



North Atlantic

Appendix D1: Avifauna Baseline Study

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Appendix D1-1: PA ARU 1 Results

Appendix D1-2: PA ARU 2 Results

Appendix D1-3: RAA ARU 1 Results

List of Acronyms and Abbreviations

AC CDC	Atlantic Canada Conservation Data Centre
ARU	Autonomous Recording Unit
BCR	Bird Conservation Region
BCS	Bird Conservation Strategy
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
*.csv file	Comma-separated values file
ECCC	Environment and Climate Change Canada
ELC	Ecological Land Classification
GIS	Geographic Information System
GPS	Global Positioning System
HGP	Hydrogen Generation Plant
HP	Hydrogenation Plant
IUCN	International Union for Conservation of Nature
kV	Kilovolts
LAA	Local Assessment Area
LOHC	Liquid Organic Hydrogen Carrier
m	Metres
MBCA	Migratory Birds Convention Act
MBR	Migratory Birds Regulations
MET tower	Meteorological Tower
MW	Megawatts
NL	Newfoundland and Labrador
NL FFA	Newfoundland and Labrador Department of Fisheries, Forestry, and Agriculture
NL ESA	Endangered Species Act (Newfoundland and Labrador)
NL WD	Newfoundland and Labrador Wildlife Division
North Atlantic	North Atlantic Refining Corp.
PA	Project Area
RAA	Regional Assessment Area
SAR	Species at Risk
SARA	Species at Risk Act (Federal)
SCC	Species of Conservation Concern
SD card	Secure Digital card
TBD	To be determined
UTM	Universal Transverse Mercator

1.0 Introduction

North Atlantic Refining Corp. (North Atlantic) is proposing to undertake the development of a Wind to Hydrogen project (the Project) on the Isthmus of Avalon Region in Newfoundland and Labrador (NL). This Project will entail the development, construction, operation and eventual decommissioning of a 324-megawatt (MW) Wind Farm consisting of 45 wind turbines on an undeveloped peninsula between Sunnyside and Deer Harbour. The Wind Farm will provide renewable electricity via a 138 kilovolt (kV) transmission line to a newly developed Hydrogen Generation Plant (HGP), from which generated hydrogen will be transported to a Hydrogenation Plant (HP) for transformation into a Liquid Organic Hydrogen Carrier (LOHC), which will then be shipped from North Atlantic's port facilities to international markets for use in various decarbonization technologies.

In support of the Project, North Atlantic has undertaken extensive environmental baseline studies throughout the Project Area (PA). The Avifauna Baseline Study included comprehensive field surveys of various types to assess the biodiversity, relative abundance, and habitat use of avifauna in the PA. Field surveys were conducted every season from 2023 to 2025 to obtain a complete picture of the bird species and habitat uses throughout the year. Field surveys specifically in the PA commenced in January 2024 and will continue to November 2025, and are supplemented with data from Autonomous Recording Units (ARUs). Surveys were designed to target a complete list of species that use the PA and Regional Assessment Area (RAA) seasonally during spring or fall migration, as breeding habitat in summer, or as year-round residents. Data from additional surveys in the RAA in 2023 and 2024, are also discussed to provide a broader context of bird assemblages across the region, given the large seasonal movements, sizable home ranges, and migratory life histories of some species.

The PA lies within the Atlantic Flyway, one of the four major flyways of North America for migratory birds (Figure D1-1.0-1). This flyway spans from the high Arctic, south to Tierra del Fuego, and stretches from the eastern seaboard inland to the western coast of Lake Erie (Smith et al., 1989). Insular Newfoundland hosts many species of breeding birds that migrate north from southern overwintering sites, and also overwintering birds that move south from the Arctic for the winter months (e.g., coastal waterfowl and seabirds) (Steenweg et al., 2017). Year-round residents also inhabit the PA and RAA, including several species of woodpeckers, passerines, and waterbirds. Migratory and resident birds were represented by species from the following taxonomic Orders of birds: Anseriformes (waterfowl), Galliformes (gamebirds), Gaviiformes (loons), Accipitriformes and Falconiformes (raptors), Charadriiformes (shorebirds), Gruiiformes (rails), Strigiformes (owls), Coraciiformes (kingfishers), Piciformes (woodpeckers), and Passeriformes (perching birds).

Four different seasonal windows of bird activity were defined for this study. These included early breeding birds/spring migration (April 15 to May 31); breeding season (June 1 to August 15), fall migration (August 16 to October 31); and overwintering/resident (November 1 to April 14). These temporal windows broadly

encompassed bird movements and life histories throughout the year. The data collected during field survey efforts in the PA and RAA are presented by the season during which the survey occurred.

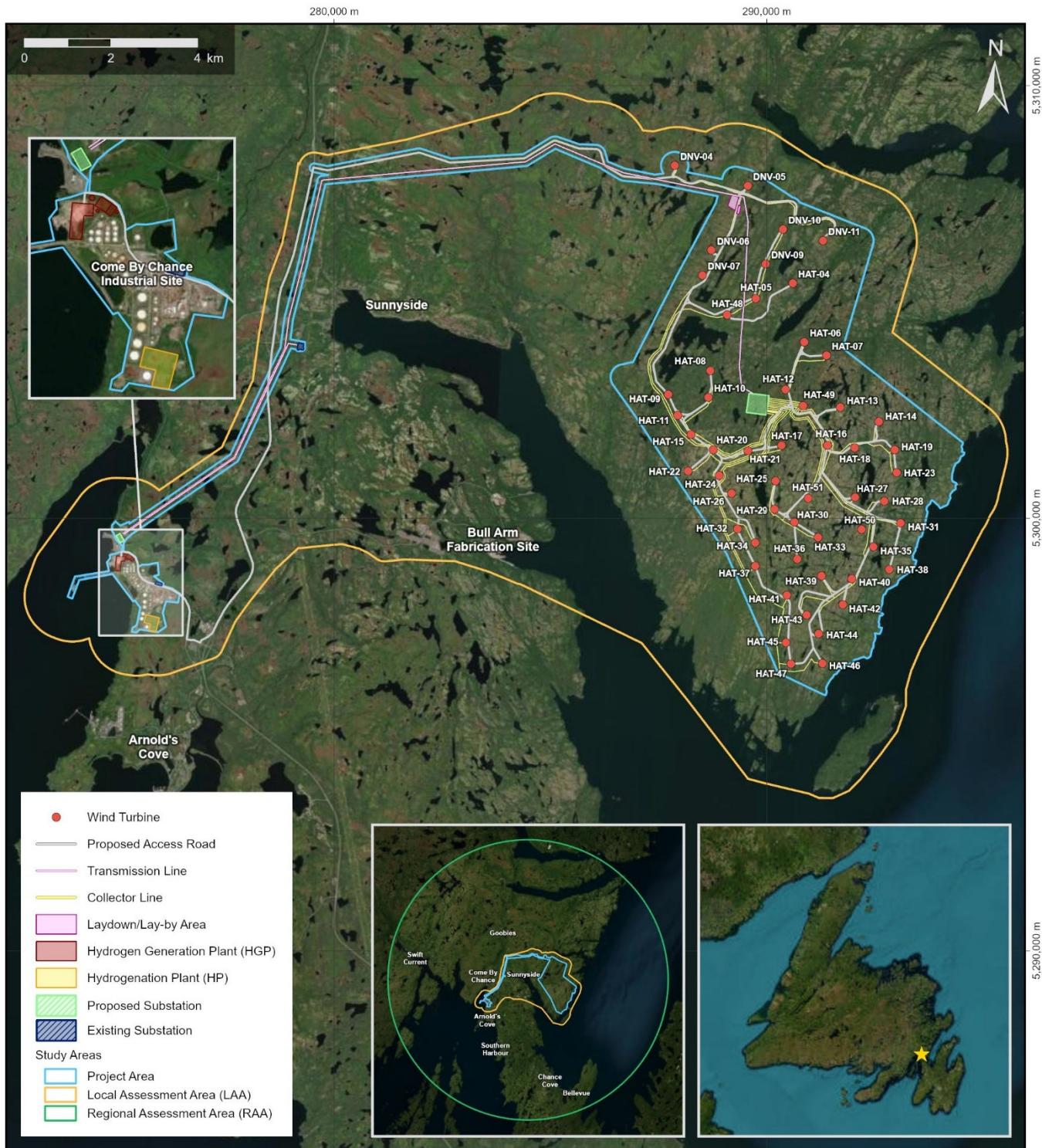


Figure D1-1.0-1 Project location and preliminary infrastructure layout.



	FIGURE TITLE:	Major North American flyways	NOTES Adapted from Washington State University-Everett with Everett Community College 2021-2022. Project Development Report 21 pp.	PREPARED BY:	DATE:
	PROJECT TITLE:			C. Burke	11/06/2025
		North Atlantic Wind to Hydrogen Project		REVIEWED BY:	C. Bursey 11/06/2025
				APPROVED BY:	C. Collins 11/06/2025
				CRS:	WGS 1984 World Mercator
					SEM MAP ID: 016-015-GIS-524-Rev0

Figure D1-1.0-2 Major North American flyways.

2.0 Methods

2.1 Desktop Study

A comprehensive desktop review was conducted to compile a list of species that were possibly using the PA or RAA for some portion of the year, and the potential life history activities for which they were using the areas. This desktop study included scientific articles, government reports and management plans, and open-source databases like iNaturalist and eBird. A review was also conducted of the avian SAR and Species of Conservation Concern (SCC) for the PA through an Atlantic Canada Conservation Data Centre (AC CDC) request. The request was made for the entire PA with a 5 km buffer, which also included the Local Assessment Area (LAA) and part of the RAA.

2.2 Field Surveys

Several survey techniques were necessary to target the various avifauna species found throughout the PA and RAA. Survey types varied by Order and/or guild (i.e., a group of different species that use their habitat in the same way for foraging, nesting, migrating, etc.). For example, perching birds were surveyed using point counts to obtain auditory and visual information on abundance and breeding behaviour. Larger raptors required a specific focus on visual observations (e.g., sky scans). Waterfowl and waterbirds required dedicated efforts around waterbodies and shorelines. The various survey types employed for the PA and RAA are discussed below.

To inform the selection of survey sites, a preliminary GIS analysis was undertaken with open-source data from the NL Department of Fisheries, Forestry, and Agriculture (NL FFA) (NL FFA, 2025). Habitat and forestry inventories were analyzed in ArcGIS to gain a preliminary understanding of the habitat types and geographic features of the PA. This analysis was used to stratify effort proportionally across habitat types and ensure adequate spatial coverage of the PA. In addition, the preferred habitats of avian SAR were considered when selecting survey locations.

Given the remote nature of the PA and the challenging terrain, a helicopter was required to survey the full extent of the PA. In 2024, a foggy June led to a limited breeding bird survey season concerning coverage of the PA. However, in 2025 weather was much more conducive to helicopter, with data supplemented by a broad array of Acoustic Recording Units (ARUs) throughout the PA. This will build on the acoustic monitoring efforts from 2024, which are discussed separately in Section 2.3.

2.2.1 Survey Types

The different types of field surveys used during the Avifauna Baseline Study are described briefly below. Similar information was collected during each survey type, including:

- Species.
- Number of individuals.
- Age and sex (if available through observation).
- Observation type (i.e., visual or auditory).
- Atlassing code (e.g., S = Song, C = Call, Nm = Nest Material Carrying).
- Distance from observer.
- Direction from observer.
- Behaviour (e.g., in flight, perched in a tree, on the ground/water).
- Flight height and direction (if in flight).
- Weather, wind, location, observers, project, date, time, and duration at each point.
- Waypoints and Global Positioning System (GPS) coordinates (Universal Transverse Mercator [UTM]) of all point count locations and incidental observations while travelling between points are also collected.

Point Counts

Point count surveys (by sight and sound) were used to measure species richness and relative abundance at predetermined locations for 10 minutes each. Behaviour and activity (e.g., male and female pair together, food carrying for young, flight height, direction) were also opportunistically recorded. Point count locations were planned to ensure representative habitat coverage of the PA and RAA. Point count locations were resampled across seasons and years when feasible. Surveys began after sunrise, and the end time depended on the weather, the temperature, and the perceived activity of birds.

Waterbirds and Waterfowl

To assess the presence of waterfowl (e.g., ducks, geese) and other waterbirds (e.g., sandpipers, yellowlegs, etc.), wetlands and waterbodies present within the boundaries of the PA were opportunistically visited, and a 15-minute scan was conducted of the shorelines and open water using high-quality optics. Observations were made of sex, breeding evidence (i.e., presence of young), and

staging (i.e., resting during migration, often in groups). In addition, any observations of waterfowl detected from the helicopter were opportunistically recorded.

Raptor Sky Scans

Raptors are not as readily identifiable via auditory cues like many other terrestrial birds. They often fly quietly while hunting, or soar high above the ground, especially near coastlines (Hanssen et al., 2020). To more accurately detect the presence of raptors, surveyors conducted sky scans on the ground where conditions were suitable (a large window of sky and horizon visible). Surveyors observed the sky and horizon for a set time (between 10-45 minutes, depending on conditions and vantage point) using high-quality optics (e.g., binoculars, spotting scopes). Sky scan surveys were often strategically located on elevated points where vegetation growth was low enough to provide the observer with a wide view of up to 1,000 m distance throughout various habitat types. In addition, surveyors would opportunistically search for raptors while transiting the PA via helicopter.

Forest raptors such as Merlin (*Falco columbarius*) and Sharp-shinned Hawk (*Accipiter striatus*) are more likely to be observed hunting at lower flight heights in their respective habitat types and were sought during point counts instead of sky scans.

Seabird Surveys

Seabird surveys were conducted along coastal areas using high-quality optics. Seabird surveys were conducted at sites with a wide field of view, as close to 360 degrees as possible. Specific coastal habitats were targeted for different species (e.g., beach vs. cliff edges). An array of these coastal habitat types was selected to provide coverage of various seabirds that use the area. The coastal ecotype represented only 0.27% of the total land coverage of the PA (see Appendix D3: ELC), and there are no proposed wind turbine locations closer than 400 meters from the coast. However, since seabirds are known to be attracted to lights (and there will be lights on turbine installations), especially Leach's Storm Petrel (*Hydrobates leucorhous*) emphasis was placed on ensuring a disproportionately high amount of survey effort for the coast.

Opportunistic Observations

While moving around the PA and RAA for the various terrestrial surveys for the Project, surveyors occasionally noted opportunistic observations of avifauna. This included observations from ground surveys and the helicopter. Emphasis was placed on seabirds, raptors, waterfowl, and Short-eared Owl, given the limited distance for species identification.

2.3 Acoustic Monitoring

To ensure that North Atlantic had sufficient data to assess bird assemblages, three autonomous recording units (ARUs) (Wildlife Acoustics Song Meter SM4s) were placed in the PA (n=2, May 6 to October 29) and RAA (n=1, May 23 to October 24) in 2024. The ARUs were programmed to record during three time periods a day, at times of higher bird activity. The ARUs recorded for a two-hour duration at the following times:

- Midnight (00:00 to 02:00) – targeting nocturnal bird activity like owls
- Morning (5:30 to 7:30) – focusing on the dawn chorus
- Evening (19:30 to 21:30) – directed at crepuscular species

To create usable data from the large amounts of raw audio footage, the application BirdNET-Analyzer was used. This software identifies birds from audio recordings and can produce spreadsheets that indicate the time the bird was identified, species, and the confidence level of each identification. Settings were verified to ensure results were accurate. Any identifications with a confidence level less than 50% were omitted from the results. A sensitivity of 1 was used as per the program recommendation. Recordings of any potential SAR or SCC were manually verified by a biologist. This extra step eliminated any false positives of SAR or SCC. Any out-of-range or unexpected species were also reviewed to ensure accuracy.

The locations of the ARUs were discussed below. Figure D1-2.3-4 displays the locations of the ARUs deployed in 2024.

ARU 1 - Rocky Bog (47.795924, -53.79338): ARU 1 was situated in a small fen wetland in a valley between rocky barren uplands in the southern portion of the PA. This ARU was sited to collect data on avian species utilizing rocky barren habitat as well as the wetland (poor fen), and the black spruce (*Picea mariana*), and eastern larch (*Larix laricina*) scrub habitats.



Figure D1-2.2-1 PA ARU 1 mounted to a tree in the upland barrens with small fen.

ARU 2 - Goose Pond Ridge (47.869344, -53.80839): ARU 2 was situated on the side of a steep ridge (near Goose Pond, in the northern part of the proposed Wind Farm area) in the PA. Uphill to the west is a mountaintop barren dominated by *Cladonia* lichens and scrub black spruce trees, and downhill to the east is a mature mixedwood forest with a large stand of paper birch (*Betula papyrifera*) surrounded by balsam fir (*Abies balsamea*). At the bottom of the slope is a marsh. This ARU was strategically positioned to record birds from all these surrounding habitats.



Figure D1-2.2-2 PA ARU 2 deployed on a slope above mature forest below.

RAA ARU 1 - Turbine Bog (47.73551, -53.922409): ARU 1 was deployed in the RAA on the periphery of a large fen with several open water areas. The fen was enveloped by mature coniferous forest, so the ARU was positioned to record wetland and forest specialist bird species.



Figure D1-2.2-3 RAA ARU 1 deployed in the RAA in a mature forest with fen in the background.



	FIGURE TITLE:	NOTES	PREPARED BY:	DATE:
	Autonomous Recording Unit (ARU) Locations		J. Crocker	09/07/2025
	PROJECT TITLE:		REVIEWED BY:	C. Bursey 09/07/2025
	North Atlantic Wind to Hydrogen Project		APPROVED BY:	C. Collins 09/07/2025
			CRS:	WGS 1984 UTM Zone 22N
			sem	

SEM MAP ID: 016-015-GIS-526-Rev0

Figure D1-2.3-4 ARU locations.

3.0 Results

3.1 Desktop Study

The boundaries of the PA, LAA and RAA do not overlap with any Canadian Important Bird Areas (IBAs), National Wildlife Areas, or Migratory Bird Sanctuaries. The PA falls within Atlas Region 6 (Bonavista-Placentia West) and Atlas Region 7 (Avalon) of the Newfoundland Breeding Bird Atlas.

Relevant legislation for the Project includes the federal **Migratory Birds Convention Act** (MBCA), which protects migratory birds, their nests, and eggs. Many bird families are protected under this Act, including all waterfowl species and most species of perching birds. Taxonomic families protected under the MBCA include warblers, thrushes, chickadees, sparrows, flycatchers, waterfowl, swallows, gulls, and terns, among others. In addition, the **Migratory Birds Regulations** (MBR) prohibit the capture, kill, take, injury, or harassment of a migratory bird and protect migratory bird nests. Raptors and owls are protected under the provincial **Wildlife Act**.

3.1.1 Species at Risk

A desktop review was conducted to identify all federally and provincially protected avifauna SAR whose range included insular Newfoundland, resulting in the identification of twenty-three (23) species. Table D1-3.1-1 lists the conservation status of these birds according to the Newfoundland and Labrador **Endangered Species Act** (NL ESA), the federal **Species at Risk Act** (SARA), and the International Union for Conservation of Nature (IUCN) Red List of Threatened Species (IUCN, 2024).

Table D1-3.1-1 Conservation status of avifauna SAR in NL.

Common Name	Scientific Name	NL ESA	SARA	IUCN Red List
Bank Swallow	<i>Riparia riparia</i>	Threatened	Threatened	Least Concern
Barn Swallow	<i>Hirundo rustica</i>	Vulnerable	Threatened	Least Concern
Barrow's Goldeneye	<i>Bucephala islandica</i>	Vulnerable	Special Concern	Least Concern
Bobolink	<i>Dolichonyx oryzivorus</i>	Vulnerable	Threatened	Least Concern
Common Nighthawk	<i>Chordeiles minor</i>	Vulnerable	Special Concern	Least Concern
Eskimo Curlew	<i>Numenius borealis</i>	Endangered	Endangered	Critically Endangered
Evening Grosbeak	<i>Hesperiphona vespertina</i>	Vulnerable	Special Concern	Vulnerable
Harlequin Duck	<i>Histrionicus histrionicus</i>	Vulnerable	Special Concern	Least Concern
Hudsonian Godwit	<i>Limosa haemastica</i>	Threatened	Not Listed*	Least Concern
Ivory Gull	<i>Pagophila eburnea</i>	Endangered	Endangered	Near Threatened
Leach's Storm Petrel	<i>Oceanodroma leucorhoa</i>	Threatened	Not Listed*	Vulnerable
Lesser Yellowlegs	<i>Tringa flavipes</i>	Threatened	Not Listed*	Least Concern

Common Name	Scientific Name	NL ESA	SARA	IUCN Red List
Newfoundland Gray-cheeked Thrush	<i>Catharus minimus minimus</i>	Threatened	Not Listed*	Least Concern**
Olive-sided Flycatcher	<i>Contopus cooperi</i>	Vulnerable	Special Concern	Near Threatened
Peregrine Falcon (anatum)	<i>Falco peregrinus anatum</i>	Vulnerable	Not Listed	Least Concern**
Peregrine Falcon (tundra)	<i>Falco peregrinus tundrius</i>	Vulnerable	Not Listed	Least Concern**
Piping Plover <i>melodus</i> subspecies	<i>Charadrius melanops melanops</i>	Endangered	Endangered	Near Threatened
Red Crossbill <i>percna</i> subspecies	<i>Loxia curvirostra percna</i>	Threatened	Threatened	Least Concern**
Red Knot	<i>Calidris canutus rufa</i>	Endangered	Endangered	Near Threatened**
Red-necked Phalarope	<i>Phalaropus lobatus</i>	Vulnerable	Special Concern	Least Concern
Ross's Gull	<i>Rhodostethia rosea</i>	Not Listed	Threatened	Least Concern
Rusty Blackbird	<i>Euphagus carolinus</i>	Vulnerable	Special Concern	Vulnerable
Short-eared Owl	<i>Asio flammeus</i>	Threatened	Special Concern	Least Concern
<u>Notes</u>				
*Under consideration for addition to Schedule 1 of the SARA as Threatened.				
**IUCN Red List ranking is not specific to subspecies.				

3.1.2 AC CDC Results

The AC CDC request yielded records of thirty (30) avifauna species, ten (10) of which were SAR, and twenty (20) were SCC. The data provided included dated and recent observations. Bird SAR and SCC are presented in Tables D1-3.1-2 (SAR) and D1-3.1-3 (SCC). S-ranks and observation dates are provided alongside the species names. A map of AC CDC results within a 5 km radius of the PA boundary is presented as Figure D1-3.1-1.

Table D1-3.1-2 AC CDC results – Species at Risk.

Common Name	Scientific Name	Observation Date(s)	S-Rank
Barn Swallow	<i>Hirundo rustica</i>	2011	S2B, SUM
Barrow's Goldeneye	<i>Bucephala islandica</i>	1993	S1B, S2N, SUM
Bobolink	<i>Dolichonyx oryzivorus</i>	1972; 2019	S1B, SUM
Harlequin Duck	<i>Histrionicus histrionicus</i>	2019	S2B, S2N
Lesser Yellowlegs	<i>Tringa flavipes</i>	2016-2018; 2021; 2022	S2S3M
Newfoundland Gray-cheeked Thrush	<i>Catharus minimus</i>	1990	S2B, SUM
Red Crossbill	<i>Loxia curvirostra</i>	2003; 2006	S1S2
Red Knot	<i>Calidris canutus rufa</i>	1999; 2000; 2002-2011; 2015-2018; 2021; 2022	S2M
Red-necked Phalarope	<i>Phalaropus lobatus</i>	2022	S3S4N
Short-eared Owl	<i>Asio flammeus</i>	2015	S2S3B

Table D1-3.1-3 AC CDC results – Species of Conservation Concern.

