Appendix 2-B

Project Nujio 'qonik: Bird and Bat Baseline Study 2023 Interim Data Report (LGL 2024)

PROJECT NUJIO'QONIK:
BIRD AND BAT BASELINE STUDY 2023
INTERIM DATA REPORT

Prepared by

in association with

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Disclaimer

This document is an Interim Data Report and the results are considered preliminary and subject to change.

1.0 Introduction

This document is an Interim Data Report for bird and bat baseline data acquired for World Energy GH_2's Project Nujio'qonik. Data were collected in 2023 to assist with the development of the Avifauna Impacts Monitoring and Mitigation Plan (AIMMP) and Species at Risk Impacts Monitoring and Mitigation Plan (SARIMMP). As specified in the Environmental Impact Statement (EIS) Guidelines (page 47) for the Project, the AIMMP and SARIMMP are to be in place prior to Project construction. A Final Data Report will be issued upon completion of all data analyses.

1.1 Background

World Energy GH_2 (WEGH2) has proposed a green hydrogen project powered by wind turbines on Newfoundland's west coast. The Project is located in two primary areas called the Port au Port Wind Farm and the Codroy Wind Farm. A hydrogen / ammonia plant is proposed for a brownfield site at the Port of Stephenville that is zoned for industrial use. Of direct relevance to potential effects of the Project on birds and bats are the proposed wind turbines, electrical grid, series of access and network roads, and to a lesser extent the hydrogen/ammonia plant (Table 1.1). Details of Project activities and proposed timelines are provided in Section 2 of the EIS (Stantec 2023).

Table 1.1. Summary of proposed infrastructure for Project Nujio'qonik at the Port au Port and Codroy wind farms (from Stantec 2023).

Project Infrastructure/Area	Port au Port Wind Farm	Codroy Wind Farm
Project Area Size	117.6 km^2	121.1 km^2
No. of wind turbines	164	164
Wind turbine height (max.)	200 m	200 m
New access / network roads (length)	197 km	151 km
Modified existing roads (length)	5 km	32 km
Electricity (collector system) lines (length)	213 km	271 km
Total area to be cleared	42 km^2	

The EIS for Project Nujio'qonik was submitted to the Provincial Department of Environment and Climate Change (DECC) on 22 August 2023 and on 31 October 2023 the DECC Minister determined the EIS was deficient and required an Amendment. This Interim Data Report has been used to support preparation of the EIS Amendment.

1.2 Study Objectives

A key objective of the bird and bat baseline study was to assist with the development of the AIMMP and the SARIMMP. Of relevance is that one of the two primary objectives of the IMMPs is to validate effects predictions made in the EIS. [The other primary objective is to ensure that mitigation measures are effective and if not, use adaptive management procedures.]

In 2023, baseline surveys for birds and bats focused on the Port au Port Wind Farm (see Figure 1.1 below) and the proposed site for the hydrogen/ammonia plant. This approach was taken given that the phased development plan for the Project entails construction at these sites commencing in 2024 followed by the Codroy Farm years later. Baseline data collection for birds and bats are planned to continue in 2024.

Specific objectives of the bird baseline field study in 2023 were to:

- describe the composition of the breeding bird community in the Project Area and Local Assessment Area (LAA);
- quantify breeding bird numbers to the extent possible;
- identify bird Species at Risk (SAR) and Species of Conservation Concern (SOCC) in the Project Area and LAA;
- document important areas, times of year, and migration routes for birds relative to the Project Area, proposed infrastructure locations, and Project construction plans;
- document use of the Project Area as stopover locations (passage migrants) and wintering areas for birds;
- document breeding colonies or other large bird concentrations (staging, migration) that occur in or near the Project Area including bird movements and behaviour; and
- provide recommendations for future bird data collection to address data gaps and to assist with continued development of IMMPs.

Specific objectives of the bat baseline field study in 2023 were to:

- determine the species composition of resident and migratory bat species in the Project Area and LAA;
- document the times of year and locations where resident and migratory bat species are more prevalent in the Project Area and LAA;
- document important areas, times of year, and migration routes for bats relative to the Project Area, proposed infrastructure locations, and Project construction plans;
- provide recommendations for future bat data collection to address data gaps and to assist with continued development of the SARIMMP; and
- Assess how much suitable bat habitat occurs within the Project Area, LAA and RAA.

1.3 Study Area

In 2023, field survey efforts for birds and bats were primarily focused in the Port au Port Project Area, site of the proposed hydrogen/ammonia plant, and the LAA. There were some coastal aerial surveys that extended from the Codroy Wind Farm to the Port au Port Wind Farm. For reference, Figure 1.1 shows the locations of the Project Area, LAA, and Regional Assessment Area (RAA) where bird and bat baseline data were collected for this study.

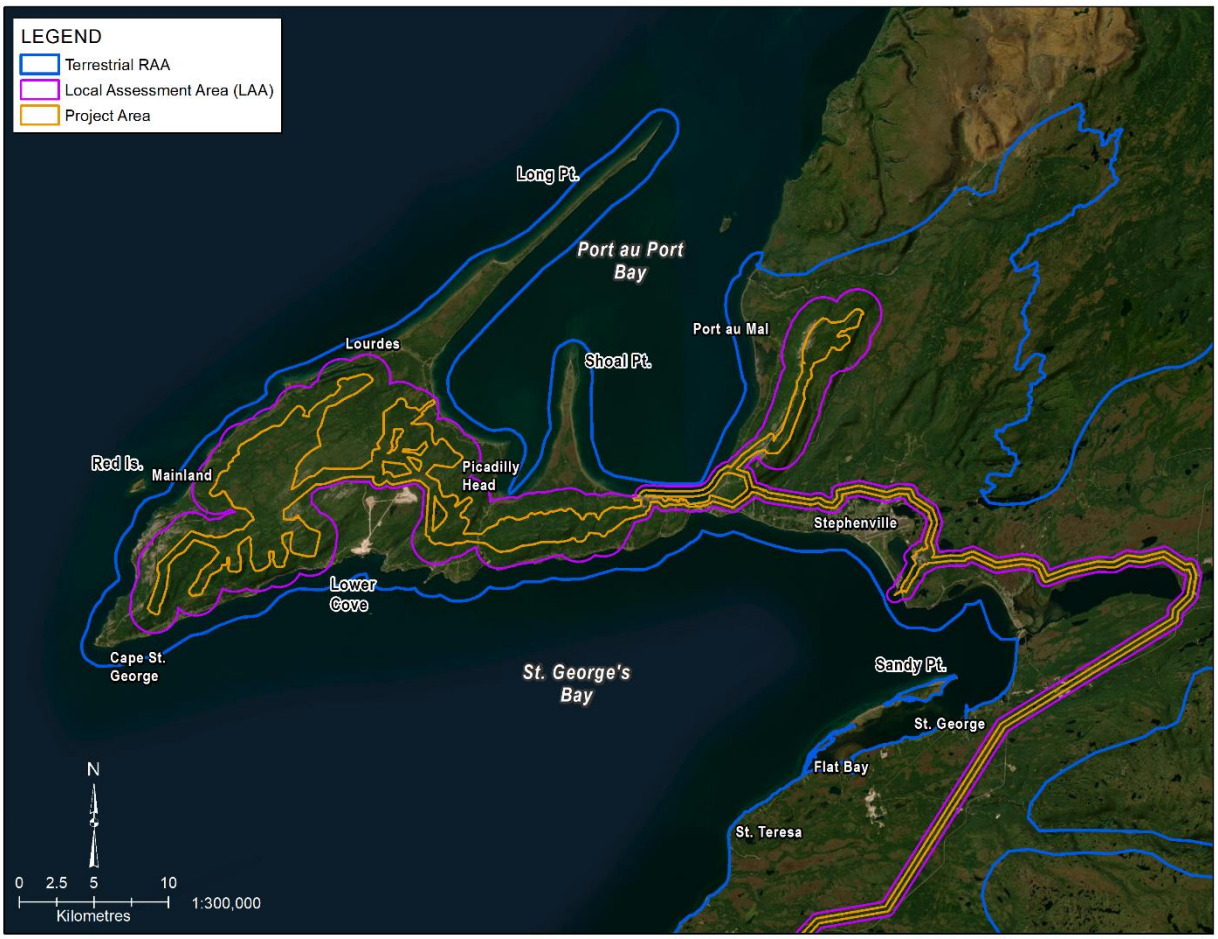

Figure 1.1. Locations of the Project Area, LAA, and RAA where baseline bird and bat data were collected in 2023.

1.4 Avifauna

The Avifauna Component Study prepared for the EIS (see Appendix BSA3 in Stantec 2023) and Section 13 of the EIS provides details on the birds known to occur in the Project Area and LAA. Much of the information was derived from existing data sources (eBird Canada, Christmas Bird Counts, Newfoundland Breeding Bird Atlas, and Atlantic Canada Shorebird Survey) supplemented by baseline data collected for the Project in February and March 2023 (see Section 3.1.4 below).

The Project Area and LAA support many bird species during the breeding season, spring and fall migration, and in winter (Stantec 2023). Two Important Bird Areas (IBAs, BirdLife International 2023), the Codroy Valley (NF040) and Codroy Valley Estuary (NF041) are located 10 km and 9 km, respectively, from the Project Area. There is no critical habitat for birds located in the Project Area (or LAA). The island of Newfoundland is part of the Atlantic Flyway, which

is a major migratory route for avifauna in North America. However, exact migration routes of birds that use the Atlantic Flyway and which occur in the Project Area are unknown.

There were 21 SAR that are known or expected to occur within the Project Area or LAA during the breeding season, spring/fall migration or in winter. These include passerines, shorebirds, waterfowl and waterbirds. SAR may be present in a range of habitats such as forests, marshes, freshwater ponds, and mudflats. Piping Plover, an Endangered species that nests on sandy beaches and dunes is present within the LAA and critical habitat is present in the RAA (EC 2012). An additional 31 SOCC were identified in the background review as potentially being present within the Project Area and LAA.

1.5 Bats

As described in Section 14 of the EIS (Stantec 2023), five species of bats are known or expected to occur in the WEGH2 Project Area. Two species of resident bats in Newfoundland (little brown myotis (*Myotis lucifugus*) and northern myotis (*M. septentrionalis*) are listed as endangered on Schedule 1 of the *Species at Risk Act* (SARA) and under the Newfoundland and Labrador *Endangered Species Act* (NL ESA) due to recent populations declines caused by white-nose syndrome, a fungal disease that infects hibernating bats. The three migratory species that occur on the island of Newfoundland (hoary bat (*Lasiurus cinereus*), eastern red bat (*L. borealis*), and silver-haired bat (*Lasionycteris noctivagans*)) have recently been assessed as endangered by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). These COSEWIC assessments reflect the population declines in the migratory bats as a result of food and habitat loss, and from wind turbine related mortality (COSEWIC 2023). The big brown bat (*Eptesicus fuscus*), a migratory species not considered at risk provincially or federally, may also occur in the LAA. Wind turbines are known to cause bat mortalities through collisions and barotrauma (Baerwald et al. 2008; Brownlee and Whidden 2011).

2.0 Methods

2.1 Field Surveys for Avifauna

Survey protocols were developed following the Canadian Wildlife Service's document "Guidance Regarding Information Needed to Support Assessment of Project Effects on Birds" (CWS 2022) and based on Stantec's experience with wind energy projects in other Canadian provinces. For breeding season surveys, the protocols of the Newfoundland Breeding Bird Atlas project were consulted (NLBBA 2023). Note that all bird data were collected by Stantec biologists.

Table 2.1 summarizes the survey types, target species, timing and the survey areas of each field survey conducted in 2023. Detailed methods are described in the following subsections.

Table 2.1. Baseline surveys for birds (2023): target species, general timing, and survey area including number of stations/sites.

Survey Type	Survey	Target Species	Timing	Survey Area
Stationary	ARU Breeding Bird Survey	Passerines, Common Nighthawk, woodcock, snipe, owls	Jun, Jul	109 stations – Port au Port Peninsula and adjacent mainland
	Breeding Bird Point Counts	Landbirds, especially passerines	Twice during breeding season	67 stations – Port au Port Peninsula
	Marshbirds: Breeding	Pied-billed Grebe, American Bittern, Sora, Willet	Twice in Jun, 4 days in Jul	18 stations – Port au Port Peninsula and adjacent mainland
	Short-eared Owl	Short-eared Owl	May and Jul	3 stations – Stephenville Airport and Long Point
	Nocturnal Owls	Owls	4 days in May	3 driving routes with 10 sites per route – Port au Port Peninsula and adjacent mainland
Area Search	Landbirds: Winter Residents	Passerines	Dec	20 stations – Port au Port Peninsula and adjacent mainland
Targeted Terrestrial	Bank Swallows: Breeding	Bank Swallow	Late Jun to late Aug	10 known nesting colonies-- Port au Port Peninsula and mainland
	Gulls/terns colonies	Herring, Great Black-backed Gulls; Arctic, Common Tern	Twice in Jun, Jul	9 known gull/ tern colonies – Port au Port Peninsula and adjacent mainland
	Seabird colonies	Black-legged Kittiwake	1 May	Cape St. George to Big Cove – Port au Port Peninsula
	Coastal Waterbirds: Fall and Winter	Waterfowl, loons, grebes, Purple Sandpiper	Mar	10 stations – Port au Port Peninsula and adjacent mainland
	Waterfowl – Inland Ponds: Spring, Fall and Early Winter	Ducks and geese	Twice in May, six times in Aug, once in early Dec	31 stations – base of Port au Port Peninsula and adjacent mainland
	Landbird Migration: Spring and Fall	Raptors	Spring, fall	15 stations – Port au Port Peninsula and adjacent mainland
Aerial	Coastal Waterbird Aerial Survey: Winter	Ducks, loons, grebes, shorebirds	Feb, Mar	Little Codroy River to Broad Cove – mainland and Port au Port Peninsula
	Harlequin Duck / Purple Sandpiper Aerial Survey: Winter	Harlequin Duck, Purple Sandpiper	Feb, Mar	Little Codroy River to Broad Cove – mainland and Port au Port Peninsula
Non-breeding Shorebird	Shorebirds: Spring and Fall	Plovers, sandpipers	May-Jun, Aug-Oct	6 reference sites, 7 impact stations – Port au Port Peninsula and adjacent mainland

2.1.1 Stationary Surveys

Stationary surveys are conducted from a fixed location to document all birds present at a given location and time (see Appendix B in CWS 2022). This can be done with a human observer or with technology such as autonomous recording units (ARUs) and provides insight into the distribution and abundance of bird species including SAR. Stationary surveys are used for general breeding bird surveys and some variants specific to habitat or time of day.

2.1.1.1 Autonomous Recording Unit (ARU) Breeding Bird Surveys

Songbirds vocalize during the breeding season to advertise their viability as potential mates. Acoustic surveys that target these vocalizations are an efficient and robust method of collecting species distribution and abundance data. ARUs are a passive sampling method: they can be deployed in the field for extended periods of time between checks, which greatly reduces workloads for human technicians in the field while at the same time capturing data every day for weeks or months at a time (Shonfield and Bayne 2017). ARU recordings offer valuable information on bird species presence and can detect birds at a level similar to humans (Castro et al. 2019). While it can be challenging to generate an accurate abundance estimate for each species, individual counts and accurate species identification are possible.

ARU Recording Schedule and Locations

In 2023, ARU recordings were used to supplement the species composition data that were collected through in-person point counts for the study. ARUs, 110 in total (model: Song Meter Micro; Wildlife Acoustics, Concord, MA, USA), were deployed in Port au Port Peninsula, Point au Mal, Stephenville and Stephenville Crossing areas to monitor birds between 9 June and 31 July (Table A-1 in Appendix A, Figure 2.1). Three ARUs malfunctioned and data were not available. Another ARU was deployed to monitor a Bank Swallow roost site; it was set to record in the evening only, from 45 min before sunset to 20 min after sunset every fourth day from 26 June–8 July. Therefore, 106 ARUs with full datasets of recordings were available for our analyses. ARU locations were selected to sample various habitats in the LAA. ARUs were deployed for an average of 23 days, and deployment duration ranged from 11–41 days. CWS (2022) guidance recommends a minimum deployment of 4 to 7 days to increase the chance that recordings will have minimal interference from ambient noise such as wind or rain across three or more days. Each ARU had a single-channel, built-in omnidirectional microphone and was programmed to record a 5-min long sound file every 30 min for 6 hours, starting one hour before sunrise (WAV format, 24-kHz sampling rate, 18 dB gain). ARUs were also programmed to record continuously in the evening from 30 min before sunset to 1.5 hours after sunset. Morning recordings targeted most breeding songbirds, and evening recordings targeted crepuscular and nocturnal species (e.g., nightjars, owls).

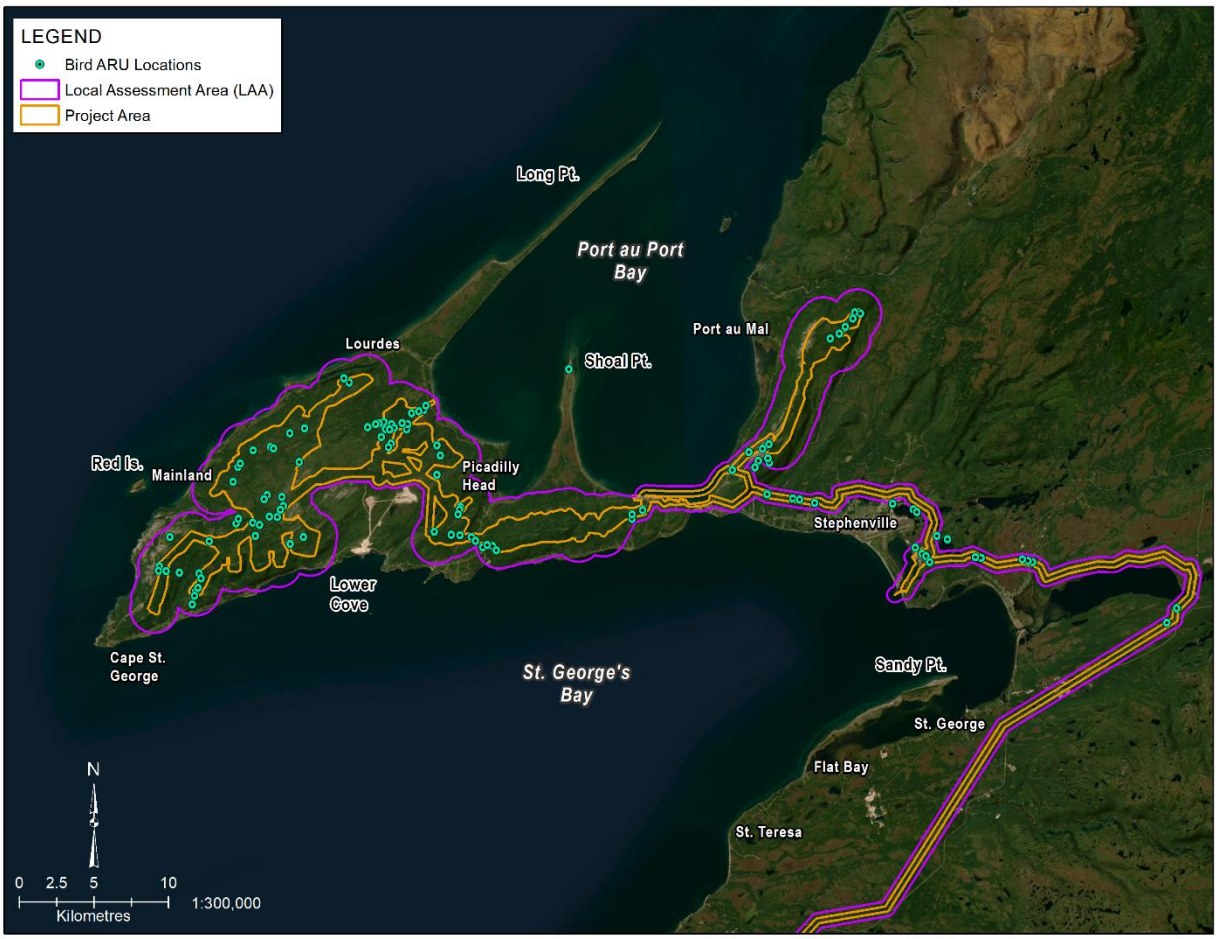

Figure 2.1. Bird ARU locations on the Port-au-Port Peninsula, Point au Mal, Stephenville, and Stephenville Crossing areas.

ARU-based Point Count Procedure

For these ARU-based 'point counts,' we selected dates and times for sampling at each ARU location based on the Newfoundland Breeding Bird Atlas point count protocol (NLBBA 2023). Two 5-min recordings from each ARU between 7 June to 15 July were selected at least 10 days apart to account for temporal variation in species' breeding activity. The first date was selected randomly, and the second date was assigned 10 days after the first date. For each date used, we chose a 5-min recording during a randomly-selected 30-min time period from 0.5 hr before sunrise until 4.5 hr after sunrise, which corresponds with the peak morning window of bird vocal activity. In total, 212 5-min recordings from 106 ARUs were analyzed to determine species composition.

If any randomly selected recording was not suitable for analysis due to bad weather (e.g., heavy wind or rain) or other background noise, an alternate recording was selected from the same

morning or, if none were suitable from the same morning, then an alternate recording was chosen from the day before (for sample period 1) or the day after (for sample period 2), to ensure that the two dates were still at least 10 days apart. If the second date was not suitable, the next day before or after was chosen, respectively.

To detect and identify vocalizations, trained observers listened to the ARU recordings while viewing spectrograms (the visual representation of the frequency, time, and amplitude of sound) using the sound analysis program Syrinx-PC (J. Burt, Seattle, WA, USA). The time of first detection of each individual bird was marked using the annotation feature in Syrinx-PC. All detected birds were identified to species whenever possible, along with their abundance (i.e., the number of unique individuals per species). We counted individuals based on the following standard methods used for audio transcription of wildlife sounds (ABMI 2019). First, we checked for overlapping vocalizations and different amplitude (volume) of songs, which can indicate two or more individuals. We also looked for the unique song types of different individuals for species, such as some warblers and sparrows, where each male has a different song type.

In a few instances, the number of individuals was estimated (e.g., for flocking species such as geese and waterfowl). To produce the most conservative abundance estimates in these cases, we used the minimum estimated count to calculate the number of individuals detected per recording. Recordings of each species were categorized relative to the type of vocalization (song or call). Sex was assigned as male, female, or unknown.

Bird abundance was summarized based on two detection categories: observations and individuals. The number of observations is the number of single detection events (e.g., one singing male songbird, one flock of geese). The number of individuals is a more precise count, where the minimum number of estimated individuals was used for group counts (e.g., five for a flock of geese with an estimated count of 5-10).

ARU-based Point Counts: Data Analysis

The breeding bird species composition data from ARUs was validated prior to further analysis. First, to account for duplicate sampling (i.e., multiple visits) at each ARU location, detections were pooled within locations by using the maximum count of observations and individuals detected per location for each species. For example, if three White-throated Sparrows were detected on visit one and four were detected on visit two at a given location, the value used for that location was four (Bibby et al. 2000). Second, the data were grouped into subsets prior to abundance and diversity analyses to include only the following three species groups most commonly detected by sound: "Shorebirds, Gulls and Allies" (Charadriiformes), "Songbirds" (Passeriformes), and "Woodpeckers and Allies" (Piciformes).

Species richness and diversity were calculated and results were visualized using boxplots. Richness was calculated as the total number of species from the three selected species groups

(see above) meeting the above criteria per sampling location. Diversity was calculated using Shannon's diversity index (H), described in Legendre and Legendre (2012), as follows:

$$H = -\sum_{i=1}^{q} p_i \log p_i$$

where q is species richness and p_i is the relative frequency or proportion (on a 0 to 1 scale) of observations in species i. For a given survey, H is maximum when the observations are equally distributed among the q species, H is lower when one or a few species exhibit stronger dominance, and H = 0 when there is only one species detected. H increases with the number of species and thus has no predefined maximum; as such, diversity accounts for species evenness.

