DILLON CONSULTING

NATURAL FORCES DEVELOPMENTS LP

Bird and Bird Habitat Appendix 2021-2022

Westchester Wind Project

December 2022 – 22-4065

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December 13, 2022

Natural Forces Developments LP
Westchester Wind Project
1801 Hollis Street, Suite 1205
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Attention: Megan MacIsaac

Bird and Bird Habitat Appendix: 2021-2022 Assessment for the for the Westchester Wind Project

Dillon Consulting Limited (Dillon) is pleased to provide you with the final report for the birds and bird habitat assessments conducted as part of the environmental assessment for the Westchester Wind Project.

We trust the following meets your present needs. If you have any questions or comments, please contact the undersigned at (902)-450-4000 ext. 5052 at your convenience.

Sincerely,

DILLON CONSULTING LIMITED

Kelly Regan, M.Sc.
Project Manager, Associate

KSR:jb
Enclosure

Our file: 22-4065

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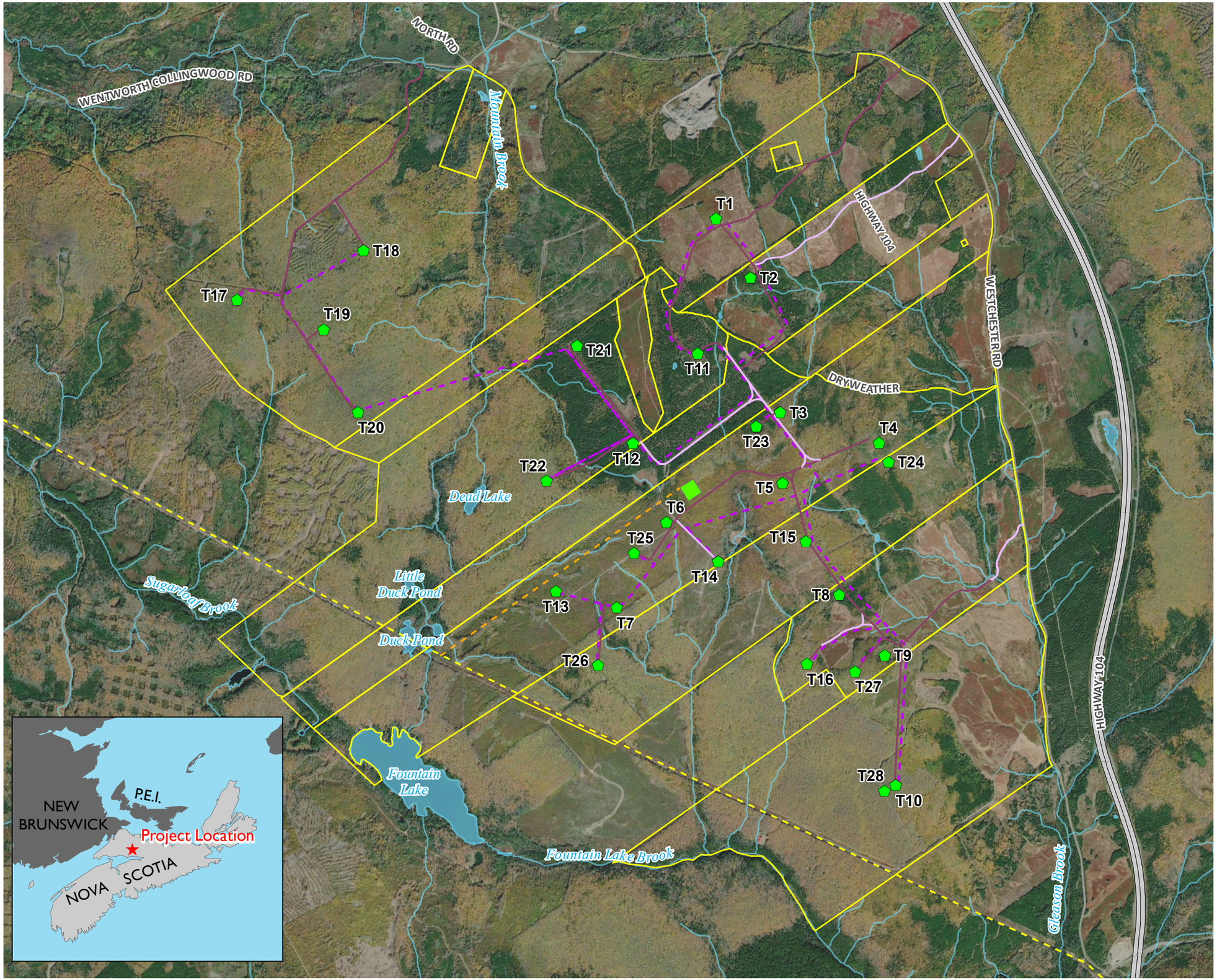
1.0 Introduction

Dillon Consulting (Dillon) was retained by Natural Forces Developments Limited Partnership (the Proponent) on behalf of the Westchester Wind Limited Partnership to complete biophysical environment surveys in support of the development of a Nova Scotia Environmental Assessment Registration Document (EARD) and associated Addendum for the Westchester Wind Project (the Project). The Project is being developed and will be owned and operated by the Westchester Wind Limited Partnership, a partnership between Natural Forces Developments Limited Partnership (referred to herein as the Proponent or Natural Forces) and Wskijnu'k Mtmo'taqnuow Agency Limited (the Agency), a corporate body wholly owned by the 13 Mi'kmaw bands in Nova Scotia. Natural Forces acts on behalf of the Westchester Wind Limited Partnership for many aspects of Project development.

The Project consists of up to 12 wind turbine generators (WTGs) capable of producing up to 50 MW of renewable energy that will be connected to the existing Nova Scotia Power transmission grid via an overhead transmission line, as well as a substation (Figure 1). The Project is located on a mixture of privately-owned blueberry fields, previously forested land and undeveloped forested land in Cumberland County near the communities of Westchester Station, Rose, and Londonderry.

The proposed project is located in an area where birds and bird habitat are present. A key environmental concern associated with wind projects is the potential for effects to birds (e.g., collisions). Birds and bird habitat are considered important features and valued environmental components (VECs) because they are valued in their relationship with other wildlife and habitats, including other biological and physical components addressed as VECs in this environmental assessment (EA). Natural environment surveys for the Project were conducted for VECs that were identified based on an understanding of the environmental features of the proposed project area, the nature of the Project, and the potential interactions that may occur between the proposed project and the environment/VECs.

Taking into consideration the objectives of the EARD, this report provides an effects assessment on birds and bird habitat, and includes: a brief overview of the proposed Project; a description of the scope and methodology used for the birds and bird habitat surveys; a summary of the assessment results; and, an assessment of residual effects (including potential interactions and mitigation) of the proposed Project on birds and bird habitat.



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WESTCHESTER WIND PROJECT

PROJECT LOCATION AND SITE LAYOUT

FIGURE 1

- Proposed Turbine Location
- Proposed Substation Location
- Property Lines
- Roads to be Upgraded
- Proposed Access Roads
- Proposed Collector Network
- Proposed Interconnection Line
- Transmission Line
- Highway
- Watercourse
- Waterbody

SCALE 1:24,994

0 0.25 0.5 1 km

N W E S

MAP DRAWING INFORMATION:
DATA PROVIDED BY DILLON CONSULTING, GEONB, NATURAL FORCES

MAP CREATED BY: DU
MAP CHECKED BY: KB
MAP PROJECTION: NAD 1983 UTM ZONE 20N

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DATE: 2022-12-09

FILE LOCATION: K:\2021\211329\Product\Internal\Westchester_Figures_2022\WC_ProjectLocation_2022.mxd

1.1 Background

In Canada, important bird habitats are recognized by the Important Bird and Biodiversity Areas Program. This program aims to conserve, and monitor a network of sites that provide essential habitat for Canada's bird populations (Birds Canada 2022a).The nearest designated Important Bird Area (IBA), Cobequid Bay located within the upper Bay of Fundy (NS019), is located approximately 15 kilometres (km) south from the PDA. This IBA is approximately 480 km^2 and consists of intertidal habitats including mudflats, sandflats and salt marshes that provide foraging opportunities for migrating shorebirds. Between 1 and 2 million shorebirds use the mud flats of the Bay of Fundy in the fall for staging before the southern migration. (IBAC 2022).

Birds in Nova Scotia have protection under both provincial and federal legislation. The vast majority of bird species found in Nova Scotia are migratory and either breed in the province during the summer months, or pass through it during the spring and fall migratory periods. Birds in Nova Scotia have protection under both provincial and federal legislation. Jurisdiction for many migratory birds is federal, since migratory birds cross both provincial and international boundaries. The *Migratory Birds Convention Act* (MBCA) is the federal law which protects migratory birds in Canada (with similar legislation in the United States). The MBCA prohibits killing, injuring or harassing migratory birds, their nests, or their young without a permit from Environment and Climate Change Canada (ECCC). Migratory birds that are protected under the MBCA in Canada, and that are relevant to the Project, include:

- Waterfowl (e.g., ducks and geese);
- Rails (e.g., coots, gallinules, sora, and other rails);
- Shorebirds (e.g., plovers and sandpipers); and
- Songbirds (e.g., thrushes and warblers).

Furthermore, species listed pursuant the federal *Species at Risk Act* (SARA) or the Nova Scotia *Endangered Species Act* (NS ESA) are afforded further protection as the destruction and harm to their nest, eggs, or young is prohibited.

Birds not addressed under federal jurisdiction include grouse, quail, pheasants, ptarmigan, hawks, owls, eagles, falcons, cormorants, pelicans, crows, jays, and kingfishers. Most birds not included in this list are protected under provincial laws, most notably the Nova Scotia *Lands and Forests Act* and the Nova Scotia *Wildlife Act*. In Nova Scotia, all but three of the 225 bird species are protected by one of these Acts. English sparrows, crows, and starlings are considered pests, and are afforded no protection against killing (NSDNRR 2011).

The federal and provincial legislation that could apply to the Project include (but may not be limited to):

- *Migratory Bird Convention Act (ECCC 1994)*
- *Canadian Environmental Protection Act* and regulations (ECCC 1999);
- *Species at Risk Act* (ECCC 2002);
- *Transportation of Dangerous Goods Act*, and regulations (TC 1992);
- Nova Scotia *Environment Act* and regulations (NSG 1994-95);
- Nova Scotia *Water Resources Protection Act* and regulations(NSG 2000);
- Nova Scotia *Endangered Species Act* and regulations (NSECC 1998a);
- Nova Scotia *Wilderness Areas Protection Act* and regulations (NSG 1998b); and
- Contingency Planning Guidelines (NSECC 2021).

Several factors that greatly influence the diversity and abundance of birds in Nova Scotia include habitat factors, geography and seasonality (i.e., the timing of important annual events including migration and breeding; Davis and Browne 1996). Nova Scotia is an important migration pathway for birds due to the extensive coastline and abundance of bird habitats such as mud flats; therefore, bird assemblages can vary greatly seasonally and between regions. As such, a study design was proposed and discussed with Nova Scotia Department of Natural Resources and Renewables (NSDNRR) biologists prior to being implemented with consideration for the ecological setting of the site and the nearby important bird habitat. The proposed study included field survey methodologies for breeding birds, migratory birds and resident bird populations with strategic timing designed to match breeding and migratory windows specific for the region and targeted species, such as the Common Nighthawk (*Chordeiles minor*) and the Barred Owl (*Strix varia*).

1.2 Purpose and Objectives of the Report

This report provides a summary of the bird surveys that were conducted as part of the biophysical surveys undertaken in support of the Project Environmental Assessment registration. The report includes:

- Brief description of the Project;
- Description of the scope and methodology used for the surveys;
- Summary of the approach used to evaluate the data;
- Results of the desktop and field surveys;
- Potential effects of the Project on birds and bird habitat; and
- Proposed mitigation based on industry best practise and experience.

2.0 Project Description

The following is a high-level summary of the Project. Please refer to the Westchester Wind Project Environmental Registration Document Addendum (the Addendum) dated December 2022 for further information.

The Project is located on Westchester Mountain in Cumberland County. The Project is proposed to have an installed capacity of up to 50 MW, amounting to up to 12 wind turbine generators and associated infrastructure, including a substation and overhead transmission line (Figure 1).

The Project will be located predominantly on privately owned lands used for blueberry farming, forestry, maple groves, and recreation (i.e. snowmobile trails). An easement will be required over a 300 m stretch of crown land along an existing access road. The forestry activities include previously forested land at varying stages of regeneration, as well as undeveloped forested lands owned by forestry companies. The Project site met crucial factors that determined suitability, which included features such as the strength and consistency of the wind resources and its proximity to existing electrical and civil infrastructure. The Project site was selected due to the existing mixed anthropogenic land uses and historical anthropogenic impacts in these areas, in order to minimize impacts to undeveloped lands to the extent feasible.

The purpose of the Project is to contribute to Nova Scotia achieving their renewable electricity targets through the generation of clean and renewable energy. Not only will this have environmental benefits, but will also reduce Nova Scotia's reliance on imported energy sources through the development of a localized renewable energy generation (Renewable Electricity Regulations 2021).

3.0 Scope of Work

To support the assessment of potential effects of the Project on birds and bird habitat, the scope of work for the bird surveys was based on the recommended Environment and Climate Change Canada's Canadian Wildlife Service (CWS) protocols (EC-CWS 2007a), and feedback from Nova Scotia Environment and Climate Change (NSECC), and NSDNRR during the regulatory consultation process. The following scope of work was completed as part of the bird and bird habitat surveys for the Project. As field work progressed, and as more information became available, the surveys were refined based on the available habitat types and expected species diversity within the Project study area. The scope of work included:

- An initial desktop assessment of bird and bird habitats near the Project;
- A desktop assessment of bird species and risk (SAR) and species of conservation concern (SoCC) with the potential to occur near the Project or previously identified in the region;
- Field Surveys for birds including:
  - Winter Residency Surveys (targeting overwintering/resident bird species);
  - Spring Surveys (targeting migrating birds using the area as a stopover and breeding nocturnal owls);
  - Summer Surveys (targeting breeding birds, including a targeted common nighthawk survey; and
  - Fall Surveys (targeting migrating birds); and
- An assessment of bird SAR, SoCC and potential habitat for priority bird species near the Project.