Common Name	Scientific Name	Observation Date(s)	S-Rank
Black Scoter	<i>Melanitta americana</i>	2020	S2B, S2N, SUM
Black-bellied Plover	<i>Pluvialis squatarola</i>	2016; 2018; 2020-2022	S3M
Black-headed Gull	<i>Chroicocephalus ridibundus</i>	2010; 2016; 2020-2022	S1B, S3N, SUM
Caspian Tern	<i>Hydroprogne caspia</i>	1989; 2020	S2B, SUM
Great Cormorant	<i>Phalacrocorax carbo</i>	2016; 2020; 2021	S3B, S3N
Greater Yellowlegs	<i>Tringa melanoleuca</i>	2019-2022	S3B, S4M
Gyrfalcon	<i>Falco rusticolus</i>	2011	S2S3N, SUM
Least Sandpiper	<i>Calidris minutilla</i>	2016; 2021	S3B, S4M
Lesser Black-backed Gull	<i>Larus fuscus</i>	2022	S3N, SUM
Northern Gannet	<i>Morus bassanus</i>	2018; 2019	S2B
American Goshawk	<i>Astur atricapillus</i>	2019	S3
Northern Harrier	<i>Circus hudsonius</i>	2005	S3B, SUM
Rough-legged Hawk	<i>Buteo lagopus</i>	2002	S2S3
Ruddy Turnstone	<i>Arenaria interpres</i>	2016-2018; 2020-2022	S2S3M
Sanderling	<i>Calidris alba</i>	2017; 2020-2022	S2N, S3M
Semipalmated Plover	<i>Charadrius semipalmatus</i>	2016; 2017; 2020-2022	S1B, S4M
Semipalmated Sandpiper	<i>Calidris pusilla</i>	2016; 2021; 2022	S3M
Short-billed Dowitcher	<i>Limnodromus griseus</i>	2016-2018; 2020; 2021	S3M
Whimbrel	<i>Numenius phaeopus</i>	2021	S2S3M
White-rumped Sandpiper	<i>Calidris fuscicollis</i>	2016; 2017; 2020-2022	S3M

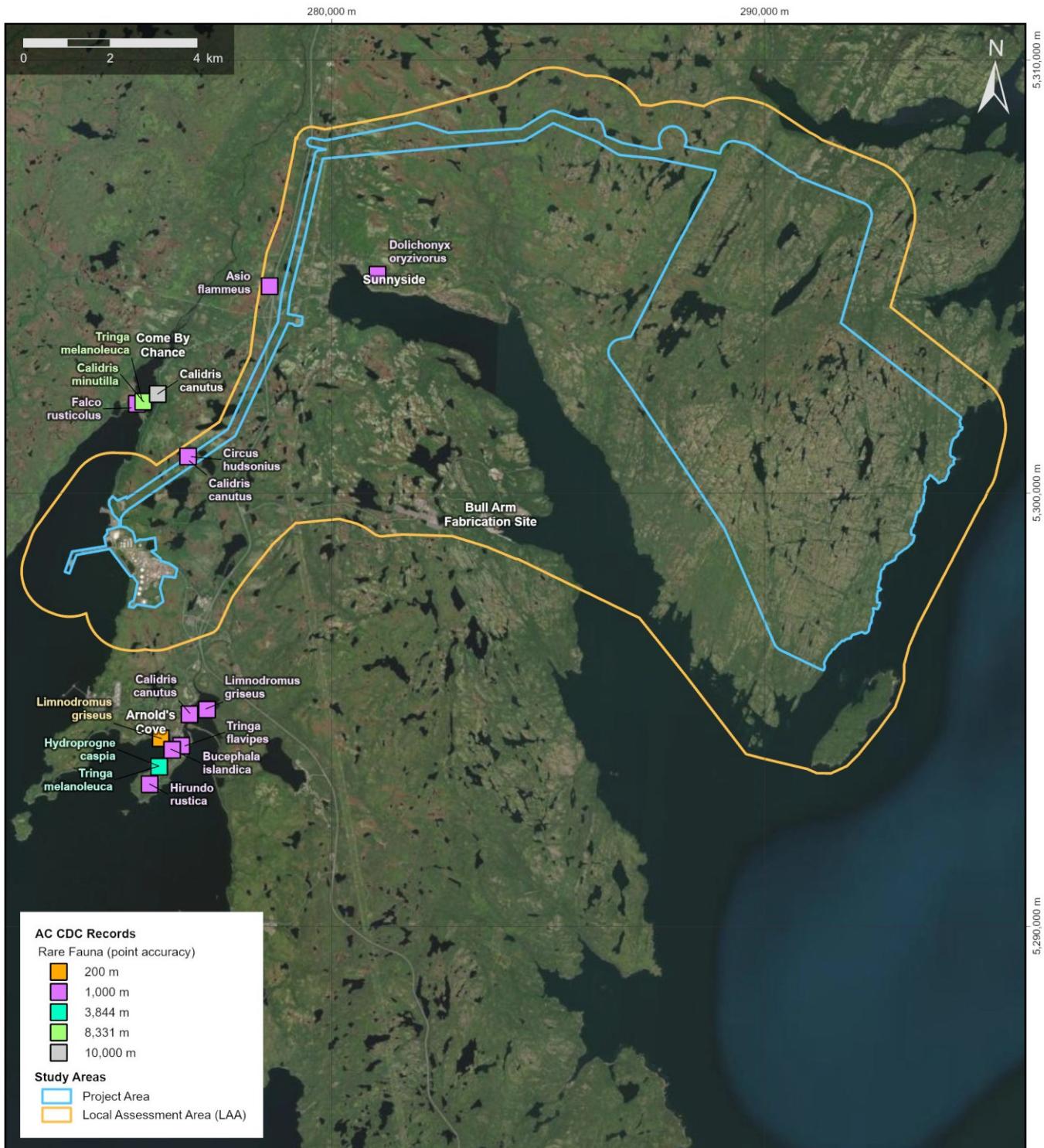


	FIGURE TITLE:	<p>AC CDC Results</p> <p>PROJECT TITLE: North Atlantic Wind to Hydrogen Project</p>	NOTES:	PREPARED BY:	DATE:
			Rare fauna records adapted from data/mapping provided by the Atlantic Canada Conservation Data Centre (AC CDC).	J. Crocker	10/07/2025

SEM MAP ID: 016-016-GIS-525-Rev0

Figure D1-3.1-1 AC CDC results for birds in the 5 km radius around the PA.

3.1.3 Historical Anecdotal Information from the PA

A review of open-source databases (iNaturalist and eBird) was undertaken to compile a list of birds that have been observed in the PA, presented in Table D1-3.1-4. The results showed only one SAR observation, the Lesser Yellowlegs (*Tringa flavipes*), listed as Threatened under SARA and by COSEWIC, observed in 2023.

Table D1-3.1-4 Anecdotal avifauna observations in the PA.

Common Name	Scientific Name	Observation Date(s)	Platform*
American Crow	<i>Corvus brachyrhynchos</i>	2023	eBird
American Goldfinch	<i>Spinus tristis</i>	2023	eBird
American Herring Gull	<i>Larus smithsonianus</i>	2023	eBird
American Robin	<i>Turdus migratorius</i>	2017	eBird
Bald Eagle	<i>Haliaeetus leucocephalus</i>	2023	eBird
Black Guillemot	<i>Cephus grylle</i>	2018	eBird
Black-legged Kittiwake	<i>Rissa tridactyla</i>	2017	eBird
Black-throated Green Warbler	<i>Setophaga virens</i>	2024	iNaturalist
Blue Jay	<i>Cyanocitta cristata</i>	2023	eBird
Boreal Chickadee	<i>Poecile hudsonicus</i>	2017	eBird
Canada Goose	<i>Branta canadensis</i>	2019, 2023	eBird
Canada Jay	<i>Perisoreus canadensis</i>	2021	iNaturalist
Common Loon	<i>Gavia immer</i>	2020, 2023	iNaturalist
Common Tern	<i>Sterna hirundo</i>	2023	eBird
Dark-eyed Junco	<i>Junco hyemalis</i>	2023	eBird
Double-crested Cormorant	<i>Nannopterum auritum</i>	2017	eBird
European Starling	<i>Sturnus vulgaris</i>	2017	eBird
Fox Sparrow	<i>Passerella iliaca</i>	2018	eBird
Glaucous Gull	<i>Larus hyperboreus</i>	2017	eBird
Great Black-backed Gull	<i>Larus marinus</i>	2018	eBird
Greater Yellowlegs	<i>Tringa melanoleuca</i>	2018	eBird
House Sparrow	<i>Passer domesticus</i>	2018	eBird
Iceland Gull	<i>Larus glaucopterus</i>	2019	eBird
Lesser Yellowlegs	<i>Tringa flavipes</i>	2023	eBird
Northern Gannet	<i>Morus bassanus</i>	2017	eBird
Northern Harrier	<i>Circus hudsonius</i>	2022	eBird
Osprey	<i>Pandion haliaetus</i>	2023	eBird
Pine Siskin	<i>Spinus pinus</i>	2018	eBird
Red-breasted Merganser	<i>Mergus serrator</i>	2019	eBird
Ring-billed Gull	<i>Larus delawarensis</i>	2017	eBird
Spotted Sandpiper	<i>Actitis macularius</i>	2018	eBird
White-throated Sparrow	<i>Zonotrichia albicollis</i>	2017	eBird
White-winged Dove	<i>Zenaidura asiatica</i>	2016	eBird

Common Name	Scientific Name	Observation Date(s)	Platform*
Wilson's Warbler	<i>Cardellina pusilla</i>	2021	iNaturalist
Yellow Warbler	<i>Setophaga petechia</i>	2018	eBird
Yellow-bellied Flycatcher	<i>Empidonax flaviventris</i>	2016	iNaturalist
<u>Notes</u> (iNaturalist, n.d.; eBird, 2025)			

3.2 Field Surveys

Field surveys were conducted throughout the PA and RAA since 2023. Results from those surveys were broken down by location (PA vs RAA), and further by bird season (bird seasonal temporal windows). Survey effort varied between the PA and RAA; surveys in the RAA began in 2023 and ended in mid-2024, whereas surveys in the PA commenced in 2024 and will continue through 2025. Incidental observations made between point counts

3.2.1 Project Area Results

Field surveys began in the PA in January 2024 and will continue through to fall 2025 to ensure a dataset that comprises each bird season for two complete years. Data collected during these surveys are presented in this section, organized by the defined bird seasonal windows. Due to weather constraints and helicopter availability, surveys were not undertaken at regular intervals but rather were done where possible, while ensuring that at least one survey was conducted during each season. This section provides data from point count surveys, supplemented with occasional incidental observations made while transiting between point counts. Seabird survey and raptor scan data are presented separately.

Note that in early March 2025, the PA boundaries were slightly altered to amalgamate the transmission line and access road corridors. This change occurred after the completion of some avifauna surveys, thus certain observations may fall outside of the current PA boundaries. However, due to the general activity of birds and the proximity of observations to the current PA boundaries, these observations will remain in the dataset. Dedicated avifauna survey dates are provided in Table D1-3.2-1. Avifauna survey effort in the PA during 2024 and 2025 is presented spatially in Figure D1-3.2-1.

Table D1-3.2-1 Survey dates, PA.

Bird Season	2024	2025
Early Breeding Birds/Spring Migration	<ul style="list-style-type: none"> May 6 	Conducted by ARU
Breeding Season	<ul style="list-style-type: none"> June 19 June 21 June 22 June 23 June 24 	<ul style="list-style-type: none"> June 9 June 10 June 11 June 23 June 24

Bird Season	2024	2025
		<ul style="list-style-type: none"> • June 26
Fall Migration	<ul style="list-style-type: none"> • September 12 • September 25 • October 18 	ARU survey planned
Overwintering/Resident	<ul style="list-style-type: none"> • January 24 • February 8 • February 21 • March 5 • March 20 • April 10 • November 4 	<ul style="list-style-type: none"> • January 17 • January 31 • February 6 • February 20 • March 28

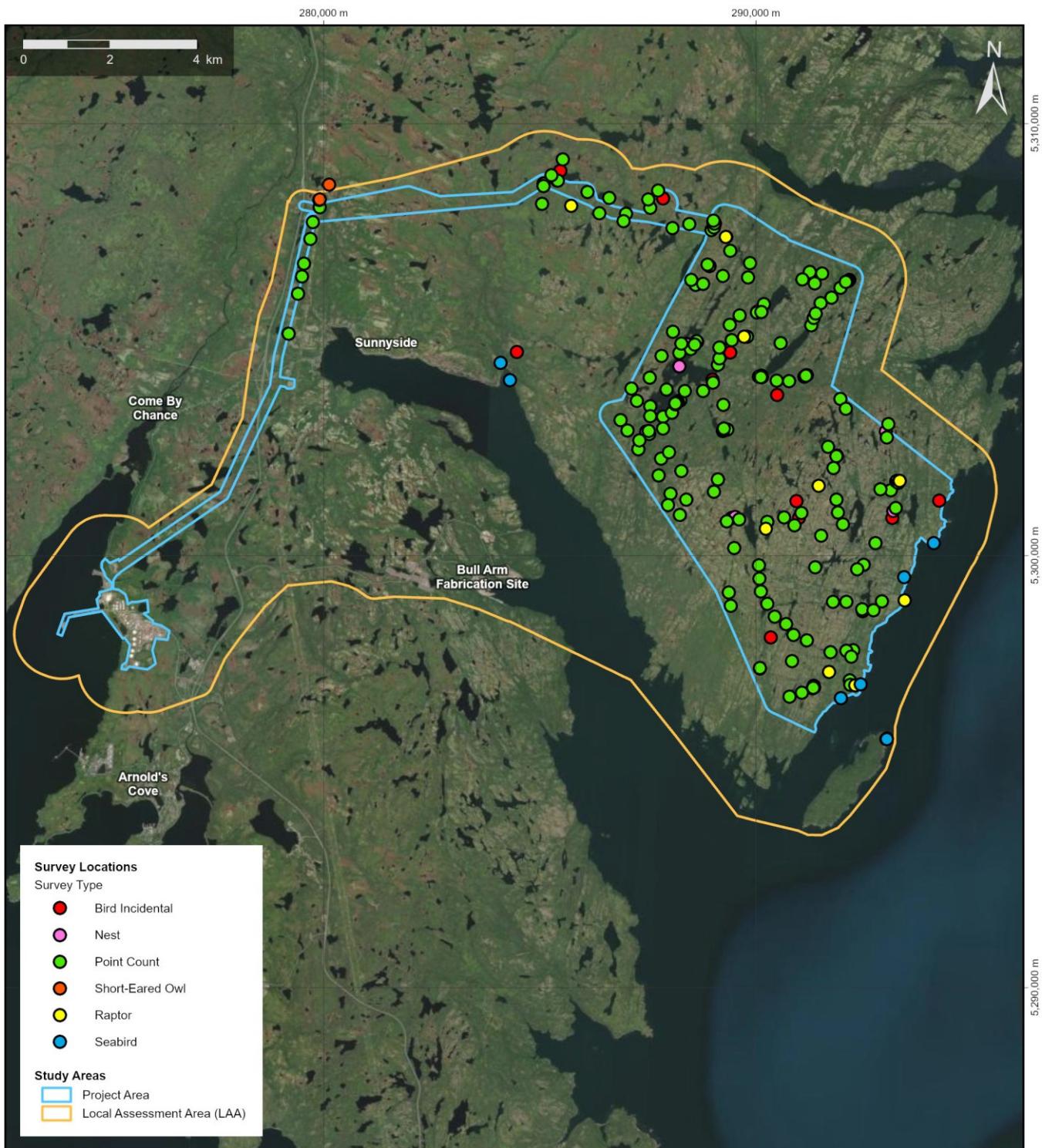


Figure D1-3.2-1 Avifauna survey effort in the PA.

3.2.1.1 Spring Migration and Early Breeding Birds

The temporal window for early breeding birds and spring migration included April 15 through May 31. During this window, many migratory birds arrive in NL from southern locations to breed and rear young throughout the summer. It is also the temporal window associated with early breeding birds, which includes the corvid species, owls, and some resident or short-distance migratory raptors.

2024

One early breeding birds/spring migration survey was undertaken on May 6, 2024 (total of 6 point counts), resulting in the following avifauna observations presented in Table D1-3.2-2. In total, 50 observations were made of 13 different species. Aside from Savannah Sparrow and Yellow-rumped Warbler (and possibly American Robin), the species on this list are primarily residents of insular Newfoundland year-round, and do not leave the island in the fall for southerly climes. Bald Eagles are primarily residents of Newfoundland year-round, usually seeking ice-free coastal areas to find food, or hunting and scavenging inland.

Table D1-3.2-2 Total birds observed, early breeding birds/spring migration window, PA, 2024.

Common Name	Scientific Name	Total # Observations
American Herring Gull	<i>Larus smithsonianus</i>	14
Common Raven	<i>Corvus corax</i>	11
Pine Siskin	<i>Spinus pinus</i>	5
Yellow-rumped Warbler	<i>Setophaga coronata</i>	5
Savannah Sparrow	<i>Passerculus sandwichensis</i>	3
Dark-eyed Junco	<i>Junco hyemalis</i>	3
Boreal Chickadee	<i>Poecile hudsonicus</i>	2
Northern Harrier	<i>Circus hudsonius</i>	2
Bald Eagle	<i>Haliaeetus leucocephalus</i>	1
Black-capped Chickadee	<i>Poecile atricapillus</i>	1
Pine Grosbeak	<i>Pinicola enucleator</i>	1
American Robin	<i>Turdus migratorius</i>	1
American Goldfinch	<i>Spinus tristis</i>	1

Most birds observed were at or below tree level (0 to 15 m above the ground), and remained within the habitat being surveyed. However, some birds were observed flying above point count locations – these are referred to as flyovers. Where possible, surveyors recorded the height above ground and flight direction of these birds. Nine (9) avifauna observations were recorded as flyovers during surveys in spring 2024 – the data is presented in Table D1-3.2-3.

Table D1-3.2-3 Flying height and direction of flyover birds, spring 2024.

Common Name	Scientific Name	# Observed	Height (m)	Direction
American Goldfinch	<i>Spinus tristis</i>	1	30–60	Southeast
Bald Eagle	<i>Haliaeetus leucocephalus</i>	1	60–100	North
Common Raven	<i>Coragyps atratus</i>	11	30–60	East
Dark-eyed Junco	<i>Junco hyemalis</i>	1	0–15	West
Herring Gull	<i>Larus argentatus</i>	8	100+	North
Herring Gull	<i>Larus argentatus</i>	3	100+	South
Herring Gull	<i>Larus argentatus</i>	1	30–60	South
Pine Siskin	<i>Spinus pinus</i>	4	0–15	East
Yellow-rumped Warbler	<i>Setophaga coronata</i>	1	0–15	North

2025

To avoid the complications of attempting helicopter flights in what is typically a challenging time of year in Newfoundland, the approach to spring bird surveys in 2025 pivoted to the deployment of a large array of ARUs spread across the PA. In addition, incidental avifauna observations were noted while surveyors deployed ARUs in mid-April 2025, which included a suite of resident species, namely Black-capped Chickadee, Bald Eagle, Canada Goose, Golden-crowned Kinglet, American Robin, Hairy Woodpecker, Boreal Chickadee, Gray Jay, Dark-eyed Junco, and Pine Grosbeak. ARU data from the spring period will be analyzed in summer 2025 and a summary of results will be provided to NL WD. Four (4) observations of Bald Eagle were recorded as flyovers, presented in Table D1-3.2-4.

Table D1-3.2-4 Flying height and direction of flyover birds, spring 2025.

Common Name	Scientific Name	# Observed	Height (m)	Direction
Bald Eagle	<i>Haliaeetus leucocephalus</i>	1	30-60	Unknown
Bald Eagle	<i>Haliaeetus leucocephalus</i>	1	0-15	Unknown
Bald Eagle	<i>Haliaeetus leucocephalus</i>	1	30-60	Unknown
Bald Eagle	<i>Haliaeetus leucocephalus</i>	2	60-100	Unknown

3.2.1.2 Breeding Bird Season

The main breeding bird season for the Project was defined as June 1 to August 15. This is the period after spring migration and early breeding birds, when the majority of bird species establish territories (for those territorial species), undergo courtship, nest building, egg incubation, and rearing of young. During this season, bird surveys are typically conducted between June 1 and July 7 to encompass the most active period of vocalizations (e.g., singing males), breeding activity (e.g., male and female pairs, courtship, nest defence, etc.) and therefore heightened detectability. These passive auditory and visual surveys, in the forms of point counts, also ensure minimal disturbance to any potential nests or young, as they don't involve any disturbances to nests or individuals.

2024

Thirty-nine (39) breeding bird point counts were conducted in the PA in 2024. Some of the most common species were White-throated Sparrow, Yellow-bellied Flycatcher, Blackpoll Warbler, Hermit Thrush, Dark-eyed Junco, and Fox Sparrow. The species observed were all typical of surveys in eastern Newfoundland. In total, 344 observations were made of 32 different species (Table D1-3.2-5).

Table D1-3.2-5 Breeding birds observed in the PA, 2024.

Common Name	Scientific Name	Total # Observations
White-throated Sparrow	<i>Zonotrichia albicollis</i>	74
Yellow-bellied Flycatcher	<i>Empidonax flaviventris</i>	52
Blackpoll Warbler	<i>Setophaga striata</i>	36
Swamp Sparrow	<i>Melospiza georgiana</i>	20
Common Yellowthroat	<i>Geothlypis trichas</i>	19
Yellow-rumped Warbler	<i>Setophaga coronata</i>	18
Hermit Thrush	<i>Catharus guttatus</i>	16
Dark-eyed Junco	<i>Junco hyemalis</i>	15
Fox Sparrow	<i>Passerella iliaca</i>	14
Northern Waterthrush	<i>Parkesia noveboracensis</i>	14
Black-and-white Warbler	<i>Mniotilla varia</i>	11
Canada Jay	<i>Perisoreus canadensis</i>	7
Savannah Sparrow	<i>Passerculus sandwichensis</i>	5
Wilson's Warbler	<i>Cardellina pusilla</i>	5
Palm Warbler	<i>Setophaga palmarum</i>	4
Common Loon	<i>Gavia immer</i>	4
Red Crossbill	<i>Loxia curvirostra percna</i>	4
Ruby-crowned Kinglet	<i>Corthylio calendula</i>	4
Northern Flicker	<i>Colaptes auratus</i>	4
Osprey	<i>Pandion haliaetus</i>	3
Willow Ptarmigan	<i>Lagopus lagopus</i>	2
Boreal Chickadee	<i>Poecile hudsonicus</i>	2
Black-capped Chickadee	<i>Poecile atricapillus</i>	2
White-winged Crossbill	<i>Loxia leucoptera</i>	1
Purple Finch	<i>Haemorhous purpureus</i>	1
Wilson's Snipe	<i>Gallinago delicata</i>	1
Bald Eagle	<i>Haliaeetus leucocephalus</i>	1
Common Tern	<i>Sterna hirundo</i>	1
Spotted Sandpiper	<i>Actitis macularius</i>	1
Belted Kingfisher	<i>Megaceryle alcyon</i>	1
Merlin	<i>Falco columbarius</i>	1

Common Name	Scientific Name	Total # Observations
American Robin	<i>Turdus migratorius</i>	1

2025

Sixty-five (65) ten-minute breeding bird point counts were conducted in the PA in 2025, over a much larger geographic area than could be accessed in 2024, including coverage of the entire Wind Farm area. Like 2024, some of the most common observations were of typical boreal forest birds like White-throated Sparrow, Yellow-bellied Flycatcher, Blackpoll Warbler, Hermit Thrush, Dark-eyed Junco, and Fox Sparrow. The species on the list below were all typical of surveys in eastern Newfoundland during breeding season (Table D1-3.2-6). In total, 1,391 observations were made of 45 different species.

Table D1-3.2-6 Breeding birds observed in the PA, 2025.