Note that for this Interim Data Report, data analyses for ARU-based point counts have only partially been completed.

Automated Recognizers for Detecting Species at Risk

An important component of the WEGH2 bird baseline data collection was to establish the presence of SAR. To identify vocalizations at the species level, we used automated species-specific recognizers built in the program Song Scope (Wildlife Acoustics, Inc., Maynard, Massachusetts, USA). Recognizers use a digital signal processing algorithm to locate and flag candidate vocalizations of target species from longer audio files recorded by the ARUs. The candidate "hits" are then verified by a trained observer. These recognizers were built by researchers and made available by the Bioacoustic Unit, a group within the Alberta Biodiversity Monitoring Institute (http://www.abmi.ca). Recognizers are built from several good-quality audio samples of a species' vocalization and are trained to generate a hit when a similarity threshold is reached.

We used automated recognizer programs to target the following SAR: Bank Swallow (*Riparia riparia*; BANS), Common Nighthawk (*Chordeiles minor*; CONI), Olive-sided Flycatcher (*Contopus cooperi*; OSFL), and Rusty Blackbird (*Euphagus carolinus*; RUBL). Recognizer programs for Gray-cheeked Thrush (*Catharus minimus minimus*; GCTH) and Red Crossbill Type 8 (*Loxia curvirostra percna*; RECR) are in development. These species were selected due to the detectability of their vocalizations by automated recognizer programs or trained observers (see next section), and their federal and provincial conservation status (Table 2.2).

All of the recordings (n = 34,057; total recording time ~7,320 hr) available for each date for all ARUs analyzed (n = 106) were run through each species-specific recognizer program. Additionally, for the one ARU located at a BANS roost site (n = 8 recordings, evenings of 26 June, 30 June, 4 July, and 8 July), we conducted a visual scan of all recordings, stopping at time of first detection for each date (when detected).

Table 2.2. Acoustic ARU data screened for avian Species at Risk and their current provincial (Newfoundland and Labrador), COSEWIC, and SARA status.

Common Name	Scientific Name	Status			Recognizer Program
		Provincial (NL)	COSEWIC	SARA	
Bank Swallow	*Riparia riparia*	Threatened	Threatened	Threatened [S1]	Completed
Common Nighthawk	*Chordeiles minor*	Vulnerable	Special Concern	Threatened [S1]	Completed
Gray-cheeked Thrush	*Catharus minimus minimus*	Threatened	Threatened	-	In progress
Olive-sided Flycatcher	*Contopus cooperi*	Vulnerable	Special Concern	Special Concern [S1]	Completed
Red Crossbill (Type 8)	*Loxia curvirostra percna*	Threatened	Threatened	Threatened [S1]	In progress
Rusty Blackbird	*Euphagus carolinus*	Vulnerable	Special Concern	Special Concern [S1]	Completed

Note: *[S1] – Listed under Schedule 1.

A minimum 'quality' and minimum 'score' threshold can be set each time a recognizer is run through a set of acoustic data. Lower thresholds lead to more hits and more false positives, but higher thresholds can lead to more false negatives. Each recognizer made available by the Bioacoustic Unit comes with a recommended minimum quality and minimum score that attempts to minimize the number of false negatives and false positives. We ran the recognizers with the recommended minimum quality and score thresholds, aside from Common Nighthawk where a more conservative setting was used based on consultation with species experts (Dr. J. Shonfield, LGL, pers. comm. 2023; Table 2.3).

Table 2.3. Recommended minimum quality and score thresholds for each species recognizer.

Species	Min. Quality	Min. Score
Bank Swallow *	20	50
Common Nighthawk	50	70
Olive-sided Flycatcher	50	70
Rusty Blackbird	50	60

Source: Bioacoustic Unit (2020).
Note: *No recommended setting; use default (20/50).

The output generated by Song Scope automated recognizers produces many potential detections or "hits", which must then be validated by trained observers. All detections of SAR were noted whether they were detected by the recognizer programs or incidentally. Incidental observations included visual scans of recordings to obtain sound clips for other analyses or listening to recordings for the ARU-based point counts.

Data Analysis

Once the SAR hits were validated, the results were compiled and plotted as a time series to visualize when and where each species was detected throughout the season and to assess the occurrence of each species at each ARU location. All analyses were conducted in R version 4.3.2 (R Core Team 2023).

2.1.1.2 Breeding Bird Point Counts

Breeding bird point counts which followed the Newfoundland Breeding Bird Atlas protocol (NLBBA 2023) were conducted in June and July 2023. All surveys were conducted by a team of two qualified personnel, with one dedicated observer and one recorder. The recorder entered data into a tablet (iPad) equipped with Stantec's proprietary onLOOKer data recording application. Point count surveys were conducted at 76 stations on the Port au Port Peninsula and the adjacent mainland (Figure 2.2; locations of point counts station are provided in appendix Table A-2). Two rounds were conducted: one round in June and one round in July. Surveys were conducted from one half-hour prior to sunrise to four and one-half hours after sunrise. Each point count station was surveyed for five min during which all birds were counted and identified to species and their behaviour categorized by strength of evidence of breeding was recorded as per Newfoundland Breeding Bird Atlas protocol (NLBBA 2023; see Appendix B for an explanation of breeding evidence categories). Individuals' distances from the observer were recorded by distance bands: ≤ 100 m, > 100 to 200 m, and > 200 to 300 m. Observers were equipped with 8X or 10X binoculars. Surveys were only conducted during periods of good visibility and Beaufort wind force of 3 or less.

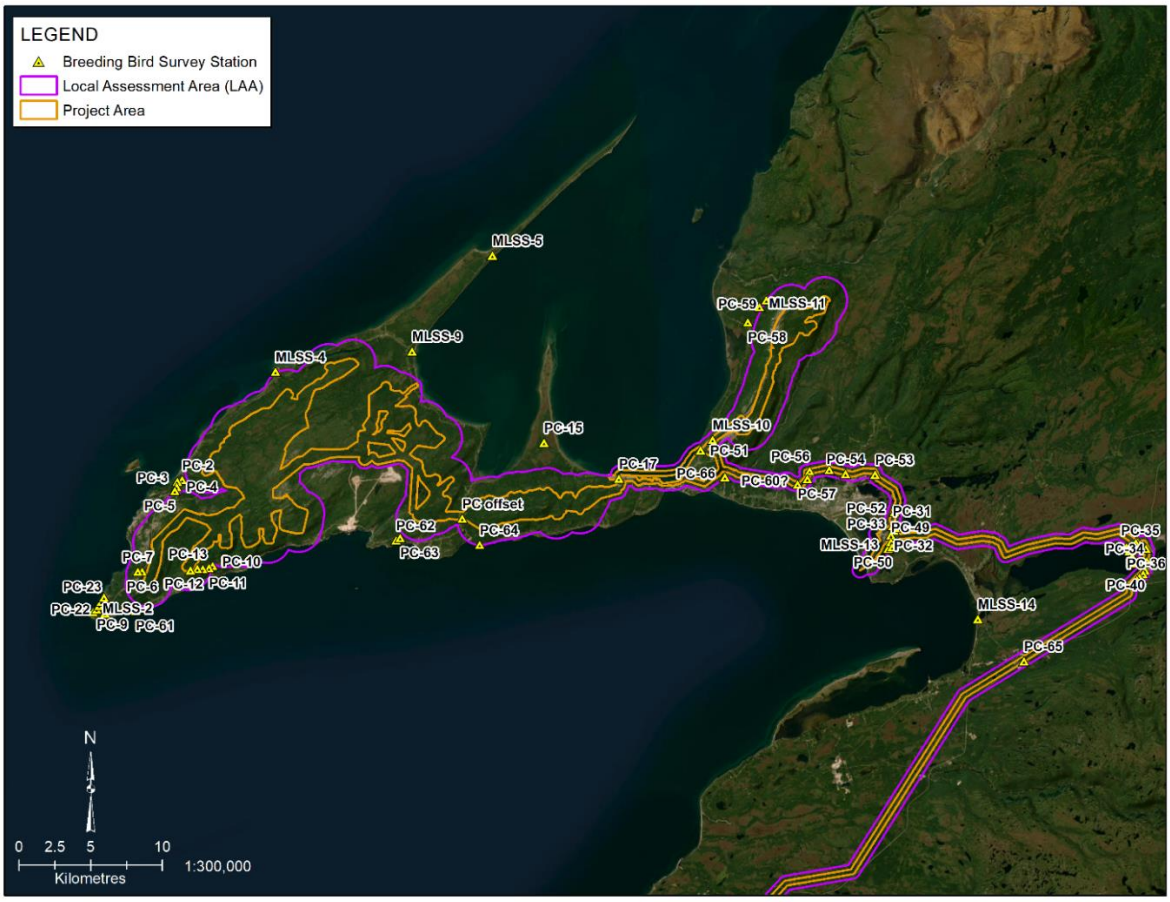

Figure 2.2. Locations of breeding bird point counts.

Data Analysis

To be provided in the Final Data Report.

2.1.1.3 Breeding Marshbirds

The protocol for surveying marshbirds was based on the Marsh Monitoring Program (MMP) survey protocol for the Maritimes and modified for Newfoundland (Birds Canada 2022). A total of 18 sites were each visited twice, at least 14 days apart, from 22 June to 30 July 2023 (Figure 2.3; appendix Table A-3). At each site, observers recorded GPS coordinates, survey start time, cloud cover, temperature, precipitation, and wind speed. The Lagoon and Inner Port Harmon site was surveyed on 23 June and was discovered to have no potential breeding habitat for Marshbirds. As such, Igloo Road marsh (MMP-18) was added as a survey site and the former site was not re-visited. The surveys began ~30 min before sunrise and ended no later than 10:00 h. Surveys were conducted in weather conditions consisting of no persistent rain or snow and wind speeds less than 25 km/h. Two observers used a broadcast speaker (Polk Boom Swimmer Jr Bluetooth waterproof speaker) and a designated .mp3 file recording of the vocalizations of five primary species, which was played from an iPhone. Speaker volume was maximized without causing sound distortion.

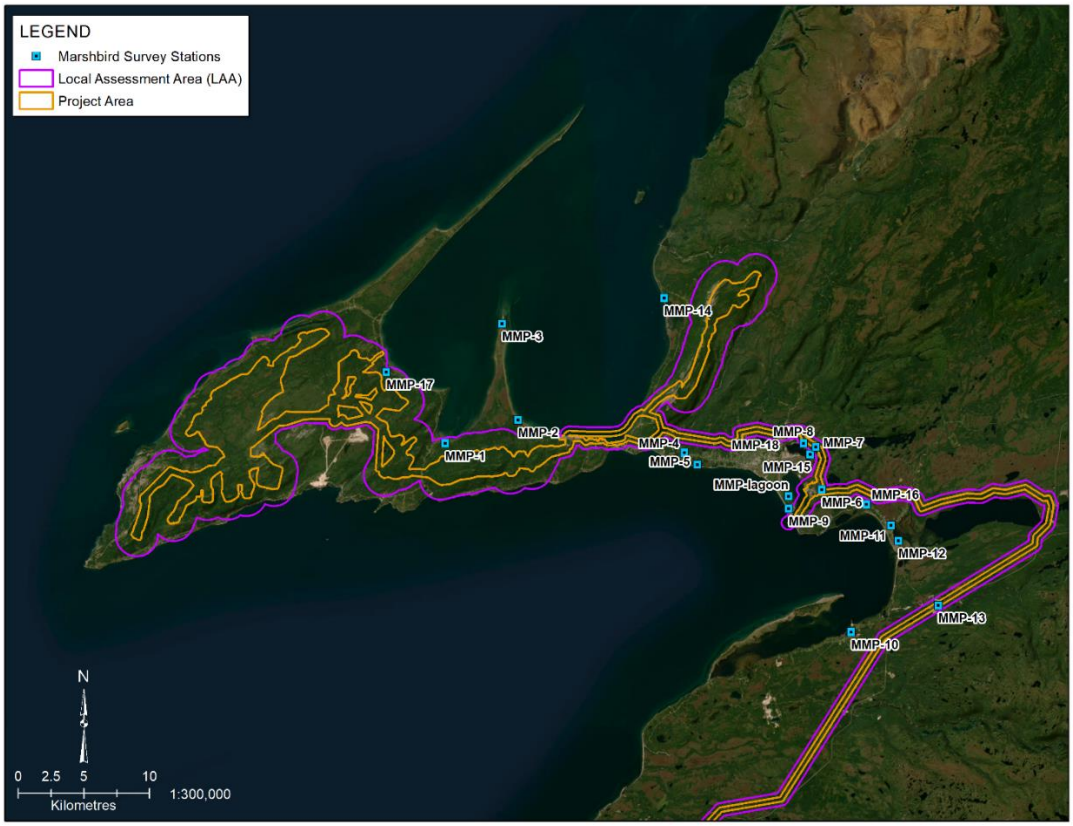

Figure 2.3. Locations of Marshbird Survey stations.

Primary Species

All individuals of the Primary species were recorded in an unlimited radius. The five Primary species selected from the 12 Maritimes MMP Primary species (Birds Canada 2022) were those most likely to occur in southwestern Newfoundland: American Bittern, Sora, Willet, Pied-billed Grebe, and American Coot. The broadcast of the five Primary species calls was created by a Stantec biologist following a similar format used in the Maritimes Marsh Monitoring Program survey protocol (Birds Canada 2022). The 15-min broadcast consists of three 5-min "blocks":

- Block 1: 5 min of silence, during which the observers listened and recorded any Primary species regardless of sighting distance and recorded Secondary species observed within a 100 m radius;
- Block 2: 5 min of Primary marshbird species calls played in sequence, for 30 seconds each and separated by 30 seconds of silence; and
- Block 3: 5 min and 30 seconds of silent listening was conducted.

Observers estimated the distance of Primary species from the observation station, recording birds as falling in one of three distance categories: within 50 m of the observer, between 50 and 100 m, or greater than 100 m. If a bird moved during a survey, it was recorded as occurring in the closest distance category in which it was detected. Observers were equipped with 8X or 10X binoculars and a 15-45X spotting scope.

Secondary Species

Any species other than the five Primary species that was detected within a 100 m radius were recorded as Secondary species. Species moving in and out of that radius were recorded as Aerial Foragers or Outside Fly-throughs, as appropriate. For those species leaving and re-entering the 100 m radius, the maximum number of individuals detected within the radius at any given time was recorded. All other marshbirds are included as Secondary species, and observers identified and counted the number of males, females, and young observed for each species when possible, within each 5-min block.

Breeding Evidence

Any breeding evidence that was detected during the survey was recorded, and any nesting sites were geolocated after the survey ended. Nesting site searches included those for Great Blue Herons, Red-winged Blackbirds, Rusty Blackbirds, and Olive-sided Flycatcher.

Data Analysis

For this Interim Data Report, the numbers of breeding Marshbirds were summarized by species recorded in the Project Area, LAA, and RAA.

2.1.1.4 Short-eared Owl

The survey protocol for Short-eared Owls was developed based on CWS guidance (CWS 2022) and protocols developed by the Saskatchewan Fish and Wildlife Branch for Short-eared Owl surveys (SK Ministry of Environment 2015). Short-eared Owls are listed as Vulnerable under the NL ESA and Special Concern under SARA.

The objective of the survey was to determine occupancy (presence/absence) of Short-eared Owl within the LAA by surveying areas of suitable habitat. Short-eared Owls occur in a variety of open habitats, including grasslands, bogs, marshes, coastal barrens, and pastures.

Suitable habitat was surveyed at Stephenville Airport (east and west) and at Winterhouse on Long Point on the Port au Port Peninsula. Survey station locations and dates and times of surveys are provided in Table 2.4. Two surveys were conducted at each site; one in May and one in July. Surveys were conducted from one hour before sunset to one half hour after sunset and during periods with no precipitation and wind speeds <20 km/h. At each survey site, observations were conducted from a good vantage point over the surrounding area. Observers were equipped with 8X or 10X binoculars and a 15-45X spotting scope. Observations were conducted for 30-min utilizing a 360-degree scan (naked eye, binocular) of the landscape to search for owls in flight or on perches, while listening for wing claps (during courtship) or begging calls of juveniles. The number of adults and juveniles sighted, bird behaviour, along with distance and bearing from the observer were recorded.

Table 2.4. Survey sites and timing of Short-eared Owl surveys.

Location	Date (2023)	Start Time
Stephenville Airport East	9 May	19:54 h
	10 July	20:28 h
Stephenville Airport West	9 May	20:36 h
	10 July	21:15 h
Winterhouse, Long Point	18 May	20:03 h
	11 July	20:31 h

Data Analysis

Data analysis was not required given that Short-eared Owls were not detected during the surveys.

2.1.1.5 Nocturnal Owls

In early May 2023, nocturnal owl surveys consisted of roadside surveys along three road routes based on the Newfoundland and Labrador Nocturnal Owl Survey protocol (Birds Canada 2020) (Table 2.5). Each of the three road routes consisted of 10 survey stations separated by at least 2 km (Figure 2.4). The NL Forestry dataset used for habitat metrics in the Project EIS was used in

GIS to identify habitat at survey locations. Survey station coordinates and habitats are provided in appendix Table A-4).

Surveys began at least one-half hour after sunset and were completed prior to midnight. Two species of owl calls were broadcast to elicit calling behaviour from owls near the survey site. The playback speaker used (Polk Boom Swimmer Jr Bluetooth waterproof speaker) produced a broadcast of the owl recording that was audible from at least 400 m. The observer/recorder was located at least 20 m from the broadcast speaker. The following steps were taken at each site:

- Observer/recorder listened silently for 2 min;
- 20 s broadcast of Boreal Owl song played;
- 1-min listening period;
- 20 s broadcast of Boreal Owl song played;
- 1-min listening period;
- 20 s broadcast of Saw-whet Owl song played;
- 1-min listening period;
- 20 s broadcast of Saw-whet Owl song played; and
- final 1-min listening period.

The number and species of calling owls and estimated distance and direction from the observer were recorded. The observer/recorder counted the vehicle traffic and assigned background noise level categories:

1 – None or slight, relatively quiet, little interference;
2 – Moderate, some interference with broadcast and/or listening;
3 – High, substantial interference with broadcast and/or listening; or
4 – Excessive noise, extreme interference with broadcast and/or listening.

Due to the proximity of most survey sites to a major roadway, traffic was a major determinant of noise level, and the number of vehicles passing by during the survey period were counted. Decibel levels from each vehicle were not measured, but vehicle noise was factored into the selected noise level category. Wind also contributed to noise level and was incorporated into the selected noise category.

Table 2.5. Location and timing of nocturnal owl surveys.

Route No.	Location	Date (2023)	Sunset Time
1	Mouth of Fox Island River to Port au Port West – Aguathuna – Felix Cove	1 & 2 May *	1 May: 20:40 h 2 May: 20:42 h
2	Piccadilly to north of Three Rock Cove	4 May	20:44 h
3	South of Three Rock Cove to just north of Cape Saint George	10 May	20:53 h

Note: * Bad weather resulted in the Route 1 survey being extended into a second day.

Figure 2.4. Locations of nocturnal owl survey stations along three roadside routes.

Data Analysis

For this Interim Data Report, the numbers of nocturnal owls were summarized by species recorded relative to the Project Area and LAA.

2.1.2 Area Search

An area search for birds aims to locate all birds within a given site (CWS 2022). It is typically less formally structured than other surveys, as the required approach is generally determined by the size, layout, and vegetation structure of the search area. Area search surveys were conducted for landbirds considered winter residents.

2.1.2.1 Winter Resident Landbirds

Winter resident landbird surveys were conducted during 2-4 December 2023 at 20 stations (Table 2.6, Figure 2.5). The survey protocol was based on that for area searches in forest habitat recommended by CWS (2022). Observers searched a 50 m radius around the centre point of each station while listening for and looking for bird activity for a period of 15 min. All birds seen or heard were counted, identified to species, and their distance to the centre point of the station, direction of travel in compass headings, height, and behaviour were recorded. Surveys were conducted at various times of the day and by a team of two qualified personnel, with one dedicated observer and one recorder. Surveys were conducted only during periods of good visibility and Beaufort wind force of 3 or less. Observers recorded a brief description of the habitat within a 50 m radius of the centre point of each station, with photos taken if the habitat was difficult to describe or did not match the prescribed Ecological Land Classification (ELC) as determined during the EIS process.

Table 2.6. Winter resident landbird survey stations, dates, and times surveys were started.

Station ID	Date (2023)	Start Time
MLSS-3	4 Dec	15:47
MLSS-6	3 Dec	13:09
MLSS-9	4 Dec	14:23
MLSS-10	3 Dec	10:15
MMP-12	2 Dec	12:59
NOS-2-5	4 Dec	15:02
NOS-3-4	4 Dec	12:52
NOS-2-10	4 Dec	13:45
PC-2	4 Dec	12:08
PC-6	4 Dec	11:34
PC-10	3 Dec	15:15
PC-22	4 Dec	11:00
PC-48	3 Dec	8:40
PC-55	3 Dec	9:10
PC-58	3 Dec	11:54
PC-61	3 Dec	15:44
PC-63	3 Dec	14:10
PC-65	2 Dec	12:26
SEOW-3	4 Dec	14:13
WF-5	3 Dec	9:49

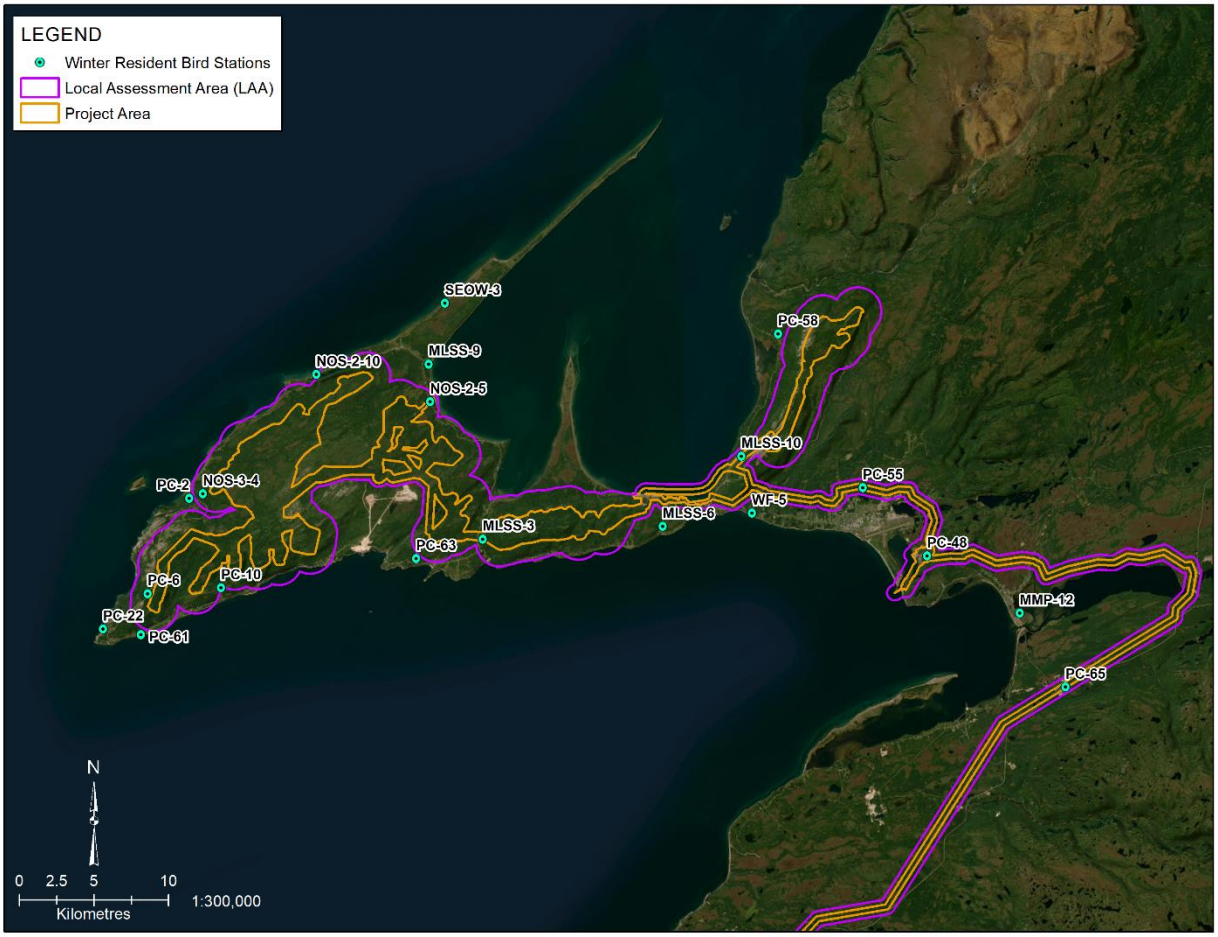

Figure 2.5. Locations of winter resident bird survey stations.

