



# Bat Habitat Assessment and Bird Surveys


## Hartlen Point, NS

### Final Report

DCC Project # IE036102



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Report: 211207.00



March 20, 2023

Jaime Darrow  
Coordinator, Environmental Services  
Defence Construction Canada  
6231 Engineer's Way  
Willow Park, Bldg WL7  
Halifax, NS B3K 5M6  
E-mail: Jaime.Darrow@dcc-cdc.gc.ca

Andrew Bradley  
Project Manager, Construction Projects Delivery  
Department of National Defence  
101 Colonel By Drive  
Ottawa, ON K1A 0K2  
E-mail: Andrew.Bradley2@forces.gc.ca

Dear Ms. Darrow and Mr. Bradley:

*RE: Environmental Surveys in Support of the Proposed Land Based Test Facility – Hartlen Point, Eastern Passage, NS – (DCC Project No. IE036102\_74469 KN) – Final Report*

CBCL Limited (CBCL) is pleased to provide Defence Construction Canada (DCC) and the Department of National Defence (DND) with this Final Report outlining the results of the bird and bat surveys conducted by CBCL in 2021 and 2022 in connection with the proposed Land Based Test Facility at Hartlen Point in Eastern Passage, NS. This report is being submitted under the DCC Atlantic Environmental Source List for Natural Resources (AE16SLNR).

We trust that this report meets your expectations. Should you have any questions or require clarification of any matter raised in this submission, please contact the undersigned at your convenience. We appreciate the opportunity to work with DCC/DND on this project.

Yours very truly,

CBCL Limited

Prepared by:  
Carrie Jardine M.Sc., B.Sc.H.  
Fisheries and Wildlife Biologist

Reviewed by:  
Loretta Hardwick, M.Sc., B.Sc.H.  
Senior Environmental Scientist

Project No: 211207.00

# Executive Summary

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The Department of National Defence (DND) is proposing to construct a Land Based Test Facility (LBTF) at the Hartlen Point Canadian Forces Base property (Study Area) in Eastern Passage, NS (the Project). The Project Area for the proposed LBTF is located on a point near the eastern property boundary. The Project Area is approximately 62,468 m<sup>2</sup> and consists of the space that will be fenced off around the LBTF for operational and security purposes. The LBTF building itself will be approximately 11,500 m<sup>2</sup> within this fenced area.

Defence Construction Canada (DCC), on behalf of DND, contracted CBCL Limited (CBCL) to conduct natural resource surveys to support DND in determining if the proposed construction of the LBTF at Hartlen Point is likely to result in significant adverse effects to the environment (the Study). CBCL completed general habitat mapping of the Study Area, a preliminary bat maternity roost habitat assessment within the proposed main Project footprint (Project Area), as well as surveys for birds and bird habitat in 2021 and 2022. CBCL identified potential impacts of Project activities on migratory birds, bird and bat species at risk (SAR), as well as bird species of conservation concern (SoCC). Mitigation measures to minimize or eliminate potential impacts were identified, as well as residual effects that are anticipated to remain following the implementation of mitigation measures.

CBCL conducted a desktop review of habitat information available for the Hartlen Point site and adjacent area. Provincial mapping classifies much of the land cover on site as urban/anthropogenic owing to the presence of the golf course. Most of the Project footprint (approximately 5 ha or 63%) consists of tall shrub habitat. An approximately 2 ha softwood stand is located within the interior of Project Area. Critical habitat for Piping Plover (*Charadrius melodus*) was identified approximately 550 m north of the Project footprint. Much of the southern portion of the Hartlen Point property was found to overlap an important migratory bird area, which is classified as provincially significant habitat.

CBCL completed a preliminary bat maternity roost habitat assessment within the proposed Project footprint to identify the presence of suitable maternity roosting habitat for three bat SAR, Little Brown Myotis (*Myotis lucifugus*), Northern Myotis (*Myotis septentrionalis*), and Tri-colored Bat (*Perimyotis subflavus*). CBCL also conducted opportunistic acoustic monitoring for bats in conjunction with the nightjar survey in July 2021. A desktop level

assessment was completed to identify the potential presence of bat hibernacula in the area. CBCL biologists did not observe any trees with attributes suitable for use as maternity roosts in the Project Area, nor were any bats detected during the opportunistic acoustic monitoring; however, the forested habitat may be used by non-reproductive bat individuals for roosting (day roosts) during the active period for bats in Nova Scotia (April to October). No bat hibernacula were reported in the vicinity of the Project Area.

CBCL completed a desktop review of SAR/SoCC birds recorded on, or within 5 km of, the Hartlen Point property and identified the population status for each species identified. CBCL also assessed whether suitable habitat for these species existed on site. CBCL identified 294 species, plus two hybrid species, that have been observed at Hartlen Point between 1983 and 2022. Of the 296 species identified, 24 are SAR and 81 are SoCC. CBCL determined that suitable breeding habitat exists on the property for 57 of these SAR/SoCC (9 SAR; 48 SoCC) and suitable foraging habitat for all SAR/SoCC species. These SAR/SoCC could potentially use the site outside of the breeding period (e.g., during migration).

A total of 122 species, plus five unidentified taxa, were observed within the Study Area during all field programs conducted by CBCL in 2021 and 2022. Of the 122 species observed, 111 are protected under the *Migratory Birds Convention Act, 1994* (MBCA). Six of the species observed are SAR and 33 are SoCC. The SAR species observed and the programs they were observed in are listed below:

- ▶ Barn Swallow (*Hirundo rustica*) (Programs: spring migration, breeding bird, incidental, nightjar, barn swallow roosting, and barn swallow habitat inventory)
- ▶ Barrow's Goldeneye (*Bucephala islandica*) (Program: winter bird residency)
- ▶ Buff-breasted Sandpiper (*Calidris subruficollis*) (Program: fall migration)
- ▶ Canada Warbler (*Cardellina canadensis*) (Program: barn swallow roosting)
- ▶ Eastern Wood-pewee (*Contopus virens*) (Programs: breeding bird, fall migration)
- ▶ Savannah Sparrow (ssp. princeps, Ipswich Sparrow) (*Passerculus sandwichensis princeps*) (Programs: winter bird residency, spring migration)

CBCL conducted breeding bird, nightjar, fall migration, and winter residency surveys on the Hartlen Point property between July 14, 2021, and January 26, 2022. Incidental bird observations were also recorded during wetland surveys completed by CBCL biologists on March 8 and May 17 of 2021, before the scheduled bird surveys. A total of 96 species, plus three unidentified taxa, were observed within the Study Area during all field programs conducted by CBCL between March 2021 and January 2022. Of the 96 species observed, 88 are protected under the *Migratory Birds Convention Act, 1994*. Five of the species observed are SAR and 26 are SoCC.

CBCL also conducted nocturnal owl, spring migration, and breeding bird surveys, as well as an inventory of suitable Barn Swallow roosting habitat within the Study Area, Barn Swallow roosting surveys, and acoustic monitoring for roosting Barn Swallows on site. These surveys were completed between March 29, 2022, and September 7, 2022. A total of 100

species, plus five unidentified taxa, were observed within the Study Area during all field programs conducted by CBCL in 2022.

CBCL recorded one Barred Owl (*Strix varia*) during the nocturnal owl surveys and two SAR bird species (Barn Swallow and Ipswich Sparrow) and 11 SoCC during the spring migration surveys. During the breeding bird surveys conducted in June 2022, CBCL detected one SAR bird species and 14 SoCC.

Since Barn Swallows were detected on site, CBCL completed an inventory of suitable Barn Swallow roosting habitat on the Hartlen Point property. One wetland area, a tidal bay salt marsh complex (HP-2), was identified as having high potential for roosting. A basin bog (HP-1) and a slope salt marsh (HP-9A) were identified as having moderate potential, and 11 areas were identified as having low potential for roosting. During the habitat inventory, five Barn Swallows were heard and observed on site, although no nesting or roosting behaviour was observed. During the Barn Swallow roosting surveys, two Barn Swallows were heard on site, although no nesting or roosting behaviour was observed. No Barn Swallows were detected during the manual review of acoustic files recorded by Autonomous Recording Units (ARUs) deployed in suitable habitat on site. Barn Swallows were not observed using the site for breeding, nesting, or evening roosting, but were observed on site, foraging for insects. There is potential that Barn Swallows could be nesting in any of the buildings or structures present on the Hartlen Point Property. Due to the proximity of other dwellings near the Study Area, it is also possible that the Barn Swallows are nesting offsite.

CBCL conducted Pileated Woodpecker Nest Surveys on September 7, 2022, in three areas, including the existing main Project footprint proposed for the LBTF and two alternate Project footprints. No active or inactive Pileated Woodpecker nest cavities were observed during the survey.

During the bird surveys conducted at Hartlen Point, there were no direct observations of any bird residences defined under the *Species at Risk Act* (SARA).

Potential adverse environmental effects that may occur as a result of the Project include the following: 1) the direct loss or alteration of habitat; 2) sensory disturbance; 3) nest or day roost destruction, disturbance, or abandonment; and 4) mortality. Mitigation measures were identified to avoid or reduce these potential impacts, among which include the following: 1) minimize habitat loss or alteration (e.g., limit tree clearing to within the Project footprint); 2) minimize noise and light emissions; 3) avoid mortality of migratory/SAR birds and SAR bats by clearing vegetation outside of the breeding bird/active bat window (i.e., conduct clearing between late October and mid-April, whenever possible). Pre-clearing surveys are proposed for migratory and resident bird species if clearing is conducted outside of the breeding bird season.

Following the implementation of mitigation measures and best management practices, residual effects expected as a result of the Project include the permanent loss or alteration

of approximately 8 ha of habitat in the Project footprint. This will result in the loss of suitable breeding and foraging habitat for birds, and potentially foraging habitat for bats. As a result, it is anticipated that species will use suitable nesting and foraging habitat available in adjacent habitat on site or within proximity to the site.

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# Acronyms

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AC CDC	Atlantic Canada Conservation Data Centre
AMO	Abandoned Mine Openings
ARU	Autonomous Recording Unit
cm	Centimetres
CBCL	CBCL Limited
CSC	Canadian Surface Combatant
CWS	Canadian Wildlife Service
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
DBH	Diameter at Breast Height
DCC	Defence Construction Canada
DFO	Fisheries and Oceans Canada
DND	Department of National Defence
DNRR	Department of Natural Resources and Renewables
EED	Environmental Effects Determination
ECCC	Environment and Climate Change Canada
FORNON	Nova Scotia Interpreted Forest Inventory
GIS	Geographic Information Systems
GPS	Global Positioning System
ha	Hectares
km	Kilometres
LBTf	Land Based Test Facility
LiDAR	Light Detection and Ranging
m	Metres
MBBA	Maritime Breeding Bird Atlas
MBCA	<i>Migratory Birds Convention Act, 1994</i>
MBR	Migratory Birds Regulations, 2022
N/A	Not applicable
NS	Nova Scotia
NSE	Nova Scotia Environment
NS ESA	Nova Scotia <i>Endangered Species Act</i>
SAR	Species at Risk
SARA	<i>Species at Risk Act</i>
SoCC	Species of Conservation Concern

# 1 Introduction

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## 1.1 Introduction

The Department of National Defence (DND) is proposing to construct a Land Based Test Facility (LBTF) at the Hartlen Point Canadian Forces Base property (Study Area) in Eastern Passage, NS (the Project). Defence Construction Canada (DCC), on behalf of DND, contracted CBCL Limited (CBCL) to conduct natural resource surveys to support DND in determining if the proposed construction of the LBTF at Hartlen Point is likely to result in residual significant adverse effects to the environment (the Study). The requested work included habitat mapping, bat surveys, and bird surveys, which CBCL completed in accordance with the DCC Atlantic Environmental Source List for Natural Resources (AE16SLNR). The Project site is a well-known, birding hotspot, and data on bird observations and patterns within the Study area are readily available to the public through external sources (i.e., eBird). CBCL used this external resource data to complement data collected through protocol survey methodology.

## 1.2 Project Background

The Royal Canadian Navy has committed to replacing ships in its existing federal fleet with Canadian Surface Combatant (CSC) ships. DND is proposing to construct an LBTF at the Hartlen Point Canadian Forces Base in support of the CSC Program and the Land Based Test Capability Strategy. The LBTF will be constructed to simulate an operational CSC configuration, will meet specific security requirements, and will be equipped with the ship systems. The LBTF will be a two-story steel and concrete building with an approximate area of 11,500 square metres (m<sup>2</sup>).

In addition to the construction of the LBTF building, the Project will entail the widening of an existing gravel access road to a 6.0 m wide, two-lane paved road. A portion of this road will be realigned. Road upgrades will accommodate site access and the extension of infrastructure for municipal services to the facility.

## 1.3 Project Location and Site Overview

The Hartlen Point Canadian Forces Base property is located in the community of Eastern Passage within the larger Halifax Regional Municipality (HRM), NS (Appendix A, Figure 1). The Project Area for the proposed LBTF is located on a point near the eastern property boundary and is bordered by the golf course to the north, the Canadian Coast Guard (CCG) communications facilities to the west, and the Halifax Harbour/Atlantic Ocean to the northeast and southeast. The Project Area is approximately 62,468 m<sup>2</sup> and consists of the space that will be fenced off around the LBTF for operational and security purposes (Appendix A, Figure 1). The LBTF building itself will be approximately 11,500 m<sup>2</sup> within this fenced area. Coordinates for the centre point of the proposed LBTF building are 4938265 m northing and 464771 m easting (NAD82 UTM Zone 20T).

The Hartlen Point property (CBCL Study Area) covers approximately 154 ha and is situated on a point at the mouth of the Halifax Harbour, approximately 7 kilometres (km) southeast of the 12 Wing Shearwater Royal Canadian Air Force base. The site includes antenna facilities and a golf course. Originally developed as a coastal defence site in 1940, Hartlen Point was used for military purposes until the mid-1950s. It was then redeveloped as a golf course in 1962.

## 1.4 Study Rationale and Objectives

DND is preparing an Environmental Effects Determination (EED) report for the Project, in accordance with Section 82 of the *Impact Assessment Act* and submitted it to Environment and Climate Change Canada (ECCC) for comment. DND is currently engaging in ongoing consultation with ECCC. As part of the ongoing consultation, additional work requested included the following:

- ▶ Habitat mapping
- ▶ Preliminary bat maternity roost habitat assessment
- ▶ Bird surveys, including migratory, winter residency, Common Nighthawk (*Chordeiles minor*), nocturnal owl, Barn Swallow (*Hirundo rustica*) roosting, and Pileated Woodpecker (*Dryocopus pileatus*) cavity surveys

Pileated Woodpecker cavity surveys were added to the survey programs for this Project owing to the protection of Pileated Woodpecker nesting cavities under the modernized Migratory Birds Regulations, 2022 (MBR), which came into force on July 30, 2022. In addition, Pileated Woodpeckers were detected within the Study Area during the surveys conducted by CBCL at Hartlen Point and due to the presence of suitable sized trees within the Project Area. This survey was therefore conducted to investigate if Pileated Woodpeckers were using the proposed Project Footprint area and alternative areas for nesting, foraging, or roosting.

In addition to the above noted surveys, study objectives included identifying the following:

- ▶ Potential impacts of Project activities on migratory birds, bird species at risk (SAR) and critical habitat, as well as bird species of conservation concern (SoCC)
- ▶ Mitigation measures to avoid or minimize potential impacts
- ▶ Residual impacts that may result from the Project

## 2 Habitat Mapping

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### 2.1 Methodology

CBCL conducted a desktop review of habitat information available for the Hartlen Point site and adjacent area. This information was used as part of a habitat mapping exercise completed at the desktop level. Resources consulted and habitat mapping compiled as part of the desktop assessment are described below.

#### 2.1.1 General Habitat Mapping

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General habitat data for the Hartlen Point site was compiled using a variety of resources, which were later supplemented with information collected during the field programs.

These resources included the following:

- ▶ Site-specific GIS data provided by DCC/DND
- ▶ Provincial Landscape Viewer
- ▶ Provincial open-source datasets (e.g., forest inventory)
- ▶ LiDAR
- ▶ Pictometry oblique imagery
- ▶ Recent satellite and aerial imagery via Google Earth Pro
- ▶ Previous consultant reports including:
  - Dillon Consulting Limited. 2006. Inventory of Breeding/Migratory Birds, Plant Species and Wetland Habitat/Functional Assessment for Proposed High Frequency Surface Wave Radar Hartlen Point - HX070604 – Final Report. 85 pp.
  - Dillon Consulting Limited. 2010. Natural Resource Management Plan, Hartlen Point Property – Final. 139 pp.
  - WSP. 2018. Natural Resource Management Plan, Hartlen Point. Final Report. March 2018. 351 pp.

#### 2.1.2 Critical and Significant Habitat Mapping

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CBCL reviewed SAR recovery strategies, management plans, action plans, and other publications, as required, to determine whether critical habitat for terrestrial and aquatic SAR that occur in NS is located on, or immediately adjacent (i.e., approximately 1 km) of, the Hartlen Point property. Residence descriptions, for SAR in which these have been

defined under the *Species at Risk Act* (SARA), were also reviewed to determine whether any features that meet the criteria of a SAR residence were observed on site during the field programs. Significant habitat data layers were also consulted to determine whether provincially significant habitat occurs on, or within proximity to, the Study Area. Information on critical habitat, residences, and significant habitat was obtained through the following resources:

- ▶ Species at Risk Public Registry (Government of Canada, 2022a) – e.g., recovery strategies, action plans, management plans, and residence descriptions
- ▶ Critical Habitat of Aquatic Species at Risk Dataset (Government of Canada, 2022b)
- ▶ DFO Species at Risk Critical Habitat 2022 Dataset (Government of Canada, 2022c)
- ▶ Atlantic Canada Critical Habitat Data (Government of Canada, 2021)

## 2.2 Results

### 2.2.1 General Habitat Mapping

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Several general habitat types were identified within the Hartlen Point property boundaries (Appendix A, Figure 2). Provincial mapping available through the Provincial Landscape Viewer showed that land cover within the Hartlen Point property boundaries consists of forested and non-forested habitat, including mixed-wood and softwood stands, wetlands, windthrow, coastal habitat, anthropogenic habitat (e.g., maintained grass and golf course), as well as several small ponds and watercourses (DNRR, n.d.).

Provincial data indicated that mixed wood forest stands on site consisted of some combination of Red Maple (*Acer rubrum*), White Spruce (*Picea glauca*), Black Spruce (*Picea mariana*), White Birch (*Betula papyrifera*), Yellow Birch (*Betula alleghaniensis*), Balsam Fir (*Abies balsamea*), and Trembling Aspen (*Populus tremuloides*). Red maple is the dominant species found in mixed wood stands on the property (DNRR, n.d.). Provincial mapping showed that softwood stands contained some combination of Black Spruce, Red Maple, White Spruce, Balsam Fir, and Tamarack (*Larix laricina*), with the leading tree species being Black Spruce or White Spruce (DNRR, n.d.).

Nova Scotia Interpreted Forest Inventory (FORNON) data showed that an approximately 2 ha forest stand, comprising approximately 25% of the Project footprint, is located in the interior of the Project Area. The early seral softwood stand is classified as a natural stand with >75% softwood basal area and 35% crown closure. Leading tree species identified in the provincial land cover data includes White Spruce (dominant), Red Maple, and Tamarack (DNRR, n.d.). Upon investigation during the site visits, CBCL confirmed that the interior forest parcel is a softwood stand that is dominated by White Spruce and Red Spruce (*P. rubens*) with lesser amounts of Red Maple, Balsam Fir, and White Birch. Mountain Ash (*Sorbus americana*) and Northern Wild Raisin (*Viburnum nudum*) dominated the understorey. The forest canopy was generally less than 10 m high with a dense understorey of shrubs and regenerating trees. Abundant coarse woody debris was present, and



diversity in the herbaceous layer was low. Representative photos of the typical forest condition in the proposed main Project footprint are provided in the Photo Log in Appendix B.

FORNON data indicated that approximately 5 ha (63%) of the Project footprint is classified as forested with 5% crown closure and >75% alders (*Alnus* spp.). The remainder is classified as non-forested (Appendix A, Figure 2). While on site, CBCL confirmed that most of the Project footprint consists of tall shrub habitat that is sparsely treed (see Appendix B, Photo 3); this same area is what is classified by FORNON as >75% alders. The dominant shrubs include Speckled Alder (*Alnus incana* ssp., *rugosa*), Black Huckleberry (*Gaylussacia baccata*), Northern Wild Raisin (*Viburnum nudum* var. *cassinoides*), Mountain Holly (*Ilex mucronata*), and Rhodora (*Rhododendron canadense*). The trees are predominantly White and Red Spruce, which rise above the shrub canopy singly or clustered. A narrow portion of the Project footprint nearest the southeastern boundary (closest to the shoreline) is open meadow dominated by Bluejoint Reed Grass (*Calamagrostis canadensis*), with sparse, isolated White Spruce (*Picea glauca*), as shown in Appendix B, Photo 4.

## 2.2.2 Critical and Significant Habitat Mapping

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The amended Recovery Strategy for Piping Plover (*Charadrius melodus*) shows that a 1 x 1 km grid denoting Piping Plover critical habitat overlaps the Hartlen Point property and critical habitat is present approximately 550 m north of the Project footprint (Appendix A, Figure 3) (ECCC, 2022a). No other SAR critical habitat was found within immediate proximity of the property.

Provincial significant habitat data showed that the Project footprint and the southern portion of the Hartlen Point property overlaps an approximately 43 ha migratory bird area (Site HX244). Significant habitat for SAR is located along the beach approximately 1 km north of the Project footprint. This beach habitat is located within the 1 km x 1 km critical habitat grid and presumably supports Piping Plover. Provincial significant habitat supporting other SAR and SoCC was identified more than 2 km from the Project Area. Critical and significant habitat identified within proximity to the Project Area are mapped in Appendix A, Figure 3.

## 3 Bats and Bat Habitat

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CBCL completed a preliminary bat maternity roost habitat assessment in July of 2021 and assessed the potential for bat hibernaculum in proximity of the Project Area. CBCL submitted the interim results of this assessment to DCC/DND on October 18, 2021. The following methodology and results summarize the contents of the letter report.

### 3.1 Methodology

#### 3.1.1 Bat Maternity Roost Habitat Assessment

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A preliminary bat habitat assessment was completed to identify the presence of habitat suitable for three bat SAR: Little Brown Myotis (*Myotis lucifugus*), Northern Myotis (*Myotis septentrionalis*), and Tri-colored Bat (*Perimyotis subflavus*). A desktop analysis was conducted to identify habitat features that may be significant to bats and to direct the subsequent field survey for the preliminary maternity roost habitat assessment. Since non-reproductive bats may use any treed habitat for individual roosting (day roosts), the purpose of the desktop review was to identify and map habitats and landscape features that could support bat maternity roosts or other types of bat habitat. The desktop analysis included the review of aerial imagery, provincial forestry data, and data of known or possible hibernacula for bats (see Section 3.1.3).

CBCL then conducted a preliminary field assessment within the proposed main Project footprint to determine whether suitable maternity roosting habitat (maternity roost trees) may be present in the Project Area. The suitability of habitat was based on the Bat Maternity Roosting Habitat Descriptions for Little Brown Myotis, Northern, and Tri-colored Bat that were provided by ECCC in Appendix 1 of the change order issued by DCC on June 3, 2021.

CBCL conducted a field survey on July 16, 2021, to visually check the treed areas within the main Project footprint. Attention was focused on the forested area; any live or dead trees encountered with a diameter at breast height (DBH) larger than 10 cm were visually examined for characteristics suitable for the establishment of maternity roosts, including dead and dying leaf clusters, loose or exfoliating bark, cracks, cavities, and lichen cover.

Surveys were conducted with the use of binoculars. Notes were taken on the habitats encountered within the Project footprint and the tree species observed. Diameter measurements were taken from a selection of larger trees encountered during the survey.

### 3.1.2 Opportunistic Acoustic Monitoring

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CBCL conducted opportunistic acoustic monitoring in conjunction with the nightjar survey completed on July 14, 2021. A hand-held acoustic monitor (Echo Meter Touch 2 Pro) was used during the evening survey when the surveyors were near the Project footprint. The handheld acoustic monitors detect, and record bat calls in real time (see Appendix B, Photo1 for a photo of the acoustic monitor in use).

### 3.1.3 Identification of Bat Hibernaculum

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In addition to the preliminary bat maternity roost habitat assessment, CBCL conducted a desktop level assessment to identify the potential presence of bat hibernacula in the area. The following sources were consulted:

- ▶ Nova Scotia Abandoned Mine Openings Database (Hennick and Poole, 2020)
- ▶ Recovery Strategy for the Little Brown Myotis (*Myotis lucifugus*), the Northern Myotis (*Myotis septentrionalis*), and the Tri-colored Bat (*Perimyotis subflavus*) in Canada (ECCC, 2018)
- ▶ Records of Bats (CHIROPTERA) at Caves and Mines in Nova Scotia (Moseley, 2007)

## 3.2 Results

### 3.2.1 Preliminary Bat Maternity Roost Habitat Assessment

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No trees encountered during the field survey exhibited attributes suitable for use as maternity roosts for bats. Attributes of trees typical for Little Brown Myotis and Northern Myotis (tall, deciduous trees with cracks in bark) were not present, except for small areas of peeling bark on White Birch trees. Many trees encountered in the forested parcel were less than 10 cm DBH, and few were greater than 25 cm DBH. Most of the trees over 25 cm DBH were coniferous. A selection of tree size measurements taken during the field assessment, and the associated species are provided in Table 3.1. A map showing the location of the measured trees is provided in Appendix A, Figure 4.

Many of the hardwood trees encountered (Red Maple and White Birch) were branched below breast height or multi trunked with small DBH (see Appendix B, Photo 3). Trees in the forest parcel did not exhibit dead foliage suitable for roosting habitat for Tri-colored Bat, but some lichen-heavy trees near the northwest corner were observed (see Appendix B, Photo 5). Samples of this lichen were taken and determined to be *Usnea subgracilis*. A few of the solitary White Spruce in the open meadow and tall shrub (i.e.,

>75% alder) habitat are large diameter trees (greater than 25 DBH) but lacked any features suitable for hosting bat maternity roosts.

Although the trees observed in the Project Area did not seem suitable for the establishment of bat maternity colonies, the forested habitat may still be used by non-reproductive bat individuals for roosting (day roosts) during the entire active period for bats in Nova Scotia (April to October).

**Table 3.1 Sample of large trees and DBH measurements**

Tree Number	Species	DBH (cm)
202	Red Spruce	30.5
204	White Spruce	23.2
205	Red Spruce	23.9
206	Red Spruce	17.1
207	Balsam Fir	18.7
208	Balsam Fir	20.4
209	Red Spruce	20.5
210	White Spruce	17.0
211	Red Maple	22.1
215	White Spruce	20.3
217	White Spruce*	35.7
218	White Spruce*	34.3
219	White Spruce	24.1
220	White Spruce	27.5
221	White Spruce*	24.1
222	Balsam Fir	17.1
223	White Spruce	27.5
226	White Spruce	24.3
227	White Spruce	40.4
229	White Spruce	27.1
231	Balsam Fir	23.1
232	White Spruce*	27.0

\*Trees with abundant lichen cover.

### 3.2.2 Opportunistic Acoustic Monitoring

No bats were detected during the opportunistic bat acoustic monitoring conducted during the nightjar surveys.

### 3.2.3 Identification of Bat Hibernaculum

No bat hibernacula were reported in the vicinity of the Project Area in the Records of Bats (CHIROPTERA) at Caves and Mines in Nova Scotia (Mosley, 2007). The review of existing

databases for known or suitable bat hibernacula in the area revealed the presence of abandoned mine openings approximately 2 km north of the Hartlen Point property boundary. According to the Nova Scotia Abandoned Mines database (Hennick and Poole, 2020), a series of 11 abandoned mine openings (AMO) are present just north of Route 322 in Cow Bay (Table 3.2). Some of the openings were over 10 m in depth originally (potentially deep enough to provide suitable hibernacula conditions) but have likely been infilled, as the AMO database currently ranks them as ‘low hazard’. None of AMO are known to be used as hibernacula. Currently, the closest known hibernaculum to the Hartlen Point site is near Elmsdale, approximately 40 km away (ECCC, 2018a).

**Table 3.2 Known Abandoned Mine Openings in the Vicinity of the Project Area (Source: Hennick and Poole, 2020).**

AMO ID	Name	Land Owner	Commodity	Type of Opening	Hazard Degree	Original Depth (m)
<b>COW-1-003</b>	N/A	Private	Gold	Shaft	Moderate	15
<b>COW-1-004</b>	N/A	Private	Gold	Shaft	Moderate	0
<b>COW-1-005</b>	Miner T. Foster (Long Vein) Tecumseh Shaft	Private	Gold	Shaft	High	18
<b>COW-2-010</b>	Surprise Shaft	Private	Gold	Shaft	Not Rated	0
<b>COW-4-001</b>	Chapman Open Cut	Private	Gold	Open Cut	Moderate	1.8
<b>COW-4-002</b>	Chapman Bay Brook Shaft	Private	Gold	Shaft	Moderate	4
<b>COW-5-006</b>	Cow Bay West Shaft	Private	Gold	Shaft	Not Rated	0
<b>COW-5-007</b>	Evangeline Gold Mining & Milling Company (Cow Bay Gold Mining Company) North Shaft	Private	Gold	Shaft	Low	42
<b>COW-5-008</b>	Evangeline Gold Mining & Milling Company (Cow Bay Gold Mining Company) Ltd. South Shaft	Private	Gold	Shaft	Low	48.5
<b>COW-5-009</b>	N/A	Private	Gold	Shaft	Not Rated	0
<b>COW-5-011</b>	Evangeline Gold Mining & Milling Company (Cow Bay Gold Mining Company) Ltd. Central Shaft	Private	Gold	Shaft	Low	21.5

# 4 Avifauna Survey Programs

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## 4.1 Methodology

CBCL completed a desktop review and avifauna survey programs to determine the diversity and abundance of breeding, migratory, resident, and SAR/SoCC birds utilizing the Study Area. During the desktop review, CBCL compiled a list of species that have previously been reported on site or are likely to occur onsite. This information informed the development of the avifauna survey programs.

### 4.1.1 Desktop Review

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CBCL collated publicly available bird data to determine the presence of migrating, breeding, and resident bird species observed on site, with a particular focus on bird SAR and SoCC. Data from the following external resources was reviewed:

- ▶ Atlantic Canada Conservation Data Centre (AC CDC) Data Report 6777: Hartlen Point, NS (AC CDC, 2021)
- ▶ eBird (Hartlen Point data from 1983 to 2022)

Hartlen Point is an area that people regularly visit for birding and, subsequently, an abundance of publicly available bird data is available through eBird. CBCL extracted eBird data of birds recorded at Hartlen Point between 1983 and 2022. The AC CDC Data Report #6777 (AC CDC, 2021) was reviewed to assess SAR and SoCC bird species that have been recorded within a 5-km radius of the Study Area. The eBird bar chart for Hartlen Point (see Appendix C – Figure C1) was also reviewed to assess the annual occurrence of avian species and the frequency that a particular species is reported within the Study Area.

#### 4.1.1.1 SAR and SoCC Site Use Assessment

CBCL collated the SAR and SoCC bird records recorded in the Study Area and within 5 km of the property. The population status for each SAR/SoCC species was identified and site habitat suitability was assessed. The population status for each SAR/SoCC was assigned based on the categories outlined in Table 4.1.

**Table 4.1 Population Status Categories Assigned to SAR/SoCC Recorded at Hartlen Point.**

Population Status in NS	Category Description
Breeding resident	Indicates species is present during the breeding period.
Non-breeding resident	Indicates species is present during months outside of the breeding period.
Year-round resident	Indicates species does not migrate out of province and can be found residing within the province year-round.
Fall/spring migrant	Indicates species occurs in Nova Scotia during migration (on route to breeding or wintering grounds).
Accidental migrant	Indicates species is likely within a correct migratory period but outside of its normal migratory route.

Site habitat suitability was assigned to each species if the species may use the site for breeding or foraging. Breeding was assigned if a species may breed and/or use the site for nesting and raising young due to the presence of suitable breeding habitat present within the Study Area. Foraging was assigned if a species may use the property for food resources due to the availability of food/prey source within the Study Area.

#### 4.1.2 Field Surveys

CBCL conducted field surveys between July 14, 2021, and September 7, 2022, during which time detections of bird species within the Study Area were recorded. Field surveys conducted within the Study Area, and associated survey dates, are summarized in Table 4.2. Birds detected during the wetland field program were recorded as incidentals. The avifauna survey programs were conducted using point counts and area searches. All bird surveys were conducted during suitable weather conditions (i.e., wind speed <25 km/hr and precipitation not exceeding a light drizzle). CBCL conducted the following bird surveys within the Study Area:

- ▶ Migration Surveys
- ▶ Spring Migration Surveys (Appendix A, Figure 5)
- ▶ Fall Migration Surveys (Appendix A, Figure 6)
- ▶ Breeding Bird Surveys (Appendix A, Figure 7a and 7b)
- ▶ Nightjar Surveys (Appendix A, Figure 8)
- ▶ Barn Swallow Habitat Inventory (Appendix A, Figure 9; Appendix A, Figure 10)
- ▶ Barn Swallow Roosting Surveys (Appendix A, Figure 11)
- ▶ Nocturnal Owl Surveys (Appendix A, Figure 12)
- ▶ Pileated Woodpecker Cavity Surveys (Appendix A, Figure 14)
- ▶ Winter Bird Residency Surveys (Appendix A, Figure 14)

**Table 4.2 2021-2022 Surveys During Which Bird Species Were Recorded in the Study Area by CBCL.**

Survey Type	Survey Dates	Survey Method
Wetland Reconnaissance	March 8, 2021	N/A*
	May 17, 2021	N/A*
Migration	September 1 & 14, 2021	Area Search
	October 5 & 29, 2021	Area Search
	April 7, 2022	Area Search
	April 12, 21, & 26, 2022	Point Counts, Area Search,
	May 6, 12, 20, & 25, 2022	Migratory Lookoff/Stopover Count
Breeding Bird	July 14 & 15, 2021	Point Counts
	June 2, 8, 16, 23, & 27, 2022	Point Counts, Area Search, Migratory Lookoff/Stopover Count
Nightjar	July 14, 2021	Point Counts
Barn Swallow Roosting	August 23, 2022	Habitat Inventory
	August 19, 20, 21, 22, 25, & 29, 2022	Roost Survey
Nocturnal Owl	March 29, 2022	Silent Listening and Playback
	April 21, 2022	Silent Listening and Playback
Pileated Woodpecker Cavity	September 7, 2022	Transect Surveys**
Winter Bird Residency	December 13, 2021	Area Search
	January 13 & 26, 2022	Area Search

\*N/A = not applicable

\*\*Resources Inventory Committee, 1999; Environment and Climate Change Canada, 2022b

The survey protocols for each bird program were developed based on the seasonal window, avian species expected to occur on site, and habitat types present within the Study Area. Survey protocols were also developed using a number of reference documents including the following:

- ▶ A Framework for the Scientific Assessment of Potential Project Impacts of Birds (Hanson et al., 2009)
- ▶ Survey protocols outlined by the Canadian Wildlife Service Division of ECCC (CWS, 2007)
- ▶ Canadian Nightjar Survey Protocol (Knight et al., 2019)
- ▶ Inventory methods for woodpeckers. Standards for components of British Columbia's Biodiversity No. 19. Min. Environ., Lands and Parks, Victoria. Mimeograph. Retrieved Online: Microsoft Word - WoodMI20.doc (gov.bc.ca) (Resources Inventory Committee, 1999)



- ▶ Pileated Woodpecker Cavity Identification Guide. Retrieved Online: Pileated Woodpecker Cavity Identification Guide - Canada.ca (Environment and Climate Change Canada, 2022)
- ▶ Foraging and Roosting Habitat Use of Nesting Bank Swallows in Sackville, NB. Submitted in partial fulfilment of the requirements for the degree of Master of Science Dalhousie University Halifax, Nova Scotia August 2016 (Saldanha, 2016)
- ▶ Survey of a Major Swallow Roost in Pembroke. Ontario Birds Volume 2; Number 1. Pp 34-37 (Ross et al., 1984)
- ▶ ECCC-CWS, 2022 (personal communication)
- ▶ Guidelines for Nocturnal Owl Monitoring in North America (Takats et al., 2001)
- ▶ Nova Scotia Nocturnal Owl Survey: Guide for Volunteers (Birds Canada, 2019)
- ▶ Recommended Protocols for Monitoring Impacts of Wind Turbines on Birds (CWS, 2007)

#### 4.1.2.1 Migration Surveys

CBCL conducted four rounds of fall migration surveys in September and October 2021 and eight rounds of spring migration surveys on a weekly basis in April and May 2022 (Appendix A, Figures 5 and 6). The migration surveys included point counts, area searches, and migratory lookoff/stopover counts along the coast. The dates of each of the migration surveys are presented in Table 4.2.