Common Name	Scientific Name	Total # Observations
White-throated Sparrow	<i>Zonotrichia albicollis</i>	378
Hermit Thrush	<i>Catharus guttatus</i>	193
Common Loon	<i>Gavia immer</i>	177
Yellow-bellied Flycatcher	<i>Empidonax flaviventris</i>	109
Blackpoll Warbler	<i>Setophaga striata</i>	91
Swamp Sparrow	<i>Melospiza georgiana</i>	72
Common Yellowthroat	<i>Geothlypis trichas</i>	61
Yellow-rumped Warbler	<i>Setophaga coronata</i>	53
Savannah Sparrow	<i>Passerculus sandwichensis</i>	46
Northern Waterthrush	<i>Parkesia noveboracensis</i>	38
Dark-eyed Junco	<i>Junco hyemalis</i>	25
Black-and-white Warbler	<i>Mniotilla varia</i>	19
Ruby-crowned Kinglet	<i>Corthylio calendula</i>	19
Bald Eagle	<i>Haliaeetus leucocephalus</i>	13
American Robin	<i>Turdus migratorius</i>	12
Canada Goose	<i>Branta canadensis</i>	11
Fox Sparrow	<i>Passerella iliaca</i>	7
American Crow	<i>Corvus brachyrhynchos</i>	6
White-winged Crossbill	<i>Loxia leucoptera</i>	6
Boreal Chickadee	<i>Poecile hudsonicus</i>	5
Magnolia Warbler	<i>Setophaga magnolia</i>	5
Wilson's Warbler	<i>Cardellina pusilla</i>	5
American Black Duck	<i>Anas rubripes</i>	4
Black-capped Chickadee	<i>Poecile atricapillus</i>	3
Herring Gull	<i>Larus smithsonianus</i>	3
Pine Siskin	<i>Spinus pinus</i>	3
Black-throated Green Warbler	<i>Setophaga virens</i>	2
Canada Jay	<i>Perisoreus canadensis</i>	2

Common Name	Scientific Name	Total # Observations
Greater Yellowlegs	<i>Tringa melanoleuca</i>	2
Northern Flicker	<i>Colaptes auratus</i>	2
Purple Finch	<i>Haemorhous purpureus</i>	2
Red-breasted Nuthatch	<i>Sitta canadensis</i>	2
Swainson's Thrush	<i>Catharus ustulatus</i>	2
Wilson's Snipe	<i>Gallinago delicata</i>	2
American Redstart	<i>Setophaga ruticilla</i>	1
Belted Kingfisher	<i>Megaceryle alcyon</i>	1
Common Goldeneye	<i>Bucephala clangula</i>	1
Common Redpoll	<i>Acanthis Spp.</i>	1
Common Tern	<i>Sterna hirundo</i>	1
Lincoln's Sparrow	<i>Melospiza lincolni</i>	1
Mourning Warbler	<i>Geothlypis philadelphica</i>	1
Osprey	<i>Pandion haliaetus</i>	1
Pine Grosbeak	<i>Pinicola enucleator</i>	1
Red Crossbill	<i>Loxia curvirostra</i>	1
Spotted Sandpiper	<i>Actitis macularius</i>	1

3.2.1.3 Fall Migration

Aside from the resident species that remain year-round, migratory bird species depart Newfoundland each fall to overwinter in more southerly locations, from the United States to South American countries (depending on the species). In addition, Newfoundland receives some species from the Arctic that overwinter in the more temperate conditions around our coasts.

The fall migration temporal window was defined as August 16 to October 31 to encompass the largest breadth of migratory species possible (and because August 15 was used as a threshold for the end of the breeding season).

2024

Dedicated fall migration surveys were undertaken in the PA in early September, late September, and mid-October, with a total of twenty-seven (27) point count locations surveyed. Incidental observations were also recorded during other surveys (muskrat and rare lichens) in mid-October, which are included in the totals in Table D1-3.2-7. In total, 29 species were observed (n=155 observations).

Table D1-3.2-7 Fall birds observed in the PA, 2024.

Common Name	Scientific Name	Total # Observations
Golden-crowned Kinglet	<i>Regulus satrapa</i>	30
Boreal Chickadee	<i>Poecile hudsonicus</i>	20

Common Name	Scientific Name	Total # Observations
Canada Jay	<i>Perisoreus canadensis</i>	16
Dark-eyed Junco	<i>Junco hyemalis</i>	13
Black-capped Chickadee	<i>Poecile atricapillus</i>	13
White-winged Crossbill	<i>Loxia leucoptera</i>	8
Swamp Sparrow	<i>Melospiza georgiana</i>	7
American Crow	<i>Corvus brachyrhynchos</i>	7
Canada Goose	<i>Branta canadensis</i>	4
Northern Flicker	<i>Colaptes auratus</i>	3
Pine Grosbeak	<i>Pinicola enucleator</i>	3
White-throated Sparrow	<i>Zonotrichia albicollis</i>	3
Blue Jay	<i>Cyanocitta cristata</i>	3
Yellow-rumped Warbler	<i>Setophaga coronata</i>	3
Hairy Woodpecker	<i>Leuconotopicus villosus</i>	3
American Black Duck	<i>Anas rubripes</i>	2
Common Raven	<i>Corvus corax</i>	2
American Goshawk	<i>Astur atricapillus</i>	2
Bald Eagle	<i>Haliaeetus leucocephalus</i>	2
Pine Siskin	<i>Spinus pinus</i>	2
Song Sparrow	<i>Melospiza melodia</i>	1
Northern Harrier	<i>Circus hudsonius</i>	1
Palm Warbler	<i>Setophaga palmarum</i>	1
Common Redpoll	<i>Acanthis flammea</i>	1
Savannah Sparrow	<i>Passerculus sandwichensis</i>	1
Woodpecker spp.	N/A	1
Red Crossbill	<i>Loxia curvirostra percna</i>	1
Ruffed Grouse	<i>Bonasa umbellus</i>	1
Hermit Thrush	<i>Catharus guttatus</i>	1

The majority of bird observations were recorded at or below tree level (0 to 15 m above the ground) and remained within the habitat being surveyed. However, seventeen (17) avifauna observations were recorded as flyovers during surveys in fall 2024 (Table D1-3.2-8). These were observations of birds using the airspace above the treetops (and of most importance when discussing bird interactions with wind installations).

Table D1-3.2-8 Flying height and direction of flyover birds, fall 2024.

Common Name	Scientific Name	# Observed	Height (m)	Direction
American Black Duck	<i>Anas rubripes</i>	1	30–60	East
American Black Duck	<i>Anas rubripes</i>	1	30–60	South
American Crow	<i>Corvus brachyrhynchos</i>	3	100+	Northeast
American Crow	<i>Corvus brachyrhynchos</i>	3	60–100	North
American Goshawk	<i>Astur atricapillus</i>	2	60–100	Unknown

Common Name	Scientific Name	# Observed	Height (m)	Direction
Bald Eagle	<i>Haliaeetus leucocephalus</i>	2	60–100	Unknown
Bald Eagle	<i>Haliaeetus leucocephalus</i>	1	Unknown	Unknown
Common Raven	<i>Corvus corax</i>	1	30–60	Southwest
Common Raven	<i>Corvus corax</i>	1	60–100	South
Common Redpoll	<i>Acanthis flammea</i>	1	15–30	South
Dark-eyed Junco	<i>Junco hyemalis</i>	2	0–15	South
Northern Harrier	<i>Circus hudsonius</i>	1	60–100	Unknown
Pine Siskin	<i>Spinus pinus</i>	1	0–15	Unknown
Pine Siskin	<i>Spinus pinus</i>	1	15–30	South
Red Crossbill	<i>Loxia curvirostra pernix</i>	1	Unknown	North
White-winged Crossbill	<i>Loxia leucoptera</i>	8	30–60	East
Yellow-rumped Warbler	<i>Setophaga coronata</i>	1	0–15	North

3.2.1.4 Overwintering/Resident

The overwintering/resident temporal survey window was defined as November 1 to April 14. This encompassed the species that reside in Newfoundland year-round and those that overwinter on the island before leaving in the spring.

2024

Overwintering/resident bird surveys were conducted in the PA approximately every two weeks, beginning in late January and concluding on April 10, including forty-one (41) total point count locations. An all-terrain vehicle (ATV) was used for most of these surveys, later replaced by a helicopter, as much of the Wind Farm area atop the rocky hilltop was inaccessible by ATV. An additional survey was completed on November 4 to supplement the data for that period. A total of 281 observations were recorded across 19 different species, of which the White-winged Crossbill (*Loxia leucoptera*) was most prevalent (flocks of flyovers account for most of the observations). Also of note is the observation of two (2) Red Crossbill, a SAR (see Section 3.4 for further details on the SAR observed in the PA). The results from all 2024 winter bird surveys are presented in Table D1-3.2-9.

Table D1-3.2-9 Winter bird observations in the PA, 2024.

Common Name	Scientific Name	Total # Observations
White-winged Crossbill	<i>Loxia leucoptera</i>	123
Boreal Chickadee	<i>Poecile hudsonicus</i>	44
Bald Eagle	<i>Haliaeetus leucocephalus</i>	20
Black-capped Chickadee	<i>Poecile atricapillus</i>	20
Common Redpoll	<i>Acanthis flammea</i>	15
Canada Goose	<i>Branta canadensis</i>	12
Woodpecker spp.	N/A	9

Common Name	Scientific Name	Total # Observations
Golden-crowned Kinglet	<i>Regulus satrapa</i>	7
Common Raven	<i>Corvus corax</i>	6
Canada Jay	<i>Perisoreus canadensis</i>	6
American Crow	<i>Corvus brachyrhynchos</i>	4
American Herring Gull	<i>Larus smithsonianus</i>	4
Red Crossbill	<i>Loxia curvirostra percna</i>	2
Red-breasted Nuthatch	<i>Sitta canadensis</i>	2
Purple Finch	<i>Haemorhous purpureus</i>	1
Black-backed Woodpecker	<i>Picoides arcticus</i>	1
Sharp-shinned Hawk	<i>Accipiter striatus</i>	1
Pine Grosbeak	<i>Pinicola enucleator</i>	1
American Goshawk	<i>Astur atricapillus</i>	2
Ruffed Grouse	<i>Bonasa umbellus</i>	1

2025

Overwintering/resident bird surveys were conducted across a greater proportion of the proposed Wind Farm area in 2025 than in 2024. A helicopter replaced ATV efforts for 2025 surveys, due to the difficulties accessing the Wind Farm area from the ground (Appendix D4). Five (5) surveys were conducted between January 17 and March 28 (most were done concurrently with species-specific mammal surveys). These surveys, representing thirty-two (32) point counts locations, produced 81 total avifauna observations from 16 different species (Table D1-3.2-10).

Table D1-3.2-10 Winter bird observations in the PA, 2025.

Common Name	Scientific Name	Total # Observations
Boreal Chickadee	<i>Poecile hudsonicus</i>	13
Common Raven	<i>Corvus corax</i>	8
Canada Jay	<i>Perisoreus canadensis</i>	8
Golden-crowned Kinglet	<i>Regulus satrapa</i>	8
Hairy Woodpecker	<i>Leuconotopicus villosus</i>	7
American Crow	<i>Corvus brachyrhynchos</i>	7
Black-capped Chickadee	<i>Poecile atricapillus</i>	6
White-winged Crossbill	<i>Loxia leucoptera</i>	5
Downy Woodpecker	<i>Dryobates pubescens</i>	5
Northern Flicker	<i>Colaptes auratus</i>	3
Canada Goose	<i>Branta canadensis</i>	3
Purple Finch	<i>Haemorhous purpureus</i>	2
Pine Grosbeak	<i>Pinicola enucleator</i>	2
Common Redpoll	<i>Acanthis flammea</i>	2

Common Name	Scientific Name	Total # Observations
Black-backed Woodpecker	<i>Picoides arcticus</i>	1
Bald Eagle	<i>Haliaeetus leucocephalus</i>	1

3.2.1.5 Seabirds

Dedicated seabird surveys were conducted at different times of year using helicopter, and seabird information was supplemented by opportunistic data collected during other surveys. Although, the coastal ecotype represented only 0.27% of the total land coverage of the PA (see Appendix D3: ELC), and there are no proposed wind turbine locations on the coast, additional effort was placed on conducting seabird surveys in 2025, as seabirds are prone to attraction to lights on wind farms, so may be vulnerable to collisions without proper mitigation and monitoring in place. Therefore, the seabird surveys were conducted outside of the PA, in coastal locations in the LAA.

2024

Two seabird-specific overwintering surveys were conducted in the Sunnyside Harbour (within the LAA) on February 8, 2024, and February 21, 2024, resulting in 65 observations of 4 different species. These surveys targeted species that may be using the marine environment during winter. The results are presented in Table D1-3.2-11 (note that these species are not seabirds, but water-associated birds). None of the observations were flyovers.

Table D1-3.2-11 Results from seabird surveys in the PA, 2024.

Common Name	Scientific Name	Total # Observations
Red-breasted Merganser	<i>Mergus serrator</i>	32
Canada Goose	<i>Branta canadensis</i>	30
American Black Duck	<i>Anas rubripes</i>	2
Belted Kingfisher	<i>Megaceryle alcyon</i>	1

2025

Additional effort was given to seabird surveys in 2025 (a much more conducive year than 2024 for suitable weather for helicopter), especially along the cliffs on the eastern and southern sides of the PA, due to their potential for species like Black-legged Kittiwake (*Rissa tridactyla*), Common Murre (*Uria aalge*), and Thick-billed Murre (*Uria lomvia*) for nesting. A total of 4 surveys were undertaken, one in April and three in June.

These surveys resulted in a total of 95 observations from 10 different species. The results from these surveys are presented in Table D1-3.2-12.

Table D1-3.2-12 Results from seabird surveys in the PA, 2025.

Common Name	Scientific Name	Total # Observations
Black Guillemot	<i>Cephus grylle</i>	32
Herring Gull	<i>Larus smithsonianus</i>	28
Common Tern	<i>Sterna hirundo</i>	11
Ring-billed Gull	<i>Larus delawarensis</i>	11
Bald Eagle	<i>Haliaeetus leucocephalus</i>	5
Great Black-backed Gull	<i>Larus marinus</i>	2
Northern Gannet	<i>Morus bassanus</i>	2
Spotted Sandpiper	<i>Actitis macularius</i>	2
Common Loon	<i>Gavia immer</i>	1
Northern Harrier	<i>Circus hudsonius</i>	1

Many seabirds observed were recorded on or just above the water (0 to 15 m above the water) and remained within the habitat being surveyed. However, forty-four (44) seabird observations were recorded as flyovers (Table D1-3.2-13).

Table D1-3.2-13 Flying height and direction of flyover birds, seabird surveys 2025.

Common Name	Scientific Name	Height (m)	Direction
Herring Gull	<i>Larus argentatus</i>	15-30	South
Bald Eagle	<i>Haliaeetus leucocephalus</i>	60-100	West
Black Guillemot	<i>Cephus grylle</i>	0-15	Southwest
Northern Harrier	<i>Circus hudsonius</i>	15-30	West
Black Guillemot	<i>Cephus grylle</i>	0-15	West
Northern Gannet	<i>Morus bassanus</i>	15-30	Unknown
Herring Gull	<i>Larus argentatus</i>	0-15	Unknown
Herring Gull	<i>Larus argentatus</i>	15-30	East
Ring-billed Gull	<i>Larus delawarensis</i>	0-15	East
Ring-billed Gull	<i>Larus delawarensis</i>	30-60	Unknown
Ring-billed Gull	<i>Larus delawarensis</i>	15-30	Unknown
Ring-billed Gull	<i>Larus delawarensis</i>	15-30	North
Ring-billed Gull	<i>Larus delawarensis</i>	15-30	North
Herring Gull	<i>Larus argentatus</i>	15-30	Unknown
Ring-billed Gull	<i>Larus delawarensis</i>	15-30	Unknown
Herring Gull	<i>Larus argentatus</i>	15-30	North
Bald Eagle	<i>Haliaeetus leucocephalus</i>	60-100	North
Black Guillemot	<i>Cephus grylle</i>	0-15	South

Common Name	Scientific Name	Height (m)	Direction
Common Tern	<i>Sterna hirundo</i>	15-30	North
Black Guillemot	<i>Cephus grylle</i>	0-15	Northeast
Bald Eagle	<i>Haliaeetus leucocephalus</i>	0-15	West
Black Guillemot	<i>Cephus grylle</i>	0-15	Unknown
Herring Gull	<i>Larus argentatus</i>	15-30	South
Herring Gull	<i>Larus argentatus</i>	0-30	Unknown
Black Guillemot	<i>Cephus grylle</i>	0-15	South
Herring Gull	<i>Larus argentatus</i>	0-15	South
Black Guillemot	<i>Cephus grylle</i>	0-15	South
Herring Gull	<i>Larus argentatus</i>	30-60	North
Black Guillemot	<i>Cephus grylle</i>	0-15	South
Black Guillemot	<i>Cephus grylle</i>	0-15	South
Herring Gull	<i>Larus argentatus</i>	30-60	South
Black Guillemot	<i>Cephus grylle</i>	0-15	Unknown
Common Tern	<i>Sterna hirundo</i>	0-15	South
Black Guillemot	<i>Cephus grylle</i>	0-15	South
Black Guillemot	<i>Cephus grylle</i>	0-15	North
Ring-billed Gull	<i>Larus delawarensis</i>	30-60	Southeast
Herring Gull	<i>Larus argentatus</i>	30-60	Southeast
Ring-billed Gull	<i>Larus delawarensis</i>	30-60	Southeast
Common Tern	<i>Sterna hirundo</i>	0-15	East
Common Tern	<i>Sterna hirundo</i>	0-15	West
Herring Gull	<i>Larus argentatus</i>	15-30	West
Great Black-backed Gull	<i>Larus marinus</i>	15-30	East
Common Tern	<i>Sterna hirundo</i>	0-15	East-Southeast
Ring-billed Gull	<i>Larus delawarensis</i>	0-15	West

3.2.1.6 Raptors

2024

Dedicated raptor scans were conducted on the ground (i.e., observers scanning the sky for soaring raptors) and from a helicopter. The helicopter was used to scan coastal cliffs several times in search of raptor nests. In addition, surveyors noted incidental raptor observations while transiting the PA, both on foot and by helicopter. Bald Eagle (*Haliaeetus leucocephalus*) was the most commonly observed raptor in the PA, including juveniles and sub-adults (less than 4-5 years of age) and adults (defined as those

with adult black and white plumage). Most observations were located within a 1.5 km area of coastal cliffs in the eastern portion of the PA, where adults were observed perched on large conifers. Eagles were also observed along the ridgeline running laterally within the central-western portion of the PA.

Two observations were recorded during several dedicated raptor scans, presented in Table D1-3.2-14, along with locations and supplemental information, if available. Any raptors observed during point count surveys (or as incidentals during point counts) were included with point count data in the field survey section above.

Table D1-3.2-14 Raptor survey results, 2024.

Common Name	Scientific Name	# Observed	Location	Date	Flying Height (m)	Direction	Description
Bald Eagle	<i>Haliaeetus leucocephalus</i>	1	47.8904082, -53.8666	June 19, 2024	100+	West	Adult
Bald Eagle	<i>Haliaeetus leucocephalus</i>	1	47.8851179, -53.8183	November 4, 2024	15-30	Unknown	Adult

2025

Surveyors conducted 6 raptor scans in 2025 (mostly during the breeding bird season), as presented in Table D1-3.2-15. Multiple observations were made of Bald Eagle, including two nests, one at (47.7900008591, -53.77760479) and another at (47.8156405991, -53.7595177). The locations of the nests are presented in Figure D1-3.2-2.

Table D1-3.2-15 Raptor survey results, 2025.

Common Name	Scientific Name	# Observed	Location	Date	Flying Height (m)	Direction	Description
Bald Eagle	<i>Haliaeetus leucocephalus</i>	1	47.81083881, -53.75913227	March 28, 2025	N/A	N/A	On a cliff edge
Bald Eagle	<i>Haliaeetus leucocephalus</i>	1	47.83571045, -53.7619	April 17, 2025	0-15	Unknown	
Bald Eagle	<i>Haliaeetus leucocephalus</i>	2	47.79000086, -53.77760479	June 9, 2025	N/A	N/A	Adults on nest
Bald Eagle	<i>Haliaeetus leucocephalus</i>	1	47.79000086, -53.77760479	June 9, 2025	30-60	Southeast	Juvenile
Bald Eagle	<i>Haliaeetus leucocephalus</i>	1	47.8904082, -53.8666	June 9, 2025	60-100	North	
Bald Eagle	<i>Haliaeetus leucocephalus</i>	1	47.79282665, -53.7733	June 10, 2025	N/A	N/A	On a tree
Bald Eagle	<i>Haliaeetus leucocephalus</i>	1	47.79282665, -53.7733	June 10, 2025	0-15	South	

Due to its more specialized ecological niche and diurnal nature (and because of its listing as an SAR), a dedicated Short-eared Owl (*Asio flammeus*) survey was conducted separately on June 25, 2025. The results of this survey are presented in Section 3.4.1 in the SAR section.



	FIGURE TITLE:	NOTES	PREPARED BY:	DATE:
	Bald Eagle Nest Observations in the Project Area		J. Crocker	2025-07-11
PROJECT TITLE:	North Atlantic Wind to Hydrogen Project		REVIEWED BY:	C. Bursey 2025-07-11
			APPROVED BY:	C. Collins 2025-07-11
			CRS:	WGS 1984 UTM Zone 22N
			sem	

SEM MAP ID: 016-015-GIS-530-Rev0

Figure D1-3.2-2 Locations of Bald Eagle nests observed in the PA, 2025.

3.2.2 Regional Assessment Area Results

For a regional context and to provide data for comparison to the Wind Farm area, field surveys in the RAA were conducted seasonally from May 2023 through October 2024. Survey data were organized by the bird seasonal windows defined for this report. Dedicated avifauna survey dates are provided in Table D1-3.2-16. This section provides data from point count surveys, supplemented with occasional incidental observations made while transiting between point counts. Seabird survey and raptor scan data are presented separately.

Table D1-3.2-16 Survey dates, RAA.

Bird Season	2023	2024
Early Breeding Birds/Spring Migration	<ul style="list-style-type: none">May 18May 24	<ul style="list-style-type: none">April 26May 23
Breeding Season	<ul style="list-style-type: none">June 21June 22June 23June 24June 29June 30July 1July 2July 3July 4July 7	<ul style="list-style-type: none">June 5June 7June 8June 9June 11June 12June 18June 19June 20June 24June 25June 26June 27July 24July 30
Fall Migration	<ul style="list-style-type: none">September 27October 20	<ul style="list-style-type: none">September 13September 24October 8October 9
Overwintering/Resident	<ul style="list-style-type: none">November 3November 15November 30December 21	<ul style="list-style-type: none">January 4February 9February 22March 7March 19April 5

3.2.2.1 Spring Migration and Early Breeding Birds

The temporal window for early breeding birds/spring migration included April 15 to May 31. During this window, migratory birds arrive in NL from southern locations to breed and rear young throughout the summer.

2023

A dedicated early breeding birds/spring migration bird survey was undertaken on May 24, 2023, and incidental observations were recorded during other fieldwork on May 18. In total, 173 observations were recorded of 22 different species at a total of nineteen (19) point count locations (Table D1-3.2-17).

Table D1-3.2-17 Spring birds observed in the RAA, 2023.

Common Name	Scientific Name	Total # Observations
White-throated Sparrow	<i>Zonotrichia albicollis</i>	26
Northern Waterthrush	<i>Parkesia noveboracensis</i>	21
Fox Sparrow	<i>Passerella iliaca</i>	15
Yellow-rumped Warbler	<i>Setophaga coronata</i>	15
Blackpoll Warbler	<i>Setophaga striata</i>	13
American Robin	<i>Turdus migratorius</i>	12
Swamp Sparrow	<i>Melospiza georgiana</i>	12
Wilson's Warbler	<i>Cardellina pusilla</i>	9
Hermit Thrush	<i>Catharus guttatus</i>	9
Common Yellowthroat	<i>Geothlypis trichas</i>	8
Ruby-crowned Kinglet	<i>Corthylio calendula</i>	7
Black-capped Chickadee	<i>Poecile atricapillus</i>	6
Dark-eyed Junco	<i>Junco hyemalis</i>	5
Golden-crowned Kinglet	<i>Regulus satrapa</i>	4
Ruffed Grouse	<i>Bonasa umbellus</i>	3
Boreal Chickadee	<i>Poecile hudsonicus</i>	2
Black-and-white Warbler	<i>Mniotilla varia</i>	1
Wilson's Snipe	<i>Gallinago delicata</i>	1
Common Loon	<i>Gavia immer</i>	1
Ring-necked Duck	<i>Aythya collaris</i>	1
Savannah Sparrow	<i>Passerculus sandwichensis</i>	1
Gull spp.	<i>Larus spp.</i>	1

2024

In 2024, early breeding birds/spring migration surveys were conducted on April 26 and May 23, at a total of sixteen (16) point count locations. A total of 286 observations were made of 28 different species. All observations are listed in Table D1-3.2-18.

Table D1-3.2-18 Spring birds observed in the RAA, 2024.