Data Analysis

For this Interim Data Report, the numbers of landbirds were summarized by species recorded relative to the Project Area, LAA, and RAA.

2.1.3 Targeted Terrestrial Surveys

Targeted terrestrial surveys were used to supplement stationary surveys, to gain more knowledge about species of interest, and/or to learn about habitat use (CWS 2022). In some cases, the surveys focused on a particular landscape feature that was uncommon in the LAA, but especially important to birds (e.g., swallow colonies, shorelines for waterbird concentrations).

2.1.3.1 Bank Swallow Breeding

In addition to guidance from CWS (2022), the Bank Swallow survey protocol was developed following advice received by CWS in an email correspondance to WEGH2.

At 10 known Bank Swallow nesting colonies (Table 2.7, Figure 2.6), observers counted (with the aid of 8X or 10X binoculars and a 15-45X spotting scope) the total number of adults, total number of burrows observed, and maximum count of active burrows, i.e., burrows at which adults were seen entering or exiting. Observers also recorded the highest breeding evidence strength category observed at each location and each visit as outlined in the Newfoundland Breeding Bird Atlas protocol (NLBBA 2023). All of the colonies were visited three times; twice during the breeding season (June, July) and once during the post-breeding (late August) period, with the exception of Three Rock Cove (BANS-1) and Southwest Brook (BANS-5; Table 2.7).

Table 2.7. Bank Swallow nesting colony locations, stations, and dates surveyed.

Site	Station ID	Latitude	Longitude	Date (2023)
Three Rock Cove	BANS-1	48.625	59.098	9 Jul 28 Jul
Two Guts Pond	BANS-2	48.639	58.671	22 Jun 7 Jul 25 Aug
Black Banks Beach	BANS-3	48.637	58.842	26 Jun 9 Jul 25 Aug
Gaudon's Brook	BANS-4	48.467	58.431	26 Jun 11 Jul 25 Aug
Southwest Brook	BANS-5	48.544	58.599	9 Jul 30 Jul
Young's Cove/Flat Bay	BANS-6	48.524	58.289	26 Jun 7 Jul 9 Jul 25 Aug
Robinson's River	BANS-7	48.396	58.622	7 Jul 30 Jul 25 Aug
McKay's River	BANS-8	48.248	58.818	7 Jul 30 Jul 25 Aug
Crabbe's River	BANS-9	48.242	58.830	7 Jul 30 Jul 25 Aug
Highlands River	BANS-10	48.218	58.864	7 Jul 30 Jul 25 Aug

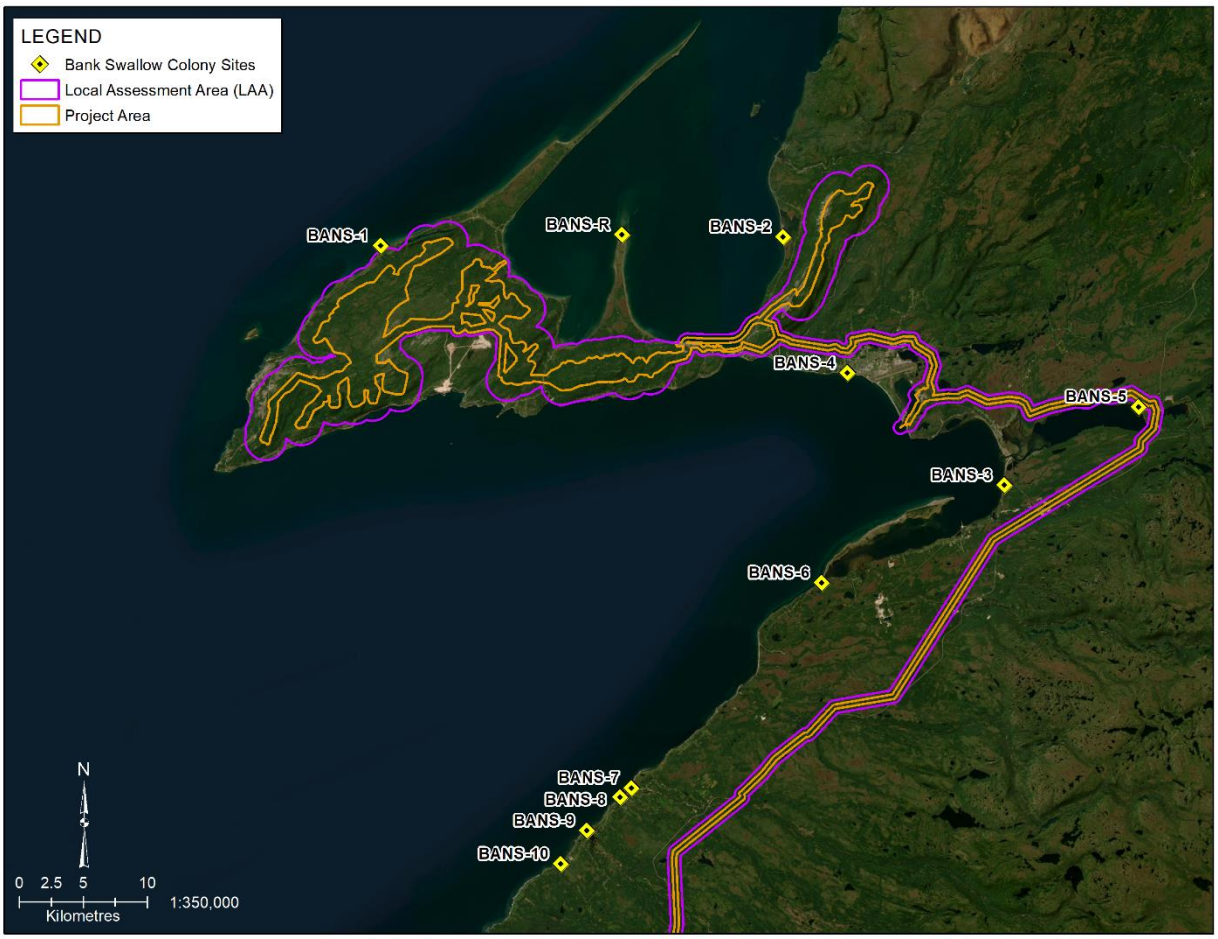

Figure 2.6. Location of Bank Swallow survey sites at nesting colonies and location of ARU deployed at potential roosting site.

An ARU was installed at the Shoal Point marsh, which was identified as a potential inland roosting site. The ARU was set to record vocalizations from 45 min prior to sunset until 20 min after sunset. Details on ARU type and other parameter settings are provided in Section 2.1.1.1.

Observers also recorded the locations of other swallow species observed within the Project Area and LAA during other surveys, and any Bank Swallows incidentally observed outside of dedicated survey windows. Mixed flocks of swallows that arrive in early summer before occupying breeding territories were recorded and a relative species composition was produced for the flock when possible.

Data Analysis

For this Interim Data Report, the numbers of Bank Swallows were summarized by survey site along with the numbers of burrows and active burrows.

2.1.3.2 Gull and Tern Breeding Colonies

Surveys of known gull/tern colonies (nine sites) were conducted in June and July 2023 (Table 2.8; Figure 2.7). During a site visit, observers (two experienced biologists) equipped with 8X or 10X binoculars and a 15-45X spotting scope identified birds to species level, counted the number of individuals present for each gull and tern species, and recorded the highest category of breeding evidence as per the Newfoundland Breeding Bird Atlas protocol (NLBBA 2023) for each species. There were no time limitations to the survey effort, but time was documented, and site visits were performed in suitable environmental conditions; namely the absence of persistent precipitation and unrestricted visibility. Other species observed in and near the colony site were identified and recorded as incidental sightings. Four of the sites were visited a second time later in the season to document evidence of any higher categories of breeding.

Table 2.8. Locations of gull and tern colonies, potential species present based on eBird data, and dates visited.

Site	Latitude	Longitude	Potential Species	Date (2023)
Black Duck Brook Beach	48.702	58.916	Ring-billed Gull	21 Jun
Blue Beach	48.767	58.787	Common Tern	21 Jun
Gravels Pond	48.558	58.726	Common Tern	21 Jun 7 Jul
Piccadilly	48.556	58.907	Common Tern	21 Jun
Point au Mal	48.645	58.670	Common Tern, Caspian Tern	22 Jun 7 Jul
Robinson's River	48.247	58.817	Common Tern, Ring-billed Gull	7 Jul 30 Jul
Ship Island	48.508	58.969	Herring Gull, Great Black-backed Gull	13 Jun
Shoal Point	48.640	58.841	Common Tern, Arctic Tern, Caspian Tern	26 Jun 9 Jul
Stephenville Crossing Estuary	48.494	58.423	Common Tern, Arctic Tern, Caspian Tern, Black-headed Gull, Ring-billed Gull, Herring Gull, Great Black-backed Gull	22 Jun

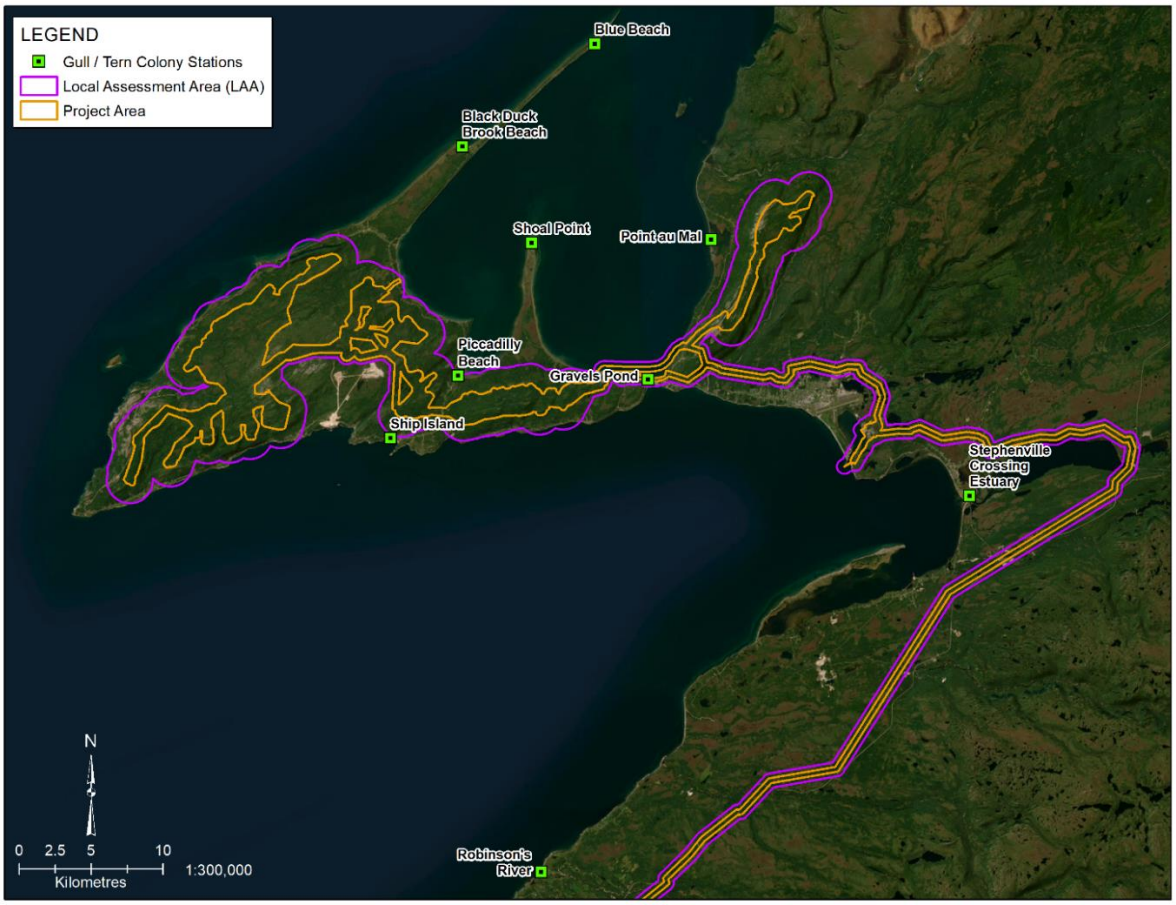

Figure 2.7. Locations of gull and tern colonies surveyed in June and July 2023.

Data Analysis

For this Interim Data Report, the numbers of gulls and terns were summed by species at each colony site.

2.1.3.3 Seabird Colonies

The seabird colonies, primarily those of Black-legged Kittiwake, at Cape St. George and Big Cove were surveyed to estimate the number of each species present in the area, both on the cliffs and on the adjacent water. The survey was conducted on 1 May 2023 given that breeding pairs were expected at or near the colonies. The survey followed the CWS (2022) shoreline counts protocol and consisted of two observers walking a 3 km transect along the cliff edge from Cape St. George north to Big Cove. Observers made three stops to count birds as shown in Figure 2.8. Observers were equipped with 8X or 10X binoculars and a 15-45X spotting scope. The number of each bird species observed was recorded, and photographs of large groups of seabirds, either on the cliff faces or on the water, were taken using a DSLR camera and 300 mm lens.

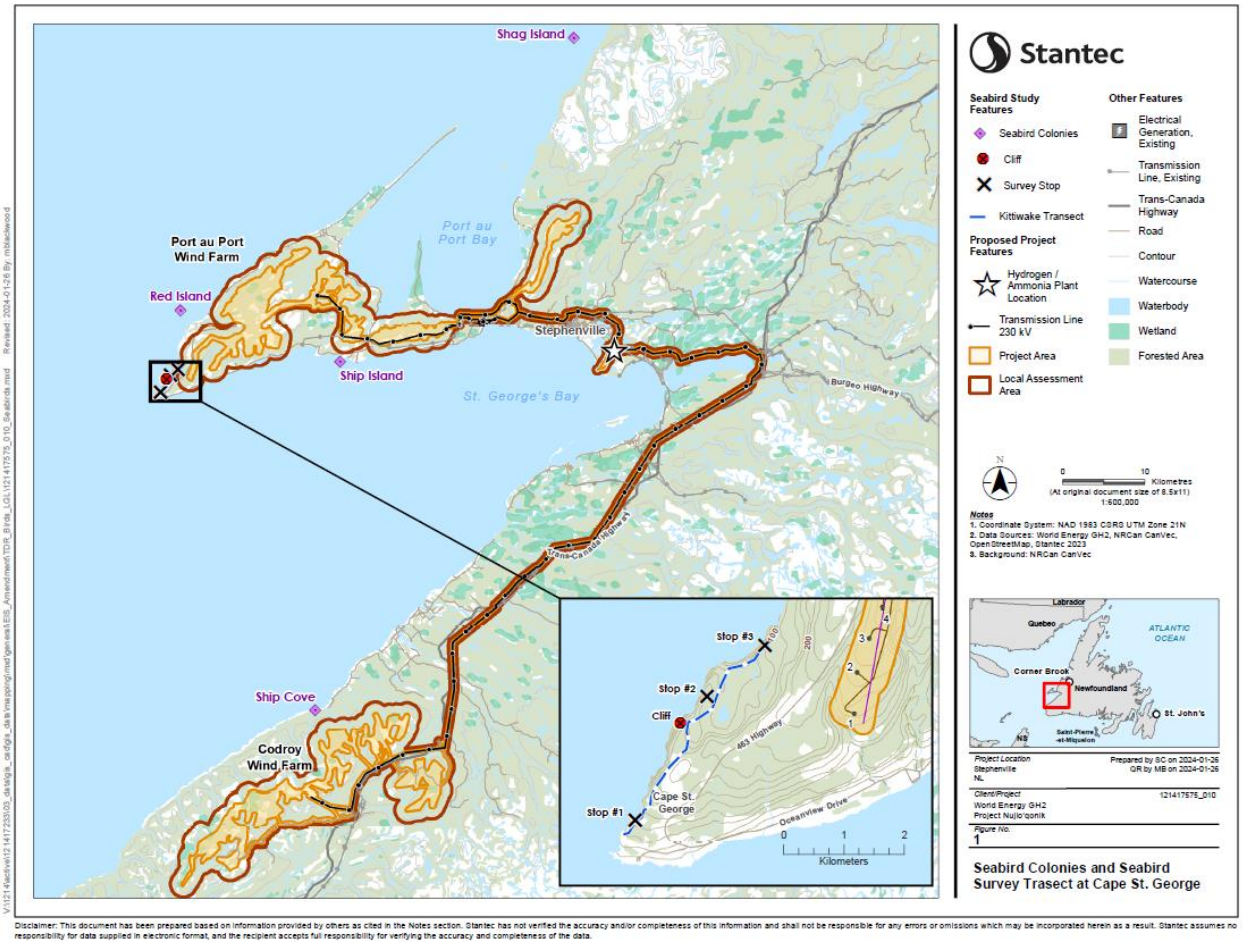

Figure 2.8. Location of seabird transect surveyed at Cape St. George relative to known seabird colonies. The magnified inset shows the 3 km transect from Cape St. George and three stops made at Black-legged Kittiwake colonies.

Data Analysis

For this Interim Data Report, the number of seabirds recorded was summed by species for the survey route.

2.1.3.4 Coastal Waterbirds: Fall and Winter

In March, August, September, October, and December 2023, land-based surveys of waterbirds (i.e., sea ducks including Harlequin Duck, Purple Sandpiper, loons, grebes, cormorants, alcids) were completed at 16 coastal locations on the Port au Port Peninsula and in the Stephenville area (Figures 2.9 and 2.10, appendix Table A-5). Survey locations were established in areas that were accessible by road and had good visibility of the adjacent coastal waters. The locations of survey stations were selected to sample a range of coastal habitats including beaches, cliffs, and

wetlands. Survey stations were limited to areas of public land located adjacent to maintained roads. During the fall survey period station C-6 was no longer accessible, so a new station, C-11, was added nearby. An additional five stations were added for the fall survey, for a total of 16 stations (Figure 2.10, appendix Table A-5). Approximately half of the survey stations were situated within 2 km of proposed Project infrastructure and the remaining survey stations were located more than 2 km away from proposed Project infrastructure. Of note, surveys in March were conducted the day before aerial waterbird surveys.

The protocol used was based on the British Columbia Coastal Waterbird Survey Protocol (Birds Canada 2021). Using 8X or 10X binoculars and a 15–45X spotting scope, all birds present in the coastal waters that were visible from the survey station were recorded. There was no time limit for the surveys and the survey ended once all birds in the survey area were documented. For each bird sighting, one of the two observers recorded species, number observed, the distance and compass bearing from the observer to the bird or center of a flock of birds, and sex and age class of the bird. Observers also recorded whether the bird was sitting on the water or flying. The compass bearing to flying birds was not recorded. The distances of birds were estimated up to 500 m; birds that were beyond 500 m were recorded as distance 500 m +.

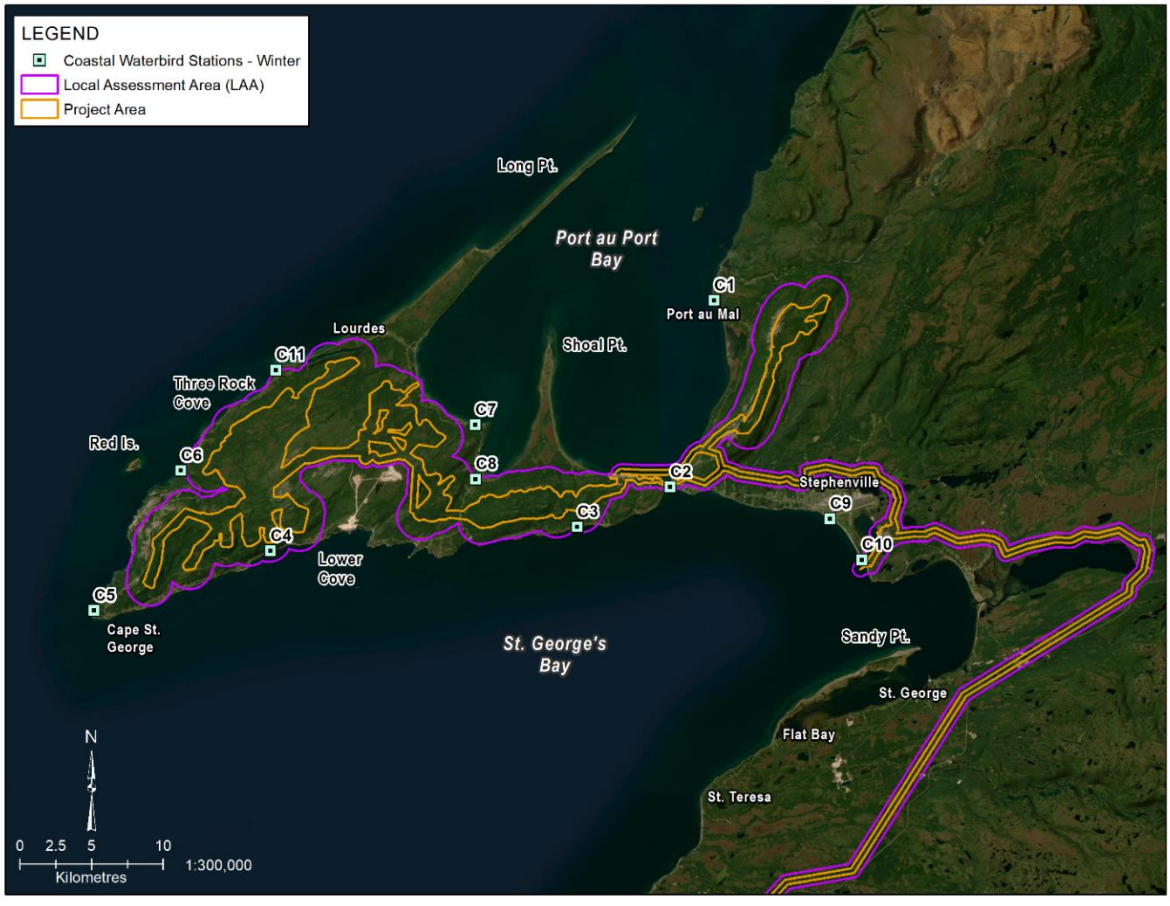

Figure 2.9. Locations of winter land-based coastal waterbird survey sites.