The methodology for the point count surveys is described in detail in section 4.1.2.2. The methodology for the area searches and the migratory lookoffs/stopover counts were derived from protocols established by the Canadian Wildlife Service (CWS), such as the Recommended Protocols for Monitoring Impacts of Wind Turbines on Birds (CWS, 2007).

Area searches were conducted within the path depicted in Appendix A, Figure 5 and entailed searching along the ground and between vegetation for birds and bird nests, as well as scanning the tree canopy for birds, bird nests, and bird behaviour suggestive of nesting activity. The following information was collected during the area searches:

- ▶ Bird species observed and heard during the search
- ▶ A basic description of the habitats searched
- ▶ Waypoints for any nests found
- ▶ Observations of bird evidence and behaviour in the area, such as:
  - ▶ Birds with food or nesting material in mouth
  - ▶ Alarm calls, birds appearing stressed (e.g., repeating the same noise and escalating their calls as the observer approached)
  - ▶ Distraction display behaviour (i.e., broken wing act)
  - ▶ Swooping
  - ▶ Other birds fighting
  - ▶ Aggressive behaviour
  - ▶ Egg shell or egg found on the ground

Migratory lookoffs/stopover counts were completed during the spring migration survey. They were conducted at the locations and route displayed in Appendix A, Figure 5. Since

Hartlen Point is well known for being a refuge to numerous migratory shorebirds and seabirds, migratory lookoffs/ stopover counts were established to evaluate the number of shorebirds and sea birds using the Study Area as a stopover area during migration. Since migration periods vary greatly between species, these locations were visited through the spring and breeding bird seasons. At each location, CBCL biologists scanned the coastline and water using a scope and/or binoculars. If birds were observed, the species were identified, and the number of each species was estimated. All birds observed or heard were recorded. Between the lookoff locations, any additional birds observed were also recorded. The spotting scope and binoculars were used to identify individuals. The habitats at each location were described and photographed. CBCL was careful not to double count birds between points. It should be noted that Devils Island, a small island approximately 630 m southwest of the Study Area, was included as part of Migratory Lookout ML-03.

#### 4.1.2.2 Breeding Bird Surveys

Breeding bird surveys were conducted in 2021 and 2022. Two rounds of breeding bird point-count surveys were conducted in 2021 (on July 14 and 15, 2021) and five rounds of point-count surveys were conducted in 2022 (June 2, 8, 16, 23 and 27). The breeding bird surveys in 2022 also included area searches and migratory lookoff/stopover counts along the coast to record any shorebirds and seabirds present during the breeding season. The locations of the 2021 and 2022 survey stations are shown in Appendix A, Figure 7a and Figure 7b, respectively.

The point count surveys were conducted between one half hour before sunrise and five hours after sunrise. All species detected visually or by sound were recorded at each point count location during a five-minute survey period. Individuals were monitored throughout the duration of the point counts to limit double counting. Estimated distance of each recorded individual from the survey locations was noted in distance bands of 0 to 50 m, 51 to 100 m, and greater than 100 m. Individuals observed flying overhead during the point count survey were recorded as fly overs. Birds detected outside the five-minute survey period were recorded as incidentals.

Breeding bird behaviour was recorded within the Study Area during field surveys and when observed incidentally. Breeding evidence was recorded in accordance with the Maritime Breeding Bird Atlas (MBBA) breeding evidence categories; a standardized protocol used within the Maritime provinces for classifying breeding behaviour (Stewart et al., 2015). MBBA breeding evidence categories are defined in Table 4.3. The highest breeding evidence categories and codes were assigned to species confirmed within the Study Area during the breeding bird surveys.

**Table 4.3 Maritime Breeding Bird Evidence Categories and Codes.**

Breeding Evidence Category	Code	Definition
<b>Observed</b>	X	Species observed in its breeding season (no breeding evidence)
<b>Possible</b>	H	Species observed in its breeding season in suitable nesting habitat
	S	Singing male(s) present, or breeding calls heard, in suitable nesting habitat in breeding season
<b>Probable</b>	P	Pair observed in suitable nesting habitat in nesting season
	T	Permanent territory presumed through registration of territorial song, or the occurrence of an adult bird, at the same place, in breeding habitat, on at least two days a week or more apart, during its breeding season
	D	Courtship display, including interaction between a male and a female or two males, including courtship feeding or copulation
	V	Visiting probable nest site
	A	Agitated behaviour or anxiety calls of an adult
	B	Brood Patch on adult female or cloacal protuberance on adult male
	N	Nest-building or excavation of nest hole by wrens and woodpeckers
<b>Confirmed</b>	NB	Nest building or carrying nest materials, for all species except wrens and woodpeckers
	DD	Distraction displays or injury feigning
	NU	Used nest or eggshells found (occupied or laid within the period of the survey)
	FY	Recently fledged young (nidicolous species) or downy young (nidifugous species), including incapable of sustained flight
	AE	Adult leaving or entering nest sites in circumstances indicating occupied nest
	FS	Adult carrying fecal sac
	CF	Adult carrying food for young
	NE	Nest containing eggs
NY	Nest with young seen or heard	

In 2021, nineteen breeding bird point count locations were selected and all main habitat types within the Study Area were surveyed. Breeding bird point count locations are shown in Appendix A, Figure 7a. Habitat types in which the breeding bird point counts were conducted are summarized in Table 4.4. Photos of each habitat type are provided in Appendix B. Habitat types were classified based on information collected during the desktop mapping exercise (Chapter 2) and field surveys. Habitat types include the following:

- ▶ Edge habitat (habitat between riparian zones/roads/forest stands/golf course)
- ▶ Hardwood dominant forest stand
- ▶ Softwood dominant forest stand
- ▶ Barrens shrublands
- ▶ Coastline
- ▶ Wetland
- ▶ Cliff
- ▶ Mixedwood forest stand

In 2022, the data collected during the 2021 point counts were reviewed. As an outcome of the review, the number of point count locations was reduced to account for a combination of survey approaches (i.e., area search, migratory lookoffs/stopover counts, and point counts). For the 2022 surveys, the number of breeding bird point count locations was reduced from 19 to 12 with four migratory lookout stations (Appendix A, Figure 7b).

**Table 4.4 Number of Breeding Bird Point Count and Migratory Lookout/Stopover Locations in Different Habitat Types Surveyed in the Study Area.**

Habitat Type	Breeding Bird Survey Locations 2021	Breeding Bird Survey Locations 2022	Migratory Lookout/Stopover Survey Locations 2022
Edge habitat	5	3	0
Hardwood dominant forest stand	2	0	0
Softwood dominant forest stand	4	1	0
Mixedwood forest stand		2	0
Barrens shrublands	2	3	0
Coastline (Beach and Ocean)	6	0	3
Cliff		0	1
Wetland		3	
<b>TOTAL</b>	<b>19</b>	<b>12</b>	<b>4</b>

#### 4.1.2.3 Nightjar Surveys

The nightjar survey program was developed following the general methodology outlined in the Canadian Nightjar Survey Protocol (Knight et al., 2019). A nightjar survey was conducted on July 14, 2021. Target species for the nightjar survey were the Common Nighthawk (*Chordeiles minor*) and Eastern Whip-poor-will (*Antrostomus vociferus*) owing to suitable habitats present on site.

CBCL developed a survey route within the Study Area which consisted of seven point-count locations. This route can be resurveyed during future nightjar surveys conducted at Hartlen Point. Unlimited radius road-side point count surveys were completed at each survey

station. A six-minute point-count survey was conducted at each station and all birds seen or heard were recorded. The survey began at 20:28, approximately 30 minutes before sunset (sunset occurred at 20:57 pm on July 14, 2021).

Nightjar survey point count locations are shown in Appendix A, Figure 8. Habitat types in which the nightjar bird point counts were conducted are summarized in Table 4.5.

**Table 4.5 Number of Nightjar Point Count Locations in Different Habitat Types Surveyed in the Study Area.**

Habitat Type	Nightjar Survey Locations
Edge habitat	4
Hardwood dominant forest stand	1
Barrens shrublands	2
<b>TOTAL</b>	<b>7</b>

#### 4.1.2.4 Barn Swallow Roosting Habitat Inventory and Surveys

One of Canada’s largest Barn Swallow colonies is found on McNab’s Island, which is located within the Halifax Harbour and within 5 km of Hartlen Point. Barn Swallows will forage up to 0.6 km from their nesting sites during the breeding season (Turner, 2004). Data from areas in the Maritimes indicate that swallows can travel 10 to 15 km from their colony site to marshes with emergent vegetation to roost overnight and return to their colony site the following morning (ECCC-CWS, pers. comm., 2022). Since Barn Swallows were also observed at Hartlen Point during 2021 field surveys, ECCC-CWS recommended that the following be completed at Hartlen Point:

- ▶ Verification of suitable Barn Swallow roosting habitat (e.g., inventory of cattail marshes and wetlands with emergent vegetation on site).
- ▶ Assessment of whether Barn Swallows are roosting in the suitable habitat identified at Hartlen Point by either conducting a roosting survey over two site visits in August beginning surveys 45 minutes before and ending 20 minutes after sunset, or by deploying acoustic recording units (ARUs) programmed to record during the survey period specified by ECCC-CWS.

As a result, CBCL completed an inventory of suitable Barn Swallow roosting habitat in the Study Area and conducted Barn Swallow roosting surveys in appropriate habitat identified on site. Further information on the methodology used is provided in the below subsections.

##### 4.1.2.4.1 Barn Swallow Roosting Habitat Inventory

On August 23, 2022, CBCL visited wetlands, wet areas, and man-made ponds in the Study Area to assess whether these areas contain suitable roosting habitat for Barn Swallows. During this survey, CBCL also identified potential areas on site that could be used for Barn

Swallow nesting. Suitable areas were georeferenced and photographed. Any incidental SAR or SoCC species were also recorded and georeferenced.

#### 4.1.2.4.2 Barn Swallow Roosting Field Surveys

The protocol for the Barn Swallow roosting field surveys was developed by CBCL and modified from Saldanha (2016), Ross et al. (1984), and recommendations from ECCC-CWS (2022 personal communication).

Survey efforts for Barn Swallows within the Study Area included evening roosting surveys of three areas assessed as high and moderate potential for Barn Swallow roosting during the Barn Swallow roosting habitat inventory. These areas are mapped in Figure 9 in Appendix A and included the following:

- 1 Roosting Survey Area 1 (RS-01): Wetland HP-9A
- 2 Roosting Survey Area 2 (RS-02): Wetland HP-1
- 3 Roosting Survey Area 3 (RS-03): Wetland HP-2

Each site was surveyed for two nights, for a total of six Barn Swallow roosting surveys. The dates that each site was surveyed are outlined in Table 4.6. Surveys were conducted on evenings with good weather conditions (e.g., no precipitation, good visibility, low wind). Surveys began 45 minutes before sunset and ended 20 minutes after sunset. Data collected during the surveys was recorded on data sheets and included survey start/end time, time of sunset, and weather conditions at the beginning of the surveys. An example of the field survey data sheet is provided in Appendix D. Visual or auditory signs of Barn Swallows were recorded if observed. Barn Swallow behaviour or activity was also recorded, if observed. Visual or auditory detections of other species were also noted, with an emphasis on SAR or SoCC.

**Table 4.6 Barn Swallow roosting field surveys dates in August 2021.**

Date	Site ID
August 19, 2022	RS-01
August 20, 2022	RS-02
August 21, 2022	RS-03
August 22, 2022	RS-01
August 25, 2022	RS-02
August 29, 2022	RS-03

#### 4.1.2.4.3 Barn Swallow Remote Acoustic Surveys

CBCL deployed six ARUs from Wildlife Acoustics© in three areas containing suitable Barn Swallow habitat, which consisted of the following wetlands containing emergent vegetation. These areas, and the ARU deployed in each, include the following (Appendix A, Figure 11):

- 1 RS-01 (Wetland HP-9A): One Song Meter Mini and one Song Meter Micro
- 2 RS-02 (Wetland HP-1): One Song Meter Mini

### 3 RS-03(Wetland HP-2): Three Song Meter Minis

ARUs were deployed on August 22, 2022, and retrieved on September 2, 2022. The ARU deployment locations are shown in Appendix A, Figure 11. ARUs were mounted directly to a nearby tree or shrub at each RS-02 and RS-03. In RS-01, which was devoid of trees or shrubs, ARUs were mounted to 6-ft PVC pipes inserted into wetland substrate so that the ARUs were elevated above the emergent vegetation. Microphones were tested during deployment, and the ARUs were programmed to record daily from 7:00 pm to 12:00 am during the study period. At each ARU location, CBCL took photos and georeferenced the location.

At the end of the field program, ARUs were retrieved and acoustic files (.wav) were downloaded. Acoustic files were analyzed using Kaleidoscope software (Kaleidoscope Pro Version 5.4.2), which converts sound into spectrograms. The recordings were visually analysed by an avian biologist experienced in identifying birds by sound and species-specific spectrograms.

#### 4.1.2.5 Nocturnal Owl Surveys

CBCL conducted nocturnal owl surveys at five survey locations within the Study Area on March 29, 2022, and April 21, 2022 (Appendix A, Figure 12). Surveys began half an hour after sunset. At each survey location, a two-minute period of silent listening was followed by playbacks of owl vocalizations as outlined in Guidelines for Nocturnal Owl Monitoring in North America (Takats, 2001) and Nova Scotia Nocturnal Owl Surveys (Birds Canada, 2019). All owl species seen or heard were recorded.

#### 4.1.2.6 Pileated Woodpecker Cavity Surveys

CBCL conducted Pileated Woodpecker nest surveys as transects in treed portions of the Project footprint and treed sections of two additional survey areas identified by DCC/DND (Appendix A, Figure 13). The protocol for the field surveys were modified from the following resources:

- ▶ Inventory methods for woodpeckers. Standards for components of British Columbia's Biodiversity No. 19. Min. Environ., Lands and Parks, Victoria. Mimeograph. Retrieved Online: Microsoft Word - WoodMI20.doc (gov.bc.ca) Resources Inventory Committee, 1999.
- ▶ Pileated Woodpecker Cavity Identification Guide. Retrieved Online: Pileated Woodpecker Cavity Identification Guide - Canada.ca (Environment and Climate Change Canada, 2022).

On September 7, 2022, CBCL surveyed a series of transects within treed portions of the proposed survey areas. Detections of woodpeckers, their nests/cavities, or other signs, were documented, photographed (when possible), and georeferenced. The following additional parameters were recorded when relevant:

- ▶ Tree species

- ▶ Tree type (Solid, hollow, dead)
- ▶ Decay class (see Inventory Technical Committee, 1995)
- ▶ Tree height
- ▶ Diameter at breast height (DBH). DBH of tree to the nearest  $\pm 1$  cm at 1.3 m height on the high side of the tree. Only focus on trees with a DBH of 25 cm or greater
- ▶ Status of cavities (a mirror and a telescopic pole were available to search cavities):
- ▶ Active or old nest cavity
- ▶ Roost cavity
- ▶ New or old foraging excavation
- ▶ Hole shape (round or teardrop, oval, irregular) and texture (smooth or rough)
- ▶ Cavity depth

An example of the field survey data sheet is provided in Appendix D.

#### 4.1.2.7 Winter Bird Residency Surveys

CBCL conducted three rounds of winter bird residency surveys on December 13, 2021, and January 13 and 26, 2022. An area search was completed during each survey round. The area search traversed the main habitat types in the Study Area, and all birds seen or heard were recorded (Appendix A, Figure 14). An estimate of the total number of individuals detected during each visit was also recorded.

## 4.2 Results

### 4.2.1 Desktop Review

A total of 294 species, plus two hybrid species (one Mallard x American Black Duck hybrid and one Mallard x American Wigeon hybrid), have been observed at Hartlen Point between 1983 and 2022. The eBird bar chart, illustrating the annual occurrence of avian species at Hartlen Point, is provided in Appendix C, Figure C.1. A full list of species reported at Hartlen Point by eBird is provided in Appendix C, Table C.1.

#### 4.2.1.1 SAR and SoCC Study Area Assessment

Of the 294 species reported through eBird, 24 are SAR and 81 are SoCC (Appendix C, Table C.1). CBCL identified suitable breeding habitat on site for 9 SAR and 48 SoCC. These 105 species could use the site outside of the breeding period (e.g., during migration). CBCL determined that suitable breeding habitat exists on the property for 57 of these SAR/SoCC (9 SAR; 48 SoCC) and suitable foraging habitat for all SAR/SoCC species. These SAR/SoCC could potentially use the site outside of the breeding period (e.g., during migration). A list of SAR/SoCC reported for Hartlen Point and habitat suitability on the Hartlen Point property is provided in Appendix C, Table C.2. It should be noted that species listed on Schedule 1 of SARA are afforded legal protection in Canada. Species listed on Schedule 2 and 3 of SARA have been assessed as at risk by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) but are not federally protected under SARA.



The habitat types observed at Hartlen Point property are relatively common in this region of Nova Scotia and are present adjacent to or within proximity to Hartlen Point.

## 4.2.2 Field Surveys

A total of 122 species, plus seven unidentified taxa, were observed within the Study Area during all field programs conducted by CBCL in 2021 and 2022. All bird species recorded during the bird surveys conducted from July 2021 to September 2022, as well as bird species detected incidentally, are provided in Appendix D. Of the 122 species identified, 111 are protected under the MBCA (see Appendix D, Table D.1). Six of the species observed are SAR and 33 are SoCC (Table 4.7). CBCL also recorded 17 bird species during the wetland surveys conducted on March 8 and May 17 of 2021, before the scheduled bird surveys (see Appendix D, Table D.2).

**Table 4.7 SAR and SoCC Birds Recorded at Hartlen Point During CBCL Field Surveys Conducted Between March 2021 and September 2022.**

Common Name	Scientific Name	SARA Ranking	NS ESA Ranking	AC CDC Ranking	Total No. of Observations Recorded
American Robin	<i>Turdus migratorius</i>	-	-	S5B,S3N	355
<b>Barn Swallow</b>	<b><i>Hirundo rustica</i></b>	<b>T</b>	<b>E</b>	<b>S3B</b>	<b>55</b>
<b>Barrow's Goldeneye</b>	<b><i>Bucephala islandica</i></b>	<b>SC</b>	-	<b>S1N,SUM</b>	<b>18</b>
Bay-breasted Warbler	<i>Setophaga castanea</i>	-	-	S3S4B,S4S5M	3
Black-bellied Plover	<i>Pluvialis squatarola</i>	-	-	S3M	18
Blackpoll Warbler	<i>Setophaga striata</i>	-	-	S3B,S5M	15
Blue-winged Teal	<i>Spatula discors</i>	-	-	S3B	31
Boreal Chickadee	<i>Poecile hudsonicus</i>	-	-	S3	1
<b>Buff-breasted Sandpiper</b>	<b><i>Calidris subruficollis</i></b>	<b>SC</b>	-	<b>SNA</b>	<b>1</b>
<b>Canada Warbler</b>	<b><i>Cardellina canadensis</i></b>	<b>T</b>	<b>E</b>	<b>S3B</b>	<b>2</b>
Cliff Swallow	<i>Petrochelidon pyrrhonota</i>	-	-	S2S3B	6
Common Eider	<i>Somateria mollissima</i>	-	-	S3B,S3M,S3N	2706
Common Goldeneye	<i>Bucephala clangula</i>	-	-	S2S3B,S5N,S5M	4
Common Murre	<i>Uria aalge</i>	-	-	S1?B	1
Common Tern	<i>Sterna hirundo</i>	NAR	-	S3B	1
Cooper's Hawk	<i>Accipiter cooperii</i>	NAR	-	S1?B,SUN,SUM	1
<b>Eastern Wood-pewee</b>	<b><i>Contopus virens</i></b>	<b>SC</b>	<b>V</b>	<b>S3S4B</b>	<b>3</b>
Greater Yellowlegs	<i>Tringa melanoleuca</i>	-	-	S3B,S4M	13

Common Name	Scientific Name	SARA Ranking	NS ESA Ranking	AC CDC Ranking	Total No. of Observations Recorded
<b>Savannah Sparrow (ssp. princeps, Ipswich Sparrow)</b>	<b><i>Passerculus sandwichensis princeps</i></b>	<b>SC</b>	-	<b>S1B</b>	<b>15</b>
Killdeer	<i>Charadrius vociferus</i>	-	-	S3B	4
Least Sandpiper	<i>Calidris minutilla</i>	-	-	S1B,S4M	18
Lesser Yellowlegs	<i>Tringa flavipes</i>	-	-	S3M	4
Northern Shoveler	<i>Spatula clypeata</i>	-	-	S2B,SUM	9
Pectoral Sandpiper	<i>Calidris melanotos</i>	-	-	S3M	1
Pine Grosbeak	<i>Pinicola enucleator</i>	-	-	S3B,S5N,S5M	6
Pine Warbler	<i>Setophaga pinus</i>	-	-	S2S3B,S4S5M	2
Purple Finch	<i>Haemorhous purpureus</i>	-	-	S4S5B,S3S4N,S5M	29
Purple Sandpiper	<i>Calidris maritima</i>	-	-	S3S4N	16
Red Crossbill	<i>Loxia curvirostra</i>	-	-	S3S4	2
Red-breasted Merganser	<i>Mergus serrator</i>	-	-	S3S4B,S5M,S5N	35
Rose-breasted Grosbeak	<i>Pheucticus ludovicianus</i>	-	-	S3B	1
Ruddy Turnstone	<i>Arenaria interpres</i>	-	-	S3M	8
Sanderling	<i>Calidris alba</i>	-	-	S2N,S3M	2
Semipalmated Plover	<i>Charadrius semipalmatus</i>	-	-	S1B,S4M	32
Semipalmated Sandpiper	<i>Calidris pusilla</i>	-	-	S3M	150
Spotted Sandpiper	<i>Actitis macularius</i>	-	-	S3S4B,S5M	17
Whimbrel	<i>Numenius phaeopus</i>	-	-	S2S3M	38
Willet	<i>Tringa semipalmata</i>	-	-	S3B	114
Wilson's Snipe	<i>Gallinago delicata</i>	-	-	S3B,S5M	1

E = Endangered, T = Threatened, V = Vulnerable, SC = Special Concern, NAR = Not at Risk, NL = Not Listed, SNA = Status not Available

**Bold font** indicates a SAR; unbolded font indicates a SoCC

#### 4.2.2.1 SAR Birds Observed

Species descriptions for each of the SAR birds recorded in or near the Study Area during the 2021-2022 surveys are provided below.

##### 4.2.2.1.1 Barn Swallow (*Hirundo rustica*)

Barn Swallows were observed several times on site during surveys as follows:

- ▶ Six Barn Swallows were observed on site on May 17, 2021
- ▶ Eight Barn Swallows were observed between July 14 and 15, 2021 during breeding bird surveys

- ▶ Six individuals were observed during the nightjar survey on July 14, 2021 (possibly the same individuals observed earlier that day)
- ▶ Five Barn Swallows were detected on May 6, 2022, during the spring migration survey
- ▶ Six individuals were detected on May 20, 2022, during the spring migration survey
- ▶ Six individuals were detected on May 25, 2022, during the spring migration survey
- ▶ Five Barn Swallows were detected on May 12, 2022, during the spring migration survey
- ▶ Three Barn Swallows were detected on June 27, 2022, during the Breeding Bird survey program
- ▶ Two Barn Swallows were identified on August 20, 2022, during the Barn Swallow Roosting Survey
- ▶ Eight Barn Swallows were observed on August 23, 2022, during the Barn Swallow habitat inventory

Barn Swallows were observed foraging for insects above the western saltmarsh along the main paved road, as well as the pond to the west of the Hartlen Point Golf Club parking lot and above the trail near the helipad (Appendix A, Figures 5, 7a, 7b, 8, 10, and 11).

Barn Swallows typically breed in open areas (e.g., agricultural lands, wetlands) and construct their nest on structures that provide a horizontal sheltered nesting surface (e.g., caves, ledges in cliff faces, crevices, barns, garages, houses, bridges, road culverts, etc.). Barn Swallows roost during the evening and night in large communal groups in wetlands (COSEWIC, 2021; Winkler, 2006).

Barn Swallows were not observed using the site for breeding, nesting, or evening roosting, but were observed on site, foraging for insects. There are buildings and structures on site that may allow Barn Swallows to nest on the Hartlen Point property. Due to the proximity of other dwellings near the Study Area, it is possible that the Barn Swallows are nesting offsite.

#### 4.2.2.1.2 Barrow's Goldeneye (*Bucephala islandica*)

Barrow's Goldeneye was detected seven times throughout winter bird residency surveys. All individuals were observed along the coast, swimming within Hartlen Cove or near the coastline of the Halifax Harbour (see Figure 14 of Appendix A for the locations of Barrow's Goldeneye detected).

The eastern population of Barrow's Goldeneye breeds primarily in Quebec lakes with a small population breeding in Iceland rivers and lakes (COSEWIC, 2000). During the non-breeding season, they frequent the coastal waters along the St. Lawrence Estuary and Gulf, with some wintering further south along the Atlantic coast (COSEWIC, 2000). This species forages along shallow, coastal waters (COSEWIC, 2000).

Barrow's Goldeneye were observed close to shore along the Hartlen Point coast and within the shallow estuary near the Study Area. The shallow estuary provides overwintering

habitat for this species, which frequently occurs at Hartlen Point between late-December and mid-March (Appendix C, Figure C.1).

#### 4.2.2.1.3 Buff-breasted Sandpiper (*Calidris subruficollis*)

Buff-breasted Sandpiper was detected once along the Hartlen Point coastline on September 1, 2021, during fall migration surveys. The Buff-breasted Sandpiper was observed foraging on the beach (see Figure 7 of Appendix A for the location of the Buff-breasted Sandpiper).

Buff-breasted Sandpipers nests in the High Arctic of northernmost Alaska and Canada (COSEWIC, 2012a). Buff-breasted Sandpipers are observed at Hartlen Point during fall migration when travelling between nesting and wintering grounds (Appendix C, Figure C.1). Buff-breasted Sandpipers would use native short-grass prairies as migratory habitat; however, much of this habitat has been anthropogenically altered. These shorebirds primarily use human-altered sites for stopovers, such as crop fields, golf courses, pastures, and airport runways; juveniles tend to travel closely to the Atlantic and Pacific coasts when migrating south (COSEWIC, 2012a).

#### 4.2.2.1.4 Canada Warbler (*Cardellina canadensis*)

The Canada Warbler tends to arrive late on breeding grounds and begins fall migration early. Canada Warbler are found in a variety of forest types, and most often breeds in moist forests with a dense deciduous shrub layer with suitable perch trees. In the Maritimes, the Canada Warbler is associated with wetlands such as mature cedar swamps. Due to the small territories utilized by Canada Warblers, high quality breeding habitat can support a high density of breeding pairs (Environment Canada, 2016; Stewart et al., 2015).

An adult and juvenile Canada Warbler were observed in HP-1 (Appendix A, Figure 11) in the evening on August 20, 2022, which was likely during the fall migration for this species. Since this species has not been observed on the property prior to this date, it is unlikely that this species is breeding on the property and was using the wetland as a stop-over during migration.

#### 4.2.2.1.5 Eastern Wood-Pewee (*Contopus virens*)

An Eastern Wood-Pewee was detected along mixed-forest edge and the golf course during a breeding bird survey conducted by CBCL on July 14, 2021. This species was also detected along mixed-forest edge during the fall migration surveys on September 14, 2021 (see Figures 6 and 7a of Appendix A for the locations). This species was infrequently detected and did not appear to be nesting onsite.

The Eastern Wood-Pewee is typically found in the mid-layer canopy of forest clearings and edges of coniferous and deciduous mixed forests (COSEWIC, 2012b; Stewart et al., 2015; Watt et al., 2017). Edge habitat does occur within the Study Area because of trails, roads, and open areas, such as wetlands and the golf course. The Eastern Wood-Pewee is not frequently recorded at Hartlen Point during their breeding period (see Appendix C,

Figure C.1); however, since this species was detected during the breeding bird surveys completed for this Project, it is possible that they could nest in or near the Study Area.

#### 4.2.2.1.6 Savannah (Ipswich) Sparrow (*Passerculus sandwichensis princeps*)

Ipswich Sparrows were detected along the Hartlen Point coastline during winter bird residency surveys (Appendix A, Figure 14). One individual was observed on December 13, 2021, and two were observed on January 13, 2021. Ipswich Sparrows were also observed in 2022 during the spring migration surveys (Appendix A, Figure 5). Seven were observed on April 7, 2022, two were observed on April 12, 2022, and three were observed on May 26, 2022).

Ipswich Sparrows breed almost exclusively on Sable Island and some overwinter along the coastline of Nova Scotia on outer dune beaches with grass cover and sheltered areas. Ipswich Sparrows are frequently seen along the coastline of Nova Scotia during migration (COSEWIC, 2009). Ipswich Sparrows are therefore likely only using the Study Area during migration and for overwintering.

#### 4.2.2.2 Spring Migration Surveys

In 2022, CBCL recorded 7,059 individual bird observations, representing 75 species and one unidentified gull, over the eight rounds of spring migration surveys which were conducted within the Study Area on a weekly basis during the months of April and May. Two SAR bird species (Barn Swallow and Ipswich Sparrow) and 11 SoCC were recorded within the Study Area. The complete list of bird species recorded during the spring migration surveys is provided in Appendix D, Table D.3.

Species richness at Hartlen Point varied between 30 and 44 species between rounds with the greatest species richness recorded during round 7 (May 20, 2022). The species with the highest relative abundances for the spring migration survey program were Common Eider (25.0%; 1,764 individuals recorded over eight rounds), Herring Gull (20.0%; 1,411 individuals) and Great Black-backed Gull (3.4%; 237 individuals). Relative abundances for species observed during the fall migration program are provided in Appendix D, Table D.3.

#### 4.2.2.3 Fall Migration Surveys

CBCL detected a total of 65 species, consisting of 1,339 individuals, during the fall migration surveys conducted within the Study Area on September 1, September 14, October 5, and October 29, 2021. Two SAR bird species, Eastern Wood-Pewee and Buff-breasted Sandpiper, and 20 SoCC were recorded. The complete list of bird species recorded during the fall migration surveys is provided in Appendix D, Table D.4.

Species richness was the greatest during survey round three (October 5, 2021) with 43 species detected. Thirty species were recorded during round one (September 1, 2021), 41 species were recorded during round two (September 14, 2021), and 22 species were recorded during round four (October 29, 2021).

In terms of relative abundances for fall migration surveys, European Starling (*Sturnus vulgaris* - 13.6%; 184 individuals) had the highest abundance, followed by Double-crested Cormorant (10.7%; 144 individuals), and Semipalmated Sandpiper (9.9%; 133 individuals). Relative abundances for species observed during the fall migration program are provided in Appendix D, Table D.4.

#### 4.2.2.4 Breeding Bird Surveys

During the breeding bird surveys conducted within the Study Area in 2021, CBCL detected a total of 39 species, and three unidentified taxa (one gull sp., two buteo sp., and two tern spp.). Total species recorded during the breeding bird surveys in 2021 are provided in Appendix D, Table D.5.

Of the 39 species identified during the 2021 breeding bird surveys, two SAR bird species were recorded: Barn Swallow (probable breeding evidence observed) and Eastern Wood-pewee (possible breeding evidence observed). Eight of the 39 species are SoCC (see Appendix D, Table D.5). There were no direct observations of any bird residences (as defined under SARA) recorded during breeding bird surveys conducted at Hartlen Point.

In 2021, species richness was consistent between survey rounds, with 33 species recorded during both rounds. The most abundant species recorded during round one was the Common Eider (*Somateria mollissima* - 43 individuals). The Herring Gull (*Larus argentatus* - 47 individuals) was the most abundant during the second round (Appendix D, Table D.5). In terms of relative abundances for the breeding bird survey program, Common Eider (13.6%; 69 individuals) had the highest abundance, followed by Herring Gull (11.9%; 60 individuals), and Double-crested Cormorant (*Phalacrocorax auritus* - 10.5%; 54 individuals).

During the breeding bird surveys conducted in the Study Area in June 2022, CBCL detected a total of 71 species, and nine unidentified taxa (three duck sp., two bird sp., two gull spp., and one sparrow sp.). Species recorded during the breeding bird surveys in 2022 are provided in Appendix D, Table D.6. Of the 71 species identified, one SAR bird species was recorded: Barn Swallow (possible breeding evidence observed). Fourteen of the 71 species are SoCC (see Appendix D, Table D.6).

An American Black Duck nest was observed on May 12, 2022, at PC-06 during the spring migration surveys. Egg fragments were observed; therefore, the nestlings hatched, or the nest was predated. An active osprey nest was also observed at PC-08 in 2022. The nest was inactive on April 12, 2002, active nest building was observed on April 26, 2022, and the nest was considered active May through August 2022. Although Devil's Island was not in the Study Area, this island was included as part of the migratory lookout/stopover locations for ML-03 owing to the proximity to the Study Area. During the breeding bird surveys, this island was confirmed breeding habitat for Herring Gull (*Larus argentatus*) and Great Black-backed Gull (*Larus marinus*) and was thought to be nesting colonies for both species based on the number of gulls observed sitting on nests. On some days between 100 and 200 Herring Gulls were observed and 2 to 70 Great Black-backed Gulls.