Common Name	Scientific Name	Observations
White-winged Crossbill	<i>Loxia leucoptera</i>	111
Pine Siskin	<i>Spinus pinus</i>	23
White-throated Sparrow	<i>Zonotrichia albicollis</i>	16
Boreal Chickadee	<i>Poecile hudsonicus</i>	16
American Robin	<i>Turdus migratorius</i>	15
American Crow	<i>Corvus brachyrhynchos</i>	15
Yellow-rumped Warbler	<i>Setophaga coronata</i>	13
Blackpoll Warbler	<i>Setophaga striata</i>	9
Hermit Thrush	<i>Catharus guttatus</i>	9
Ruby-crowned Kinglet	<i>Corthylio calendula</i>	8
Northern Waterthrush	<i>Parkesia noveboracensis</i>	7
Dark-eyed Junco	<i>Junco hyemalis</i>	6
Gull spp.	<i>Larus</i> spp.	5
Black-capped Chickadee	<i>Poecile atricapillus</i>	5
American Herring Gull	<i>Larus smithsonianus</i>	5
Fox Sparrow	<i>Passerella iliaca</i>	5
Northern Flicker	<i>Colaptes auratus</i>	4
Common Raven	<i>Corvus corax</i>	3
Canada Jay	<i>Perisoreus canadensis</i>	2
Swamp Sparrow	<i>Melospiza georgiana</i>	1
Ruffed Grouse	<i>Bonasa umbellus</i>	1
Common Loon	<i>Gavia immer</i>	1
Bald Eagle	<i>Haliaeetus leucocephalus</i>	1
Blue Jay	<i>Cyanocitta cristata</i>	1
Common Redpoll	<i>Acanthis flammea</i>	1
Wilson's Warbler	<i>Cardellina pusilla</i>	1
Black-and-white Warbler	<i>Mniotilla varia</i>	1
Domestic Rooster	<i>Gallus gallus domesticus</i>	1

3.2.2.2 Breeding Season

The bird nesting season in Newfoundland is from mid-April to mid-August, as per Environment and Climate Change Canada (ECCC) (ECCC, 2025). This temporal window encompasses the early breeding species, like some corvids and owls, to the late breeding passerines like the American Goldfinch. To maximize the detectability of the greatest suite of bird species, dedicated breeding bird surveys were conducted between June 1 and July 7. This period reflects when most species are most vocal and territorial (i.e., singing male passerines, aggressive defence of nests, etc.) and most easily observed for estimates of relative abundance.

2023

In the RAA in 2023, eleven (11) surveys were conducted from June 21 to July 5, at a total of eighty-eight (88) point count locations. A total of 1,060 observations were made of 53 different species. All observations are presented in Table D1-3.2-19. Two (2) Red Crossbills were observed, discussed further in Section 3.4.2 (Species at Risk). Red Crossbill was the only SAR detected in 2023 in the RAA.

Table D1-3.2-19 Breeding bird observations in the RAA, 2023.

Common Name	Scientific Name	Total # Observations
White-throated Sparrow	<i>Zonotrichia albicollis</i>	109
Yellow-bellied Flycatcher	<i>Empidonax flaviventris</i>	99
Blackpoll Warbler	<i>Setophaga striata</i>	94
Northern Waterthrush	<i>Parkesia noveboracensis</i>	88
Hermit Thrush	<i>Catharus guttatus</i>	70
Fox Sparrow	<i>Passerella iliaca</i>	65
Yellow-rumped Warbler	<i>Setophaga coronata</i>	58
Swamp Sparrow	<i>Melospiza georgiana</i>	51
Wilson's Warbler	<i>Cardellina pusilla</i>	49
American Robin	<i>Turdus migratorius</i>	49
Black-and-white Warbler	<i>Mniotilla varia</i>	43
Yellow Warbler	<i>Setophaga petechia</i>	25
Ruby-crowned Kinglet	<i>Corthylio calendula</i>	22
Common Yellowthroat	<i>Geothlypis trichas</i>	21
White-winged Crossbill	<i>Loxia leucoptera</i>	18
Black-capped Chickadee	<i>Poecile atricapillus</i>	17
Dark-eyed Junco	<i>Junco hyemalis</i>	15
Black-throated Green Warbler	<i>Setophaga virens</i>	15
Boreal Chickadee	<i>Poecile hudsonicus</i>	13
Savannah Sparrow	<i>Passerculus sandwichensis</i>	12
Wilson's Snipe	<i>Gallinago delicata</i>	11
Hairy Woodpecker	<i>Leuconotopicus villosus</i>	11
Golden-crowned Kinglet	<i>Regulus satrapa</i>	10
Canada Jay	<i>Perisoreus canadensis</i>	8
Mourning Warbler	<i>Geothlypis philadelphica</i>	7
Northern Flicker	<i>Colaptes auratus</i>	7
Magnolia Warbler	<i>Setophaga magnolia</i>	7
American Herring Gull	<i>Larus smithsonianus</i>	6
American Crow	<i>Corvus brachyrhynchos</i>	5
American Redstart	<i>Setophaga ruticilla</i>	5

Common Name	Scientific Name	Total # Observations
Common Raven	<i>Corvus corax</i>	5
American Goldfinch	<i>Spinus tristis</i>	5
Purple Finch	<i>Haemorhous purpureus</i>	4
Gull spp.	<i>Larus</i> spp.	4
Tennessee Warbler	<i>Leiothlypis peregrina</i>	3
Red-breasted Nuthatch	<i>Sitta canadensis</i>	3
Common Loon	<i>Gavia immer</i>	3
Northern Harrier	<i>Circus hudsonius</i>	2
Greater Yellowlegs	<i>Tringa melanoleuca</i>	2
Black-backed Woodpecker	<i>Picoides arcticus</i>	2
Spruce Grouse	<i>Canachites canadensis</i>	2
Red Crossbill	<i>Loxia curvirostra percna</i>	2
Bald Eagle	<i>Haliaeetus leucocephalus</i>	2
Song Sparrow	<i>Melospiza melodia</i>	2
Tree Swallow	<i>Tachycineta bicolor</i>	1
Woodpecker spp.	<i>Picidae</i> spp.	1
Brown Creeper	<i>Certhia americana</i>	1
Swainson's Thrush	<i>Catharus ustulatus</i>	1
Blackburnian Warbler	<i>Setophaga fusca</i>	1
Palm Warbler	<i>Setophaga palmarum</i>	1
Pine Grosbeak	<i>Pinicola enucleator</i>	1
Canada Warbler	<i>Cardellina canadensis</i>	1
Spotted Sandpiper	<i>Actitis macularius</i>	1

2024

Eleven (11) surveys were conducted from June 5 to 27 at a total of ninety-five (95) point count locations. A total of 1,858 observations were made of 64 different species. All observations are presented in Table D1-3.2-20. Two SAR were observed during these surveys, the Gray-cheeked Thrush (*Catharus minimus minimus*) (n=1) and Red Crossbill (n=20). These species are discussed further in Section 3.4.2.

Table D1-3.2-20 Breeding bird observations in the RAA, 2024.

Common Name	Scientific Name	Total # Observations
White-throated Sparrow	<i>Zonotrichia albicollis</i>	194
Blackpoll Warbler	<i>Setophaga striata</i>	167
Yellow-bellied Flycatcher	<i>Empidonax flaviventris</i>	140
Northern Waterthrush	<i>Parkesia noveboracensis</i>	130
Hermit Thrush	<i>Catharus guttatus</i>	113
Yellow-rumped Warbler	<i>Setophaga coronata</i>	110

Common Name	Scientific Name	Total # Observations
Fox Sparrow	<i>Passerella iliaca</i>	107
White-winged Crossbill	<i>Loxia leucoptera</i>	101
American Robin	<i>Turdus migratorius</i>	71
Pine Siskin	<i>Spinus pinus</i>	57
Black-and-white Warbler	<i>Mniotilla varia</i>	51
Swamp Sparrow	<i>Melospiza georgiana</i>	50
Common Yellowthroat	<i>Geothlypis trichas</i>	44
Wilson's Warbler	<i>Cardellina pusilla</i>	42
Yellow Warbler	<i>Setophaga petechia</i>	35
Ruby-crowned Kinglet	<i>Corthylio calendula</i>	34
Black-throated Green Warbler	<i>Setophaga virens</i>	30
Dark-eyed Junco	<i>Junco hyemalis</i>	28
Boreal Chickadee	<i>Poecile hudsonicus</i>	28
Black-capped Chickadee	<i>Poecile atricapillus</i>	27
Savannah Sparrow	<i>Passerculus sandwichensis</i>	22
Wilson's Snipe	<i>Gallinago delicata</i>	22
American Goldfinch	<i>Spinus tristis</i>	21
Pine Grosbeak	<i>Pinicola enucleator</i>	20
Red Crossbill	<i>Loxia curvirostra percna</i>	20
Mourning Warbler	<i>Geothlypis philadelphia</i>	20
American Redstart	<i>Setophaga ruticilla</i>	17
American Herring Gull	<i>Larus argentatus</i>	17
Canada Goose	<i>Branta canadensis</i>	14
Canada Jay	<i>Perisoreus canadensis</i>	13
Golden-crowned Kinglet	<i>Regulus satrapa</i>	11
Hairy Woodpecker	<i>Dryobates villosus</i>	10
Common Loon	<i>Gavia immer</i>	9
American Crow	<i>Corvus brachyrhynchos</i>	9
Spotted Sandpiper	<i>Actitis macularius</i>	7
Ruffed Grouse	<i>Bonasa umbellus</i>	5
Swainson's Thrush	<i>Catharus ustulatus</i>	5
Lincoln's Sparrow	<i>Melospiza lincolni</i>	5
Greater Yellowlegs	<i>Tringa melanoleuca</i>	5
Magnolia Warbler	<i>Setophaga magnolia</i>	4
Bald Eagle	<i>Haliaeetus leucocephalus</i>	3
American Goshawk	<i>Astur atricapillus</i>	3
Song Sparrow	<i>Melospiza melodia</i>	3
Northern Flicker	<i>Colaptes auratus</i>	3
Blue Jay	<i>Cyanocitta cristata</i>	3
Red-breasted Nuthatch	<i>Sitta canadensis</i>	3
Green-winged Teal	<i>Anas crecca</i>	2
Northern Harrier	<i>Circus hudsonius</i>	2

Common Name	Scientific Name	Total # Observations
Ring-necked Duck	<i>Aythya collaris</i>	2
Common Raven	<i>Corvus corax</i>	2
Blackburnian Warbler	<i>Setophaga fusca</i>	1
Gray-cheeked Thrush	<i>Catharus minimus</i>	1
Willow Ptarmigan	<i>Lagopus lagopus</i>	1
Blue-headed Vireo	<i>Vireo solitarius</i>	1
Yellow-throated Warbler	<i>Setophaga dominica</i>	1
Black-backed Woodpecker	<i>Picoides arcticus</i>	1
American Pipit	<i>Anthus rubescens</i>	1
Purple Finch	<i>Haemorhous purpureus</i>	1
Merlin	<i>Falco columbarius</i>	1
Red-eyed Vireo	<i>Vireo olivaceus</i>	1
Common Tern	<i>Sterna hirundo</i>	1
Palm Warbler	<i>Setophaga palmarum</i>	1
Black-bellied Plover	<i>Pluvialis squatarola</i>	1

3.2.2.3 Fall Migration

After the conclusion of the breeding season, many migratory bird species leave Newfoundland to overwinter in more southerly locations. The fall migration window was established as August 16 to October 31 to encompass the widest range of migratory bird species.

2023

In 2023, fall migration surveys took place on September 27 and October 20, at a total of eighteen (18) point count locations. A total of 274 observations were made of 24 different species, presented in Table D1-3.2-21. Fifteen (15) Red Crossbills, a Species at Risk, were observed on October 20, mostly represented by small flocks flying overhead. Red Crossbill is discussed further in Section 3.4.2 (Species at Risk).

Table D1-3.2-21 Fall bird observations in the RAA, 2023.

Species	Scientific Name	Total # Observations
White-winged Crossbill	<i>Loxia leucoptera</i>	85
Boreal Chickadee	<i>Poecile hudsonicus</i>	50
Blue Jay	<i>Cyanocitta cristata</i>	21
Pine Siskin	<i>Spinus pinus</i>	16
American Crow	<i>Corvus brachyrhynchos</i>	16
Red Crossbill	<i>Loxia curvirostra percna</i>	15
Black-capped Chickadee	<i>Poecile atricapillus</i>	13
Northern Flicker	<i>Colaptes auratus</i>	11

Species	Scientific Name	Total # Observations
American Robin	<i>Turdus migratorius</i>	11
Canada Jay	<i>Perisoreus canadensis</i>	9
Hermit Thrush	<i>Catharus guttatus</i>	5
Yellow-rumped Warbler	<i>Setophaga coronata</i>	4
Golden-crowned Kinglet	<i>Regulus satrapa</i>	3
Brown Creeper	<i>Certhia americana</i>	2
Gull spp.	N/A	2
Swamp Sparrow	<i>Melospiza georgiana</i>	2
Dark-eyed Junco	<i>Junco hyemalis</i>	2
Northern Harrier	<i>Circus hudsonius</i>	1
American Goldfinch	<i>Spinus tristis</i>	1
Bald Eagle	<i>Haliaeetus leucocephalus</i>	1
Canada Goose	<i>Branta canadensis</i>	1
Semipalmated Sandpiper	<i>Calidris pusilla</i>	1
American Black Duck	<i>Anas rubripes</i>	1
Fox Sparrow	<i>Passerella iliaca</i>	1

2024

Four (4) fall surveys were undertaken in September and October 2024, resulting in 291 observations of 36 different species. A total of twenty-eight (28) point count locations were surveyed. A summary of observations is presented in Table D1-3.2-22. Three (3) Red Crossbill were observed, discussed further in Section 3.4.2 (Species at Risk).

Table D1-3.2-22 Fall bird observations in the RAA, 2024.

Common Name	Scientific Name	Total # Observations
American Goldfinch	<i>Spinus tristis</i>	35
Swamp Sparrow	<i>Melospiza georgiana</i>	27
Canada Jay	<i>Perisoreus canadensis</i>	25
Black-capped Chickadee	<i>Poecile atricapillus</i>	24
Boreal Chickadee	<i>Poecile hudsonicus</i>	20
White-throated Sparrow	<i>Zonotrichia albicollis</i>	19
Golden-crowned Kinglet	<i>Regulus satrapa</i>	16
Pine Grosbeak	<i>Pinicola enucleator</i>	13
American Robin	<i>Turdus migratorius</i>	12
American Crow	<i>Corvus brachyrhynchos</i>	11
Dark-eyed Junco	<i>Junco hyemalis</i>	10
Green-winged Teal	<i>Anas crecca</i>	9
American Black Duck	<i>Anas rubripes</i>	9
Common Raven	<i>Corvus corax</i>	8

Common Name	Scientific Name	Total # Observations
Northern Flicker	<i>Colaptes auratus</i>	7
Yellow-rumped Warbler	<i>Setophaga coronata</i>	6
Hermit Thrush	<i>Catharus guttatus</i>	6
Double-crested Cormorant	<i>Nannopterum auritum</i>	5
Palm Warbler	<i>Setophaga palmarum</i>	4
Fox Sparrow	<i>Passerella iliaca</i>	3
Red Crossbill	<i>Loxia curvirostra percna</i>	3
White-winged Crossbill	<i>Loxia leucoptera</i>	3
Purple Finch	<i>Haemorhous purpureus</i>	2
Wilson's Snipe	<i>Gallinago delicata</i>	2
Red-breasted Nuthatch	<i>Sitta canadensis</i>	2
Ruby-crowned Kinglet	<i>Corthylio calendula</i>	1
Bald Eagle	<i>Haliaeetus leucocephalus</i>	1
Sharp-shinned Hawk	<i>Accipiter striatus</i>	1
Blue-headed Vireo	<i>Vireo solitarius</i>	1
Northern Harrier	<i>Circus hudsonius</i>	1
Ruffed Grouse	<i>Bonasa umbellus</i>	1
Savannah Sparrow	<i>Passerculus sandwichensis</i>	1
Blue Jay	<i>Cyanocitta cristata</i>	1
Common Loon	<i>Gavia immer</i>	1
Hairy Woodpecker	<i>Dryobates villosus</i>	1

3.2.2.4 Overwintering/Resident

The overwintering season, November 1 to April 14, was defined as the post-migration period and before spring migration (for the majority of species). This period considers resident species that remain in Newfoundland year-round and species that overwinter in Newfoundland, arriving from more northern climes.

2023

Overwintering/resident bird surveys in 2023 were conducted bi-weekly from November 3 to December 21. Four (4) surveys were conducted at thirty-five (35) point count locations, with a total of 938 observations from 26 different species. White-winged Crossbill and Common Redpoll were the most common, typically observed in medium to large flocks. Results are presented below in Table D1-3.2-23.

Table D1-3.2-23 Winter bird observations in the RAA, 2023.

Common Name	Scientific Name	Total # Observations
White-winged Crossbill	<i>Loxia leucoptera</i>	382
Common Redpoll	<i>Acanthis flammea</i>	235
Pine Siskin	<i>Spinus pinus</i>	83

Common Name	Scientific Name	Total # Observations
American Crow	<i>Corvus brachyrhynchos</i>	70
Boreal Chickadee	<i>Poecile hudsonicus</i>	39
Gull spp.	<i>Larus</i> spp.	38
Pine Grosbeak	<i>Pinicola enucleator</i>	21
Red Crossbill	<i>Loxia curvirostra pernix</i>	17
Canada Jay	<i>Perisoreus canadensis</i>	10
American Herring Gull	<i>Larus smithsonianus</i>	8
Black-capped Chickadee	<i>Poecile atricapillus</i>	7
Northern Flicker	<i>Colaptes auratus</i>	5
American Goldfinch	<i>Spinus tristis</i>	3
Common Raven	<i>Corvus corax</i>	4
Bald Eagle	<i>Haliaeetus leucocephalus</i>	3
Blue Jay	<i>Cyanocitta cristata</i>	2
Golden-crowned Kinglet	<i>Regulus satrapa</i>	2
Belted Kingfisher	<i>Megaceryle alcyon</i>	1
Song Sparrow	<i>Melospiza melodia</i>	1
Ruffed Grouse	<i>Bonasa umbellus</i>	1
Dark-eyed Junco	<i>Junco hyemalis</i>	1
White-throated Sparrow	<i>Zonotrichia albicollis</i>	1
American Robin	<i>Turdus migratorius</i>	1
Hermit Thrush	<i>Catharus guttatus</i>	1
Raptor spp.	N/A	1
Common Loon	<i>Gavia immer</i>	1

2024

Six (6) overwintering/resident bird surveys took place in 2024 at bi-weekly intervals. Surveys commenced on January 4 and concluded on April 5. A total of 1,399 avifauna observations of 30 species were compiled across all surveys. Fifty-eight (58) point count locations were surveyed. White-winged Crossbill was the most commonly observed species with 589 total observations (it is also the most easily detected and travels in flocks). Results are presented in Table D1-3.2-24.

Table D1-3.2-24 Winter bird observations in the RAA, 2024.

Common Name	Scientific Name	Total # Observations
White-winged Crossbill	<i>Loxia leucoptera</i>	589
Common Redpoll	<i>Acanthis flammea</i>	175
American Crow	<i>Corvus brachyrhynchos</i>	153
Pine Siskin	<i>Spinus pinus</i>	141
Boreal Chickadee	<i>Poecile hudsonicus</i>	68
Pine Grosbeak	<i>Pinicola enucleator</i>	37

Common Name	Scientific Name	Total # Observations
Herring Gull	<i>Larus smithsonianus</i>	34
Black-capped Chickadee	<i>Poecile atricapillus</i>	34
Canada Jay	<i>Perisoreus canadensis</i>	27
American Robin	<i>Turdus migratorius</i>	23
Dark-eyed Junco	<i>Junco hyemalis</i>	22
Common Raven	<i>Corvus corax</i>	17
Gull spp.	<i>Larus</i> spp.	16
Red Crossbill	<i>Loxia curvirostra</i> <i>perca</i>	14
Bald Eagle	<i>Haliaeetus leucocephalus</i>	9
Purple Finch	<i>Haemorhous purpureus</i>	6
Blue Jay	<i>Cyanocitta cristata</i>	5
American Black Duck	<i>Anas rubripes</i>	5
Northern Flicker	<i>Colaptes auratus</i>	4
Golden-crowned Kinglet	<i>Regulus satrapa</i>	4
Fox Sparrow	<i>Passerella iliaca</i>	3
Black-backed Woodpecker	<i>Picoides arcticus</i>	3
Woodpecker spp.	<i>Picidae</i> spp.	3
Red-breasted Nuthatch	<i>Sitta canadensis</i>	1
American Goshawk	<i>Astur atricapillus</i>	1
Sharp-shinned Hawk	<i>Accipiter striatus</i>	1
Belted Kingfisher	<i>Megaceryle alcyon</i>	1
Great Black-backed Gull	<i>Larus marinus</i>	1
Brown Creeper	<i>Certhia americana</i>	1
Hairy Woodpecker	<i>Leuconotopicus villosus</i>	1

3.2.2.5 Seabird Surveys

Seabird surveys were conducted at regular intervals in the RAA, often at Arnold's Cove, Chance Cove, and other coastal communities in the Isthmus of Avalon region. Any raptors observed during seabird surveys were included with the data, following the same approach as the point count surveys above.

2023

Ten (10) seabird survey days were completed throughout the RAA between May and December 2023, resulting in 386 observations of 18 different species (Table D1-3.2-25).

Table D1-3.2-25 Seabirds observed during seabird surveys, RAA, 2023.

Common Name	Scientific Name	Total # Observations
American Herring Gull	<i>Larus argentatus</i>	184
Common Eider	<i>Somateria mollissima</i>	60
Gull spp.	N/A	48
Red-breasted Merganser	<i>Mergus serrator</i>	31
Tern spp. (Common or Arctic)	N/A	12
Double-crested Cormorant	<i>Nannopterum auritum</i>	12
Great Black-backed Gull	<i>Larus marinus</i>	8
Black Guillemot	<i>Cephus grylle</i>	6
Bald Eagle	<i>Haliaeetus leucocephalus</i>	4
Northern Gannet	<i>Morus bassanus</i>	4
Long-tailed Duck	<i>Clangula hyemalis</i>	4
Ring-billed Gull	<i>Larus delawarensis</i>	3
Common Loon	<i>Gavia immer</i>	3
Common Tern	<i>Sterna hirundo</i>	2
Dovekie	<i>Alle alle</i>	2
Spotted Sandpiper	<i>Actitis macularius</i>	1
Black-legged Kittiwake	<i>Rissa tridactyla</i>	1
Osprey	<i>Pandion haliaetus</i>	1

2024

Eighteen (18) seabird survey days were completed throughout the RAA in 2024 (during fall and breeding seasons), resulting in 848 observations of 24 different water-associated species (Table D1-3.2-26). Raptor observations during seabird surveys are included – also note that two Common Redpoll and two Red Crossbill were observed incidentally during seabird surveys, included in the table and discussed in Section 3.4.2.

Table D1-3.2-26 Seabirds observed during seabird surveys, RAA, 2024.

Common Name	Scientific Name	Total # Observations
Herring Gull	<i>Larus argentatus</i>	263
American Black Duck	<i>Anas rubripes</i>	112
Red-breasted Merganser	<i>Mergus serrator</i>	88
Greater Yellowlegs	<i>Tringa melanoleuca</i>	60
Common Loon	<i>Gavia immer</i>	34
Great Black-backed Gull	<i>Larus marinus</i>	31
Mallard	<i>Anas platyrhynchos</i>	31
Common Tern	<i>Sterna hirundo</i>	27
Long-tailed Duck	<i>Clangula hyemalis</i>	26

Common Name	Scientific Name	Total # Observations
Bald Eagle	<i>Haliaeetus leucocephalus</i>	22
Double-crested Cormorant	<i>Nannopterum auritum</i>	21
Ring-billed Gull	<i>Larus delawarensis</i>	19
Spotted Sandpiper	<i>Actitis macularius</i>	19
Northern Gannet	<i>Morus bassanus</i>	18
Gull spp.	<i>Larus spp.</i>	17
White-winged Scoter	<i>Melanitta deglandi</i>	14
Black Guillemot	<i>Cephus grylle</i>	12
Snow Bunting	<i>Plectrophenax nivalis</i>	11
Common Merganser	<i>Mergus merganser</i>	7
Lesser Yellowlegs	<i>Tringa flavipes</i>	5
Semipalmated Plover	<i>Charadrius semipalmatus</i>	5
Common Redpoll	<i>Acanthis flammea</i>	2
Red Crossbill	<i>Loxia curvirostra</i>	2
Osprey	<i>Pandion haliaetus</i>	1
Belted Kingfisher	<i>Megaceryle alcyon</i>	1
Black-headed Gull	<i>Chroicocephalus ridibundus</i>	1

3.2.2.6 Raptor Surveys

No raptor surveys were undertaken in 2023.

