalmated Sandpiper, and Red-necked Phalarope also nest on the Belcher Islands (Todd 1963; Godfrey 1986); however, we observed only the plovers.

The single summer record for Least Sandpiper (*Calidris minutilla*) on the Belcher Islands is an observation of one nest by Twomey (1942) on Tukarak Island. Even though we did not observe any Least Sandpipers and Godfrey (1986) indicates that they do not nest on the Belcher Islands, further fieldwork could reveal that they are occasional breeders, as they are known to nest around Lac Guillaume-Delisle (Todd 1963; KRG 2007).

The sightings of adult Great Black-backed Gulls were noteworthy because known breeding colonies are quite distant: at Akimiski Strait, James Bay, 350 km south of the Belcher Islands (Eckert 2007; Dunn and Alderfer 2011) and 1400 km (by the coastline) northeast at the mouth of the Rivière aux Feuilles in Ungava Bay (Good 1998). The Belcher Islands could be colonized in the near future as nesting at Akimiski Strait was documented for the first time in 2007 (Eckert 2007). The Great Black-backed Gull is undergoing rap-

id range expansion throughout eastern North America (Good 1998).

We did not observe Arctic Terns. Arctic Tern populations declined between the 1980s and 1997 in the three northern regions (Sleeper, Split, and Laddie Islands) of the Belcher Islands (Gilchrist and Robertson 1999). Only 19 of the 431 islets in that region had nesting terns in 1997. This decline is attributed either to winter mortality or to emigration out of the Belcher Islands as a response to eggging or disturbance by residents of Sanikiluaq, the only village on the islands. The tern surveys, summarized by Gilchrist and Robertson (1999), were not made on Tukarak Island, presumably because Arctic Terns are not known to nest on this island.

The nesting Peregrine Falcons we observed at Laddie Harbour belonged to the tundra subspecies, *P. f. tundrius*, based on the thin malar stripe, white upper breast, and extensive white in the auricular area. Freeman (1970) assigned the Peregrine Falcons he observed on Tukarak Island to *P. f. anatum*, although he provided no evidence to support this determination. The Nastapoka River represents a dividing line between *P. f. tundrius* on the north and *P. f. anatum* to the south (Murphy 1990).

The Hermit Thrushes seen in the Lac Guillaume-Delisle were extra-limital records, over 450 km north of the northern limit of their breeding range in southwestern Quebec (Godfrey 1986; Dellinger *et al.* 2012). Yves Aubrey (in KRG 2007) reports that they do nest in this area.

The Belcher Islands are the southernmost breeding site in North America for Snow Buntings (*Plectrophenax nivalis*), whereas the Yellow Warbler (*Setophaga petechia*) and White-throated Sparrow (*Zonotrichia albicollis*) are at the northern limits of their range at Lac Guillaume-Delisle. Sightings of these three species in the regions we visited are consistent with their known occurrence in eastern Canada.

In summary, the Belcher Islands are large, we only visited parts of Tukarak Island, and our fieldwork was brief — factors that make our survey less than complete. Clearly fieldwork in more areas and for longer periods is required to determine the current status of all breeding and summering birds there. The strategic location of the Belcher Islands and Lac Guillaume-Delisle — at the tree line and in a climatic zone where arctic conditions exist, as well as the fact that they support a number of species at the limits of their geographic range — make them useful sites for studying shifts in species' breeding ranges that could result from global climate change.

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