In 2022, species richness varied slightly between survey rounds, with between 37 and 55 species recorded during rounds. The round with the highest species count was conducted on June 8, 2022. The most abundant species recorded during any round was Herring Gull (*Larus argentatus* – 150 individuals) see Appendix D, Table D.6). The species with the highest relative abundances for the breeding bird survey program were Herring Gull (18.4%; 669 individuals recorded over the five rounds), Common Eider (13.5%; 489 individuals) and European Starling (9.0%; 328 individuals).

#### 4.2.2.5 Nightjar Surveys

CBCL did not detect the target species, Common Nighthawk and Eastern Whip-poor-will, during the nightjar survey. However, 13 bird species were detected within the Study Area, including one SAR bird (Barn Swallow) (Appendix A, Figure 8). A list of species recorded during the nightjar survey is provided in Appendix D, Table D.7).

#### 4.2.2.6 Barn Swallow Roosting Habitat Inventory

On August 23, 2022, CBCL visited the wetlands and one artificial pond within the Study Area to assess Barn Swallow roosting habitat potential. In total, 14 areas were assessed for Barn Swallow roosting habitat on the Hartlen Point property.

One wetland area, a tidal bay salt marsh complex (HP-2), was identified as having high potential for Barn Swallow roosting. A basin bog (HP-1) and a slope salt marsh (HP-9A) were identified as having moderate potential. The remaining 11 identified areas were assessed as having low potential for roosting (see Appendix A, Figure 10; Appendix D, Table D.8).

Three buildings were identified during the Barn Swallow roosting habitat survey in the Study Area that could potentially be used for Barn Swallow nesting (see Appendix D, Table D.9). There is a potential that Barn Swallows could be nesting in these structures. All three structures are located outside of the Project Area (see Appendix A, Figure 10).

During the habitat inventory, five Barn Swallows were heard and observed near one of the fairways on the golf course and over a small shrubby area (see Appendix A, Figure 9). No nesting or roosting behaviour was observed at this time. In addition, 10 SoCC species were observed or heard incidentally during the survey (see Appendix A, Figure 10). Other than Barn Swallow, no other SAR birds were detected during this survey.

#### 4.2.2.7 Barn Swallow Roosting Surveys

Two Barn Swallows were heard during the Barn Swallow roost surveys (Appendix A, Figure 11); however, none were detected during the analysis of acoustic files recorded by ARUs deployed in each survey area. Two SAR and six SoCC were detected during Barn Swallow roost surveys (Appendix A, Figure 11). See Table 4.8 for all SAR or SoCC species detected visually or audibly during Barn Swallow roost surveys.

**Table 4.8 SAR and SoCC bird species recorded by visual or audible observation during the Barn Swallow Roost Surveys conducted from August 19-29, 2022, at Hartlen Point.**

Species Name	Scientific Name	Conservation Status	Rarity Status (NS)	Site ID Occurrence
<b>Species at Risk (SAR)</b>				
Barn Swallow	<i>Hirundo rustica</i>	SARA – T COSEWIC - SC NS ESA - E	S3B	RS-02
Canada Warbler	<i>Cardellina canadensis</i>	SARA – T COSEWIC – SC NS ESA – E	S3B	RS-02
<b>Species of Conservation Concern (SoCC)</b>				
Greater Yellowlegs	<i>Tringa melanoleuca</i>	-	S3B,S4M	RS-01 RS-03
Lesser Yellowlegs	<i>Tringa flavipes</i>	-	S3M	RS-03
Pectoral Sandpiper	<i>Calidris melanotos</i>	-	S3M	RS-01
Spotted Sandpiper	<i>Actitis macularius</i>	-	S3S4B,S5M	RS-03
Willet	<i>Tringa semipalmata</i>	-	S3B	RS-02 RS-03
Whimbrel	<i>Numenius phaeopus hudsonicus</i>	-	S2S3M	RS-03

RS = Roost Survey

E = Endangered, T = Threatened, SC = Special Concern, NL = Not Listed, NA = Not Assessed

The following section describes the survey locations chosen as the most suitable Barn Swallow habitat at Hartlen Point for the Barn Swallow roost surveys.

#### 4.2.2.7.1 Barn Swallow Roost Survey Location One (RS-01)

Roost Survey Location One (RS-01) is located to the southwest of the Project Area at Hartlen Point (Appendix A, Figure 9). This habitat was the second-largest survey location and is a combination of a freshwater and shrub swamp complex wetland, shrub forest dominant with alder species and sand and cobble beach. The wetland has open standing water and cattails. This location was used as a survey location for the Barn Swallow roost survey due to the mature wetland complex with cattails and emergent vegetation for potential roosting of Barn Swallows. This was also a site chosen for an ARU placement to enhance the potential of detecting Barn Swallows roosting in the wetland in the evenings (Appendix A, Figure 11).



#### 4.2.2.7.2 Barn Swallow Roost Survey Location Two (RS-02)

Roost Survey Location Two (RS-02) is located to the west of the Project Area at Hartlen Point (Appendix A, Figure 9). This habitat was the smallest survey location and is a combination of freshwater marsh and developed, urban area (golf course). The freshwater marsh has a small pond which is present year-round with cattails and emergent shrub layer surrounding the pond. This location was used as a survey location for the Barn Swallow roost survey due to the presence of cattails and emergent vegetation for potential roosting of Barn Swallows. This was also a site chosen for an ARU placement to enhance the potential of detecting Barn Swallows roosting in the marsh in the evenings (Appendix A, Figure 11).

#### 4.2.2.7.3 Roost Survey Location Three (RS-03)

Roost Survey Location Three (RS-03) is located to the north of the Project Area at Hartlen Point (Appendix A, Figure 9). This habitat was the largest survey location and is a combination of saltmarsh wetland turning into sand and mud beach along a protected inlet from the bay. There are small creeks coming in from the inlet traveling into the saltmarsh. The cattails at this site are tall and well over 6 feet high. Behind the cattail field is more emergent vegetation in a small shrub forest dominant in alder species which then becomes mixed-wooded forest. This location was used as a survey location for the Barn Swallow roost survey due to the presence of large cattails and emergent vegetation for potential roosting of Barn Swallows. This was also a site chosen for an ARU placement to enhance the potential of detecting Barn Swallows roosting in the marsh in the evenings (Appendix A, Figure 11). This site is expected to have the highest potential for Barn Swallow evening roosting due to it being the largest cattail site on the Hartlen Point property and because Barn Swallows have been observed foraging at this site during the breeding season.

#### 4.2.2.8 Barn Swallow Remote Acoustic Surveys

CBCL did not detect the target species, Barn Swallow, at any of the survey stations on any of the recordings.

#### 4.2.2.9 Nocturnal Owl Surveys

CBCL recorded one Barred Owl (*Strix varia*) during the nocturnal owl survey conducted on March 29, 2022 (Appendix A, Figure 12). No other owl species were detected during the two rounds of owl surveys conducted in the Study Area. Two non-target species, Wilson's Snipe (*Gallinago delicata*) and American Woodcock (*Scolopax minor*), were also heard during the nocturnal owl surveys. A list of species recorded during the nocturnal owl survey is provided in Table 4.9

**Table 4.9 Bird species detected during nocturnal owl surveys conducted on March 29 and April 21, 2022, at Hartlen Point.**

Species	Scientific Name	SARA Status	NS ESA Status	AC CDC Ranking	Total No. Of Individuals Recorded
Barred Owl	<i>Strix varia</i>	NAR	NAR	S5	1
Wilson’s Snipe*	<i>Gallinago delicata</i>	NAR	NAR	S3B, S5M	1
American Woodcock	<i>Scolopax minor</i>	NAR	NAR	S5B	4

NAR = Not at Risk

\*Indicates a SoCC

#### 4.2.2.10 Pileated Woodpecker Cavity Surveys

CBCL conducted Pileated Woodpecker Cavity Surveys on September 7, 2022, within the Project Area (Survey Area 1) and two additional survey areas (Survey Areas 2 and 3) identified by DCC (Appendix A, Figure 13). CBCL visited 12 transects throughout these survey areas (Appendix A, Figure 13). No active or inactive Pileated Woodpecker nest cavities were observed during the survey. One inactive stick nest was observed approximately 0.5 m from the ground which was thought to be an American Robin nest (Appendix A, Figure 13).

Pileated Woodpeckers prefer to nest in trees > 40 cm in diameter at breast height (DBH) (ECCC, 2022b) and between 7.3 to 50.6 m in height (Conner et al., 1975; McClelland and McClelland, 1999). Although no signs of Pileated Woodpecker were observed during the survey, some forested sections in Survey Areas 1 and 2 were identified as having mature trees falling within these size specifications for Pileated Woodpecker roosting, foraging, and nesting cavities. Details of the habitats encountered during the surveys and other woodpecker signs are provided in Appendix E, Table E.10.

No Pileated Woodpecker observations were made during the survey, although a Northern Flicker and a Hairy Woodpecker were identified. The CBCL team also detected two Semipalmated Plovers, which are a SoCC (Appendix A, Figure 13).

#### 4.2.2.11 Winter Bird Residency Surveys

CBCL recorded 43 species, including two SAR (Ipswich Sparrow and Barrow’s Goldeneye) and eight SoCC, during the winter bird residency surveys conducted on December 13, 2021, and on January 13 and 26, 2022 (Appendix A, Figure 14). The complete list of bird species recorded during the winter residency surveys is provided in Appendix D, Table D.11.

Species richness was greatest in round three with 31 species, followed by round one with 26 species and round two with 23 species (Appendix D, Table D.11).

In terms of relative abundances for winter bird residency surveys, Canada Goose (*Branta canadensis* - 16.5%; 129 individuals) had the highest abundance, followed by Herring Gull (12.0%; 94 individuals), and Common Eider (11.2%; 88 individuals). Relative abundances for species observed during the winter residency program are provided in Appendix D, Table D.11.

# 5 Impacts, Mitigation Measures, and Residual Effects

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## 5.1 Methodology

### 5.1.1 Identification of Impacts

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CBCL used information collected during the desktop review and field surveys to identify potential on-site impacts of the Project activities on migratory birds and listed species, as well as the critical habitat of Extirpated, Endangered, and Threatened species identified under Schedule 1 of SARA.

To obtain information on the project, CBCL reviewed the following documents provided by DCC/DND:

- ▶ Project footprint as per Appendix A, Figure 1
- ▶ Final Concept Report – Irving Shipbuilding Inc. – Land Based Test Capability (Stantec, 2020a)
- ▶ Geotechnical Letter Report – Proposed Development, Hartlen Point, Shearwater, Nova Scotia (Stantec, 2020b)

CBCL assumed that the proposed Project will entail typical construction activities, such as:

- ▶ Site clearing
- ▶ Grubbing
- ▶ Surface water management
- ▶ Infilling
- ▶ Excavation/infilling
- ▶ Construction
- ▶ Paving

CBCL assessed potential impacts of these activities on migratory birds and SAR/SoCC reported within the Project footprint, or that may use the Project footprint based on the presence of suitable habitat.

## 5.1.2 Identification of Mitigation Measures

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CBCL identified mitigation measures to minimize or eliminate potential impacts. Mitigation measures for listed species were developed in accordance with best management practices and available information in SAR recovery strategies, management plans, and actions plans, and comply with the SARA and its provisions with regards to the protection of individuals, residences, and the critical habitat of extirpated, endangered, or threatened species.

## 5.1.3 Cumulative Effects

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Upon determination of the anticipated environmental impacts of the Project, CBCL assessed whether the Project effects will add to any known human impacts already occurring on the Hartlen Point property.

## 5.1.4 Residual Effects

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Upon determination of the anticipated environmental impacts of the Project, CBCL identified whether the Project will result in any residual environmental effects following the implementation of mitigation measures.

# 5.2 Results

## 5.2.1 Identification of Impacts

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Potential environmental effects may occur during all phases of the Project, including the construction, operation and maintenance, and decommissioning phases. Potential impacts to birds or bats potentially utilizing habitats within or in proximity to the Project footprint include:

- ▶ Habitat loss and alteration (permanent and/or temporary)
- ▶ Sensory disturbance (e.g., noise, light)
- ▶ Nest or day roost site destruction, disturbance, or abandonment
- ▶ Mortality

These potential impacts are discussed in the following sections by project phase, with respect to both birds and bats on the Hartlen Point site.

### 5.2.1.1 Habitat Loss and Alteration

The proposed Project is anticipated to entail the permanent removal or alteration of bird habitat. Upwards of approximately 2 ha of treed habitat (softwood stand) and approximately 5 ha of tall shrub habitat will be permanently lost or altered during the site preparation and construction phases of the Project. A small amount of bat day roost habitat and bat foraging habitat may also be lost. Habitat loss and alteration will primarily occur within the Project footprint, including the access road. In addition to habitat loss,

vegetation clearing can also affect cover and habitat connectivity. Habitat loss and alteration, such as fragmentation and the intrusion of edge effects, have been shown to impact breeding birds (Ortega and Capen; 1999).

The loss of a small amount of wetland habitat on the property (HP-2, HP-5, and HP-6) will also result in the loss of some foraging habitat for bats and insectivorous birds. However, this is a very small proportion of the available foraging habitat on site. HP-2, HP-5, and HP-6 score Moderate or Higher for several wetland functions relevant to birds and bats, including:

- ▶ Songbird, Raptor, & Mammal Habitat
- ▶ Pollinator Habitat
- ▶ Native Plant Habitat
- ▶ Water Storage & Delay

The loss of these wetland functions could affect birds and bats in a variety of ways. Loss of habitat can impact birds and bats via loss of foraging, breeding, and/or day roosting habitat, while loss of native plant and pollinator habitat could lead to decreases in pollinating insects that insectivorous birds and bats rely upon. Loss of water storage and delay capacity in wetlands could lead to changes in vegetative habitats within or near the wetland and a decrease in the wetland's capacity to support insect prey for birds and bats. DND will complete wetland compensation to ensure a zero net loss of wetland function.

Although the Project will result in a loss of habitat for birds, similar habitat exists adjacent and within proximity to the Study Area. If the habitats in the Study Area are removed outside of the breeding bird season, birds are expected to find alternative similar habitat adjacent to the Study Area. DND will also employ other mitigation measures discussed in Section 5.2.2 to reduce impacts to wildlife, including birds and bats.

#### 5.2.1.2 Nest or Roost Destruction, Disturbance, or Abandonment

The Hartlen Point site is situated at the edge of nesting zone C3; the regional nesting period for most migratory bird species in this area occurs between mid-April and late August (ECCC, 2018b). If site preparation and construction phases occur during the breeding season, nests, eggs, and birds within the Project Area and within the immediate vicinity are anticipated to be negatively affected both directly and indirectly. If clearing along watercourses and wetland buffers occurs during the nesting period, it is anticipated that nests, eggs, and birds within these areas will be negatively affected.

SAR bats in this region are generally expected to be active from early April until late October. There is no habitat deemed suitable for bat maternity roosts within the Project Area. Therefore, no impacts to reproductively active bats or their young are expected to occur during the site preparation, construction, or operations phases.

The operations phase will presumably require some degree of vegetation management. As discussed in the previous section, if clearing occurs within the nesting period, the nests,

eggs, and individuals of ground-nesting species could be negatively affected, via mowing equipment and noise emissions. Vegetation maintenance is not expected to have any impacts on foraging bats, assuming no potentially bio-accumulating pesticides are used on the site. Mowing is also expected to happen during daylight hours when bats are not active. Disturbance to non-reproductive bats using day roosts on the Hartlen Point property is possible; however, these impacts are expected to be infrequent due to the small amount of treed habitat present and will be of short duration.

### 5.2.1.3 Sensory Disturbance

Work during the site preparation and construction phases may disturb birds through visual stimuli (e.g., machinery and personnel) and noise within the Project footprint and immediate vicinity. Noise pollution is known to affect birds in a variety of ways including (but not limited to) physical damage to ears, stress responses, fright-flight responses, avoidance response, changes in other behavioural responses such as foraging, reproductive success, vocal communication, as well as interference with the ability to hear predators and potential changes in populations (see review by Ortega, 2012).

Noise pollution created during site preparation, construction, and operations phases may also impact the reproductive success of nesting birds within proximity to the Project footprint. Noise may negatively impact egg production and incubation. Work activities, including noise, can impact the behaviour of breeding birds which may also lead to birds abandoning their nests, eggs, and nestlings. Noise can also interfere with the ability of parents to hear begging calls from nestlings (Warren et al., 2006).

Disturbance to birds during the operations phase is predicted to be mainly due to vehicular traffic accessing the site. Traffic noise could result in birds avoiding the area in proximity to the new roadway (Schaub et al., 2008). Birds occupying habitat within proximity to the roadway could also be disturbed by traffic noise, resulting in changes in behaviour. These changes could increase distraction, making them more vulnerable and may cause an increase in anti-predator vigilance, which could indirectly affect bird reproductive rate by reducing foraging time (Quinn et al., 2006).

Noise pollution is not expected to impact bats potentially foraging on the site as most of the traffic will likely occur during daylight hours, when bats are not actively foraging. Noise disturbance to bats that may be utilizing day roosts on the Hartlen Point property is possible, however these impacts are expected to be infrequent due to the small amount of treed habitat present and will be of short duration.

### 5.2.1.4 Mortality

The site preparation, construction, and operations phases of the Project may result in direct and indirect mortality of migratory and resident bird species found within the area of work activities. Direct mortality may result from collisions with vehicles, machinery, and associated infrastructure. If work activities (e.g., clearing and grubbing) occur during the

nesting period, direct mortality to nesting birds, eggs, and nestlings could occur. Indirect mortality may occur if work activities result in nest abandonment and increased predation.

During the operation and maintenance phases, vegetation management, such as mowing and planting, may negatively impact birds within the area of impact. As previously discussed, if clearing of vegetation occurs during the nesting period, direct mortality to nesting birds, eggs, and nestlings may occur. Indirect mortality may occur if work activities result in nest abandonment and increased predation.

Accidental mortality of foraging bats could also potentially occur due to vehicle collisions if night traffic is present, during all project phases.

## 5.2.2 Mitigation Measures

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### 5.2.2.1 Avoid Disturbance

Although CBCL did not find suitable bat maternity roost trees within the Project footprint, SAR bats have previously been recorded in the area and may be present until October when they enter their overwintering habitat. Clearing between late October and early April will reduce the risk of impacting SAR bats. Clearing during this timeframe will also facilitate compliance with the MBCA, as clearing would take place outside the general nesting period, which occurs between early April and late August. Additional mitigation measures to protect migrant and resident birds should include:

- ▶ Conduct pre-stressing activities to encourage resident or migrant birds to move away from the site prior to clearing. Pre-stressing can be defined as encouraging wildlife to leave an area prior to construction by making noise, fencing, surveying, or using human scents (City of Ottawa, 2015).
- ▶ If clearing is conducted outside of the breeding bird season, conduct pre-clearing surveys focusing on breeding evidence for owls and other resident birds that have the potential to nest outside of the typical breeding bird season (mid-April and late August). Some species such as Red Crossbills and White-winged Crossbills can nest outside of their typical breeding season if food resources are plentiful (COSEWIC, 2004). Since these species were both detected during the 2022 breeding bird surveys, it is possible they could also choose to nest in the Project Footprint. In addition, owls, ravens, and some raptorial species begin nesting activities as early as March (NS DNRR, 2021). In Nova Scotia, Barred Owls typically lay eggs between March and April (Elderkin, 1981). One Barred Owl was heard during the owl surveys in 2022 and suitable breeding habitat is present; therefore, it is possible this species could choose to nest in the Project Footprint.
- ▶ Minimize tree and shrub clearing to the extent possible.
- ▶ Create or restore wetlands to compensate loss or alteration of habitat for species utilizing wetlands.



### 5.2.2.2 Minimize Habitat Loss and Alteration

The removal of trees may affect suitable nesting habitat for birds in the Project Area. As no evidence of bat maternity roost colonies was detected in the Project Area, the removal of trees in the Project footprint may only affect the day roosting habitat for individual bats and foraging habitat for all SAR bats. To minimize the destruction, degradation, and fragmentation of suitable bird or bat foraging, nesting, and/or day roosting habitat present at Hartlen Point, tree removal should be limited to the LBTF footprint and as required along the access road. A conservative approach should be taken to remove only those trees as required during the site preparation and construction phases of the Project and preserving as much of the forested and shrub/tree wetland habitat, particularly mature large diameter trees, decaying trees, snags (standing dead trees), or trees with hollow cavities. Site workers should be familiarized with the bat SAR/SoCC identified as having the potential to occur in the Project Area prior to work commencing and if a bat SAR/SoCC is identified during Project activities, a buffer will be maintained, and additional mitigation measures will be developed in consultation with NSDNRR and CWS.

The minimization of wetland habitat impacts was discussed in detail in the *Assessment of Wetland Impacts and Compensation Options Final Report* prepared by CBCL and submitted to DCC/DND in March of 2022.

During the construction phase, existing access roads and cleared areas should be used for site access and as laydown areas as much as possible, to minimize unnecessary disturbance to bird and bat habitat. In addition, the contractors on site should develop and adhere to a stringent spill response plan to reduce the risk of contamination of bird and bat habitat on site.

It is confirmed that Barn Swallows use the property at Hartlen Point as foraging grounds from data collected by CBCL biologists during avian field surveys. Because Barn Swallows were observed foraging in the month of June when Barn Swallows will be nesting and breeding in Nova Scotia, there is potential for Barn Swallows to be nesting somewhere on site or within 0.6 km of the site (Turner, 2004), including the military at the beginning of Caddy Road west of the Project Area and the building located southeast of the helipad (Appendix A, Figure 9). None of the structures identified as suitable nesting habitat on site are located within the Project footprint; therefore, the Project is not anticipated to impact Barn Swallows should they be nesting in these buildings.

Although no active or inactive Pileated Woodpecker nests were found in 2022, this species has been recorded in the Study Area, suitable nesting, foraging, and roosting habitat is present in the three survey areas (Appendix A, Figure 12), including the Project Area. Therefore, pre-clearing surveys should be conducted in the Project Area to confirm that there are no new Pileated Woodpecker cavities. Under the modernized MBR that came into force on July 30, 2022, if an active or abandoned Pileated Woodpecker nest is present in an area proposed for tree clearing, a notice must be provided to the Minister of the

Environment, and the nest must remain unoccupied for 36 months from the time the notice is received by the Minister, before the tree (and associated nest) can be removed.

### 5.2.2.3 Minimize Noise and Light Disturbance

Implementation of mitigation measures that will reduce sensory disturbance associated with Project activities are recommended and include the following:

- ▶ Reduce excess noise when possible.
- ▶ Keep construction equipment properly maintained and muffled to reduce disturbance due to noise.
- ▶ Avoid idling vehicles and equipment.
- ▶ Minimize lighting when possible (e.g., reduce the number and brightness of exterior lights and use motion sensor lights, when appropriate, to minimize illumination).
- ▶ Use lights that minimize bird attraction (e.g., downward pointing lights on exteriors)
- ▶ Avoid the use of heavy equipment at dusk and dawn.
- ▶ Develop and implement a Spill Response Plan and associated measures (e.g., check equipment daily for leaks and keep emergency spill-kits on site).

### 5.2.2.4 Avoid Bird and Bat Mortality

Mitigation measures intended to minimize accidental mortality for birds and bats on the Hartlen Point site during the site preparation, construction, and operations phases of the Project include, but are not limited to, the following:

- ▶ Clear vegetation outside the breeding bird/active bat window, i.e., clearing should be conducted between late October and early April, whenever possible. Pre-clearing surveys are recommended for birds outside of this window to protect migratory and resident species.
- ▶ Minimize tree and shrub clearing to the extent possible.
- ▶ If vegetation must be cleared during breeding bird/active bat season, conduct pre-clearing surveys (using non-intrusive methods by a qualified biologist). If during surveys, an observation is made of an active nest site (e.g., a bird calling, attending a nest, displaying aggressive behaviour) inside or outside the Project Area, georeferenced the location of the nest site using a GPS, and determine the appropriate mitigation and course of action in consultation with CWS. Conduct surveys (using non-intrusive methods by a qualified biologist) to determine if bats are currently utilizing the area to be cleared.
- ▶ Avoid stockpiling of soils during the breeding bird season, as this may attract breeding Bank Swallows. If stockpiles must be in place during the breeding bird season, they should be covered in landscape fabric or tarp secured in place to prevent nest excavation by soil-nesting birds.
- ▶ Protect active nests with a buffer zone determined by a setback distance appropriate to the species, the level of the disturbance and the landscape context, until the young have permanently left the vicinity of the nest.
- ▶ Prohibit littering, and immediately remove debris that accidentally enters the aquatic environment to reduce impacts to waterfowl.

- ▶ Enforce speed limits on the property during both day and night hours to reduce the potential for collision or slipstream injuries to birds and bats.
- ▶ Establish a No Harassment of Wildlife policy for the site.
- ▶ Report observations of day roosting bats or nesting SAR birds to the Environmental Officer for the site.
- ▶ Conduct pre-stressing activities to encourage resident or migrant birds to move away from the site prior to clearing.

### 5.2.3 Cumulative Effects

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The Hartlen Point site has a long history of development, including military activities involving ongoing high frequency surface wave radar and recreational (golfing) activity. The cumulative effects of these activities have resulted in the loss of much of the original natural conditions of the site, particularly in the interior of the property. Past projects in the area have resulted in the loss or fragmentation of available habitat for birds and bats. This likely resulted in the loss of breeding and foraging habitat for birds, and possibly the loss of foraging habitat for bats. In the future, additional projects causing habitat loss in the area could result in additional cumulative effects if the projects cause the adjacent required habitats for migratory birds, bats, and species listed in Table C.2 of Appendix C, to be further diminished, fragmented, or eliminated.

### 5.2.4 Residual Effects

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While mitigation measures can be implemented to reduce potentially adverse effects of the Project, the construction of the LBTF will result in the permanent loss of approximately 8 ha of habitat. Permanent loss of bird habitat is considered a residual effect as migratory and SAR/SoCC birds will lose habitat for foraging and breeding (see Appendix C, Table C.2).

Bats may also lose some day roosting habitat as well as, foraging habitat within the Project footprint, although high quality foraging habitat was not identified within the Project Area. As no suitable bat maternity roost habitat was identified in the Project footprint during the targeted surveys, no impacts to this habitat type are anticipated as a result of the Project.

CBCL understands that the loss of wetland habitat will be compensated for elsewhere on the Hartlen Point property so that there is no net loss in wetland functions, which will minimize wetland-related effects on foraging birds and bats.

A slight increase in sensory disturbance to birds and bats during all project phases is also likely, but is difficult to quantify, as noise/light tolerance are poorly understood for most species, as habituation to disturbance can occur.

No effects to any critical habitat for any SAR are expected as a result of the Project.

## 6 Conclusions

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Much of the land cover on the Hartlen Point property is classified as urban/anthropogenic by DNRR. This is owing to the golf course present on site. An approximately 2 ha softwood stand is located within the interior of the Project footprint. Most of the Project Area (approximately 5 ha or 63%) contains tall shrub habitat. No SAR critical habitat was identified within the property boundaries. Critical habitat for Piping Plover was identified approximately 550 m north of the Project footprint. The Project Area, and much of the southern portion of the property, overlaps an area provincially recognized as an important migratory bird area.

Suitable bat maternity roost habitat was not observed in the Project Area. No bat hibernacula were reported within the vicinity of the Project Area, nor were any bats detected on site during opportunistic acoustic surveys conducted in conjunction with the nightjar survey in July of 2021. The forested habitat may still be used by non-reproductive bat individuals for roosting (day roosts) during the active period for bats in Nova Scotia (April to October).

During the desktop review, CBCL found that 296 species, plus two hybrid species, have been observed at Hartlen Point between 1983 and 2022 (Appendix C, Table C.1). Of the 294 species reported, 24 are SAR, 81 are SoCC. CBCL identified suitable breeding habitat on site for 57 of these SAR/SoCC (Appendix C, Table C.2) and possible suitable foraging habitat for all SAR/SoCC species.

A total of 122 species, plus seven unidentified taxa, were observed within the Study Area during all field programs conducted by CBCL in 2021 and 2022. Of the 122 species observed, 111 are protected under the MBCA. Six of the species observed are SAR and 33 are SoCC. There were no direct observations of any bird residences defined under SARA during the bird surveys conducted at Hartlen Point by CBCL.

Potential adverse environmental effects that may occur as a result of the Project include the following: 1) the direct loss or alteration of habitat; 2) sensory disturbance; 3) nest or day roost destruction, disturbance, or abandonment; and 4) mortality. Mitigation measures that may reduce or avoid some of these impacts include the following: 1) minimize habitat loss or alteration (e.g., limit tree clearing to within the Project footprint); 2) minimize noise

and light emissions; 3) avoid mortality of migratory/SAR birds and SAR bats by clearing vegetation outside of the breeding bird/active bat window (i.e., conduct clearing between late October and mid-April, whenever possible). Pre-clearing surveys are proposed for migratory and resident bird species if clearing must be conducted during the breeding bird season. Following the implementation of mitigation measures, and best management practices, residual effects expected as a result of the Project include the permanent loss or alteration of approximately 8 ha of habitat within the Project footprint. This may result in the loss of suitable breeding and foraging habitat for birds, and potentially foraging habitat for bats. As a result, it is anticipated that species will use suitable nesting, day roosting and foraging habitat available in adjacent habitat on site. DND will also employ wetland compensation on site so that there is a no net loss of wetland functions, such as habitat support for birds and bats.

## 7 Closure

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This report has been prepared for the sole benefit of DCC/DND. The report may not be relied upon by any other person or entity without the express written consent of CBCL and DCC/DND. Any use which a third party makes of this report and any reliance on decisions made based on it, are the responsibility of such third parties. CBCL Limited accepts no responsibility for damages, if any, suffered by any third party as a result of decisions or actions made based on this report.

The conclusions presented represent the best judgement of the assessors based on the observed site conditions. Due to the nature of the investigation, the assessors cannot warrant against undiscovered environmental conditions or liabilities.

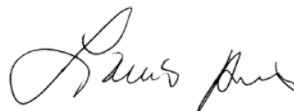
Should additional information become available, CBCL requests that this information be brought to our attention so that we may re-assess the conclusions presented herein.