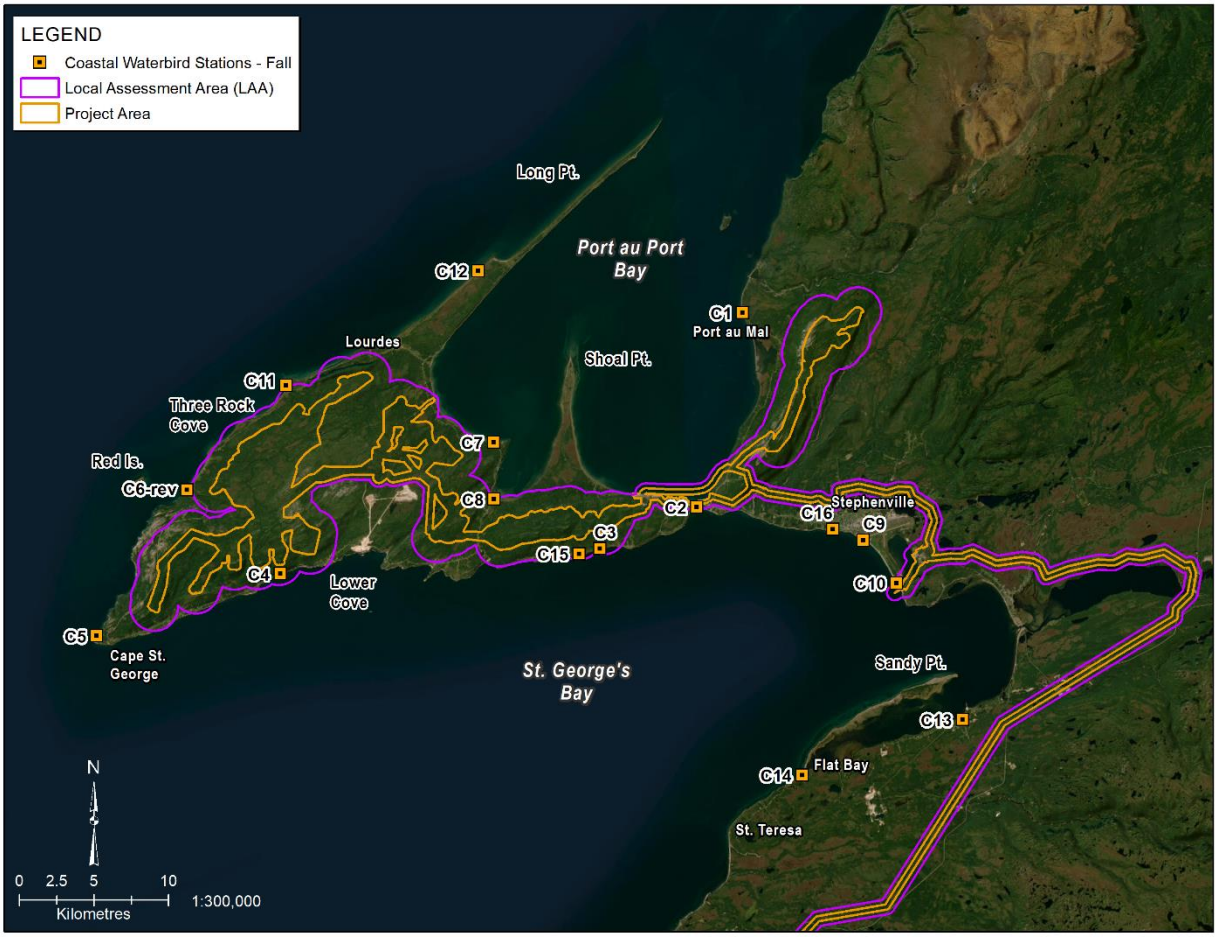

Figure 2.10. Locations of fall land-based coastal waterbird survey sites.

Data Analysis

For this Interim Data Report, the numbers of coastal waterbirds (subdivided by Waterfowl and Colonial Waterbirds) were summarized by species and season relative to the LAA and RAA.

2.1.3.5 Waterfowl Surveys of Inland Ponds: Spring, Fall, and Winter

Survey locations for waterfowl were determined based on accessibility (via vehicle and/or walking) of ponds within the Project Area and LAA. Ponds were initially selected for surveying based on aerial imagery, which were validated during the first survey visit in May 2023 (Figure 2.11). A total of 31 survey stations were established, but not all stations were surveyed during each survey period (spring, fall, and winter). All survey locations except Goose Pond WF-04 are located on the mainland due to the scarcity of wetlands on the Port au Port Peninsula. These locations were surveyed twice in May to target breeding pairs and spring migrants and six times during August to mid-October to target fall migrants (appendix Table A-6). Winter surveys

in early December occurred once to target over-wintering waterfowl. Stations WF-22, WF-23, and WF-31 along the old railway bed were difficult to access during the fall migratory period, and thus were only surveyed once in spring and once in fall. WF-19, WF-27 and WF-32 were added in the fall for additional survey coverage.

All surveys were conducted with a team of two qualified personnel, with one serving as a dedicated observer and the other as the data recorder. Surveys were conducted only in good visibility. Observers used 8X or 10X binoculars and a 15-45X spotting scope to count individual birds and identify waterfowl to species, age, and sex, if possible. If a species identification could not be confirmed, individuals were recorded as dabblers or divers.

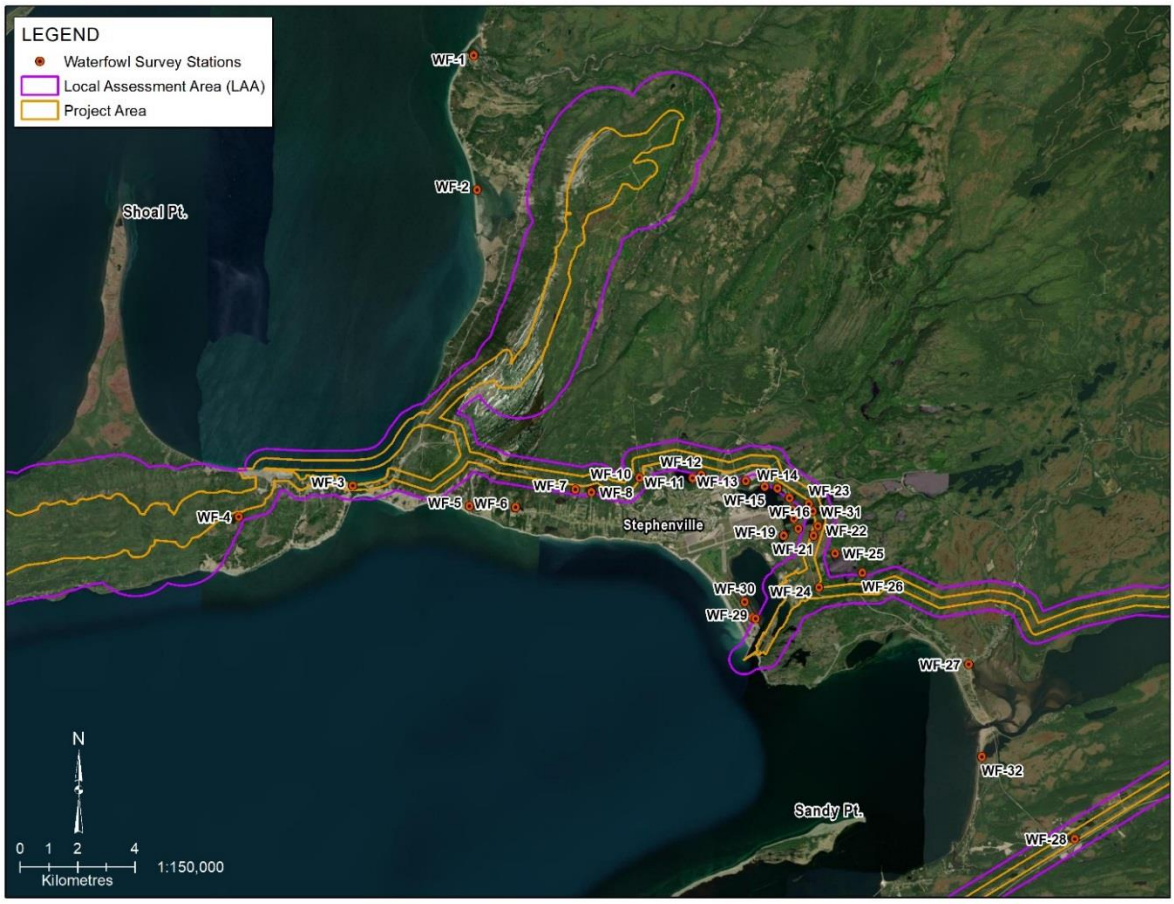

Figure 2.11. Locations of ponds surveyed during the waterfowl surveys in spring, fall, and winter.

Data Analysis

For this Interim Data Report, the numbers of waterfowl were summarized by species and season relative to the Project Area, LAA, and RAA.

2.1.3.6 Landbird Migration: Spring and Fall

Surveys for landbird migration in spring and fall were conducted based on the bird movement survey protocol (CWS 2022). Survey stations (n=18) were selected based on accessibility, the presence of geographic features that concentrate landbird movements (i.e., coastlines, ridges, headlands, the isthmus of the peninsula) to enable survey effort to be concentrated, and the ability to provide good vantage points (Figure 2.12). Each survey station had at least 270° range of visibility. Observers equipped with 8X or 10X binoculars and a 15-45X spotting scope conducted at least one 30-min observation period per viewing location. All surveys were carried out by a team of at least two qualified personnel, with one dedicated observer and one recorder. For each bird (or flock), observers recorded the species, number of individuals, distance, and bearing to the original point of detection (within a 500 m radius of the observer), and estimated height above ground. Any birds identified beyond 500 m were recorded separately with distances, heights, and bearings. Observers recorded the flight direction/heading of any raptors observed throughout the survey. Count station coordinates, elevations, and dates and start and end times of surveys are provided in appendix Table A-7. Out of 159 surveys, 81 (51%) were conducted in the afternoon to capture raptor migration.

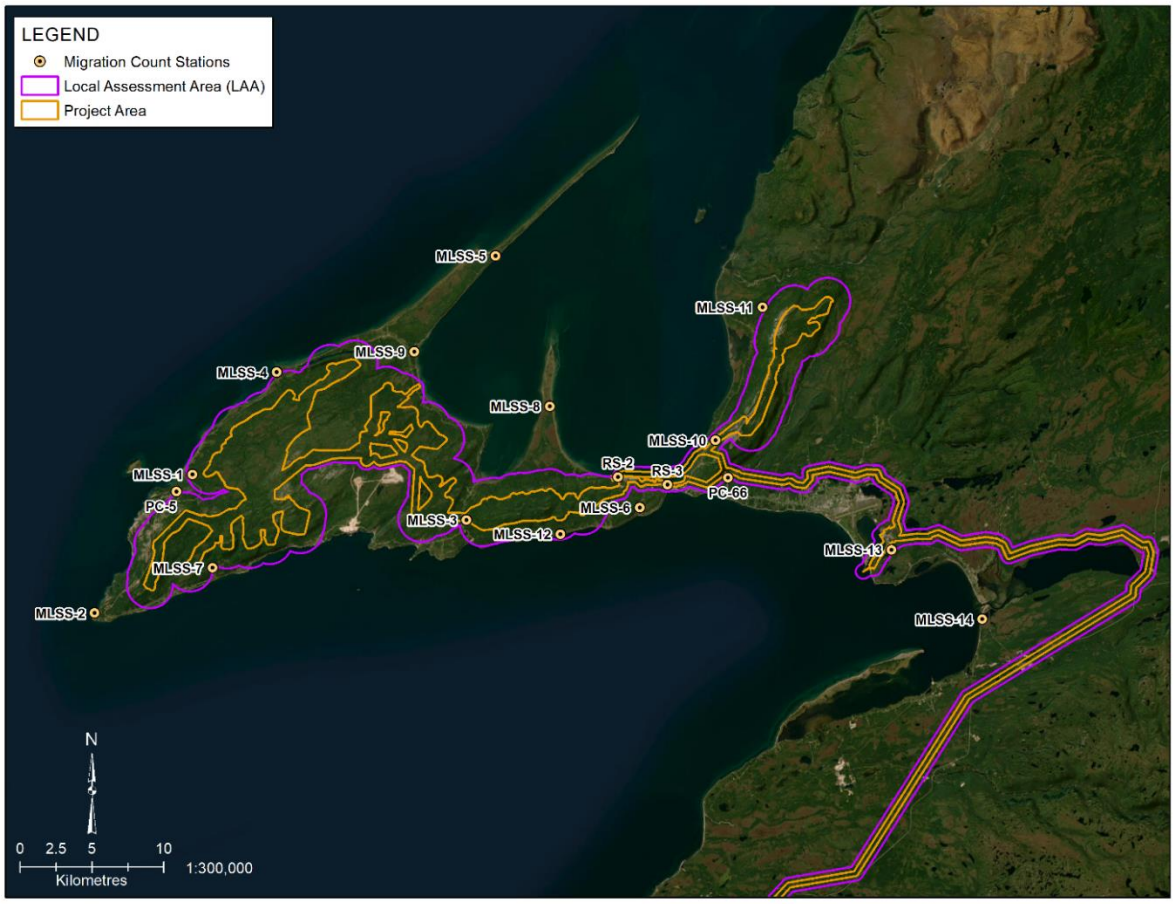

Figure 2.12. Locations of Landbird Migration count stations.

Data Analysis

For this Interim Data Report, the numbers of raptors were summarized by species and season relative to the Project Area, LAA, and RAA. The minimum, maximum, and average flight altitudes for each raptor species recorded in the RAA were summarized.

2.1.4 Aerial Surveys

Aerial surveys were used to document the distribution and abundance of waterbirds (i.e., sea ducks including Harlequin Duck, loons, grebes, Purple Sandpiper) in nearshore marine waters of the LAA.

2.1.4.1 Coastal Waterbird Aerial Survey: Winter

Winter coastal waterbird aerial surveys were flown with a team of three biologists experienced in bird identification and trained using the U. S. Fish and Wildlife Aerial Waterfowl Survey Training (USFWS 2014). Two of the biologists had previous experience conducting aerial waterfowl, seabird, and raptor surveys. The survey route extended along the west coast of the Island of Newfoundland from the mouth of Little Codroy River to Broad Cove just north of Fox Island River (nominal 408 km) (Figure 2.13). The survey route also included nearshore islands present along the survey route.

The survey was conducted using a Bell 206L Long Ranger helicopter. The observer in the front seat entered all observations (to the extent possible—see below) into the ArcGIS Field Maps while two observers in the rear seats observed birds from the right and left side of the helicopter. The helicopter was equipped with large bubble windows so that the observers could see directly below and had a full 180-degree panoramic view. Both observers had 8x42 binoculars and one observer had a DSLR camera equipped with a 300 mm lens with circular polarizing filter to take photographs, when possible, to help with identification/estimating numbers of birds post survey.

Surveys were flown on 7 February and 14 March 2023, starting at approximately 10:00 h at the southern end of the route and finishing approximately 4 hours later at the northern end of the route; with a 30-min refueling stop in Stephenville. Surveys were flown at an altitude of 80 m and a ground speed of 120 km/h. The survey route was flown at a nominal 250 m from the coast. Transect strip width was 500 m (250 m on either side of the helicopter) (USFWS 2014). The shoreline route surveyed on 7 February and 14 March 2023 was 408 km and 325 km, respectively.

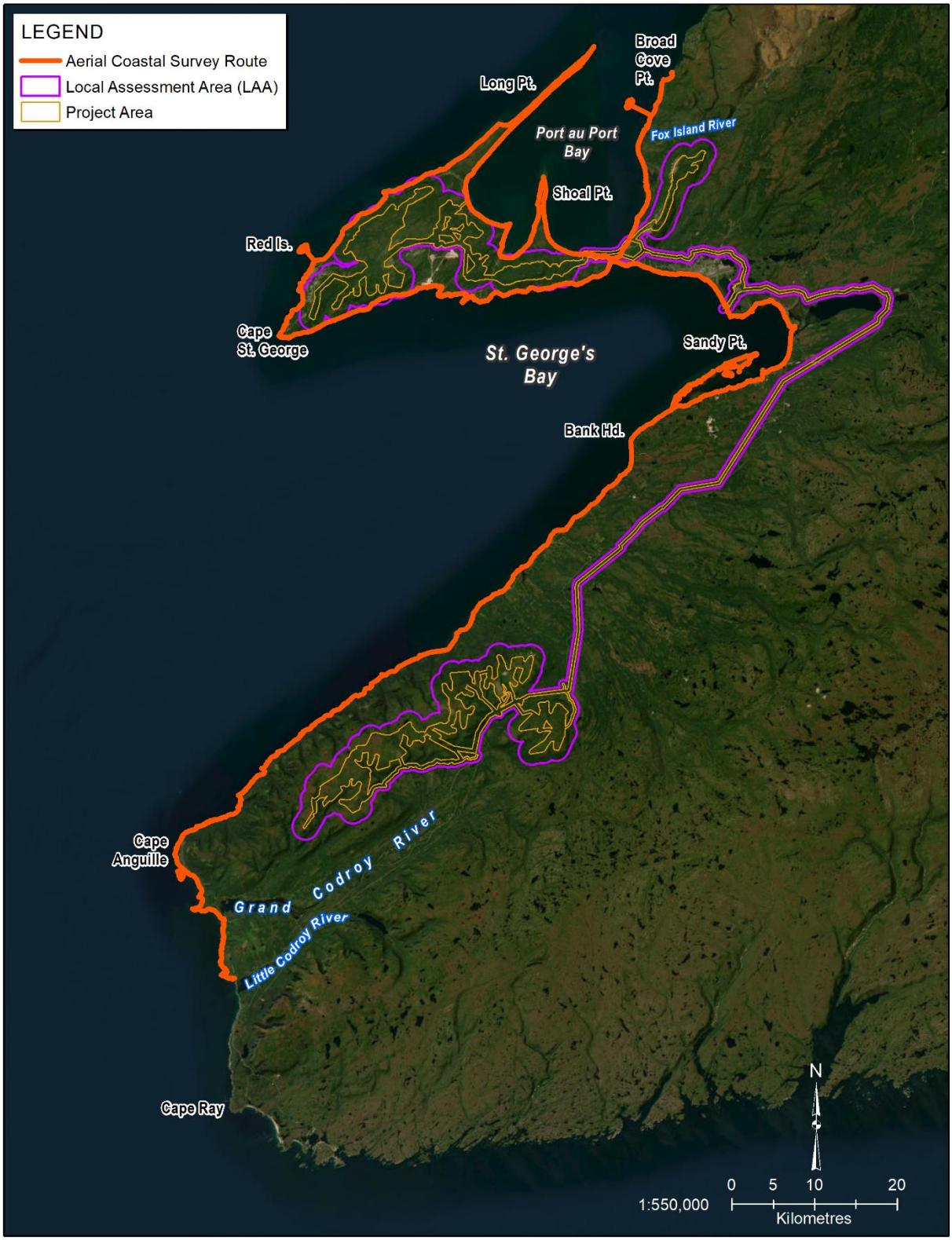

Figure 2.13. Coastal Waterbird aerial survey route flown in February and March 2023.

During the surveys, each observer called out the species and number of birds observed on transect as they were encountered. They also indicated if the bird was flying or sitting on the water. Immediately after calling out sighting details the observer recorded this information along with the time of the observation onto a dictaphone. The front seat observer entered the data onto an iPad equipped with a custom application designed for recording seabirds and waterfowl during aerial surveys. In instances where the front seat observer was unable to accurately record frequent bird records coming from the rear seat observers, the dictaphone audio recordings were used to later fill in the missing bird records using the time stamp to establish where the missing bird records were situated along the route. The front seat observer recorded initial wind speed, cloud cover, sky condition, glare, and glare percent, and when conditions changed.

Data Analysis

For this Interim Data Report, the numbers and uncorrected (for detection and availability biases) densities of Waterfowl and Colonial Waterbirds were summarized by species and month.

2.1.4.2 Harlequin Duck / Purple Sandpiper Aerial Survey: Winter

The winter Harlequin Duck/Purple Sandpiper aerial surveys were conducted along the same route as the coastal waterbird aerial surveys (see Figure 2.13). The same equipment and general methods were used; however, the flight parameters for the survey were altered to increase the probability of observing Harlequin Ducks and Purple Sandpipers. Both species tend to be difficult to see from high altitudes, as they can spend much of their time on or near rocks and are often reluctant to flush. For this reason, the survey was flown at an altitude of 30 m and at a ground speed of between 80 and 100 km/h (Gutowsky et al. 2019). The helicopter was flown parallel to the coast approximately 100 m from the shore. Birds were also counted on both sides of the aircraft. Birds beyond 100 m were recorded as off-transect. All species, numbers, whether flying or on the water, side of the aircraft, time and coordinates were recorded. The winter Harlequin Duck/Purple Sandpiper aerial surveys were flown on 8 February and 14 March 2023, starting at the north end of the coastal transect. The 8 February survey (408 km) was flown the day after the winter coastal waterbird survey. The 14 March survey was flown immediately after completing the winter coastal waterbird aerial survey due to impending poor flying weather that was forecast to last several days. Federal regulations limit the number of pilot flying hours to eight hours per day, so it was not possible to complete both the winter coastal waterbird survey and the winter Harlequin Duck/Purple Sandpiper aerial surveys on the same day. As such, only the portion (114 km) of the winter Harlequin Duck/Purple Sandpiper aerial survey extending from Broad Cove to Stephenville was completed. This represents approximately 60% of the entire route.

Data Analysis

For this Interim Data Report, the numbers and uncorrected densities of Purple Sandpiper and Harlequin Duck were summarized by species and month.

2.1.5 Non-breeding Shorebird Surveys

Non-breeding shorebird surveys are primarily conducted to document diversity and abundance of shorebirds at migratory stopover locations (CWS 2022).

2.1.5.1 Spring and Fall Shorebirds

Shorebird surveys were designed and conducted based on guidance from CWS (2022), the Atlantic Canada Shorebird Survey (ECCC 2017), and the Program for Regional and International Shorebird Monitoring (PRISM 2018). Surveys were conducted to capture spring (16 days surveyed from 2 May to 26 June) and fall migration (23 days surveyed from 9 August to 17 October) periods (Table 2.9). Surveys at individual sites were conducted at intervals of 7 to 10 days and were conducted within 2 hours before or after the highest tide and when lighting conditions supported a valid survey effort.

The surveyed sites were largely homogeneous (e.g., beach vs. tidal pond vs. meadow), and were small enough to be thoroughly surveyed within at most 2-3 hours. Observers used one or more positions to survey a site, depending upon landscape features and whether their movements would flush shorebirds. Survey sites were selected to recognize a maximum observable distance of 300 m to 500 m. All surveys were completed with a team of at least 2 qualified personnel, with one dedicated observer and one recorder, using 8X or 10X binoculars and a 15-45X spotting scope. The observers searched as much of the sampling site as possible and limited disturbance to birds that were present. The objective of the surveys was to document all species and individuals present, so there was no maximum survey duration. Shorebirds observed flying during the survey were noted, along with their flight headings and estimated heights above ground level, as incidental observations, but were not included in the overall count for the site. Where possible, observations were categorized into age and sex classes. In cases where not all individuals could be identified (e.g., a tightly packed mass of roosting birds), a subsample of the flock was selected to count individuals of each species and these numbers were extrapolated to the total group. If viewing conditions were inadequate to identify birds to species (e.g., distance or poor lighting), individuals were assigned to groups, e.g., large plovers (Black-bellied or American Golden-Plover), small plovers (small *Charadrius* species), yellowlegs (Greater or Lesser), peeps (Baird's, Least, Semipalmated, or White-rumped Sandpiper), dowitchers (Long-billed or Short-billed), or phalaropes (Red, Red-necked, or Wilson's).

At each survey site, the UTM coordinates of the observer's location, the start and end times of the survey, tide height at the start of the survey, and weather conditions (temperature, wind speed, percent cloud cover, precipitation) were recorded. Any factors that may have influenced the survey results (e.g., people, dogs, vehicles, or predators active within or adjacent to the sampling site) were noted. If the surveyors moved throughout the site, estimates of distance travelled and any significant changes to the field of view were noted.

Table 2.9. Locations and dates of Spring and Fall Shorebird Survey stations.

