ENVIRONMENT CANADA'S CANADIAN WILDLIFE SERVICE, ROYAL ONTARIO MUSEUM, ONTARIO MINISTRY OF NATURAL RESOURCES, BIRD STUDIES CANADA, AND MOOSE CREE FIRST NATION.

James Bay Shorebird Project

2014 Report

Christian Friis (CWS)

Spring 2015

Photo: Longridge Point

Report summarizing 2014 shorebird survey results from three camps on the western James Bay coast.

Land Acknowledgment

We would like to begin by acknowledging that the work carried out and reported upon here was in Treaty 9 territory and the land on which the study sites are located is the traditional territory of Mushkegowuk (Cree), Ojibwe/Chippewa, Oji-Cree, Algonquin, and Métis Peoples.

Introduction

The Hudson Bay Lowlands are the third largest wetland complex on earth and the coastal ecosystems of south-western Hudson Bay and James Bay are a global hotspot for breeding and staging waterbirds, waterfowl, shorebirds and other migratory birds (Manning 1952, Ross *et al.* 2003, Abraham and Keddy 2005, Abraham and McKinnon 2011). For shorebirds, the Lowlands are known or believed to harbour significant proportions of the provincial breeding populations of Hudsonian Godwit (*Limosa haemastica*) and Whimbrel (*Numenius phaeopus hudsonicus*) (Manning 1952, Morrison 1987, Skeel and Mallory 1996, Peck and James 1983, Peck 2007, Peck and Sutherland 2007, Prevett 1987, Walker *et al.* 2011). Several Arctic and sub-Arctic breeding shorebird species stage along the coast to add fat reserves and undertake partial moults (e.g., White-rumped Sandpiper (*Calidris fuscicollis*), Semipalmated Sandpiper (*C. pusilla*)) or complete moults (e.g., Dunlin (*C. alpina*)) in preparation for their migrations (Harrington *et al.* 1991, Parmelee 1992, Warnock and Gill 1996, Hicklin and Gratto-Trevor 2010, Abraham and McKinnon 2011).

Research on shorebirds throughout the Americas in the 1970s led to the establishment of the Western Hemisphere Shorebird Reserve Network (WHSRN) program in 1985 (Morrison 1983, 1984, Myers *et al.* 1987a, b). A site must meet two criteria to be considered for WHSRN designation: demonstrated importance to shorebirds and expressed landowner agreement. Three categories of WHSRN sites are recognised based on peak counts or use by a percentage of a population of a species: Sites of Hemispheric Importance hosting at least 500,000 shorebirds annually, or at least 30% of the biogeographic population for a species; Sites of International Importance hosting at least 100,000 shorebirds annually, or at least 10% of the biogeographic population for a species; and Sites of Regional Importance hosting at least 20,000 shorebirds annually, or at least 1% of the biogeographic population for a species (WHSRN 2009). Landowners must agree in writing to the following three conditions: to make shorebird conservation a priority at the site; to protect and manage the site for shorebirds; and to update WHSRN annually about the status of the site (WHSRN 2009).

During the 1990s, Environment Canada's Canadian Wildlife Service (CWS) compiled an inventory of potential WHSRN sites along the coasts of both Hudson Bay and James Bay (Morrison *et al.* 1991, 1995, Ross *et al.* 2003). Despite meeting criteria demonstrating the importance to shorebirds, efforts to date have failed to secure a WHSRN designation for any of the James Bay sites, leading to a significant and recognized gap in the WHSRN program.

The James Bay shorebird project (hereafter: the project) began when the Royal Ontario Museum (ROM) and the Ontario Ministry of Natural Resources (OMNR) partnered to survey birds at sites along the James Bay coast in 2009. Since then, CWS, Bird Studies Canada (BSC), Nature Canada and the Moose Cree First Nation have joined this partnership in various capacities to continue work on surveys of southbound staging shorebirds. This work initially included bird surveys at sites known to support staging shorebirds, with an emphasis on Red Knot (*C. canutus rufa*) to enable identification of critical habitat, as well as species at risk surveys for Yellow Rail (*Coturnicops noveboracensis*) and Short-eared Owl (*Asio flammeus*). Additional work to collect natural heritage information by staff at the Natural Heritage Information Centre of the OMNR has been conducted in concert with more recent surveys. Currently, the project

involves annual surveys of shorebirds staging at various sites along the south-western coast of James Bay.