Respectfully submitted,

CBCL Limited



Prepared by:  
Carrie Jardine M.Sc., B.Sc.H.  
Fisheries and Wildlife Biologist



Reviewed by:  
Loretta Hardwick, M.Sc., B.Sc.H.  
Senior Environmental Scientist

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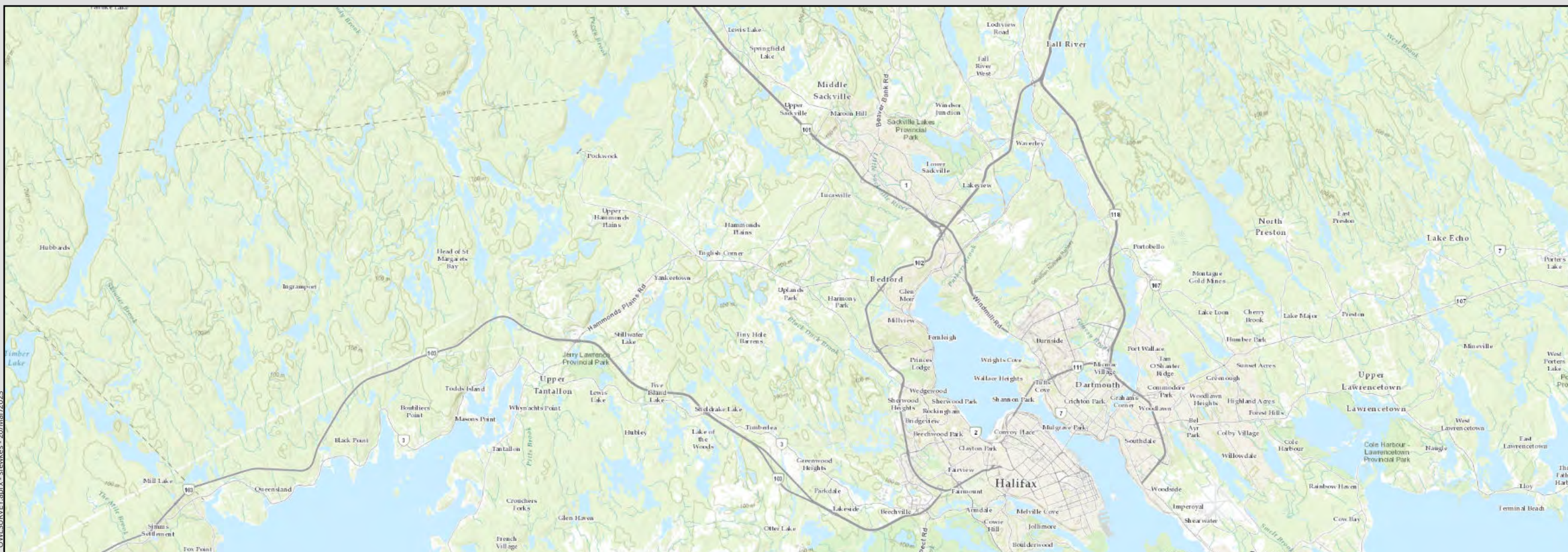
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# APPENDIX A

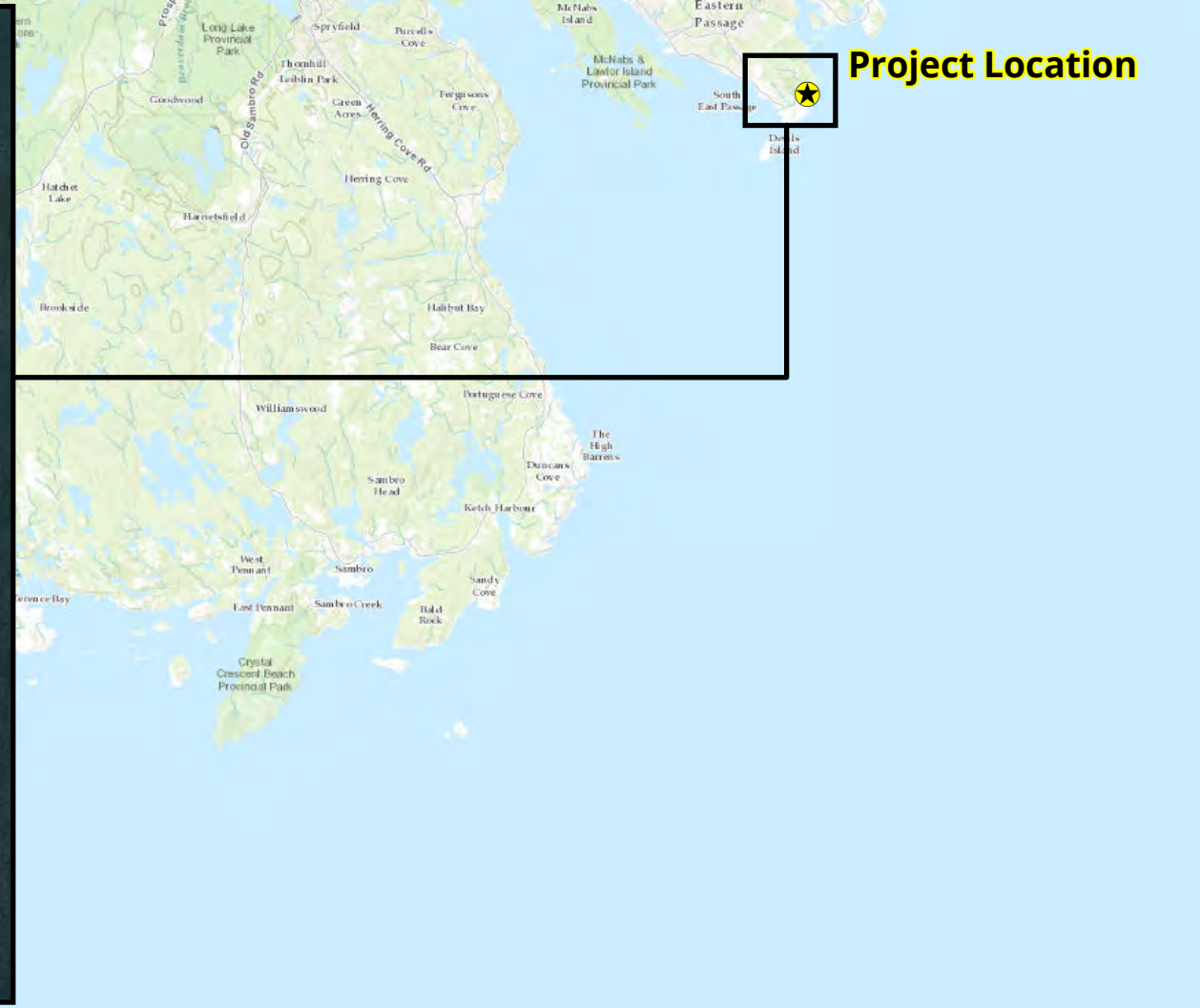
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## Figures

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- LEGEND**
- Project Location
  - Site Boundary
  - Fenceline
  - Paved Surface / Roadway
  - LBTF Bulding Footprint

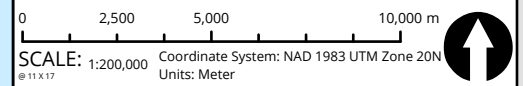


Environmental Surveys in Support of the Proposed Land Based Test Facility – Hartlen Point, Eastern Passage, NS

**Project Area Location**

DATE: 2023-03-20	PROJ N°: 211207.00	FIGURE: <b>Appendix A Figure 1</b>
DRAWN BY: SF	CHECKED BY: LM	APPROVED: JB

NOTES:

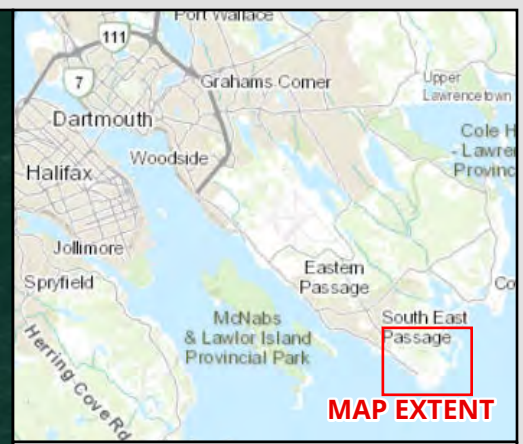


Document Path: \\Halifax\Data\Projects\211207.00-Hartlen Point Wetland Impact Assessment and Compensation Options\44 CAD\08 GIS\PROJ\211207.00-HARTLENPOINT-DWI-SURVEY.aprx - sfwakes - 20/Mar/2023



Halifax Harbour

Hartlen Cove



- Wetland (Field Delineated)
- Site Boundary
- DNRR Land Cover
- Mixed Wood
- Soft Wood
- NS Interpreted Forest Inventory (FORNON)
- WETLANDS
- WINDTHROW
- Forested - Natural Stand (>75% Softwood Basal Area)
- Forested - Alders (<75% Crown Coverage)
- BEACH
- CLIFF
- URBAN

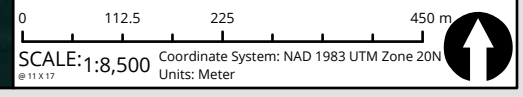


Environmental Surveys in Support of the Proposed Land Based Test Facility – Hartlen Point, Eastern Passage, NS

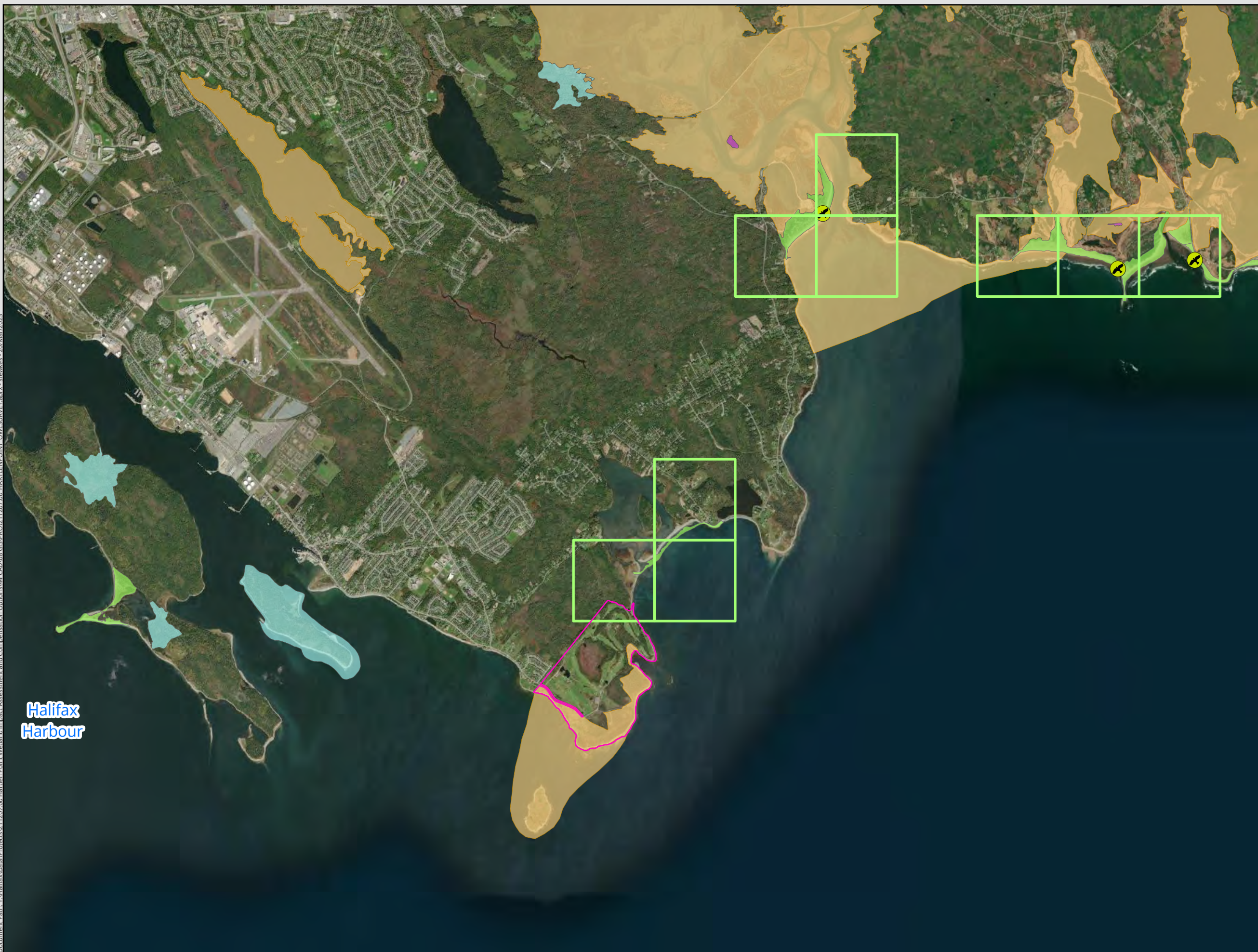
### General Habitat Classification

DATE: 2023-03-20	PROJ N°: 211207	FIGURE: APPENDIX A FIGURE 2
DRAWN BY: SF	CHECKED BY: LM	APPROVED: JB

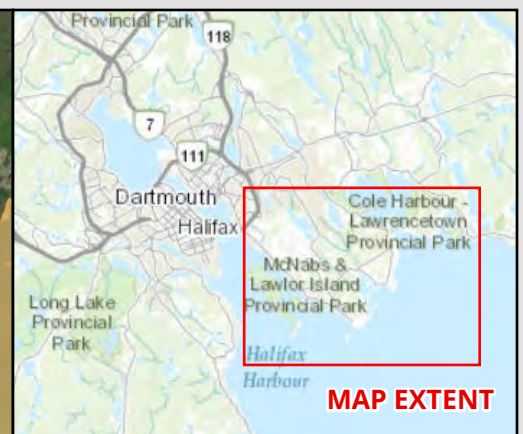
NOTES:



Document Path: \\Halifax\Data\Projects\211207.00-Hartlen Point Wetland Impact Assessment and Compensation Options\44\_CAD\08\_GIS\PROJ\211207.00\_HARTLENPOINT\_OWI\_SURVEY.aprx - sfwakes - 20/Mar/2023



Halifax Harbour



- LEGEND**
- DCC Site Boundary
  - Critical Habitat (ECCC, 2022)**
  - Piping Plover - 1km Grid
  - Piping Plover Observation
  - Significant Habitat (NSLF, 2022)**
  - Migratory Bird
  - Other Habitat
  - Species at Risk
  - Species of Concern

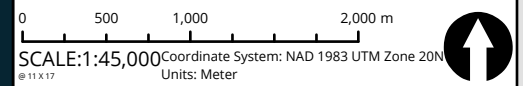


Environmental Surveys in Support of the Proposed Land Based Test Facility – Hartlen Point, Eastern Passage, NS

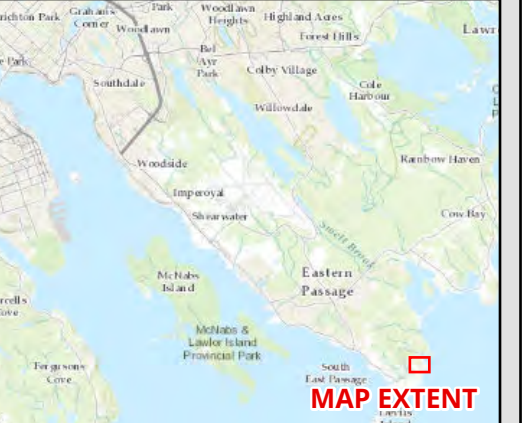
### CRITICAL AND SIGNIFICANT HABITAT

DATE: 2023-03-20	PROJ N°: 211207	FIGURE: <b>Appendix A Figure 3</b>
DRAWN BY: SF	CHECKED BY:	APPROVED:

NOTES:  
- Significant Habitat provided (open source) by Nova Scotia Lands and Forestry (Accessed September 2022, <https://novascotia.ca/natr/wildlife/habitats/hab-data/>)



Document Path: Y:\Halifax\Data\Projects\211207.00 Hartlen Point Wetland Impact Assessment and Compensation Options\44\_CAD\08\_GIS\PROJ\211207.00\_HARTLENPOINT\_OWLSURVEY.aprx - sfewkes - 20/Mar/2023



**LEGEND**

- Tree measured
- Tree measured with lichen

**Layer**

- Forested - Natural Stand (> 75% Softwood Basal Area)
- Forested - Wind Throw
- Forested - Alders (<75% Crown Coverage)
- Wetland - General
- Open Bog
- Treed Bog
- Ocean Wetland
- Wetland in Lake
- Cliffs, Dunes & Coastal Rocks
- Inland Water
- Urban
- Beach
- Road Corridor
- ▬ Survey Area
- ▬ Site Boundary



Environmental Surveys in Support of the Proposed Land Based Test Facility – Hartlen Point, Eastern Passage, NS

**Forest Cover and Tree Measurements**

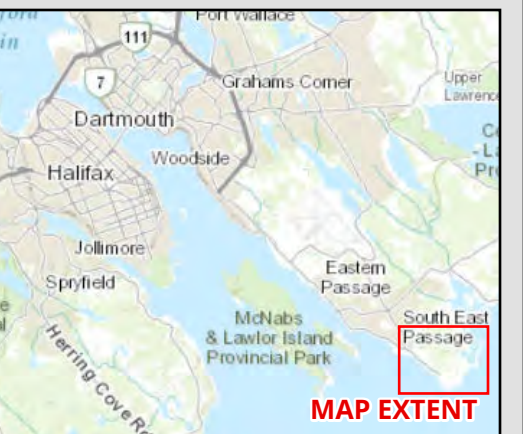
DATE: 2023-03-20	PROJ N°: 211207	FIGURE: <b>Appendix A Figure 4</b>
DRAWN BY: SF	CHECKED BY: LM	APPROVED: JB

0 15 30 60 m

SCALE: 1:1,500 Coordinate System: NAD 1983 UTM Zone 20N Units: Meter



Document Path: \\Halifax\Data\Projects\211207.00-Hartlen Point Wetland Impact Assessment and Compensation Options\44\_CAD\08\_GIS\PROJ\211207.00\_HARTLENPOINT\_OWI\_SURVEY.aprx - sfawkes - 20/Mar/2023



- LEGEND**
- Spring Migratory Bird Point Count Location
  - ~ Area Search Route
  - SoCC Observation Locations
  - SAR Observation Location
  - Osprey Nest
  - Fenceline
  - LBTF Building Footprint
  - Site Boundary

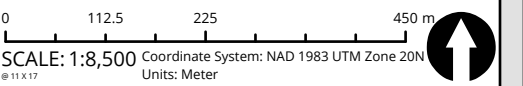


Environmental Surveys in Support of the Proposed Land Based Test Facility – Hartlen Point, Eastern Passage, NS

### 2022 Spring Migratory Bird Survey

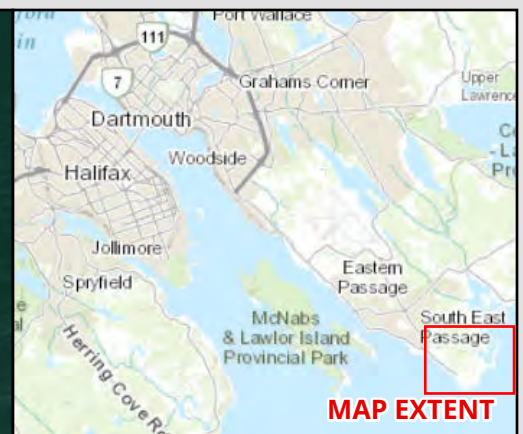
DATE: 2023-03-20	PROJ N°: 211207	FIGURE: Appendix A Figure 5
DRAWN BY: SF	CHECKED BY: LM	APPROVED: JB

NOTES:



Halifax Harbour

Document Path: Y:\Halifax\Projects\211207.00 Hartlen Point Wetland Impact Assessment and Compensation Options\44 CAD\08 GIS\PROJ\211207.00 HARTLENPOINT OWI SURVEY.aprx - sfawkes - 20/Mar/2023



- LEGEND**
- SoCC Observation Locations
  - SAR Observation Location
  - Site Boundary
  - LBTF Bulding Footprint
  - Fenceline



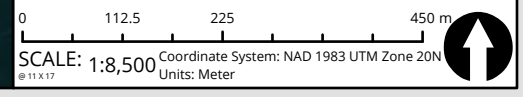
Environmental Surveys in Support of the Proposed Land Based Test Facility – Hartlen Point, Eastern Passage, NS

### Fall Migratory Bird Survey

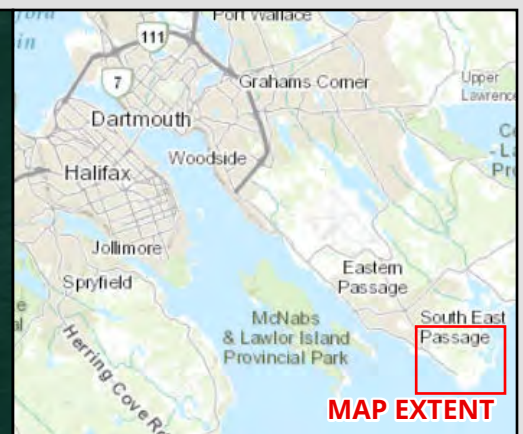
DATE: 2023-03-20    PROJ N°: 211207    FIGURE: Appendix A Figure 6

DRAWN BY: NH    CHECKED BY:    APPROVED:

NOTES:



Document Path: \\Halifax\Data\Projects\211207.00\Hartlen Point Wetland Impact Assessment and Compensation Options\44\_CAD\08\_GIS\PROJ\211207.00\_HARTLENPOINT\_OWI\_SURVEY.aprx - sfawkes - 20/Mar/2023



- LEGEND**
- Breeding Bird Point Count Location
  - SoCC Observation Locations
  - SAR Observation Location
  - Osprey Nest
  - LBTF Bulding Footprint
  - - - Fenceline
  - ▭ Site Boundary

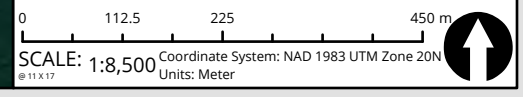


Environmental Surveys in Support of the Proposed Land Based Test Facility – Hartlen Point, Eastern Passage, NS

### 2021 Breeding Bird Survey

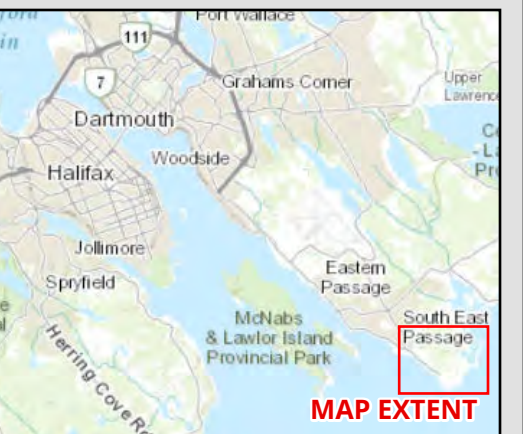
DATE: 2023-03-20	PROJ N°: 211207	FIGURE: Appendix A Figure 7a
DRAWN BY: SF	CHECKED BY: LM	APPROVED: JB

NOTES:



Halifax Harbour

Document Path: \\Halifax\Data\Projects\211207.00-Hartlen Point Wetland Impact Assessment and Compensation Options\44\_CAD\08\_GIS\PROJ\211207.00\_HARTLENPOINT\_OWI\_SURVEY.aprx - sfwakes - 20/Mar/2023



- LEGEND**
- Breeding Bird Point Count Location
  - 📍 SoCC Observation Locations
  - 📍 SAR Observation Location
  - 📍 Osprey Nest
  - ▭ LBTF Bulding Footprint
  - - - Fenceline
  - ▭ Site Boundary

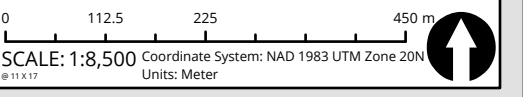


Environmental Surveys in Support of the Proposed Land Based Test Facility – Hartlen Point, Eastern Passage, NS

### 2022 Breeding Bird Survey

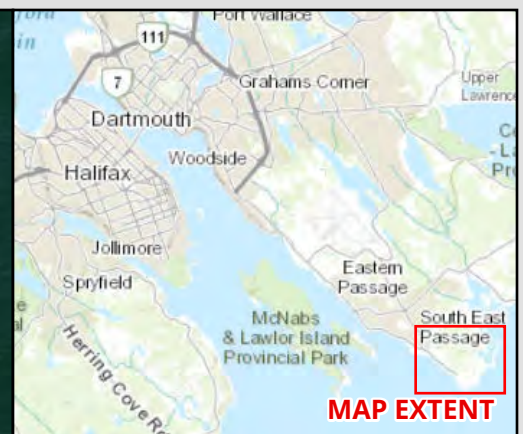
DATE: 2023-03-20	PROJ N°: 211207	FIGURE: Appendix A Figure 7b
DRAWN BY: SF	CHECKED BY: LM	APPROVED: JB

NOTES:



Halifax Harbour

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- LEGEND**
- SAR Observation Location
  - Common Nighthawk Survey Location
  - Osprey Nest
  - LBTF Building Footprint
  - Fenceline
  - Site Boundary

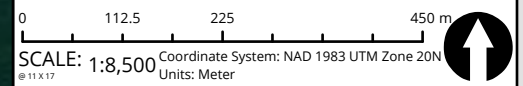


Environmental Surveys in Support of the Proposed Land Based Test Facility – Hartlen Point, Eastern Passage, NS

### Nightjar Survey

DATE: 2023-03-20	PROJ N°: 211207	FIGURE: <b>Appendix A Figure 8</b>
DRAWN BY: SF	CHECKED BY: LM	APPROVED:

NOTES:

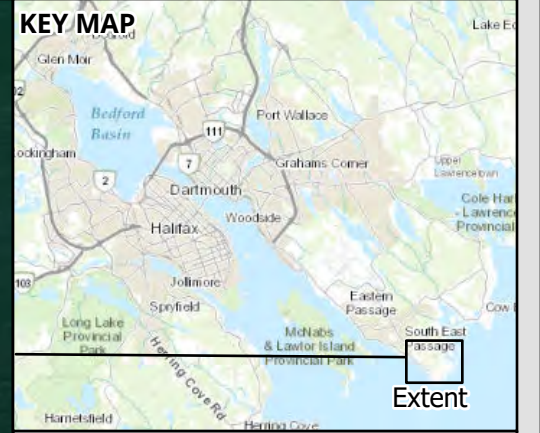


Document Path: Y:\Halifax\Ara\Projects\211207.00 Hartlen Point Wetland Impact Assessment and Compensation Options\44 CAD\08 GIS\PROJ\211207.00 HARTLENPOINT OWI SURVEY.aprx - sfwakes - 20/Mar/2023

RS-02 AREA

RS-01 AREA

RS-03 AREA



- LEGEND**
- Barn Swallow Roosting Survey
  - Site Boundary
  - LBTF Building Footprint
  - Fenceline



Environmental Surveys in Support of the Proposed Land Based Test Facility – Hartlen Point, Eastern Passage, NS

### Barn Swallow Roosting Survey Areas

DATE: 2023-03-20	PROJ N°: 211207	FIGURE: Appendix A Figure 9
DRAWN BY: SF	CHECKED BY: LM	APPROVED: JB

NOTES:

0 95 190 380 m

SCALE: 1:7,500 Coordinate System: NAD 1983 UTM Zone 20N Units: Meter

Document Path: \\Halifax\Data\Projects\211207.00 Hartlen Point Wetland Impact Assessment and Compensation Options\44 CAD\08 GIS\PROJ\211207.00 HARTLENPOINT\_OWI\_SURVEY.aprx - sfwakes - 20/Mar/2023



- LEGEND**
- Barn Swallow Observations
  - Potential Barn Swallow Nesting Areas
- Areas Assessed for Barn Swallow Roosting Habitat
- High Potential
  - Moderate Potential
  - Low Potential
- Incidental SoCC Bird Observations
  - Osprey Nest
  - Wetlands (CBCL Delineated, 2021)
  - Wetlands (DNRR, 2015)
  - Wetlands (Dillon, 2008)
  - Wetlands (Dillon, 2006)
  - ~ WSP Field Delineated Watercourse
  - ~ DNRR Watercourse
  - Approximate Fence Location
  - Fenceline
  - LBTF Bulding Footprint
  - Site Boundary



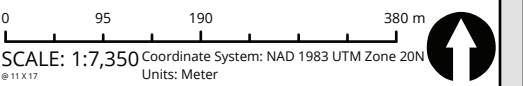
Environmental Surveys in Support of the Proposed Land Based Test Facility - Hartlen Point, Eastern Passage, NS

**Barn Swallow Roosting & Nesting Habitat Survey Results**

DATE: 2023-03-20	PROJ N°: 211207	FIGURE: Appendix A Figure 10
DRAWN BY: SF	CHECKED BY: LM	APPROVED: JB

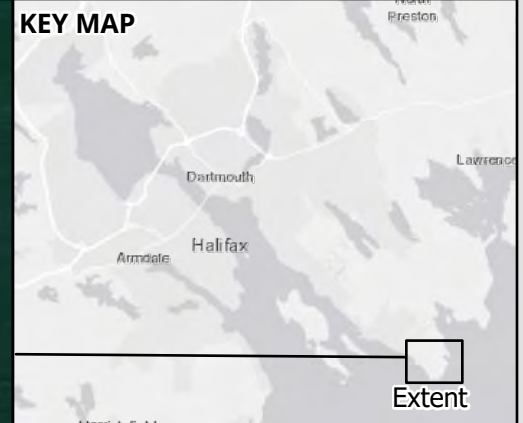
NOTES:

AREAS SURVEYED	
ID	NAME
HP-1	Basin Bog
HP-2	Tidal Bay Salt Marsh Complex
HP-9A	Slope Salt Marsh



Halifax Harbour

Document Path: \\Halifax\Data\Projects\211207.00-Hartlen Point Weiland Impact Assessment and Compensation Options\44-CAD\08-GIS\PROJ\211207.00-HARTLENPOINT\_OWI\_SURVEY.aprx - sfwakes - 20/Mar/2023



- ### LEGEND
- Barn Swallow Roosting Survey
  - ARU Location
  - Site Boundary
  - Access Road
  - Incidental SAR Observation
  - Incidental SoCC Observation
  - LBTF Bulding Footprint
  - Fenceline

ID	EASTING	NORTHING
HP-ARU-1	464741.1245	4938719.0891
HP-ARU-2	464654.9891	4938676.2256
HP-ARU-3	464672.3387	4938597.2342
HP-ARU-4	464346.5757	4938402.7153
HP-ARU-5	463956.9902	4937819.8555
HP-ARU-6	463956.2726	4937781.8237



Environmental Surveys in Support of the Proposed Land Based Test Facility - Hartlen Point, Eastern Passage, NS

### Barn Swallow Roosting Survey Areas and ARU Locations

DATE: 2023-03-20	PROJ N°: 211207	FIGURE: Appendix A Figure 11
DRAWN BY: SF	CHECKED BY: LM	APPROVED: JB

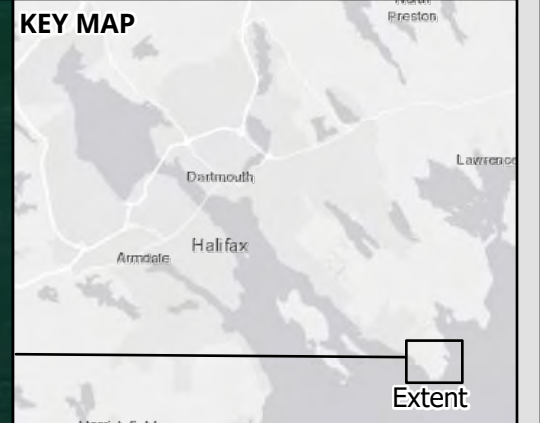
NOTES:

0 95 190 380 m

SCALE: 1:7,500 Coordinate System: NAD 1983 UTM Zone 20N Units: Meter



Document Path: \\Halifax\Data\Projects\211207.00-Hartlen Point Wetland Impact Assessment and Compensation Options\44 CAD\08 GIS\PROJ\211207.00-HARTLENPOINT OWL SURVEY.aprx - sfwakes - 20/Mar/2023



- LEGEND**
- Owl Survey Location
  - Site Boundary
  - Access Road
  - LBTF Bulding Footprint
  - Fenceline

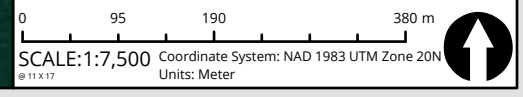


Environmental Surveys in Support of the Proposed Land Based Test Facility – Hartlen Point, Eastern Passage, NS

**Nocturnal Owl Survey Locations**

DATE: 2023-03-20	PROJ N°: 211207	FIGURE: Appendix A Figure 12
DRAWN BY: SF	CHECKED BY: LM	APPROVED: JB

NOTES:



Document Path: \\Halifax\Data\Projects\211207.00 Hartlen Point Wetland Impact Assessment and Compensation Options\44 CAD\08 GIS\PROJ\211207.00 HARTLENPOINT OWI SURVEY.aprx - sfwakes - 20/Mar/2023



- LEGEND**
- Potential Nesting, Foraging and Roosting Habitat for Pileated Woodpecker
  - Woodpecker Observations**
    - Hairy Woodpecker
    - Northern Flicker
  - SoCC Observations**
    - Semipalmated Plover
    - Inactive American Robin Nest
  - Site Boundary
  - LBTB Bulding Footprint
  - Fenceline
  - Access Road
  - Pileated Woodpecker Transects
  - Survey Area 1
  - Survey Area 2
  - Survey Area 3

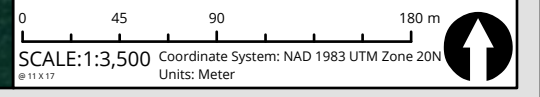


Environmental Surveys in Support of the Proposed Land Based Test Facility - Hartlen Point, Eastern Passage, NS

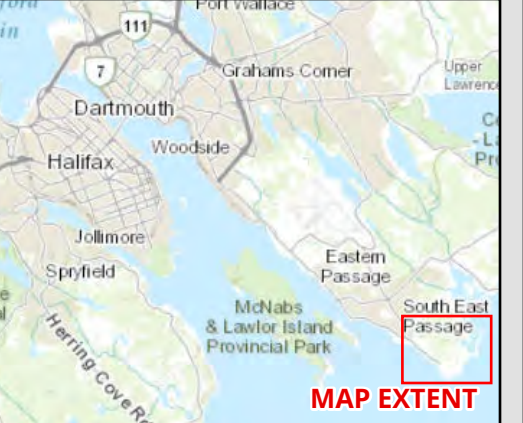
**Pileated Woodpecker Nest Surveys**

DATE: 2023-03-20	PROJ N°: 211207	FIGURE: Appendix A Figure 13
DRAWN BY: SF	CHECKED BY: LM	APPROVED: JB

NOTES:



Document Path: Y:\Halifax\Projects\211207.00-Hartlen Point Wetland Impact Assessment and Compensation Options\44\_CAD\08\_GIS\PROJ\211207.00\_HARTLENPOINT\_OWI\_SURVEY.aprx - sfwakes - 20/Mar/2023



- LEGEND**
- SoCC Observation Locations
  - SAR Observation Location
  - Site Boundary
  - LBTF Bulding Footprint
  - Fenceline

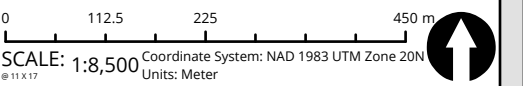


Environmental Surveys in Support of the Proposed Land Based Test Facility – Hartlen Point, Eastern Passage, NS

### Winter Residency Bird Survey

DATE: 2023-03-20	PROJ N°: 211207	FIGURE: Appendix A Figure 14
DRAWN BY: SF	CHECKED BY: LM	APPROVED: JB

NOTES:



# APPENDIX B

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## Photo Log

# Appendix B: Photo Log

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Photo 1: Forested Area in Project Footprint (a)



Photo 2: Forested Area in Project Footprint (b)



Photo 3: Forested Area in Project Footprint (c)



Photo 4: Forested Area in Project Footprint (d)

Appendix B: Photo Log



Photo 5: Tall Shrub Habitat in Project Footprint (a)



Photo 6: Tall Shrub Habitat in Project Footprint (b)



Photo 7: Tree with Significant Lichen Cover in NE Corner of Project Footprint



Photo 8: Wetland Dominated by Bluejoint in SE Corner of Project Footprint

Appendix B: Photo Log



Photo 9: 2021 Breeding Bird Point Count (PC) 1



Photo 10: 2021 Breeding Bird PC 2



Photo 11: 2021 Breeding Bird PC 3



Photo 12: 2021 Breeding Bird PC 4(a)

## Appendix B: Photo Log



Photo 13: 2021 Breeding Bird PC 4(b)



Photo 14: 2021 Breeding Bird PC 5



Photo 15: 2021 Breeding Bird PC 6(a)



Photo 16: 2021 Breeding Bird PC 6(b)



Appendix B: Photo Log



Photo 17: 2021 Breeding Bird PC 7



Photo 18: 2021 Breeding Bird PC 8(a)



Photo 19: 2021 Breeding Bird PC 8(b)



Photo 20: 2021 Breeding Bird PC 9(a)

Appendix B: Photo Log



Photo 21: 2021 Breeding Bird PC 9(b)



Photo 22: 2021 Breeding Bird PC 10



Photo 23: 2021 Breeding Bird PC 11



Photo 24: 2021 Breeding Bird PC 13

Appendix B: Photo Log



Photo 25: 2021 Breeding Bird PC 14



Photo 26: 2021 Breeding Bird PC 15



Photo 27: 2021 Breeding Bird PC 16



Photo 28: 2021 Breeding Bird PC 17

Appendix B: Photo Log



Photo 29: 2021 Breeding Bird PC 18(a)



Photo 30: 2021 Breeding Bird PC 18(b)



Photo 31: 2021 Breeding Bird PC 19(a)



Photo 32: 2021 Breeding Bird PC 19(b)

## Appendix B: Photo Log



Photo 33: Ruby-crowned Kinglet Observed During 2021 Fall Migration Surveys



Photo 34: Yellow Warbler Observed During 2021 Fall Migration Survey



Photo 35: Yellow-rumped Warbler Observed During 2021 Fall Migration Surveys



Photo 36: Semipalmated Sandpiper Observed During 2021 Fall Migration Surveys (a)



Photo 37: Semipalmated Sandpiper Observed During 2021 Fall Migration Surveys (b)



Photo 38: Willet Observed During 2021 Fall Migration Surveys (a)



Photo 39: Willet Observed During 2021 Fall Migration Surveys (b)



Photo 40: Osprey Observed During 2021 Fall Migration Surveys

## Appendix B: Photo Log



Photo 41: Coopers Hawk Observed During 2021 Fall Migration Surveys



Photo 42: Monarch Butterfly Observed During 2021 Fall Migration Surveys



Photo 43: 2022 Spring and Breeding Bird Surveys PC 1(a)



Photo 44: 2022 Spring and Breeding Bird Surveys PC 1(b)

Appendix B: Photo Log



Photo 45: 2022 Spring and Breeding Bird Surveys PC 2(a)



Photo 46: 2022 Spring and Breeding Bird Surveys PC 2(b)



Photo 47: 2022 Spring and Breeding Bird Surveys PC 4(a)



Photo 48: 2022 Spring and Breeding Bird Surveys PC 4(b)



Appendix B: Photo Log



Photo 49: Canada Goose Near PC 4



Photo 50: General Habitat of Ipswich Sparrow Observation (a)



Photo 51: General Habitat of Ipswich Sparrow Observation (b)



Photo 52: General Habitat of Ipswich Sparrow Observation (c)