Within/ Beyond 500 m of LAA	Location	Station ID	Distance (m) to LAA	Distance (m) to PA	Season	Date (2023)
Beyond	Stephenville Crossing Estuary	SS-3	1,281	3,245	Spring	2, 8, 16, 23, 30 May
					Fall	12, 21 Aug, 3, 18, 27 Sep, 15 Oct
	Shoal Point	SS-4	7,856	9,576	Spring	3, 9, 16, 21 May, 1, 6 Jun
					Fall	11, 22 Aug, 5, 16, 28 Sep, 12 Oct
	Two Guts Pond/Point au Mal	SS-13	1,073	3,071	Spring	4, 10, 16, 23, 31 May
					Fall	11, 23 Aug, 6, 15, 28 Sep, 17 Oct
	Black Banks Beach	SS-12	1,893	3,894	Spring	2, 8, 16, 23, 30 May
					Fall	10, 21 Aug, 6 Sep
	Black Duck Brook beach	SS-5	8,668	10,307	Spring	4, 9, 17, 24, 31 May
					Fall	23 Aug, 2, 15, 29 Sep
	Blue Beach	SS-6	14,465	16,465	Spring	4, 9, 17, 24 May, 1 Jun
					Fall	9, 23 Aug, 6, 15, 29 Sep
Within	Three Rock Cove	SS-7	39	1,510	Spring	3, 9, 17, 25, 31 May
					Fall	22 Aug, 2, 16 Sep
	Piccadilly Beach	SS-1	0	1,303	Spring	3, 9, 17, 24, 30 May
					Fall	10, 22 Aug, 2, 15, 28 Sep, 12 Oct
	The Gravels	SS-2	0	202	Spring	5, 8, 17, 24, 31 May
					Fall	9, 23 Aug, 6, 15, 28 Sep, 13 Oct
	North Indian Head beach	SS-11	337	2,339	Spring	2, 8, 16, 23, 31 May
					Fall	9, 21 Aug, 3, 18 Sep, 14 Oct
	South Indian Head beach	SS-10	0	417	Spring	2, 8, 16, 23, 31 May
					Fall	9 Aug
	Port Harmon	SS-9	0	4,734	Spring	5, 11, 16, 23, 31 May
					Fall	9, 21 Aug, 3, 27 Sep
	Turf Point causeway	SS-8	228	2,229	Spring	2, 8, 16, 23, 30 May
					Fall	10, 18 Aug, 27 Sep, 15 Oct

Survey Sites

A total of 13 sites were selected based on known occurrences of shorebirds, geography, and accessibility (Figure 2.14). Seven sites were located within 500 m of the LAA and six sites are more than 500 m outside of the LAA.

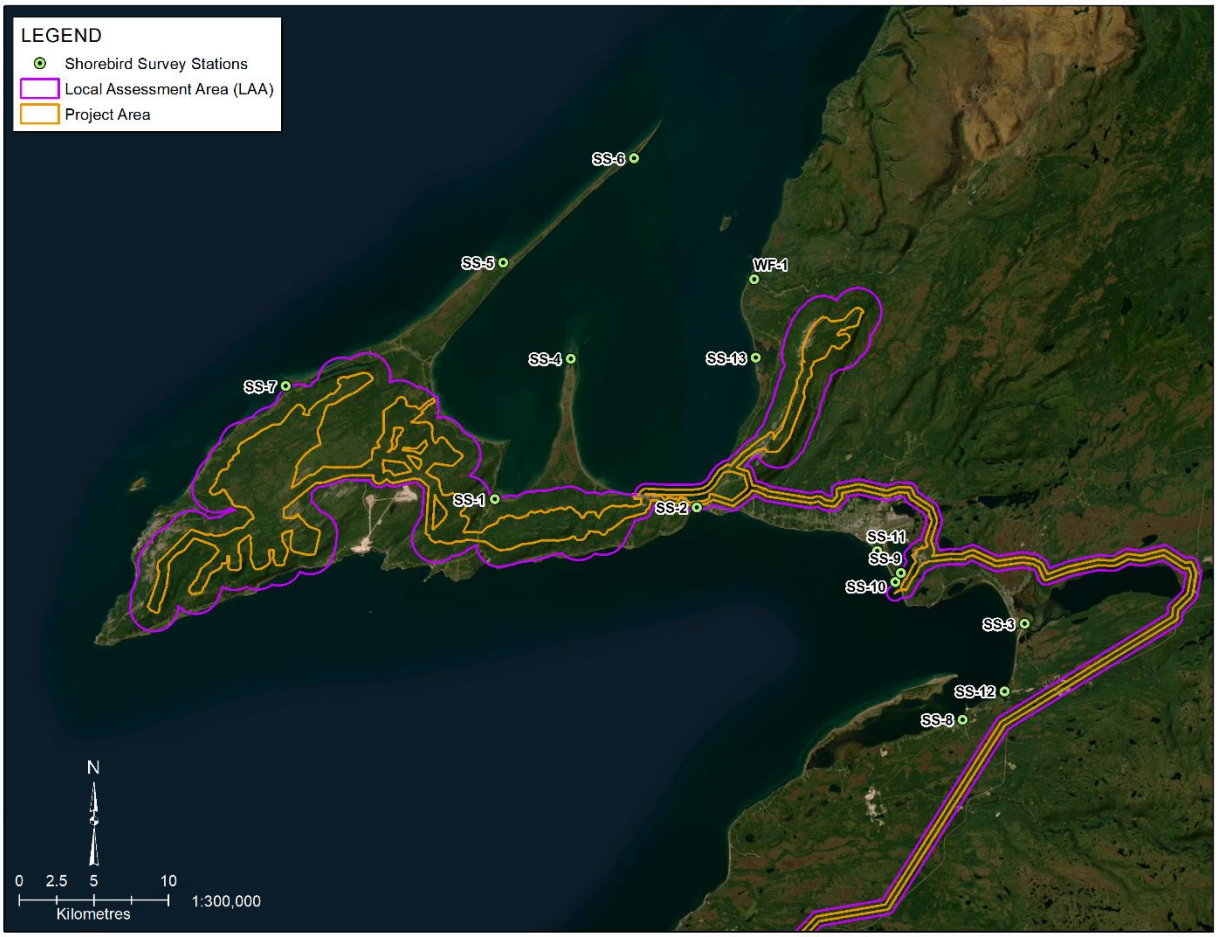

Figure 2.14. Locations of spring and fall shorebird survey sites.

Data Analysis

For this Interim Data Report, the numbers of shorebirds were summarized by species and season relative to the LAA and RAA.

2.1.6 Incidental Bird Sightings

Incidental sightings of birds and observations of nests made while field teams were conducting other field studies were recorded with coordinates, dates/time, surveyors, and habitat in some cases.

2.2 Field Surveys for Bats

ARUs were used as the primary means to survey for the presence of bats in the Project Area and LAA. There were some limited searches for bat roosting habitat by biologists during other fieldwork.

2.2.1 ARU Deployments

In 2023, 22 bat or ultrasonic ARUs were deployed at sites throughout the Port au Port Peninsula and Stephenville area to assess the baseline species and species counts of bats within the Project Area, LAA, and outside of the LAA (Figure 2.15). Sites were selected to represent a variety of habitat types (i.e., wetland, watercourses/waterbodies, mature forest, scrub, barrens, and cave). The Wildlife Acoustics Song Meter SM4BAT automated 16-bit full-spectrum ARUs were deployed. The bat detectors were installed with the microphones positioned at a height of approximately 1-2 m when placed at ground level, and three ARUs were deployed on MET towers within the Project Area and LAA. Five ARUs were deployed outside of the LAA; these locations are intended to serve as control or reference sites. During deployment, photographs were taken of each site to document habitat setting.

Each ARU was programmed (see settings in Table 2.10) to record ultrasonic calls starting at half an hour before sunset to half an hour after sunrise. Acoustic monitoring was undertaken from 5 June to 26 November 2023. Not all sites had continuous monitoring from June through November, and further data review will confirm the extent of coverage across the sites in the Final Data Report.

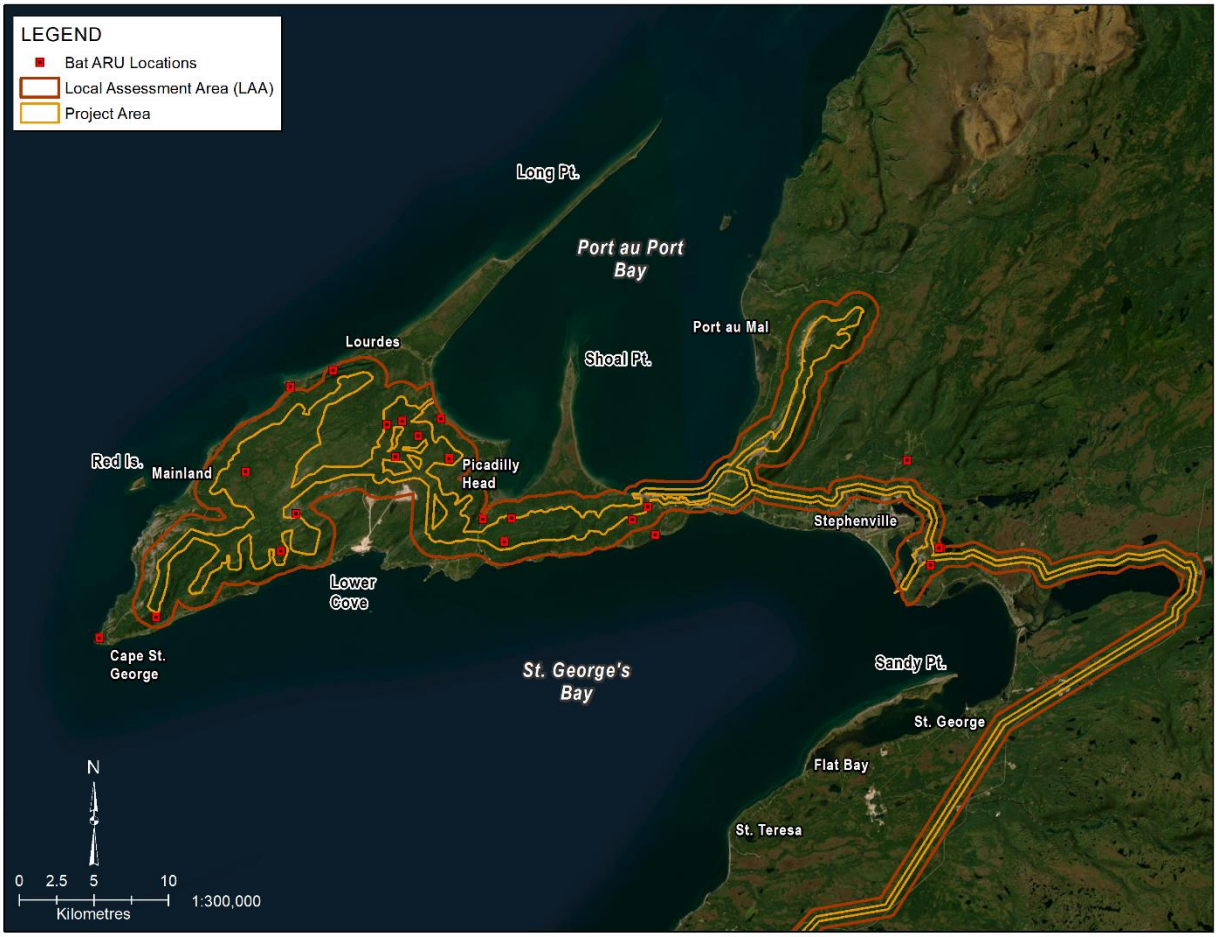

Figure 2.15. Locations of bat ARUs deployed during 2023.

Table 2.10. Wildlife Acoustics SM4 Detector Settings used in 2023.

Parameter	Setting
Recording Format	Full-Spectrum
Sample Rate	256 kHz
Minimum Trigger Frequency	12 kHz
Maximum Recording Length	15 seconds
Trigger Window	3 seconds
Save Noise	No
Left Channel Gain	12 dB

2.2.2 Data Analysis

Potential bat species were determined using the automated classification software Kaleidoscope Pro v5.6.1 (Wildlife Acoustics, Inc.). The software uses classifiers developed from libraries of

species-verified recordings to generate complex algorithms used in the automated identification process. Classifiers for the three resident bat species found in Newfoundland plus two additional species considered present were used in the automated classification process. The species classifiers (Bats of North America v5.2.1) used included:

- Little Brown Myotis (MYOLUC)
- Northern Myotis (MYOSEP)
- Hoary Bat (LASCIN)
- Eastern Red Bat (LASBOR)
- Silver-haired Bat (LASNOC)

The neutral sensitivity setting was used in Kaleidoscope Pro to classify bat calls to species level. During processing, the software picks up signals created by background noise such as rain or wind and labels them as 'noise'. These noise files were screened out and excluded from analysis. Only files containing bat call characteristics were retained for classification analysis (noise files were scrubbed and not carried forward). The software outputs the classification results in a ".csv" file which was then imported into Excel and RStudio to visualize the results.

Environmental (e.g., rain, wind, surface echoes, temperature changes, etc.) and biological (e.g., number of bats present, distance of bats, etc.) factors can affect the recording quality of bats obtained by the bat detectors. In addition, the acoustic signatures of many bat species overlap in their frequency ranges (Szewczak et al. 2011), making it difficult to confidently identify the species for every bat call recorded. As a result, in post-processing vetting of auto-classified calls, recordings may be grouped or refined.

Data analysis will include the following manual vetting of auto-classified calls through the review of sonograms in Kaleidoscope:

- Manual inspection of auto-classified calls to review accuracy and identifications, where possible.
- Confirmation of all or a sub-set of Myotis auto-classified calls. Where Myotis species are confirmed, these may be lumped together as High Frequency bat group; and,
- Random sub-sample of all other auto-classified species results to screen for potential misidentifications.

3.0 Results

3.1 Field Surveys for Avifauna

Various Stationary, Area Search, Targeted Terrestrial, Aerial Surveys, and Non-breeding Shorebird surveys were completed throughout 2023 with focus on the Port au Port Peninsula and LAA.

3.1.1 Stationary Surveys

Five types of Stationary Surveys were completed in spring and summer 2023. Preliminary results are provided below with the exception of breeding bird point counts.

3.1.1.1 Breeding Bird Surveys Using ARUs

Automated Recognizers

Three of the six target SAR were detected on the ARU recordings, either by automated recognizers or incidental observation: Bank Swallow, Olive-sided Flycatcher, and Rusty Blackbird (Table 3.1). The other three species (Common Nighthawk, Gray-cheeked Thrush, and Red Crossbill) were not detected, nor were other avian SAR not specifically targeted by our analyses (e.g., Short-eared Owl *Asio flammeus*). Common Nighthawk was targeted by recognizers, whereas Gray-cheeked Thrush and Red Crossbill were only searched for incidentally.

Table 3.1. Detections of Species at Risk targeted by automated recognizers.

Species	Total Number of ARUs with Detections	Detection Method		Detection Dates (2023)
		Automated Recognizer	Incidental Observation	
Bank Swallow	1	0	1	June 26-30
Common Nighthawk	0	0	0	N/A
Gray-cheeked Thrush	0	N/A*	0	N/A
Olive-sided Flycatcher	16	15	1	June 12-July 17
Red Crossbill	0	N/A*	0	N/A
Rusty Blackbird	1	1	0	June 24

Note: * Recognizer program not run for this species.
The total number of ARUs with detections is listed by species and detection method (recognizer or incidental).

The most-detected SAR at the ARU locations was Olive-sided Flycatcher: it was located on 16 ARUs, on dates between June 12 to July 17 (Table 3.2). Overall, detection rates were low; the species was detected on 10 days at one site (SMM10286), but on only one or two dates at the remaining sites. Rusty Blackbird was detected at one location (SMM10228) on June 24, and Bank Swallow was detected on June 26 and June 30 at the known roost site (SMM10697) (Table 3.2).

Table 3.2. Detection days of Species at Risk by ARU location in 2023.

ARU ID	Deployment Start Date	Deployment End Date	Number of Detection Days		
			Bank Swallow	Olive-sided Flycatcher	Rusty Blackbird
SMM10213	Jun 10	Jun 28	-	1	-
SMM10219	Jun 12	Jul 9	-	1	-
SMM10220	Jun 12	Jun 25	-	1	-
SMM10221	Jun 12	Jun 25	-	2	-
SMM10226	Jun 9	Jun 25	-	2	-
SMM10228	Jun 14	Jul 8	-	-	1
SMM10232	Jun 9	Jun 25	-	1	-
SMM10235	Jun 12	Jun 25	-	1	-
SMM10239	Jun 11	Jul 8	-	1	-

ARU ID	Deployment Start Date	Deployment End Date	Number of Detection Days		
			Bank Swallow	Olive-sided Flycatcher	Rusty Blackbird
SMM10240	Jun 14	Jul 8	-	1	-
SMM10250	Jun 11	Jun 23	-	1	-
SMM10270	Jun 11	Jun 23	-	1	-
SMM10286	Jun 11	Jun 28	-	10	-
SMM10667	Jun 24	Jul 14	-	2	-
SMM10684	Jun 8	Jun 28	-	1	-
SMM10687	Jun 24	Jul 31	-	1	-
SMM10694	Jun 20	Jul 31	-	1	-
SMM10697	June 24	Jul 8	1	-	-

Note: Only ARUs with confirmed SAR are listed; (-) indicates zero detections.

3.1.1.2 Breeding Bird Point Counts

Results will be provided in the Final Data Report.

3.1.1.3 Marshbirds: Breeding

Breeding Marshbirds were detected in the Project Area, LAA, and RAA, which had 3, 7, and 19 survey sites, respectively. Species were categorized as Primary Species, Secondary Species, and Other Species.

Primary Species

Of the five Primary Species (American Bittern, Sora, Willet, Pied-billed Grebe, and American Coot) targeted in the breeding Marshbird surveys, only Willets were detected. There were 46 sightings totalling 99 Willets at two survey sites (MMP-10, Turf Point Causeway and MMP-12, Stephenville Crossing Estuary; see Figure 2.3); both sites were located outside of the LAA. Primary Marshbird Species were not recorded at 17 of the 19 survey sites in June and July 2023.

At the Turf Point Causeway site, of the 18 Willet sightings (20 individuals in total) all but one sighting was considered Probable Breeders based on agitated behaviour and/or alarm calls by adult birds. At the Stephenville Crossing Estuary site, all 28 Willet sightings (79 individuals in total) were considered Probable Breeders based on agitated behaviour and/or alarm calls by adult birds.

Secondary Species

Numerous "Secondary Species" of Marshbirds were recorded in June and July 2023 (Table 3.3). These species are considered important breeding marshbird species in Newfoundland (in addition to the Primary Species). Only Marshbirds detected within 100 m of the observer were recorded as per survey protocol. American Black Duck and American Wigeon were the most common species observed but were not recorded in the Project Area. Species which were notably

absent include Greater Scaup, Least Sandpiper, Northern Pintail, Short-eared Owl, and Northern Harrier.

Table 3.3. Secondary Species of Marshbirds recorded during Marshbird surveys in the Project Area, LAA, and RAA. Surveys were conducted at 19 sites in June and July 2023.

Secondary Species	Project Area		Local Assessment Area		Regional Assessment Area	
	Sightings	Individuals	Sightings	Individuals	Sightings	Individuals
American Black Duck			7	67	23	130
American Wigeon			4	33	24	127
Canada Goose	1	6	1	6	3	8
Common Yellowthroat	1	1	2	2	3	3
Green-winged Teal			1	10	2	12
Mallard			3	11	3	11
Red-winged Blackbird			2	2	4	12
Ring-necked Duck			2	4	3	5
Swamp Sparrow	3	3	5	5	10	11
Wilson's Snipe	1	2	4	9	8	13
Total	**6**	**12**	**31**	**149**	**83**	**332**

Other Species and Nesting Evidence

In addition to the Primary and Secondary Species, other breeding bird species which are known to occur in marsh habitat were recorded (Table 3.4). Rusty Blackbirds, a SAR (Special Concern, SARA; Vulnerable, NL ESA) was recorded in the Project Area (3 sightings, totalling 6 individuals) with one sighting of two birds outside of the LAA. The Rusty Blackbirds in the Project Area were designated as Possible Breeders whereas the sighting outside of the LAA was deemed Probable Breeder. Bank Swallows (3 sightings, totalling 11 individuals), a SAR, were recorded outside of the LAA.

Of note, a confirmed nesting site was observed for each of a Song Sparrow and Tree Swallow at a Marshbird survey site outside of the LAA.

Table 3.4. Other species of birds associated with marshes recorded during Marshbird surveys in the Project Area, LAA, and RAA. Surveys were conducted at 19 sites in June and July 2023.

Other Species	Project Area		Local Assessment Area		Regional Assessment Area	
	Sightings	Individuals	Sightings	Individuals	Sightings	Individuals
Alder Flycatcher	3	3	4	1	9	10
Bank Swallow *					3	11
Great Blue Heron	1	1	1	1	5	6
Greater Yellow Legs			1	4	2	5
Lincoln's Sparrow	1	1	1	1	2	4
Rusty Blackbird *	3	6	3	6	4	8
Song Sparrow	1	1	1	1	5	5
Spotted Sandpiper					2	2
Tree Swallow	2	2	2	2	7	15
Yellow Warbler	4	4	7	7	13	14
Total	**15**	**18**	**20**	**23**	**52**	**80**

3.1.1.4 Short-eared Owl

Short-eared owls, a SAR, were not detected at any of the three survey sites (Stephenville Airport East, Stephenville Airport West, and Winterhouse on Long Point, Port au Port Peninsula) in either May or July 2023. Survey effort was six 30-min observation periods.

3.1.1.5 Nocturnal Owls

One species of nocturnal owl was detected during the May 2023 roadside surveys—a single detection of Northern Saw-whet Owl at site NOS 2-7 (see Figure 2.4). This site was located in the LAA but outside the Project Area. The background noise level during this survey was categorized as High. During the 30 site surveys for nocturnal owls, noise levels ranged from None (n=7) to Excessive (n=5) with Moderate to High noise levels for 7 and 10 surveys, respectively. One survey did not include a noise level rank.

3.1.2 Area Search

One type of Area Search surveys was completed in 2023—surveys for winter resident Landbirds.

3.1.2.1 Landbirds: Winter Residents

Overall, 15 species of Landbirds totalling 205 individuals were recorded during area search surveys conducted in early December. Of these species, White-winged Crossbill were by far the most numerous with 19 sightings totalling 143 birds (Table 3.5). American Crow, American Goldfinch, and Pine Grosbeak were also frequently recorded.

Table 3.5. Landbird species recorded during area searches in the Project Area, LAA, and RAA. Surveys were conducted at 20 stations in early December 2023.

Landbird Species	Project Area		Local Assessment Area		Regional Assessment Area	
	Sightings	Individuals	Sightings	Individuals	Sightings	Individuals
American Crow	1	2	1	2	9	17
American Goldfinch	3	3	3	3	6	14
American Robin	1	1	1	1	2	2
Boreal Chickadee	1	1	2	2	2	2
Canada Jay	1	2	1	2	1	2
Common Raven					1	1
Common Redpoll					1	1
Dark-eyed Junco	1	2	1	2	1	2
Downy Woodpecker	1	1	1	1	1	1
Golden-crowned Kinglet			1	1	1	1
Hairy Woodpecker					1	1
Pine Grosbeak	5	7	5	7	5	7
Purple Finch	1	2	1	2	1	2
Rock Pigeon					1	9
White-winged Crossbill	10	52	12	72	19	143
Total	**25**	**73**	**29**	**95**	**52**	**205**

Note: data includes birds seen within and beyond the 50 m radius of the observer.

The height above ground level for recorded Landbirds ranged from 1 m to 50 m and averaged 11.7 m.

3.1.3 Targeted Terrestrial Surveys

Six types of Targeted Surveys were completed in spring, summer, fall, and winter 2023. Preliminary results are provided below.