Goals of the project are: to increase our ability to estimate population trends of shorebird species staging along the south-western James Bay coast; to understand movement patterns of these birds and their causes (local and flyway scale); and to obtain information that could be used to update the identification of important shorebird staging habitats as potential WHSRN sites based on recent research and traditional ecological knowledge. The intention is to use the results of this project to update information on Important Bird Areas and ultimately to protect habitat for the Endangered Red Knot[1] and other declining shorebird species by the nomination and eventual establishment of WHSRN site(s) for south-western James Bay. The objectives to meet these goals are to estimate variability of migration phenology (both annually and among species) and length of stay of staging shorebirds; to estimate annual variation in abundance of staging shorebirds; to assess habitat and food resource availability for staging shorebirds; and to determine the minimum proportion of the global Red Knot, subspecies *rufa*, population that uses the south-western James Bay coast.

Three field camps operated on the south-western coast of James Bay in 2014; Little Piskwamish Point, Longridge Point, and Northbluff Point between 15 July and 26 August (see Figure 1). From these field camps, dedicated volunteers and staff counted shorebirds during their southbound migration. The timing of these counts was driven by the tide cycle, in that birds are more easily counted when they concentrate because of the flooding (incoming) and ebbing (outgoing) tides.

Motus Wildlife Tracking System

This season marked the beginning of using the Motus network in earnest(http://motus-wts.org). The Motus Wildlife Tracking System (Motus) comprises a network of coordinated automated radio telemetry towers that track the movements of small organisms throughout terrestrial environments. The purpose of Motus is to facilitate landscape-scale research and education on the ecology and conservation of migratory animals. It is a program of Bird Studies Canada (BSC) in partnership with Acadia University, Western University, the University of Guelph and all collaborating researchers and organizations.

As of early 2015, the array is comprised of over 200 automated VHF radio receiving stations, positioned from Hudson Bay, along the James Bay Coast, stretching from south-western Ontario to the mouth of the St. Lawrence River, through the Maritime provinces and down the eastern seaboard to Virginia. A digital "nano-tag" tracking device is secured to an animal and they can be detected in real-time up to 25 km away from any station. When combined, this array can track animals across a diversity of landscapes covering thousands of kilometres.

The data, which will comprise millions of individual records, are stored locally, and (optionally) transmitted back to a centralized data management system at BSC's National Data Centre where data is filtered, archived, visualized, and disseminated. Researchers, decisions makers, non-government organizations, and the public can then query those data and examine the movements and behaviours of any species being tracked. This state-of-the-art system is the first of its kind in the world and will be open to all researchers and organizations.

Banding took place at two of the sites with the objective of affixing 150 VHF radio tags (nanotags) to individuals of five target species:

[1] The Red Knot was listed as Endangered in Ontario in 2008 under the provincial Endangered Species Act *2007*; in 2007 COSEWIC designated the Red Knot as Endangered; and in 2012 the rufa subspecies was listed as Endangered, roselaari subspecies was listed as Threatened, and the islandica subspecies was listed as Special Concern under Schedule 1 of the federal *Species at Risk Act* (SARA).

Semipalmated and White-rumped sandpipers, Dunlin, Red Knot, and Hudsonian Godwit.

Study Areas

The Longridge Point camp (51.798942ºN, 080.69204ºW) has been surveyed annually since 2009. It is located approximately 60 km northwest of Moosonee (Figure 1). The site is characterised by a prominent point that juts out into James Bay. Sheltered areas have formed on either side of the point, where fresh water tributaries flow out into the bay. These areas provide excellent roosting and feeding opportunities for migrant shorebirds. The gradient of the shoreline is very flat. The spruce forest is close to the high tide line, generally within 1 km, and opens to willow thickets and meadow marsh, eventually grading into brackish and saline tidal marshes. Based upon aerial surveys, and supported by ground surveys of this project, the area is known to host large concentrations of shorebirds (e.g., Semipalmated Sandpiper, Red Knot, Pectoral Sandpiper) during autumn migration.