It is noted that as field work progressed, and as more information became available, the surveys were refined based on the available habitat types and expected species diversity within the Project study area.

3.1 Spatial Boundaries

For the purpose of the bird and bird habitat surveys conducted as part of the biophysical baseline assessment for the Project, the spatial boundaries included the Potential Development Area (PDA), the study area and the Local Assessment Area (LAA) (Table 1, Figure 2). The Canadian Wildlife Service (CWS) (2007b) recommends selecting survey locations within representative habitats likely to be used by songbirds in the region and spacing the survey locations at least 250 m apart in forest, or 500 m apart in open habitat. Following this recommendation, a study area design was developed that incorporated a LAA defined as a 500 m buffer around the PDA. The survey locations selected within the LAA were designed to identify the Project-specific environmental interactions in relation to potential turbine locations within a representative area that environmental interactions can be predicted and measured with a reasonable degree of accuracy and confidence. The extent of each spatial boundary and purpose for the assessment of birds and bird habitat is summarized in Table 1 and shown on Figure 2.

Table 1: Spatial Boundaries for the Assessment of Birds and Bird Habitats

Assessment Area	Definition	Purpose of Boundary
Potential Development Area	Area encompasses the Project footprint and a buffer of 15 m on either side of shoulders of the roadways (either existing or new) and collector lines and transmission line, a 75 m buffer around the base of each turbine location, and a 25 m buffer around the substation.	Represents the extent of anticipated areas that could undergo physical disturbance associated with the Project. This area encompasses the proposed 28 turbines locations and their associated infrastructure. However, the Project would consist of up to 12 of those locations and their associated infrastructure.
Study Area	Encompasses the area over which surveys (point count and watch surveys) were completed. These locations are presented on Figures 2 and 3.	The area included in focused surveys on foot. Observations in the study area are extrapolated and applied to understand potential effects of the Project on the assessment area.
Local Assessment Area	Area includes a 500 m buffer around the potential development area of project components including turbines, substations and access roads.	The maximum area where Project-specific environmental interactions can be predicted and measured with a reasonable degree of accuracy and confidence (i.e. the zone of influence of the Project phases on each VEC).

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WESTCHESTER WIND PROJECT

STUDY AND LOCAL ASSESSMENT AREA FOR BIRDS (WINTER SEARCH AREAS AND DIURNAL WATCH COUNT LOCATIONS)

FIGURE 2

- Diurnal Watch Count Location
- Nocturnal Survey Location

Winter Area Search

- February 25, 2021 (5.4 km)
- March 13, 2021 (7.37 km)
- March 12, 2021 (6.44 km)
- February 26, 2021 (5.85 km)

- Proposed Turbine Location
- Proposed Substation Location
- Local Assessment Area (LAA)
- Potential Development Area (PDA)
- Highway
- Watercourse
- Waterbody
- Wetland

0 0.125 0.25 0.5 km

N W E S

SCALE 1:24,000

MAP DRAWING INFORMATION:
DATA PROVIDED BY DILLON CONSULTING, GEONB, NATURAL FORCES

MAP CREATED BY: GAM
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Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

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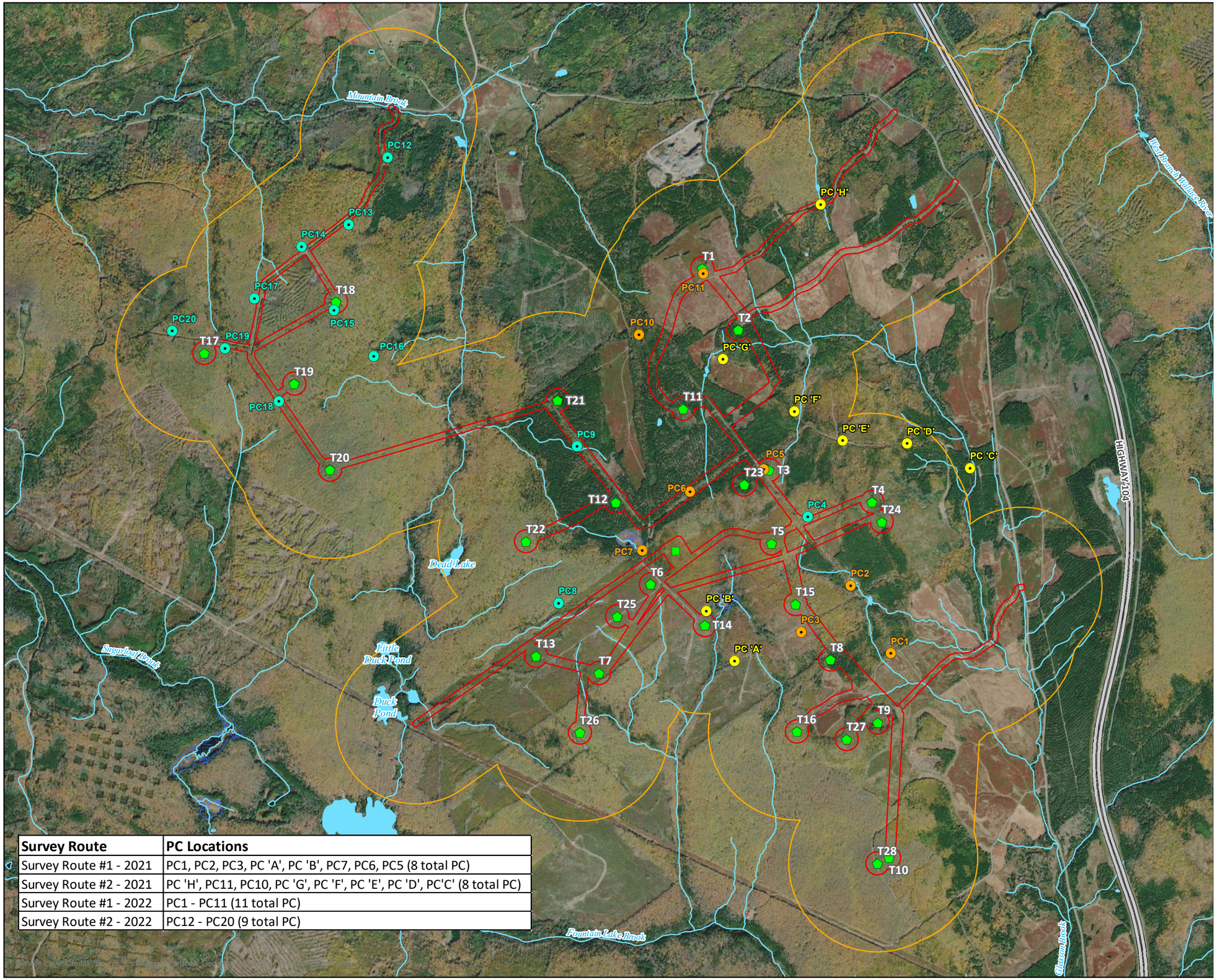

Survey Route	PC Locations
Survey Route #1 - 2021	PC1, PC2, PC3, PC 'A', PC 'B', PC7, PC6, PC5 (8 total PC)
Survey Route #2 - 2021	PC 'H', PC11, PC10, PC 'G', PC 'F', PC 'E', PC 'D', PC'C' (8 total PC)
Survey Route #1 - 2022	PC1 - PC11 (11 total PC)
Survey Route #2 - 2022	PC12 - PC20 (9 total PC)

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WESTCHESTER WIND PROJECT

STUDY AND LOCAL ASSESSMENT AREAS FOR BIRDS (POINT COUNT LOCATIONS AND SURVEY ROUTES)

FIGURE 3

- Point Count (2022)
- Point Count (2021 & 2022)
- Point Count (2021)
- Proposed Turbine Location
- Proposed Substation Location
- Local Assessment Area (LAA)
- Potential Development Area (PDA)
- Highway
- Watercourse
- Waterbody
- Wetland

0 0.125 0.25 0.5 km

N W E S

SCALE 1:24,000

MAP DRAWING INFORMATION:
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4.0 Methods

4.1 Desktop Surveys

4.1.1 Desktop Forest Habitat Assessment

Mature forests typically have larger diameter trees and are effective habitat indicators for birds as they offer nest sites, perches, and provide sources for cavities that enhance the habitat for many forest birds (Treyger 2019). This assessment included a review of available background information sources and mapping to identify forested habitat for birds within the LAA. Information reviewed included the following sources:

- Publicly available GIS map layers (e.g., ecological land classification, forest and non-forest inventory, wetland inventory, Protected Natural Areas, Wildlife Management Zones);
- High-resolution Google Earth imagery, which was available for the site from September 2021, June 2020, November 2019, August 2018, and December 2017;
- Important Bird Areas (IBAs) of Canada mapping;
- Nova Scotia Natural Resources and Renewables Forest Inventory (NSDNRR 2021);
- Provincial Parks and Protected Areas mapping;
- Environmentally Sensitive Areas (ESAs) database;
- Federally-designated Migratory Bird Sanctuaries;
- Second Atlas of Breeding Birds of the Maritime Provinces (Stewart et al. 2015);
- Data Reports from the Atlantic Canada Conservation Data Centre (AC CDC; 2021 and 2022); and
- Identified Protected Natural Areas (PNAs) and Wildlife Management Zones (WMZ).

This assessment used available forestry data from NSDNRR which was verified based on field observations noted during the 2021 and 2022 field surveys. Mature forest stands were determined based on the NSDNRR forest inventory and diameter at breast height (dbh).

4.1.2 Desktop Screening for Bird SAR and SoCC

Prior to conducting field work, a high-level desktop screening for priority bird species and habitats within the LAA was completed. The purpose of the screening was to aid in the planning of the field surveys and identify targeted species surveys to include in the bird biophysical assessments. The priority species screening included consultation with NSDNRR wildlife biologists and a desktop analysis, which includes data obtained from a site specific report provided by the Atlantic Canada Conservation Data Centre (AC CDC).

For this assessment, the following definitions of SAR and SoCC apply:

- Species at Risk (SAR): A species that is determined to be Endangered, Threatened, or Vulnerable/Special Concern by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), Nova Scotia Endangered Species Act (NSESA), or the federal Species at Risk Act (SARA); and,
- Species of Conservation Concern (SoCC): those species that are not SAR but are identified as regionally vulnerable or imperilled by the Atlantic Canada Conservation Data Centre (AC CDC) (i.e., those species with AC CDC S-ranks of S1: Critically imperiled in province; S2: Imperiled in province; and S3: Vulnerable in province of Nova Scotia.

Readily-available information from reputable sources was reviewed to evaluate the potential for bird SAR and SoCC within the LAA. Dillon completed a review of the following sources and data lists for the purpose of characterizing existing conditions at the Project site:

- Data from the Atlantic Canada Conservation Data Centre (2021 and 2022);
- The federal SAR public registry (GoC 2022);
- The provincial Endangered Species registry (GNS 2022);
- Second Atlas of Breeding Birds of the Maritime Provinces (MBBA; Stewart et al. 2015); and,
- Final Bird Survey Report Study by Strum Environmental completed during previous iteration of the Project (Strum 2013).

To provide information on potential occurrences of rare and endangered birds, and unique or sensitive wildlife habitats potentially existing within and/or near the LAA, a review of the following existing data and information sources was conducted:

- Listed species by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC);
- Listed species under the federal Species at Risk Act (SARA) or the Nova Scotia Endangered Species Act (ESA);
- Important Bird Areas (IBAs) of Canada; and
- Federally-designated Migratory Bird Sanctuaries.

4.2 Field Assessments

Based on the desktop review, consultation with Nova Scotia Environment (NSE), as well as *Wind Turbines and Birds: A Guidance Document for Environmental Assessment* (EC/CWS 2007a), *Recommended Protocols for Monitoring Impacts of Wind Turbines on Birds. Report by Canadian Wildlife Service and Environment Canada* (EC/CWS 2007b) and *Guide to Preparing an EA Registration Document for Wind Power Projects in Nova Scotia* (NSE 2021), the following approach for the bird surveys was completed with the objective of estimating of both the number of bird species using the LAA, and their relative abundance and how bird presence and use of the LAA varies throughout the seasons.

Recommendations described in "A Guide to Addressing Wildlife Species and Habitat in an EA Registration Document" (NSE 2009) were consulted when planning field surveys to include the assessment for potential SAR and SoCC within the LAA.

Field surveys were performed by experienced specialists skilled at identifying birds by song, call and sight. Survey design was informed and developed based on professional experience, knowledge of the Project area, recommended techniques from CWS guidance documents (EC, 2007a; EC, 2007b) and informed based on the results from previously completed bird studies (Strum Environmental 2013). The general timing, purpose and description of the bird surveys conducted in 2021 and 2022 are described in the sections below. The following sections also present site-specific details of the various bird surveys completed for the bird and bird habitat focused effects assessment for the Project by season.

The surveys were scheduled so that data was collected across important seasonal periods for birds in Nova Scotia (i.e. spring and fall migration periods, peak breeding season and winter residency) during the two-year study period between 2021 and 2022. Additional targeted surveys were conducted in 2021 for breeding nocturnal owls and for breeding Common Nighthawks. Considerable effort was made such that surveys were conducted when weather conditions were appropriate for viewing and listening for birds (i.e., on days or nights with minimal forecasted fog, precipitation and forecasted wind speeds ≤20km/h).

4.2.1 Survey Locations

Two years of bird surveys were undertaken for the Project. The survey locations and routes for the second year of the bird surveys were refined based on the results of the first year's surveys and updates to the PDA, aiming to increase coverage over more representative habitat types and assess areas not represented in 2021. The surveys were scheduled so that data was collected across seasonal periods for birds (i.e. spring and fall migration and peak breeding early in the summer) during the two-year study period between 2021 and 2022. Specific surveys were conducted in 2021 for confirmation of winter residents, nocturnal owls and nocturnal breeding nightjars (including Common Nighthawks). The survey routes and Point Count locations for the Breeding Bird Surveys and Spring and Fall Migration Stop-Over Surveys were selected to collect data over representative habitats within the LAA, as well as provide overlapping locations between both survey years to allow comparability between study years.