3.1.3.1 Bank Swallows: Breeding

Bank Swallows, a SAR (Threatened, Schedule 1 of SARA), were recorded at all visited sites during the breeding season (Table 3.6). There were no survey sites located in the Project Area or LAA (see Figure 2.6). Banks Swallows were more numerous at Two Guts Pond (BANS-2) followed by Crabbe's River (BANS-9) and McKay's River (BANS-8). Of the 31 sightings of Banks Swallows, 11 and 10 sightings were reported as Confirmed and Possible breeding, respectively. Bank Swallows were seldom observed during the post-breeding season visit in late August.

Overall, 222 burrows were recorded at the 11 surveyed sites with 18 of the burrows categorized as active.

Table 3.6. Bank Swallow sightings and burrows recorded at sites in the RSA in June, July, and August 2023.

Site Location	Bank Swallows		No. of Burrows
	No. of Sightings	No. of Individuals	
BANS-1	2	5	0
BANS-2	3	123	20
BANS-3	3	26	50
BANS-4	3	11	61
BANS-5	2	0	4
BANS-6	4	6	1
BANS-7	3	3	0
BANS-8	3	55	62
BANS-9	3	75	9
BANS-10	3	23	15
BANS-R	2	15	0
Total	**31**	**342**	**222**

3.1.3.2 Gull and Tern Colonies

Overall, there were 35 sightings of terns and gulls totalling 1110 individuals recorded at known gull and tern colonies during June and July (Table 3.7). Arctic and/or Common Terns were recorded at most survey sites with the exception of Black Duck Brook Beach and Piccadilly. Common Terns were more abundant relative to Arctic Terns with total numbers of 236 and 7 individuals, respectively.

Table 3.7. Terns and gulls recorded during summer surveys of known colonies near the LAA.

Species	Blue Beach		Black Duck Brook Beach		Gravels Pond		Point au Mal		Piccadilly		Robinson's River		Stephenville Crossing Estuary		Ship Island		Shoal Point		Total Sightings	Total Indiv.
	Sightings	Indiv.	Sightings	Indiv.	Sightings	Indiv.	Sightings	Indiv.	Sightings	Indiv.	Sightings	Indiv.	Sightings	Indiv.	Sightings	Indiv.	Sightings	Indiv.		
Arctic Tern					2	7													**2**	**7**
Common Tern	1	7			2	45	2	48			2	72	1	27	1	2	2	35	**11**	**236**
Black-legged Kittiw ake					1	1					2	6							**3**	**7**
Bonaparte's Gull											1	1							**1**	**1**
Great Black-backed Gull	1	21	1	25					1	2	2	5			1	16			**6**	**69**
Herring Gull	1	32	1	17	1	2			1	29	2	24			1	116			**7**	**220**
Ring-billed Gull			1	40					1	20	2	60	1	450					**5**	**570**
Total	**3**	**60**	**3**	**82**	**6**	**55**	**2**	**48**	**3**	**51**	**11**	**168**	**2**	**477**	**3**	**134**	**2**	**35**	**35**	**1110**

Five gull species were recorded with Ring-billed Gull (5 sightings, 570 individuals), Herring Gull (7 sightings, 220 individuals), and Great Black-backed Gull (6 sightings, 69 individuals) most abundant (Table 3.7). Robinson's River and Stephenville Crossing Estuary, both located outside of the LAA, had the highest numbers of recorded gulls and terns with Robinson River hosting six of the seven species recorded at all survey sites.

Breeding evidence was Confirmed for all species except Black-legged Kittiwake. One of three Black-legged Kittiwake sightings was categorized as Possible breeding.

3.1.3.3 Seabird Colonies

During the May seabird survey along the 3 km route between Cape St. George and Big Cove, eight seabird species were recorded totalling an estimated 4275 birds. Black-legged Kittiwakes comprised the vast majority of birds with an estimated 4000 individuals recorded, almost entirely on the water (Table 3.8). Almost 3000 Black-legged Kittiwakes were recorded at a single location. A few hundred individual kittiwakes were seen visiting probable nest sites on the cliffs, mostly at the colony just north of the Cape (Stop #1,), near the pond (Stop #2,), and in Big Cove (Stop #3; see Figure 2.8).

The only species with confirmed nesting sites was Great Cormorants (five birds at Cape St. George). No other occupied nest sites were observed along the cliffs between the Cape and Big Cove.

Table 3.8. Estimated number of seabirds recorded during the seabird survey on 1 May 2023.

Seabird Species	Estimated Number of Individuals
Great Cormorant	20
Northern Gannet	1
Black Guillemot	70
Razorbill	30
Herring Gull	150
Great Black-backed Gull	3
Iceland Gull	1
Black-legged Kittiwake	4000
Total	4275

3.1.3.4 Coastal Waterbirds: Fall and Winter

Surveys for coastal Waterbirds, i.e., Waterfowl and Colonial Waterbirds, were conducted in late winter, fall, and early winter 2023.

Waterfowl

Overall, there were 219 sightings totalling 1315 waterfowl recorded during Coastal Waterbird surveys conducted in fall, late winter and early winter (Table 3.9). During late winter (March)

surveys, 8 species were recorded with Red-breasted Merganser (126 individuals) and Common Eider (35 individuals) representing ~67% of waterfowl recorded during that period. During fall (August, September, and October) surveys, 14 species were recorded with Common Eider (217 individuals), Common Loon (94 individuals), and Canada Goose (81 individuals) representing ~74 % of waterfowl recorded. In early winter (December), of the 14 species recorded, Red-breasted Merganser (280 individuals) and Common Eider (84 individuals) accounted for two-thirds of the waterfowl.

Harlequin Duck, a SAR (Special Concern, SARA Schedule 1) was recorded in December (1 sighting of 4 individuals) and March (1 sighting of 15 individuals).

Table 3.9. Waterfowl recorded during Coastal Waterbird surveys in the LAA and RAA during fall, late winter and early winter. Surveys were conducted at 16 sites.

Species	Season	Local Assessment Area		Regional Assessment Area	
		Sightings	Individuals	Sightings	Individuals
American Black Duck	Late Winter	1	25	1	25
Common Eider	Late Winter	1	22	2	35
Common Goldeneye	Late Winter	2	3	3	5
Common Loon	Late Winter	1	1	1	1
Harlequin Duck*	Late Winter			1	15
Long-Tailed Duck	Late Winter	6	24	6	24
Mallard	Late Winter	1	4	1	4
Red-breasted Merganser	Late Winter	20	121	23	126
Sea duck spp.	Late Winter	1	7	1	7
Subtotal (Late Winter)		***33***	***207***	***39***	***242***
American Black Duck	Fall	5	9	5	9
Black Scoter	Fall			1	1
Canada Goose	Fall	2	14	4	81
Common Eider	Fall	1	1	24	217
Common Goldeneye	Fall			1	3
Common Loon	Fall	19	43	55	94
Common Merganser	Fall			1	4
Greater Scaup	Fall	1	4	1	4
Hooded Merganser	Fall			2	9
Mallard	Fall	2	3	2	3
Red-breasted Merganser	Fall	1	1	5	23
Red-throated Loon	Fall			2	3
Surf Scoter	Fall	1	1	5	13
Scoter spp.	Fall			1	28
White-winged Scoter	Fall	13	22	19	36
Subtotal (Fall)		***45***	***98***	***128***	***528***
American Black Duck	Early Winter	1	16	2	32
Black Scoter	Early Winter			1	1
Bufflehead	Early Winter	1	8	1	8
Common Eider	Early Winter	3	7	8	84
Common Goldeneye	Early Winter	1	11	3	17
Common Loon	Early Winter	2	7	6	11
Harlequin Duck *	Early Winter			1	4
Long-tailed Duck	Early Winter			3	4
Mallard	Early Winter	1	4	1	4
Red-breasted Merganser	Early Winter	7	242	17	280
Red-necked Grebe	Early Winter	1	1	1	1
Red-throated Loon	Early Winter	1	1	1	1

Species	Season	Local Assessment Area		Regional Assessment Area	
		Sightings	Individuals	Sightings	Individuals
Surf Scoter	Early Winter			1	1
Duck spp.	Early Winter	1	75	1	75
Scoter spp.	Early Winter	1	6	2	13
White-winged Scoter	Early Winter	2	2	3	9
Subtotal (Early Winter)		***22***	***380***	***52***	***545***
Grand Total		**100**	**685**	**219**	**1315**

Colonial Waterbirds

Overall, there were 633 sightings totalling 2079 Colonial Waterbirds recorded during Coastal Waterbird surveys conducted in fall, late winter and early winter (Table 3.10). During late winter (March) surveys, six species were recorded with Great Black-backed Gull and Iceland Gull the most numerous. During fall (August, September, and October) surveys, 12 species were recorded with various gull species (Herring Gull, Great Black-backed Gull, Ring-billed Gull, and Black-legged Kittiwake) representing ~63 % of colonial waterbirds recorded. Terns and cormorants were also frequently observed during fall. In early winter (December), of the 9 species recorded, Common Murre (49 individuals) and Black Guillemot (34 individuals) accounted for ~60% of the Colonial Waterbirds.

Table 3.10. Colonial Waterbirds recorded during Coastal Waterbird surveys in the LAA and RAA during fall, late winter and early winter. Surveys were conducted at 16 sites.

Species	Season	Local Assessment Area		Regional Assessment Area	
		Sightings	Individuals	Sightings	Individuals
Black Guillemot	Late Winter	2	2	4	4
Glaucous Gull	Late Winter	2	2	2	2
Great Black-backed Gull	Late Winter	5	6	7	21
Great Cormorant	Late Winter	1	1	2	3
Herring Gull	Late Winter	5	6	5	6
Iceland Gull	Late Winter	4	6	9	24
Gull spp.	Late Winter	1	1	1	1
Subtotal (Late Winter)		***20***	***24***	***30***	***61***
Arctic Tern	Fall			1	1
Black Guillemot	Fall	12	21	14	25
Black-legged Kittiwake	Fall	11	115	25	167
Caspian Tern	Fall	8	26	20	50
Common Tern	Fall	17	111	26	139
Double-crested Cormorant	Fall	16	35	64	278
Great Black-backed Gull	Fall	29	109	84	219
Great Cormorant	Fall	10	32	32	148
Herring Gull	Fall	87	313	206	660
Northern Gannet	Fall	12	13	29	45
Razorbill	Fall	1	1	4	4
Ring-billed Gull	Fall	19	77	48	144
Cormorant spp.	Fall			1	1
Subtotal (Fall)		***222***	***853***	***554***	***1881***
Black Guillemot	Early Winter	8	19	17	34
Black-legged Kittiwake	Early Winter	1	4	1	4
Common Murre	Early Winter	5	20	9	49
Double-crested Cormorant	Early Winter	2	2	2	2

Species	Season	Local Assessment Area		Regional Assessment Area	
		Sightings	Individuals	Sightings	Individuals
Dovekie	Early Winter	2	2	2	2
Great Black-backed Gull	Early Winter	2	2	4	7
Herring Gull	Early Winter	3	16	5	18
Iceland Gull	Early Winter	2	2	7	17
Razorbill	Early Winter	1	2	2	4
Subtotal (Early Winter)		***26***	***69***	***49***	***137***
Grand Total		**268**	**946**	**663**	**2079**

3.1.3.5 Waterfowl – Inland Ponds: Spring, Fall, and Early Winter

Overall, there were 152 sightings totalling 1588 waterfowl recorded during Waterfowl-Inland Ponds surveys conducted in spring, fall, and winter (Table 3.11). During spring surveys, nine species were recorded with American Wigeon, Red-breasted Merganser, Ring-necked Duck, and American Black Duck accounting for ~67% of waterfowl recorded. During fall surveys, 14 species were recorded with American Wigeon, Greater Scaup, and American Black Duck accounting for ~82 % of all waterfowl observed. In early winter (December), of the 11 species recorded, Greater Scaup (319 individuals) and Common Goldeneye (213 individuals) accounted for ~80% of the waterfowl recorded.

Table 3.11. Waterfowl recorded during Inland Ponds surveys in the Project Area, LAA, and RAA during spring, fall, and winter. Surveys were conducted at 31 sites although not all sites were surveyed in each season.

Species	Season	Project Area		Local Assessment Area		Regional Assessment Area	
		Sightings	Individuals	Sightings	Individuals	Sightings	Individuals
American Black Duck	Spring	2	2	5	9	7	13
American Wigeon	Spring	11	22	13	26	12	24
Canada Goose	Spring	1	3	1	3	1	3
Common Goldeneye	Spring					1	2
Greater Scaup	Spring	1	2	1	2	1	2
Mallard	Spring	2	5	2	5	2	5
Red-breasted Merganser	Spring					3	16
Ring-necked Duck	Spring			1	14	1	14
Merganser spp.	Spring			1	1	1	1
Wood Duck	Spring					1	1
Subtotal (Spring)		***17***	***34***	***24***	***60***	***30***	***81***
American Black Duck	Fall	12	63	15	78	23	103
American Wigeon	Fall	15	178	16	180	26	315
Canada Goose	Fall	2	27	2	27	3	32
Common Goldeneye	Fall	1	1	1	1	1	1
Common Loon	Fall	1	1	1	1	8	11
Greater Scaup	Fall	7	274	8	276	9	277
Green-winged Teal	Fall	2	11	2	11	4	15
Hooded Merganser	Fall			1	1	2	3
Lesser Scaup	Fall			1	2	2	3

Species	Season	Project Area		Local Assessment Area		Regional Assessment Area	
		Sightings	Individuals	Sightings	Individuals	Sightings	Individuals
Mallard	Fall	3	18	3	18	3	18
Northern Pintail	Fall	2	4	2	4	2	4
Red-breasted Merganser	Fall					1	13
Ring-necked Duck	Fall	3	20	4	24	4	24
White-winged Scoter	Fall	1	6	1	6	2	8
Duck spp.	Fall					2	17
Subtotal (*Fall*)		***49***	***603***	***57***	***629***	***92***	***844***
American Black Duck	Winter	1	20	1	20	2	23
American Wigeon	Winter	1	3	1	3	1	3
Canada Goose	Winter	1	6	1	6	2	15
Common Goldeneye	Winter					6	213
Common Merganser	Winter					1	7
Eurasian Wigeon	Winter	1	1	1	1	1	1
Greater Scaup	Winter	2	302	2	302	5	319
Hooded Merganser	Winter					1	4
Mallard	Winter	2	14	2	14	2	14
Red-breasted Merganser	Winter	1	4	1	4	8	61
White-winged Scoter	Winter	1	3	1	3	1	3
Subtotal (Winter)		***10***	***353***	***10***	***353***	***30***	***663***
Grand Total		**76**	**990**	**91**	**1042**	**152**	**1588**

3.1.3.6 Landbird Migration: Spring and Fall

Surveys designed to target Landbird Migration were conducted in spring and fall at 18 sites. Only raptors are reported for the Interim Data Report; other bird species will be presented in the Final Data Report.

Raptors

Seven species of raptors were recorded during Landbird Migration surveys on the Port au Port Peninsula (Table 3.12). More raptors were recorded during the fall migration (54 individuals) versus spring migration (24 individuals) period with Merlin, Northern Harrier, and Sharp-shinned Hawk as the most frequently recorded species.

The height raptors were observed flying above ground level ranged from several meters to 300 m (Table 3.12). Merlin and Northern Harrier had the highest maximum flight altitudes at 300 m and 250 m, respectively.

Table 3.12. Raptors recorded during Landbird Migration surveys in the Project Area, LAA, and RAA during spring and fall 2023. Surveys were conducted at 18 sites.

Species (Raptors)	Season	Project Area		Local Assessment Area		Regional Assessment Area				
		Sightings	Individuals	Sightings	Individuals	Sightings	Individuals	Flight Altitude (m)		
								Mean	Min.	Max.
American Goshawk	Spring					1	1	1.0	1	1
Bald Eagle	Spring	1	1	2	2	2	2	45.0	40	50
Merlin	Spring	2	2	2	2	3	3	12.5	5	20
Northern Harrier	Spring			3	3	7	7	50.9	1	250
Osprey	Spring	2	3	2	3	6	9	44.2	10	75
Sharp-shinned Hawk	Spring					1	1	5.0	5	5
Raptor spp.	Spring					1	1	5.0	5	5
Subtotal (Spring)		***5***	***6***	***9***	***10***	***21***	***24***			
American Goshawk	Fall					3	3	12.5	10	15
Bald Eagle	Fall			2	2	2	2	65.0	50	80
Merlin	Fall	2	2	11	13	18	20	45.7	3	300
Northern Harrier	Fall			5	5	10	12	23.5	3	75
Osprey	Fall			1	2	2	3	70.0	70	70
Peregrine Falcon	Fall					1	1			
Sharp-shinned Hawk	Fall	2	2	6	6	10	10	33.3	5	150
Raptor spp.	Fall	2	2	2	2	3	3	100.0	20	250
Subtotal (Fall)		***6***	***6***	***27***	***30***	***49***	***54***			
Grand Total		**11**	**12**	**36**	**40**	**70**	**78**			

3.1.4 Aerial Surveys

Aerial surveys were conducted to document Coastal Waterbird and Purple Sandpiper/Harlequin Duck occurrence in winter along the coast of the RSA (see Figure 2.13 for the survey route).

3.1.4.1 Coastal Waterbird: Winter

For analysis purposes, Coastal Waterbirds were divided into Waterfowl species and Colonial Waterbirds.

Waterfowl

Twelve species of Waterfowl were recorded during winter aerial surveys with overall Waterfowl densities (uncorrected) almost twice as high in March versus February. Of the 12 species, Common Eider was the most abundant species observed in each month with uncorrected densities of 3.70 birds/km^2 and 5.84 birds/km^2 in February and March, respectively. Common Goldeneye, Red-breasted Merganser, and Long-tailed Duck were also relatively common in each survey month. A single Barrow's Goldeneye (Special Concern, SARA) was recorded during the February aerial survey.

Table 3.13. Waterfowl species and uncorrected densities during winter (February, March) aerial surveys.

Waterfowl Species	February		March	
	No. Indiv.	Density	No. Indiv.	Density
American Black Duck	60	0.29	12	0.07
Barrow's Goldeneye *	1	0.005	0	0.00
Black Scoter	8	0.04	33	0.20
Bufflehead	1	0.005	10	0.06
Canada Goose	0	0.00	100	0.62
Common Eider	754	3.70	949	5.84
Common Goldeneye	309	1.51	607	3.74
Common Loon	1	0.005	0	0.00
Red-throated Loon	0	0.00	1	0.01
Long-tailed Duck	366	1.79	314	1.93
Red-breasted Merganser	166	0.81	331	2.04
Unidentified Duck	49	0.24	88	0.54
Unidentified Scoter	1	0.005	0	0.00
White-winged Scoter	110	0.54	16	0.10
Total	**1826**	**8.95**	**2461**	**15.14**

Colonial Waterbirds

Ten species of Colonial Waterbirds were recorded during winter aerial surveys with overall densities (uncorrected) higher in March (4.83 birds/km^2) versus February (3.26 birds/km^2). Of the 10 species, Iceland Gull was the most abundant species observed in each month with uncorrected densities of 1.91 birds/km^2 and 2.00 birds/km^2 in February and March, respectively. Great Black-backed Gull was also relatively common in March.

Table 3.14. Colonial Waterbird species and uncorrected densities during winter (February, March) aerial surveys.

Colonial Waterbird Species	February		March	
	No. Indiv.	Density	No. Indiv.	Density
Black Guillemot	23	0.11	17	0.10
Black-headed Gull	1	0.005	0	0.00
Dovekie	3	0.01	0	0.00
Glaucous Gull	2	0.01	3	0.02
Great Black-backed Gull	14	0.07	263	1.62
Great Cormorant	21	0.10	120	0.74
Herring Gull	96	0.47	56	0.34
Iceland Gull	390	1.91	325	2.00
Razorbill	1	0.005	0	0.00
Larus spp.	114	0.56	0	0.00
Thick-billed Murre	0	0.00	1	0.01
Total	**665**	**3.26**	**785**	**4.83**

3.1.4.2 Harlequin Duck and Purple Sandpiper: Winter

On 8 February, 244 Purple Sandpipers were recorded on transect during aerial surveys along the entire survey route (see Figure 2.13), resulting in a density estimate of 2.99 birds/km^2 (uncorrected for detection and availability biases). A similar density of 2.85 birds/km^2 (uncorrected for detection and availability biases) was estimated based on 65 Purple Sandpipers recorded during the aerial survey of the Port au Port Peninsula coastline on 14 March.

No Harlequin Ducks were detected during aerial surveys in February and March.

3.1.5 Non-breeding Shorebird

3.1.5.1 Shorebirds: Spring and Fall

Overall, there were 242 sightings totalling 1771 shorebirds recorded during spring and fall surveys at 13 sites (Table 3.15). Nineteen species were recorded. During spring surveys conducted on 16 days, the Willet was the most commonly recorded species, representing 42% of the shorebirds. Whereas during fall surveys (on 23 days), Semipalmated Plover (703), Semipalmated Sandpiper (269), and Greater Yellowlegs (265) comprised most shorebirds recorded.

Two sightings (16 individuals) of Red Knot, a SAR (Endangered, SARA Schedule 1) were recorded at the Stephenville Crossing Estuary (Site SS-3) and Shoal Point (Site SS-4; Figure 2.14). Two other SAR, Hudsonian Godwit (Threatened, COSEWIC and NL ESA) and Lesser Yellowlegs (Threatened, COSEWIC and NL ESA) were also recorded in low numbers (Table 3.15).

Table 3.15. Shorebirds recorded during spring and fall surveys at 13 sites.

Species	Season	Local Assessment Area		Regional Assessment Area	
		Sightings	Individuals	Sightings	Individuals
Black-bellied Plover	Spring			3	6
Greater Yellowlegs	Spring	4	5	4	5
Purple Sandpiper	Spring			1	2
Semipalmated Plover	Spring			1	5
Spotted Sandpiper	Spring			5	5
Sandpiper spp.	Spring			1	1
Shorebird spp.	Spring			1	1
Willet	Spring			12	18
Subtotal (Spring)		***4***	***5***	***28***	***43***
American Golden-Plover	Fall	1	9	7	23
Black-bellied Plover	Fall	8	64	22	112
Dunlin	Fall			5	34
Great Blue Heron	Fall	1	3	3	5
Greater Yellowlegs	Fall	26	138	58	265
Hudsonian Godwit *	Fall			1	1
Kildeer	Fall	1	2	1	2
Least Sandpiper	Fall	1	9	5	27
Lesser Yellowlegs *	Fall	6	11	6	11
Red Knot *	Fall			2	16
Ruddy Turnstone	Fall			4	9
Sanderling	Fall	1	1	8	127
Semipalmated Plover	Fall	9	25	41	703
Semipalmated Sandpiper	Fall	8	45	25	269
Short-billed Dowitcher	Fall	1	3	4	10
Spotted Sandpiper	Fall			8	9
Sandpiper spp.	Fall	1	3	5	40
White-rumped Sandpiper	Fall	1	1	6	56
Willet	Fall			3	9
Subtotal (Fall)		***65***	***314***	***214***	***1728***
Grand Total		**69**	**319**	**242**	**1771**

3.2 Field Surveys for Bats

3.2.1 ARU Surveys

A summary of auto-classified acoustic data files is provided in Table 3.16. Files identified as NoID and auto-classified to species will be carried forward for manual vetting. Of the substantial number of files recorded across the 2023 season, a majority (97.55%) were identified as noise files.

Table 3.16. Summary of bat ARU audio files.

Number of Audio Files	Number of Files Identified as Noise	Number of Files Identified as NoID	Eastern Red Bat	Hoary Bat	Silver-haired Bat	Little Brown Myotis	Northern Myotis
162,818	158,834 (97.55%)	1220 (0.75%)	104 (0.06%)	477 (0.29%)	58 (0.04%)	1998 (1.23%)	127 (0.08%)

Manual vetting and grouping of auto-classified files is ongoing at the time of this Interim Data Report. A summary of auto-processing output is provided. The 2023 ARU survey yielded a total of 162,818 audio files for processing from 24 discrete bat locations as shown in Figure 2.15. Of the locations, 21 were stationed at ground level and 3 were stationed in meteorological towers (MET) to achieve a greater height, namely S4U18707, S4U18740 and S4U18752. Five ARUs were stations at ground level outside of the LAA (S4U18539, S4U18619, S4U18709 (2 locations) and S4U18923). One of the locations outside of the LAA was positioned to target the mouth of a cave.