Appendix B: Photo Log



Photo 53: 2022 Spring and Breeding Bird Surveys PC 5 (a)



Photo 54: 2022 Spring and Breeding Bird Surveys PC 5(b)



Photo 55: 2022 Spring and Breeding Bird Surveys PC 6(a)



Photo 56: 2022 Spring and Breeding Bird Surveys PC 6(b)

Appendix B: Photo Log



Photo 57: 2022 Spring and Breeding Bird Surveys PC 7(a)



Photo 58: 2022 Spring and Breeding Bird Surveys PC 7(b)



Photo 59: 2022 Spring and Breeding Bird Surveys PC 8(a)



Photo 60: 2022 Spring and Breeding Bird Surveys PC 8(b)

Appendix B: Photo Log



Photo 61: Song Sparrow Near PC 8



Photo 62: Osprey Nest Near PC 8



Photo 63: 2022 Spring and Breeding Bird Surveys PC 9(a)

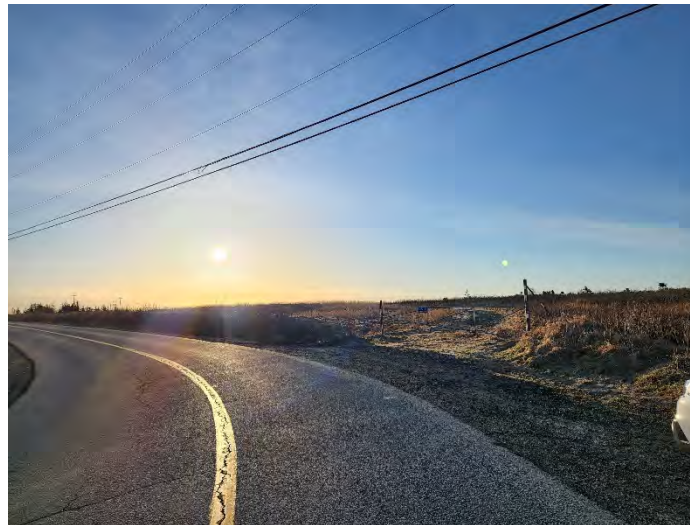


Photo 64: 2022 Spring and Breeding Bird Surveys PC 9(b)

Appendix B: Photo Log



Photo 65: 2022 Spring and Breeding Bird Surveys PC 9(c)



Photo 66: Great Black-backed Gull Near PC 10



Photo 67: Ring-necked Pheasant Near PC 9



Photo 68: Canada Geese on Golf Course Near PC 9

Appendix B: Photo Log



Photo 69: Icelandic Gull Near PC 10



Photo 70: Northern Harrier Near PC 10



Photo 71: 2022 Spring and Breeding Bird Surveys PC 11(a)



Photo 72: 2022 Spring and Breeding Bird Surveys PC 11(b)

Appendix B: Photo Log



Photo 73: 2022 Spring and Breeding Bird Surveys PC 11(c)



Photo 74: 2022 Spring and Breeding Bird Surveys PC 12(a)



Photo 75: 2022 Spring and Breeding Bird Surveys PC 12(b)



Photo 76: 2022 Spring and Breeding Bird Surveys PC 12(c)

Appendix B: Photo Log

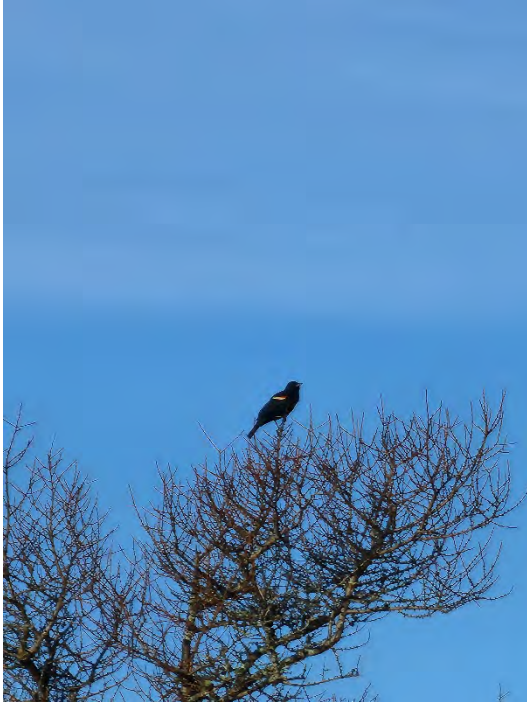


Photo 77: Red-winged Blackbird Observed Near PC 12



Photo 78: 2022 Spring and Breeding Bird Surveys PC 13(a)



Photo 79: 2022 Spring and Breeding Bird Surveys PC 13(b)



Photo 80: 2022 Spring and Breeding Bird Surveys PC 13(c)



Appendix B: Photo Log



Photo 81: 2022 Spring and Breeding Bird Surveys Migratory Lookoff (ML) 1 (a)



Photo 82: 2022 Spring and Breeding Bird Surveys ML 1(b)



Photo 83: Male Common Eider and Two Females at ML 1



Photo 84: 2022 Spring and Breeding Bird Surveys ML 2(a)

Appendix B: Photo Log



Photo 85: 2022 Spring and Breeding Bird Surveys ML 2(b)



Photo 86: 2022 Spring and Breeding Bird Surveys ML 3(a)



Photo 87: 2022 Spring and Breeding Bird Surveys ML 3(b)



Photo 88: 2022 Spring and Breeding Bird Surveys ML 4(a)

Appendix B: Photo Log



Photo 89: 2022 Spring and Breeding Bird Surveys ML 4(b)



Photo 90: Area Search Where Ipswich Sparrow was Previously Identified (a)



Photo 91: Area Search Where Ipswich Sparrow was Previously Identified (b)



Photo 92: Area Search Where Ipswich Sparrow was Previously Identified (c)

Appendix B: Photo Log



Photo 93: Ipswich Sparrow Observed Between PC 10 and ML 4



Photo 94: General Area Where Ipswich Sparrow was Observed (a)



Photo 95: General Area Where Ipswich Sparrow was Observed (b)



Photo 96: General Area Where Ipswich Sparrow was Observed (c)

Appendix B: Photo Log



Photo 97: Ruddy Turnstone Observed During 2021 Fall Migration Surveys



Photo 98: Sanderling Observed During 2021 Fall Migration Surveys



Photo 99: Semipalmated Sandpipers Observed During 2021 Fall Migration Surveys



Photo 100: Buff-breasted Sandpiper Observed During 2021 Fall Migration Surveys

## Appendix B: Photo Log



Photo 101: Common Eider and Ducklings Observed During 2022 Breeding Bird Surveys



Photo 102: Greater Yellowlegs, Semipalmated Plover, Semipalmated Sandpiper, Sanderling Observed in August 2022



Photo 103: Willetts Observed During 2022 Breeding Bird Surveys



Photo 104: Pectoral Sandpiper Observed During ARU Retrieval on September 2, 2022

Appendix B: Photo Log



Photo 105: Barn Swallow Roosting Survey Area 1 (RS-01)



Photo 106: Barn Swallow RS-02



Photo 107: Barn Swallow RS-03 General Habitat (a)



Photo 108: Barn Swallow RS-03 General Habitat (b)



Photo 109: Barn Swallow RS-03 General Habitat (c)



# APPENDIX C

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## eBird and AC CDC Results Tables

**Table C.1. All bird species recorded at Hartlen Point between 1983 and 2022 as reported by eBird (Bold denotes SAR).**

Common Name	Scientific Name	Ranking		
		SARA	NS ESA	AC CDC (2022)
<b>Acadian Flycatcher</b>	<b><i>Empidonax virescens</i></b>	<b>E</b>	-	<b>SNA</b>
Alder Flycatcher	<i>Empidonax alnorum</i>	-	-	S5B
American Avocet	<i>Recurvirostra americana</i>	-	-	SNA
American Bittern*	<i>Botaurus lentiginosus</i>	-	-	S3S4B,S4S5M
American Black Duck	<i>Anas rubripes</i>	-	-	S5B,S5N
American Coot*	<i>Fulica americana</i>	-	-	S1B
American Crow	<i>Corvus brachyrhynchos</i>	-	-	S5
American Golden Plover*	<i>Pluvialis dominica</i>	-	-	S2S3M
American Goldfinch	<i>Spinus tristis</i>	-	-	S5
American Kestrel*	<i>Falco sparverius</i>	-	-	S3B,S4S5M
American Oystercatcher*	<i>Haematopus palliatus</i>	-	-	SNRB
American Pipit	<i>Anthus rubescens</i>	-	-	S4M
American Redstart	<i>Setophaga ruticilla</i>	-	-	S5B
American Robin*	<i>Turdus migratorius</i>	-	-	S5B,S3N
American Tree Sparrow	<i>Spizelloides arborea</i>	-	-	S5N
American Wigeon	<i>Mareca americana</i>	-	-	S4B,S4S5M
American Wigeon X Mallard Hybrid		-	-	#N/A
American Woodcock	<i>Scolopax minor</i>	-	-	S5B
Arctic Tern*	<i>Sterna paradisaea</i>	-	-	S3B
Atlantic Puffin*	<i>Fratercula arctica</i>	-	-	S2B
Baird's Sandpiper	<i>Calidris bairdii</i>	-	-	SNA
Bald Eagle	<i>Haliaeetus leucocephalus</i>	-	-	S5
Baltimore Oriole*	<i>Icterus galbula</i>	-	-	S2S3B,SUM
<b>Bank Swallow</b>	<b><i>Riparia riparia</i></b>	<b>T</b>	<b>E</b>	<b>S2B</b>
<b>Barn Swallow</b>	<b><i>Hirundo rustica</i></b>	<b>T</b>	<b>E</b>	<b>S3B</b>
<b>Barrow's Goldeneye</b>	<b><i>Bucephala islandica</i> (Eastern pop.)</b>	<b>SC</b>	-	<b>S1N,SUM</b>
Bay-breasted Warbler*	<i>Setophaga castanea</i>	-	-	S3S4B,S4S5M
Bell's Vireo	<i>Vireo bellii</i>	-	-	SNA
Belted Kingfisher	<i>Megaceryle alcyon</i>	-	-	S4S5B
Black Guillemot	<i>Cephus grylle</i>	-	-	S4B
Black Scoter	<i>Melanitta americana</i>	-	-	S4N,SUM
Black Skimmer	<i>Rynchops niger</i>	-	-	SNA
Black Tern*	<i>Chlidonias niger</i>	-	-	S1B

**Table C.1. Total number of birds observed at Hartlen Point between 1983 and 2022 as reported by eBird (Bold denotes SAR).**

Common Name	Scientific Name	Ranking		
		SARA	NS ESA	AC CDC (2022)
Black-and-white Warbler	<i>Mniotilta varia</i>	-	-	S5B
Black-bellied Plover*	<i>Pluvialis squatarola</i>	-	-	S3M
Black-billed Cuckoo*	<i>Coccyzus erythrophthalmus</i>	-	-	S3B
Blackburnian Warbler	<i>Setophaga fusca</i>	-	-	SNA
Black-capped Chickadee	<i>Poecile atricapillus</i>	-	-	S5
Black-headed Gull*	<i>Chroicocephalus ridibundus</i>	-	-	S3N
Black-legged Kittiwake*	<i>Rissa tridactyla</i>	-	-	S2S3B
Blackpoll Warbler*	<i>Setophaga striata</i>	-	-	S3B,S5M
Black-throated Blue Warbler	<i>Setophaga caerulescens</i>	-	-	S5B
Black-throated Green Warbler	<i>Setophaga virens</i>	-	-	S5B
Blue Grosbeak	<i>Passerina caerulea</i>	-	-	SNA
Blue Jay	<i>Cyanocitta cristata</i>	-	-	S5
Blue-gray Gnatcatcher	<i>Poliioptila caerulea</i>	-	-	SNA
Blue-headed Vireo	<i>Vireo solitarius</i>	-	-	S5B
Blue-winged Teal*	<i>Spatula discors</i>	-	-	S3B
Blue-winged Warbler	<i>Vermivora cyanoptera</i>	-	-	SNA
<b>Bobolink</b>	<b><i>Dolichonyx oryzivorus</i></b>	<b>T</b>	<b>V</b>	<b>S3B</b>
Bohemian Waxwing	<i>Bombycilla garrulus</i>	-	-	S4N
Bonaparte's Gull	<i>Chroicocephalus philadelphia</i>	-	-	S5M
Boreal Chickadee*	<i>Poecile hudsonicus</i>	-	-	S3
Brant*	<i>Branta bernicla</i>	-	-	S3M
Brewer's Sparrow	<i>Spizella breweri</i>	-	-	SNA
Broad-winged Hawk	<i>Buteo platypterus</i>	-	-	S5B
Brown Creeper	<i>Certhia americana</i>	-	-	S5
Brown Thrasher*	<i>Toxostoma rufum</i>	-	-	S1B
Brown-headed Cowbird*	<i>Molothrus ater</i>	-	-	S2B
<b>Buff-breasted Sandpiper</b>	<b><i>Calidris subruficollis</i></b>	<b>SC</b>	-	<b>SNA</b>
Bufflehead*	<i>Bucephala albeola</i>	-	-	S4N,SUM
Canada Goose	<i>Branta canadensis</i>	-	-	SUB,S4N,S5M
Canada Jay*	<i>Perisoreus canadensis</i>	-	-	S3

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Common Name	Scientific Name	Ranking		
		SARA	NS ESA	AC CDC (2022)
<b>Canada Warbler</b>	<b><i>Cardellina canadensis</i></b>	<b>T</b>	<b>E</b>	<b>S3B</b>
Cape May Warbler*	<i>Setophaga tigrine</i>	-	-	S3B,SUM
Caspian Tern	<i>Hydroprogne caspia</i>	-	-	SNA
Cave Swallow	<i>Petrochelidon fulva</i>	-	-	SNA
Cedar Waxwing	<i>Bombycilla cedrorum</i>	-	-	S5B
<b>Cerulean Warbler</b>	<b><i>Setophaga cerulea</i></b>	<b>E</b>	-	<b>SNA</b>
Chestnut-sided Warbler	<i>Setophaga pensylvanica</i>	-	-	S5B
<b>Chimney Swift</b>	<b><i>Chaetura pelagica</i></b>	<b>T</b>	<b>E</b>	<b>S2S3B,S1M</b>
Chipping Sparrow	<i>Spizella passerine</i>	-	-	S4B,S5M
Clapper Rail	<i>Rallus crepitans</i>	-	-	SNA
Clay-colored Sparrow	<i>Spizella pallida</i>	-	-	SNA
Cliff Swallow*	<i>Petrochelidon pyrrhonota</i>	-	-	S2S3B
Common Eider*	<i>Somateria mollissima</i>	-	-	S3B,S3M,S3N
Common Goldeneye*	<i>Bucephala clangula</i>	-	-	S2S3B,S5N,S5M
Common Grackle	<i>Quiscalus quiscula</i>	-	-	S5B
Common Loon	<i>Gavia immer</i>	-	-	S4B
Common Merganser	<i>Mergus merganser</i>	-	-	S5B,S5M,S5N
Common Murre*	<i>Uria aalge</i>	-	-	S1?B
<b>Common Nighthawk</b>	<b><i>Chordeiles minor</i></b>	<b>T</b>	<b>T</b>	<b>S3B</b>
Common Raven	<i>Corvus corax</i>	-	-	S5
Common Redpoll	<i>Acanthis flammea</i>	-	-	S5N
Common Tern*	<i>Sterna Hirundo</i>	-	-	S3B
Common Yellowthroat	<i>Geothlypis trichas</i>	-	-	S5B
Connecticut Warbler	<i>Oporornis agilis</i>	-	-	SNA
Cooper's Hawk*	<i>Accipiter cooperi</i>	-	-	S1?B,SUN,SUM
Cory's Shearwater	<i>Calonectris Diomedea</i>	-	-	SNA
Dark-eyed Junco	<i>Junco hyemalis</i>	-	-	S4S5
Dickcissel	<i>Spiza americana</i>	-	-	SNA
Double-crested Cormorant	<i>Phalacrocorax auritus</i>	-	-	S5B
Dovekie	<i>Alle alle</i>	-	-	S5N
Downy Woodpecker	<i>Dryobates pubescens</i>	-	-	S5
Dunlin	<i>Calidris alpina</i>	-	-	S4M
Eared Grebe	<i>Podiceps nigricollis</i>	-	-	SNA
Eastern Bluebird*	<i>Sialia sialis</i>	-	-	S3B
Eastern Kingbird*	<i>Tyrannus tyrannus</i>	-	-	S3B

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Common Name	Scientific Name	Ranking		
		SARA	NS ESA	AC CDC (2022)
Eastern Phoebe	<i>Sayornis phoebe</i>	-	-	S4S5B,S4M
Eastern Towhee	<i>Pipilo erythrophthalmus</i>	-	-	SNA
<b>Eastern Wood-pewee</b>	<b><i>Contopus virens</i></b>	<b>SC</b>	<b>V</b>	<b>S3S4B</b>
Eurasian Kestrel	<i>Falco tinnunculus</i>	-	-	SNA
Eurasian Wigeon	<i>Mareca Penelope</i>	-	-	SNA
European Golden Plover	<i>Pluvialis apricaria</i>	-	-	SNA
European Starling	<i>Sturnus vulgaris</i>	-	-	SNA
<b>Evening Grosbeak</b>	<b><i>Coccothraustes vespertinus</i></b>	<b>SC</b>	<b>V</b>	<b>S3B,S3N,S3M</b>
Field Sparrow	<i>Spizella pusilla</i>	-	-	SNA
Forster's Tern	<i>Sterna forsteri</i>	-	-	SNA
Fox Sparrow*	<i>Passerella iliaca</i>	-	-	S3S4B,S5M
Franklin's Gull	<i>Leucophaeus pipixcan</i>	-	-	SNA
Gadwall*	<i>Mareca strepera</i>	-	-	S2B,SUM
Glaucous Gull	<i>Larus hyperboreus</i>	-	-	SNA
Glossy Ibis	<i>Plegadis falcinellus</i>	-	-	SNA
Golden-crowned Kinglet	<i>Regulus satrapa</i>	-	-	S5
<b>Golden-winged Warbler</b>	<b><i>Vermivora chrysoptera</i></b>	<b>T</b>	<b>-</b>	<b>SNA</b>
Gray Catbird*	<i>Dumetella carolinensis</i>	-	-	S4B
Gray-cheeked Thrush	<i>Catharus minimus</i>	-	-	SUB
Great Black-backed Gull	<i>Larus marinus</i>	-	-	S4S5
Great Blue Heron	<i>Ardea herodias</i>	-	-	S4B,S4S5M
Great Cormorant*	<i>Phalacrocorax carbo</i>	-	-	S2S3B,S2S3N
Great Egret	<i>Ardea alba</i>	-	-	SNA
Great Horned Owl	<i>Bubo virginianus</i>	-	-	S4
Great Shearwater	<i>Ardenna gravis</i>	-	-	S5N
Great Skua	<i>Stercorarius skua</i>	-	-	SNA
Greater Scaup	<i>Aythya marila</i>	-	-	S4N,SUM
Greater Yellowlegs*	<i>Tringa melanoleuca</i>	-	-	S3B,S4M
Green-winged Teal	<i>Anas crecca</i>	-	-	S4S5B,S5M
Gull-billed Tern	<i>Gelochelidon nilotica</i>	-	-	SNA
Hairy Woodpecker	<i>Dryobates villosus</i>	-	-	S5
<b>Harlequin Duck – Eastern Population</b>	<b><i>Histrionicus histrionicus pop. 1</i></b>	<b>SC</b>	<b>E</b>	<b>S2S3N,SUM</b>
Hermit Thrush	<i>Catharus guttatus</i>	-	-	S5B
Herring Gull	<i>Larus argentatus</i>	-	-	S5
Hooded Warbler	<i>Setophaga citrina</i>	-	-	SNA

**Table C.1. Total number of birds observed at Hartlen Point between 1983 and 2022 as reported by eBird (Bold denotes SAR).**

Common Name	Scientific Name	Ranking		
		SARA	NS ESA	AC CDC (2022)
Horned Grebe	<i>Podiceps auratus</i>	-	-	S3N,SUM
Horned Lark	<i>Eremophila alpestris</i>	-	-	SHB,S4S5N,S5M
House Finch	<i>Haemorhous mexicanus</i>	-	-	SNA
House Sparrow	<i>Passer domesticus</i>	-	-	SNA
House Wren	<i>Troglodytes aedon</i>	-	-	SNA
Hudsonian Godwit*	<i>Limosa haemastica</i>	-	-	S2S3M
Whimbrel*	<i>Numenius phaeopus hudsonicus</i>	-	-	S2S3M
Iceland Gull	<i>Larus glaucoides</i>	-	-	S4N
Indigo Bunting*	<i>Passerina cyanea</i>	-	-	S1?B,SUM
Kentucky Warbler	<i>Geothlypis Formosa</i>	-	-	SNA
Killdeer*	<i>Charadrius vociferus</i>	-	-	S3B
King Eider	<i>Somateria spectabilis</i>	-	-	SNA
Lapland Longspur*	<i>Calcarius lapponicus</i>	-	-	S3?N,SUM
<b>Lark Bunting</b>	<b><i>Calamospiza melanocorys</i></b>	<b>T</b>	-	<b>SNA</b>
Lark Sparrow	<i>Chondestes grammacus</i>	-	-	SNA
Laughing Gull	<i>Leucophaeus atricilla</i>	-	-	SHB
Least Flycatcher	<i>Empidonax minimus</i>	-	-	S4S5B,S5M
Least Sandpiper*	<i>Calidris minutilla</i>	-	-	S1B,S4M
Lesser Black-backed Gull	<i>Larus fuscus</i>	-	-	SNA
Lesser Scaup	<i>Aythya affinis</i>	-	-	SUM
Lesser Yellowlegs*	<i>Tringa flavipes</i>	-	-	S3M
Lincoln's Sparrow	<i>Melospiza lincolnii</i>	-	-	S4B,S5M
Little Egret	<i>Egretta garzetta</i>	-	-	SNA
Little Stint	<i>Calidris minuta</i>	-	-	SNA
Long-eared Owl*	<i>Asio otus</i>	-	-	S2S3
Long-tailed Duck	<i>Clangula hyemalis</i>	-	-	S5N
Magnificent Frigatebird	<i>Fregata magnificens</i>	-	-	SNA
Magnolia Warbler	<i>Setophaga magnolia</i>	-	-	S5B
Mallard	<i>Anas platyrhynchos</i>	-	-	S5B,S5N
Mallard X American Black Duck Hybrid		-	-	
Manx Shearwater*	<i>Puffinus puffinus</i>	-	-	S1?B
Marbled Godwit	<i>Limosa fedoa</i>	-	-	SNA
Marsh Wren*	<i>Cistothorus palustris</i>	-	-	S1B
Merlin	<i>Falco columbarius</i>	-	-	S5B
Mourning Dove	<i>Zenaida macroura</i>	-	-	S5
Mourning Warbler	<i>Geothlypis Philadelphia</i>	-	-	S4B,S5M
Nashville Warbler	<i>Oreothlypis ruficapilla</i>	-	-	S4B,S5M
Nelson's Sparrow*	<i>Ammodramus nelson</i>	-	-	S3S4B
Northern Cardinal	<i>Cardinalis cardinalis</i>	-	-	S4

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Common Name	Scientific Name	Ranking		
		SARA	NS ESA	AC CDC (2022)
Northern Flicker	<i>Colaptes auratus</i>	-	-	S5B
Northern Gannet	<i>Morus bassanus</i>	-	-	SHB
Northern Harrier*	<i>Circus hudsonicus</i>	-	-	S4B,S4S5M
Northern Mockingbird*	<i>Mimus polyglottos</i>	-	-	S1B
Northern Parula	<i>Setophaga americana</i>	-	-	S5B
Northern Pintail*	<i>Anas acuta</i>	-	-	S1B,SUM
Northern Shoveler*	<i>Spatula clypeata</i>	-	-	S2B,SUM
Northern Shrike*	<i>Lanius borealis</i>	-	-	S3S4N
Northern Waterthrush	<i>Parkesia noveboracensis</i>	-	-	S4B,S5M
<b>Olive-sided Flycatcher</b>	<b><i>Contopus cooperi</i></b>	<b>T</b>	<b>T</b>	<b>S3B</b>
Orange-crowned Warbler	<i>Oreothlypis celata</i>	-	-	SUM
Orchard Oriole	<i>Icterus spurius</i>	-	-	SNA
Osprey	<i>Pandion haliaetus</i>	-	-	S4S5B,S5M
Ovenbird	<i>Seiurus aurocapilla</i>	-	-	S5B
Palm Warbler	<i>Setophaga palmarum</i>	-	-	S5B
Parasitic Jaeger	<i>Stercorarius parasiticus</i>	-	-	SNA
Pectoral Sandpiper*	<i>Calidris melanotos</i>	-	-	S3M
<b>Peregrine Falcon</b>	<b><i>Falco peregrinus pop. 1</i></b>	<b>SC</b>	<b>V</b>	<b>S1B,SUM</b>
Philadelphia Vireo*	<i>Vireo philadelphicus</i>	-	-	S2?B,SUM
Pied-billed Grebe	<i>Podilymbus Podiceps</i>	-	-	S4B
Pileated Woodpecker	<i>Dryocopus pileatus</i>	-	-	S5
Pine Grosbeak*	<i>Pinicola enucleator</i>	-	-	S3B,S5N,S5M
Pine Siskin*	<i>Spinus pinus</i>	-	-	S3
Pine Warbler*	<i>Setophaga pinus</i>	-	-	S2S3B,S4S5M
<b>Piping Plover - melodus ssp</b>	<b><i>Charadrius melodus melodus</i></b>	<b>E</b>	<b>E</b>	<b>S1B</b>
Pomarine Jaeger	<i>Stercorarius pomarinus</i>	-	-	SNA
Prairie Warbler	<i>Setophaga discolor</i>	-	-	SNA
<b>Prothonotary Warbler</b>	<b><i>Protonotaria citrea</i></b>	<b>E</b>	<b>-</b>	<b>SNA</b>
Purple Finch*	<i>Haemorhous purpureus</i>	-	-	S4S5B,S3S4N,S5M
Purple Gallinule	<i>Porphyrio martinicus</i>	-	-	SNA
Purple Martin	<i>Progne subis</i>	-	-	SHB
Purple Sandpiper*	<i>Calidris maritima</i>	-	-	S3S4N
Razorbill*	<i>Alca torda</i>	-	-	S2B
Red Crossbill*	<i>Loxia curvirostra</i>	-	-	S3S4
<b>Red Knot</b>	<b><i>Calidris canutus rufa</i></b>	<b>E</b>	<b>E</b>	<b>S2M</b>
Red Phalarope*	<i>Phalaropus fulicarius</i>	-	-	S2S3M

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Common Name	Scientific Name	Ranking		
		SARA	NS ESA	AC CDC (2022)
Red-bellied Woodpecker	<i>Melanerpes carolinus</i>	-	-	SU
Red-breasted Merganser*	<i>Mergus serrator</i>	-	-	S3S4B,S5M,S5N
Red-breasted Nuthatch*	<i>Sitta canadensis</i>	-	-	S4S5
Red-eyed Vireo	<i>Vireo olivaceus</i>	-	-	S5B
Redhead	<i>Aythya americana</i>	-	-	SHB
Red-necked Grebe	<i>Podiceps grisegena</i>	-	-	S4N
<b>Red-necked Phalarope</b>	<b><i>Phalaropus lobatus</i></b>	<b>SC</b>	<b>-</b>	<b>S2S3M</b>
Red-tailed Hawk	<i>Buteo jamaicensis</i>	-	-	S5
Red-throated Loon	<i>Gavia stellata</i>	-	-	S4N,S5M
Red-winged Blackbird	<i>Agelaius phoeniceus</i>	-	-	S4B
Ring-billed Gull	<i>Larus delawarensis</i>	-	-	SUB,S5N
Ring-necked Duck	<i>Aythya collaris</i>	-	-	S5B
Ring-necked Pheasant	<i>Phasianus colchicus</i>	-	-	SNA
Rock Pigeon	<i>Columba livia</i>	-	-	SNA
Rose-breasted Grosbeak*	<i>Pheucticus ludovicianus</i>	-	-	S3B
Ross' Goose	<i>Anser rossii</i>	-	-	SNA
Rough-legged Hawk*	<i>Buteo lagopus</i>	-	-	S3N
Royal Tern	<i>Thalasseus maximus</i>	-	-	SNA
Ruby-crowned Kinglet*	<i>Regulus calendula</i>	-	-	S4B,S5M
Ruby-throated Hummingbird	<i>Archilochus colubris</i>	-	-	S5B
Ruddy Duck*	<i>Oxyura jamaicensis</i>	-	-	S1B
Ruddy Turnstone*	<i>Arenaria interpres</i>	-	-	S3M
Ruff	<i>Calidris pugnax</i>	-	-	SNA
Ruffed Grouse	<i>Bonasa umbellus</i>	-	-	S5
<b>Rusty Blackbird</b>	<b><i>Euphagus carolinus</i></b>	<b>SC</b>	<b>E</b>	<b>S2B</b>
Sanderling*	<i>Calidris alba</i>	-	-	S2N,S3M
Sandwich Tern	<i>Thalasseus sandvicensis</i>	-	-	SNA
Savannah Sparrow	<i>Passerculus sandwichensis</i>	-	-	S4S5B,S5M
Scarlet Tanager*	<i>Piranga olivacea</i>	-	-	S2B,SUM
Seaside Sparrow	<i>Ammospiza maritima</i>	-	-	SNA
Semipalmated Plover*	<i>Charadrius semipalmatus</i>	-	-	S1B,S4M



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Common Name	Scientific Name	Ranking		
		SARA	NS ESA	AC CDC (2022)
Semipalmated Sandpiper*	<i>Calidris pusilla</i>	-	-	S3M
Sharp-shinned Hawk	<i>Accipiter striatus</i>	-	-	S5
Short-billed Dowitcher*	<i>Limnodromus griseus</i>	-	-	S3M
<b>Short-eared Owl</b>	<b><i>Asio flammeus</i></b>	<b>SC</b>	-	<b>S1B</b>
Snow Bunting	<i>Plectrophenax nivalis</i>	-	-	S5N
Snow Goose	<i>Anser caerulescens</i>	-	-	SNA
Snowy Owl	<i>Bubo scandiacus</i>	-	-	SNA
Solitary Sandpiper*	<i>Tringa solitaria</i>	-	-	SUB,S3S4M
Song Sparrow	<i>Melospiza melodia</i>	-	-	S5B
Sooty Shearwater	<i>Ardenna grisea</i>	-	-	S5N
Sora	<i>Porzana Carolina</i>	-	-	S5B
Spotted Sandpiper*	<i>Actitis macularius</i>	-	-	S3S4B,S5M
Spruce Grouse	<i>Falcapennis canadensis</i>	-	-	S4
Stilt Sandpiper	<i>Calidris Himantopus</i>	-	-	SNA
Summer Tanager	<i>Piranga rubra</i>	-	-	SNA
Surf Scoter	<i>Melanitta perspicillata</i>	-	-	S4N,SUM
Swainson's Thrush*	<i>Catharus ustulatus</i>	-	-	S4B,S5M
Swainson's Warbler	<i>Limnothlypis swainsonii</i>	-	-	SNA
Swamp Sparrow	<i>Melospiza georgiana</i>	-	-	S5B
Tennessee Warbler*	<i>Oreothlypis peregrina</i>	-	-	S3S4B,S5M
Thick-billed Murre	<i>Uria lomvia</i>	-	-	S5N
Townsend's Warbler	<i>Setophaga townsendi</i>	-	-	SNA
Tree Swallow	<i>Tachycineta bicolor</i>	-	-	S4B
Tufted Duck	<i>Aythya fuligula</i>	-	-	SNA
Turkey Vulture*	<i>Cathartes aura</i>	-	-	S2S3B,S4S5M
Upland Sandpiper	<i>Bartramia longicauda</i>	-	-	SNA
Veery*	<i>Catharus fuscescens</i>	-	-	S4B
Vesper Sparrow*	<i>Poocetes gramineus</i>	-	-	S1S2B,SUM
Virginia Rail*	<i>Rallus limicola</i>	-	-	S2S3B
Warbling Vireo*	<i>Vireo gilvus</i>	-	-	S1B,SUM
Western Kingbird	<i>Tyrannus verticalis</i>	-	-	SNA
Western Sandpiper	<i>Calidris mauri</i>	-	-	SNA
White-breasted Nuthatch	<i>Sitta carolinensis</i>	-	-	S4
White-crowned Sparrow	<i>Zonotrichia leucophrys</i>	-	-	SUM
White-eyed Vireo	<i>Vireo griseus</i>	-	-	SNA
White-rumped Sandpiper*	<i>Calidris fuscicollis</i>	-	-	S4M

**Table C.1. Total number of birds observed at Hartlen Point between 1983 and 2022 as reported by eBird (Bold denotes SAR).**

Common Name	Scientific Name	Ranking		
		SARA	NS ESA	AC CDC (2022)
White-throated Sparrow	<i>Zonotrichia albicollis</i>	-	-	S4S5B,S5M
White-winged Crossbill	<i>Loxia leucoptera</i>	-	-	S4S5
White-winged Scoter	<i>Melanitta deglandi</i>	-	-	S4N,SUM
Willet*	<i>Tringa semipalmata</i>	-	-	S3B
Willow Flycatcher*	<i>Empidonax traillii</i>	-	-	S2B
Wilson's Phalarope	<i>Phalaropus tricolor</i>	-	-	SNA
Wilson's Snipe*	<i>Gallinago delicata</i>	-	-	S3B,S5M
Wilson's Warbler*	<i>Cardellina pusilla</i>	-	-	S3B,S5M
Winter Wren*	<i>Troglodytes hiemalis</i>	-	-	S5B
Wood Duck	<i>Aix sponsa</i>	-	-	S5B
Worm-eating Warbler	<i>Helmitheros vermivorum</i>	-	-	SNA
Yellow Warbler	<i>Setophaga petechia</i>	-	-	S5B
Yellow-bellied Flycatcher*	<i>Empidonax flaviventris</i>	-	-	S4B,S5M
Yellow-bellied Sapsucker	<i>Sphyrapicus varius</i>	-	-	S5B
Yellow-billed Cuckoo	<i>Coccyzus americanus</i>	-	-	SNA
<b>Yellow-breasted Chat</b>	<b><i>Icteria virens</i></b>	<b>E</b>	-	<b>SNA</b>
Yellow-crowned Night-heron	<i>Nyctanassa violacea</i>	-	-	SNA
Yellow-headed Blackbird	<i>Xanthocephalus xanthocephalus</i>	-	-	SNA
Yellow-rumped Warbler	<i>Setophaga coronate</i>	-	-	S5B
Yellow-throated Vireo	<i>Vireo flavifrons</i>	-	-	SNA
Yellow-throated Warbler	<i>Setophaga dominica</i>	-	-	SNA

**Table C.2. SAR/SoCC Birds Reported at Hartlen Point (1983-2022), Population Status, and Site Suitability (SAR listed in bold text).**

Common Name	Scientific Name	2022 Status	Source of Observation	Population Status in Nova Scotia	Site Habitat Suitability
<b>Acadian Flycatcher</b>	<i><b>Empidonax virescens</b></i>	COSEWIC Endangered SARA Endangered NS ESA Not listed SNA: Not Applicable	eBird observations (September)	Accidental Transient	Foraging
<b>Bank Swallow</b>	<i><b>Riparia riparia</b></i>	COSEWIC Threatened SARA Threatened NS ESA Endangered S2B: Imperilled – Breeding	AC CDC Data Report (2021)  eBird observations (May-September)	Breeding resident	Breeding Foraging
<b>Barn Swallow</b>	<i><b>Hirundo rustica</b></i>	COSEWIC Special Concern SARA Threatened NS ESA Endangered S3B: Vulnerable – Breeding	eBird observations (April-November)	Breeding resident	Breeding Foraging
<b>Barrow's Goldeneye</b>	<i><b>Bucephala islandica</b></i> <b>(Eastern pop.)</b>	COSEWIC Special Concern SARA Special Concern NS ESA Not at Risk S1N, SUM: Critically Imperilled – Nonbreeding/ Status Unknown-Migrant	eBird observations (December – March)	Nonbreeding resident	Foraging
<b>Bobolink</b>	<i><b>Dolichonyx oryzivorus</b></i>	COSEWIC Special Concern SARA Threatened NS ESA Vulnerable S3B: Vulnerable– Breeding	eBird observations (May to June and August to November)	Breeding resident	Breeding Foraging

Table C.2. SAR/SoCC Birds Reported at Hartlen Point (1983-2022), Population Status, and Site Suitability (SAR listed in bold text).