In 2021, sixteen Point Count stations were established over two survey routes and eight of these locations were repeated during the 2022 spring and fall migration surveys and breeding bird survey. In addition to the eight stations that were surveyed for both years of the study, twelve additional Point Count stations were selected at representative locations in 2022 to increase surveyed coverage of the revised PDA for the aforementioned surveys. The Point Count locations, survey years and representative habitat at each location are summarized in Table 2.

Diurnal Watch Counts (DWC) were conducted during the 2021 and 2022 survey seasons. The locations for the DWC are shown on Figure 2. In 2022, DWC were conducted from PC 2, as it provided the best vantage over the PDA.

Table 2: Habitat Descriptions and Survey Years for the Point Count Survey Locations

Point Count Location	Survey Years	Primary Habitat	Secondary Habitat (if applicable)	Tertiary Habitat (if applicable)
PC 'A'	2021	Conifer plantation	Mixed-wood Forest	n/a
PC 'B'	2021	Conifer plantation	Mixed-wood Forest	Wetland (Fen)
PC 'C'	2021	Wetland	Conifer plantation	n/a
PC 'D'	2021	Hardwood Forest	Mixedwood Forest	n/a
PC 'E'	2021	Hardwood Forest	Mixedwood Forest	n/a
PC 'F'	2021	Hardwood Forest	n/a	n/a
PC 'G'	2021	Wetland	Blueberry Field	Softwood Forest
PC 'H'	2021	Mixedwood Forest	Hardwood Forest	n/a
*PC1	2021 and 2022	Wetland	Blueberry field	Conifer plantation
*PC2	2021 and 2022	Wetland	Conifer plantation	Mixedwood forest
*PC3	2021 and 2022	Open/cleared	Mixedwood forest	n/a
PC4	2022	Hardwood forest	Open/cleared	n/a
*PC5	2021 and 2022	Hardwood forest	Conifer plantation	
*PC6	2021 and 2022	Conifer plantation	n/a	n/a
*PC7	2021 and 2022	Wetland	Conifer plantation	Hardwood forest
PC8	2022	Hardwood forest	Mixedwood forest	n/a
PC9	2022	Conifer plantation	Wetland	n/a
*PC10	2021 and 2022	Conifer plantation	Wetland	Blueberry field
*PC11	2021 and 2022	Blueberry field	n/a	n/a
PC12	2022	Mixedwood forest	n/a	n/a
PC13	2022	Hardwood forest	n/a	n/a
PC14	2022	Hardwood forest	n/a	n/a
PC15	2022	Hardwood forest	n/a	n/a
PC16	2022	Hardwood forest	Mixedwood forest	n/a
PC17	2022	Hardwood forest	n/a	n/a
PC18	2022	Hardwood forest	n/a	n/a
PC19	2022	Hardwood forest	Mixedwood forest	n/a
PC20	2022	Hardwood forest	Mixedwood forest	n/a

*indicates a PC location surveyed during both the 2021 and 2022 field seasons.

The Point Count locations were grouped into survey routes based on the area that can feasibly be surveyed per day. The survey routes and the Point Count locations that they include are described below in Table 3 and shown on Figure 3.

Table 3: Survey Routes

Survey Route	PC Locations
Survey Route #1 - 2021	#1, #2 ,# 3 , 'A', 'B', #7, #6 ,#5 (8 total point counts)
Survey Route #2 - 2021	'H', #11, #10, 'G,' 'F', 'E', 'D', 'C' (8 total point counts)
Survey Route #1 -2022	#1 to #11 (11 total point counts)
Survey Route #2 - 2022	#12 to #20 (9 total point counts)

4.2.2 Survey Program

4.2.2.1 Winter Survey Program

Winter Resident Survey

Targeted Timing: January 1 to March 31
Occurred: February 25 - 26 and March 12 - 13, 2021.
Purpose: To assess and determine which species are resident in the area and can be anticipated to occur in the Project area year-round.

The Winter Resident Survey was completed for the Project in 2021. General area searches were conducted along four unique transects through the LAA in which all birds seen or heard were recorded and counted. The location of general area searches are shown below on Figure 2.

4.2.2.2 Spring Migration Survey Program

During the spring migration period, two different types of survey were employed: Migration Stop-Over Point Counts and Diurnal Watch Counts. The former determines the number and species of birds that land in the study area during their period of migration, while the latter examines the number, species, altitude and behaviour of birds flying over the study area during the daytime. The general methods for migration point counts and diurnal watch counts are in the sections below.

Spring Migration Stop-Over Point Count Surveys

Targeted Timing: April 15 to May 31
Occurred: between April 28 and May 26, 2021 & between April 29 and May 31, 2022
Purpose: To determine the abundance and species of birds that may land and 'stop-over' within the LAA during the spring migratory period.

Point Counts were conducted at locations that were determined following a preliminary desktop assessment of the habitat types present within the LAA. Locations were selected to both maximize site coverage, as well as to target habitats similar to where WTGs or other infrastructure will be located. To extend coverage of representative habitats across the LAA, the Point Count locations were grouped into established survey routes, which can be surveyed within one morning period, that were selected to maintain consistency across seasonal surveys. Point counts were ten minutes in length during which all

birds seen or heard were recorded. Spring Migration Point Counts typically began 30-60 minutes after sunrise, as many birds become active later in the morning in response to the colder dawn temperatures during this season.

For the spring surveys, the Point Count locations were surveyed five times within the targeted migration window in 2021 and four times in 2022. Table 4 summarizes the dates the surveys were conducted in the spring of 2021 and 2022. Eight-point counts were conducted along each of the four survey routes completed in 2021, and 12-point counts were conducted along each of the two survey routes completed in 2022. The locations of point counts and the survey route groupings are shown on Figure 3.

Table 4: Timing of the Spring Migratory Stop-Over Surveys

Point Count Location	Spring Surveyed Dates
Survey Route 1 – 2021	April 28, May 3, May 14, May 21, and May 26, 2021
Survey Route 2 – 2021	April 28, May 7, May 15, May 20, and May 26, 2021
Survey Route 1 – 2022	May 11, May 19, May 24, and May 31, 2022
Survey Route 4 – 2022	May 11, May 19, May 24, and May 30, 2022
Diurnal Watch Count Location 1	May 14 and May 21, 2021
Diurnal Watch Count Location 2	May 7, May 15, and May 20, 2021 May 11 and May 19, 2022

Spring Migration Diurnal Watch Counts

Targeted Timing: Spring migration period (April 15 to May 31)
Occurred: between May 7 and May 21, 2021 and May 11 and May 19, 2022.
Purpose: To estimate the abundance, species, approximate altitude and behaviour of birds flying over the study area during the daytime.

Spring Diurnal Watch Counts were conducted at a pre-determined, repeatable observation point within the LAA. The selected location provided as close as possible to an extended 360° view of the air space over the LAA and was in close proximity to the proposed site for the placement of the WTGs (Figure 2). These counts were often conducted following the completion of the Spring Migration Stop-over Point Counts and typically began during the mid-morning and continued into the early afternoon.

Diurnal Watch Counts were recorded in 30-minute blocks of observations, and all birds seen or heard were recorded according to their species, number of individuals, location, and altitude relative to the observer (not to the point over which they were flying), and flight direction. Table 4 above summarizes the dates the surveys were conducted in the spring of 2021 and 2022.

4.2.2.3 Breeding Bird Survey Program

During the 2021 and 2022 peak nesting season (i.e., June 1 – July 15), a breeding bird survey was conducted to estimate the abundance and identify species of birds that breed in the LAA with particular

attention paid to their habitat requirements and habitat availability within the LAA. This survey was also supplemented by targeted nocturnal surveys in 2021 for bird species that may breed in the area, but that are typically only detectable at night, or during twilight hours, such as Nightjars (i.e. Common Nighthawk and Eastern Whip-Poor-Will) and nocturnal breeding owls.

Breeding Bird Point Count Surveys

Targeted Timing: June 1 to July 31
Occurred: June 7 and June 29, 2021 & June 7, July 8 and July 14, 2022
Purpose: To estimate the abundance and identify which species of birds are anticipated to breed in the LAA with particular attention paid to their habitat requirements and habitat availability in the LAA.

Description: Point Counts were conducted along the survey routes established for the Migratory Point Count surveys. Within the general search area, all birds seen or heard within 10-minute interval surveys were recorded.

Breeding bird surveys were conducted during the summer months following the same survey routes established for the spring and fall Migration Stop-Over Point Counts, which are shown on Figure 3. For the breeding bird surveys, each survey route was completed twice each year, once early and once late, within the targeted peak breeding window. Special consideration was given to complete a portion of the survey within the June full moon phase to appropriately assess for the Common Nighthawk. The peak of the full moon phases occurred on June 24, 2021 and June 14, 2022.

The use of targeted playback (i.e. broadcasting recorded bird sounds) was used occasionally at the discretion of the observer during the Breeding Bird Survey to detect possible SAR or SoCC in their vicinity. This would occur to either confirm a possible detection (when there was uncertainty) or to simply elicit a response from particular species when surveying appropriate habitat. The detrimental impact of playback recordings on breeding birds is noted, and, as such, the use of playback recordings was limited and employed sparingly to avoid undue disturbance to breeding birds. Table 5 below summarizes the survey dates of the Breeding Bird Surveys conducted in 2021 and 2022.

Table 5: Timing of the Breeding Bird Surveys

Point Count Location	Surveyed Dates
Survey Route 1 – 2021	June 7 and June 28, 2021
Survey Route 2 – 2021	June 7 and June 28, 2021
Survey Route 1 – 2022	June 7 and July 8, 2022
Survey Route 2 – 2022	June 7 and July 14, 2022
Breeding Nocturnal Owls	May 10, 2021
Common Nighthawk Survey	June 21, 2021

Targeted Breeding Nocturnal Owl Survey

Targeted Timing: mid-March to mid- May
Occurred: May 10, 2021
Purpose: Nocturnal surveys were conducted to estimate abundance and to identify breeding bird species in the LAA that are not readily detectable during daylight hours.

A breeding nocturnal owl survey was conducted on May 10, 2021 within the recommended survey window of mid-March to mid-May (Takats et al. 2001; Birds Canada 2019). This survey was conducted from pre-determined Nocturnal Survey Locations (NSL) within the Study Area, which are shown on Figure 2. The methods employed for the breeding nocturnal owl followed the protocols described in *Guidelines for Nocturnal Owl Monitoring in North America* (Takats et al. 2001), as well as the *Nova Scotia Nocturnal Owl Survey: Guide for Volunteers* (Birds Canada 2019) and consists of periods of silent listening and multi-species playback.

A nocturnal survey was conducted for breeding bird species not readily detectable during daylight hours that targeted owls during the spring of 2021.

Targeted Breeding Nightjar Survey

Targeted Timing: June 1 to June 31
Occurred: June 21, 2021
Purpose: Nocturnal surveys were conducted to estimate abundance and to identify breeding bird species in the LAA that are not readily detectable during daylight hours.

A targeted Breeding Nightjar Survey was conducted on June 21, 2021, with special consideration given to completing this survey within seven days of the June full moon phase when nighthawks are most active and readily detectable. The full moon phase occurred on the night of June 24, 2021. This survey was conducted from the same pre-determined Nocturnal Survey Locations (NSL) and these are shown on Figure 2. The methodology employed for the breeding common nighthawk survey followed the protocols described in the *Canadian Nightjar Survey Protocol* (Bird Studies Canada 2019) and consists of periods of silent listening and targeted playback.

Eastern Whip-poor-wills are most vocal during clear nights in June when the moon is at least half full, and can repeat their characteristic “whip-poor-will” call up to 100 times without stopping. They begin calling about 30 minutes after sunset, and call for about 90 minutes each night. Common Nighthawks become active approximately 30 minutes before sunset, and remain active until 60 or 90 minutes after sunset.

4.2.2.4 Fall Migration Survey Program

During the fall migration period, the same survey methods and locations were used during the Spring Migration Surveys; Migration Stop-Over Point Counts and Diurnal Watch Counts. The former determines the number and species of birds that land in the Study Area during the fall period of migration, while the latter examines the number, species, altitude and behaviour of birds flying over the study area during the daytime. The general methods for migration point counts and diurnal watch counts are described in the sections below.

Fall Migration Stop-Over Point Count Surveys

Targeted Timing: August 15 to October 31
Occurred: between August 25 and Oct. 8, 2021 & between August 29 and October 13, 2022
Purpose: To determine the abundance and species of birds that may land and 'stop-over' within the LAA during the fall migratory period.
Counts were conducted at the same locations as the spring Migration Stop-over Point Count Surveys, as determined following a preliminary desktop assessment of the habitat types present within the LAA. Locations were selected to both maximize site coverage, as well as to target habitats similar to where WTGs or other infrastructure will be located. To extend coverage of representative habitats across the LAA, the Point Count locations were grouped into established survey routes, which can be surveyed within one morning period, that were selected to maintain consistency across seasonal surveys. The locations of point counts and the survey route groupings are shown on Figure 3.

Point counts were ten minutes in length during which all birds seen or heard were recorded. Spring Migration Point Counts typically began 30-60 minutes after sunrise, as many birds become active later in the morning in response to the colder dawn temperatures during this season.

A summary of the habitat at each Point Count location in 2022 and 2021 are described in Table 2. During the 2021 and 2022 fall migration peak periods, each survey route was surveyed 5 and 4 times, respectively. Table 6 summarizes the dates the surveys were conducted in the spring of 2021 and 2022, respectively.