A review of Ecological Land Classification (ELC) communities at each ARU deployment location was undertaken (appendix Table C-1). Provincial Forest Resource Inventory data (which is based on aerial photography at sub-meter resolution) was used to characterize habitat within 50 m of each ARU placement. Habitat for 2023 ARU placement was a mosaic of anthropogenic, agricultural, barren, coniferous scrub, mixedwood, softwood and wetland. Six ARUs were placed in areas of uniform habitat, where a single habitat class comprised 90% of the surrounding 50 m buffer.

4.0 Discussion

To be included in the Final Data Report.

5.0 Recommendations

To be included in the Final Data Report.

6.0 References

ABMI (Alberta Biodiversity Monitoring Institute). 2019. WildTrax Acoustic Transcription User Guide, Version 2.0. University of Alberta. 43 p.

Baerwald, E.F., G.H. D'Amours, B.J. Klug, and R.M. Barclay. 2008. Barotrauma is a significant cause of bat fatalities at wind turbines. Curr. Biol. 18(16): R695-R696.

Bibby, C.J., N.D. Burgess, D.A. Hill, and S. Mustoe. 2000. Bird Census Techniques 2nd ed. Academic Press, London, U.K.

Bioacoustic Unit. 2020. Single-species Songscope Recognizers. Available at: http://bioacoustic.abmi.ca/wp-content/uploads/2020/02/SSR_Package_2020.pdf.

BirdLife International. 2023. Protecting the most important habitats for birds. Available at: https://www.birdlife.org/projects/ibas-mapping-most-important-places/.

Birds Canada. 2020. Newfoundland and Labrador Nocturnal Owl Survey: Guide for Volunteers. 13 p. Available at: https://www.birdscanada.org/atlantic_owls.

Birds Canada. 2021. British Columbia Coastal Waterbird Survey Protocol.

Birds Canada. 2022. Maritimes Marsh Monitoring Program Survey Protocols. Available at: https://birdscanada.org/wp-content/uploads/2022/05/MMMP-Survey-Protocols_2022.pdf.

Brownlee, S.A., and H.P. Whidden. 2011. Additional evidence for barotrauma as a cause of bat mortality at wind farms. J. Pa. Acad. Sci., 85(4): 147-150.

Castro, I., A. De Rosa, N. Priyadarshani, L. Bradbury, and S. Marsland. 2019. Experimental test of bird call detection by autonomous recorder units and by human observers using broadcast. Ecol. Evol. 9:2376–2397.

COSEWIC. 2023. Seeing conservation solutions for unseen species. Press release – May 2023. Available at: https://www.cosewic.ca/index.php/en-ca/news-and-events/press-release-may-2023.html.

CWS (Canadian Wildlife Service). 2022. Guidance Regarding Information Needed to Support Assessment of Project Effects on Birds. Environment and Climate Change Canada [draft]. Environment and Climate Change Canada, Gatineau, Quebec. 79 p.

EC (Environment Canada). 2012. Recovery Strategy for the Piping Plover (*Charadrius melodus melodus*) in Canada. Species at Risk Act Recovery Strategy Series. Environment Canada, Ottawa. V + 29 p.

ECCC. 2017. Atlantic Canada Shorebird Survey [web page]. Environment and Climate Change Canada. Available at: https://www.canada.ca/en/environment-climate-change/services/bird-surveys/shorebird/atlantic.html.

Gutowsky, S.E., R.A. Ronconi, L.F.G. Gutowsky, M.F. Elderkin, J. Paquet, P.M. Mills, and M.L. Mallory. 2019. Winter habitat associations of purple sandpiper (*Calidris maritima*) and harlequin duck (*Histrionicus histrionicus*) in Atlantic Canada. Estuar. Coast. Shelf Sci. 222: 214-225.

Legendre P. and L. Legendre. 2012. Numerical Ecology, 3rd edition. Elsevier, Amsterdam.

NLBBA (Newfoundland Breeding Bird Atlas). 2023. Newfoundland Breeding Bird Atlas: General Atlassing Instructions and Forms. Available at: https://nf.birdatlas.ca/instructions-and-forms/.

PRISM (Program for Regional and International Shorebird Monitoring). 2018. Standards for Monitoring Nonbreeding Shorebirds in the Western Hemisphere. Unpublished report. 33 p. Available at: https://www.shorebirdplan.org/science/program-for-regional-andinternational-shorebird-monitoring/.

R Core Team. 2023. R: A language and environment for statistical computing. Version 4.3.2. R Foundation for Statistical Computing, Vienna, Austria. Available at: https://www.R-project.org/.

Shonfield, J. and E.M. Bayne. 2017. Autonomous recording units in avian ecological research: current use and future applications. Avian Conserv. Ecol. 12(1):14. Available at: https://doi.org/10.5751/ACE-00974-120114.

SK Ministry of Environment. 2015. Species Detection Survey Protocols – Short-eared Owl Surveys. Saskatchewan Ministry of the Environment, Fish and Wildlife Branch Technical Report No. 2015-6.0. 8 p.

Stantec. 2023. Project Nujio'qonik: Environmental Impact Statement. Report for World Energy GH2.

Szewczak, J.M., A.J. Corcoran, J.K. Kennedy, P.C. Ormsbee, and T.E. Weller. 2011. Echolocation Call Characteristics of Eastern US Bats. Humboldt State University Bat Lab, Arcata, California. Available at: http://www.sonobat. com/download/EasternUS_Acoustic_Table_Mar2011.pdf.

USFWS (U.S. Fish and Wildlife Service). 2014. Aerial Observer Training and Testing Resources. U.S. Fish and Wildlife Service Anchorage, Alaska, Anchorage, Alaska. Available at: https://www.fws.gov/waterfowlsurveys/welcome.jsp?menu=home.

Appendix A: Supporting Tables

Table A-1. Bird ARU locations, recording start dates, recording end dates, and number of days deployed.

ARU ID	Latitude	Longitude	Recording Started	Recording Ended	Days Deployed
SMM10213	48.536	58.938	10 Jun	28 Jun	18
SMM10214	48.498	59.177	13 Jun	6 Jul	23
SMM10215	48.531	58.518	14 Jun	9 Jul	25
SMM10217	48.500	59.175	13 Jun	6 Jul	23
SMM10218	48.530	58.908	10 Jun	28 Jun	18
SMM10219	48.549	58.782	12 Jun	9 Jul	27
SMM10220	48.599	59.009	12 Jun	25 Jun	13
SMM10221	48.603	59.010	12 Jun	25 Jun	13
SMM10221	48.5901	59.003	27 Jun	14 Jul	17
SMM10222	48.600	59.025	9 Jun	25 Jun	16
SMM10222	48.553	58.939	27 Jun	14 Jul	17
SMM10223	48.663	58.597	11 Jun	23 Jun	12
SMM10223	48.572	58.961	27 Jun	14 Jul	17
SMM10224	48.675	58.578	11 Jun	23 Jun	12
SMM10224	48.584	58.958	27 Jun	14 Jul	17
SMM10225	48.563	58.636	14 Jun	6 Jul	22
SMM10226	48.602	59.014	9 Jun	25 Jun	16
SMM10226	48.552	58.939	27 Jun	14 Jul	17
SMM10227	48.535	58.928	9 Jun	28 Jun	19
SMM10228	48.558	58.526	14 Jun	8 Jul	24
SMM10229	48.529	58.917	10 Jun	28 Jun	18
SMM10230	48.530	58.464	11 Jun	8 Jul	27
SMM10231	48.531	58.913	10 Jun	28 Jun	18
SMM10232	48.599	58.989	9 Jun	25 Jun	16
SMM10232	48.588	59.005	27 Jun	14 Jul	17
SMM10233	48.513	59.211	13 Jun	8 Jul	25
SMM10234	48.540	58.495	14 Jun	8 Jul	24
SMM10235	48.602	59.003	12 Jun	25 Jun	13
SMM10236	48.609	58.985	8 Jun	25 Jun	17
SMM10236	48.530	59.202	27 Jun	28 Jul	31
SMM10237	48.611	58.974	9 Jun	25 Jun	16
SMM10237	48.590	58.961	27 Jun	14 Jul	17
SMM10238	48.602	58.988	9 Jun	25 Jun	16
SMM10238	48.538	58.962	27 Jun	14 Jul	17
SMM10239	48.530	58.469	11 Jun	8 Jul	27
SMM10240	48.542	58.505	14 Jun	8 Jul	24
SMM10241	48.528	58.417	11 Jun	10 Jul	29
SMM10242	48.676	58.583	11 Jun	23 Jun	12
SMM10243	48.536	58.946	10 Jun	28 Jun	18
SMM10244	48.602	59.018	9 Jun	25 Jun	16
SMM10245	48.528	58.421	11 Jun	10 Jul	29
SMM10246	48.501	58.285	11 Jun	9 Jul	28
SMM10249	48.561	58.616	8 Jun	6 Jul	28
SMM10250	48.660	58.605	11 Jun	23 Jun	12
SMM10252	48.672	58.585	11 Jun	23 Jun	12
SMM10265	48.610	58.979	9 Jun	25 Jun	16
SMM10265	48.594	59.012	27 Jun	14 Jul	17

ARU ID	Latitude	Longitude	Recording Started	Recording Ended	Days Deployed
SMM10266	48.490	59.180	13 Jun	6 Jul	23
SMM10270	48.667	58.592	11 Jun	23 Jun	12
SMM10276	48.551	59.099	20 Jun	14 Jul	24
SMM10277	48.528	58.905	10 Jun	28 Jun	18
SMM10281	48.563	58.630	14 Jun	6 Jul	22
SMM10285	48.533	58.924	9 Jun	28 Jun	19
SMM10286	48.493	58.294	11 Jun	28 Jun	17
SMM10288	48.510	59.211	13 Jun	8 Jul	25
SMM10290	48.603	58.994	9 Jun	25 Jun	16
SMM10292	48.600	59.001	12 Jun	25 Jun	13
SMM10292	48.549	58.941	27 Jun	31 Jul	34
SMM10293	48.565	58.660	14 Jun	6 Jul	22
SMM10295	48.614	58.972	9 Jun	25 Jun	16
SMM10296	48.599	59.005	12 Jun	25 Jun	13
SMM10299	48.540	59.127	22 Jun	29 Jul	37
SMM10631	48.540	59.142	22 Jun	29 Jul	37
SMM10632	48.590	58.677	15 Jun	5 Jul	20
SMM10634	48.533	59.081	20 Jun	17 Jul	27
SMM10635	48.586	59.113	20 Jun	31 Jul	41
SMM10637	48.535	58.524	28 Jun	9 Jul	11
SMM10638	48.557	59.115	23 Jun	14 Jul	21
SMM10641	48.530	58.514	28 Jun	9 Jul	11
SMM10650	48.544	59.105	20 Jun	29 Jul	39
SMM10652	48.542	59.140	20 Jun	29 Jul	39
SMM10655	48.556	58.523	14 Jun	8 Jul	24
SMM10659	48.626	59.043	20 Jun	31 Jul	41
SMM10660	48.584	59.129	20 Jun	31 Jul	41
SMM10661	48.585	58.668	15 Jun	5 Jul	20
SMM10664	48.527	58.511	28 Jun	9 Jul	11
SMM10665	48.561	58.545	14 Jun	8 Jul	24
SMM10666	48.529	58.426	8 Jun	10 Jul	32
SMM10667	48.555	59.117	24 Jun	14 Jul	20
SMM10668	48.581	58.671	15 Jun	5 Jul	20
SMM10669	48.629	59.048	20 Jun	31 Jul	41
SMM10670	48.532	59.124	24 Jun	17 Jul	23
SMM10671	48.551	58.782	28 Jun	11 Jul	13
SMM10672	48.509	59.175	23 Jun	31 Jul	38
SMM10674	48.528	59.093	20 Jun	17 Jul	27
SMM10675	48.506	59.173	23 Jun	17 Jul	24
SMM10676	48.544	59.112	22 Jun	29 Jul	37
SMM10678	48.549	59.102	22 Jun	14 Jul	22
SMM10679	48.596	58.659	15 Jun	5 Jul	20
SMM10680	48.593	58.665	15 Jun	5 Jul	20
SMM10681	48.578	59.086	24 Jun	31 Jul	37
SMM10682	48.574	59.142	23 Jun	31 Jul	38
SMM10683	48.585	59.110	20 Jun	31 Jul	41
SMM10684	48.554	58.773	8 Jun	28 Jun	20

ARU ID	Latitude	Longitude	Recording Started	Recording Ended	Days Deployed
SMM10685	48.495	59.178	27 Jun		1
SMM10686	48.495	59.178	13 Jun	6 Jul	23
SMM10687	48.576	59.140	24 Jun	31 Jul	37
SMM10688	48.584	58.659	15 Jun	5 Jul	20
SMM10689	48.598	59.082	20 Jun	31 Jul	41
SMM10690	48.539	59.121	22 Jun	29 Jul	37
SMM10691	48.579	58.692	8 Jun	5 Jul	27
SMM10692	48.556	59.101	23 Jun	14 Jul	21
SMM10694	48.595	59.096	20 Jun	31 Jul	41
SMM10695	48.587	58.660	15 Jun	5 Jul	20
SMM10697	48.638	58.843	26 Jun	8 Jul	12
SMM10700	48.509	59.192	24 Jun	17 Jul	23
SMM10701	48.510	59.204	23 Jun	*missing*	0
SMM10702	48.528	59.166	24 Jun	17 Jul	23
SMM10703	48.565	59.146	24 Jun	28 Jul	34

Table A-2. Location of breeding bird survey point count stations and dates of the surveys.

Station ID	Latitude	Longitude	Date
MLSS-1	48.556	59.178	13 Jun
MLSS-2	48.468	59.266	10 Jun 6 Jul
MLSS-3	48.533	58.920	6 Jul
MLSS-4	48.623	59.100	13 Jun 5 Jul
MLSS-5	48.699	58.897	13 Jun 5 Jul
MLSS-6	48.543	58.75	16 Jun 11 Jul
MLSS-8	48.606	58.841	14 Jun 11 Jul
MLSS-9	48.638	58.971	13 Jun 5 Jul
MLSS-10	48.587	58.684	14 Jun 7 Jul
MLSS-11	48.671	58.642	14 Jun 7 Jul
MLSS-12	48.526	58.829	14 Jun 7 Jul
MLSS-13	48.520	58.516	12 Jun
MLSS-14	48.477	58.429	11 Jun 9 Jul
MLSS-offset	48.533	58.919	14 Jun
MMP-2	48.582	58.844	14 Jun
NOS 2-10	48.630	48.630	13 Jun
NOS 3-1	48.600	59.131	13 Jun 5 Jul
NOS 3-2	48.587	59.154	13 Jun 5 Jul
NOS 3-3	48.571	59.172	13 Jun 5 Jul

Station ID	Latitude	Longitude	Date
NOS 3-4	48.556	59.173	13 Jun 5 Jul
NOS 10	48.630	59.073	5 Jul
PC-2	48.553	59.185	9 Jun 5 Jul
PC-3	48.552	59.190	10 Jun 5 Jul
PC-4	48.549	59.190	10 Jun 5 Jul
PC-5	48.546	59.192	10 Jun 5 Jul
PC-6	48.495	59.221	10 Jun 5 Jul
PC-7	48.495	59.225	10 Jun 5 Jul
PC-9	48.470	59.263	10 Jun 6 Jul
PC-10	48.500	59.154	13 Jun 6 Jul
PC-11	48.498	59.158	13 Jun 6 Jul
PC-12	48.497	59.163	13 Jun 6 Jul
PC-13	48.497	59.169	13 Jun 6 Jul
PC-14	48.496	59.175	13 Jun 6 Jul
PC-15	48.582	58.844	11 Jul
PC-17	48.561	58.772	11 Jul
PC-22	48.473	59.260	10 Jun 6 Jul
PC-23	48.475	59.258	10 Jun 6 Jul
PC-24	48.478	59.256	10 Jun 6 Jul
PC-25	48.468	59.255	10 Jun 6 Jul
PC-26	48.470	59.252	10 Jun 6 Jul
PC-31	48.535	58.512	20 Jun 9 Jul
PC-32	48.532	58.510	20 Jun
PC-33	48.534	58.510	20 Jun
PC-34	48.514	58.273	12 Jun 10 Jul
PC-35	48.525	58.286	12 Jun 10 Jul
PC-36	48.523	58.271	12 Jun 10 Jul
PC-37	48.516	58.271	12 Jun 10 Jul
PC-38	48.526	58.277	12 Jun 10 Jul
PC-39	48.527	58.281	12 Jun 10 Jul

Station ID	Latitude	Longitude	Date
PC-40	48.510	58.272	20 Jun 10 Jul
PC-41	48.507	58.274	20 Jun 10 Jul
PC-42	48.505	58.277	20 Jun 10 Jul
PC-43	48.504	58.279	20 Jun 10 Jul
PC-44	48.524	58.290	12 Jun 10 Jul
PC-45	48.522	58.287	12 Jun
PC-46	48.518	58.284	12 Jun 10 Jul
PC-47	48.514	58.282	12 Jun 10 Jul
PC-48	48.529	58.513	12 Jun
PC-49	48.525	58.513	12 Jun
PC-50	48.521	58.512	12 Jun 9 Jul
PC-51	48.580	58.695	21 Jun 7 Jul
PC-52	48.544	58.510	20 Jun 8 Jul
PC-53	48.567	58.529	20 Jun
PC-54	48.567	58.557	20 Jun 8 Jul
PC-55	48.569	58.573	20 Jun 7 Jul
PC-56	48.568	58.591	20 Jun
PC-57	48.563	58.593	20 Jun 7 Jul
PC58	48.661	58.653	14 Jun 7 Jul
PC59	48.675	58.636	14 Jun
PC-60?	48.560	58.602	14 Jun 21 Jun
PC-61	48.470	59.226	21 Jun 5 Jul
PC-62	48.519	58.981	21 Jun 6 Jul
PC-63	48.520	58.978	21 Jun 6 Jul
PC-64	48.517	58.902	21 Jun 11 Jul
PC-65	48.451	58.385	20 Jun 10 Jul
SEOW-3	48.674	58.957	13 Jun

Table A-3. Marshbird survey locations, stations, and dates surveyed.

Site	Station ID	Date
Piccadilly	MMP-1	26 Jun 11 Jul
Boswarlos	MMP-2	11 Jul 30 Jul
Shoal Point	MMP-3	26 Jun 11 Jul
Doucette's Pond	MMP-4	23 Jun 8 Jul
The Banks	MMP-5	23 Jun 8 Jul
Peace Park Pond	MMP-6	22 Jun 8 Jul
Warm Creek	MMP-7	23 Jun 8 Jul
Noel's Pond	MMP-8	23 Jun 8 Jul
Indian Head Park	MMP-9	22 Jun 8 Jul
Turf Point Causeway	MMP-10	22 Jun 9 Jul
Memorial Park	MMP-11	22 Jun 9 Jul
Stephenville Crossing Estuary	MMP-12	22 Jun 8 Jul
Goldeneye Pond	MMP-13	22 Jun 26 Jun
Point au Mal	MMP-14	23 Jun 7 Jul
Pond B	MMP-15	23 Jun 8 Jul
Seal Cove Brook	MMP-16	22 Jun 9 Jul
West Bay	MMP-17	26 Jun 11 Jul
Igloo Road Marsh	MMP-18	8 Jul 28 Jul
Lagoon and Inner Port Harmon	MMP-lagoon	23 Jun

Table A-4. Locations and habitat of nocturnal owl spring survey stations.

Station ID	Latitude	Longitude	Habitat
NOS 1-1	48.694	58.677	River/Riparian
NOS 1-2	48.678	58.687	Bog/Wetland, Softwood
NOS 1-3	48.659	58.657	Anthropogenic (residential)
NOS 1-4	48.636	58.658	Softwood
NOS 1-5	48.619	58.663	Softwood
NOS 1-6	48.604	58.678	Softwood
NOS 1-7	48.589	58.687	Softwood
NOS 1-8	48.570	58.699	Coniferous Scrub
NOS 1-9	48.556	58.718	Anthropogenic (residential)
NOS 1-10	48.553	58.751	Transmission Line between Coniferous Scrub

Station ID	Latitude	Longitude	Habitat
NOS 2-1	48.557	58.908	Coniferous Scrub, Riparian
NOS 2-2	48.577	58.906	Anthropogenic (residential)
NOS 2-3	48.592	58.920	Unknown Forest
NOS 2-4	48.600	58.948	Anthropogenic (residential)
NOS 2-5	48.615	58.969	Unknown Forest
NOS 2-6	48.630	58.975	Anthropogenic (residential)
NOS 2-7	48.645	58.982	Anthropogenic (residential)
NOS 2-8	48.641	59.024	Coniferous Scrub
NOS 2-9	48.637	59.050	Coniferous Scrub
NOS 2-10	48.630	59.073	Coniferous Scrub
NOS 3-1	48.599	59.131	Anthropogenic (residential)
NOS 3-2	48.587	59.153	Anthropogenic (cleared land)
NOS 3-3	48.571	59.172	Anthropogenic (residential)
NOS 3-4	48.556	59.173	Softwood
NOS 3-5	48.547	59.169	Anthropogenic (cleared land)
NOS 3-6	48.540	59.190	Softwood
NOS 3-7	48.533	59.209	Anthropogenic (cleared land)
NOS 3-8	48.510	59.213	Softwood
NOS 3-9	48.494	59.221	Barren
NOS 3-10	48.481	59.240	Softwood

Table A-5. Station locations and timing of the 2023 land-based fall and winter coastal waterbird survey.

Station Name	Station ID	Latitude	Longitude	Season	Date
Fox Island Road	C1	48.673	58.686	Winter	13 Mar
				Fall	11 Aug
					24 Aug
					3 Sep
					15 Sep
					28 Sep
					17 Oct
				Winter	3 Dec
Gravels Beach	C2	48.555	58.723	Winter	13 Mar
				Fall	11 Aug
					23 Aug
					5 Sep
					16 Sep
					28 Sep
					13 Oct
				Winter	3 Dec
Man of War Cove	C3	48.529	58.811	Winter	13 Mar

Station Name	Station ID	Latitude	Longitude	Season	Date
				Fall	23 Aug
					28 Sep
					12 Oct
				Winter	3 Dec
Marches Point	C4	48.509	59.101	Winter	13 Mar
				Fall	11 Aug
					22 Aug
					6 Sep
					16 Sep
					30 Sep
					12 Oct
				Winter	3 Dec
Boutte du Cap Park	C5	48.465	59.266	Winter	13 Mar
				Fall	11 Aug
					22 Aug
					6 Sep
					16 Sep
					30 Sep
					12 Oct
				Winter	4 Dec
Mainland Beach	C6	48.558	59.188	Winter	13 Mar
				Fall	11 Aug
					22 Aug
					2 Sep
					16 Sep
					30 Sep
					12 Oct
				Winter	4 Dec
Picadilly Head	C7	48.592	58.910	Winter	13 Mar
				Fall	11 Aug
					23 Aug
					2 Sep
					15 Sep
					29 Sep
					12 Oct
				Winter	4 Dec
Picadilly	C8	48.557	58.908	Winter	13 Mar
				Fall	11 Aug
					22 Aug
					2 Sep

Station Name	Station ID	Latitude	Longitude	Season	Date
					15 Sep
					28 Sep
					12 Oct
				Winter	4 Dec
Outer Port Harmon Beach North	C9	48.538	58.571	Winter	13 Mar
				Fall	12 Aug
					21 Aug
					3 Sep
					18 Sep
					27 Sep
					14 Oct
				Winter	2 Dec
Outer Port Harmon Beach South	C10	48.512	58.540	Winter	13 Mar
				Fall	12 Aug
					21 Aug
					3 Sep
					18 Sep
					27 Sep
					14 Oct
				Winter	2 Dec
Three Rock Cove	C11	48.623	59.100	Fall	12 Aug
					2 Sep
					16 Sep
					29 Sep
					13 Oct
				Winter	4 Dec
Winterhouse	C12	48.695	58.928	Fall	11 Aug
					23 Aug
					2 Sep
					15 Sep
					29 Sep
					13 Oct
Turf point causeway/Seal Rocks	C13	48.431	58.478	Fall	12 Aug
					21 Aug
					3 Sep
					18 Sep
					18 Sep
					27 Sep
					15 Oct
Flat Bay	C14	48.395	58.622	Fall	12 Aug

Station Name	Station ID	Latitude	Longitude	Season	Date
					24 Aug
					3 Sep
					18 Sep
					29 Sep
					14 Oct
Cambell's Creek	C15	48.526	58.829	Fall	12 Aug
					5 Sep
					16 Sep
					28 Sep
					12 Oct
Kippens	C16	48.544	58.599	Fall	13 Aug
					24 Aug
					3 Sep
					18 Sep
					27 Sep
					14 Oct

Table A-6. Locations and timing of inland waterfowl surveys.