Common Name	Scientific Name	2022 Status	Source of Observation	Population Status in Nova Scotia	Site Habitat Suitability
<b>Buff-breasted Sandpiper</b>	<b><i>Calidris subruficollis</i></b>	COSEWIC Special Concern SARA Special Concern NS ESA Not at Risk SNA: Not Applicable	AC CDC Data Report (2021)  eBird observations (August to September)	Accidental migrant	Foraging
<b>Canada Warbler</b>	<b><i>Cardellina canadensis</i></b>	COSEWIC Special Concern SARA Threatened NS ESA Endangered S3B: Vulnerable- Breeding	AC CDC Data Report (2021)  eBird observations (May and August to September)	Breeding resident	Breeding Foraging
<b>Cerulean Warbler</b>	<b><i>Setophaga cerulea</i></b>	COSEWIC Endangered SARA Endangered NS ESA Not at Risk SNA: Not Applicable	eBird observations (September to October)	Accidental migrant	Foraging
<b>Chimney Swift</b>	<b><i>Chaetura pelagica</i></b>	COSEWIC Threatened SARA Threatened NS ESA Endangered S2S3B: Imperilled-Vulnerable- Breeding/ Critically Imperilled Migrant	eBird observations (August to September)	Breeding resident	Foraging
<b>Common Nighthawk</b>	<b><i>Chordeiles minor</i></b>	COSEWIC Special Concern SARA Threatened NS ESA Threatened S3B: Vulnerable- Breeding	eBird observations (August to September)	Breeding resident	Breeding Foraging
<b>Eastern Wood-Pewee</b>	<b><i>Contopus virens</i></b>	COSEWIC Special Concern SARA Special Concern NS ESA Vulnerable	eBird observations (June to October)	Breeding resident	Breeding Foraging

**Table C.2. SAR/SoCC Birds Reported at Hartlen Point (1983-2022), Population Status, and Site Suitability (SAR listed in bold text).**

Common Name	Scientific Name	2022 Status	Source of Observation	Population Status in Nova Scotia	Site Habitat Suitability
		S3S4B: Vulnerable/Apparently Secure – Breeding			
<b>Evening Grosbeak</b>	<b><i>Coccothraustes vespertinus</i></b>	COSEWIC Special Concern SARA Special Concern NS ESA Vulnerable S3S4B, S3N: Vulnerable/Apparently Secure – Breeding, Vulnerable – Nonbreeding	eBird observations (October and December)	Breeding resident	Breeding (possible, though unlikely) Foraging
<b>Golden-winged Warbler</b>	<b><i>Vermivora chrysoptera</i></b>	COSEWIC Threatened SARA Threatened NS ESA Not at Risk SNA: Not Applicable	eBird observations (September)	Accidental migrant	Foraging
<b>Harlequin Duck – Eastern Population</b>	<b><i>Histrionicus histrionicus</i> pop. 1</b>	COSEWIC Special Concern SARA Special Concern NS ESA Endangered S2S3N, SUM: Imperiled/ Vulnerable – Nonbreeding/ Status Unknown-Migrant	eBird observations (October and December)	Nonbreeding resident	Foraging
<b>Lark Bunting</b>		COSEWIC Threatened SARA Threatened NS ESA Not listed SN: Not Applicable	eBird observations (October)	Accidental Transient	Foraging
<b>Olive-sided Flycatcher</b>	<b><i>Contopus cooperi</i></b>	COSEWIC Special Concern SARA Threatened NS ESA Threatened S3B: Vulnerable -Breeding	eBird observations (August to September)	Breeding resident	Foraging

Table C.2. SAR/SoCC Birds Reported at Hartlen Point (1983-2022), Population Status, and Site Suitability (SAR listed in bold text).

Common Name	Scientific Name	2022 Status	Source of Observation	Population Status in Nova Scotia	Site Habitat Suitability
<b>Peregrine Falcon</b>	<b><i>Falco peregrinus</i></b> pop. 1	COSEWIC Not at Risk SARA Special Concern NS ESA Vulnerable S1B, SUM: Critically Imperiled – Breeding, Status Unknown-Migrant	eBird observations (July to April)	Breeding resident	Foraging
<b>Piping Plover – melodus ssp.</b>	<b><i>Charadrius melodus melodus</i></b>	COSEWIC Endangered SARA Endangered NS ESA Endangered S1B: Critically Imperiled – Breeding	eBird observations (May)	Breeding resident	Foraging
<b>Prothonotary Warbler</b>	<b><i>Protonotaria citrea</i></b>	COSEWIC Endangered SARA Endangered NS ESA Not at Risk SNA: Not Applicable	eBird observations (May to October)	Accidental migrant	Foraging
<b>Red Knot</b>	<b><i>Calidris canutus rufa</i></b>	COSEWIC Endangered SARA Endangered NS ESA Endangered S2M: Imperiled – Migrant	eBird observations (May and August to November)	Spring/fall migrant	Foraging
<b>Red-necked Phalarope</b>	<b><i>Phalaropus lobatus</i></b>	COSEWIC Special Concern SARA Special Concern NS ESA Not at Risk S2S3M: Imperiled/Vulnerable – Migrant	eBird observations (May and July to October)	Spring/fall migrant	Foraging
<b>Rusty Blackbird</b>	<b><i>Euphagus carolinus</i></b>	COSEWIC Special Concern SARA Special Concern NS ESA Endangered S2B: Imperiled – Breeding	eBird observations (June and October to November)	Breeding resident	Breeding (possible, though unlikely) Foraging

**Table C.2. SAR/SoCC Birds Reported at Hartlen Point (1983-2022), Population Status, and Site Suitability (SAR listed in bold text).**

Common Name	Scientific Name	2022 Status	Source of Observation	Population Status in Nova Scotia	Site Habitat Suitability
<b>Short-eared Owl</b>	<b><i>Asio flammeus</i></b>	COSEWIC Threatened SARA Special Concern NS ESA Not at Risk S1B: Critically Imperiled – Breeding	AC CDC Data Report (2021)  eBird observations (February to May and October to December)	Breeding resident	Breeding Foraging
<b>Yellow-breasted Chat</b>	<b><i>Icteria virens</i></b>	COSEWIC Endangered SARA Endangered NS ESA Not at Risk SNA: Not Applicable	eBird observations (August to December)	Accidental migrant	Foraging
American Bittern	<i>Botaurus lentiginosus</i>	S3S4B, S4S5M: Vulnerable/Apparently Secure – Breeding / Apparently Secure/Secure - Migrant	eBird observations (May to September)	Breeding resident	Breeding Foraging
American Coot	<i>Fulica americana</i>	S1B: Critically Imperiled – Breeding	eBird observations (October to November)	Breeding resident	Foraging
American Golden-Plover	<i>Pluvialis dominica</i>	S2S3M: Imperiled/Vulnerable – Migrant	AC CDC Data Report (2021)  eBird observations (August to October)	Spring/fall migrant	Foraging
American Kestrel	<i>Falco sparverius</i>	S3B, S4S5M: Vulnerable – Breeding/ Apparently Secure/Secure-Migrant	AC CDC Data Report (2021)  eBird observations (April to May and August to January)	Breeding resident	Breeding Foraging

**Table C.2. SAR/SoCC Birds Reported at Hartlen Point (1983-2022), Population Status, and Site Suitability (SAR listed in bold text).**

Common Name	Scientific Name	2022 Status	Source of Observation	Population Status in Nova Scotia	Site Habitat Suitability
American Robin	<i>Turdus migratorius</i>	S5B, S3N: Secure – Breeding, Vulnerable – Nonbreeding	eBird observations (January to December)	Breeding resident	Breeding Foraging
Arctic Tern	<i>Sterna paradisaea</i>	S3B: Vulnerable – Breeding	eBird observations (May and July to September)	Breeding resident	Foraging
Atlantic Puffin	<i>Fratercula arctica</i>	S2B: Imperilled – Breeding	eBird observations (September to October)	Breeding resident	Foraging
Baltimore Oriole	<i>Icterus galbula</i>	S2S3B, SUM: Imperilled/Vulnerable – Breeding /Status Unknown- Migrant	eBird observations (May and August to November)	Breeding resident	Breeding Foraging
Bay-breasted Warbler	<i>Setophaga castanea</i>	S3S4B, S4S5M: Vulnerable/Apparently Secure – Breeding / Apparently Secure-Secure - Migrant	eBird observations (August to November)	Breeding resident	Breeding Foraging
Black Tern	<i>Chlidonias niger</i>	S3B: Vulnerable – Breeding	eBird observations (September)	Breeding resident	Foraging
Black-bellied Plover	<i>Pluvialis squatarola</i>	S3M: Vulnerable – Migrant	AC CDC Data Report (2021)  eBird observations (April to May and August to December)	Spring/fall migrant	Foraging
Black-billed Cuckoo	<i>Coccyzus erythrophthalmus</i>	S3B: Vulnerable – Breeding	eBird observations (September to October)	Breeding resident	Foraging
Black-headed Gull	<i>Chroicocephalus ridibundus</i>	S3B: Vulnerable – Nonbreeding	AC CDC Data Report (2021)	Nonbreeding resident	Foraging



**Table C.2. SAR/SoCC Birds Reported at Hartlen Point (1983-2022), Population Status, and Site Suitability (SAR listed in bold text).**

Common Name	Scientific Name	2022 Status	Source of Observation	Population Status in Nova Scotia	Site Habitat Suitability
			eBird observations (August and October to April)		
Black-legged Kittiwake	<i>Rissa tridactyla</i>	S2S3B: Imperilled/ Vulnerable – Breeding	eBird observations (April to May and August to February)	Breeding resident	Foraging
Blackpoll Warbler	<i>Setophaga striata</i>	S3B, S5M: Vulnerable – Breeding, Secure-Migrant	eBird observations (May to June and August to November)	Breeding resident	Breeding (possible, though unlikely) Foraging
Blue-winged Teal	<i>Spatula discors</i>	S3B: Vulnerable – Breeding	AC CDC Data Report (2021)  eBird observations (April to May and September to December)	Breeding resident	Breeding Foraging
Boreal Chickadee	<i>Poecile hudsonicus</i>	S3: Vulnerable	AC CDC Data Report (2021)  eBird observations (February to June and August to December)	Year-round resident	Breeding Foraging
Brant	<i>Branta bernicla</i>	S3M: Vulnerable – Migrant	eBird observations (February to April and November to December)	Spring/fall migrant	Foraging
Brown Thrasher	<i>Toxostoma rufum</i>	S1B: Critically Imperilled – Breeding	eBird observations (May and October)	Breeding resident	Breeding Foraging

**Table C.2. SAR/SoCC Birds Reported at Hartlen Point (1983-2022), Population Status, and Site Suitability (SAR listed in bold text).**

Common Name	Scientific Name	2022 Status	Source of Observation	Population Status in Nova Scotia	Site Habitat Suitability
Brown-headed Cowbird	<i>Molothrus ater</i>	S2B: Imperilled – Breeding	eBird observations (March to November)	Breeding resident	Breeding Foraging
Canada Jay	<i>Perisoreus canadensis</i>	S3: Vulnerable	AC CDC Data Report (2021)  eBird observations (March and October to November)	Year-round resident	Breeding Foraging
Cape May Warbler	<i>Setophaga tigrina</i>	S3B, SUM S3: Vulnerable – Breeding/ Status Unknown-Migrant	eBird observations (May to June and August to October)	Breeding resident	Breeding Foraging
Cliff Swallow	<i>Petrochelidon pyrrhonota</i>	S2S3B: Imperilled/ Vulnerable – Breeding	eBird observations (June to July and September)	Breeding resident	Breeding Foraging
Common Eider	<i>Somateria mollissima</i>	S3B, S3M,S3N: Vulnerable – Breeding, Vulnerable- Migrant, Vulnerable – Non-breeding	AC CDC Data Report (2021)  eBird observations (January to December)	Year-round resident	Breeding Foraging
Common Goldeneye	<i>Bucephala clangula</i>	S2S3B,S5N,S5M: Imperilled / Vulnerable – Breeding, Secure – Nonbreeding, Secure-Migrant	AC CDC Data Report (2021)  eBird observations (October to May)	Breeding resident	Foraging
Common Murre	<i>Uria aalge</i>	S1?B: Critically Imperilled (Uncertain) – Breeding	eBird observations (January and April)	Unknown breeding/yea r-round,	Foraging

**Table C.2. SAR/SoCC Birds Reported at Hartlen Point (1983-2022), Population Status, and Site Suitability (SAR listed in bold text).**

Common Name	Scientific Name	2022 Status	Source of Observation	Population Status in Nova Scotia	Site Habitat Suitability
				nonbreeding resident	
Common Tern	<i>Sterna hirundo</i>	S3B: Vulnerable – Breeding	AC CDC Data Report (2021)  eBird observations (May to November)	Breeding resident	Breeding Foraging
Cooper’s Hawk	<i>Accipiter cooperii</i>	S1?B,SUN,SUM: Critically Imperiled (Uncertain) – Breeding , Status Unknown-Non-breeding, Status Unknown – Migrant	eBird observations (September to January)	Breeding resident	Breeding Foraging
Eastern Bluebird	<i>Sialia sialis</i>	S3B: Vulnerable – Breeding	eBird observations (May)	Breeding resident	Breeding Foraging
Eastern Kingbird	<i>Tyrannus tyrannus</i>	S3B: Vulnerable – Breeding	eBird observations (May to June and August to October)	Breeding resident	Breeding Foraging
Fox Sparrow	<i>Passerella iliaca</i>	S3S4B, S5M: Vulnerable/Apparently Secure – Breeding, Secure - Migrant	eBird observations (April to May and August to October)	Breeding resident	Foraging
Gadwall	<i>Mareca strepera</i>	S2B, SUM: S2B: Imperiled – Breeding, Status Unknown – Migrant	eBird observations (March to April, August, and December to January)	Breeding resident	Breeding Foraging
Great Cormorant	<i>Phalacrocorax carbo</i>	S2S3B, S2S3N S2S3: Imperiled/Vulnerable – Breeding, Imperiled/ Vulnerable-Non-breeding	eBird observations (August to May)	Year-round resident	Foraging

**Table C.2. SAR/SoCC Birds Reported at Hartlen Point (1983-2022), Population Status, and Site Suitability (SAR listed in bold text).**

Common Name	Scientific Name	2022 Status	Source of Observation	Population Status in Nova Scotia	Site Habitat Suitability
Greater Yellowlegs	<i>Tringa melanoleuca</i>	S3B, S4M: Vulnerable – Breeding, Apparently Secure – Migrant	AC CDC Data Report (2021)  eBird observations (April to November)	Breeding resident	Breeding Foraging
Horned Grebe	<i>Podiceps auritus</i>	COSEWIC Not at Risk SARA Not at Risk NS ESA Not at Risk S3N, SUM: Vulnerable-Nonbreeding/ Status Unknown – Migrant	eBird observations (September to June)	Nonbreeding resident/Spring/fall migrant	Foraging
Hudsonian Godwit	<i>Limosa haemastica</i>	COSEWIC Threatened SARA Not at Risk NS ESA Not at Risk S2S3M: Imperiled/Vulnerable – Migrant	AC CDC Data Report (2021)  eBird observations (September to October)	Spring/fall migrant	Foraging
Hudsonian Whimbrel	<i>Numenius phaeopus hudsonicus</i>	S2S3M: Imperiled/Vulnerable – Migrant	AC CDC Data Report (2021)  eBird observations (July to October)	Spring/fall migrant	Foraging
Indigo Bunting	<i>Passerina cyanea</i>	S1?B, SUM: Critically Imperiled (Uncertain) – Breeding, Status Unknown – Migrant	eBird observations (May and August to November)	Breeding resident	Breeding Foraging
Killdeer	<i>Charadrius vociferus</i>	S3B: Vulnerable – Breeding	AC CDC Data Report (2021)	Breeding resident	Breeding Foraging

**Table C.2. SAR/SoCC Birds Reported at Hartlen Point (1983-2022), Population Status, and Site Suitability (SAR listed in bold text).**

Common Name	Scientific Name	2022 Status	Source of Observation	Population Status in Nova Scotia	Site Habitat Suitability
			eBird observations (July to October and (December to May)		
Lapland Longspur	<i>Calcarius lapponicus</i>	S3?N,SUM: Vulnerable (Uncertain) – Nonbreeding, Status Unknown – Migrant	AC CDC Data Report (2021)  eBird observations (January to February and September to November)	Nonbreeding resident	Foraging
Least Sandpiper	<i>Calidris minutilla</i>	S1B, S4M: Critically Imperiled – Breeding, Apparently Secure – Migrant	AC CDC Data Report (2021)  eBird observations (May and July to November)	Breeding resident	Breeding (possible, though unlikely) Foraging
Lesser Yellowlegs	<i>Tringa flavipes</i>	S3M: Vulnerable – Migrant	AC CDC Data Report (2021)  eBird observations (April to October)	Spring/fall migrant	Breeding Foraging
Long-eared Owl	<i>Asio otus</i>	S2S3: Imperiled/Vulnerable	AC CDC Data Report (2021)  eBird observations (December)	Year-round resident	Breeding (possible, though unlikely) Foraging
Manx Shearwater	<i>Puffinus puffinus</i>	S1?B: Critically Imperiled (Uncertain) – Breeding	eBird observations (October)	Breeding resident	Foraging

**Table C.2. SAR/SoCC Birds Reported at Hartlen Point (1983-2022), Population Status, and Site Suitability (SAR listed in bold text).**

Common Name	Scientific Name	2022 Status	Source of Observation	Population Status in Nova Scotia	Site Habitat Suitability
Marsh Wren	<i>Cistothorus palustris</i>	S1B: Critically Imperiled – Breeding	eBird observations (October and December)	Breeding resident	Breeding Foraging
Nelson’s Sparrow	<i>Ammospiza nelsoni</i>	S3S4B: Vulnerable/Apparently Secure – Breeding	eBird observations (May to November)	Breeding resident	Breeding Foraging
Northern Mockingbird	<i>Mimus polyglottos</i>	S1B: Critically Imperiled – Breeding	eBird observations (September to October)	Breeding resident	Breeding Foraging
Northern Pintail	<i>Anas acuta</i>	S1B, SUM S1B: Critically Imperiled – Breeding, Status Unknown – Migrant	eBird observations (September to February)	Breeding resident	Breeding Foraging
Northern Shoveler	<i>Spatula clypeata</i>	S2B, SUM: Imperiled – Breeding, Status Unknown – Migrant	AC CDC Data Report (2021) eBird observations (January, May to June and September)	Breeding resident	Breeding Foraging
Northern Shrike	<i>Lanius borealis</i>	S3S4N: Vulnerable/Apparently Secure – Nonbreeding	eBird observations (February to April and October)	Nonbreeding resident	Foraging
Pectoral Sandpiper	<i>Calidris melanotos</i>	S3M: Vulnerable – Migrant	AC CDC Data Report (2021) eBird observations (July to November)	Spring/fall migrant	Foraging
Philadelphia Vireo	<i>Vireo philadelphicus</i>	S2?B,SUM: Imperiled (Uncertain) – Breeding, Status Unknown -Migrant	eBird observations (August to October)	Breeding resident	Breeding Foraging

**Table C.2. SAR/SoCC Birds Reported at Hartlen Point (1983-2022), Population Status, and Site Suitability (SAR listed in bold text).**

Common Name	Scientific Name	2022 Status	Source of Observation	Population Status in Nova Scotia	Site Habitat Suitability
Pine Grosbeak	<i>Pinicola enucleator</i>	S3B, S5N,S5M: Vulnerable – Breeding, Secure – Nonbreeding, Secure-Migrant	eBird observations (November to January)	Breeding resident	Breeding Foraging
Pine Siskin	<i>Spinus pinus</i>	S3: Vulnerable	eBird observations (May and August to February)	Year-round resident	Breeding Foraging
Pine Warbler	<i>Setophaga pinus</i>	S2S3B, S4S5M: Imperilled/Vulnerable – Breeding, Apparently Secure/Secure – Migrant	eBird observations (September to December)	Breeding resident	Breeding Foraging
Purple Finch	<i>Haemorhous purpureus</i>	S4S5B, S3S4N, S5M: Apparently Secure/Secure – Breeding, Vulnerable/Apparently Secure – Nonbreeding, Secure-Migrant	eBird observations (January to December)	Breeding resident	Breeding Foraging
Purple Sandpiper	<i>Calidris maritima</i>	S3S4N: Vulnerable/Apparently Secure – Nonbreeding	AC CDC Data Report (2021)  eBird observations (April and November to February)	Nonbreeding resident	Foraging
Razorbill	<i>Alca torda</i>	S2B: Imperilled – Breeding	eBird observations (October to February)	Breeding resident	Foraging
Red Crossbill	<i>Loxia curvirostra</i>	S3S4: Vulnerable/Apparently Secure	eBird observations (July to November)	Year-round resident	Breeding Foraging
Red Phalarope	<i>Phalaropus fulicarius</i>	S2S3M: Imperilled/Vulnerable – Migrant	AC CDC Data Report (2021)	Spring/fall migrant	Foraging

**Table C.2. SAR/SoCC Birds Reported at Hartlen Point (1983-2022), Population Status, and Site Suitability (SAR listed in bold text).**

Common Name	Scientific Name	2022 Status	Source of Observation	Population Status in Nova Scotia	Site Habitat Suitability
			eBird observations (January and May to November)		
Red-breasted Merganser	<i>Mergus serrator</i>	S3S4B, S5M,S5N: Vulnerable/Apparently Secure – Breeding, Secure- Migrant, Secure – Nonbreeding	AC CDC Data Report (2021) eBird observations (July to May)	Breeding resident	Breeding Foraging
Rose-breasted Grosbeak	<i>Pheucticus ludovicianus</i>	S3B: Vulnerable – Breeding	eBird observations (April to May and September to October)	Breeding resident	Breeding Foraging
Rough-legged Hawk	<i>Buteo lagopus</i>	S3N: Vulnerable – Nonbreeding	AC CDC Data Report (2021) eBird observations (October to May)	Nonbreeding resident	Foraging
Ruddy Duck	<i>Oxyura jamaicensis</i>	S1B: Critically Imperiled – Breeding	eBird observations (October to November)	Breeding resident	Breeding Foraging
Ruddy Turnstone	<i>Arenaria interpres</i>	S3M: Vulnerable – Migrant	AC CDC Data Report (2021) eBird observations (May and July to November)	Spring/fall migrant	Foraging
Sanderling	<i>Calidris alba</i>	S2N, S3M: Imperiled – Nonbreeding, Vulnerable – Migrant	AC CDC Data Report (2021)	Spring/fall migrant	Foraging



**Table C.2. SAR/SoCC Birds Reported at Hartlen Point (1983-2022), Population Status, and Site Suitability (SAR listed in bold text).**

Common Name	Scientific Name	2022 Status	Source of Observation	Population Status in Nova Scotia	Site Habitat Suitability
			eBird observations (April to May and July to January)		
Scarlet Tanager	<i>Piranga olivacea</i>	S2B, SUM: Imperiled- Breeding, Status Unknown - Migrant	AC CDC Data Report (2021)  eBird observations (May and September to October)	Breeding resident	Foraging
Semipalmated Plover	<i>Charadrius semipalmatus</i>	S1B, S4M: Critically Imperiled - Breeding, Apparently Secure - Migrant	AC CDC Data Report (2021)  eBird observations (February, May, and July to November)	Breeding resident	Foraging
Semipalmated Sandpiper	<i>Calidris pusilla</i>	S3M: Vulnerable - Migrant	AC CDC Data Report (2021)  eBird observations (May and July to November)	Spring/fall migrant	Foraging
Short-billed Dowitcher	<i>Limnodromus griseus</i>	S3M: Vulnerable - Migrant	AC CDC Data Report (2021)  eBird observations (May and July to September)	Spring/fall migrant	Foraging

**Table C.2. SAR/SoCC Birds Reported at Hartlen Point (1983-2022), Population Status, and Site Suitability (SAR listed in bold text).**

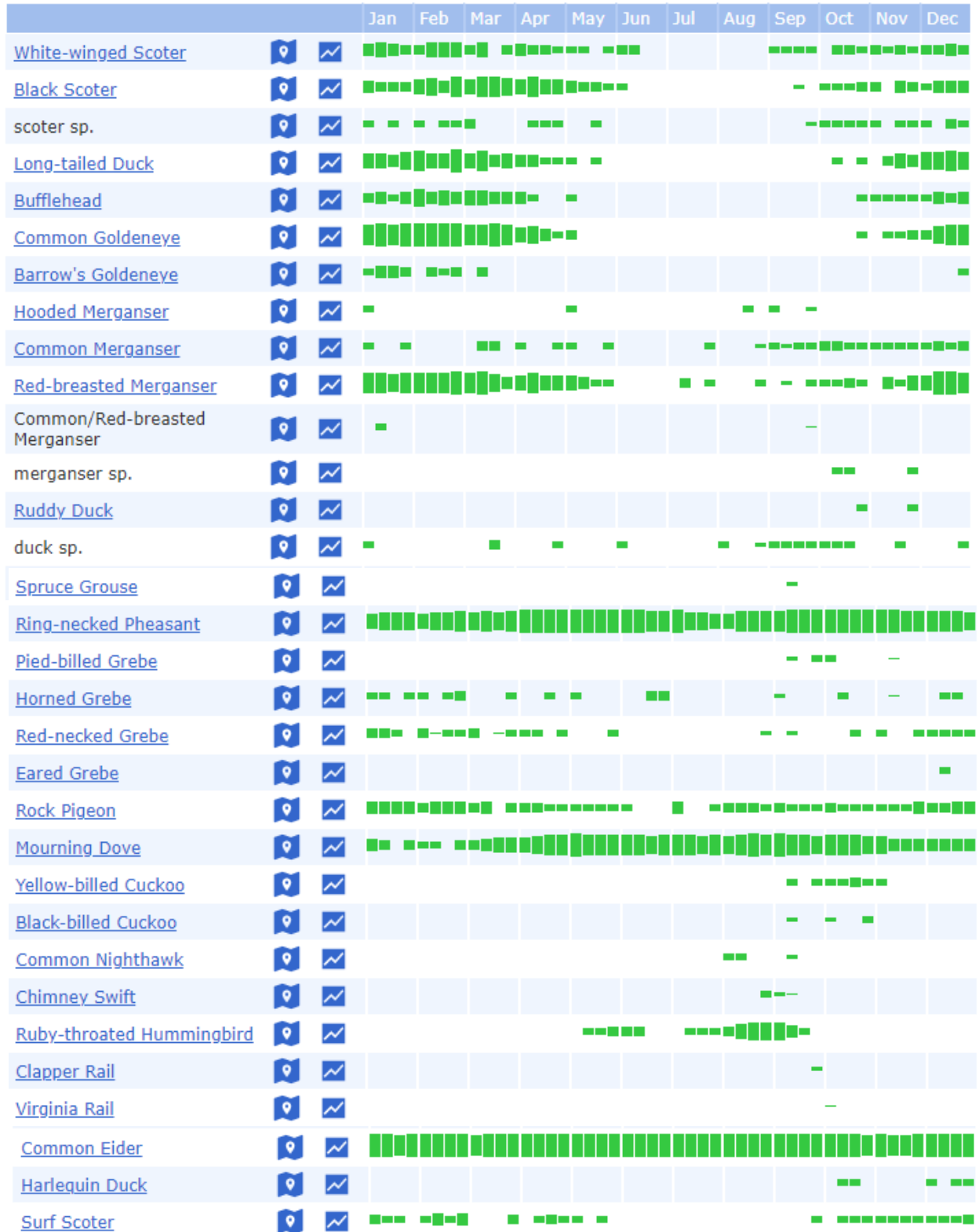
Common Name	Scientific Name	2022 Status	Source of Observation	Population Status in Nova Scotia	Site Habitat Suitability
Solitary Sandpiper	<i>Tringa solitaria</i>	SUB, S3S4M: Status Unknown – Breeding, Vulnerable/Apparently Secure – Migrant	eBird observations (April and August to October)	Breeding resident	Breeding Foraging
Spotted Sandpiper	<i>Actitis macularius</i>	S3S4B, S5M: Vulnerable/Apparently Secure – Breeding, Secure-Migrant	AC CDC Data Report (2021)  eBird observations (January and May to November)	Breeding resident	Breeding Foraging
Tennessee Warbler	<i>Oreothlypis peregrina</i>	S3S4B, S5M: Vulnerable/Apparently Secure – Breeding, Secure-Migrant	eBird observations (June and August to October)	Breeding resident	Breeding (possible, though unlikely) Foraging
Turkey Vulture	<i>Cathartes aura</i>	S2S3B, S4S5M: Imperilled/Vulnerable – Breeding, Apparently Secure/Secure-Migrant	eBird observations (April to May and September to December)	Breeding resident	Foraging
Vesper Sparrow	<i>Pooecetes gramineus</i>	S1S2B, SUM: Critically Imperilled/Imperilled – Breeding, Status Unknown – Migrant	eBird observations (August)	Breeding resident	Breeding Foraging
Virginia Rail	<i>Rallus limicola</i>	S2S3B: Imperilled/Vulnerable – Breeding	eBird observations (October)	Breeding resident	Foraging
Warbling Vireo	<i>Vireo gilvus</i>	S1B, SUM: Critically Imperilled – Breeding, Status Unknown – Migrant	eBird observations (May and August to October)	Breeding resident	Breeding Foraging
Willet	<i>Tringa semipalmata</i>	S3B: Vulnerable – Breeding	AC CDC Data Report (2021)	Breeding resident	Breeding Foraging

**Table C.2. SAR/SoCC Birds Reported at Hartlen Point (1983-2022), Population Status, and Site Suitability (SAR listed in bold text).**

Common Name	Scientific Name	2022 Status	Source of Observation	Population Status in Nova Scotia	Site Habitat Suitability
			eBird observations (April to September)		
Willow Flycatcher	<i>Empidonax traillii</i>	S2B: Imperiled – Breeding	eBird observations (June)	Breeding resident	Breeding Foraging
Wilson’s Snipe	<i>Gallinago delicata</i>	S3B, S5M: Vulnerable – Breeding/ Secure – Migratory	AC CDC Data Report (2021) eBird observations (April to May and July to December)	Breeding resident	Breeding Foraging
Wilson’s Warbler	<i>Cardellina pusilla</i>	S3B, S5M: Vulnerable – Breeding/ Secure – Migratory	eBird observations (May to June and August to October)	Breeding resident	Breeding Foraging

Figure C.1. eBird Annual Avian Observation Bar Chart (Source: eBird, 2022).