The Little Piskwamish Point camp (51.683427ºN, 080.565783ºW) has been monitored since 2011. It is located approximately 45 km northwest of Moosonee, and about 20 km south-east of Longridge Point (Figure 1). The habitat is similar to Longridge, except that there is no prominent point. Based upon aerial surveys, and supported by ground surveys of this project, the area is known to host large concentrations of shorebirds (e.g., Red Knots, Dunlin and White-rumped Sandpiper) during southern migration.

The Northbluff Point camp (51.4879571ºN, 080.4398775ºW) is the most southerly of the project's field camps surveyed in 2014 and has been surveyed in 2009 and 2011. Like the other two sites, the shoreline gradient is very flat. An old air strip remains inland, that used to service a no-longer-existent commercial goose hunt camp. From the spruce tree line, willow thickets and meadow marsh eventually grade to brackish ad saline tidal marshes. Based upon aerial surveys, and supported by ground surveys of this project, the area is known to host large concentrations of shorebirds (e.g., Semipalmated Sandpiper, White-rumped Sandpiper) during southern migration.

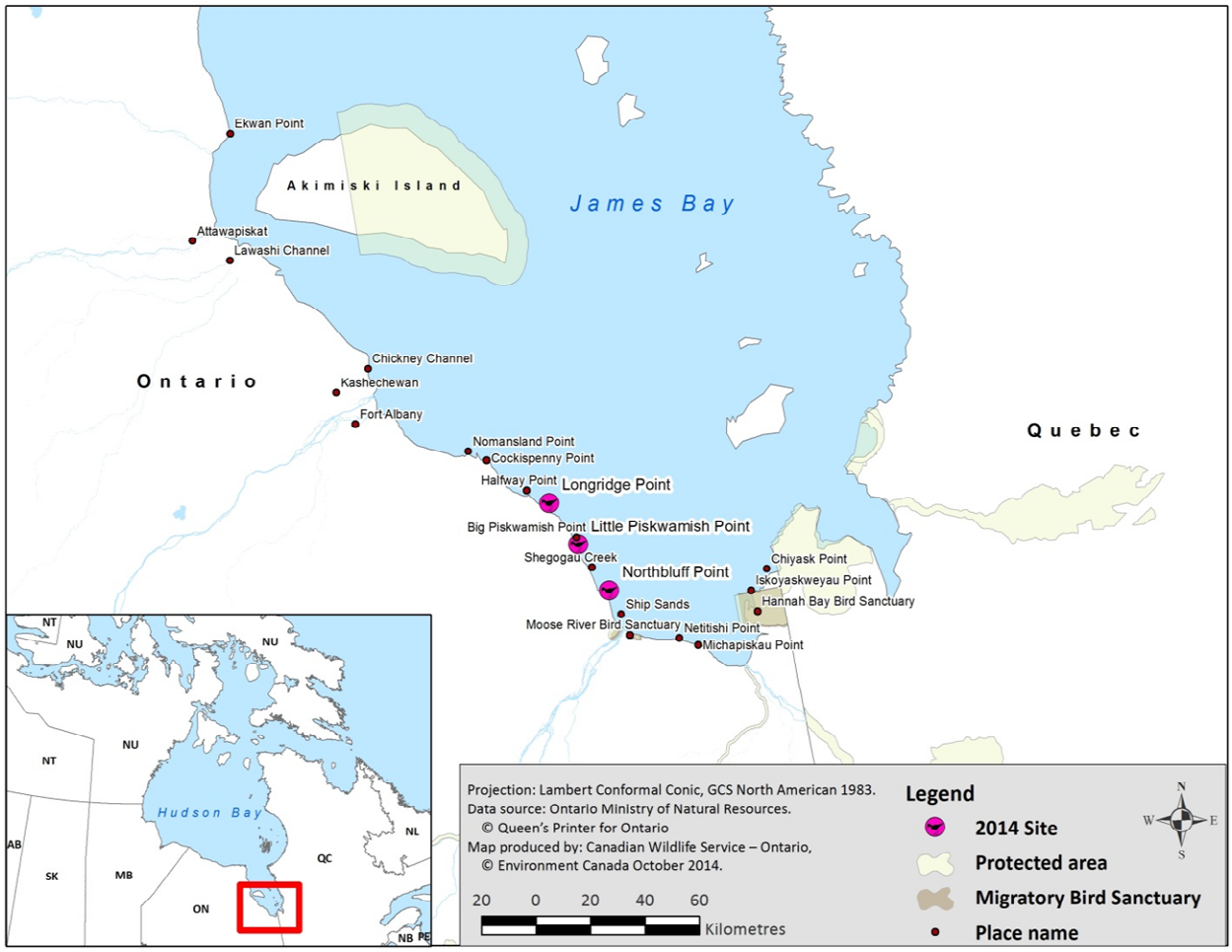
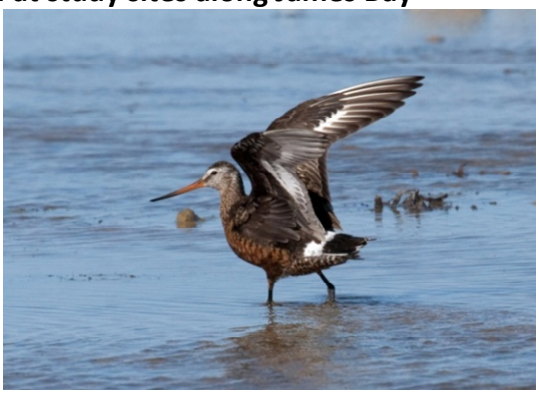