Table 6: Fall Migration Survey Dates

Point Count Location	Surveyed Dates
Survey Route 1 – 2021	August 25, Sept. 7, Sept. 15, Sept. 27, and Oct. 8, 2021
Survey Route 2 – 2021	August 25, Sept. 7, Sept. 15, Sept. 27, and Oct. 8, 2021
Survey Route 1 – 2022	August 29, Sept. 12, Sept. 29, and Oct. 13, 2022
Survey Route 2 - 2022	August 31, Sept. 12, Sept. 29, and Oct. 13, 2022
Diurnal Watch Count Location 1	Sept. 27 and Oct. 8, 2021
Diurnal Watch Count Location 2	Sept. 21 and Oct. 8, 2021 Sept. 12 and 29, 2022

Fall Migration Diurnal Watch Counts

Targeted Timing: Fall migration period (August 15 to October 30)
Occurred: Sept. 7 and Oct. 8, 2022, as well as on Sept. 12 and 29, 2022.
Purpose: To identify species, number, approximate altitude and behaviour of birds flying over the study area during the daytime to determine abundance.

As with the spring migration surveys, Diurnal Watch Counts were also conducted as a part of the fall migration surveys and from the same Diurnal Watch Count location shown in Figure 2. These counts were conducted in order to identify species, approximate altitude and the behaviour of birds flying over the study area during the daytime, and to determine species abundance

Similar to the Spring Diurnal Watch Counts these surveys were often conducted following the completion of Migration Stop-Over Point Counts and therefore typically began during the mid-morning and continued into the early afternoon. However, in contrast to the spring surveys, some of the Fall Diurnal Watch Counts were scheduled for the morning and evening hours of the day.

Diurnal Watch Counts were recorded in 30-minute blocks of observations, whereby all birds seen or heard were recorded according to their species, location and altitude relative to the observer (not to the point over which they were flying), flight direction, and number of individuals.

4.3 Bird SAR and SoCC Assessment

The proposed PDA will span several landscapes and include areas that have the potential to provide habitat for some SAR and SoCC populations. Natural Forces is committed to protecting SAR, SoCC, and their habitat as important features and VECs related to the proposed Project. Priority species and habitats for targeted species surveys were identified in consultation with NSDNRR wildlife biologists and a desktop analysis, which includes data obtained from a site specific report provided by the AC CDC (2022) (Appendix B). Recommendations described in "*A Guide to Addressing Wildlife Species and Habitat in an EA Registration Document*" (NSE 2009) were consulted when planning field surveys to include the assessment for potential SAR and SoCC within the LAA. Various biophysical surveys were conducted between the months of April to October, 2021 and February to November, 2022 to characterize site-specific environmental conditions for flora and fauna within and around the LAA.

Methods for the priority bird SAR and SoCC are described above in Section 4.1.2. During field surveys, priority species were targeted and following field surveys, the priority species found within the LAA were assessed for their likelihood to be found throughout the LAA.

5.0 Results

Results from the desktop analysis and field surveys for the assessment of bird and bird habitat within the LAA are presented in the sections below.

5.1 Desktop Forest Habitat Assessment

The Project is located within the Nova Scotia Uplands – Cobequid Hills ecodistrict (Unit 340) (Neily et al. 2017). This ecodistrict is characterized by late successional Acadian shade tolerant hardwood forests (Neily et al. 2017). At higher elevations within this ecodistrict, such as those within the proposed PDA, softwood stands occur on moist, level terrain, with shade tolerant mixed-wood forests found along steep-sided ravines (Neily et al. 2017).

As part of the desktop review, the locations of mature forest habitat in relation to Project infrastructure were identified within the LAA. Additionally, aligned with the recommendation from Environment and Climate Change Canada's Canadian Wildlife Service (ECCC-CWS), mature forest habitat within the LAA was identified in relation to Project infrastructure. Mature forests typically have larger diameter trees, and were chosen as a habitat indicator for birds as they offer nest sites, perches, and provide sources for cavities that enhance the habitat for many forest birds (Treyger 2019). Mature forest stands were determined based on the NSDNRR forest inventory and diameter at breast height (dbh). Mapped polygons of mature coniferous forest, mature deciduous forest and mature mixed forest with an average diameter at breast height (DBH) 15 cm or more within the LAA were included.

Areas identified as habitat for birds within the LAA are presented on Figure 4. Within the LAA, forested habitats were identified and they generally consisted of a mixture of mature coniferous forest, mature deciduous forest and mature mixed-wood forest. The majority of the potential WTG locations (i.e., 19 out of 28) were selected in areas that do not contain forests with average dbh >15 cm.

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WESTCHESTER WIND PROJECT

FOREST HABITATS WITHIN THE LAA

FIGURE 4

- Proposed Turbine Location
- Proposed Substation Location
- Forest with Average Diameter at Breast Height 15-25 cm
- Local Assessment Area (LAA)
- Potential Development Area (PDA)
- Highway
- Watercourse
- Waterbody
- Wetland

0 0.125 0.25 0.5 km

N W E S

SCALE 1:24,000

MAP DRAWING INFORMATION:
DATA PROVIDED BY DILLON CONSULTING, GEONB, NATURAL FORCES

MAP CREATED BY: GAM
MAP CHECKED BY:CK
MAP PROJECTION: NAD 1983 UTM ZONE 20N

DILLON CONSULTING

PROJECT: 22-4065
STATUS: DRAFT
DATE: 2022-12-08

FILE LOCATION: K:\2021\211329\Product\Client\EA_WC_Sept2022\WC_F04_ForestHabitatswithinLAA.mxd

5.1.1 Desktop Screening for Priority Species

Site-specific AC CDC reports were generated on May 7, 2021 and September 20, 2022, and included historical observations of SAR and SoCC reported within 5 km of the PDA and includes data within 100 km of the PDA for information purposes. Due to the size of the PDA, a search of the AC CDC was requested to include a search radius of 10 km from the PDA centre in 2022. The 2022 AC CDC report, which supersedes the 2021 report, identified 26 bird species with historical observances were observed within 5 km of the PDA (AC CDC 2022). Table 7 summarizes the historical observations of bird SAR and SOCC within 5 km of the PDA reported by the AC CDC.

Table 7: Rare and/or Endangered Birds within 5 km from the PDA (AC CDC 2022)

Common Name	Scientific Name	S-rank and Conservation Status	No. of Obs.	Distance from PDA Centre (km)
American Kestrel	*Falco sparverius*	S3B,S4S5M	607	3.1 ± 7.0
Bank Swallow	*Riparia riparia*	S2B SARA: T COSEWIC: T NSESA: E	2503	7.2 ± 7.0
Barn Swallow	*Hirundo rustica*	S3B SARA: T COSEWIC: SC NSESA: E	1888	3.1 ± 7.0
Bay-breasted Warbler	*Setophaga castanea*	S3S4B,S4S5M	673	0.6 ± 0.0
Black-backed Woodpecker	*Picoides arcticus*	S3S4	148	3.1 ± 7.0
Blackpoll Warbler	*Setophaga striata*	S3B,S5M	90	7.2 ± 7.0
Bobolink	*Dolichonyx oryzivorus*	S3B SARA: T COSEWIC: SC NSESA: V	2217	7.2 ± 7.0
Boreal Chickadee	*Poecile hudsonicus*	S3	624	0.5 ± 0.0
Canada Jay	*Perisoreus canadensis*	S3	639	3.1 ± 7.0
Canada Warbler	*Cardellina canadensis*	S3B SARA: T COSEWIC: SC NSESA: E	1137	3.1 ± 7.0
Cape May Warbler	*Setophaga tigrina*	S3B,SUM	289	0.7 ± 0.0

Common Name	Scientific Name	S-rank and Conservation Status	No. of Obs.	Distance from PDA Centre (km)
Chimney Swift	*Chaetura pelagica*	S2S3B,S1M SARA: T COSEWIC: T NSESA: E	1301	6.5 ± 0.0
Cliff Swallow	*Petrochelidon pyrrhonota*	S2S3B	579	7.2 ± 7.0
Eastern Kingbird	*Tyrannus*	S3B	536	9.3 ± 7.0
Eastern Wood-Pewee	*Contopus virens*	S3S4B SARA: SC COSEWIC: SC NSESA: V	1256	1.6 ± 0.0
Evening Grosbreak	*Coccothraustes vespertinus*	S3B,S3N,S3M SARA: SC COSEWIC: SC NSESA: V	683	0.6 ± 0.0
Killdeer	*Charadrius vociferus*	S3B	1116	7.2 ± 7.0
Northern Goshawk	*Accipiter gentilis*	S3S4	164	9.3 ± 7.0
Olive-sided Flycatcher	*Contopus cooperi*	S3B SARA: T COSEWIC: SC NSESA: T	998	1.3 ± 0.0
Pine Grosbeak	*Pinicola enucleator*	S3B,S5N,S5M	109	0.5 ± 0.0
Pine Siskin	*Spinus pinus*	S3	545	2.1 ± 0.0
Rose-breasted Grosbeak	*Pheucticus ludovicianus*	S3B	760	3.1 ± 7.0
Spotted Sandpiper	*Actitis macularius*	S3S4B,S5M	990	3.1 ± 7.0
Tennessee Warbler	*Leiothlypis peregrina*	S3S4B,S5M	573	3.1 ± 7.0
Vesper Sparrow	*Pooecetes gramineus*	S1S2B,SUM	97	3.1 ± 7.0
Wilson's Snipe	*Gallinago delicata*	S3B,S5M	1455	3.1 ± 7.0

Notes:
S-rank refers to the Sub-national (Provincial) rank provided by the AC CDC and includes the following: S1 Critically Imperiled, S2 Imperiled, S3 Vulnerable, S4 Apparently Secure, S5 Secure and SU Unrankable. Rankings are frequently paired with the following breeding status qualifiers: B Breeding, N Non-breeding and M Migrant
SC Special Concern, V Vulnerable, T Threatened, E Endangered

5.2 Field Assessments

Throughout the biophysical environmental surveys conducted as part of the environmental assessment of the Project, 90 bird species and approximately 7000 individual bird observations were recorded during the 2021 and 2022 seasons. A list of species observed throughout the surveys is presented in Appendix A. The following sections provide the results of the bird surveys conducted by season, following by an assessment and summary of priority bird species and habitat for the LAA.

5.2.1 Winter Survey

A total of 92 individual birds comprised of 13 species were recorded during the Winter Survey program, which consisted of 4 transect-based area searches (Winter Resident Survey), as summarized in Table 8. One bird SoCC, a Boreal Chickadee, was observed during the winter surveys conducted in 2021. The remaining bird species detected within the LAA during the winter 2021 resident surveys are ranked S4 or S5 by the AC CDC, indicating that they have populations in Nova Scotia considered 'Apparently Secure' or 'Secure', respectively.

Table 8: Birds Detected During the 2021 Winter Residency Survey

Common Name	Scientific Name	S-rank	Number Detected
Black-capped Chickadee	*Poecile atricapillus*	S5	32
Golden-crowned Kinglet	*Regulus satrapa*	S5	15
American Crow	*Corvus brachyrhynchos*	S5	12
*Boreal Chickadee	*Poecile hudsonicus*	S3	9
Dark-eyed Junco	*Junco hyemalis*	S4S5	5
Blue Jay	*Cyanocitta cristata*	S5	4
White-winged Crossbill	*Loxia leucoptera*	S4S5	4
Red-breasted Nuthatch	*Sitta canadensis*	S4S5	3
Snow Bunting	*Plectrophenax nivalis*	S5N	3
Common Raven	*Corvus corax*	S5	2
Bald Eagle	*Haliaeetus leucocephalus*	S5	1
Pileated Woodpecker	*Dryocopus pileatus*	S5	1
Red-tailed Hawk	*Buteo jamaicensis*	S5	1
		Total Number of Birds Detected	92

* indicates a species is considered a SoCC

S-Ranks: status determined by the AC CDC. S1: Critically Imperiled, S2: Imperiled, S3: Vulnerable, S4: Apparently Secure, S5: Secure
Conservation Status: status listed on the Species At Risk Act (SARA) or the Nova Scotia Endangered Species Act (NS ESA).

The results of winter bird surveys conducted for a former iteration of the Project during the winter months of 2012, which are presented in Strum (2013) were reviewed. The 2013 report concluded that no significant staging or wintering area for waterfowl, shorebirds or any other water associated birds, and no evidence was found to suggest significant areas for birds of prey or any other bird concentrations (Strum 2013). Similarly, the results of the 2021 winter resident surveys for birds and observations of available habitat support the conclusion that the PDA provides limited habitat for winter resident bird species. Overall, a relatively low number of birds appear to reside near the PDA during the winter months. This is anticipated to be the result of high winds that the PDA is exposed to and it is likely that resident bird species would favour habitat present within the surrounding river valleys.

5.2.2 Spring Surveys

Spring bird surveys were comprised of Spring Migration Surveys (i.e., Point Count surveys) and diurnal watch counts, both of which were completed in 2021 and 2022. More than 80 bird species were identified during spring period of 2021 and 2022 through incidental observation and focused Spring Surveys. The following sections detail the results.

5.2.2.1 Spring Migration Surveys

Spring migration surveys provide information on the diversity of bird species that migrate through the LAA as well as; an estimate of the abundance of bird species present. Raw data collected from Point Count surveys and a summary of the weather and site observations is provided in Appendix A.

Between 2021 and 2022, a total of 72 bird species were identified during the spring migration Point Count surveys. Sixty-one species of the sixty three species were identified in 2021, noting that 55 of these species observed were recorded in both 2021 and 2022. A summary of bird species and their abundance recorded during the spring migration surveys conducted in both 2021 and 2022 summarized in Table 9.

Table 9: Total Abundance of Birds Detected during Spring Migration Point Counts.