2024

Six (6) raptor surveys were undertaken throughout June 2024. Surveys resulted in the observation of three raptor species, with the Bald Eagle as the most commonly observed. An active Bald Eagle nest was observed at UTM 22T 290279, 5280805. The nest was on a vegetated cliff ledge. One female adult was observed occupying the nest while the male defended the area.

Table D1-3.2-27 Raptor survey results in the RAA, 2024.

Common Name	Scientific Name	# Observed	Location	Date	Description
Bald Eagle	<i>Haliaeetus leucocephalus</i>	1	47.64473508, -53.84441108	June 8, 2024	Adult patrolled by goshawk.
American Goshawk	<i>Astur atricapillus</i>	1	47.64473508, -53.84441108	June 8, 2024	Patrolling under eagle until it went away.
Osprey	<i>Pandion haliaetus</i>	1	47.64473508, -53.84441108	June 8, 2024	Moved away from eagle as it passed over a pond.
Bald Eagle	<i>Haliaeetus leucocephalus</i>	1	47.62700909, -53.81895785	June 18, 2024	

Common Name	Scientific Name	# Observed	Location	Date	Description
Bald Eagle	<i>Haliaeetus leucocephalus</i>	1	47.76700022, -53.98190411	June 19, 2024	
Bald Eagle	<i>Haliaeetus leucocephalus</i>	1	47.76700022, -53.98190411	June 24, 2024	On a tree.
Osprey	<i>Pandion haliaetus</i>	1	47.8904082, -53.86657073	June 24, 2024	

3.3 Acoustic Monitoring

This section discusses the data obtained from the ARUs deployed in 2024 (by season). The ARUs were deployed for the early breeding birds/spring migration, breeding season, and fall migration windows.

3.3.1 PA ARU 1

ARU 1 was deployed in a small wetland valley amongst the rocky barrens in the southern portion of the PA. During the deployment period of May 6 to October 29, 2024, a total of 24,494 vocalizations were recorded from 47 different species. The total vocalizations by date are presented in Figure D1-3.3-1. The most common species recorded, along with their total vocalizations recorded, are shown in Figure D1-3.3-2. Refer to Appendix D1-1, Table 1 for the full dataset of vocalizations recorded during the deployment window.

The most commonly recorded species across all seasons were the Golden-Crowned Kinglet (*Regulus satrapa*), Blackpoll Warbler, Savannah Sparrow, and White-throated Sparrow. These birds are typical of the Maritime Barrens ecoregion and use habitat types such as the rocky barrens represented by PA ARU 1. Any SAR and SCC recorded on this ARU are discussed further in Section 3.4.1. Data from PA ARU 1 is available in Sections 3.3.1.1 through 3.3.1.4, separated by seasonal windows.

This ARU had fewer bird vocalizations than its counterpart, ARU 2, which recorded roughly 42,000 more during the same duration. Similarly, RAA ARU 1, deployed from May 23 to October 24 in the RAA to the south, recorded roughly 79,000 more vocalizations than PA ARU 1. Given that PA ARU 1 was deployed purposely to represent a typical Wind Farm area suite of species, it is evident that the species richness of the Wind Farm may be quite lower than that of other nearby areas (as might be expected for a rocky barren hilltop).

Some notable identifications from the PA ARU 1 recordings included species that were presumably migrating through the area, including American Tree Sparrow and Lapland Longspur in spring, and Ruddy Turnstone in fall. Great Horned Owls were recorded over 100 times, indicating that there is likely a territory for a nesting pair nearby. Great-horned Owl nests warrant a 200 m buffer in NL. A dedicated survey for this nest would be undertaken prior to construction and avoided.

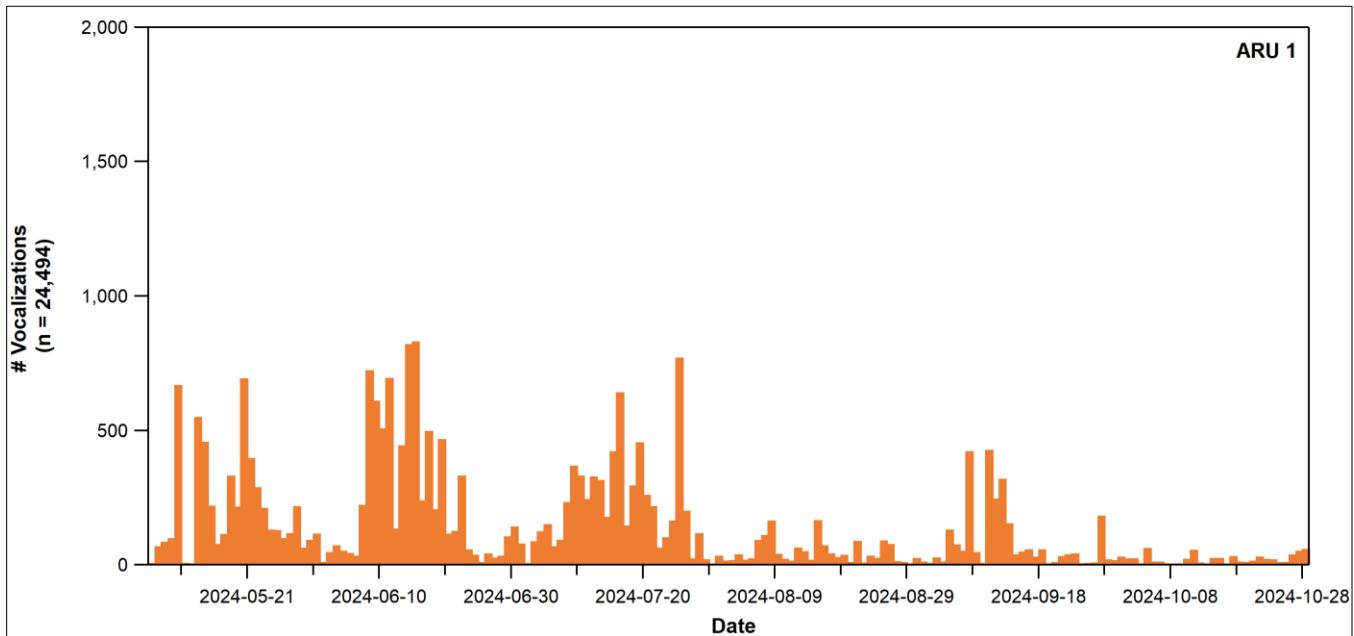


Figure D1-3.3-1 PA ARU 1 – Total vocalizations by date.

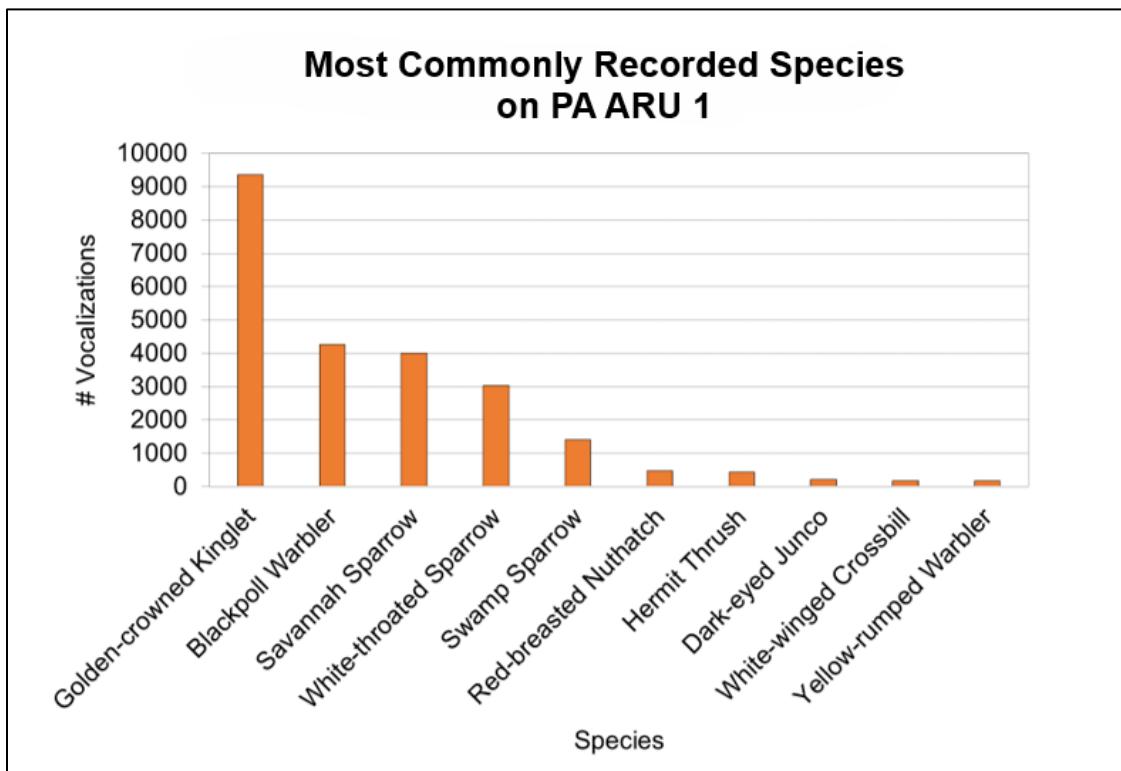


Figure D1-3.3-2 PA ARU 1 – Total vocalizations from the most commonly recorded species.

3.3.1.1 Early Breeding Birds/Spring Migration

While PA ARU 1 was deployed during the early breeding birds/spring migration window (from its deployment on May 6 through to May 31), it recorded a total of 5,499 vocalizations from 32 different species. The most recorded species are presented in Table D1-3.3-1. Refer to Appendix D1-1, Table 2 for the full early breeding birds/spring migration dataset.

Table D1-3.3-1 PA ARU 1 – Vocalizations from the most recorded species during the early breeding birds/spring migration window.

Common Name	Scientific Name	Total # Vocalizations
Savannah Sparrow	<i>Passerculus sandwichensis</i>	2,399
White-throated Sparrow	<i>Zonotrichia albicollis</i>	1,646
Golden-crowned Kinglet	<i>Regulus satrapa</i>	776
Swamp Sparrow	<i>Melospiza georgiana</i>	165
Hermit Thrush	<i>Catharus guttatus</i>	104
White-winged Crossbill	<i>Loxia leucoptera</i>	96
Yellow-rumped Warbler	<i>Setophaga coronata</i>	77
American Tree Sparrow	<i>Spizelloides arborea</i>	53
Common Redpoll	<i>Acanthis flammea</i>	39
Dark-eyed Junco	<i>Junco hyemalis</i>	21

3.3.1.2 Breeding Season

PA ARU 1 recorded a total of 15,206 vocalizations from June 1 through August 15, from 40 different species. The most commonly recorded species are presented in Table D1-3.3-2. Refer to Appendix D1-1, Table 3 for the full breeding season dataset. These common species are typical boreal forest specialists, representing the coniferous forest niches as well as the wetland niche.

Table D1-3.3-2 PA ARU 1 – Vocalizations from the most commonly recorded species recorded during the breeding season window.

Common Name	Scientific Name	Total # Vocalizations
Golden-crowned Kinglet	<i>Regulus satrapa</i>	6,088
Blackpoll Warbler	<i>Setophaga striata</i>	4,249
Savannah Sparrow	<i>Passerculus sandwichensis</i>	1,489
White-throated Sparrow	<i>Zonotrichia albicollis</i>	1,189
Swamp Sparrow	<i>Melospiza georgiana</i>	936
Hermit Thrush	<i>Catharus guttatus</i>	336
Red-breasted Nuthatch	<i>Sitta canadensis</i>	279
Common Yellowthroat	<i>Geothlypis trichas</i>	93
White-winged Crossbill	<i>Loxia leucoptera</i>	89
Yellow-bellied Flycatcher	<i>Empidonax flaviventris</i>	60

3.3.1.3 Fall Migration

While PA ARU 1 was deployed during the fall migration window (from August 16 through to its retrieval on October 29), it recorded a total of 3,789 vocalizations from 33 different species. The most commonly recorded species are presented in Table D1-3.3-3. Refer to Appendix D1-1, Table 3 for the full fall migration dataset. This suite of common species represents a mixture of residents and migrants.

Table D1-3.3-3 PA ARU 1 – Vocalizations from the most commonly recorded species during the fall migration window.

Common Name	Scientific Name	Total # Vocalizations
Golden-crowned Kinglet	<i>Regulus satrapa</i>	2,500
Swamp Sparrow	<i>Melospiza georgiana</i>	311
White-throated Sparrow	<i>Zonotrichia albicollis</i>	192
Red-breasted Nuthatch	<i>Sitta canadensis</i>	190
Dark-eyed Junco	<i>Junco hyemalis</i>	162
Savannah Sparrow	<i>Passerculus sandwichensis</i>	114
Great Horned Owl	<i>Bubo virginianus</i>	59
Yellow-rumped Warbler	<i>Setophaga coronata</i>	53
Greater Yellowlegs	<i>Tringa melanoleuca</i>	41
Brown Creeper	<i>Certhia americana</i>	37

3.3.2 PA ARU 2

PA ARU 2 (Goose Pond Ridge) was deployed on the side of a steep ridge below a mountain top barren and above a mature mixedwood forest. Over the deployment period of May 6 to October 29, 2024, a total of 67,395 vocalizations were recorded from 66 different species. The total vocalizations by date for this recorder are presented in Figure D1-3.3-3. The most recorded species on PA ARU 2, along with their total vocalizations recorded, are shown in Figure D1-3.3-4. Refer to Appendix D1-2, Table 1 for the full dataset of vocalizations recorded during the deployment window.

The most recorded species across all seasons were Hermit Thrush, Yellow-bellied Flycatcher, Blackpoll Warbler, White-throated Sparrow, and Golden-crowned Kinglet. This suite is typical of the Maritime Barrens ecoregion and is known to use habitat types such as the boreal mixedwood forest represented by PA ARU 2. There was a diversity of species from several Families and guilds represented in the data, including year-round residents like Black-capped and Boreal Chickadees, Red-breasted Nuthatch, and several finch and corvid species; also, several species of neotropical migrant species including several species of warblers, such as Common Yellowthroat and Black-and-white Warbler; shorter distance migrants like the sparrow species; resident and migratory raptors, and very few waterfowl or water-associated birds.

Any SAR and SCC recorded on this ARU are discussed further in Section 3.4.1. Data from PA ARU 2 are available in Sections 3.3.2.1 through 3.3.2.4, separated by seasonal windows.

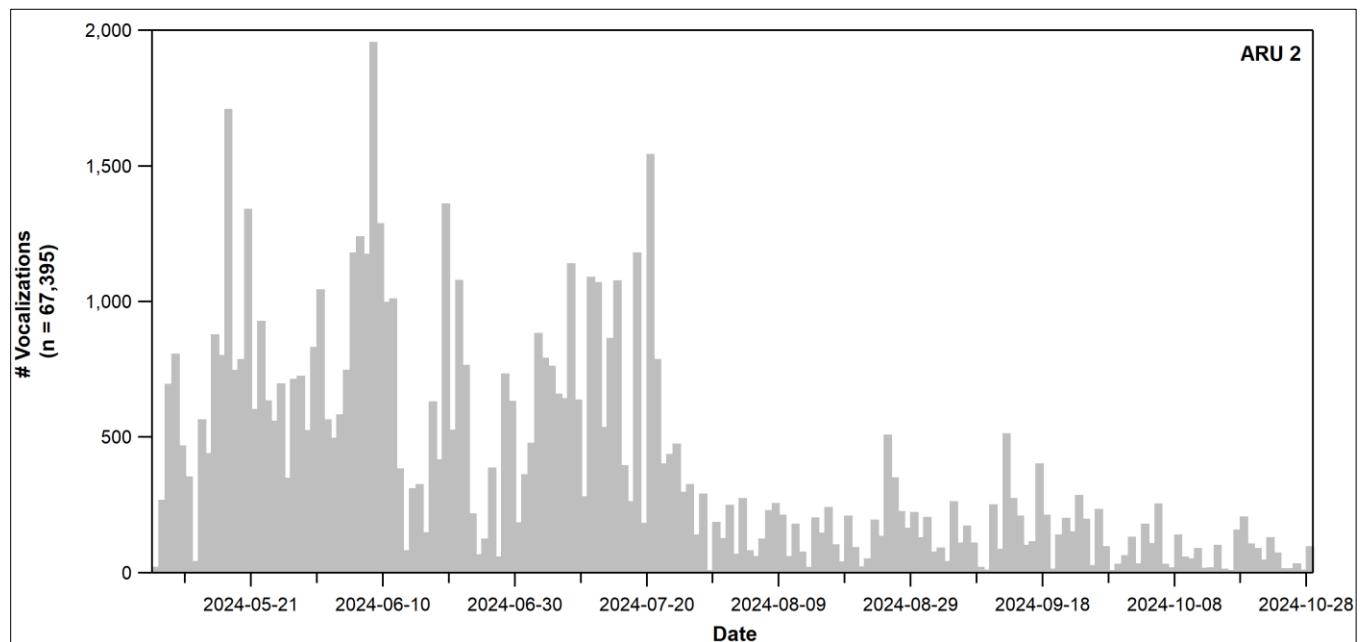


Figure D1-3.3-3 PA ARU 2 – Total vocalizations by date.

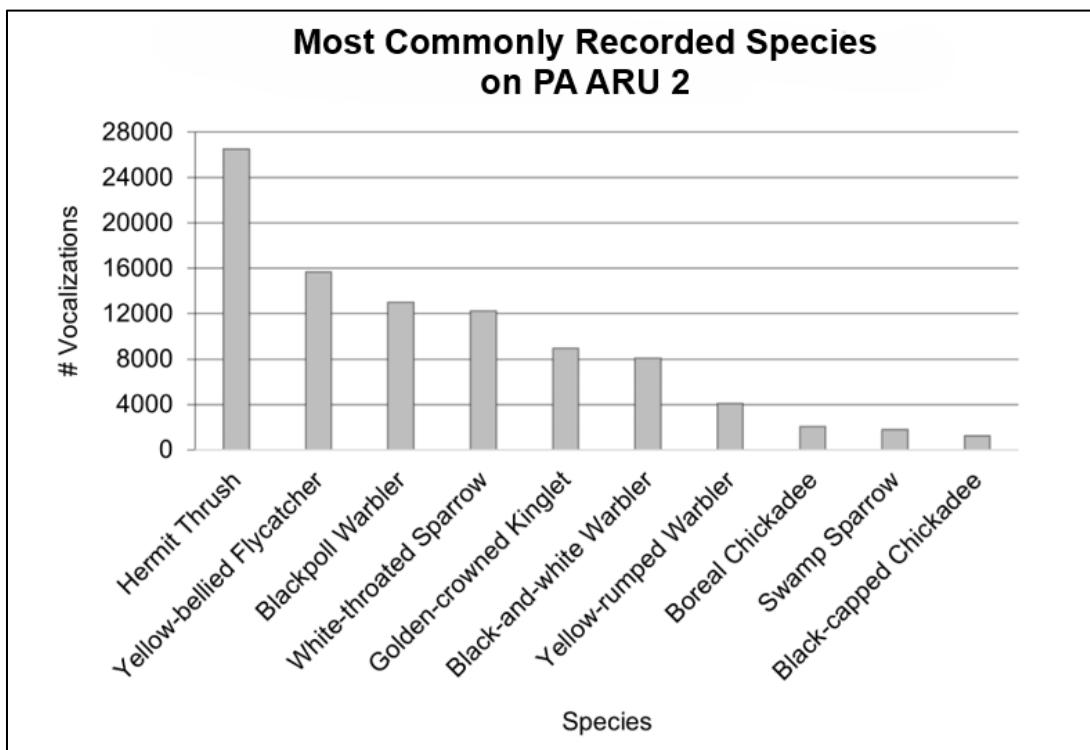


Figure D1-3.3-4 PA ARU 2 – Total vocalizations from the most commonly recorded species.

3.3.2.1 Early Breeding Birds/Spring Migration

While PA ARU 2 was deployed during the early breeding birds/spring migration window (from its deployment on May 6 through to May 31), it recorded a total of 17,604 vocalizations from 46 different species. The most recorded species are presented in Table D1-3.3-4. Refer to Appendix D1-2, Table 2 for the full early breeding birds/spring migration dataset.

Table D1-3.3-4 PA ARU 2 – Vocalizations from the most commonly recorded species during the early breeding birds/spring migration window.

Common Name	Scientific Name	Total # Vocalizations
Hermit Thrush	<i>Catharus guttatus</i>	6,936
White-throated Sparrow	<i>Zonotrichia albicollis</i>	3,328
Yellow-rumped Warbler	<i>Setophaga coronata</i>	2,311
Blackpoll Warbler	<i>Setophaga striata</i>	1,770
Boreal Chickadee	<i>Poecile hudsonicus</i>	649
Golden-crowned Kinglet	<i>Regulus satrapa</i>	571
American Robin	<i>Turdus migratorius</i>	426
Dark-eyed Junco	<i>Junco hyemalis</i>	302
White-winged Crossbill	<i>Loxia leucoptera</i>	187
Common Loon	<i>Gavia immer</i>	161

3.3.2.2 Breeding Season

PA ARU 2 recorded a total of 45,750 vocalizations from June 1 through August 15, from 59 different species. The most recorded species are presented in Table D1-3.3-5. Refer to Appendix D1-2, Table 3 for the full breeding season dataset.

Table D1-3.3-5 PA ARU 2 – Vocalizations from the most recorded species recorded during the breeding season window.

Common Name	Scientific Name	Total # Vocalizations
Hermit Thrush	<i>Catharus guttatus</i>	12,973
Blackpoll Warbler	<i>Setophaga striata</i>	11,675
White-throated Sparrow	<i>Zonotrichia albicollis</i>	5,343
Golden-crowned Kinglet	<i>Regulus satrapa</i>	4,668
Yellow-bellied Flycatcher	<i>Empidonax flaviventris</i>	4,052
Yellow-rumped Warbler	<i>Setophaga coronata</i>	1,842
Common Loon	<i>Gavia immer</i>	768
Black-and-white Warbler	<i>Mniotilla varia</i>	737
Red-breasted Nuthatch	<i>Sitta canadensis</i>	577
Northern Waterthrush	<i>Parkesia noveboracensis</i>	537

3.3.2.3 Fall Migration

While PA ARU 2 was deployed during the fall migration window (from August 16 through to its retrieval on October 29), it recorded a total of 4,581 vocalizations from 42 different species. The most recorded species are presented in Table D1-3.3-6. Refer to Appendix D1-2, Table 3 for the full fall migration dataset.

Table D1-3.3-6 PA ARU 2 – Vocalizations from the most recorded species during the fall migration window.

Common Name	Scientific Name	Total # Vocalizations
Golden-crowned Kinglet	<i>Regulus satrapa</i>	2,731
Boreal Chickadee	<i>Poecile hudsonicus</i>	300
Dark-eyed Junco	<i>Junco hyemalis</i>	234
Northern Flicker	<i>Colaptes auratus</i>	152
Pine Grosbeak	<i>Pinicola enucleator</i>	147
Red-breasted Nuthatch	<i>Sitta canadensis</i>	126
Hermit Thrush	<i>Catharus guttatus</i>	126
Yellow-rumped Warbler	<i>Setophaga coronata</i>	105
Hairy Woodpecker	<i>Dryobates villosus</i>	93
Pine Siskin	<i>Spinus pinus</i>	67

3.3.3 RAA ARU 1

RAA ARU 1 was deployed on the periphery of a large fen with several open water areas. The fen was surrounded by mature coniferous forest. From May 23 to October 24, 2024, a total of 104,082 vocalizations were recorded from 88 different species. The total vocalizations by date for this recorder are presented as Figure D1-3.3-5. The most recorded species are shown in Figure D1-3.3-6. Refer to Appendix D1-3, Table 1 for the full dataset of vocalizations recorded during the deployment window.