Figure 1. Field camp sites of the James Bay Shorebird Project, 2014.

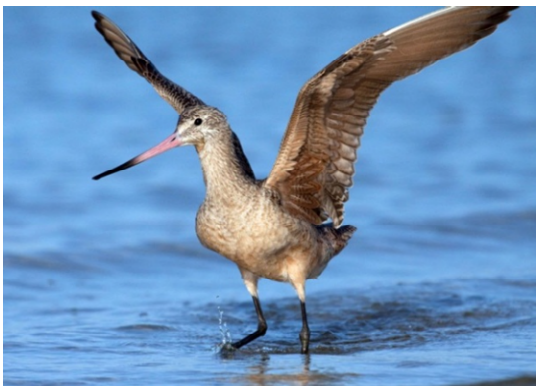
Images of the most commons species encountered at study sites along James Bay

Semipalmated Plover



Hudsonian Godwit

Greater Yellowlegs



Marbled Godwit

Lesser Yellowlegs

Ruddy Turnstone

Red Knot – with individual colour marked flag banded in Argentina

Least Sandpiper

Sanderling

White-rumped Sandpiper

Semipalmated Sandpiper

Pectoral Sandpiper

Dunlin

Results and Discussion

Longridge Point

A maximum of 10 people were stationed at Longridge Point during the season. The camp was active from 15 July to 13 August 2014. The period focused on daily surveys to generate estimated totals for the area, passive banding, and banding target species and affixing radio tags to these birds. A total of 210 birds was banded and 75 target shorebird species were equipped with nanotags (radio telemetry tags) during the period. The radio tags send signals to strategically placed towers notifying researchers of each bird's arrival and departure.

During this season at Longridge Point a total of 240 hours was spent in the field, which is 45 more hours than in 2013. There were 133 bird species recorded during this time. Tables 1 and 2 show the top ten estimated high counts of bird species and shorebird species, respectively, encountered each month during the survey period. Red Knot and Semipalmated and White-rumped sandpipers continued to be well represented at Longridge Point.

Table 1. Top 10 estimated single-day high counts of bird species encountered at Longridge Point, 15 July to 13 August 2014.

Common Name	July High Count
White-rumped Sandpiper	3500
Semipalmated Sandpiper	1725
Red Knot	1354
Canada Goose	476
Ruddy Turnstone	460
Hudsonian Godwit	354
Lesser Yellowlegs	310
Pectoral Sandpiper	258
Greater Yellowlegs	226
Bonaparte's Gull	197

Common Name	August High Count
White-rumped Sandpiper	6635
Semipalmated Sandpiper	2626
Red Knot	1850
Canada Goose	1062
Bonaparte's Gull	900
Black Scoter	820
Ruddy Turnstone	562
Hudsonian Godwit	458
Lesser Yellowlegs	374
Least Sandpiper	363

Table 2. Top 10 estimated single-day high counts of shorebird species encountered at Longridge Point, 15 July to 13 August 2014.