Number Detected (2021)	Number Detected (2022)	Common Name	Scientific Name	S-rank and Conservation Status
140	136	White-throated Sparrow	*Zonotrichia albicollis*	S4S5B, S5M
125	154	*American Robin	*Turdus migratorius*	S5B,S3N
92	96	Black-throated Green Warbler	*Setophaga virens*	S5B
73	144	Ovenbird	*Seiurus aurocapilla*	S5B
70	73	Hermit Thrush	*Catharus guttatus*	S5B
65	59	Yellow-rumped Warbler	*Setophaga coronata*	S5B
49	46	Dark-eyed Junco	*Junco hyemalis*	S4S5
48	52	Magnolia Warbler	*Setophaga magnolia*	S5B
44	15	Ruby-crowned Kinglet	*Regulus calendula*	S4B, S5M
39	41	Common Yellowthroat	*Geothlypis trichas*	S5B
39	20	Song Sparrow	*Melospiza melodia*	S5B
38	41	Black-and-White Warbler	*Mniotilta varia*	S5B
37	20	Northern Flicker	*Colaptes auratus*	S5B
37	37	*Purple Finch	*Haemorhous purpureus*	S4S5B, S3S4N, S5M
36	97	Black-capped Chickadee	*Poecile atricapillus*	S5
32	35	Blue Jay	*Cyanocitta cristata*	S5
30	43	Blue-headed Vireo	*Vireo solitarius*	S5B

Number Detected (2021)	Number Detected (2022)	Common Name	Scientific Name	S-rank and Conservation Status
24	17	Savannah Sparrow	*Passerculus sandwichensis*	S4S5B,S5M
22	10	Golden-crowned Kinglet	*Regulus satrapa*	S5
21	25	American Crow	*Corvus brachyrhynchos*	S5
19	48	American Goldfinch	*Spinus tristis*	S5
19	93	American Redstart	*Setophaga ruticilla*	S5B
17	1	Palm Warbler	*Setophaga palmarum*	S5B
17	21	Ruffed Grouse	*Bonasa umbellus*	S5
16	9	*Boreal Chickadee	*Poecile hudsonicus*	S3
14	19	Winter Wren	*Troglodytes hiemalis*	S5B
13	11	Lincoln's Sparrow	*Melospiza lincolnii*	S4B, S5M
11	25	Chestnut-sided Warbler	*Setophaga pensylvanica*	S5B
11	14	Swainson's Thrush	*Catharus ustulatus*	S4B,S5M
9	4	*Bay-breasted Warbler	*Setophaga castanea*	S3S4B,S4S5M
8	5	Hairy Woodpecker	*Dryobates villosus*	S5
7	33	Red-eyed Vireo	*Vireo olivaceus*	S5B
7	0	Ring-necked Pheasant	*Phasianus colchicus*	SNA
5	9	Alder Flycatcher	*Empidonax alnorum*	S5B
5	1	*American Kestrel	*Falco sparverius*	S3B, S4S5M
5	7	Black-throated Blue Warbler	*Setophaga caerulescens*	S5B
5	0	Common Grackle	*Quiscalus quiscula*	S5B
5	2	Evening Grosbreak	*Coccothraustes vespertinus*	S3B, S3N, S3M SARA: SC NSESA: V
5	11	Northern Parula	*Setophaga americana*	S5B
5	6	Swamp Sparrow	*Melospiza georgiana*	S5B
4	0	American Black Duck	*Anas rubripes*	S5B,S5N
4	1	*Cape May Warbler	*Setophaga tigrina*	S3B,SUM
4	8	Common Raven	*Corvus corax*	S5
4	13	Downy Woodpecker	*Dryobates pubescens*	S5
4	2	Nashville Warbler	*Oreothlypis ruficapilla*	S4B, S5M
4	33	Yellow-bellied Sapsucker	*Sphyrapicus varius*	S5B
3	4	Blackburnian Warbler	*Setophaga fusca*	S4B, S5M
3	32	Least Flycatcher	*Empidonax minimus*	S4S5B, S5M
3	2	Mourning Dove	*Zenaida macroura*	S5
3	0	Northern Waterthrush	*Parkesia noveboracensis*	S4B, S5M
3	6	Pileated Woodpecker	*Dryocopus pileatus*	S5

Number Detected (2021)	Number Detected (2022)	Common Name	Scientific Name	S-rank and Conservation Status
2	0	*Blackpoll Warbler	*Setophaga striata*	S3B, S5M
2	0	Brown Creeper	*Certhia americana*	S5
2	3	Canada Goose	*Branta canadensis*	SUB,S4N,S5M Exotic Breeding
2	0	Canada Warbler	*Cardellina canadensis*	S3B SARA: T NSESA: E
2	4	Mourning Warbler	*Geothlypis philadelphia*	S4B, S5M
2	1	*Northern Harrier	*Circus hudsonius*	S3S4B
2	12	Red-breasted Nuthatch	*Sitta canadensis*	S4S5
2	0	Yellow Warbler	*Setophaga petechia*	S5B
1	6	*Canada Jay	*Perisoreus canadensis*	S3
1	0	Merlin	*Falco columbarius*	S5B
0	3	American Woodcock	*Scolopax minor*	S5B
0	3	Cedar Waxwing	*Bombycilla cedrorum*	S5B
0	1	Eastern Wood-Pewee	*Contopus virens*	S3S4B SARA: SC NSESA: V
0	42	*Pine Siskin	*Spinus pinus*	S3
0	35	White-winged Crossbill	*Loxia leucoptera*	S4S5
0	6	*Red Crossbill	*Loxia curvirostra*	S3S4
0	5	*Rose-breasted Grosbeak	*Pheucticus ludovicianus*	S3B
0	3	White-breasted Nuthatch	*Sitta carolinensis*	S4
0	1	Ruby-throated Hummingbird	*Archilochus colubris*	S5B
0	1	Sharp-shinned Hawk	*Accipiter striatus*	S5
0	1	Belted Kingfisher	*Megaceryle alcyon*	S4S5B
1321	1708	Total Number of Birds Detected		

Bold indicates a species is considered a SAR

* indicates a species is considered a SoCC

S-Ranks: status determined by the AC CDC. S1: Critically Imperiled, S2: Imperiled, S3: Vulnerable, S4: Apparently Secure, S5: Secure
Conservation Status: status listed on the Species At Risk Act (SARA) or the Nova Scotia Endangered Species Act (NS ESA).

The most frequently observed birds were the White-throated Sparrow, American Robin in 2021 and 2022 and the Ovenbird in 2022. There were three SAR and 12 SoCC detected during the Spring Migration Point Counts (including American Robin and Purple Finch which have non-breeding populations in Nova Scotia that are considered vulnerable by the AC CDC) over the two-year survey. SAR detected included Evening Grosbreak in 2021 and 2022; Canada Warbler in 2021 and Eastern Wood-peewee in 2022.

Overall, most birds detected within the assessment area during the Spring Migration Point Counts are ranked S4 or S5 by the AC CDC, indicating that their populations within Nova Scotia are considered 'Apparently Secure' or 'Secure', respectively. A discussion of detected SoCC and SAR is available in Section 5.3.

5.2.2.2 Spring Diurnal Watch Counts

Spring Diurnal Watch Counts provide information on the species and behaviour of birds flying over the study area during daylight hours. Raw data collected from Point Count surveys and a summary of the weather and site observations is provided in Appendix A.

A summary of the behaviours and estimated pass heights of the 29-bird species that were observed during the Spring Diurnal Watch Counts is presented in Table 10.

Table 10: Summary of Diurnal Species Observed during the Spring Surveys (2021-2022)

Common name	Scientific Name	S-Rank	Pass Height (m)	Observed Behaviours
American Goldfinch	*Spinus tristis*	S5	50-250	Passing by, calling
*American Kestrel	*Falco sparverius*	S3B, S4S5M	<50	Parching, hunting, passing by, perched in pairs
*American Robin	*Turdus migratorius*	S5B,S3N	<50-100	Passing by, resident bird, foraging
Bald Eagle	*Haliaeetus leucocephalus*	S5	50->1000	Flying over, circling, soaring/gaining altitude, most were adults and two juvenile birds
Barn Swallow	*Hirundo rustica*	S3B	20	Foraging over field
Belted Kingfisher	*Megaceryle alcyon*	S4S5B	50-100	Agitated, calling
Blue Jay	*Cyanocitta cristata*	S5	<50-250	Resident birds, passing by, flying above canopy, calling
Broad-winged Hawk	*Buteo platypterus*	S5B	100-250	Perching, passing by
Canada Goose	*Branta canadensis*	SUB,S4N,S5M	100-250	Passing by
*Canada Jay	*Perisoreus canadensis*	S3	-	Flying over fields
Common Grackle	*Quiscalus quiscula*	S5B	50-100	Passing by, calling

Common name	Scientific Name	S-Rank	Pass Height (m)	Observed Behaviours
Common Raven	*Corvus corax*	S5	50->250	Perching, flying over canopy, harassed by a small falcon, flying sub canopy, soaring, local resident birds
Common Yellowthroat	*Geothlypis trichas*	S5B	n/a	Passing by
Hairy Woodpecker	*Dryobates villosus*	S5	<50	Just staying above canopy level
Northern Flicker	*Colaptes auratus*	S5B	<50	Resident bird, moving over cut area
*Northern Goshawk	*Accipiter gentilis*	S3S4	<100	Juvenile. Just above trees and before entering canopy
Northern Harrier	*Circus hudsonius*	S4B, S4S5M	<50-250	Hunting, foraging, passing by
Osprey	*Pandion haliaetus*	S4S5B, S5M	100-250	Passing by
*Purple Finch	*Haemorhous purpureus*	S4S5B, S3S4N, S5M	50-100	Passing by
Red-tailed Hawk	*Buteo jamaicensis*	S5	20-800	Adults, kettling, soaring, gaining altitude flying low over field, calling/ screeching, hunting, circling, calling, passing by
Sharp-shinned Hawk	*Accipiter striatus*	S5	50-250	Riding updrafts, gradually moving east, passing by
*Turkey Vulture	*Cathartes aura*	S2S3B, S4S5M	50-250	Gained altitude, foraging, passing by
White-throated Sparrow	*Zonotrichia albicollis*	S4S5B, S5M	n/a	Resident birds, singing
White-winged Crossbill	*Loxia leucoptera*	S4S5	-	Passing by
Yellow-rumped Warbler	*Setophaga coronata*	S5B	50-100	Resident bird, flying sub-canopy, flying over a field, passing by

Bold indicates a species is considered a SAR

* indicates a species is considered a SoCC

S-Ranks: status determined by the AC CDC. S1: Critically Imperiled, S2: Imperiled, S3: Vulnerable, S4: Apparently Secure, S5: Secure
Conservation Status: status listed on the Species At Risk Act (SARA) or the Nova Scotia Endangered Species Act (NS ESA).

Many of the bird species that were observed during the day appeared to be resident species or passing by the site. Birds of prey were observed hunting and scavenging within the LAA during the day-light hours. Several SoCC were identified during the diurnal watch surveys including American Kestrel and

Turkey Vulture, which are considered to be SoCC (i.e., they have breeding populations in Nova Scotia that are considered to be and vulnerable and vulnerable to imperilled, respectively, by the AC CDC).

5.2.2.3 Spring Survey Summary and Data Assessment

The locations surveyed during the Spring Migration Stop-Over Point Count surveys are the same locations that were surveyed for the Breeding Bird Point Count and the Fall Migration Stop-Over Point Count surveys (discussed in future sections). This method was selected in order to provide a consistent seasonal depiction of the bird diversity and relative abundance at the representative habitats that were selected for point count placement within the LAA. The locations were selected to both maximize coverage across the LAA and include locations in a diversity of habitats representative of those within the LAA and near the proposed placement of WTGs or their related infrastructure.

For the Spring Migration Stop-Over Point Count Survey, each of the eight PC locations were surveyed on five occasions in 2021 and four occasions in 2022 between April 28 and May 31. A summary of diversity and abundance of birds observed at the Point Count locations that were surveyed in 2021 and 2022 is provided in Table 11.

In general, bird diversity and abundance was observed to increase throughout the spring migratory period until mid-May and remained consistent between 2021 and 2022, which is illustrated in Figure 5. For comparison between years, only data from the Point Count locations that were surveyed over two years are displayed on Figure 5. As the spring progresses, more bird species return to Nova Scotia from their wintering grounds and remain through their summer breeding season.

Table 11: Summary of Spring Bird Diversity and Abundance between 2021 and 2022

Point Count Location*	Diversity (# species 2021)	Diversity(# species 2022)	Abundance (# birds 2021)	Abundance (# birds 2021)
1	26	25	81	71
2	27	27	95	101
3	28	24	115	95
4	N/A	22	N/A	65
5	22	21	64	50
6	24	31	85	100
7	33	31	104	87
8	N/A	20	N/A	61
9	N/A	25	N/A	78
10	22	23	73	68
11	27	17	84	61
12	N/A	33	N/A	101
13	N/A	22	N/A	75

Point Count Location*	Diversity (# species 2021)	Diversity(# species 2022)	Abundance (# birds 2021)	Abundance (# birds 2021)
14	N/A	26	N/A	105
15	N/A	25	N/A	67
16	N/A	26	N/A	101
17	N/A	30	N/A	89
18	N/A	21	N/A	76
19	N/A	20	N/A	72
20	N/A	29	N/A	83
A	31	N/A	109	N/A
B	29	N/A	86	N/A
C	24	N/A	67	N/A
D	25	N/A	63	N/A
E	23	N/A	70	N/A
F	24	N/A	57	N/A
G	30	N/A	84	N/A
H	26	N/A	82	N/A
Incidentals	10	7	28	10
Total	61	64	1347	1616

*Point locations were surveyed on 5 occasions in 2021 and 4 occasions in 2022 between April 28 and May 31.