Station Name	Station ID	Latitude	Longitude	Season	Date
CNA Pond	WF-13	48.562	58.543	Spring	18 May
				Fall	10 Aug
					25 Aug
					7 Sep
					17 Sep
					27 Sep
					14 Oct
				Winter	2 Dec
Devil's Pond	WF-12	48.564	58.564	Spring	5 May
				Fall	13 Aug
					25 Aug
					7 Sep
					17 Sep
					27 Sep
				Winter	2 Dec
Doucette's Pond	WF-6	48.553	58.651	Spring	18 May
				Fall	12 Aug
					25 Aug
					7 Sep
					17 Sep

Station Name	Station ID	Latitude	Longitude	Season	Date
					28 Sep
					14 Oct
				Winter	3 Dec
Dump Road Pond	WF-10	48.563	58.593	Spring	18 May
				Fall	19 Sep
					28 Sep
					14 Oct
				Winter	3 Dec
Farm Pond	WF-21	48.546	58.510	Spring	18 May
				Fall	25 Aug
					7 Sep
					17 Sep
					27 Sep
					14 Oct
				Winter	2 Dec
Fox Island River	WF-1	48.694	58.676	Spring	18 May
				Fall	7 Sep
					15 Sep
					28 Sep
					17 Oct
					24 Aug
				Winter	3 Dec
Gaudon's Lane Pond	WF-7	48.559	58.623	Spring	18 May
				Fall	19 Sep
					14 Oct
					25 Aug
					12 Aug
					7 Sep
				Winter	3 Dec
Goldeneye Pond	WF-28	48.452	58.384	Spring	5 May
				Fall	12 Aug
					17 Sep
					27 Sep
					15 Oct
					24 Aug
					6 Sep
				Winter	2 Dec
Goose Pond	WF-4	48.548	58.782	Spring	18 May
				Fall	24 Aug
					20 Sep

Station Name	Station ID	Latitude	Longitude	Season	Date
					28 Sep
					13 Oct
				Winter	3 Dec
Gravel's Pond	WF-3	48.558	58.728	Spring	17 May
				Fall	9 Aug
					6 Sep
					15 Sep
					28 Sep
					13 Oct
					24 Aug
				Winter	3 Dec
Gull Pond	WF-25	48.540	58.500	Spring	5 May
				Fall	25 Aug
					7 Sep
					20 Sep
					27 Sep
					15 Oct
				Winter	2 Dec
Island Pond	WF-8	48.558	58.616	Spring	18 May
				Fall	25 Aug
					7 Sep
					19 Sep
					28 Sep
					14 Oct
				Winter	3 Dec
Knife Pond	WF-22	48.549	58.508	Spring	18 May
				Fall	17 Sep
Lagoon	WF-30	48.519	58.537	Fall	25 Aug
					25 Aug
					7 Sep
					17 Sep
					27 Sep
					14 Oct
				Winter	2 Dec
Memorial Park Pond	WF-27	48.506	58.436	Fall	12 Aug
					25 Aug
					7 Sep
					27 Sep
					15 Oct
				Winter	2 Dec

Station Name	Station ID	Latitude	Longitude	Season	Date
Ned's Pond	WF-11	48.563	58.568	Spring	5 May
				Fall	25 Aug
					7 Sep
					17 Sep
					27 Sep
					14 Oct
				Winter	2 Dec
Noel's Pond	WF-15	48.561	58.534	Spring	18 May
				Fall	27 Sep
					10 Aug
					25 Aug
					7 Sep
					17 Sep
					14 Oct
				Winter	2 Dec
Noel's Pond marsh	WF-14	48.560	58.528	Spring	18 May
				Fall	10 Aug
					25 Aug
					25 Aug
					7 Sep
					17 Sep
					27 Sep
					14 Oct
				Winter	2 Dec
Old Mill Road Pond	WF-19	48.545	58.524	Fall	10 Aug
					25 Aug
					7 Sep
					17 Sep
					27 Sep
					14 Oct
				Winter	2 Dec
Oxback Pond	WF-26	48.534	58.487	Spring	5 May
				Fall	12 Aug
				Winter	2 Dec
Peace Park Pond	WF-24	48.529	58.507	Spring	5 May
				Fall	16 May
					19 May
					25 Aug
					7 Sep
					17 Sep

Station Name	Station ID	Latitude	Longitude	Season	Date
					27 Sep
					15 Oct
				Winter	2 Dec
Pole Pond	WF-31	48.553	58.511	Spring	18 May
				Fall	17 Sep
Pond A	WF-16	48.557	58.522	Spring	18 May
				Fall	10 Aug
					25 Aug
					7 Sep
					17 Sep
					27 Sep
					14 Oct
				Winter	2 Dec
Pond B	WF-17	48.554	58.520	Spring	18 May
				Fall	10 Aug
				Fall	25 Aug
				Fall	25 Aug
				Fall	7 Sep
				Fall	17 Sep
				Fall	27 Sep
				Fall	14 Oct
				Winter	2 Dec
Port Harmon	WF-29	48.519	58.537	Spring	5 May
				Fall	27 Sep
					25 Aug
					25 Aug
					7 Sep
					17 Sep
					14 Oct
				Winter	2 Dec
Romaine's River	WF-5	48.553	58.673	Spring	18 May
				Fall	12 Aug
					25 Aug
					7 Sep
					17 Sep
					28 Sep
					14 Oct
				Winter	3 Dec
Runway Pond	WF-18	48.551	58.520	Spring	18 May
				Fall	10 Aug

Station Name	Station ID	Latitude	Longitude	Season	Date
				Winter	25 Aug
					7 Sep
					17 Sep
					27 Sep
					14 Oct
					2 Dec
Scaup Pond (Extra Site)	WF-32	48.477	58.429	Fall	17 Sep
				Winter	2 Dec
Shallow/Highway Pond	WF-20	48.548	58.518	Spring	18 May
				Fall	10 Aug
					25 Aug
					7 Sep
					17 Sep
					27 Sep
					14 Oct
				Winter	2 Dec
Two Guts Pond	WF-2	48.652	58.673	Spring	18 May
				Fall	11 Aug
					24 Aug
					7 Sep
					15 Sep
					28 Sep
					17 Oct
				Winter	3 Dec
Warm Creek	WF-23	48.556	58.513	Spring	18 May
				Fall	17 Sep

Table A-7. Landbird migration count sites, locations, dates, seasons, elevations, and start and end times (2023).

Site Name	Latitude	Longitude	Station ID	Date	Season	Elevation (m)	Visit	Start Time	End Time
Mainland MET tower access road	48.557	59.177	MLS-1	2 May	Spring	69	1	17:10	17:40
				10 May	Spring	69	2	9:54	10:24
				17 May	Spring	69	3	11:57	12:27
				23 May	Spring	69	4	16:40	17:10
				25 May	Spring	69	4	12:28	12:58
				1 June	Spring	69	5	9:12	9:43
				9 Aug	Fall	69	1	14:05	14:35
				22 Aug	Fall	69	2	13:15	13:45
				6 Sep	Fall	69	3	13:30	14:00
				16 Sep	Fall	69	4	14:20	14:50
				30 Sep	Fall	69	5	12:35	13:05
				12 Oct	Fall	69	6	11:50	1210
Cape St. George	48.468	59.266	MLSS-2	1 May	Spring	34	1	15:01	15:31
				10 May	Spring	34	2	10:48	11:18
				17 May	Spring	34	3	12:50	13:20
				25 May	Spring	34	4	11:01	11:31
				1 June	Spring	34	5	10:06	10:36
				9 Aug	Fall	34	1	12:35	13:05
				22 Aug	Fall	34	2	12:22	12:52
				6 Sep	Fall	34	3	11:58	12:28
				16 Sep	Fall	34	4	15:43	16:13
				30 Sep	Fall	34	5	11:40	12:10
				12 Oct	Fall	34	6	14:50	12:20
Piccadilly transmission line	48.533	58.918	MLSS-3	2 May	Spring	87	1	13:38	14:08
				9 May	Spring	87	2	13:44	14:14
				17 May	Spring	87	3	15:24	16:15
				24 May	Spring	87	4	8:20	8:30
				31 May	Spring	87	5	12:28	12:58
				9 Aug	Fall	87	1	10:07	10:37

Site Name	Latitude	Longitude	Station ID	Date	Season	Elevation (m)	Visit	Start Time	End Time
				23 Aug	Fall	87	2	12:12	12:42
				5 Sep	Fall	87	3	13:08	13:38
				15 Sep	Fall	87	4	17:40	18:10
				29 Sep	Fall	87	5	12:38	13:08
				12 Oct	Fall	87	6	10:25	10:55
Three Rock Cove beach (shorebird site)	48.623	59.101	MLSS-4	3 May	Spring	2	1	11:45	12:15
				9 May	Spring	2	2	12:30	13:00
				17 May	Spring	2	3	11:06	11:32
				25 May	Spring	2	4	13:12	13:51
				31 May	Spring	2	5	8:58	9:28
				11 Aug	Fall	2	1	20:25	20:55
				22 Aug	Fall	2	2	14:26	14:56
				2 Sep	Fall	2	3	15:26	15:56
				16 Sep	Fall	2	4	13:00	13:30
				29 Sep	Fall	2	5	10:55	11:25
				13 Oct	Fall	2	6	12:43	13:13
Long Point road	48.699	58.896	MLSS-5	4 May	Spring	19	1	10:57	11:27
				9 May	Spring	19	2	10:20	10:50
				17 May	Spring	19	3	9:59	10:30
				23 May	Spring	19	4	15:14	15:44
				31 May	Spring	19	5	10:33	11:03
				9 Aug	Fall	19	1	16:00	16:30
				23 Aug	Fall	19	2	14:19	14:49
				2 Sep	Fall	19	3	17:10	17:40
				15 Sep	Fall	19	4	14:34	15:04
				29 Sep	Fall	19	5	9:32	10:02
				13 Oct	Fall	19	6	10:15	10:45
Father Joy's road	48.543	58.754	MLSS-6	1 May	Spring	43	1	18:15	18:45
				10 May	Spring	43	2	16:36	17:05
				17 May	spring	43	3	19:31	18:01

Site Name	Latitude	Longitude	Station ID	Date	Season	Elevation (m)	Visit	Start Time	End Time
				24 May	Spring	43	4	9:51	10:21
				30 May	Spring	43	5	14:43	15:13
				9 Aug	Fall	43	1	9:08	9:38
				23 Aug	Fall	43	2	9:42	10:12
				4 Sep	Fall	43	3	17:36	18:06
				16 Sep	Fall	43	4	9:03	9:33
				30 Sep	Fall	43	5	9:41	10:11
				13 Oct	Fall	43	6	15:32	16:02
Loretto road	48.499	59.156	MLSS-7	2 May	Spring	142	1	15:03	15:33
				10 May	Spring	142	2	11:48	12:18
				17 May	Spring	142	3	13:45	14:15
				25 May	Spring	142	4	9:54	10:24
				1 June	Spring	142	5	10:57	11:27
				9 Aug	Fall	142	1	11:25	11:55
				22 Aug	Fall	142	2	11:33	12:03
				6 Sep	Fall	142	3	9:41	10:11
				16 Sep	Fall	142	4	17:31	18:01
				30 Sep	Fall	142	5	10:54	10:24
				12 Oct	Fall	142	6	15:56	16:26
Shoal Point access road	48.606	58.842	MLSS-8	3 May	Spring	8	1	9:50	10:20
				9 May	Spring	8	2	15:42	16:12
				16 May	Spring	8	3	20:04	20:35
				24 May	Spring	8	4	10:50	11:20
				1 June	Spring	8	5	7:06	7:36
				11 Aug	Fall	8	1	7:15	7:45
				22 Aug	Fall	8	2	17:40	18:10
				6 Sep	Fall	8	3	16:59	17:29
				16 Sep	Fall	8	4	10:39	11:09
				28 Sep	Fall	8	5	9:50	10:20
				12 Oct	Fall	8	6	8:20	8:50

Site Name	Latitude	Longitude	Station ID	Date	Season	Elevation (m)	Visit	Start Time	End Time
West Bay/Tea Cove	48.638	58.971	MLSS-9	9 May	Spring	5	2	9:27	9:57
				17 May	Spring	5	3	8:18	8:48
				25 May	Spring	5	4	12:12	14:42
				31 May	Spring	5	5	11:18	11:48
				9 Aug	Fall	5	1	15:10	15:40
				23 Aug	Fall	5	2	13:19	13:49
				2 Sep	Fall	5	3	18:01	18:31
				15 Sep	Fall	5	4	15:47	16:17
				29 Sep	Fall	5	5	11:40	12:10
				12 Oct	Fall	5	6	12:22	12:52
Stephenville Radar station road	48.587	58.684	MLSS-10	4 May	Spring	126	1	14:23	14:53
				10 May	Spring	126	2	15:32	16:02
				16 May	Spring	126	3	12:16	12:36
				30 May	Spring	126	5	13:50	14:20
				10 Aug	Fall	126	1	8:46	9:16
				24 Aug	Fall	126	2	11:40	12:10
				7 Sep	Fall	126	3	10:10	10:40
				15 Sep	Fall	126	4	7:29	7:59
				16 Sep	Fall	126	4	7:10	7:40
				28 Sep	Fall	126	5	13:46	14:16
				17 Oct	Fall	126	6	9:35	10:05
Table Mountain access road	48.671	58.642	MLSS-11	4 May	Spring	46	1	13:18	13:48
				10 May	Spring	46	2	14:08	14:38
				16 May	Spring	46	3	11:27	11:57
				23 May	Spring	46	4	15:40	16:10
				30 May	Spring	46	5	13:00	13:30
				11 Aug	Fall	46	1	10:10	10:40
				24 Aug	Fall	46	2	10:53	11:23
				3 Sep	Fall	46	3	10:05	10:35
				28 Sep	Fall	46	5	12:52	13:22

Site Name	Latitude	Longitude	Station ID	Date	Season	Elevation (m)	Visit	Start Time	End Time
				17 Oct	Fall	46	6	10:26	10:56
Campbell's Creek	48.526	58.829	MLSS-12	3 May	Spring	31	1	13:35	14:05
				9 May	Spring	31	2	8:34	9:04
				17 May	spring	31	3	18:52	19:22
				24 May	Spring	31	4	9:10	9:40
				31 May	Spring	31	5	13:08	13:38
				10 Aug	Fall	31	1	7:35	8:05
				23 Aug	Fall	31	2	11:30	12:00
				5 Sep	Fall	31	3	14:24	14:54
				16 Sep	Fall	31	4	8:18	8:48
				28 Sep	Fall	31	5	16:25	16:55
				12 Oct	Fall	31	6	9:26	10:56
Joey's Lookout	48.520	58.516	MLSS-13	3 May	Spring	172	1	16:15	15:45
				11 May	Spring	172	2	10:07	10:37
				16 May	Spring	172	3	14:30	15:00
				24 May	Spring	172	4	18:02	18:32
				30 May	Spring	172	5	10:45	11:15
				27 Jul	Spring	172	Incidental Visit	10:08	10:38
				10 Aug	Fall	172	1	11:00	11:30
				21 Aug	Fall	172	2	10:32	11:02
				4 Sep	Fall	172	3	9:30	10:00
				18 Sep	Fall	172	4	9:54	10:24
				27 Sep	Fall	172	5	17:20	17:50
				11 Oct	Fall	172	6	14:51	15:21
Black Banks Beach (shorebird site)	48.478	58.429	MLSS-14	3 May	Spring	2	1	6:00	6:30
				8 May	Spring	2	2	11:18	11:48
				16 May	Spring	2	3	7:54	8:24
				23 May	Spring	2	4	12:03	12:33
				31 May	Spring	2	5	16:15	16:45

Site Name	Latitude	Longitude	Station ID	Date	Season	Elevation (m)	Visit	Start Time	End Time
				10 Aug	Fall	2	1	13:33	14:03
				21 Aug	Fall	2	2	13:55	14:05
				6 Sep	Fall	2	3	7:11	7:41
				18 Sep	Fall	2	4	17:01	17:31
				27 Sep	Fall	2	5	9:07	9:37
				15 Oct	Fall	2	6	10:17	10:47
Jean Baptiste Mainland	48.546	59.192	PC-5	13 Aug	Fall	184	1	9:05	9:35
Romaines River	48.563	58.672	PC-66	13 Aug	Fall	26	1	11:47	12:17
				17 Sep	Fall	26	4	7:01	7:31
Aguathuna (Rescinded site)	48.562	58.775	RS-2	9 May	Spring	1	2	16:34	17:04
Danny's trail (Rescinded site)	48.558	58.728	RS-3	4 May	Spring	13	1	15:55	16:25

Appendix B: Avifauna Breeding Evidence and Codes

Avifauna Breeding Evidence and Codes

Breeding evidence observed during avifauna surveys was categorized into one of various types of evidence and levels of strength of evidence of breeding, taken from the Newfoundland Breeding Bird Atlas protocol (NLBBA 2023):

OBSERVED

X Species observed during their breeding season, but NOT in suitable nesting habitat (no breeding evidence found). Note that this code is rarely used as birds tend to occupy nesting habitat during the breeding season. Do not use for species known to be migrants.

POSSIBLE BREEDING

H Species observed in suitable nesting Habitat during their breeding season.

S Singing male or adult producing other sounds associated with breeding (e.g., calls or drumming) in suitable nesting habitat during the species' breeding season.

PROBABLE BREEDING

M Multiple singing/calling/drumming individuals (7 or more) heard during one visit to a single square and in suitable nesting habitat during the species' breeding season. Use with caution to avoid counting migrants.

P Pair observed in suitable nesting habitat during the species' breeding season.

T Presumed Territory based on the presence of an adult bird (usually singing, but not necessarily so), in the same suitable nesting habitat patch on at least two visits, one week or more apart, during the species' breeding season. Use discretion when using this code. "T" is not to be used for colonial birds, or species that might forage or loaf a long distance from their nesting site (e.g. Turkey Vulture, and male waterfowl).

D Courtship or Displays involving a male and female (e.g., courtship feeding, copulation) or antagonistic behavior between two or more individuals (e.g., territorial disputes or chases), in suitable nesting habitat during the species' breeding season.

V Bird Visiting a probable nest site in suitable nesting habitat during the species' breeding season.

A Agitated behavior or alarm calls of an adult in suitable nesting habitat during the species' breeding season.

B Brood patch or cloacal protuberance on an adult in suitable nesting habitat during the species' breeding season.

N Nest-building by wrens or nest hole excavation by woodpeckers (both may build dummy or roosting nests so nest-building alone is not enough to confirm breeding).

CONFIRMED BREEDING

NB Nest building, including the carrying of nesting material, by all species except wrens and woodpeckers.

DD Distraction Display, injury-feigning, or other displays attempting to draw attention away from a nest or young.

NU Empty Nest Used or identifiable eggshells from earlier in the same nesting season.

FY Recently Fledged Young (nidicolous species) or downy young (nidifugous species) incapable of sustained flight.

AE Adult Entering, occupying, or leaving a nest site (visible or not) or whose behavior suggests the presence of an occupied nest.

FS Adult carrying a Faecal Sac.

CF Adult Carrying Food for young.

NE Nest containing Eggs.

NY Nest with Young (seen or heard)

Appendix C: Habitat Class Summary for Bat ARUs

Table C-1. Summary of Habitat Classes for 2023 Bat ARU Deployment.

ARU Details (provided by Stantec)				Vegetation Habitat Classes within 50m of ARU (NL Forest Resource Inventory) (GIS analysis by LGL Limited)										
ARU ID	**Height**	**ARU Location**	**Habitat Field Description**	***ELC Habitat Description***	**Agriculture**	**Anthropogenic**	**Barren**	**Con_Scrub**	**Mixedwood**	**Small_Island**	**Softwood**	**Unk_Forest**	**Water**	**Wetland**
S4U18539	Ground	Outside Local Assessment Area	Open rolling grassland/wetland/pit, near ocean and scrub trees (spruce, alder)	Anthropogenic		91%					8%		1%	0%
S4U18619	Ground	Outside Local Assessment Area	Small forest opening surrounded by mixed wood	Softwood		8%	3%				89%			
S4U18629	Ground	Within Local Assessment Area	Wooded area off of open field and ATV trail	Agriculture	51%						49%			
S4U18631	Ground	Within Project Area	Mixed wood closed to river bank and off a forest cut	Mixedwood					63%		37%			
S4U18638	Ground	Within Local Assessment Area	River bank flood plain	Mixedwood					96%					4%
S4U18640	Ground	Within Project Area	Edge of open wetland/coniferous forest transition	Softwood				1%			57%			42%
S4U18640	Ground	Within Project Area	Edge of open wetland (was moved more into open area to reduce clutter around mic, moved approx. 19m to west)	Wetland				0%			34%			66%
S4U18657	Ground	Within Local Assessment Area	Bog/coniferous scrub	Coniferous Scrub				76%			0%		24%	
S4U18660	Ground	Within Project Area	Coniferous wetland/scrub	Softwood							53%	47%		

S4U18661	Ground	Within Project Area	Coniferous forest adjacent to small watercourse	Softwood							76%			24%
S4U18670	Ground	Within Project Area	Coniferous forest	Coniferous Scrub				59%				41%		
S4U18685	Ground	Within Local Assessment Area	Steep bank into the lake off a game trail - coniferous forest adjacent to Gull Pond	Mixedwood					73%				27%	
S4U18685	Ground	Within Local Assessment Area	Moved closer to Gull Pond, in a more open area (less clutter around mic).	Mixedwood					63%				37%	
S4U18706	Ground	Within Local Assessment Area	Wooded area next to river	Softwood	0%			8%	32%		60%			
S4U18707	MET Tower	Within Project Area	MET tower	Coniferous Scrub				99%				1%		
S4U18709	Ground	Outside Local Assessment Area	Barren, scrub, tuckamore	Coniferous Scrub			18%	48%			34%			
S4U18709	Ground	Outside Local Assessment Area	Mouth of cave	Coniferous Scrub				100%						
S4U18721	Ground	Within Project Area	Mixed wood near cut block	Mixedwood					66%		34%			
S4U18733	Ground	Within Local Assessment Area	Softwood forest off road, next to cliff face.	Softwood				4%			96%			
S4U18740	MET Tower	Within Project Area	MET Tower	Softwood				20%			80%			
S4U18751	Ground	Within Project Area	On bank next to still pond with small cliff faces	Softwood							44%	43%	13%	
S4U18752	MET Tower	Within Local Assessment Area	MET tower	Barren			100%							
S4U18870	Ground	Within Local Assessment Area	Wetland edge	Softwood						3%	57%		37%	3%
S4U18923	Ground	Outside Local Assessment Area	Open wetland edge	Coniferous Scrub				48%	3%			15%		34%