Common Name	July High Count
Red Knot	1500
Semipalmated Sandpiper	1100
White-rumped Sandpiper	750
Hudsonian Godwit	400
Pectoral Sandpiper	270
Ruddy Turnstone	209
Greater Yellowlegs	147
Lesser Yellowlegs	138
Whimbrel	130
Least Sandpiper	85

Common Name	August High Count
White-rumped Sandpiper	5950
Red Knot	710
Semipalmated Sandpiper	620
Pectoral Sandpiper	306
Hudsonian Godwit	260
Lesser Yellowlegs	234
Dunlin	225
Ruddy Turnstone	139
Black-bellied Plover	89
Least Sandpiper	86

Little Piskwamish Point

A maximum of 14 people were stationed at Little Piskwamish Point, exceeding capacity at this camp. The camp was active from 15 July to 26 August 2014. During this period a total of 267 hours were spent in the field recording a

total of 139 bird species. This is 136 more hours and five more species than in 2013.

The period focused on daily surveys to generate estimated totals for the area, banding target species and affixing radio tags to these birds. A total of 183 birds was banded and 71 target shorebird species were equipped with nanotags during the period. The radio tags send signals to strategically placed towers notifying researchers of each bird's arrival and departure.

Tables 3 and 4 show the top ten estimated high counts of bird species and shorebird species, respectively, encountered each month during the survey period. White-rumped and Semipalmated sandpipers were the most abundant species recorded. Piskwamish represents the most important of our study sites for Red Knots.

Table 3. Top 10 estimated single-day high counts of bird species encountered at Little Piskwamish Point, 15 July to 26 August 2014.

Common Name	July High Count
White-rumped Sandpiper	10000
Semipalmated Sandpiper	7300
Red Knot	2100
Black Scoter	1300
Canada Goose	1000
Dunlin	928
Hudsonian Godwit	388
Red-winged Blackbird	350
Greater Yellowlegs	338
Lesser Yellowlegs	319

Common Name	August High Count
White-rumped Sandpiper	30000
Semipalmated Sandpiper	10000
Black Scoter	4000
Red Knot	2000
Canada Goose	1386
Dunlin	1200
Bonaparte's Gull	1080
Greater Yellowlegs	380
Snow Goose	329
Lesser Yellowlegs	325

Table 4. Top 10 estimated single-day high counts of shorebird species encountered at Little Piskwamish Point, 15 July to 26 August 2014.

Common Name	July High Count
White-rumped Sandpiper	10000
Semipalmated Sandpiper	7300
Red Knot	2100
Dunlin	928
Hudsonian Godwit	388
Greater Yellowlegs	338
Lesser Yellowlegs	319
Pectoral Sandpiper	175
Semipalmated Plover	90
Sanderling	74

Common Name	August High Count
White-rumped Sandpiper	30000
Semipalmated Sandpiper	10000
Red Knot	2000
Dunlin	1200
Greater Yellowlegs	380
Lesser Yellowlegs	325
Hudsonian Godwit	300
Pectoral Sandpiper	300
Least Sandpiper	250
Black-bellied Plover	150

Northbluff Point

A maximum of five people were stationed at Northbluff Point. The camp was active from 30 July to 26 August 2014. During this period, a total of 111 hours was spent in the field. There were 142 bird species observed during this time. Tables 5 and 6 show the top ten estimated high counts of bird species and shorebird species, respectively, encountered each month during the survey period. Semipalmated and

White-rumped sandpipers are the most common species at Northbluff Point.

Table 5. Top 10 estimated single-day high counts of bird species encountered at Northbluff Point, 30 July to 26 August 2014.

Common Name	July High Count
White-rumped Sandpiper	595
Semipalmated Sandpiper	340
Pectoral Sandpiper	220
Least Sandpiper	190
Lesser Yellowlegs	115
Greater Yellowlegs	87
Hudsonian Godwit	80
Sandhill Crane	50
Mallard	48
Savannah Sparrow	35

Common Name	August High Count
Semipalmated Sandpiper	6465
White-rumped Sandpiper	6229
Canada Goose	1600
Dunlin	1397
peep sp.	1300
Red Knot	999
Hudsonian Godwit	702
Red-winged Blackbird	696
Least Sandpiper	544
Greater Yellowlegs	480

Table 6. Top 10 estimated single-day high counts of shorebird species encountered at Northbluff Point, 30 July to 26 August 2014.