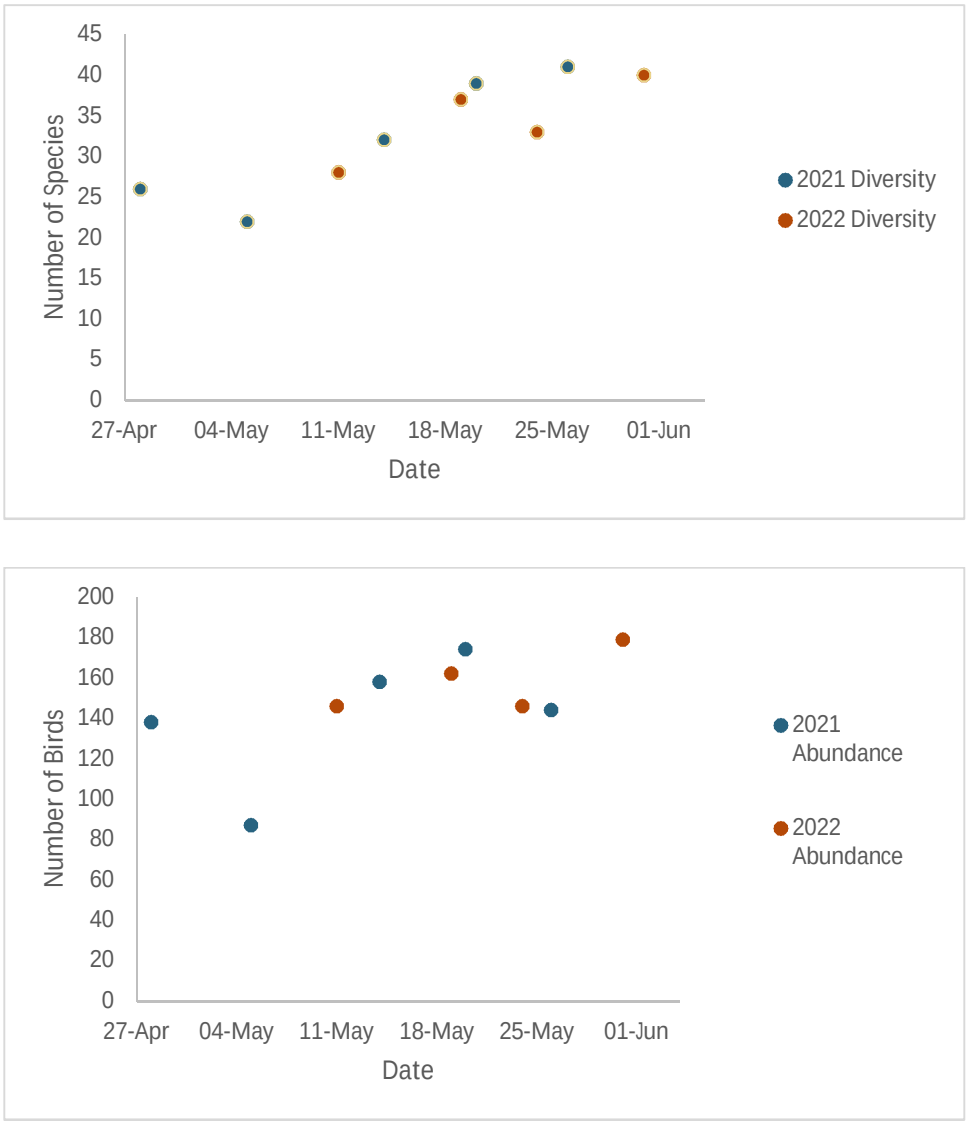


Figure 5: Diversity and Abundance of Bird Species Detected During the 2021 and 2022 Migratory Point Count Surveys

5.2.3 Breeding Bird Surveys

Summer bird surveys were comprised of two years of breeding bird surveys (i.e., Point Count surveys) within the LAA and a nocturnal survey targeting common night hawks was conducted in 2021. Including bird observations that were reported incidentally, 62 bird species (totaling 1389 bird observations) were recorded during summer period of 2021 and 2022. Details of the individual surveys conducted during the summer of 2021 and 2022 are provided in the following sections. Raw data collected from breeding bird Point Count surveys and a summary of the weather and site observations is provided in Appendix A.

5.2.3.1 Breeding Bird Survey

Breeding bird surveys within the LAA were completed over 2 years to assess abundance of each species, as well as to briefly examine the seasonality of bird diversity during the earlier and later portion of the peak breeding period. Throughout 2021 and 2022 breeding bird surveys, 1352 bird observations were made. Of these, 562 individual birds comprised of 54 species were recorded during 2021 and 789 individual birds comprised of 57 species were recorded during 2022. The bird species recorded and their abundance in both years from breeding bird point counts is summarized in Table 12, which only includes data collected during the summer Point Count surveys.

Table 12: Total Abundance of Birds Detected During the Summer Breeding Bird Surveys.

Number Detected in 2021	Number Detected in 2022	Common Name	Scientific Name	S-rank and Conservation Status
51	60	White-throated Sparrow	*Zonotrichia albicollis*	S4S5B, S5M
49	48	Black-throated Green Warbler	*Setophaga virens*	S5B
38	32	Common Yellowthroat	*Geothlypis trichas*	S5B
32	30	Magnolia Warbler	*Setophaga magnolia*	S5B
30	64	Ovenbird	*Seiurus aurocapilla*	S5B
28	57	Red-eyed Vireo	*Vireo olivaceus*	S5B
27	12	Alder Flycatcher	*Empidonax alnorum*	S5B
23	66	American Redstart	*Setophaga ruticilla*	S5B
21	56	*American Robin	*Turdus migratorius*	S5B,S3N
19	29	Black-and-White Warbler	*Mniotilta varia*	S5B
19	16	Swainson's Thrush	*Catharus ustulatus*	S4B,S5M
18	44	Hermit Thrush	*Catharus guttatus*	S5B
14	7	Lincoln's Sparrow	*Melospiza lincolnii*	S4B, S5M
13	5	Blue Jay	*Cyanocitta cristata*	S5
12	10	Yellow-rumped Warbler	*Setophaga coronata*	S5B
11	24	Dark-eyed Junco	*Junco hyemalis*	S4S5

Number Detected in 2021	Number Detected in 2022	Common Name	Scientific Name	S-rank and Conservation Status
11	2	Savannah Sparrow	*Passerculus sandwichensis*	S4S5B,S5M
10	17	Blue-headed Vireo	*Vireo solitarius*	S5B
9	1	*Boreal Chickadee	*Poecile hudsonicus*	S3
9	10	Song Sparrow	*Melospiza melodia*	S5B
8	3	Golden-crowned Kinglet	*Regulus satrapa*	S5
7	3	*Bay-breasted Warbler	*Setophaga castanea*	S3S4B,S4S5M
6	0	American Black Duck	*Anas rubripes*	S5B,S5N
6	10	Cedar Waxwing	*Bombycilla cedrorum*	S5B
6	20	Chestnut-sided Warbler	*Setophaga pensylvanica*	S5B
6	8	Mourning Warbler	*Geothlypis philadelphia*	S4B, S5M
6	5	Northern Flicker	*Colaptes auratus*	S5B
6	9	*Purple Finch	*Haemorhous purpureus*	S4S5B, S3S4N, S5M
5	22	Black-capped Chickadee	*Poecile atricapillus*	S5
5	2	*Canada Jay	*Perisoreus canadensis*	S3
5	5	Ruby-crowned Kinglet	*Regulus calendula*	S4B, S5M
4	9	American Crow	*Corvus brachyrhynchos*	S5
4	0	*American Kestrel	*Falco sparverius*	S3B, S4S5M
4	2	Common Raven	*Corvus corax*	S5
3	13	American Goldfinch	*Spinus tristis*	S5
3	1	*Cape May Warbler	*Setophaga tigrina*	S3B,SUM
3	1	Nashville Warbler	*Oreothlypis ruficapilla*	S4B, S5M
3	0	Palm Warbler	*Setophaga palmarum*	S5B
3	1	*Red Crossbill	*Loxia curvirostra*	S3S4
3	0	Ring-necked Pheasant	*Phasianus colchicus*	SNA
3	6	Winter Wren	*Troglodytes hiemalis*	S5B
2	1	Blackburnian Warbler	*Setophaga fusca*	S4B, S5M
2	2	Black-throated Blue Warbler	*Setophaga caerulescens*	S5B
2	0	Evening Grosbreak	*Coccothraustes vespertinus*	S3S4B,S3N SARA: SC NSESA: V
2	3	Hairy Woodpecker	*Dryobates villosus*	S5
2	2	Northern Parula	*Setophaga americana*	S5B
2	7	Red-breasted Nuthatch	*Sitta canadensis*	S4S5
1	2	Common Grackle	*Quiscalus quiscula*	S5B

Number Detected in 2021	Number Detected in 2022	Common Name	Scientific Name	S-rank and Conservation Status
1	5	Downy Woodpecker	*Dryobates pubescens*	S5
1	20	Least Flycatcher	*Empidonax minimus*	S4S5B, S5M
1	1	*Northern Harrier	*Circus hudsonius*	S3S4B
1	1	Ruffed Grouse	*Bonasa umbellus*	S5
1	2	Swamp Sparrow	*Melospiza georgiana*	S5B
1	6	Yellow-bellied Sapsucker	*Sphyrapicus varius*	S5B
0	15	*Pine Siskin	*Spinus pinus*	S3
0	3	White-breasted Nuthatch	*Sitta carolinensis*	S4
0	2	Eastern Wood-Pewee	*Contopus virens*	S3S4B SARA:SC COSWIC: SC NSESA:V
0	2	Mourning Dove	*Zenaida macroura*	S5
0	2	White-winged Crossbill	*Loxia leucoptera*	S4S5
0	1	Common Loon	*Gavia immer*	S4B
0	1	Olive-sided Flycatcher	*Contopus cooperi*	S3B SARA: T NSESA: T
0	1	Pileated Woodpecker	*Dryocopus pileatus*	S5
562	789	Total Number of Birds Detected		

Bold indicates a species is considered a SAR
* indicates a species is considered a SoCC

White-throated Sparrow and Black-throated Green Warbler were the most abundantly observed birds during the breeding surveys conducted in 2021 and 2021. Three bird SAR species were recorded during the breeding surveys: two Evening Grosbeaks in 2021, and two Eastern Wood-pewees and one Olive-sided Flycatcher in 2022. During the breeding bird surveys, ten birds considered to be SoCC were recorded over the two year study. Eight species of SoCC birds were observed over both years. American Kestrels were only observed in 2021 and Pine Siskin were only observed in the 2022 surveys. Overall, the remainder of the birds detected within the assessment area during the Summer Breeding Bird Surveys are ranked S4 or S5 by the AC CDC indicating that they are considered 'Apparently Secure' or 'Secure', respectively. A detailed discussion of detected SoCC and SAR is presented in Section 5.3.

Breeding bird surveys were conducted in early and late June to compare the bird diversity between the 'early' and 'late' breeding season. Bird species diversity is shown below for the early and late breeding bird surveys conducted in 2021 and 2022 below in Figure 6. Overall the number of bird species detected during breeding bird surveys remained similar throughout breeding periods, ranging from 40-50 species detected during each period.

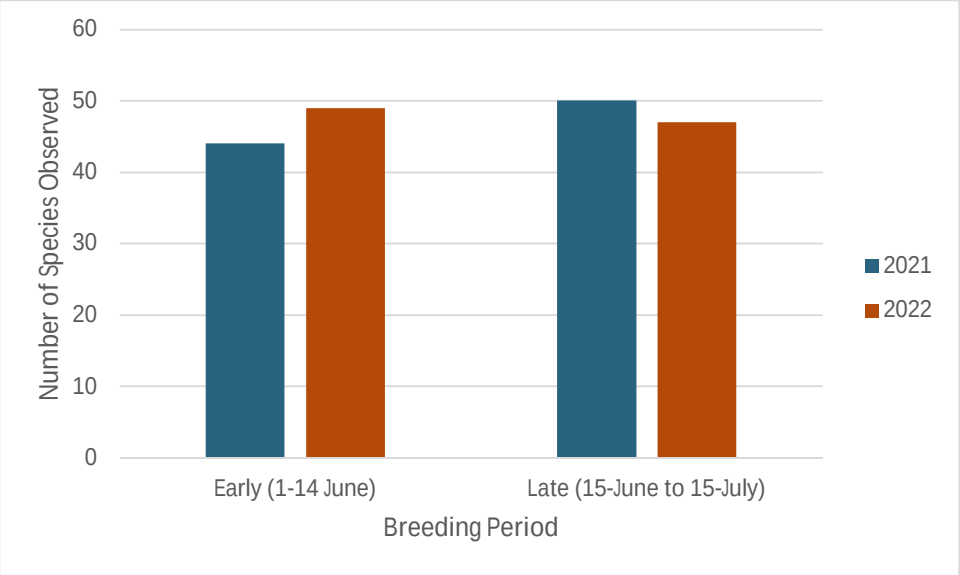


Figure 6: Bird Species Diversity detected during the Early and Late Breeding Bird Surveys in 2021-2022

5.2.3.2 Common Nighthawk Survey

There were three Common Nighthawk individuals detected during the Breeding Common Nighthawk Survey. This survey took place under a mostly clear sky on the evening of June 21, 2021 (the June 2021 full moon was on June 24, 2021). The results of the survey are summarized below in Table 13.

Table 13: Results of the Breeding Common Nighthawk Survey

Survey Location	Number Detected	Common Name	Scientific Name	Estimated Distance (m)	Estimated Direction	SARA	NS ESA	S-rank
#1	nil	n/a	n/a	n/a	n/a	n/a	n/a	n/a
#2	1	Common Nighthawk	*Chordeiles minor*	500	NW	T	T	S3B
#3	2	Common Nighthawk	*Chordeiles minor*	100-200	NW	T	T	S3B
#4	nil	n/a	n/a	n/a	n/a	n/a	n/a	n/a
#5	nil	n/a	n/a	n/a	n/a	n/a	n/a	n/a
#6	nil	n/a	n/a	n/a	n/a	n/a	n/a	n/a

S-Ranks: status determined by the AC CDC. S1: Critically Imperiled, S2: Imperiled, S3: Vulnerable, S4: Apparently Secure, S5: Secure
Conservation Status: status listed on the Species At Risk Act (SARA) or the Nova Scotia Endangered Species Act (NS ESA).

5.2.3.3 Breeding Nocturnal Owl Survey

During the breeding nocturnal owl survey in 2021, one species of nocturnal owl was detected, a single Barred Owl (*Strix varia*). No SAR or SoCC owl species were detected and the results of the 2021 breeding nocturnal owl surveys are presented in Table 14.