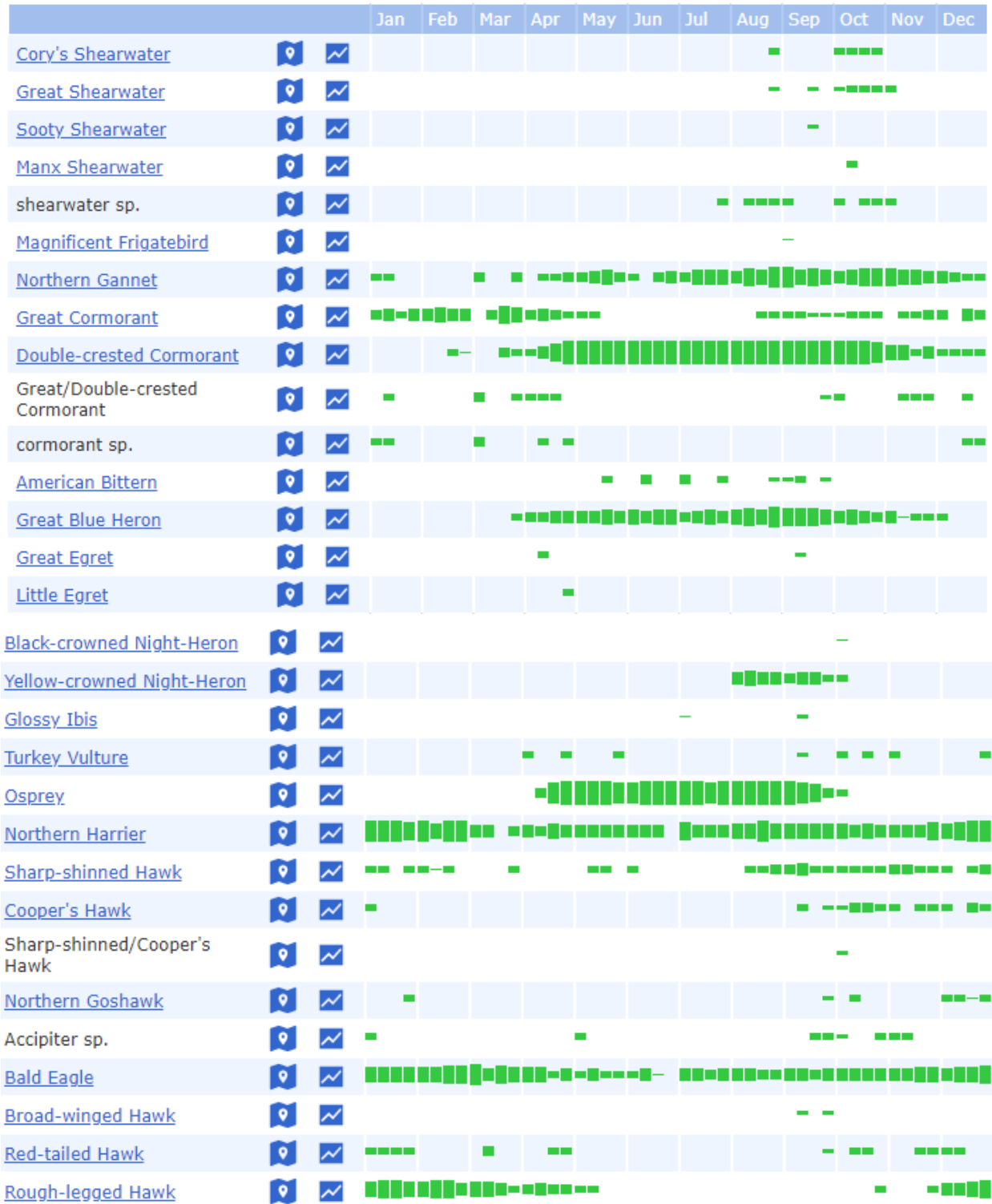
KEY: | = insufficient data |  = rare to widespread



			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<a href="#">Sora</a>											■	-		
<a href="#">American Coot</a>												-	■	
<a href="#">Purple Gallinule</a>									■					
<a href="#">rail/crake sp.</a>											-			
<a href="#">American Avocet</a>											-	■		
<a href="#">American Oystercatcher</a>										■				
<a href="#">Black-bellied Plover</a>							■	■	■	■	■	■	■	■
<a href="#">European Golden-Plover</a>								■				-		
<a href="#">American Golden-Plover</a>										■	■	■	■	
<a href="#">Black-bellied Plover/golden-plover sp.</a>												-		
<a href="#">Semipalmated Plover</a>				■			■	■	■	■	■	■	■	■
<a href="#">Piping Plover</a>								■						
<a href="#">Killdeer</a>			■	■	■	■	■	■	■	■	■	■	■	■
<a href="#">Upland Sandpiper</a>											-			
<a href="#">Whimbrel</a>									■	■	■	■	■	
<a href="#">Hudsonian Godwit</a>											-	■	-	
<a href="#">Marbled Godwit</a>											■	■		
<a href="#">Ruddy Turnstone</a>							■	■	■	■	■	■	■	■
<a href="#">Red Knot</a>							■				■	■	■	■
<a href="#">Ruff</a>							■	■					■	
<a href="#">Stilt Sandpiper</a>												-	■	
<a href="#">Sanderling</a>			■	■		■	■			■	■	■	■	■
<a href="#">Dunlin</a>				■							-	■	■	■
<a href="#">Purple Sandpiper</a>			■	■	■	■	■						■	■
<a href="#">Baird's Sandpiper</a>											■	■	■	■
<a href="#">Little Stint</a>													-	
<a href="#">Least Sandpiper</a>							■	■	■	■	■	■	■	■
<a href="#">White-rumped Sandpiper</a>							■			■	■	■	■	■
<a href="#">Buff-breasted Sandpiper</a>											-	■	■	
<a href="#">Pectoral Sandpiper</a>										■	■	■	■	■

			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<a href="#">Semipalmated Sandpiper</a>							■		■	■	■	■	■	■
<a href="#">Western Sandpiper</a>											■		■	
peep sp.							■		■	■	■	■	■	
<a href="#">Calidris sp.</a>						■				■	■			■
<a href="#">Short-billed Dowitcher</a>							■	■	■	■	■	■		
<a href="#">American Woodcock</a>						■	■		■	■	■	■		
<a href="#">Wilson's Snipe</a>						■	■		■	■	■	■	■	■
<a href="#">Wilson's Phalarope</a>										■				
<a href="#">Red-necked Phalarope</a>							■		■	■	■	■		
<a href="#">Red Phalarope</a>												■	■	
<a href="#">Spotted Sandpiper</a>			■				■	■	■	■	■	■	■	■
<a href="#">Solitary Sandpiper</a>						■			■	■	■	■		
<a href="#">Greater Yellowlegs</a>						■	■	■	■	■	■	■	■	■
<a href="#">Willet</a>						■	■	■	■	■	■	■	■	
<a href="#">Lesser Yellowlegs</a>						■	■	■	■	■	■	■	■	
Greater/Lesser Yellowlegs							■	■	■	■	■	■		
shorebird sp.			■						■	■	■	■	■	
<a href="#">Great Skua</a>													■	
skua sp.											■			
<a href="#">Pomarine Jaeger</a>									■		■		■	
<a href="#">Parasitic Jaeger</a>										■	■			
jaeger sp.										■			■	
<a href="#">Dovekie</a>			■	■		■						■		■
<a href="#">Common Murre</a>			■			■								
<a href="#">Thick-billed Murre</a>			■	■	■	■								
Common/Thick-billed Murre														■
<a href="#">Razorbill</a>			■	■								■	■	■
large alcid sp.				■							■	■		
<a href="#">Black Guillemot</a>			■	■	■	■	■	■	■	■	■	■	■	■
<a href="#">Atlantic Puffin</a>											■	■		

			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
alcid sp.														
<a href="#">Black-legged Kittiwake</a>														
<a href="#">Bonaparte's Gull</a>														
<a href="#">Black-headed Gull</a>														
<a href="#">Laughing Gull</a>														
<a href="#">Franklin's Gull</a>														
<a href="#">Common Gull</a>														
<a href="#">Ring-billed Gull</a>														
<a href="#">Herring Gull</a>														
<a href="#">Iceland Gull</a>														
<a href="#">Lesser Black-backed Gull</a>														
<a href="#">Glaucous Gull</a>														
<a href="#">Great Black-backed Gull</a>														
Larus sp.														
gull sp.														
<a href="#">Gull-billed Tern</a>														
<a href="#">Caspian Tern</a>														
<a href="#">Black Tern</a>														
<a href="#">Common Tern</a>														
<a href="#">Arctic Tern</a>														
Common/Arctic Tern														
<a href="#">Forster's Tern</a>														
Sterna sp.														
<a href="#">Royal Tern</a>														
<a href="#">Sandwich Tern</a>														
tern sp.														
<a href="#">Black Skimmer</a>														
<a href="#">Red-throated Loon</a>														
<a href="#">Common Loon</a>														
loon sp.														





			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Buteo sp.														
hawk sp.														
<a href="#">Great Horned Owl</a>														
<a href="#">Snowy Owl</a>														
<a href="#">Long-eared Owl</a>														
<a href="#">Short-eared Owl</a>														
owl sp.														
<a href="#">Belted Kingfisher</a>														
<a href="#">Yellow-bellied Sapsucker</a>														
<a href="#">Red-bellied Woodpecker</a>														
<a href="#">Downy Woodpecker</a>														
<a href="#">Hairy Woodpecker</a>														
Downy/Hairy Woodpecker														
<a href="#">Pileated Woodpecker</a>														
<a href="#">Northern Flicker</a>														
woodpecker sp.														
<a href="#">Eurasian Kestrel</a>														
<a href="#">American Kestrel</a>														
<a href="#">Merlin</a>														
<a href="#">Peregrine Falcon</a>														
falcon sp.														
<a href="#">Olive-sided Flycatcher</a>														
<a href="#">Eastern Wood-Pewee</a>														
<a href="#">Yellow-bellied Flycatcher</a>														
<a href="#">Acadian Flycatcher</a>														
<a href="#">Alder Flycatcher</a>														
<a href="#">Willow Flycatcher</a>														
Alder/Willow Flycatcher (Traill's Flycatcher)														
<a href="#">Least Flycatcher</a>														
Empidonax sp.														

			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<a href="#">Eastern Phoebe</a>						■	■			■	■	■	■	
<a href="#">Western Kingbird</a>													■	
<a href="#">Eastern Kingbird</a>							■	■		■	■	■	■	
flycatcher sp. (Tyrannidae sp.)										■	■	■	■	
<a href="#">White-eyed Vireo</a>												■	■	
<a href="#">Bell's Vireo</a>												■		
<a href="#">Yellow-throated Vireo</a>											■	■	■	
<a href="#">Blue-headed Vireo</a>						■	■	■	■	■	■	■	■	■
<a href="#">Philadelphia Vireo</a>										■	■	■	■	
<a href="#">Warbling Vireo</a>							■			■	■	■	■	
<a href="#">Red-eyed Vireo</a>						■	■	■	■	■	■	■	■	■
vireo sp.											■			
<a href="#">Northern Shrike</a>				■	■	■							■	
<a href="#">Canada Jay</a>					■							■		■
<a href="#">Blue Jay</a>			■	■	■	■	■	■	■	■	■	■	■	■
<a href="#">American Crow</a>			■	■	■	■	■	■	■	■	■	■	■	■
<a href="#">Common Raven</a>			■	■	■	■	■	■	■	■	■	■	■	■
<a href="#">Black-capped Chickadee</a>			■	■	■	■	■	■	■	■	■	■	■	■
<a href="#">Boreal Chickadee</a>				■	■	■	■	■		■	■	■	■	■
<a href="#">Horned Lark</a>			■	■	■	■	■					■	■	■
<a href="#">Purple Martin</a>											■			
<a href="#">Tree Swallow</a>						■	■	■	■	■	■	■		
<a href="#">Bank Swallow</a>							■	■	■	■	■			
<a href="#">Barn Swallow</a>						■	■	■	■	■	■	■	■	
<a href="#">Cliff Swallow</a>							■		■		■			
<a href="#">Cave Swallow</a>												■		
swallow sp.							■	■		■	■	■	■	
<a href="#">Ruby-crowned Kinglet</a>				■	■	■	■			■	■	■	■	■
<a href="#">Golden-crowned Kinglet</a>			■	■	■	■	■	■	■	■	■	■	■	■
<a href="#">Red-breasted Nuthatch</a>			■	■	■	■	■	■		■	■	■	■	■

			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<a href="#">White-breasted Nuthatch</a>														
<a href="#">Brown Creeper</a>														
<a href="#">Blue-gray Gnatcatcher</a>														
<a href="#">House Wren</a>														
<a href="#">Winter Wren</a>														
<a href="#">Marsh Wren</a>														
<a href="#">European Starling</a>														
<a href="#">Gray Catbird</a>														
<a href="#">Brown Thrasher</a>														
<a href="#">Northern Mockingbird</a>														
<a href="#">Eastern Bluebird</a>														
<a href="#">Veery</a>														
<a href="#">Gray-cheeked Thrush</a>														
<a href="#">Swainson's Thrush</a>														
<a href="#">Hermit Thrush</a>														
<a href="#">American Robin</a>														
<a href="#">Bohemian Waxwing</a>														
<a href="#">Cedar Waxwing</a>														
<a href="#">Bohemian/Cedar Waxwing</a>														
<a href="#">House Sparrow</a>														
<a href="#">American Pipit</a>														
<a href="#">Evening Grosbeak</a>														
<a href="#">Pine Grosbeak</a>														
<a href="#">House Finch</a>														
<a href="#">Purple Finch</a>														
<a href="#">Common Redpoll</a>														
<a href="#">Red Crossbill</a>														
<a href="#">White-winged Crossbill</a>														
<a href="#">Pine Siskin</a>														
<a href="#">American Goldfinch</a>														

			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
finch sp.				-							-			-
<a href="#">Lapland Longspur</a>			■	■	■	■	■					■	■	■
<a href="#">Snow Bunting</a>			■	■	■	■	■					■	■	■
<a href="#">Chipping Sparrow</a>											■	■	■	■
<a href="#">Clay-colored Sparrow</a>											■	■	■	■
<a href="#">Field Sparrow</a>												■	■	
<a href="#">Brewer's Sparrow</a>												■		
<a href="#">Lark Sparrow</a>			■								■	■	■	■
<a href="#">Lark Bunting</a>												■		
<a href="#">American Tree Sparrow</a>			■	■	■	■	■					■	■	■
Spizella sp./American Tree Sparrow						■								
<a href="#">Fox Sparrow</a>						■	■	■		■	■	■	■	
<a href="#">Dark-eyed Junco</a>			■	■	■	■	■	■	■	■	■	■	■	■
<a href="#">White-crowned Sparrow</a>							■	■			■	■	■	■
<a href="#">White-throated Sparrow</a>			■	■	■	■	■	■	■	■	■	■	■	■
<a href="#">Vesper Sparrow</a>											■			■
<a href="#">Seaside Sparrow</a>											■			
<a href="#">Nelson's Sparrow</a>								■	■	■	■	■	■	■
<a href="#">Savannah Sparrow</a>			■	■	■	■	■	■	■	■	■	■	■	■
<a href="#">Song Sparrow</a>			■	■	■	■	■	■	■	■	■	■	■	■
<a href="#">Lincoln's Sparrow</a>									■		■	■	■	■
<a href="#">Swamp Sparrow</a>			■	■		■	■	■	■	■	■	■	■	■
<a href="#">Eastern Towhee</a>												■	■	■
sparrow sp.			■	■	■	■	■			■	■	■	■	■
<a href="#">Yellow-breasted Chat</a>										■	■	■	■	■
<a href="#">Yellow-headed Blackbird</a>												■	■	
<a href="#">Bobolink</a>							■	■		■	■	■	■	■
<a href="#">Orchard Oriole</a>										■	■			
<a href="#">Baltimore Oriole</a>							■	■		■	■	■	■	■
new world oriole sp.											■			

			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<a href="#">Red-winged Blackbird</a>					█	█	█	█	█	█	█	█	█	█
<a href="#">Brown-headed Cowbird</a>					█	█	█	█	█	█	█	█	█	█
<a href="#">Rusty Blackbird</a>								█				█	█	
<a href="#">Common Grackle</a>					█	█	█	█	█	█	█	█	█	█
blackbird sp.												█	█	
<a href="#">Ovenbird</a>							█	█		█	█	█	█	
<a href="#">Worm-eating Warbler</a>											█	█		
<a href="#">Northern Waterthrush</a>							█	█		█	█	█	█	
<a href="#">Golden-winged Warbler</a>											█	█		
<a href="#">Blue-winged Warbler</a>											█	█	█	
<a href="#">Black-and-white Warbler</a>							█	█	█	█	█	█	█	█
<a href="#">Prothonotary Warbler</a>							█			█	█	█	█	
<a href="#">Swainson's Warbler</a>											█			
<a href="#">Tennessee Warbler</a>								█		█	█	█	█	
<a href="#">Orange-crowned Warbler</a>				█							█	█	█	█
<a href="#">Nashville Warbler</a>							█	█		█	█	█	█	█
<a href="#">Connecticut Warbler</a>											█			
<a href="#">Mourning Warbler</a>										█	█	█	█	
<a href="#">Kentucky Warbler</a>										█	█	█	█	
<a href="#">Common Yellowthroat</a>							█	█	█	█	█	█	█	█
<a href="#">Hooded Warbler</a>					█					█	█	█	█	
<a href="#">American Redstart</a>							█	█	█	█	█	█	█	█
<a href="#">Cape May Warbler</a>							█	█		█	█	█	█	
<a href="#">Cerulean Warbler</a>											█	█		
<a href="#">Northern Parula</a>							█	█	█	█	█	█	█	█
<a href="#">Magnolia Warbler</a>							█	█	█	█	█	█	█	█
<a href="#">Bay-breasted Warbler</a>										█	█	█	█	█
<a href="#">Blackburnian Warbler</a>							█			█	█	█	█	
<a href="#">Yellow Warbler</a>							█	█	█	█	█	█	█	█
<a href="#">Chestnut-sided Warbler</a>							█	█	█	█	█	█	█	█



# APPENDIX D

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## Bird Survey Results

**Table D.1. Bird species detected during bird surveys conducted by CBCL between July 14, 2021 and September 7, 2022, and incidental bird species recorded during wetland surveys conducted on March 8 and May 17, 2021, at Hartlen Point.**

Common Name	Scientific Name	SARA Rank	NS ESA Rank	AC CDC Rank	Total No. of Observations	Relative Abundance	2021 Totals	2022 Totals
Alder Flycatcher	<i>Empidonax alnorum</i>	-	-	S5B	67	0.5%	11	56
American Black Duck	<i>Anas rubripes</i>	-	-	S5B,S5N	465	3.4%	81	384
American Crow	<i>Corvus brachyrhynchos</i>	-	-	S5	731	5.3%	176	555
American Goldfinch	<i>Spinus tristis</i>	-	-	S5	615	4.5%	119	496
American Pipit	<i>Anthus rubescens</i>	-	-	S4M	36	0.3%	34	2
American Redstart	<i>Setophaga ruticilla</i>	-	-	S5B	72	0.5%	8	64
American Robin*	<i>Turdus migratorius</i>	-	-	S5B,S3N	355	2.6%	79	276
American Scoter	<i>Melanitta americana</i>	-	-	S4N,SUM	22	0.2%	6	16
American Tree Sparrow	<i>Spizelloides arborea</i>	-	-	S5N	2	0.0%	2	0
American Woodcock	<i>Scolopax minor</i>	-	-	S5B	10	0.1%	0	10
Bald Eagle	<i>Haliaeetus leucocephalus</i>	NAR	-	S5	6	0.0%	5	1
<b>Barn Swallow</b>	<b><i>Hirundo rustica</i></b>	<b>T</b>	<b>E</b>	<b>S3B</b>	<b>55</b>	<b>0.4%</b>	<b>20</b>	<b>35</b>
<b>Barrow's Goldeneye</b>	<b><i>Bucephala islandica</i></b>	<b>SC</b>	<b>-</b>	<b>S1N,SUM</b>	<b>18</b>	<b>0.1%</b>	<b>18</b>	<b>0</b>
Bay-breasted Warbler*	<i>Setophaga castanea</i>	-	-	S3S4B,S4S5M	3	0.0%	0	3
Belted Kingfisher	<i>Megaceryle alcyon</i>	-	-	S4S5B	2	0.0%	2	0
Black Guillemot	<i>Cephus grylle</i>	-	-	S4B	17	0.1%	7	10
Black-and-White Warbler	<i>Mniotilta varia</i>	-	-	S5B	32	0.2%	12	20
Black-bellied Plover*	<i>Pluvialis squatarola</i>	-	-	S3M	18	0.1%	18	0
Blackburnian Warbler	<i>Setophaga fusca</i>	-	-	S4B,S5M	1	0.0%	0	1
Black-capped Chickadee	<i>Poecile atricapillus</i>	-	-	S5	313	2.3%	85	228
Blackpoll Warbler*	<i>Setophaga striata</i>	-	-	S3B,S5M	15	0.1%	13	2
Black-throated Blue Warbler	<i>Setophaga caerulescens</i>	-	-	S5B	1	0.0%	0	1
Black-throated Green Warbler	<i>Setophaga virens</i>	-	-	S5B	64	0.5%	7	57
Blue Jay	<i>Cyanocitta cristata</i>	-	-	S5	64	0.5%	45	19
Blue-headed Vireo	<i>Vireo solitarius</i>	-	-	S5B	9	0.1%	1	8
Blue-winged Teal*	<i>Spatula discors</i>	-	-	S3B	31	0.2%	0	31
Bonaparte's Gull	<i>Chroicocephalus philadelphia</i>	-	-	S5M	1	0.0%	0	1



Common Name	Scientific Name	SARA Rank	NS ESA Rank	AC CDC Rank	Total No. of Observations	Relative Abundance	2021 Totals	2022 Totals
Boreal Chickadee*	<i>Poecile hudsonicus</i>	-	-	S3	1	0.0%	0	1
Brown Creeper	<i>Certhia americana</i>	-	-	S5	1	0.0%	0	1
<b>Buff-breasted Sandpiper</b>	<b><i>Calidris subruficollis</i></b>	<b>SC</b>	-	<b>SNA</b>	<b>1</b>	0.0%	<b>1</b>	<b>0</b>
Bufflehead*	<i>Bucephala albeola</i>	-	-	S4N,SUM	27	0.2%	27	0
Canada Goose	<i>Branta canadensis</i>	-	-	SUB,S4N,S5M	387	2.8%	170	217
<b>Canada Warbler</b>	<b><i>Cardellina canadensis</i></b>	<b>T</b>	<b>E</b>	<b>S3B</b>	<b>2</b>	0.0%	<b>0</b>	<b>2</b>
Cedar Waxwing	<i>Bombycilla cedrorum</i>	-	-	S5B	80	0.6%	36	44
Chestnut-sided Warbler	<i>Setophaga pensylvanica</i>	-	-	S5B	1	0.0%	0	1
Cliff Swallow*	<i>Petrochelidon pyrrhonota</i>	-	-	S2S3B	6	0.0%	6	0
Common Eider*	<i>Somateria mollissima</i>	-	-	S3B,S3M,S3N	2706	19.8%	234	2472
Common Goldeneye*	<i>Bucephala clangula</i>	-	-	S2S3B,S5N,S5M	4	0.0%	4	0
Common Grackle	<i>Quiscalus quiscula</i>	-	-	S5B	123	0.9%	0	123
Common Loon	<i>Gavia immer</i>	NAR	-	S4B	12	0.1%	2	10
Common Murre*	<i>Uria aalge</i>	-	-	S1?B	1	0.0%	0	1
Common Raven	<i>Corvus corax</i>	-	-	S5	51	0.4%	10	41
Common Tern*	<i>Sterna hirundo</i>	NAR	-	S3B	1	0.0%	1	0
Common Yellowthroat	<i>Geothlypis trichas</i>	-	-	S5B	235	1.7%	58	177
Cooper's Hawk*	<i>Accipiter cooperii</i>	NAR	-	S1?B,SUN,SUM	1	0.0%	1	0
Dark-eyed Junco	<i>Junco hyemalis</i>	-	-	S4S5	34	0.2%	5	29
Double-crested Cormorant	<i>Nannopterum auritum</i>	NAR	-	S5B	516	3.8%	227	289
Dovekie	<i>Alle alle</i>	-	-	S5N	4	0.0%	4	0
Downy Woodpecker	<i>Dryobates pubescens</i>	-	-	S5	12	0.1%	3	9
<b>Eastern Wood-pewee</b>	<b><i>Contopus virens</i></b>	<b>SC</b>	<b>V</b>	<b>S3S4B</b>	<b>3</b>	0.0%	<b>3</b>	<b>0</b>
European Starling	<i>Sturnus vulgaris</i>	-	-	SNA	674	4.9%	249	425
Golden-crowned Kinglet	<i>Regulus satrapa</i>	-	-	S5	36	0.3%	13	23
Great Black-backed Gull	<i>Larus marinus</i>	-	-	S4S5	436	3.2%	38	398
Great Blue Heron	<i>Ardea herodias</i>	-	-	S4B,S4S5M	23	0.2%	6	17
Greater Yellowlegs*	<i>Tringa melanoleuca</i>	-	-	S3B,S4M	13	0.1%	4	9
Green-winged Teal	<i>Anas crecca</i>	-	-	S4S5B,S5M	28	0.2%	0	28
Grey Catbird	<i>Dumetella carolinensis</i>	-	-	S4B	5	0.0%	1	4
Hairy Woodpecker	<i>Dryobates villosus</i>	-	-	S5	2	0.0%	1	1

Common Name	Scientific Name	SARA Rank	NS ESA Rank	AC CDC Rank	Total No. of Observations	Relative Abundance	2021 Totals	2022 Totals
Hermit Thrush	<i>Catharus guttatus</i>	-	-	S5B	18	0.1%	0	18
Herring Gull	<i>Larus argentatus</i>	-	-	S5	2643	19.3%	265	2378
Horned Lark	<i>Eremophila alpestris</i>	-	-	SHB,S4S5N,S5M	19	0.1%	19	0
Iceland Gull	<i>Larus glaucooides</i>	-	-	S4N	48	0.4%	32	16
Killdeer*	<i>Charadrius vociferus</i>	-	-	S3B	4	0.0%	2	2
Least Flycatcher	<i>Empidonax minimus</i>	-	-	S4S5B,S5M	3	0.0%	2	1
Least Sandpiper*	<i>Calidris minutilla</i>	-	-	S1B,S4M	18	0.1%	0	18
Lesser Yellowlegs	<i>Tringa flavipes</i>	-	-	S3M	4	0.0%	0	4
Lincoln's Sparrow	<i>Melospiza lincolnii</i>	-	-	S4B,S5M	1	0.0%	1	0
Long-tailed Duck	<i>Clangula hyemalis</i>	-	-	S5N	25	0.2%	17	8
Magnolia Warbler	<i>Setophaga magnolia</i>	-	-	S5B	7	0.1%	2	5
Mallard	<i>Anas platyrhynchos</i>	-	-	S5B,S5N	14	0.1%	3	11
Merlin	<i>Falco columbarius</i>	NAR	-	S5B	6	0.0%	6	0
Mourning Dove	<i>Zenaida macroura</i>	-	-	S5	80	0.6%	25	55
Nashville Warbler	<i>Leiothlypis ruficapilla</i>	-	-	S4B,S5M	2	0.0%	0	2
Northern Cardinal	<i>Cardinalis cardinalis</i>	-	-	S4	4	0.0%	1	3
Northern Flicker	<i>Colaptes auratus</i>	-	-	S5B	51	0.4%	15	36
Northern Gannet	<i>Morus bassanus</i>	-	-	SHB	4	0.0%	3	1
Northern Harrier	<i>Circus hudsonius</i>	NAR	-	S4B,S4S5M	37	0.3%	11	26
Northern Parula	<i>Setophaga americana</i>	-	-	S5B	26	0.2%	6	20
Northern Shoveler*	<i>Spatula clypeata</i>	-	-	S2B,SUM	9	0.1%	2	7
Osprey	<i>Pandion haliaetus</i>	-	-	S4S5B,S5M	46	0.3%	14	32
Ovenbird	<i>Seiurus aurocapilla</i>	-	-	S5B	1	0.0%	0	1
Palm Warbler	<i>Setophaga palmarum</i>	-	-	S5B	3	0.0%	1	2
Pectoral Sandpiper*	<i>Calidris melanotos</i>	-	-	S3M	1	0.0%	0	1
Pileated Woodpecker	<i>Dryocopus pileatus</i>	-	-	S5	3	0.0%	0	3
Pine Grosbeak*	<i>Pinicola enucleator</i>	-	-	S3B,S5N,S5M	6	0.0%	0	6
Pine Warbler*	<i>Setophaga pinus</i>	-	-	S2S3B,S4S5M	2	0.0%	2	0
Prairie Warbler	<i>Setophaga discolor</i>	NAR	-	SNA	1	0.0%	1	0
Purple Finch*	<i>Haemorhous purpureus</i>	-	-	S4S5B,S3S4N,S5M	29	0.2%	4	25
Purple Sandpiper*	<i>Calidris maritima</i>	-	-	S3S4N	16	0.1%	16	0

Common Name	Scientific Name	SARA Rank	NS ESA Rank	AC CDC Rank	Total No. of Observations	Relative Abundance	2021 Totals	2022 Totals
Red Crossbill*	<i>Loxia curvirostra</i>	-	-	S3S4	2	0.0%	0	2
Red-breasted Merganser*	<i>Mergus serrator</i>	-	-	S3S4B,S5M,S5N	35	0.3%	13	22
Red-breasted Nuthatch	<i>Sitta canadensis</i>	-	-	S4S5	1	0.0%	0	1
Red-eyed Vireo	<i>Vireo olivaceus</i>	-	-	S5B	25	0.2%	8	17
Red-winged Blackbird	<i>Agelaius phoeniceus</i>	-	-	S4B	203	1.5%	22	181
Ring-billed Gull	<i>Larus delawarensis</i>	-	-	SUB,S5N	25	0.2%	24	1
Ring-necked Duck	<i>Aythya collaris</i>	-	-	S5B	13	0.1%	13	0
Ring-necked Pheasant	<i>Phasianus colchicus</i>	-	-	SNA	200	1.5%	25	175
Rose-breasted Grosbeak*	<i>Pheucticus ludovicianus</i>	-	-	S3B	1	0.0%	1	0
Ruby-crowned Kinglet	<i>Corthylio calendula</i>	-	-	S4B,S5M	5	0.0%	4	1
Ruddy Turnstone*	<i>Arenaria interpres</i>	-	-	S3M	8	0.1%	6	2
Ruffed Grouse	<i>Bonasa umbellus</i>	-	-	S5	6	0.0%	0	6
Sanderling*	<i>Calidris alba</i>	-	-	S2N,S3M	2	0.0%	0	2
Savannah Sparrow	<i>Passerculus sandwichensis</i>	-	-	S4S5B,S5M	108	0.8%	20	88
<b>Savannah Sparrow (ssp. princeps, Ipswich Sparrow)</b>	<b><i>Passerculus sandwichensis princeps</i></b>	<b>SC</b>	-	<b>S1B</b>	<b>15</b>	<b>0.1%</b>	<b>3</b>	<b>12</b>
Semipalmated Plover*	<i>Charadrius semipalmatus</i>	-	-	S1B,S4M	32	0.2%	15	17
Semipalmated Sandpiper*	<i>Calidris pusilla</i>	-	-	S3M	150	1.1%	133	17
Snow Bunting	<i>Plectrophenax nivalis</i>	-	-	S5N	2	0.0%	2	0
Snowy Owl	<i>Bubo scandiacus</i>	NAR	-	SNA	2	0.0%	2	0
Song Sparrow	<i>Melospiza melodia</i>	-	-	S5B	747	5.5%	96	651
Spotted Sandpiper*	<i>Actitis macularius</i>	-	-	S3S4B,S5M	17	0.1%	14	3
Surf Scoter	<i>Melanitta perspicillata</i>	-	-	S4N,SUM	10	0.1%	0	10
Swamp Sparrow	<i>Melospiza georgiana</i>	-	-	S5B	43	0.3%	3	40
Tree Swallow	<i>Tachycineta bicolor</i>	-	-	S4B	14	0.1%	4	10
Veery	<i>Catharus fuscescens</i>	-	-	S4B	1	0.0%	0	1
Whimbrel*	<i>Numenius phaeopus</i>	-	-	S2S3M	38	0.3%	17	21
White-throated Sparrow	<i>Zonotrichia albicollis</i>	-	-	S4S5B,S5M	14	0.1%	9	5
White-winged Crossbill	<i>Loxia leucoptera</i>	-	-	S4S5	1	0.0%	0	1
White-winged Scoter	<i>Melanitta deglandi</i>	-	-	S4N,SUM	3	0.0%	3	0
Willet*	<i>Tringa semipalmata</i>	-	-	S3B	114	0.8%	1	113

Common Name	Scientific Name	SARA Rank	NS ESA Rank	AC CDC Rank	Total No. of Observations	Relative Abundance	2021 Totals	2022 Totals
Wilson's Snipe*	<i>Gallinago delicata</i>	-	-	S3B,S5M	1	0.0%	0	1
Yellow Warbler	<i>Setophaga petechia</i>	-	-	S5B	177	1.3%	22	155
Yellow-rumped Warbler	<i>Setophaga coronata</i>	-	-	S5B	60	0.4%	31	29
Unidentified Accipiter	-	-	-	#N/A	2	0.0%	2	0
Unidentified Bird	-	-	-	#N/A	2	0.0%	0	2
Unidentified Duck	-	-	-	#N/A	3	0.0%	0	3
Unidentified Gull	-	-	-	#N/A	10	0.1%	0	9
Unidentified Sparrow	-	-	-	#N/A	1	0.0%	0	1
Unidentified Tern	-	-	-	#N/A	2	0.0%	2	0
Unidentified Woodpecker	-	-	-	#N/A	1	0.0%	0	1

E = Endangered, T = Threatened, V = Vulnerable, SC = Special Concern, NR = Not at Risk, NL = Not Listed

**Bold font** indicates a SAR

\* Indicates a SoCC

**Table D.2. Bird species observed incidentally during wetland surveys conducted on March 8 and May 17, 2021, at Hartlen Point, NS.**

Species	Scientific Name	Total No. Of Individuals Recorded
American Black Duck	<i>Anas rubripes</i>	2
American Goldfinch	<i>Spinus tristis</i>	3
American Redstart	<i>Setophaga ruticilla</i>	1
American Robin*	<i>Turdus migratorius</i>	1
<b>Barn Swallow</b>	<b><i>Hirundo rustica</i></b>	<b>6</b>
Black-capped Chickadee	<i>Poecile atricapillus</i>	2
Blue Jay	<i>Cyanocitta cristata</i>	1
Bufflehead*	<i>Bucephala albeola</i>	20
Cliff Swallow*	<i>Petrochelidon pyrrhonota</i>	6
Great Blue Heron	<i>Ardea herodias</i>	1
Killdeer*	<i>Charadrius vociferus</i>	1
Mourning Dove	<i>Zenaida macroura</i>	6
Northern Harrier*	<i>Circus hudsonicus</i>	3
Northern Shoveler*	<i>Spatula clypeata</i>	2
Osprey	<i>Pandion haliaetus</i>	1
Red-winged Blackbird	<i>Agelaius phoeniceus</i>	9
Yellow Warbler	<i>Setophaga petechia</i>	1

**Bold font** indicates a SAR

\* Indicates a SoCC

**Table D.3. Bird species recorded during spring migration surveys conducted weekly in April and May 2022, at Hartlen Point.**

Common Name	Scientific Name	Total Individuals	Relative Abundance
Alder Flycatcher	<i>Empidonax alnorum</i>	1	0.0%
American Black Duck	<i>Anas rubripes</i>	169	2.4%
American Crow	<i>Corvus brachyrhynchos</i>	156	2.2%
American Goldfinch	<i>Spinus tristis</i>	112	1.6%
American Pipit	<i>Anthus rubescens</i>	2	0.0%
American Redstart	<i>Setophaga ruticilla</i>	4	0.1%
American Robin*	<i>Turdus migratorius</i>	67	0.9%
American Scoter	<i>Melanitta americana</i>	10	0.1%
American Woodcock	<i>Scolopax minor</i>	2	0.0%
Bald Eagle	<i>Haliaeetus leucocephalus</i>	0	0.0%
<b>Barn Swallow</b>	<i>Hirundo rustica</i>	2	0.0%
Black Guillemot	<i>Cephus grylle</i>	8	0.1%
Black-and-White Warbler	<i>Mniotilta varia</i>	3	0.0%
Black-capped Chickadee	<i>Poecile atricapillus</i>	57	0.8%
Black-throated Blue Warbler	<i>Setophaga caeruleascens</i>	0	0.0%
Black-throated Green Warbler	<i>Setophaga virens</i>	7	0.1%
Blue Jay	<i>Cyanocitta cristata</i>	9	0.1%
Blue-headed Vireo	<i>Vireo solitarius</i>	0	0.0%
Bonaparte's Gull	<i>Chroicocephalus philadelphia</i>	0	0.0%
Brown Creeper	<i>Certhia americana</i>	1	0.0%
Canada Goose	<i>Branta canadensis</i>	122	1.7%
Cedar Waxwing	<i>Bombycilla cedrorum</i>	4	0.1%
Common Eider*	<i>Somateria mollissima</i>	1764	25.0%
Common Grackle	<i>Quiscalus quiscula</i>	36	0.5%
Common Loon	<i>Gavia immer</i>	4	0.1%
Common Murre*	<i>Uria aalge</i>	1	0.0%
Common Raven	<i>Corvus corax</i>	8	0.1%
Common Yellowthroat	<i>Geothlypis trichas</i>	35	0.5%
Dark-eyed Junco	<i>Junco hyemalis</i>	11	0.2%
Double-crested Cormorant	<i>Nannopterum auritum</i>	115	1.6%
Downy Woodpecker	<i>Dryobates pubescens</i>	7	0.1%
European Starling	<i>Sturnus vulgaris</i>	30	0.4%
Golden-crowned Kinglet	<i>Regulus satrapa</i>	8	0.1%
Great Black-backed Gull	<i>Larus marinus</i>	237	3.4%
Great Blue Heron	<i>Ardea herodias</i>	6	0.1%
Greater Yellowlegs*	<i>Tringa melanoleuca</i>	1	0.0%
Green-winged Teal	<i>Anas crecca</i>	14	0.2%
Grey Catbird	<i>Dumetella carolinensis</i>	1	0.0%