Common Name	July High Count
White-rumped Sandpiper	595
Semipalmated Sandpiper	340
Pectoral Sandpiper	220
Least Sandpiper	190
Lesser Yellowlegs	115
Greater Yellowlegs	87
Hudsonian Godwit	80
Dunlin	21
Ruddy Turnstone	14
Black-bellied Plover	8

Common Name	August High Count
Semipalmated Sandpiper	6465
White-rumped Sandpiper	6229
Dunlin	1397
peep sp.	1300
Red Knot	999
Hudsonian Godwit	702
Least Sandpiper	544
Greater Yellowlegs	480
Sanderling	414
Lesser Yellowlegs	312

Motus towers, banding and tagging

In July 2014, five temporary Motus towers were set-up at sites on the southwestern coast of James Bay (Figure 2). These autonomous VHF receivers detect and store records of individual nanotagged birds. Individuals tagged at the study sites and elsewhere (either on northbound migration or on the breeding grounds), while in the vicinity of the tower, are recorded on a regular interval depending on the duty cycle of the nanotag (e.g., every nine seconds). These towers operated from 16 July to 6 November 2014.

Banding and tagging activities were focussed at Longridge Point and Little Piskwamish Point; no trapping and banding took place at Northbluff Point. Shorebird trapping followed a non-standardized approach using mist-nets; trapping was conducted both day and night and throughout the tidal cycle. Along with recording standard morphometrics (age, weight, exposed culmen, wing cord, flattened wing cord, fat score), each shorebird was marked with a uniquely coded alphanumeric leg flag and a uniquely coded USGS metal band.

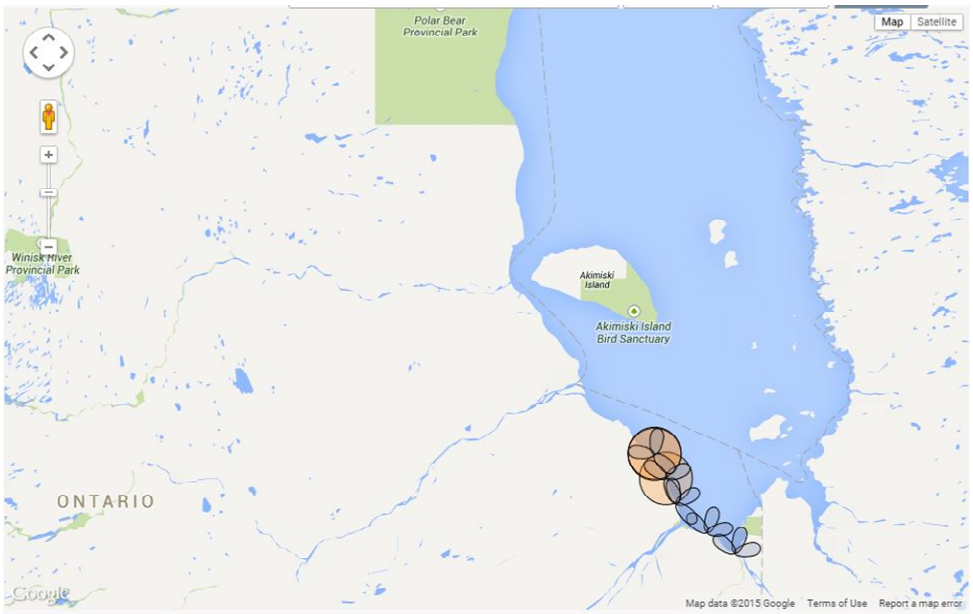


Figure 2. Locations of Motus towers, showing direction of antennas. Active 16 July to 6 November 2014.

Non-standard mist-netting was also conducted in a variety of habitats within each study site. Non-shorebird species were banded with a uniquely coded USGS metal band and standard morphometrics were recorded.