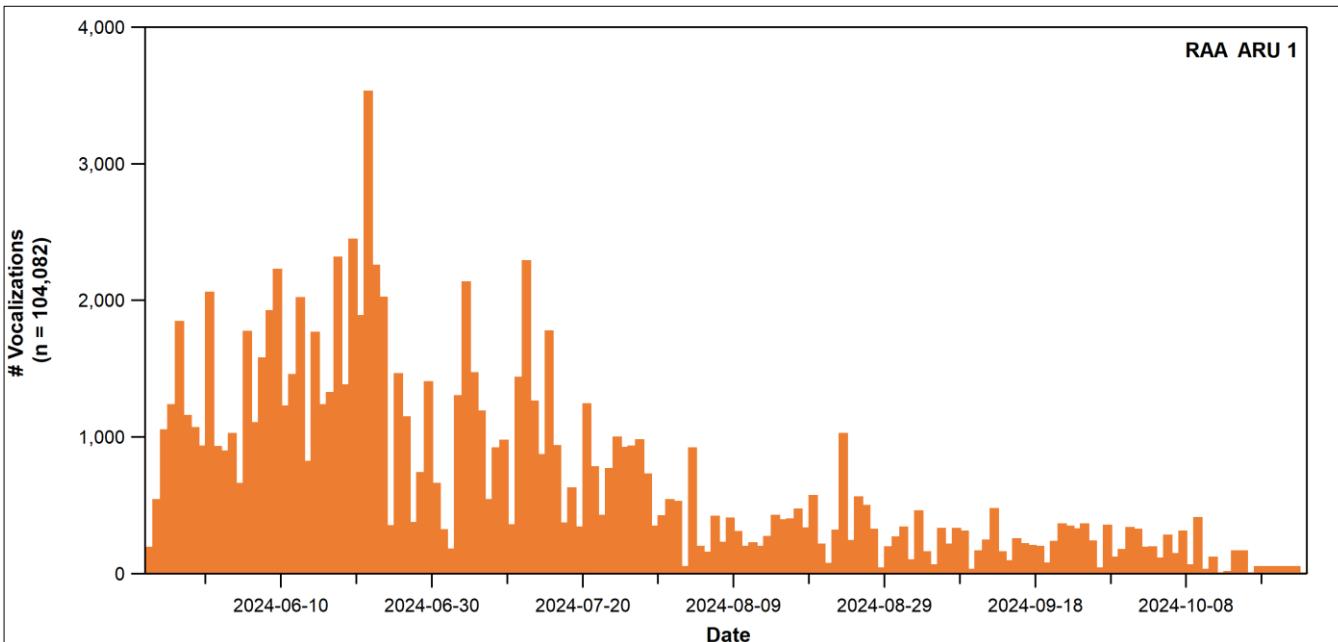


Figure D1-3.3-5 RAA ARU 1 – Total vocalizations by date.

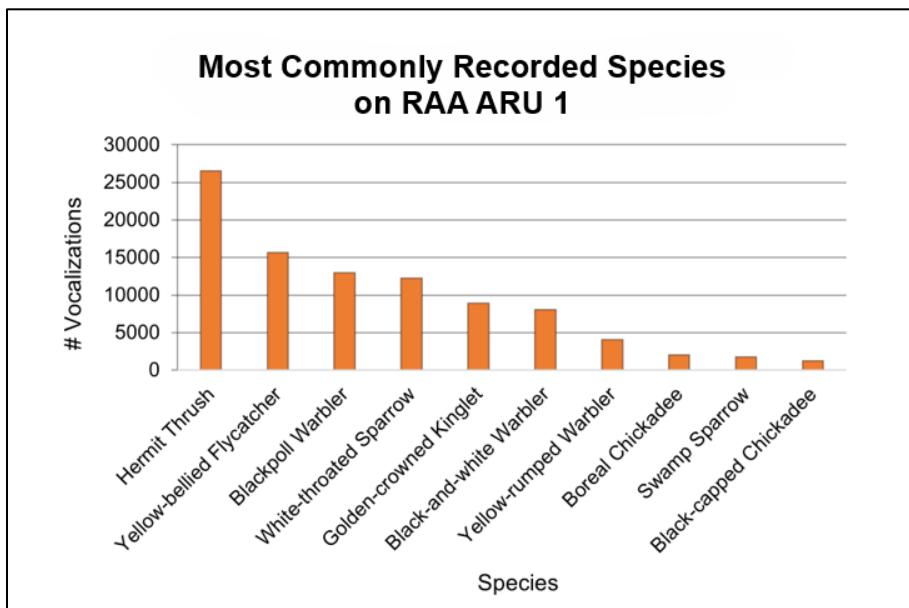


Figure D1-3.3-6 RAA ARU 1 – Total vocalizations from the most commonly recorded species.

3.3.3.1 Early Breeding Birds/Spring Migration

While RAA ARU 1 was deployed during the early breeding birds/spring migration window (from its deployment on May 23 through to May 31), it recorded a total of 10,157 vocalizations from 48 different species. The most recorded species are presented in Table D1-3.3-7. Refer to Appendix D1-3, Table 2 for the full early breeding birds/spring migration dataset.

Table D1-3.3-7 RAA ARU 1 – Vocalizations from the most recorded species during the early breeding birds/spring migration window.

Common Name	Scientific Name	Total # Vocalizations
White-throated Sparrow	<i>Zonotrichia albicollis</i>	2,597
Blackpoll Warbler	<i>Setophaga striata</i>	2,033
Hermit Thrush	<i>Catharus guttatus</i>	1,296
Swamp Sparrow	<i>Melospiza georgiana</i>	869
Yellow-rumped Warbler	<i>Setophaga coronata</i>	570
Ruby-crowned Kinglet	<i>Corthylio calendula</i>	515
Palm Warbler	<i>Setophaga palmarum</i>	461
Northern Waterthrush	<i>Parkesia noveboracensis</i>	369
White-winged Crossbill	<i>Loxia leucoptera</i>	285
Black-and-white Warbler	<i>Mniotilla varia</i>	184

3.3.3.2 Breeding Season

RAA ARU 1 recorded a total of 77,909 vocalizations from June 1 through August 15, from 80 different species. The most commonly recorded species are presented in Table D1-3.3-8. Refer to Appendix D1-3, Table 3 for the full breeding season dataset.

Table D1-3.3-8 RAA ARU 1 – Vocalizations from the most commonly recorded species recorded during the breeding season window.

Common Name	Scientific Name	Total # Vocalizations
Hermit Thrush	<i>Catharus guttatus</i>	23,316
Yellow-bellied Flycatcher	<i>Empidonax flaviventris</i>	15,112
Blackpoll Warbler	<i>Setophaga striata</i>	10,567
White-throated Sparrow	<i>Zonotrichia albicollis</i>	8,582
Black-and-white Warbler	<i>Mniotilla varia</i>	6,283
Golden-crowned Kinglet	<i>Regulus satrapa</i>	3,811
Yellow-rumped Warbler	<i>Setophaga coronata</i>	2,885
Boreal Chickadee	<i>Poecile hudsonicus</i>	851
White-winged Crossbill	<i>Loxia leucoptera</i>	681
Northern Waterthrush	<i>Parkesia noveboracensis</i>	625

3.3.3.3 Fall Migration

While RAA ARU 1 was deployed during the fall migration window (from August 16 through to its retrieval on October 24), it recorded a total of 16,016 vocalizations from 67 different species. The most commonly recorded species are presented in Table D1-3.3-9. Refer to Appendix D1-3, Table 3 for the full fall migration dataset.

Table D1-3.3-9 RAA ARU 1 – Vocalizations from the most commonly recorded species recorded during the fall migration window.

Common Name	Scientific Name	Total # Vocalizations
Golden-crowned Kinglet	<i>Regulus satrapa</i>	5,078
Hermit Thrush	<i>Catharus guttatus</i>	1,947
Black-and-white Warbler	<i>Mniotilla varia</i>	1,601
Boreal Chickadee	<i>Poecile hudsonicus</i>	1,082
White-throated Sparrow	<i>Zonotrichia albicollis</i>	1,069
Yellow-rumped Warbler	<i>Setophaga coronata</i>	628
Great Horned Owl	<i>Bubo virginianus</i>	557
Yellow-bellied Flycatcher	<i>Empidonax flaviventris</i>	534
Black-capped Chickadee	<i>Poecile atricapillus</i>	531
Blackpoll Warbler	<i>Setophaga striata</i>	387

3.4 SAR and SCC

This section presents the SAR and SCC observed during field studies and acoustic monitoring efforts in the PA (3.4.1) and RAA (3.4.2).

3.4.1 Project Area

Surveys in the PA resulted in the observation of three (3) SAR and fourteen (14) SCC, discussed below.

3.4.1.1 Species at Risk

Red Crossbill *percna*

Red Crossbill *percna* is a subspecies of Red Crossbill (*Loxia curvirostra*). The range of this finch is restricted to insular Newfoundland, the surrounding islands, and Anticosti Island in Quebec (COSEWIC, 2016b). These birds overwinter in NL and are thought to be non-migratory, although they are known to move across various spatial scales in search of food (COSEWIC, 2016b). Red Crossbill *percna* are dependent on conifer forests as their beaks are specially adapted to eat cone-obligate seeds produced by coniferous trees, such as red pine (*Pinus resinosa*), white pine (*Pinus strobus*), and black spruce (*Picea mariana*) (COSEWIC, 2016b).

Red Crossbill *percna* was observed seven (7) times during field surveys in the PA in 2024, including two observations during winter (both on March 20), four during breeding season (all on June 21), and one during fall (October 18). All observations were made in or near mature coniferous forest stands. The observations on March 20 were in the LAA outside of the PA, but are included due to proximity to the PA boundary. In addition, both PA ARU 1 and PA ARU 2 captured Red Crossbill *percna* vocalizations, with

14 and 6 recordings, respectively. Figure D1-3.4-1 demonstrates the Red Crossbill vocalizations by date for both ARUs. An additional incidental observation was recorded in 2025 along the NL Hydro transmission line ROW (June 26). Locations of Red Crossbill *percna* observations are presented in Figure D1-3.4-2.

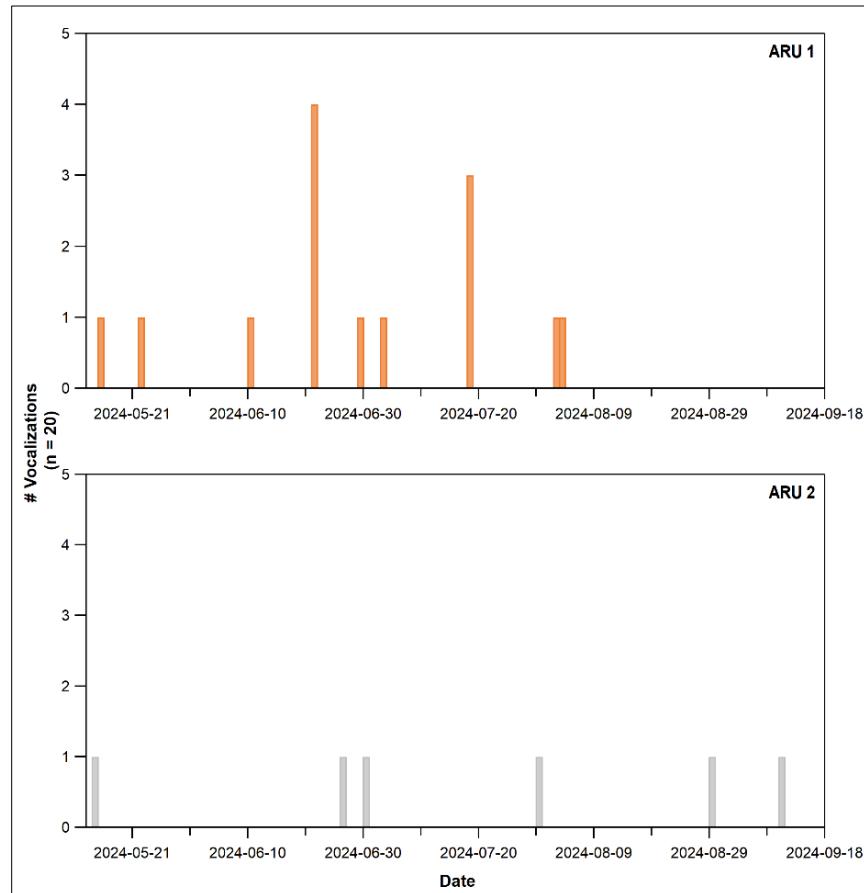


Figure D1-3.4-1 Red Crossbill *percna* vocalizations by date on PA ARU 1 (top, orange) and PA ARU 2 (bottom, gray).



	FIGURE TITLE:	NOTES	PREPARED BY:	DATE:
	Red Crossbill <i>Percna</i> Observations in the Project Area		J. Crocker	10/07/2025
PROJECT TITLE:	North Atlantic Wind to Hydrogen Project		REVIEWED BY:	C. Bursey 10/07/2025
			APPROVED BY:	C. Collins 10/07/2025
			CRS:	WGS 1984 UTM Zone 22N
				

SEM MAP ID: 016-015-GIS-529-Rev0

Figure D1-3.4-2 Red Crossbill *percna* observations in the PA.

Evening Grosbeak

Evening Grosbeak is a forest-dwelling finch that inhabits Newfoundland year-round. Evening Grosbeak prefers mature mixedwood forests with fir and white spruce, foraging mainly on invertebrates in summer (COSEWIC, 2016a), but also seeds and buds. They primarily eat seeds in winter. Their populations are thought to correlate with the occurrence of spruce budworm (COSEWIC, 2016a).

Evening Grosbeak was not observed during field surveys, but was recorded on PA ARU 2 (location and map provided in Section 2.3), with seventy (70) vocalizations throughout the deployment, which is adjacent to mature mixedwood forest. Most vocalizations were recorded in the fall – Figure D1-3.4-3 demonstrates the Evening Grosbeak vocalizations by date for PA ARU 2.

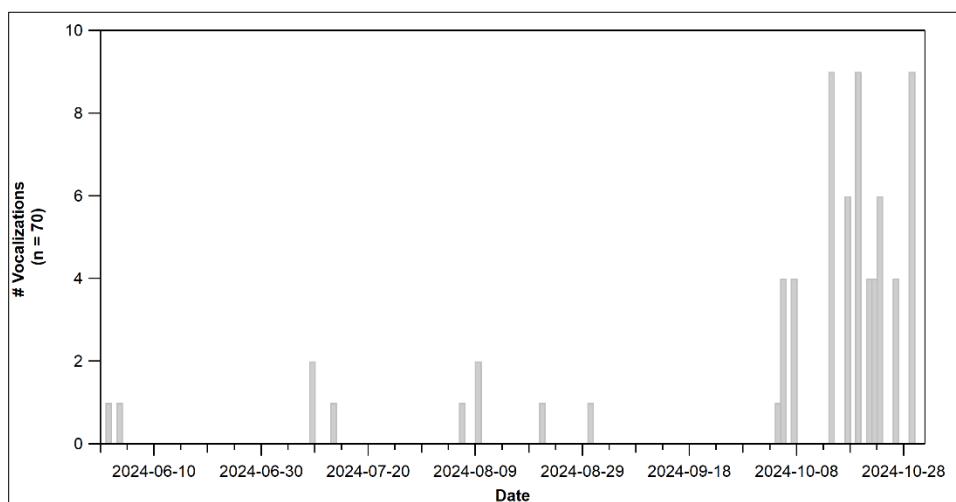


Figure D1-3.4-3 Evening Grosbeak vocalizations by date.

Short-eared Owl

The third avian SAR observed in the PA is the Short-eared Owl (*Asio flammeus*). This nomadic owl is thought to breed in NL and overwinter in the U.S., although species-specific studies have been limited. Short-eared Owl typically breeds in open habitat (e.g., grasslands) of at least 50-100 ha, preying primarily on small mammals like voles and other rodents (COSEWIC, 2021). Habitat destruction/alteration and climate change are thought to be the greatest threats to Short-eared Owl populations (COSEWIC, 2021).

A dedicated Short-eared Owl (*Asio flammeus*) survey was completed on June 25, 2025 along the existing NL Hydro transmission line, which is within the proposed Linear Corridor for the PA. Surveyors observed one (1) Short-eared Owl, heard at UTM 22T, 0279966 E, 5308209 N, and seen at UTM 22T, 0279931 E, 5308424 N (Figure D1-3.4-4). The observations were made in the LAA close to the PA boundary, so it is reasonable to assume that it may also be using habitats within the PA.



FIGURE TITLE:	NOTES:	PREPARED BY:	DATE:
		J. Crocker	08/07/2025
Short-Eared Owl Observations in the Project Area		REVIEWED BY:	C. Bursey 08/07/2025
PROJECT TITLE:		APPROVED BY:	C. Collins 08/07/2025
North Atlantic Wind to Hydrogen Project		CRS:	WGS 1984 UTM Zone 22N
North Atlantic			

Figure D1-3.4-4 Short-eared Owl observations in the PA.

3.4.1.2 Species of Conservation Concern

A total of fourteen (14) SCC were observed in the PA throughout field surveys and acoustic monitoring efforts in 2024 and 2025. A full list of the SCC observed, along with their current S-rank as per the AC CDC, is provided in Table D1-3.4-1. SCC are organized by S-rank, where those ranked S1 (critically imperilled) are presented at the top of the table, and descending to species ranked S3 (vulnerable). Species ranked S1 and S2 are discussed further in this section.

Table D1-3.4-1 Species of Conservation Concern observed in the PA.

Common Name	Scientific Name	S-rank	# Observations/Vocalizations			
			Field Surveys	PA ARU 1	PA ARU 2	Total
Blue-winged Teal	<i>Spatula discors</i>	SUB, S1M	-	-	1	1
Long-tailed Duck	<i>Clangula hyemalis</i>	S2B, S5N	-	2	-	2
Snow Bunting	<i>Plectrophenax nivalis</i>	S2N, S5M	-	-	3	3
Common Redpoll	<i>Acanthis flammea</i>	S2S3B, S4N, SUM	19	63	34	116
Ruddy Turnstone	<i>Arenaria interpres</i>	S2S3M	-	1	-	1
American Goshawk	<i>Astur atricapillus</i>	S3	4	-	8	12
Brown Creeper	<i>Certhia americana</i>	S3	-	44	60	104
American Pipit	<i>Anthus rubescens</i>	S3B, S4M	-	61	98	159
Greater Yellowlegs	<i>Tringa melanoleuca</i>	S3B, S4M	2	83	24	109
American Tree Sparrow	<i>Spizelloides arborea</i>	S3B, SUM	-	113	42	180
Horned Lark	<i>Eremophila alpestris</i>	S3B, SUM	-	-	5	5
Mallard	<i>Anas platyrhynchos</i>	S3B, SUM	-	5	27	32
Northern Harrier	<i>Circus hudsonius</i>	S3B, SUM	4	-	-	4
Belted Kingfisher	<i>Megaceryle alcyon</i>	S4B, S3N, SUM	3	2	1	6

Blue-winged Teal (*Spatula discors*) is a dabbling duck that nests in herbaceous vegetation (often across grasslands) in Canada and the U.S. in the summer before migrating south to forage in marshy wetlands and small, calm waterbodies during the winter (Ehrlich et al., 1988). They may use NL as a migratory stopover or to breed, although they are less common in eastern Canada. Blue-winged Teal was recorded once on PA ARU 2 on August 11, 2024.

Long-tailed Duck (*Clangula hyemalis*) is a diving duck that can dive to depths of 200 feet to catch fish and invertebrates (Ehrlich et al., 1988). These ducks breed on Arctic tundra and overwinter on large freshwater lakes or along the ocean coastline (Ehrlich et al., 1988). Long-tailed Duck can be found overwintering in NL beginning in October, before leaving again in May. PA ARU 1 recorded two (2) Long-tailed Duck vocalizations on May 9, 2024.

Snow Bunting (*Plectrophenax nivalis*) is a ground-dwelling passerine bird considered to be an Arctic specialist. They breed on rocky shores and tundra in the Arctic during the summer, and tend to overwinter in grassy, open fields, lake shores, or coastal beaches (Ehrlich et al., 1988). They are known to migrate in the late fall and early spring. Three (3) Snow Bunting vocalizations were recorded on PA ARU 2 – one on August 10, one on September 8, and one on September 28, 2024.

Common Redpoll (*Acanthis flammea*) is a small finch that can be found across a range of habitats, although they are preferential to open areas such as open coniferous forest or scrubby fields (Ehrlich et al., 1988). Common Redpoll demonstrates an irregular migration pattern, moving south to find food as necessary (Ehrlich et al., 1988). Common Redpoll was observed eighteen (18) times during fall and winter field surveys in the PA in 2024, and once during breeding season in June 2025. In addition, both PA ARU 1 and PA ARU 2 recorded vocalizations, with sixty-three (63) and thirty-four (34) recordings, respectively. Table D1-3.4-2 demonstrates the number of vocalizations recorded during each seasonal window.

Table D1-3.4-2 Number of Common Redpoll vocalizations per bird season, 2024.

Detector	Bird Season		
	Early Breeding Birds/Spring Migration	Breeding Season	Fall Migration
PA ARU 1	39	12	12
PA ARU 2	4	10	20

Ruddy Turnstone (*Arenaria interpres*) is a small, short-legged shorebird that breeds along rocky coasts and on tundra in the Arctic and migrates long distances to wintering grounds in South America and elsewhere (Ehrlich et al., 1988). These birds are typically found on ocean coastlines during winter but are also known to use freshwater shorelines during migration. Ruddy Turnstone uses NL as a stopover site during migration, or less commonly for overwintering. One (1) Ruddy Turnstone vocalization was recorded on PA ARU 1 on October 16, 2024.

3.4.2 Regional Assessment Area

Surveys in the RAA resulted in the observation of five (5) SAR and twenty-four (24) SCC, discussed below.

3.4.2.1 Species at Risk

The Red Crossbill, Evening Grosbeak, Olive-sided Flycatcher (*Contopus cooperi*), Gray-cheeked Thrush (*Catharus minimus minimus*), and Lesser Yellowlegs (*Tringa flavipes*) were observed in the RAA. These observations, along with the current status of each bird under the SARA and NL ESA, are presented in Table D1-3.4-3.

Table D1-3.4-3 Species at Risk observed in the RAA.

Common Name	Scientific Name	SARA	NL ESA	# Observations/Vocalizations		
				Field Surveys	RAA ARU 1	Total
Red Crossbill	<i>Loxia curvirostra percna</i>	Threatened	Threatened	73	78	149
Evening Grosbeak	<i>Coccothraustes vespertinus</i>	Special Concern	Vulnerable	-	21	21
Olive-sided Flycatcher	<i>Contopus cooperi</i>	Special Concern	Vulnerable	-	3	3
Gray-cheeked Thrush	<i>Catharus minimus minimus</i>	Not Listed*	Threatened	1	-	1
Lesser Yellowlegs	<i>Tringa flavipes</i>	Not Listed*	Threatened	5	-	5
<u>Notes</u>						
*Under consideration for addition to Schedule 1 of the SARA as Threatened.						

3.4.2.2 Species of Conservation Concern

A total of twenty-four (24) SCC were observed in the RAA throughout field surveys and acoustic monitoring in 2023 and 2024. A full list of the SCC observed, along with their current S-rank as per the AC CDC, is provided in Table D1-3.4-4.

Table D1-3.4-4 Species of Conservation Concern observed in the RAA.