Table 14: Results of the 2021 Breeding Nocturnal Owl Survey

Survey Location	Number Detected	Common Name	Scientific Name	Estimated Distance (m)	Estimated Direction	S-rank
#1	2	American Woodcock	*Scolopax minor*	100-250	North	S5B
#2	1	American Woodcock	*Scolopax minor*	200	South	S5B
#3	nil	n/a	n/a	n/a	n/a	n/a
#4	1	Barred Owl	*Strix varia*	400	SW	S5
#5	nil	n/a	n/a	n/a	n/a	n/a
#6	2	American Woodcock	*Scolopax minor*	100-250	North	S5B

S-Ranks: status determined by the AC CDC. S1: Critically Imperiled, S2: Imperiled, S3: Vulnerable, S4: Apparently Secure, S5: Secure
Conservation Status: status listed on the Species At Risk Act (SARA) or the Nova Scotia Endangered Species Act (NS ESA).

5.2.4 Fall Surveys

Fall bird surveys were comprised of two years of Fall Migration Surveys (i.e., Point Count surveys) and diurnal watch counts. More than 70 bird species were recorded during spring period of 2021 and 2022 between species incidentally observed as well as identified during the fall Surveys. The following sections provide the results of the fall bird surveys that were conducted in 2021 and 2022.

5.2.4.1 Fall Migration Surveys (Point Count Method)

Fall migration surveys provide information the diversity of bird species that migrate through the LAA as well as an estimate of the abundance of bird species. Raw data collected from Point Count surveys and a summary of the weather and site observations is provided in Appendix A.

Between 2021 and 2022 fall migration seasons, a total of 72 bird species were identified during the migration Point Count surveys. During the fall of 2021, 1167 birds comprised of 63 species were recorded compared to 787 birds comprised of 58 species in fall 2022. It is noted that 49 species were recorded in both 2021 and 2022 fall migration surveys. A summary of bird species and their abundance recorded during the fall migration surveys conducted in both 2021 and 2022 summarized in Table 15.

Table 15: Total Abundance of Birds Detected during Spring Migration Point Counts.

Number Detected (2021)	Number Detected (2022)	Common Name	Scientific Name	S-rank and Conservation Status
69	88	Black-capped Chickadee	*Poecile atricapillus*	S5
63	55	White-throated Sparrow	*Zonotrichia albicollis*	S4S5B, S5M
70	49	Yellow-rumped Warbler	*Setophaga coronata*	S5B
7	46	*Blackpoll Warbler	*Setophaga striata*	S3B, S5M
69	44	Golden-crowned Kinglet	*Regulus satrapa*	S5
39	40	Black-throated Green Warbler	*Setophaga virens*	S5B
104	38	Blue Jay	*Cyanocitta cristata*	S5
56	38	Dark-eyed Junco	*Junco hyemalis*	S4S5
31	37	Red-eyed Vireo	*Vireo olivaceus*	S5B
20	35	Song Sparrow	*Melospiza melodia*	S5B
43	33	*American Robin	*Turdus migratorius*	S5B,S3N
12	22	Hermit Thrush	*Catharus guttatus*	S5B
13	21	*Purple Finch	*Haemorhous purpureus*	S4S5B, S3S4N, S5M
38	20	American Crow	*Corvus brachyrhynchos*	S5
56	18	Common Yellowthroat	*Geothlypis trichas*	S5B
8	15	Swamp Sparrow	*Melospiza georgiana*	S5B
26	13	*Boreal Chickadee	*Poecile hudsonicus*	S3
14	13	Magnolia Warbler	*Setophaga magnolia*	S5B
30	11	Northern Flicker	*Colaptes auratus*	S5B
16	11	Blue-headed Vireo	*Vireo solitarius*	S5B
12	10	Black-and-White Warbler	*Mniotilta varia*	S5B
28	9	American Goldfinch	*Spinus tristis*	S5
17	9	Savannah Sparrow	*Passerculus sandwichensis*	S4S5B,S5M
8	8	Hairy Woodpecker	*Dryobates villosus*	S5
7	8	*Canada Jay	*Perisoreus canadensis*	S3
5	7	Northern Parula	*Setophaga americana*	S5B
13	6	Common Raven	*Corvus corax*	S5
6	6	Downy Woodpecker	*Dryobates pubescens*	S5
3	6	Pileated Woodpecker	*Dryocopus pileatus*	S5
34	5	Palm Warbler	*Setophaga palmarum*	S5B
29	5	Red-breasted Nuthatch	*Sitta canadensis*	S4S5
17	5	Ruby-crowned Kinglet	*Regulus calendula*	S4B, S5M
5	5	Ovenbird	*Seiurus aurocapilla*	S5B
15	4	White-winged Crossbill	*Loxia leucoptera*	S4S5
1	4	*American Kestrel	*Falco sparverius*	S3B, S4S5M

Number Detected (2021)	Number Detected (2022)	Common Name	Scientific Name	S-rank and Conservation Status
1	4	Lincoln's Sparrow	*Melospiza lincolnii*	S4B, S5M
0	4	*Pine Siskin	*Spinus pinus*	S3
3	3	*Bay-breasted Warbler	*Setophaga castanea*	S3S4B,S4S5M
3	3	Ruffed Grouse	*Bonasa umbellus*	S5
43	2	Cedar Waxwing	*Bombycilla cedrorum*	S5B
5	2	Brown Creeper	*Certhia americana*	S5
5	2	Sharp-shinned Hawk	*Accipiter striatus*	S5
3	2	Winter Wren	*Troglodytes hiemalis*	S5B
2	2	*Northern Harrier	*Circus hudsonius*	S3S4B
1	2	White-breasted Nuthatch	*Sitta carolinensis*	S4
0	2	Black-throated Blue Warbler	*Setophaga caerulescens*	S5B
0	2	Chestnut-sided Warbler	*Setophaga pensylvanica*	S5B
61	1	Canada Goose	*Branta canadensis*	SUB,S4N,S5M
11	1	Nashville Warbler	*Oreothlypis ruficapilla*	S4B, S5M
4	1	Red-tailed Hawk	*Buteo jamaicensis*	S5
2	1	Mourning Warbler	*Geothlypis philadelphia*	S4B, S5M
2	1	Blackburnian Warbler	*Setophaga fusca*	S4B, S5M
0	1	*Philadelphia Vireo	*Vireo philadelphicus*	S2?B,SUM
0	1	*Northern Goshawk	*Accipiter gentilis*	S3S4
0	1	Swainson's Thrush	*Catharus ustulatus*	S4B,S5M
0	1	Barred Owl	*Strix varia*	S5
0	1	Mourning Dove	*Zenaida macroura*	S5
0	1	Yellow Warbler	*Setophaga petechia*	S5B
7	0	American Pipit	*Anthus rubescens*	S4M
6	0	*Cape May Warbler	*Setophaga tigrina*	S3B,SUM
4	0	American Redstart	*Setophaga ruticilla*	S5B
4	0	Ruby-throated Hummingbird	*Archilochus colubris*	S5B
3	0	*Red Crossbill	*Loxia curvirostra*	S3S4
3	0	American Woodcock	*Scolopax minor*	S5B
2	0	Spruce Grouse	*Falcipennis canadensis*	S4
2	0	Bald Eagle	*Haliaeetus leucocephalus*	S5
1	0	Canada Warbler	*Cardellina canadensis*	S3B SARA: T NSESA: E
1	0	Belted Kingfisher	*Megaceryle alcyon*	S4S5B
1	0	Least Flycatcher	*Empidonax minimus*	S4S5B, S5M

Number Detected (2021)	Number Detected (2022)	Common Name	Scientific Name	S-rank and Conservation Status
1	0	Alder Flycatcher	*Empidonax alnorum*	S5B
1	0	Common Grackle	*Quiscalus quiscula*	S5B
1	0	Double-crested Cormorant	*Phalacrocorax auritus*	S5B
1167	785	Total Number of Birds Detected		

Bold indicates a species is considered a SAR

* indicates a species is considered a SoCC

S-Ranks: status determined by the AC CDC. S1: Critically Imperiled, S2: Imperiled, S3: Vulnerable, S4: Apparently Secure, S5: Secure
Conservation Status: status listed on the Species At Risk Act (SARA) or the Nova Scotia Endangered Species Act (NS ESA).

Overall, many of the birds detected within the assessment area during the Fall Migration Point Counts are ranked S4 or S5 by the AC CDC, indicating that their populations within Nova Scotia are considered 'Apparently Secure' or 'Secure', respectively. During the fall Point Count surveys, one bird SAR was identified in 2021 and 13 SoCC were identified during one or both years of the surveys (including American Robin and Purple Finch which have non-breeding populations in Nova Scotia that are considered vulnerable by the AC CDC). Cape May Warbler and Red Crossbill were observed only in 2021, whereas Pine Siskin, Philadelphia Vireo and Northern Goshawk bird SoCC were only observed in 2022. A discussion of detected SoCC and SAR is available in Section 5.3.

5.2.4.2 Fall Diurnal Watch Counts

Fall Diurnal Watch Counts provide information on the abundance, species, and behaviour of birds flying over the study area during daylight hours. Raw data collected from Point Count surveys and a summary of the weather and site observations is provided in Appendix A.

A summary of the behaviours and estimated pass heights of the 24-bird species that were observed during the Fall Diurnal Watch Counts is presented in Table 16.

Table 16: Summary of Diurnal Species Observed during the Fall Surveys (2021-2022)

Common Name	Scientific Name	S-Rank	Pass Height (m)	Observed Behaviours
American Crow	*Corvus brachyrhynchos*	S5	<50-100	Passing through
American Goldfinch	*Spinus tristis*	S5	<50	Passing through
American Kestrel	*Falco sparverius*	S3B, S4S5M	<50-100	Passing by, perching, female hunting in cutover areas, soaring

Common Name	Scientific Name	S-Rank	Pass Height (m)	Observed Behaviours
American Robin	*Turdus migratorius*	S5B,S3N	<50	Passing through
Bald Eagle	*Haliaeetus leucocephalus*	S5	50>250	Circling, soaring, passing by, gaining altitude, mature and juvenile birds
Blue Jay	*Cyanocitta cristata*	S5	<50	Staying within or just above canopy
Broad-winged Hawk	*Buteo platypterus*	S5B		Passing through
Canada Goose	*Branta canadensis*	SUB,S4N,S5M Exotic Breeding	50-100	Passing through
Common Raven	*Corvus corax*	S5	<50-500	Passing, soaring, agitated, circling, calling
Cooper's Hawk		S1?B,SUN,SUM		Hunting
Double-crested Cormorant	*Phalacrocorax auritus*	S5B	250+	Circling to gain altitude, looked like it eventually headed ne
Herring Gull	*Larus argentatus*	S5	<50-250	Passing by, soaring
Large accipiter species			100+	Soaring
Northern Goshawk	*Circus hudsonius*	S3S4	50+	Soaring
Northern Harrier	*Circus hudsonius*	S3S4B	50>-100	No male, one female, passing by, soaring, hunting
passerine spp.	-	-	50-100	Passing through
Red-tailed Hawk	*Buteo jamaicensis*	S5	<50-500	Passing through, soaring, hunting
Savannah Sparrow	*Passerculus sandwichensis*	S4S5B,S5M	<50	Calling, resident bird
Sharp-shinned Hawk	*Accipiter striatus*	S5	50-100	Stooped into woods, soaring, passing through, hunting
Turkey Vulture	*Cathartes aura*	S2S3B,S4S5M	100	Passing
warbler spp.	-	-	<50	Passing through

Common Name	Scientific Name	S-Rank	Pass Height (m)	Observed Behaviours
Yellow-rumped Warbler	*Setophaga coronata*	S5B	<50	Passing through

Bold indicates a species is considered a SAR
* indicates a species is considered a SoCC
S-Ranks: status determined by the AC CDC. S1: Critically Imperiled, S2: Imperiled, S3: Vulnerable, S4: Apparently Secure, S5: Secure
Conservation Status: status listed on the Species At Risk Act (SARA) or the Nova Scotia Endangered Species Act (NS ESA).

5.2.4.1 Fall Survey Summary and Data Assessment

Fall point counts survey locations were selected to maximize the survey area coverage and include locations that were representative of habitats through the LAA. To allow comparability of the datasets between both survey years, eight of the Point Count locations were surveyed during both years. In general, bird diversity and abundance was observed to decline throughout the fall migratory period between mid-August and October, which is illustrated in Figure 7. A summary of diversity and abundance of birds observed at the Point Count locations that were surveyed in 2021 and 2022 is provided in Table 17. For comparison, only data from the Point Count locations that were surveyed over two years are displayed on Figure 7. As the fall season progresses, more bird species depart from Nova Scotia for their more southerly wintering grounds and fewer species can be expected to remain in the LAA.