Nanotag efforts targeted five shorebird species (Semipalmated Sandpiper, White-rumped Sandpiper, Dunlin, Red Knot and Hudsonian Godwit). Species and age targets were established; there were no targets established for bird that were marked with a leg flag or a metal band only. Age and species targets for nanotags were revised during the season to account for changes in abundance of the target groups and to maximize data collection while birds were staging in the study areas. In addition to affixing a nanotag, marking with a leg flag and metal band and recording standard morphometrics, blood samples (up to 200µL) were taken. Blood sampling is primarily for determining correlates of length of stay, condition related changes in fatty acids, DNA sex typing, and to establish diet through stable isotope analysis. A total of 146 nanotags were affixed to individuals of our target species (Table 7). Over 85% of the individuals tagged were adults (AHY, or after hatch-year).

Movement of Semipalmated and White-rumped Sandpipers through the Motus network show an interesting pattern, and in some cases, differ from previously held notions of movement from James Bay (Figure 3). For example, it was long considered, based on band recaptures, that Semipalmated Sandpipers staged in James Bay, flew to the Bay of Fundy where they staged for another period of time before migrating to the wintering grounds. In most cases, nanotagged Semipalmated Sandpipers did not follow this pattern.

Table 7. Species and ages of shorebirds banded and affixed with a nanotags at Longridge Point and Little Piskwamish Point, 2014.

Species	Age	Count
Dunlin	**AHY**	**2**
Least Sandpiper	**HY**	**3**
Red Knot	**SY**	**1**
Semipalmated Sandpiper	**AHY**	**68**
Semipalmated Sandpiper	**HY**	**14**
White-rumped Sandpiper	**AHY**	**58**
Total		**146**

Other banding activities resulted in trapping and banding shorebirds and local

breeding individuals and their young. Together with the shorebird trapping effort, just under 400 individuals of 28 species were banded. Close to 90% of the individuals banded were shorebird species, accounting for 32% of the species banded (Table 8).

Table 8. Species and ages of birds banded at Longridge Point and Little Piskwamish Point, 2014.

Species (four-letter code)	Age	Count
ALFL	HY	2
BOCH	HY	2
DUNL	AHY	2
GRAJ	HY	1
HAWO	SY	1
LCSP	AHY	1
LCSP	HY	1
LEFL	HY	4
LESA	HY	15
LISP	AHY	1
LISP	HY	5
MYWA	HY	1
NESP	AHY	4
NOWA	HY	1
PHVI	AHY	1
REKN	SY	1
REVI	AHY	1
SAND	AHY	2
SAVS	HY	1
SEPL	AHY	6
SEPL	HY	1
SEPL	SY	1
SESA	AHY	229
SESA	HY	14
SOSP	HY	2
SPSA	HY	1
SWSP	HY	6
TEWA	ASY	1
TEWA	HY	4
WISN	HY	1
WISP	HY	1
WIWA	HY	1
WRSA	AHY	72
WTSP	HY	2
YEWA	AHY	1
YEWA	HY	3
Total		393