Common Name	Scientific Name	S-rank	# Observations/Vocalizations		
			Field Surveys	RAA ARU 1	Total
American Goshawk	<i>Astur atricapillus</i>	S3	5	75	80
American Pipit	<i>Anthus rubescens</i>	S3B, S4M	1	49	50
American Tree Sparrow	<i>Spizelloides arborea</i>	S3B, SUM	-	67	67
American Wigeon	<i>Mareca americana</i>	S3B, SUM	-	1	1
Belted Kingfisher	<i>Megaceryle alcyon</i>	S4B, S3N, SUM	3	69	72
Black-bellied Plover	<i>Pluvialis squatarola</i>	S3M	1	-	1
Blackburnian Warbler	<i>Setophaga fusca</i>	S2B, SUM	2	-	2
Blue-headed Vireo	<i>Vireo solitarius</i>	S3S4B, SUM	2	-	2
Blue-winged Teal	<i>Spatula discors</i>	SUB, S1M	-	1	1
Brown Creeper	<i>Certhia americana</i>	S3	4	97	101
Caspian Tern	<i>Hydroprogne caspia</i>	S2B, SUM	-	1	1
Common Grackle	<i>Quiscalus quiscula</i>	S4B, S3?N, SUM	-	7	7
Common Redpoll	<i>Acanthis flammea</i>	S2S3B, S4N, SUM	413	74	487
Greater Yellowlegs	<i>Tringa melanoleuca</i>	S3B, S4M	67	27	38

Common Name	Scientific Name	S-rank	# Observations/Vocalizations		
			Field Surveys	RAA ARU 1	Total
Long-tailed Duck	<i>Clangula hyemalis</i>	S2B, S5N	26	-	4
Mallard	<i>Anas platyrhynchos</i>	S3B, SUM	31	373	398
Mourning Dove	<i>Zenaida macroura</i>	S3	-	4	4
Northern Gannet	<i>Morus bassanus</i>	S2B	22	-	22
Northern Harrier	<i>Circus hudsonius</i>	S3B, SUM	6	7	13
Red-eyed Vireo	<i>Vireo olivaceus</i>	S3S4B, SUM	1	-	1
Semipalmated Plover	<i>Charadrius semipalmatus</i>	S1B, S4M	5	-	1
Semipalmated Sandpiper	<i>Calidris pusilla</i>	S3M	1	-	1
Snow Bunting	<i>Plectrophenax nivalis</i>	S2N, S5M	11	8	8

4.0 Discussion

The PA has a broad diversity of habitat types, including rocky barren (~36%), coniferous scrub (~27%), mature forest (~13%), and wetland (~12%), and several others, all of which provide habitat for many species of birds during various life cycle stages.

The Wind Farm area of the PA had low species richness compared to the adjacent areas at lower elevations, which had more trees and shrubs and vertical strata. This low diversity was expected, as the higher elevation where the Wind Farm has been proposed to be constructed is primarily rocky barren and consistently quite windy. A wide breadth of species does not occupy this specialized niche, so the suite of species is mostly represented by those that are generalist enough for these conditions or those that can establish territories in the valleys or wetlands between the rocky outcrops.

Overall, the data were consistent between the human-led surveys and the ARUs. The most common species were relatively similar throughout the PA and the RAA. This suite of species consisted of a mixture of resident species and migrants, some of which would remain in Newfoundland for the breeding season, and some of which would use it for stopover/staging during migration. The most common Order of birds observed across the PA was passerines, represented by kinglets, thrushes, warblers, flycatchers, and sparrows. All of these species observed were typical of the habitats present in this part of Newfoundland, including Golden Crowned Kinglet, Blackpoll Warbler, Yellow-rumped Warbler in mature forests; species like Savannah Sparrow, Swamp Sparrow, and Yellow-bellied Flycatcher in open areas, wetlands, and edge habitats; finches like the crossbill species, Pine Siskin, and Pine Grosbeak; and an assortment of other species that span several ecological niches, including species of waterfowl and woodpeckers, Greater Yellowlegs, American Herring Gull, Canada Goose, Common Tern, Great-horned Owl, Belted Kingfisher, and Lapland Longspur (on migration).

Some bird species are more vulnerable to turbine collisions than others, and some have slower rates of reproduction, so they may be more affected by losses. Many species of warblers, thrushes, flycatchers, sparrows and other passerines would possibly negatively interact with wind turbines during migration, and presumably only during migration (as during the rest of their life cycle, they would primarily exist in the stratum from the treetops to the ground). Given their relative numbers compared to other types of birds, they are often the Order with the highest number of collisions. However, individually, these species are at less risk of collisions than some other species, like raptors, which may occupy the vertical stratum of the blade swept area on a day-to-day basis. From scientific literature, it has been established that raptors, shorebirds, and seabirds are some of the most vulnerable to collisions. In particular, mitigation efforts will be targeted towards Bald Eagle, which is relatively common near the Wind Farm. These efforts will involve consultations with NL WD, and may involve deterrents, blade painting, thermal imaging and AI, and adaptive smart curtailment.

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Appendix D1-1: PAARU 1 Results

Table 1 PA ARU 1 - Total vocalizations recorded.

Common Name	Scientific Name	Total # Vocalizations
Golden-crowned Kinglet	<i>Regulus satrapa</i>	9,364
Blackpoll Warbler	<i>Setophaga striata</i>	4,258
Savannah Sparrow	<i>Passerculus sandwichensis</i>	4,002
White-throated Sparrow	<i>Zonotrichia albicollis</i>	3,027
Swamp Sparrow	<i>Melospiza georgiana</i>	1,412
Red-breasted Nuthatch	<i>Sitta canadensis</i>	486
Hermit Thrush	<i>Catharus guttatus</i>	444
Dark-eyed Junco	<i>Junco hyemalis</i>	210
White-winged Crossbill	<i>Loxia leucoptera</i>	188
Yellow-rumped Warbler	<i>Setophaga coronata</i>	188
American Tree Sparrow	<i>Spizelloides arborea</i>	113
Great Horned Owl	<i>Bubo virginianus</i>	106
Common Yellowthroat	<i>Geothlypis trichas</i>	96
Greater Yellowlegs	<i>Tringa melanoleuca</i>	83
Common Redpoll	<i>Acanthis flammea</i>	63
American Pipit	<i>Anthus rubescens</i>	61
Yellow-bellied Flycatcher	<i>Empidonax flaviventris</i>	60
Palm Warbler	<i>Setophaga palmarum</i>	53
Pine Siskin	<i>Spinus pinus</i>	46
Brown Creeper	<i>Certhia americana</i>	44
Bohemian Waxwing	<i>Bombycilla garrulus</i>	25
Common Loon	<i>Gavia immer</i>	21
Canada Goose	<i>Branta canadensis</i>	17
Boreal Chickadee	<i>Poecile hudsonicus</i>	16
American Robin	<i>Turdus migratorius</i>	15
Red Crossbill	<i>Loxia curvirostra</i>	14
Cedar Waxwing	<i>Bombycilla cedrorum</i>	11
Lincoln's Sparrow	<i>Melospiza lincolni</i>	11
Lapland Longspur	<i>Calcarius lapponicus</i>	10
Pine Grosbeak	<i>Pinicola enucleator</i>	7
Great Black-backed Gull	<i>Larus marinus</i>	6
Mallard	<i>Anas platyrhynchos</i>	5
Common Raven	<i>Corvus corax</i>	4
Magnolia Warbler	<i>Setophaga magnolia</i>	3
Black-and-white Warbler	<i>Mniotilla varia</i>	3
American Goldfinch	<i>Spinus tristis</i>	3
American Redstart	<i>Setophaga ruticilla</i>	3
Hairy Woodpecker	<i>Dryobates villosus</i>	2
Long-tailed Duck	<i>Clangula hyemalis</i>	2
Belted Kingfisher	<i>Megaceryle alcyon</i>	2
Northern Waterthrush	<i>Parkesia noveboracensis</i>	2
Ring-billed Gull	<i>Larus delawarensis</i>	2
Ruffed Grouse	<i>Bonasa umbellus</i>	2

Common Name	Scientific Name	Total # Vocalizations
Tree Swallow	<i>Tachycineta bicolor</i>	1
Ruddy Turnstone	<i>Arenaria interpres</i>	1
Black-capped Chickadee	<i>Poecile atricapillus</i>	1
Fox Sparrow	<i>Passerella iliaca</i>	1
		Total 24,494

Table 2 PA ARU 1 – Total vocalizations recorded during the early breeding birds/spring migration window.

Common Name	Scientific Name	Total # Vocalizations
Savannah Sparrow	<i>Passerculus sandwichensis</i>	2,399
White-throated Sparrow	<i>Zonotrichia albicollis</i>	1,646
Golden-crowned Kinglet	<i>Regulus satrapa</i>	776
Swamp Sparrow	<i>Melospiza georgiana</i>	165
Hermit Thrush	<i>Catharus guttatus</i>	104
White-winged Crossbill	<i>Loxia leucoptera</i>	96
Yellow-rumped Warbler	<i>Setophaga coronata</i>	77
American Tree Sparrow	<i>Spizelloides arborea</i>	53
Common Redpoll	<i>Acanthis flammea</i>	39
Dark-eyed Junco	<i>Junco hyemalis</i>	21
Red-breasted Nuthatch	<i>Sitta canadensis</i>	17
Canada Goose	<i>Branta canadensis</i>	14
American Robin	<i>Turdus migratorius</i>	13
Common Loon	<i>Gavia immer</i>	11
Blackpoll Warbler	<i>Setophaga striata</i>	8
Palm Warbler	<i>Setophaga palmarum</i>	8
Pine Siskin	<i>Spinus pinus</i>	8
Boreal Chickadee	<i>Poecile hudsonicus</i>	6
Lapland Longspur	<i>Calcarius lapponicus</i>	6
Bohemian Waxwing	<i>Bombycilla garrulus</i>	5
Great Horned Owl	<i>Bubo virginianus</i>	5
Black-and-white Warbler	<i>Mniotilla varia</i>	3
Lincoln's Sparrow	<i>Melospiza lincolni</i>	3
Brown Creeper	<i>Certhia americana</i>	3
Pine Grosbeak	<i>Pinicola enucleator</i>	2
Red Crossbill	<i>Loxia curvirostra</i>	2
Long-tailed Duck	<i>Clangula hyemalis</i>	2
American Pipit	<i>Anthus rubescens</i>	2
Common Yellowthroat	<i>Geothlypis trichas</i>	2
Black-capped Chickadee	<i>Poecile atricapillus</i>	1
Mallard	<i>Anas platyrhynchos</i>	1
Tree Swallow	<i>Tachycineta bicolor</i>	1
		Total 5,499

Table 3 PA ARU 1 – Total vocalizations recorded during the breeding bird season window.

Common Name	Scientific Name	Total # Vocalizations
Golden-crowned Kinglet	<i>Regulus satrapa</i>	6,088
Blackpoll Warbler	<i>Setophaga striata</i>	4,249
Savannah Sparrow	<i>Passerculus sandwichensis</i>	1,489
White-throated Sparrow	<i>Zonotrichia albicollis</i>	1,189
Swamp Sparrow	<i>Melospiza georgiana</i>	936
Hermit Thrush	<i>Catharus guttatus</i>	336
Red-breasted Nuthatch	<i>Sitta canadensis</i>	279
Common Yellowthroat	<i>Geothlypis trichas</i>	93
White-winged Crossbill	<i>Loxia leucoptera</i>	89
Yellow-bellied Flycatcher	<i>Empidonax flaviventris</i>	60
Yellow-rumped Warbler	<i>Setophaga coronata</i>	58
Great Horned Owl	<i>Bubo virginianus</i>	42
Greater Yellowlegs	<i>Tringa melanoleuca</i>	42
American Tree Sparrow	<i>Spizelloides arborea</i>	40
Pine Siskin	<i>Spinus pinus</i>	34
Dark-eyed Junco	<i>Junco hyemalis</i>	27
American Pipit	<i>Anthus rubescens</i>	26
Palm Warbler	<i>Setophaga palmarum</i>	25
Bohemian Waxwing	<i>Bombycilla garrulus</i>	15
Common Redpoll	<i>Acanthis flammea</i>	12
Red Crossbill	<i>Loxia curvirostra</i>	12
Cedar Waxwing	<i>Bombycilla cedrorum</i>	10
Boreal Chickadee	<i>Poecile hudsonicus</i>	8
Great Black-backed Gull	<i>Larus marinus</i>	6
Pine Grosbeak	<i>Pinicola enucleator</i>	5
Common Loon	<i>Gavia immer</i>	4
Common Raven	<i>Corvus corax</i>	4
Brown Creeper	<i>Certhia americana</i>	4
American Redstart	<i>Setophaga ruticilla</i>	3
Lincoln's Sparrow	<i>Melospiza lincolni</i>	3
Magnolia Warbler	<i>Setophaga magnolia</i>	3
Mallard	<i>Anas platyrhynchos</i>	3
Ruffed Grouse	<i>Bonasa umbellus</i>	2
Ring-billed Gull	<i>Larus delawarensis</i>	2
Lapland Longspur	<i>Calcarius lapponicus</i>	2
Hairy Woodpecker	<i>Dryobates villosus</i>	2
American Goldfinch	<i>Spinus tristis</i>	1
American Robin	<i>Turdus migratorius</i>	1
Belted Kingfisher	<i>Megaceryle alcyon</i>	1
Northern Waterthrush	<i>Parkesia noveboracensis</i>	1
Total		15,206

Table 3 PA ARU 1 – Total vocalizations recorded during the fall migration window.

Common Name	Scientific Name	Total # Vocalizations
Golden-crowned Kinglet	<i>Regulus satrapa</i>	2,500
Swamp Sparrow	<i>Melospiza georgiana</i>	311
White-throated Sparrow	<i>Zonotrichia albicollis</i>	192
Red-breasted Nuthatch	<i>Sitta canadensis</i>	190
Dark-eyed Junco	<i>Junco hyemalis</i>	162
Savannah Sparrow	<i>Passerculus sandwichensis</i>	114
Great Horned Owl	<i>Bubo virginianus</i>	59
Yellow-rumped Warbler	<i>Setophaga coronata</i>	53
Greater Yellowlegs	<i>Tringa melanoleuca</i>	41
Brown Creeper	<i>Certhia americana</i>	37
American Pipit	<i>Anthus rubescens</i>	33
Palm Warbler	<i>Setophaga palmarum</i>	20
American Tree Sparrow	<i>Spizelloides arborea</i>	20
Common Redpoll	<i>Acanthis flammea</i>	12
Common Loon	<i>Gavia immer</i>	6
Lincoln's Sparrow	<i>Melospiza lincolni</i>	5
Bohemian Waxwing	<i>Bombycilla garrulus</i>	5
Pine Siskin	<i>Spinus pinus</i>	4
Hermit Thrush	<i>Catharus guttatus</i>	4
White-winged Crossbill	<i>Loxia leucoptera</i>	3
Canada Goose	<i>Branta canadensis</i>	3
Boreal Chickadee	<i>Poecile hudsonicus</i>	2
American Goldfinch	<i>Spinus tristis</i>	2
Lapland Longspur	<i>Calcarius lapponicus</i>	2
Mallard	<i>Anas platyrhynchos</i>	1
Blackpoll Warbler	<i>Setophaga striata</i>	1
American Robin	<i>Turdus migratorius</i>	1
Fox Sparrow	<i>Passerella iliaca</i>	1
Common Yellowthroat	<i>Geothlypis trichas</i>	1
Cedar Waxwing	<i>Bombycilla cedrorum</i>	1
Northern Waterthrush	<i>Parkesia noveboracensis</i>	1
Ruddy Turnstone	<i>Arenaria interpres</i>	1
Belted Kingfisher	<i>Megaceryle alcyon</i>	1
Total		3,789

Appendix D1-2: PAARU 2 Results

Table 1 PA ARU 2 – Total vocalizations recorded.

Common Name	Scientific Name	Total # Vocalizations
Hermit Thrush	<i>Catharus guttatus</i>	20,035
Blackpoll Warbler	<i>Setophaga striata</i>	13,445
White-throated Sparrow	<i>Zonotrichia albicollis</i>	8,722
Golden-crowned Kinglet	<i>Regulus satrapa</i>	7,970
Yellow-rumped Warbler	<i>Setophaga coronata</i>	4,258
Yellow-bellied Flycatcher	<i>Empidonax flaviventris</i>	4,065
Boreal Chickadee	<i>Poecile hudsonicus</i>	1,252
Common Loon	<i>Gavia immer</i>	971
Black-and-white Warbler	<i>Mniotilla varia</i>	876
Red-breasted Nuthatch	<i>Sitta canadensis</i>	862
Dark-eyed Junco	<i>Junco hyemalis</i>	833
Pine Grosbeak	<i>Pinicola enucleator</i>	656
Northern Waterthrush	<i>Parkesia noveboracensis</i>	646
American Robin	<i>Turdus migratorius</i>	557
White-winged Crossbill	<i>Loxia leucoptera</i>	483
Northern Flicker	<i>Colaptes auratus</i>	329
Black-capped Chickadee	<i>Poecile atricapillus</i>	171
Hairy Woodpecker	<i>Dryobates villosus</i>	165
Canada Jay	<i>Perisoreus canadensis</i>	159
Pine Siskin	<i>Spinus pinus</i>	156
Ruby-crowned Kinglet	<i>Corthylio calendula</i>	152
Canada Goose	<i>Branta canadensis</i>	142
Common Raven	<i>Corvus corax</i>	118
American Pipit	<i>Anthus rubescens</i>	98
Swamp Sparrow	<i>Melospiza georgiana</i>	92
Great Horned Owl	<i>Bubo virginianus</i>	84
Evening Grosbeak	<i>Coccothraustes vespertinus</i>	70
Brown Creeper	<i>Certhia americana</i>	60
Savannah Sparrow	<i>Passerculus sandwichensis</i>	51
Downy Woodpecker	<i>Dryobates pubescens</i>	47
Fox Sparrow	<i>Passerella iliaca</i>	45
American Tree Sparrow	<i>Spizelloides arborea</i>	42
Common Yellowthroat	<i>Geothlypis trichas</i>	37
Bohemian Waxwing	<i>Bombycilla garrulus</i>	35
Common Redpoll	<i>Acanthis flammea</i>	34
Palm Warbler	<i>Setophaga palmarum</i>	34
Mallard	<i>Anas platyrhynchos</i>	27
Greater Yellowlegs	<i>Tringa melanoleuca</i>	24
Sharp-shinned Hawk	<i>Accipiter striatus</i>	18
Lapland Longspur	<i>Calcarius lapponicus</i>	15
Merlin	<i>Falco columbarius</i>	14
Lincoln's Sparrow	<i>Melospiza lincolni</i>	13
Black-throated Green Warbler	<i>Setophaga virens</i>	10

Common Name	Scientific Name	Total # Vocalizations
Green-winged Teal	<i>Anas crecca</i>	10
American Goshawk	<i>Astur atricapillus</i>	8
Red Crossbill	<i>Loxia curvirostra</i>	6
American Redstart	<i>Setophaga ruticilla</i>	6
Horned Lark	<i>Eremophila alpestris</i>	5
Cedar Waxwing	<i>Bombycilla cedrorum</i>	3
Eurasian Wigeon	<i>Mareca penelope</i>	3
Snow Bunting	<i>Plectrophenax nivalis</i>	3
Osprey	<i>Pandion haliaetus</i>	2
Wilson's Warbler	<i>Cardellina pusilla</i>	2
Spotted Sandpiper	<i>Actitis macularius</i>	2
Belted Kingfisher	<i>Megaceryle alcyon</i>	1
Common Tern	<i>Sterna hirundo</i>	1
Ruffed Grouse	<i>Bonasa umbellus</i>	1
Magnolia Warbler	<i>Setophaga magnolia</i>	1
Herring Gull	<i>Larus argentatus</i>	1
Purple Finch	<i>Haemorhous purpureus</i>	1
Wilson's Snipe	<i>Gallinago delicata</i>	1
Ring-necked Duck	<i>Aythya collaris</i>	1
American Goldfinch	<i>Spinus tristis</i>	1
Swainson's Thrush	<i>Catharus ustulatus</i>	1
Blue-winged Teal	<i>Spatula discors</i>	1
Blue Jay	<i>Cyanocitta cristata</i>	1
Total		67,935

Table 2 PA ARU 2 – Total vocalizations recorded during the early breeding birds/spring migration window.

Common Name	Scientific Name	Total # Vocalizations
Hermit Thrush	<i>Catharus guttatus</i>	6,936
White-throated Sparrow	<i>Zonotrichia albicollis</i>	3,328
Yellow-rumped Warbler	<i>Setophaga coronata</i>	2,311
Blackpoll Warbler	<i>Setophaga striata</i>	1,770
Boreal Chickadee	<i>Poecile hudsonicus</i>	649
Golden-crowned Kinglet	<i>Regulus satrapa</i>	571
American Robin	<i>Turdus migratorius</i>	426
Dark-eyed Junco	<i>Junco hyemalis</i>	302
White-winged Crossbill	<i>Loxia leucoptera</i>	187
Common Loon	<i>Gavia immer</i>	161
Red-breasted Nuthatch	<i>Sitta canadensis</i>	159
Pine Grosbeak	<i>Pinicola enucleator</i>	147
Black-and-white Warbler	<i>Mniotilla varia</i>	139
Northern Waterthrush	<i>Parkesia noveboracensis</i>	109
Black-capped Chickadee	<i>Poecile atricapillus</i>	75
Ruby-crowned Kinglet	<i>Corthylio calendula</i>	41
Pine Siskin	<i>Spinus pinus</i>	37

Common Name	Scientific Name	Total # Vocalizations
Great Horned Owl	<i>Bubo virginianus</i>	35
Downy Woodpecker	<i>Dryobates pubescens</i>	32
Northern Flicker	<i>Colaptes auratus</i>	26
Canada Goose	<i>Branta canadensis</i>	22
Brown Creeper	<i>Certhia americana</i>	22
Swamp Sparrow	<i>Melospiza georgiana</i>	18
Savannah Sparrow	<i>Passerculus sandwichensis</i>	17
Yellow-bellied Flycatcher	<i>Empidonax flaviventris</i>	13
Common Raven	<i>Corvus corax</i>	11
Canada Jay	<i>Perisoreus canadensis</i>	10
American Pipit	<i>Anthus rubescens</i>	8
Fox Sparrow	<i>Passerella iliaca</i>	6
American Tree Sparrow	<i>Spizelloides arborea</i>	5
American Redstart	<i>Setophaga ruticilla</i>	4
Lapland Longspur	<i>Calcarius lapponicus</i>	4
Common Redpoll	<i>Acanthis flammea</i>	4
Lincoln's Sparrow	<i>Melospiza lincolni</i>	3
Merlin	<i>Falco columbarius</i>	3
Horned Lark	<i>Eremophila alpestris</i>	2
Green-winged Teal	<i>Anas crecca</i>	2
Red Crossbill	<i>Loxia curvirostra</i>	1
Cedar Waxwing	<i>Bombycilla cedrorum</i>	1
Ring-necked Duck	<i>Aythya collaris</i>	1
Black-throated Green Warbler	<i>Setophaga virens</i>	1
Magnolia Warbler	<i>Setophaga magnolia</i>	1
Eurasian Wigeon	<i>Mareca penelope</i>	1
Mallard	<i>Anas platyrhynchos</i>	1
Spotted Sandpiper	<i>Actitis macularius</i>	1
Greater Yellowlegs	<i>Tringa melanoleuca</i>	1
Total		17,604

Table 3 PA ARU 2 – Total vocalizations recorded during the breeding season window.

Common Name	Scientific Name	Total # Vocalizations
Hermit Thrush	<i>Catharus guttatus</i>	12,973
Blackpoll Warbler	<i>Setophaga striata</i>	11,675
White-throated Sparrow	<i>Zonotrichia albicollis</i>	5,343
Golden-crowned Kinglet	<i>Regulus satrapa</i>	4,668
Yellow-bellied Flycatcher	<i>Empidonax flaviventris</i>	4,052
Yellow-rumped Warbler	<i>Setophaga coronata</i>	1,842
Common Loon	<i>Gavia immer</i>	768
Black-and-white Warbler	<i>Mniotilla varia</i>	737
Red-breasted Nuthatch	<i>Sitta canadensis</i>	577
Northern Waterthrush	<i>Parkesia noveboracensis</i>	537
Pine Grosbeak	<i>Pinicola enucleator</i>	362
Boreal Chickadee	<i>Poecile hudsonicus</i>	303

Common Name	Scientific Name	Total # Vocalizations
Dark-eyed Junco	<i>Junco hyemalis</i>	297
White-winged Crossbill	<i>Loxia leucoptera</i>	273
Northern Flicker	<i>Colaptes auratus</i>	151
Canada Goose	<i>Branta canadensis</i>	111
Ruby-crowned Kinglet	<i>Corthylio calendula</i>	111
American Robin	<i>Turdus migratorius</i>	107
Canada Jay	<i>Perisoreus canadensis</i>	104
Common Raven	<i>Corvus corax</i>	93
Hairy Woodpecker	<i>Dryobates villosus</i>	72
American Pipit	<i>Anthus rubescens</i>	67
Swamp Sparrow	<i>Melospiza georgiana</i>	66
Pine Siskin	<i>Spinus pinus</i>	52
Great Horned Owl	<i>Bubo virginianus</i>	38
American Tree Sparrow	<i>Spizelloides arborea</i>	37
Common Yellowthroat	<i>Geothlypis trichas</i>	37
Savannah Sparrow	<i>Passerculus sandwichensis</i>	32
Fox Sparrow	<i>Passerella iliaca</i>	31
Black-capped Chickadee	<i>Poecile atricapillus</i>	29
Palm Warbler	<i>Setophaga palmarum</i>	28
Greater Yellowlegs	<i>Tringa melanoleuca</i>	20
Brown Creeper	<i>Certhia americana</i>	19
Bohemian Waxwing	<i>Bombycilla garrulus</i>	19
Sharp-shinned Hawk	<i>Accipiter striatus</i>	14
Downy Woodpecker	<i>Dryobates pubescens</i>	13
Common Redpoll	<i>Acanthis flammea</i>	11
Merlin	<i>Falco columbarius</i>	10
Evening Grosbeak	<i>Coccothraustes vespertinus</i>	10
Lapland Longspur	<i>Calcarius lapponicus</i>	9
Black-throated Green Warbler	<i>Setophaga virens</i>	9
American Goshawk	<i>Astur atricapillus</i>	7
Lincoln's Sparrow	<i>Melospiza lincolni</i>	6
Red Crossbill	<i>Loxia curvirostra</i>	5
Green-winged Teal	<i>Anas crecca</i>	4
Horned Lark	<i>Eremophila alpestris</i>	3
Osprey	<i>Pandion haliaetus</i>	2
American Redstart	<i>Setophaga ruticilla</i>	2
Snow Bunting	<i>Plectrophenax nivalis</i>	2
Wilson's Warbler	<i>Cardellina pusilla</i>	2
Cedar Waxwing	<i>Bombycilla cedrorum</i>	2
Belted Kingfisher	<i>Megaceryle alcyon</i>	1
Purple Finch	<i>Haemorhous purpureus</i>	1
Spotted Sandpiper	<i>Actitis macularius</i>	1
Swainson's Thrush	<i>Catharus ustulatus</i>	1
Common Tern	<i>Sterna hirundo</i>	1
Ruffed Grouse	<i>Bonasa umbellus</i>	1

Common Name	Scientific Name	Total # Vocalizations
Blue-winged Teal	<i>Spatula discors</i>	1
American Herring Gull	<i>Larus argentatus</i>	1
Total	45,750	

Table 4 PA ARU 2 – Total vocalizations during the fall migration window.