Common Name	Scientific Name	Total Individuals	Relative Abundance
Hermit Thrush	<i>Catharus guttatus</i>	2	0.0%
Herring Gull	<i>Larus argentatus</i>	1411	20.0%
Iceland Gull	<i>Larus glaucoides</i>	10	0.1%
<b>Ipswich Sparrow</b>	<i>Passerculus sandwichensis princeps</i>	12	0.2%
Killdeer*	<i>Charadrius vociferus</i>	2	0.0%
Long-tailed Duck	<i>Clangula hyemalis</i>	8	0.1%
Magnolia Warbler	<i>Setophaga magnolia</i>	0	0.0%
Mallard	<i>Anas platyrhynchos</i>	3	0.0%
Mourning Dove	<i>Zenaida macroura</i>	11	0.2%
Northern Cardinal	<i>Cardinalis cardinalis</i>	2	0.0%
Northern Flicker	<i>Colaptes auratus</i>	7	0.1%
Northern Harrier	<i>Circus hudsonius</i>	9	0.1%
Northern Parula	<i>Setophaga americana</i>	3	0.0%
Northern Shoveler*	<i>Spatula clypeata</i>	1	0.0%
Osprey	<i>Pandion haliaetus</i>	10	0.1%
Ovenbird	<i>Seiurus aurocapilla</i>	0	0.0%
Palm Warbler	<i>Setophaga palmarum</i>	0	0.0%
Pileated Woodpecker	<i>Dryocopus pileatus</i>	0	0.0%
Pine Grosbeak*	<i>Pinicola enucleator</i>	3	0.0%
Purple Finch*	<i>Haemorhous purpureus</i>	5	0.1%
Red-breasted Merganser*	<i>Mergus serrator</i>	22	0.3%
Red-eyed Vireo	<i>Vireo olivaceus</i>	1	0.0%
Red-winged Blackbird	<i>Agelaius phoeniceus</i>	22	0.3%
Ring-necked Pheasant	<i>Phasianus colchicus</i>	24	0.3%
Ruby-crowned Kinglet	<i>Corthylio calendula</i>	0	0.0%
Ruffed Grouse	<i>Bonasa umbellus</i>	0	0.0%
Savannah Sparrow	<i>Passerculus sandwichensis</i>	23	0.3%
Song Sparrow	<i>Melospiza melodia</i>	189	2.7%
Surf Scoter	<i>Melanitta perspicillata</i>	9	0.1%
Swamp Sparrow	<i>Melospiza georgiana</i>	9	0.1%
Tree Swallow	<i>Tachycineta bicolor</i>	1	0.0%
Unidentified Gull	<i>Undetermined</i>	0	0.0%
Veery	<i>Catharus fuscescens</i>	0	0.0%
Whimbrel*	<i>Numenius phaeopus</i>	0	0.0%
White-throated Sparrow	<i>Zonotrichia albicollis</i>	0	0.0%
Willet*	<i>Tringa semipalmata</i>	12	0.2%
Yellow Warbler	<i>Setophaga petechia</i>	20	0.3%
Yellow-rumped Warbler	<i>Setophaga coronata</i>	4	0.1%

**Bolded font** indicates SAR

\* Indicates SoCC

**Table D.4. Bird species recorded during fall migratory bird surveys conducted on September 1, September 14, October 5 and October 29, 2021, at Hartlen Point.**

Common Name	Scientific Name	Total No. of Individuals Recorded	Relative Abundance (%)
American Black Duck	<i>Anas rubripes</i>	43	3.2
American Crow	<i>Corvus brachyrhynchos</i>	57	4.2
American Goldfinch	<i>Carduelis tristis</i>	43	3.2
American Pipit	<i>Anthus rubescens</i>	34	2.5
American Robin*	<i>Turdus migratorius</i>	57	4.2
Bald Eagle	<i>Haliaeetus leucocephalus</i>	2	0.1
Belted Kingfisher	<i>Megaceryle alcyon</i>	1	0.1
Black-and-white Warbler	<i>Mniotilta varia</i>	2	0.1
Black-bellied Plover*	<i>Pluvialis squatarola</i>	18	1.3
Black-capped Chickadee	<i>Poecile atricapilla</i>	49	3.6
Blackpoll Warbler*	<i>Dendroica striata</i>	13	1.0
Black-throated Green Warbler	<i>Dendroica virens</i>	5	0.4
Blue Jay	<i>Cyanocitta cristata</i>	42	3.1
Blue-headed Vireo	<i>Vireo solitarius</i>	1	0.1
<b>Buff-breasted Sandpiper</b>	<b><i>Tryngites subruficollis</i></b>	<b>1</b>	0.1
Canada Goose	<i>Branta canadensis</i>	29	2.2
Cedar Waxwing	<i>Bombycilla cedrorum</i>	32	2.4
Common Eider*	<i>Somateria mollissima</i>	76	5.6
Common Raven	<i>Corvus corax</i>	10	0.7
Common Tern*	<i>Sterna hirundo</i>	1	0.1
Common Yellowthroat	<i>Geothlypis trichas</i>	28	2.1
Cooper's Hawk*	<i>Accipiter cooperii</i>	1	0.1
Dark-eyed Junco	<i>Junco hyemalis</i>	4	0.3
Double-crested Cormorant	<i>Phalacrocorax auritus</i>	144	10.7
<b>Eastern Wood-pewee</b>	<b><i>Contopus virens</i></b>	<b>2</b>	0.1
European Starling	<i>Sturnus vulgaris</i>	184	13.6
Golden-crowned Kinglet	<i>Regulus satrapa</i>	3	0.2
Gray Catbird*	<i>Dumetella carolinensis</i>	1	0.1



Common Name	Scientific Name	Total No. of Individuals Recorded	Relative Abundance (%)
Great Black-backed Gull	<i>Larus marinus</i>	20	1.5
Great Blue Heron	<i>Ardea herodias</i>	2	0.1
Greater Yellowlegs*	<i>Tringa melanoleuca</i>	4	0.3
Hairy Woodpecker	<i>Picoides villosus</i>	1	0.1
Herring Gull	<i>Larus argentatus</i>	74	5.5
Killdeer*	<i>Charadrius vociferus</i>	1	0.1
Least Flycatcher	<i>Empidonax minimus</i>	2	0.1
Lincoln's Sparrow	<i>Melospiza lincolni</i>	1	0.1
Magnolia Warbler	<i>Oporornis tolmiei</i>	1	0.1
Merlin	<i>Falco columbarius</i>	5	0.4
Mourning Dove	<i>Zenaida macroura</i>	1	0.1
Northern Cardinal	<i>Cardinalis cardinalis</i>	1	0.1
Northern Flicker	<i>Colaptes auratus</i>	10	0.7
Northern Harrier*	<i>Circus hudsonicus</i>	3	0.2
Northern Parula	<i>Parula americana</i>	3	0.2
Osprey	<i>Pandion haliaetus</i>	3	0.2
Palm Warbler	<i>Setophaga palmarum</i>	1	0.1
Pine Warbler*	<i>Dendroica pinus</i>	1	0.1
Prairie Warbler	<i>Setophaga discolor</i>	1	0.1
Purple Finch*	<i>Haemorhous purpureus</i>	1	0.1
Red-eyed Vireo	<i>Vireo olivaceus</i>	3	0.2
Ring-billed Gull	<i>Larus delawarensis</i>	24	1.8
Ring-necked Pheasant	<i>Phasianus colchicus</i>	5	0.4
Rose-breasted Grosbeak*	<i>Pheucticus ludovicianus</i>	1	0.1
Ruby-crowned Kinglet*	<i>Regulus calendula</i>	4	0.3
Ruddy Turnstone*	<i>Arenaria interpres</i>	6	0.4
Savannah Sparrow	<i>Passerculus sandwichensis</i>	8	0.6
Semipalmated Plover*	<i>Charadrius semipalmatus</i>	15	1.1
Semipalmated Sandpiper*	<i>Calidris pusilla</i>	133	9.9
Song Sparrow	<i>Melospiza melodia</i>	65	4.8
Spotted Sandpiper*	<i>Actitis macularius</i>	1	0.1

Common Name	Scientific Name	Total No. of Individuals Recorded	Relative Abundance (%)
Swamp Sparrow	<i>Melospiza georgiana</i>	3	0.2
Whimbrel*	<i>Numenius phaeopus hudsonicus</i>	17	1.3
White-throated Sparrow	<i>Zonotrichia albicollis</i>	8	0.6
Willet*	<i>Tringa semipalmata</i>	1	0.1
Yellow Warbler	<i>Setophaga petechia</i>	4	0.3
Yellow-rumped Warbler	<i>Setophaga coronate</i>	31	2.3

**Bolded font** indicates a SAR species

\* Indicates a SoCC Species

**Table D.5. Bird species detected during breeding bird surveys conducted on July 14 and 15, 2021, at Hartlen Point.**

Species	Scientific Name	Total Individuals	Breeding Evidence (Breeding Code)****	Relative Abundance (%)
Alder Flycatcher	<i>Empidonax alnorum</i>	11	Probable (T)	2.1
American Black Duck***	<i>Anas rubripes</i>	2	Confirmed (NE)	8.6
American Crow	<i>Corvus brachyrhynchos</i>	44	Probable (T)	8.0
American Goldfinch	<i>Carduelis tristis</i>	41	Probable (T)	1.4
American Redstart	<i>Setophaga ruticilla</i>	7	Probable (T)	3.9
American Robin*	<i>Turdus migratorius</i>	20	Probable (T)	1.6
<b>Barn Swallow</b>	<b><i>Hirundo rustica</i></b>	<b>8</b>	<b>Probable (T)</b>	0.2
Belted Kingfisher	<i>Megaceryle alcyon</i>	1	Possible (H)	1.0
Black Guillemot	<i>Cepphus grylle</i>	5	Observed (X)	2.0
Black-and-white Warbler	<i>Mniotilta varia</i>	10	Probable (T)	2.5
Black-capped Chickadee	<i>Poecile atricapilla</i>	13	Probable (T)	0.4
Black-throated Green Warbler	<i>Dendroica virens</i>	2	Possible (H)	0.2
Blue Jay	<i>Cyanocitta cristata</i>	2	Possible (H)	0.8
Bufflehead*	<i>Bucephala albeola</i>	20	Possible (H)	13.7
Cedar Waxwing	<i>Bombycilla cedrorum</i>	4	Possible (H)	0.4
Common Eider*	<i>Somateria mollissima</i>	70	Confirmed (FY)	5.1
Common Loon	<i>Gavia immer</i>	2	Observed (X)	0.2
Common Yellowthroat	<i>Geothlypis trichas</i>	26	Confirmed (CF)	10.5
Dark-eyed Junco	<i>Junco hyemalis</i>	1	Possible (H)	0.4
Double-crested Cormorant	<i>Phalacrocorax auritus</i>	54	Possible (H)	0.2
Downy Woodpecker	<i>Picoides pubescens</i>	2	Possible (H)	0.2
<b>Eastern Wood-pewee</b>	<b><i>Contopus virens</i></b>	<b>1</b>	<b>Possible (H)</b>	1.0
European Starling	<i>Sturnus vulgaris</i>	0**	n/a	0.2
Golden-crowned Kinglet	<i>Regulus satrapa</i>	1	Possible (S)	11.9
Great Black-backed Gull	<i>Larus marinus</i>	5	Observed (X)	0.2
Great Blue Heron	<i>Ardea herodias</i>	1	Observed (X)	3.3
Herring Gull	<i>Larus argentatus</i>	61	Possible (H)	0.4
Killdeer*	<i>Charadrius vociferus</i>	1	Possible (H)	0.6

Species	Scientific Name	Total Individuals	Breeding Evidence (Breeding Code)****	Relative Abundance (%)
Magnolia Warbler	<i>Oporornis tolmiei</i>	1	Observed (X)	0.6
Mourning Dove	<i>Zenaida macroura</i>	17	Probable (T)	2.0
Northern Flicker	<i>Colaptes auratus</i>	2	Possible (H)	0.6
Northern Harrier*	<i>Circus cyaneus</i>	3	Possible (H)	1.0
Northern Parula	<i>Parula americana</i>	3	Possible (S)	1.8
Northern Shoveler*	<i>Spatula clypeata</i>	2	Confirmed (NE)	1.6
Osprey	<i>Pandion haliaetus</i>	10	Confirmed (NY)	1.8
Purple Finch*	<i>Carpodacus purpureus</i>	3	Possible (S)	3.1
Red-eyed Vireo	<i>Vireo olivaceus</i>	5	Possible (S)	2.5
Red-winged Blackbird	<i>Agelaius phoeniceus</i>	9	Confirmed (FY)	0.2
Ring-necked Pheasant	<i>Phasianus colchicus</i>	8	Confirmed (NE, NY)	0.4
Savannah Sparrow	<i>Passerculus sandwichensis</i>	9	Probable (T)	0.4
Song Sparrow	<i>Melospiza melodia</i>	16	Probable (T)	3.3
Spotted Sandpiper*	<i>Actitis macularius</i>	13	Confirmed (FY)	2.1
Gull sp.	<i>Family Laridae</i>	1	-	8.6
Buteo sp.	<i>Family Accipitridae</i>	2	-	8.0
Tern sp.	<i>Family Laridae</i>	2	-	1.4
Yellow Warbler	<i>Dendroica petechia</i>	17	Probable (T)	3.9

**Bold font** indicates a SAR

\* Indicates a SoCC

\*\* This species was not directly observed; however, an unused nest of this species was observed onsite

\*\*\* This species was observed out of the breeding bird survey window, but was confirmed on site nesting or with young

\*\*\*\* Breeding bird evidence codes are defined in Table 4.3 with the main document.

**Table D.6. Bird species recorded during spring breeding bird surveys conducted weekly in June 2022, at Hartlen Point.**

Common Name	Scientific Name	Total Individuals	Breeding Evidence (Breeding Code)**	Relative Abundance
Alder Flycatcher	<i>Empidonax alnorum</i>	54	S	1.5%
American Black Duck	<i>Anas rubripes</i>	116	FY	3.2%
American Crow	<i>Corvus brachyrhynchos</i>	194	NB	5.3%
American Goldfinch	<i>Spinus tristis</i>	168	H	4.6%
American Redstart	<i>Setophaga ruticilla</i>	53	S	1.5%
American Robin*	<i>Turdus migratorius</i>	78	D	2.1%
American Woodcock	<i>Scolopax minor</i>	3	H	0.1%
<b>Barn Swallow</b>	<b><i>Hirundo rustica</i></b>	<b>3</b>	H	<b>0.1%</b>
Bay-breasted Warbler*	<i>Setophaga castanea</i>	3	S	0.1%
Black-and-White Warbler	<i>Mniotilta varia</i>	10	S	0.3%
Blackburnian Warbler	<i>Setophaga fusca</i>	1	S	0.0%
Black-capped Chickadee	<i>Poecile atricapillus</i>	51	S	1.4%
Blackpoll Warbler*	<i>Setophaga striata</i>	2	X	0.1%
Black-throated Green Warbler	<i>Setophaga virens</i>	28	S	0.8%
Blue Jay	<i>Cyanocitta cristata</i>	2	H	0.1%
Blue-headed Vireo	<i>Vireo solitarius</i>	5	S	0.1%
Blue-winged Teal*	<i>Spatula discors</i>	31	FY	0.9%
Boreal Chickadee*	<i>Poecile hudsonicus</i>	1	X	0.0%
Canada Goose	<i>Branta canadensis</i>	5	P	0.1%
Cedar Waxwing	<i>Bombycilla cedrorum</i>	33	H	0.9%
Chestnut-sided Warbler	<i>Setophaga pensylvanica</i>	1	S	0.0%
Common Eider*	<i>Somateria mollissima</i>	489	FY	13.5%
Common Grackle	<i>Quiscalus quiscula</i>	31	S	0.9%
Common Loon	<i>Gavia immer</i>	3	X	0.1%
Common Raven	<i>Corvus corax</i>	15	H	0.4%
Common Yellowthroat	<i>Geothlypis trichas</i>	111	S	3.1%

Common Name	Scientific Name	Total Individuals	Breeding Evidence (Breeding Code)**	Relative Abundance
Dark-eyed Junco	<i>Junco hyemalis</i>	5	P	0.1%
Double-crested Cormorant	<i>Nannopterum auritum</i>	136	H	3.7%
European Starling	<i>Sturnus vulgaris</i>	328	H	9.0%
Golden-crowned Kinglet	<i>Regulus satrapa</i>	7	S	0.2%
Great Black-backed Gull	<i>Larus marinus</i>	105	NB	2.9%
Great Blue Heron	<i>Ardea herodias</i>	8	H	0.2%
Greater Yellowlegs*	<i>Tringa melanoleuca</i>	1	X	0.0%
Green-winged Teal	<i>Anas crecca</i>	13	FY	0.4%
Grey Catbird	<i>Dumetella carolinensis</i>	2	H	0.1%
Hairy Woodpecker	<i>Dryobates villosus</i>	1	H	0.0%
Hermit Thrush	<i>Catharus guttatus</i>	4	S	0.1%
Herring Gull	<i>Larus argentatus</i>	669	NB	18.4%
Least Flycatcher	<i>Empidonax minimus</i>	1	S	0.0%
Least Sandpiper*	<i>Calidris minutilla</i>	3	X	0.1%
Magnolia Warbler	<i>Setophaga magnolia</i>	4	S	0.1%
Mallard	<i>Anas platyrhynchos</i>	4	H	0.1%
Mourning Dove	<i>Zenaida macroura</i>	24	S	0.7%
Nashville Warbler	<i>Leiothlypis ruficapilla</i>	2	S	0.1%
Northern Cardinal	<i>Cardinalis cardinalis</i>	1	S	0.0%
Northern Flicker	<i>Colaptes auratus</i>	11	H	0.3%
Northern Gannet	<i>Morus bassanus</i>	1	X	0.0%
Northern Harrier	<i>Circus hudsonius</i>	10	P	0.3%
Northern Parula	<i>Setophaga americana</i>	10	S	0.3%
Northern Shoveler*	<i>Spatula clypeata</i>	3	H	0.1%
Osprey	<i>Pandion haliaetus</i>	11	AE	0.3%
Palm Warbler	<i>Setophaga palmarum</i>	1	H	0.0%
Purple Finch*	<i>Haemorhous purpureus</i>	15	P	0.4%
Red Crossbill*	<i>Loxia curvirostra</i>	2	H	0.1%

Common Name	Scientific Name	Total Individuals	Breeding Evidence (Breeding Code)**	Relative Abundance
Red-breasted Nuthatch	<i>Sitta canadensis</i>	1	S	0.0%
Red-eyed Vireo	<i>Vireo olivaceus</i>	16	S	0.4%
Red-winged Blackbird	<i>Agelaius phoeniceus</i>	76	S	2.1%
Ring-billed Gull	<i>Larus delawarensis</i>	1	P	0.0%
Ring-necked Pheasant	<i>Phasianus colchicus</i>	66	H	1.8%
Savannah Sparrow	<i>Passerculus sandwichensis</i>	35	S	1.0%
Semipalmated Plover*	<i>Charadrius semipalmatus</i>	1	X	0.0%
Song Sparrow	<i>Melospiza melodia</i>	222	P	6.1%
Spotted Sandpiper*	<i>Actitis macularius</i>	1	H	0.0%
Surf Scoter	<i>Melanitta perspicillata</i>	1	X	0.0%
Swamp Sparrow	<i>Melospiza georgiana</i>	8	S	0.2%
Tree Swallow	<i>Tachycineta bicolor</i>	7	H	0.2%
Unidentified Bird	Undetermined	2	-	0.1%
Unidentified Duck	Undetermined	3	-	0.1%
Unidentified Gull	Undetermined	2	-	0.1%
Unidentified Sparrow	Undetermined	1	-	0.0%
Unidentified Woodpecker	Undetermined	1	-	0.0%
White-throated Sparrow	<i>Zonotrichia albicollis</i>	3	S	0.1%
White-winged Crossbill	<i>Loxia leucoptera</i>	1	H	0.0%
Willet*	<i>Tringa semipalmata</i>	68	D	1.9%
Yellow Warbler	<i>Setophaga petechia</i>	97	S	2.7%
Yellow-rumped Warbler	<i>Setophaga coronata</i>	11	S	0.3%

**Bolded font** indicates SAR

\* Indicates SoCC

\*\*Breeding bird evidence codes are defined in Table 4.3 with the main document.

**Table D.7. Bird species recorded during the nightjar survey conducted on July 14, 2021, at Hartlen Point.**




Common Name	Scientific Name	Total No. of Individuals Recorded	Relative Abundance (%)
American Goldfinch	<i>Carduelis tristis</i>	1	1.4
Bald Eagle	<i>Haliaeetus leucocephalus</i>	1	1.4
<b>Barn Swallow</b>	<b><i>Hirundo rustica</i></b>	<b>6</b>	8.5
Canada Goose	<i>Branta canadensis</i>	4	5.6
Common Yellowthroat	<i>Geothlypis trichas</i>	4	5.6
Double-crested Cormorant	<i>Phalacrocorax auritus</i>	5	7.0
Great Blue Heron	<i>Ardea herodias</i>	2	2.8
Herring Gull	<i>Larus argentatus</i>	36	50.7
Osprey	<i>Pandion haliaetus</i>	0*	5.6
Red-winged Blackbird	<i>Agelaius phoeniceus</i>	4	4.2
Savannah Sparrow	<i>Passerculus sandwichensis</i>	3	1.4
Song Sparrow	<i>Melospiza melodia</i>	1	5.6
Tree Swallow	<i>Tachycineta bicolor</i>	4	1.4

**Bolded font** indicates a SAR

\* Nest observed



**Table D.8 Locations with Barn Swallow Roosting Potential in the Study Area**

Wetland	Roosting Potential	Rationale	Photo
HP-1 Basin Bog	Moderate	Moderate sized area of emergent vegetation and cattails.	
HP-2 Tidal Bay Salt Marsh Complex	High	Large area of emergent vegetation and cattails.	
HP-3 Tall Shrub Swamp	Low	Minimal emergent vegetation.	

Wetland	Roosting Potential	Rationale	Photo
HP-4 Treed Forested Swamp	Low	Minimal emergent vegetation.	
HP-5 Basin Bog	Low	Minimal emergent vegetation.	
HP-6 Slope Marsh	Low	Minimal emergent vegetation.	

Wetland	Roosting Potential	Rationale	Photo
HP-7A Bog Wetland Pocket	Low	Minimal emergent vegetation.	
HP-7B Bog Wetland Pocket	Low	Minimal emergent vegetation.	
HP-7C Bog Wetland Pocket	Low	Minimal emergent vegetation.	



Wetland	Roosting Potential	Rationale	Photo
HP-7D Bog Wetland Pocket	Low	Minimal emergent vegetation.	
HP-8 Basin Marsh	Low	Minimal emergent vegetation, very exposed to wind.	
HP-9A Slope Salt Marsh	Moderate	Moderate sized area of emergent vegetation and cattails.	




Wetland	Roosting Potential	Rationale	Photo
HP-9B Slope Salt Marsh	Low	<p>Small area of cattails and emergent vegetation.</p> <p>This area is fairly exposed to wind.</p>	
Artificial Pond	Low	<p>Small area of cattails and emergent vegetation.</p>	

**Table D.9 Locations with Barn Swallow Nesting Potential in the Study Area**




Location	Photo
Old Building with Golf Course Sign in the Study Area	
Golf Course Storage Building in the Study Area	
Building within a fenced area within the Study Area	

**Table D.10 Detailed Results of Pileated Woodpecker Nest Survey**

Area	Transect(s)	Summary	Photo
1	1	<p>Transect 1 was almost entirely within a basin bog (HP-5).</p> <p>No woodpecker evidence found.</p>	
1	2	<p>Transect 2 was mostly clear cut and a bog with very few mature trees.</p> <p>No woodpecker evidence found.</p>	

Area	Transect(s)	Summary	Photo
1-2	3	<p>Transect 3 was mostly clear cut with some young and mature trees (&gt;25cm DBH).</p> <p>One Northern Flicker observed.</p>	
1-2	4	<p>Transect 4 was a mixed forest that transitioned into a coastal salt marsh.</p> <p>One Hairy Woodpecker was identified.</p>	
1-2	5	<p>Transect 5 was a young mixed forest some suitable sized trees (&gt;25cm DBH), this transect ended in the clearing for the building and fence line.</p> <p>No woodpecker evidence.</p>	



Area	Transect(s)	Summary	Photo
1-2	6	<p>Transect 6 was mostly wooded with some suitable sized trees (&gt;25cm DBH), this transect ended in the clearing for the building and fence line.</p> <p>No woodpecker evidence.</p>	
1-2	7	<p>Transect 7 was mostly shrubs with a few mature trees (&gt;25cm DBH)</p> <p>No woodpecker evidence.</p>	
2	8	<p>Transect 8 was mostly shrubs with a small area of trees</p> <p>No woodpecker evidence.</p>	

Area	Transect(s)	Summary	Photo
2	9-10	<p>Transects 9 and 10 were mostly shrubs with very few trees.</p> <p>No woodpecker evidence.</p>	
3	11-12	<p>Transects 11 and 12 were mostly shrubs, grasses and stunted small diameter trees.</p> <p>No woodpecker evidence.</p>	

**Table D.11. Bird species recorded during winter residency surveys conducted on December 13, 2021, January 13, and January 26, 2022, at Hartlen Point.**

Common Name	Scientific Name	Total No. of Individuals Recorded	Relative Abundance (%)
American Black Duck	<i>Anas rubripes</i>	36	4.6
American Crow	<i>Corvus brachyrhynchos</i>	75	9.6
American Goldfinch	<i>Carduelis tristis</i>	31	4.0
American Robin*	<i>Turdus migratorius</i>	1	0.1
American Tree Sparrow	<i>Spizelloides arborea</i>	2	0.3
Bald Eagle	<i>Haliaeetus leucocephalus</i>	2	0.3
<b>Barrow's Goldeneye</b>	<b><i>Bucephala islandica</i></b>	<b>18</b>	0.9
Black Guillemot	<i>Cephus grylle</i>	2	0.3
Black Scoter	<i>Melanitta americana</i>	6	0.8
Black-capped Chickadee	<i>Poecile atricapilla</i>	21	2.7
Blue Jay	<i>Cyanocitta cristata</i>	1	0.1
Bonaparte's Gull	<i>Chroicocephalus Philadelphia</i>	1	0.1
Bufflehead*	<i>Bucephala albeola</i>	7	0.9
Canada Goose	<i>Branta canadensis</i>	129	16.5
Common Eider*	<i>Somateria mollissima</i>	88	11.2
Common Goldeneye*	<i>Bucephala clangula</i>	4	0.5
Double-crested Cormorant	<i>Phalacrocorax auritus</i>	24	3.1
Dovekie	<i>Alle alle</i>	4	0.5
Downy Woodpecker	<i>Picoides pubescens</i>	1	0.1
European Starling	<i>Sturnus vulgaris</i>	65	8.3
Golden-crowned Kinglet	<i>Regulus satrapa</i>	9	1.1
Great Black-backed Gull	<i>Larus marinus</i>	13	1.7
Herring Gull	<i>Larus argentatus</i>	94	12.0
Horned Lark	<i>Eremophila alpestris</i>	19	2.4
Iceland Gull	<i>Larus glaucoides</i>	32	4.1
Long-tailed Duck	<i>Clangula hyemalis</i>	17	2.2
Mallard	<i>Anas platyrhynchos</i>	3	0.4
Merlin	<i>Falco columbarius</i>	1	0.1
Mourning Dove	<i>Zenaida macroura</i>	1	0.1
Northern Flicker	<i>Colaptes auratus</i>	3	0.4
Northern Gannet	<i>Morus bassanus</i>	3	0.4
Northern Harrier*	<i>Circus hudsonicus</i>	2	0.3
Pine Warbler*	<i>Dendroica pinus</i>	1	0.1
Purple Sandpiper*	<i>Calidris ferruginea</i>	16	2.0
Red-breasted Merganser*	<i>Mergus serrator</i>	13	1.7
Ring-necked Duck	<i>Aythya collaris</i>	13	1.7
Ring-necked Pheasant	<i>Phasianus colchicus</i>	12	1.5
<b>Savannah Sparrow (Ipswich)</b>	<b><i>Passerculus sandwichensis princeps</i></b>	<b>3</b>	0.4
Snow Bunting	<i>Plectrophenax nivalis</i>	2	0.3

Common Name	Scientific Name	Total No. of Individuals Recorded	Relative Abundance (%)
Snowy Owl	<i>Bubo scandiacus</i>	2	0.3
Song Sparrow	<i>Melospiza melodia</i>	14	1.8
White-throated Sparrow	<i>Zonotrichia albicollis</i>	1	0.1
White-winged Scoter	<i>Melanitta deglandi</i>	3	0.4

SC = Special Concern, NAR = Not at Risk, NL = Not Listed

**Bolded font** indicates SAR

\* Indicates SoCC



Site ID: \_\_\_\_\_ Date: \_\_\_\_\_ Waypoint: \_\_\_\_\_ Name of Surveyer(s): \_\_\_\_\_  
 Survey Start Time : \_\_\_\_\_ Survey End Time : \_\_\_\_\_ Time of Sunset: \_\_\_\_\_ Precipitation: \_\_\_\_\_  
 Habitat Type<sup>1</sup>: \_\_\_\_\_ Relative Humidity (%): \_\_\_\_\_  
 Cloud Cover (Scale 1-2<sup>4</sup>): \_\_\_\_\_ Visibility: \_\_\_\_\_ Lunar Cycle: \_\_\_\_\_ Tidal Cycle: \_\_\_\_\_  
 Start Temperature (°C): \_\_\_\_\_ End Temperature (°C) \_\_\_\_\_ Wind (km/h): \_\_\_\_\_ Wind Gusts (km/h): \_\_\_\_\_  
 Comments: \_\_\_\_\_

Interval (min)	Time (pm)	Barn Swallow Observed (y/n) (visual or vocal)	Flock Observed (y/n)	# Of Individuals	Behaviour Observed	Comments (e.g. changing conditions, incidental observations)
<b><i>Before Sunset</i></b>						
0-5						
5-10						
10-15						
15-20						
20-25						
25-30						
30-35						

<sup>1</sup> Habitat Types: RS-01: Wetland (Freshwater Marsh/Shrub Swamp Complex) and Forested (Alders) and Beach; RS-02: Wetland (Freshwater Marsh) and Urban Golf Course RS-03 Wetland (Saltmarsh)

<sup>2</sup> Cloud Cover (Categorized as 1 to 4 with 1 being clear and 4 being overcast)



Interval (min)	Time (pm)	Barn Swallow Observed (y/n) (visual or vocal)	Flock Observed (y/n)	# Of Individuals	Behaviour Observed	Comments (e.g. changing conditions, incidental observations)
35-40						
40-45						
<b>Sunset</b>						
45-50						
50-55						
55-60						
60-65						
65-70						

**Protocol: Modified from: Saldanha, 2016; Ross et al., 1984; ECCC-CWS, 2022 (personal communication):**

- Surveys start at 45 minutes before sunset and end 20 minutes after sunset.
- Areas with emergent vegetation (e.g., cattails) and adjacent shrubs will be surveyed at each survey area (i.e., RS-01, RS-02, RS-03).
- Barn swallows will be monitored in 5-minute intervals as flocks will generally arrive circle then descend into the cattails
- Count individuals if < 50 individuals
- Estimate individuals if > 50 individuals
- Barn swallows circling or barn swallows joining a circle and then descending into the cattails are assumed to be roosting at the site.
- If a flock leaves the site and then reappears, then assume it is the same flock if the number of individuals are similar.



Area #: \_\_\_\_\_ Transect #: \_\_\_\_\_ Transect Length: \_\_\_\_\_ Date: \_\_\_\_\_ Surveyer(s): \_\_\_\_\_  
 Start Waypoint: \_\_\_\_\_ End Waypoint: \_\_\_\_\_ Cloud Cover<sup>1</sup>: \_\_\_\_\_ Visibility: \_\_\_\_\_ Wind (km/h): \_\_\_\_\_  
 Temperature (°C): \_\_\_\_\_ Precipitation: \_\_\_\_\_ Start Time: \_\_\_\_\_ End Time: \_\_\_\_\_  
 Habitat(s): \_\_\_\_\_ Additional Notes<sup>2</sup>: \_\_\_\_\_

Distance along Transect (m)	Woodpecker Species Seen & Sign Type on Tree <sup>3</sup>	Distance from Transect to Tree (approx.)	Waypoint # of Tree	Tree Species	Tree Type & Decay Class <sup>4</sup>	DBH <sup>5</sup>	Tree Height	Hole Shape <sup>6</sup> & Size	Cavity Depth	Hole Edge Texture (smooth or rough)

<sup>1</sup> Cloud cover categorized as 1 to 4 with 1 being clear and 4 being overcast.

<sup>2</sup> Include SAR/SoCC species identified and provide waypoints.

<sup>3</sup> Signs: Active or old nest cavity, roost cavity, new or old foraging excavation. Use mirror and pole to assist. Identify the # of holes per tree.

<sup>4</sup> Tree Type: Solid, hollow, dead. State decay class according to evergreen or coniferous tree classification system, see images below for guidance.

<sup>5</sup> DBH of tree to the nearest ± 1 cm at 1.3 m height on the high side of the tree. Only focus on trees with a DBH of 25 cm or greater.

<sup>6</sup> Hole Shape: Round or teardrop, oval, irregular.



Distance along Transect (m)	Woodpecker Species Seen & Sign Type on Tree <sup>3</sup>	Distance from Transect to Tree (approx.)	Waypoint # of Tree	Tree Species	Tree Type & Decay Class <sup>4</sup>	DBH <sup>5</sup>	Tree Height	Hole Shape <sup>6</sup> & Size	Cavity Depth	Hole Edge Texture (smooth or rough)

**Decay Class Rating Guide:**

Decay Class	LIVE		DEAD						
	1	2	3	4	5	6	7	8	9

Decay Class	LIVE		DEAD			DEAD FALLEN
	1	2	3	4	5	6
Description	Live/healthy: no decay.	Live with defects: dead or broken top, dead limbs, fungal conks. Dying tree.	Dead: most limbs intact, some internal rot, top usually broken.	Dead: most limbs gone, top broken, extensive heartrot.	Dead: top 1/3 or more broken off, no branches, extensive heartrot.	Dead, fallen: downed trees, coarse woody debris.





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