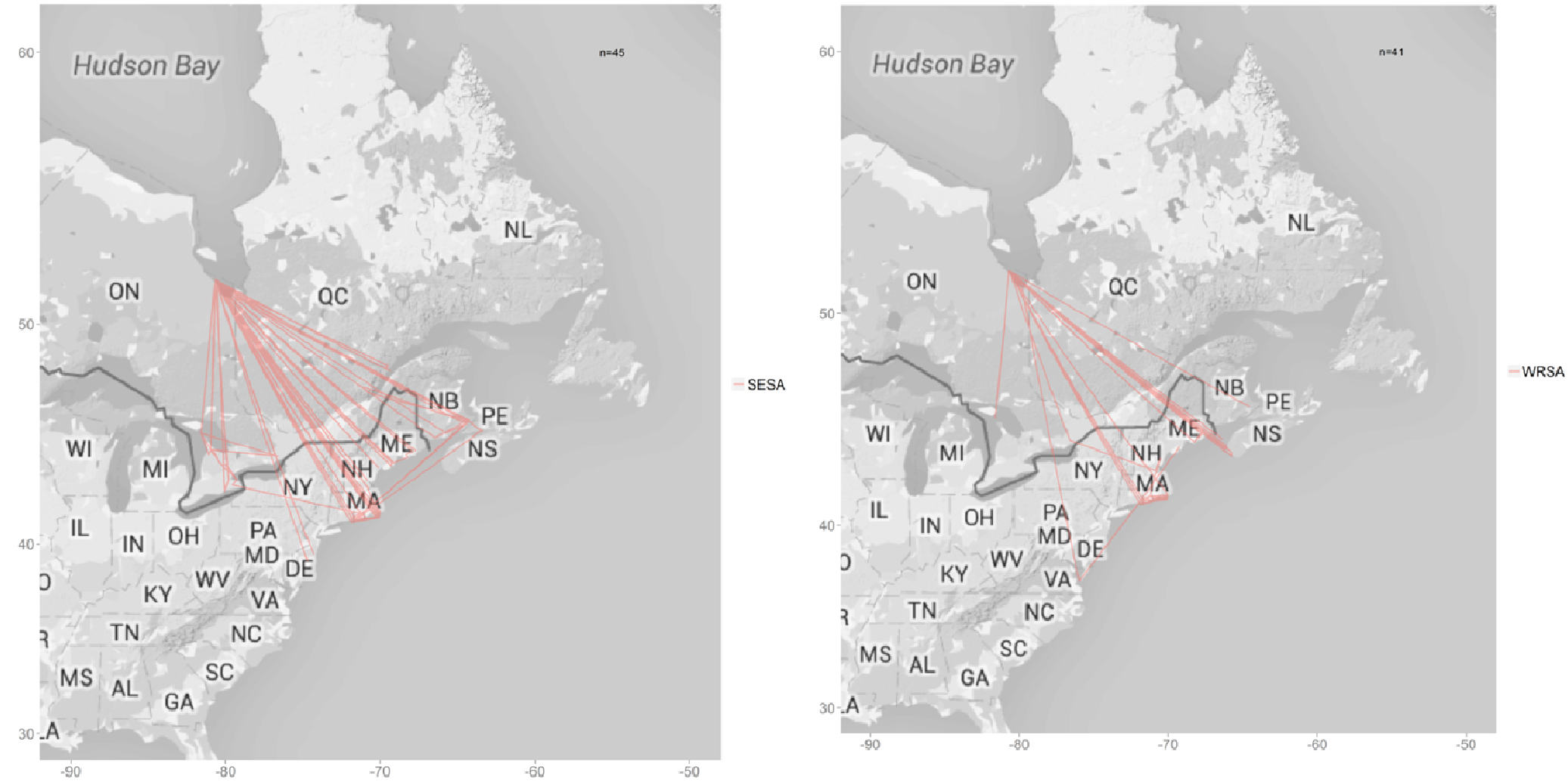


Figure 3. Movements of Semipalmated (SESA) and White-rumped (WRSA) sandpipers based on nanotag data collected throughout the Motus network, 2014.

Future Plans

Plans for the next three years include trapping and attaching nanotags to shorebirds at study sites as well as continuing deployment of temporary Motus towers at various sites along the coast that will be used to detect marked shorebirds. This project will contribute to a larger North America wide project, Motus. More information can be found at sensorgnome.org.

Work is currently underway to determine the best path forward for continued surveying of staging shorebirds at sites along the western James Bay coast. Part of this work entails drafting a sampling plan by winter 2015. In the meantime, surveys are expected to continue in an effort to maintain annual coverage at core sites, such as Longridge Point, while gaining new or updated information from other survey locations that are either new to the project or have been surveyed historically.

Finally, it is hoped that aerial surveys will be completed in future years following the same methodology as in previous aerial surveys of the James Bay coast.

Acknowledgements

The James Bay Shorebird Project is a cooperative effort spearheaded by Environment Canada's Canadian Wildlife Service, the Royal Ontario Museum, the Ontario Ministry of Natural Resources, and Bird Studies Canada. Additional support received from the USFWS Neotropical Migratory Birds Conservation Act program. The OMNR provided helicopter transport to and from field camps and accommodations in the staff house while crews were in Moosonee. Thanks to Rod Brook, Sarah Hagey, Kim Bennett and to the OMNR pilots for providing logistical support. Ted Cheskey of Nature Canada and Bernie McLeod of Moose Cree First Nation coordinated logistics associated with the Moose Cree First Nation volunteers. Finally, without the many hours of dedicated volunteer support, this project would not have been possible. Many thanks to the volunteers who gave their time to the project this year.

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