Common Name	Scientific Name	Total # Vocalizations
Golden-crowned Kinglet	<i>Regulus satrapa</i>	2,731
Boreal Chickadee	<i>Poecile hudsonicus</i>	300
Dark-eyed Junco	<i>Junco hyemalis</i>	234
Northern Flicker	<i>Colaptes auratus</i>	152
Pine Grosbeak	<i>Pinicola enucleator</i>	147
Red-breasted Nuthatch	<i>Sitta canadensis</i>	126
Hermit Thrush	<i>Catharus guttatus</i>	126
Yellow-rumped Warbler	<i>Setophaga coronata</i>	105
Hairy Woodpecker	<i>Dryobates villosus</i>	93
Pine Siskin	<i>Spinus pinus</i>	67
Black-capped Chickadee	<i>Poecile atricapillus</i>	67
Evening Grosbeak	<i>Coccothraustes vespertinus</i>	60
White-throated Sparrow	<i>Zonotrichia albicollis</i>	51
Canada Jay	<i>Perisoreus canadensis</i>	45
Common Loon	<i>Gavia immer</i>	42
Mallard	<i>Anas platyrhynchos</i>	26
American Robin	<i>Turdus migratorius</i>	24
American Pipit	<i>Anthus rubescens</i>	23
White-winged Crossbill	<i>Loxia leucoptera</i>	23
Common Redpoll	<i>Acanthis flammea</i>	19
Brown Creeper	<i>Certhia americana</i>	19
Bohemian Waxwing	<i>Bombycilla garrulus</i>	16
Common Raven	<i>Corvus corax</i>	14
Great Horned Owl	<i>Bubo virginianus</i>	11
Canada Goose	<i>Branta canadensis</i>	9
Swamp Sparrow	<i>Melospiza georgiana</i>	8
Fox Sparrow	<i>Passerella iliaca</i>	8
Palm Warbler	<i>Setophaga palmarum</i>	6
Sharp-shinned Hawk	<i>Accipiter striatus</i>	4
Lincoln's Sparrow	<i>Melospiza lincolni</i>	4
Green-winged Teal	<i>Anas crecca</i>	4
Greater Yellowlegs	<i>Tringa melanoleuca</i>	3
Lapland Longspur	<i>Calcarius lapponicus</i>	2
Downy Woodpecker	<i>Dryobates pubescens</i>	2
Savannah Sparrow	<i>Passerculus sandwichensis</i>	2
Eurasian Wigeon	<i>Mareca penelope</i>	2
American Goshawk	<i>Astur atricapillus</i>	1
Blue Jay	<i>Cyanocitta cristata</i>	1
Wilson's Snipe	<i>Gallinago delicata</i>	1

Common Name	Scientific Name	Total # Vocalizations
Merlin	<i>Falco columbarius</i>	1
American Goldfinch	<i>Spinus tristis</i>	1
Snow Bunting	<i>Plectrophenax nivalis</i>	1
Total		4,581

Appendix D1-3: RAA ARU 1 Results

Table 1 RAA ARU 1 – Total vocalizations recorded.

Common Name	Scientific Name	Total # Vocalizations
Hermit Thrush	<i>Catharus guttatus</i>	26,559
Yellow-bellied Flycatcher	<i>Empidonax flaviventris</i>	15,702
Blackpoll Warbler	<i>Setophaga striata</i>	12,987
White-throated Sparrow	<i>Zonotrichia albicollis</i>	12,248
Golden-crowned Kinglet	<i>Regulus satrapa</i>	8,956
Black-and-white Warbler	<i>Mniotilla varia</i>	8,068
Yellow-rumped Warbler	<i>Setophaga coronata</i>	4,083
Boreal Chickadee	<i>Poecile hudsonicus</i>	2,049
Swamp Sparrow	<i>Melospiza georgiana</i>	1,806
Black-capped Chickadee	<i>Poecile atricapillus</i>	1,227
Northern Waterthrush	<i>Parkesia noveboracensis</i>	1,134
White-winged Crossbill	<i>Loxia leucoptera</i>	974
Dark-eyed Junco	<i>Junco hyemalis</i>	744
Great Horned Owl	<i>Bubo virginianus</i>	742
Ruby-crowned Kinglet	<i>Corthylio calendula</i>	723
Palm Warbler	<i>Setophaga palmarum</i>	634
Savannah Sparrow	<i>Passerculus sandwichensis</i>	577
Red-breasted Nuthatch	<i>Sitta canadensis</i>	518
Fox Sparrow	<i>Passerella iliaca</i>	445
American Robin	<i>Turdus migratorius</i>	426
Mallard	<i>Anas platyrhynchos</i>	373
Pine Grosbeak	<i>Pinicola enucleator</i>	241
Common Yellowthroat	<i>Geothlypis trichas</i>	229
Black-throated Green Warbler	<i>Setophaga virens</i>	203
Pine Siskin	<i>Spinus pinus</i>	192
Common Loon	<i>Gavia immer</i>	188
Wilson's Snipe	<i>Gallinago delicata</i>	179
Wilson's Warbler	<i>Cardellina pusilla</i>	129
Canada Jay	<i>Perisoreus canadensis</i>	129
Northern Flicker	<i>Colaptes auratus</i>	115
Herring Gull	<i>Larus argentatus</i>	104
Common Raven	<i>Corvus corax</i>	101
Brown Creeper	<i>Certhia americana</i>	97
American Goldfinch	<i>Spinus tristis</i>	92
Mourning Warbler	<i>Geothlypis philadelphica</i>	88
Red Crossbill	<i>Loxia curvirostra</i>	78
American Goshawk	<i>Astur atricapillus</i>	75
Common Redpoll	<i>Acanthis flammea</i>	74
Belted Kingfisher	<i>Megaceryle alcyon</i>	69
American Tree Sparrow	<i>Spizelloides arborea</i>	67
Eurasian Wigeon	<i>Mareca penelope</i>	56
Common Tern	<i>Sterna hirundo</i>	55
American Pipit	<i>Anthus rubescens</i>	49

Common Name	Scientific Name	Total # Vocalizations
Green-winged Teal	<i>Anas crecca</i>	45
Bohemian Waxwing	<i>Bombycilla garrulus</i>	38
Osprey	<i>Pandion haliaetus</i>	35
Blue Jay	<i>Cyanocitta cristata</i>	28
House Sparrow	<i>Passer domesticus</i>	28
Greater Scaup	<i>Aythya marila</i>	27
Greater Yellowlegs	<i>Tringa melanoleuca</i>	27
Hairy Woodpecker	<i>Dryobates villosus</i>	26
American Crow	<i>Corvus brachyrhynchos</i>	21
Evening Grosbeak	<i>Coccothraustes vespertinus</i>	21
Swainson's Thrush	<i>Catharus ustulatus</i>	19
Common Merganser	<i>Mergus merganser</i>	14
Downy Woodpecker	<i>Dryobates pubescens</i>	13
Lincoln's Sparrow	<i>Melospiza lincolni</i>	11
Ruffed Grouse	<i>Bonasa umbellus</i>	10
Great Black-backed Gull	<i>Larus marinus</i>	9
Purple Finch	<i>Haemorhous purpureus</i>	9
Cedar Waxwing	<i>Bombycilla cedrorum</i>	9
Sharp-shinned Hawk	<i>Accipiter striatus</i>	9
Snow Bunting	<i>Plectrophenax nivalis</i>	8
Ring-billed Gull	<i>Larus delawarensis</i>	8
Northern Harrier	<i>Circus hudsonius</i>	7
Common Grackle	<i>Quiscalus quiscula</i>	7
Tree Swallow	<i>Tachycineta bicolor</i>	6
Bald Eagle	<i>Haliaeetus leucocephalus</i>	6
American Redstart	<i>Setophaga ruticilla</i>	5
Ring-necked Duck	<i>Aythya collaris</i>	5
Rock Pigeon	<i>Columba livia</i>	5
Lapland Longspur	<i>Calcarius lapponicus</i>	5
Magnolia Warbler	<i>Setophaga magnolia</i>	4
Alder Flycatcher	<i>Empidonax alnorum</i>	4
Mourning Dove	<i>Zenaida macroura</i>	4
Merlin	<i>Falco columbarius</i>	3
Common Goldeneye	<i>Bucephala clangula</i>	3
Canada Goose	<i>Branta canadensis</i>	3
Olive-sided Flycatcher	<i>Contopus cooperi</i>	3
Black-legged Kittiwake	<i>Rissa tridactyla</i>	2
Yellow Warbler	<i>Setophaga petechia</i>	2
Arctic Tern	<i>Sterna paradisaea</i>	2
American Wigeon	<i>Mareca americana</i>	1
Caspian Tern	<i>Hydroprogne caspia</i>	1
Spotted Sandpiper	<i>Actitis macularius</i>	1
Bonaparte's Gull	<i>Chroicocephalus philadelphia</i>	1
Blue-winged Teal	<i>Spatula discors</i>	1

Common Name	Scientific Name	Total # Vocalizations
Snowy Owl	<i>Bubo scandiacus</i>	1
		Total 104,082

Table 2 RAA ARU 1 – Total vocalizations recorded during the early breeding birds/spring migration window.

Common Name	Scientific Name	Total # Vocalizations
White-throated Sparrow	<i>Zonotrichia albicollis</i>	2,597
Blackpoll Warbler	<i>Setophaga striata</i>	2,033
Hermit Thrush	<i>Catharus guttatus</i>	1,296
Swamp Sparrow	<i>Melospiza georgiana</i>	869
Yellow-rumped Warbler	<i>Setophaga coronata</i>	570
Ruby-crowned Kinglet	<i>Corthylio calendula</i>	515
Palm Warbler	<i>Setophaga palmarum</i>	461
Northern Waterthrush	<i>Parkesia noveboracensis</i>	369
White-winged Crossbill	<i>Loxia leucoptera</i>	285
Black-and-white Warbler	<i>Mniotilla varia</i>	184
Black-capped Chickadee	<i>Poecile atricapillus</i>	150
Boreal Chickadee	<i>Poecile hudsonicus</i>	116
American Robin	<i>Turdus migratorius</i>	98
Wilson's Warbler	<i>Cardellina pusilla</i>	76
Great Horned Owl	<i>Bubo virginianus</i>	75
Golden-crowned Kinglet	<i>Regulus satrapa</i>	67
Yellow-bellied Flycatcher	<i>Empidonax flaviventris</i>	56
Pine Grosbeak	<i>Pinicola enucleator</i>	52
Dark-eyed Junco	<i>Junco hyemalis</i>	42
Pine Siskin	<i>Spinus pinus</i>	31
Red Crossbill	<i>Loxia curvirostra</i>	25
Common Loon	<i>Gavia immer</i>	24
Fox Sparrow	<i>Passerella iliaca</i>	21
Savannah Sparrow	<i>Passerculus sandwichensis</i>	21
Wilson's Snipe	<i>Gallinago delicata</i>	20
Northern Goshawk	<i>Accipiter gentilis</i>	18
Mallard	<i>Anas platyrhynchos</i>	14
Common Tern	<i>Sterna hirundo</i>	7
American Tree Sparrow	<i>Spizelloides arborea</i>	7
Common Redpoll	<i>Acanthis flammea</i>	5
Canada Jay	<i>Perisoreus canadensis</i>	5
Common Yellowthroat	<i>Geothlypis trichas</i>	5
Northern Harrier	<i>Circus hudsonius</i>	5
American Pipit	<i>Anthus rubescens</i>	4
Black-throated Green Warbler	<i>Setophaga virens</i>	4
Red-breasted Nuthatch	<i>Sitta canadensis</i>	4
Common Raven	<i>Corvus corax</i>	4
Green-winged Teal	<i>Anas crecca</i>	4
Belted Kingfisher	<i>Megaceryle alcyon</i>	3

Common Name	Scientific Name	Total # Vocalizations
Greater Yellowlegs	<i>Tringa melanoleuca</i>	3
Purple Finch	<i>Haemorhous purpureus</i>	2
Lincoln's Sparrow	<i>Melospiza lincolni</i>	2
Common Goldeneye	<i>Bucephala clangula</i>	2
House Sparrow	<i>Passer domesticus</i>	2
Merlin	<i>Falco columbarius</i>	1
Olive-sided Flycatcher	<i>Contopus cooperi</i>	1
American Goldfinch	<i>Spinus tristis</i>	1
Arctic Tern	<i>Sterna paradisaea</i>	1
Total		10,157

Table 3 RAA ARU 1 – Total vocalizations recorded during the breeding season window.

Common Name	Scientific Name	Total # Vocalizations
Hermit Thrush	<i>Catharus guttatus</i>	23,316
Yellow-bellied Flycatcher	<i>Empidonax flaviventris</i>	15,112
Blackpoll Warbler	<i>Setophaga striata</i>	10,567
White-throated Sparrow	<i>Zonotrichia albicollis</i>	8,582
Black-and-white Warbler	<i>Mniotilla varia</i>	6,283
Golden-crowned Kinglet	<i>Regulus satrapa</i>	3,811
Yellow-rumped Warbler	<i>Setophaga coronata</i>	2,885
Boreal Chickadee	<i>Poecile hudsonicus</i>	851
White-winged Crossbill	<i>Loxia leucoptera</i>	681
Northern Waterthrush	<i>Parkesia noveboracensis</i>	625
Swamp Sparrow	<i>Melospiza georgiana</i>	587
Black-capped Chickadee	<i>Poecile atricapillus</i>	546
Dark-eyed Junco	<i>Junco hyemalis</i>	485
Fox Sparrow	<i>Passerella iliaca</i>	338
Savannah Sparrow	<i>Passerculus sandwichensis</i>	320
Red-breasted Nuthatch	<i>Sitta canadensis</i>	313
American Robin	<i>Turdus migratorius</i>	285
Common Yellowthroat	<i>Geothlypis trichas</i>	221
Black-throated Green Warbler	<i>Setophaga virens</i>	199
Ruby-crowned Kinglet	<i>Corthylio calendula</i>	161
Wilson's Snipe	<i>Gallinago delicata</i>	159
Pine Grosbeak	<i>Pinicola enucleator</i>	143
Common Loon	<i>Gavia immer</i>	111
Great Horned Owl	<i>Bubo virginianus</i>	110
Mourning Warbler	<i>Geothlypis philadelphia</i>	88
Herring Gull	<i>Larus argentatus</i>	86
Pine Siskin	<i>Spinus pinus</i>	85
Palm Warbler	<i>Setophaga palmarum</i>	77
Mallard	<i>Anas platyrhynchos</i>	65
Canada Jay	<i>Perisoreus canadensis</i>	57
Northern Goshawk	<i>Accipiter gentilis</i>	54
Common Redpoll	<i>Acanthis flammea</i>	52

Common Name	Scientific Name	Total # Vocalizations
Red Crossbill	<i>Loxia curvirostra</i>	52
Wilson's Warbler	<i>Cardellina pusilla</i>	49
Common Tern	<i>Sterna hirundo</i>	48
Belted Kingfisher	<i>Megaceryle alcyon</i>	44
Green-winged Teal	<i>Anas crecca</i>	37
American Goldfinch	<i>Spinus tristis</i>	36
Common Raven	<i>Corvus corax</i>	33
Greater Scaup	<i>Aythya marila</i>	27
House Sparrow	<i>Passer domesticus</i>	25
Osprey	<i>Pandion haliaetus</i>	23
Bohemian Waxwing	<i>Bombycilla garrulus</i>	22
American Tree Sparrow	<i>Spizelloides arborea</i>	22
Brown Creeper	<i>Certhia americana</i>	20
Swainson's Thrush	<i>Catharus ustulatus</i>	19
Hairy Woodpecker	<i>Dryobates villosus</i>	19
Northern Flicker	<i>Colaptes auratus</i>	19
American Pipit	<i>Anthus rubescens</i>	17
Eurasian Wigeon	<i>Mareca penelope</i>	16
Common Merganser	<i>Mergus merganser</i>	14
Ruffed Grouse	<i>Bonasa umbellus</i>	10
American Crow	<i>Corvus brachyrhynchos</i>	9
Ring-billed Gull	<i>Larus delawarensis</i>	8
Greater Yellowlegs	<i>Tringa melanoleuca</i>	8
Evening Grosbeak	<i>Coccothraustes vespertinus</i>	7
Cedar Waxwing	<i>Bombycilla cedrorum</i>	6
Bald Eagle	<i>Haliaeetus leucocephalus</i>	6
Tree Swallow	<i>Tachycineta bicolor</i>	6
Purple Finch	<i>Haemorhous purpureus</i>	6
Lincoln's Sparrow	<i>Melospiza lincolni</i>	5
Magnolia Warbler	<i>Setophaga magnolia</i>	4
Snow Bunting	<i>Plectrophenax nivalis</i>	4
Alder Flycatcher	<i>Empidonax alnorum</i>	4
Rock Pigeon	<i>Columba livia</i>	3
American Redstart	<i>Setophaga ruticilla</i>	3
Common Grackle	<i>Quiscalus quiscula</i>	3
Olive-sided Flycatcher	<i>Contopus cooperi</i>	2
Ring-necked Duck	<i>Aythya collaris</i>	2
Downy Woodpecker	<i>Dryobates pubescens</i>	2
Northern Harrier	<i>Circus hudsonius</i>	2
Mourning Dove	<i>Zenaida macroura</i>	2
Black-legged Kittiwake	<i>Rissa tridactyla</i>	2
Lapland Longspur	<i>Calcarius lapponicus</i>	2
Spotted Sandpiper	<i>Actitis macularius</i>	1
Blue-winged Teal	<i>Spatula discors</i>	1
Common Goldeneye	<i>Bucephala clangula</i>	1

Common Name	Scientific Name	Total # Vocalizations
Arctic Tern	<i>Sterna paradisaea</i>	1
Bonaparte's Gull	<i>Chroicocephalus philadelphia</i>	1
Canada Goose	<i>Branta canadensis</i>	1
Total		77,909

Table 4 RAA ARU 1 – Total vocalizations recorded during the fall migration window.

Common Name	Scientific Name	Total # Vocalizations
Golden-crowned Kinglet	<i>Regulus satrapa</i>	5,078
Hermit Thrush	<i>Catharus guttatus</i>	1,947
Black-and-white Warbler	<i>Mniotilla varia</i>	1,601
Boreal Chickadee	<i>Poecile hudsonicus</i>	1,082
White-throated Sparrow	<i>Zonotrichia albicollis</i>	1,069
Yellow-rumped Warbler	<i>Setophaga coronata</i>	628
Great Horned Owl	<i>Bubo virginianus</i>	557
Yellow-bellied Flycatcher	<i>Empidonax flaviventris</i>	534
Black-capped Chickadee	<i>Poecile atricapillus</i>	531
Blackpoll Warbler	<i>Setophaga striata</i>	387
Swamp Sparrow	<i>Melospiza georgiana</i>	350
Mallard	<i>Anas platyrhynchos</i>	294
Savannah Sparrow	<i>Passerculus sandwichensis</i>	236
Dark-eyed Junco	<i>Junco hyemalis</i>	217
Red-breasted Nuthatch	<i>Sitta canadensis</i>	201
Northern Waterthrush	<i>Parkesia noveboracensis</i>	140
Palm Warbler	<i>Setophaga palmarum</i>	96
Northern Flicker	<i>Colaptes auratus</i>	96
Fox Sparrow	<i>Passerella iliaca</i>	86
Brown Creeper	<i>Certhia americana</i>	77
Pine Siskin	<i>Spinus pinus</i>	76
Canada Jay	<i>Perisoreus canadensis</i>	67
Common Raven	<i>Corvus corax</i>	64
American Goldfinch	<i>Spinus tristis</i>	55
Common Loon	<i>Gavia immer</i>	53
Ruby-crowned Kinglet	<i>Corthylio calendula</i>	47
Pine Grosbeak	<i>Pinicola enucleator</i>	46
American Robin	<i>Turdus migratorius</i>	43
Eurasian Wigeon	<i>Mareca penelope</i>	40
American Tree Sparrow	<i>Spizelloides arborea</i>	38
Blue Jay	<i>Cyanocitta cristata</i>	28
American Pipit	<i>Anthus rubescens</i>	28
Belted Kingfisher	<i>Megaceryle alcyon</i>	22
Herring Gull	<i>Larus argentatus</i>	18
Common Redpoll	<i>Acanthis flammea</i>	17
Bohemian Waxwing	<i>Bombycilla garrulus</i>	16
Greater Yellowlegs	<i>Tringa melanoleuca</i>	16
Evening Grosbeak	<i>Coccothraustes vespertinus</i>	14

Common Name	Scientific Name	Total # Vocalizations
American Crow	<i>Corvus brachyrhynchos</i>	12
Osprey	<i>Pandion haliaetus</i>	12
Downy Woodpecker	<i>Dryobates pubescens</i>	11
Sharp-shinned Hawk	<i>Accipiter striatus</i>	9
Great Black-backed Gull	<i>Larus marinus</i>	9
White-winged Crossbill	<i>Loxia leucoptera</i>	8
Hairy Woodpecker	<i>Dryobates villosus</i>	7
Wilson's Warbler	<i>Cardellina pusilla</i>	4
Lincoln's Sparrow	<i>Melospiza lincolni</i>	4
Snow Bunting	<i>Plectrophenax nivalis</i>	4
Common Grackle	<i>Quiscalus quiscula</i>	4
Green-winged Teal	<i>Anas crecca</i>	4
Common Yellowthroat	<i>Geothlypis trichas</i>	3
American Goshawk	<i>Astur atricapillus</i>	3
Cedar Waxwing	<i>Bombycilla cedrorum</i>	3
Ring-necked Duck	<i>Aythya collaris</i>	3
Lapland Longspur	<i>Calcarius lapponicus</i>	3
Yellow Warbler	<i>Setophaga petechia</i>	2
Canada Goose	<i>Branta canadensis</i>	2
Mourning Dove	<i>Zenaida macroura</i>	2
Rock Pigeon	<i>Columba livia</i>	2
Merlin	<i>Falco columbarius</i>	2
American Redstart	<i>Setophaga ruticilla</i>	2
Caspian Tern	<i>Hydroprogne caspia</i>	1
American Wigeon	<i>Mareca americana</i>	1
House Sparrow	<i>Passer domesticus</i>	1
Red Crossbill	<i>Loxia curvirostra</i>	1
Purple Finch	<i>Haemorhous purpureus</i>	1
Snowy Owl	<i>Bubo scandiacus</i>	1
Total		16,016