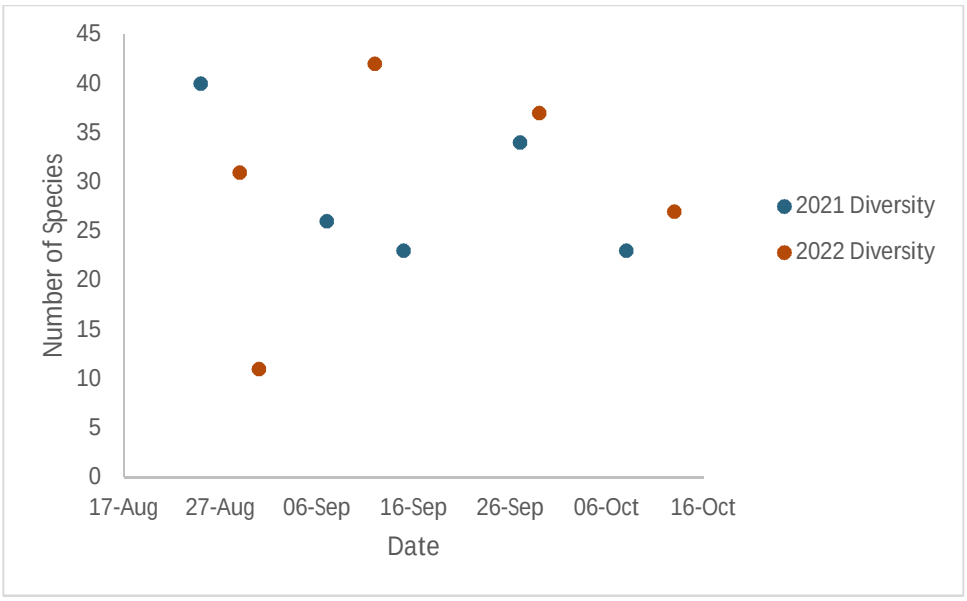
Table 17: Summary of Fall Bird Diversity and Abundance between 2021 and 2022

Point Count Location*	Diversity (# species 2021)	Diversity (# species 2022)	Abundance (# birds 2021)	Abundance (# birds 2021)
1	30	22	96	61
2	24	24	101	75
3	24	23	84	76
4	N/A	16	N/A	45
5	19	22	42	50
6	17	27	70	78
7	28	17	105	34
8	N/A	17	N/A	39
9	N/A	14	N/A	43
10	19	20	41	37
11	27	7	72	16
12	N/A	17	N/A	37
13	N/A	13	N/A	28
14	N/A	11	N/A	18

Point Count Location*	Diversity (# species 2021)	Diversity (# species 2022)	Abundance (# birds 2021)	Abundance (# birds 2021)
15	N/A	13	N/A	22
16	N/A	13	N/A	25
17	N/A	12	N/A	28
18	N/A	10	N/A	16
19	N/A	10	N/A	26
20	N/A	18	N/A	33
A	21	N/A	73	N/A
B	20	N/A	74	N/A
C	25	N/A	61	N/A
D	25	N/A	65	N/A
E	20	N/A	105	N/A
F	23	N/A	50	N/A
G	24	N/A	71	N/A
H	19	N/A	39	N/A
Incidentals	6	2	10	3
Total	63	59	1159	790

*Point locations were surveyed on 5 occasions in 2021 and 4 occasions in 2022 between August 25 and October 13.

In general, bird diversity and abundance was observed to increase throughout the spring migratory period until mid-May and remained consistent between 2021 and 2022, which is illustrated in Figure 5. For comparison between years, only data from the Point Count locations that were surveyed over two years are displayed on Figure 7. As the fall progresses, more bird species return to their wintering grounds from Nova Scotia.



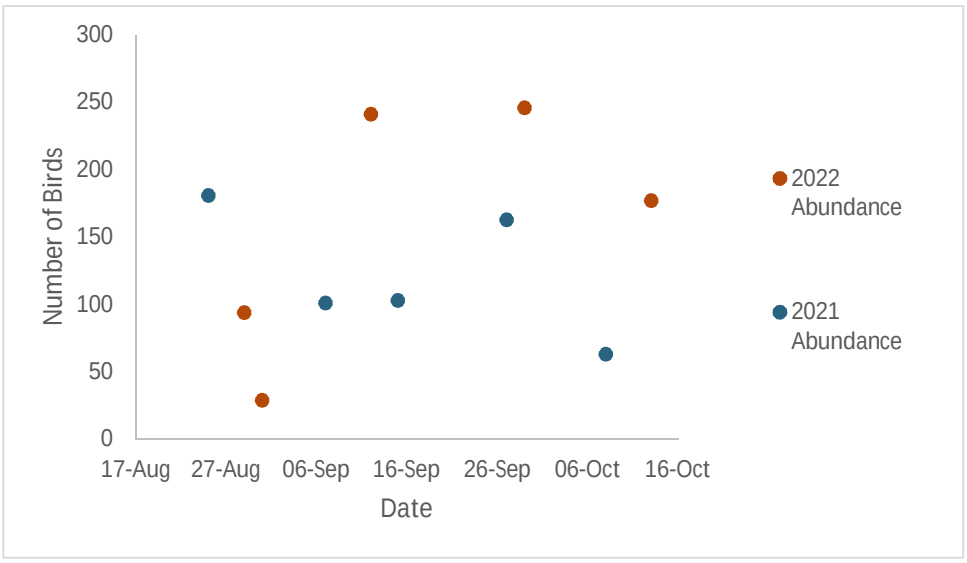


Figure 7: Diversity and Abundance of Bird Species Detected During the Fall 2021 and 2022 Migratory Point Count Surveys

5.3 Bird SAR and SoCC Assessment

During 2021 and 2022 surveys were conducted using a variety of techniques and timing windows to gather information of birds and their habitats with the LAA for the Project. The survey locations and methods were also selected to target potential SAR and SoCC, using the preliminary habitat assessment and desktop SAR and SoCC screening, presented above in Section 5.1 (see Table 5).

Priority bird species that were observed during the field surveys included 6 SAR and 15 SoCC. A summary of the season that they were identified in and the survey type used is provided below in Table 18 with comments on whether or not the birds observed are likely to be breeding in the LAA. The locations where the priority bird species were observed are shown on Figure 8.

Information on bird SAR that have the potential to be present within the LAA, including their general habitat requirements are summarized below in Table 19. This includes SAR that were observed during the field surveys and SAR that were documented by the AC CDC within 10 km of the PDA centre (AC CDC 2022).

Table 18: Bird SAR Observed in the LAA

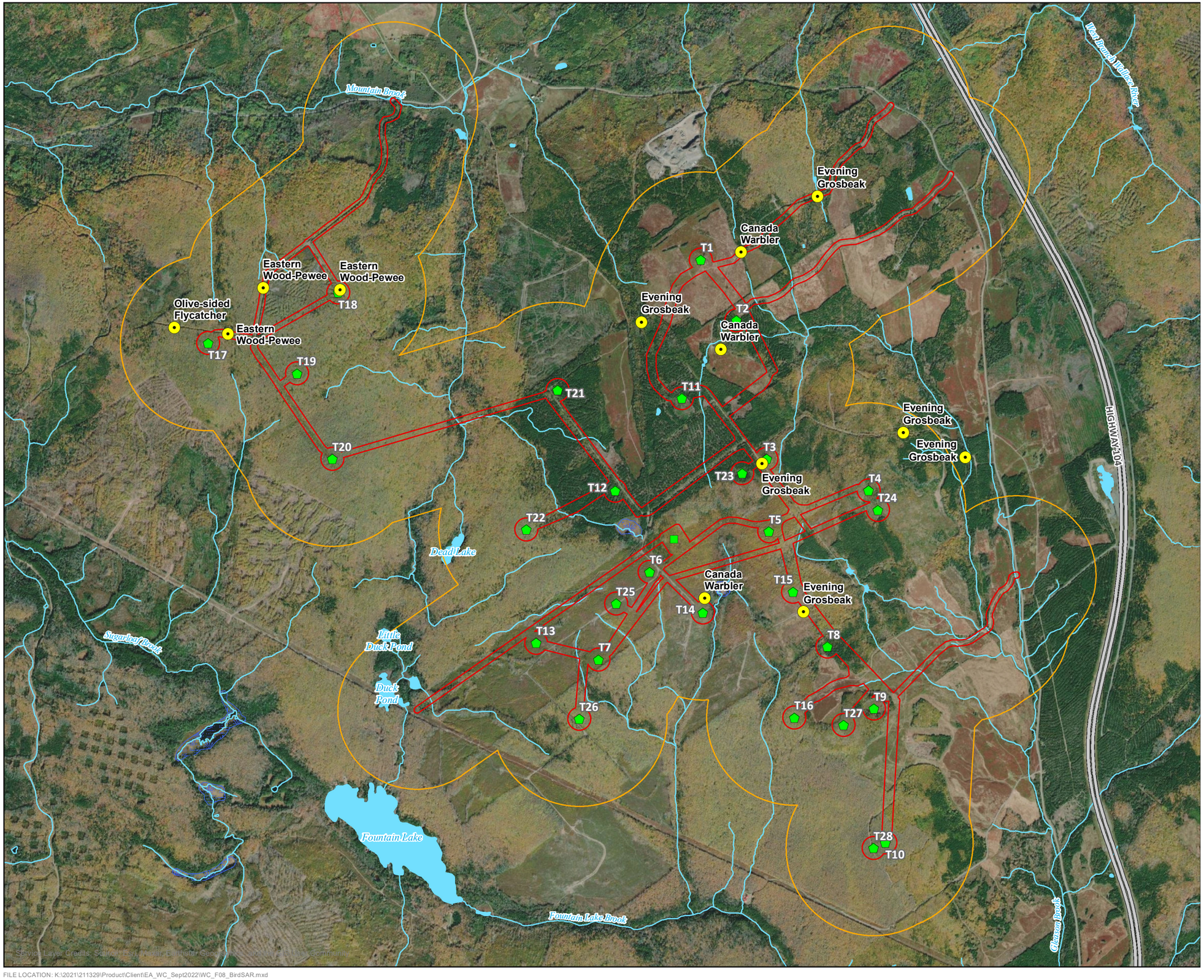
Species	S-rank	Protection Status	Survey Type	Winter	Spring	Summer	Fall	Comments
*American Kestrel *Falco sparverius*	S3B, S4S5M		PC/DWC/Inc		X	X	X	Observed during sensitive breeding season
*American Robin *Turdus migratorius*	S5B, S3N		DWC/PC		X	X	X	Observed both during breeding and non-breeding season - considered sensitive in non-breeding season
Barn Swallow *Hirundo rustica*	S3B	SARA: T COSEWIC: SC NSESA: E	DWC		X			Observed during breeding season (sensitive period)
*Bay-breasted Warbler *Setophaga castanea*	S3S4B, S4S5M		PC/Inc.		X	X	X	Observed during breeding season (sensitive period)
*Blackpoll Warbler *Setophaga striata*	S3B, S5M		PC		X		X	Not observed during sensitive breeding season. Considered secure during migration.
*Boreal Chickadee *Poecile hudsonicus*	S3		PC/Inc.	X	X	X	X	Observed in all seasons
*Canada Jay *Perisoreus canadensis*	S3		DWC/PC		X	X	X	Observed during breeding season
Canada Warbler Cardellina canadensis	S3B	SARA: T COSEWIC: SC NSESA: E	PC/Inc.		X		X	Not observed during sensitive breeding season
*Cape May Warbler *Setophaga tigrina*	S3B,SUM		PC/Inc.		X	X	X	Observed during sensitive breeding season
Common Nighthawk *Chordeiles minor*	S3B	SARA: T COSEWIC: SC NSESA: T	Br.CNHk			X		Observed during sensitive breeding season
*Cooper's Hawk *Accipiter cooperii*	S1?B,SUN, SUM	NAR	DWC				X	Not observed during sensitive breeding season

Species	S-rank	Protection Status	Survey Type	Winter	Spring	Summer	Fall	Comments
Eastern Wood-Pewee *Contopus virens*	S3S4B	SARA: SC COSEWIC: SC NSESA: V	PC		X	X		Observed during sensitive breeding season
Evening Grosbreak *Coccothraustes vespertinus*	S3B, S3N, S3M	SARA: SC COSEWIC: SC NSESA: V	PC		X	X		Observed during breeding and non-breeding seasons (both sensitive).
*Northern Goshawk *Accipiter gentilis*	S3S4	NAR	PC/DWC		X		X	Observed during breeding season
Olive-sided Flycatcher *Contopus cooperi*	S3B	SARA: T COSEWIC: SC NSESA: T	PC			X		Observed during sensitive breeding season
*Philadelphia Vireo *Vireo philadelphicus*	S2?B,SUM		PC				X	Observed outside of sensitive breeding season
*Pine Siskin *Spinus pinus*	S3		PC		X	X	X	Observed in all seasons except winter
*Purple Finch *Haemorhous purpureus*	S4S5B, S3S4N, S5M		PC		X	X	X	Observed during sensitive non-breeding season.
*Red Crossbill *Loxia curvirostra*	S3S4		PC		X	X	X	Observed during breeding season
*Rose-breasted Grosbeak *Pheucticus ludovicianus*	S3B		PC/Inc.		X			Observed outside sensitive breeding season
*Turkey Vulture *Cathartes aura*	S2S3B,S4S 5M		DWC/Inc.		X	X	X	Observed during breeding season

Bold indicates a species is considered a SAR * indicates a species is considered a SoCC

S-Ranks: status determined by the AC CDC. S1: Critically Imperiled, S2: Imperiled, S3: Vulnerable, S4: Apparently Secure, S5: Secure Conservation Status: status listed on the Species At Risk Act (SARA) or the Nova Scotia Endangered Species Act (NS ESA).

T = threatened; SC = special concern; E = endangered; V = vulnerable; NAR = not at risk; PC = point count; DWC = diurnal watch count; Inc. = incidental; Br.CNHk = Breeding Common Nighthawk.



Natural Forces

WESTCHESTER WIND PROJECT

LOCATIONS WHERE BIRDS SPECIES AT RISK WERE OBSERVED

FIGURE 8

- Species at Risk (SAR) Observations
- Proposed Turbine Location
- Proposed Substation Location
- Local Assessment Area (LAA)
- Potential Development Area (PDA)
- Highway
- Watercourse
- Waterbody
- Wetland

0 0.125 0.25 0.5 km

N W E S

SCALE 1:24,000

MAP DRAWING INFORMATION:
DATA PROVIDED BY DILLON CONSULTING, GEONB, NATURAL FORCES

MAP CREATED BY: GAM
MAP CHECKED BY:CK
MAP PROJECTION: NAD 1983 UTM ZONE 20N

DILLON CONSULTING

PROJECT: 22-4065
STATUS: DRAFT
DATE: 2022-12-08

FILE LOCATION: K:\2021\211329\Product\Client\EA_WC_Sept2022\WC_F08_BirdSAR.mxd

Table 19: Bird SAR with the Potential to be Present in the LAA

Species	AC CDC	Potential Habitat within the LAA
Bank Swallow *Riparia*	2503 7.2 ± 7.0 km from the PDA Centre	Species is listed as threatened (SARA and COSEWIC), endangered (NSESA) and ranked by the AC CDC as S2B for imperilled in Nova Scotia for the breeding population. Bank Swallows are a colonial breeder that are found across Nova Scotia in lowlands along rivers, streams and ocean coasts and nest around vertical, or near vertical cliffs or banks. These birds are aerial insectivores catching nearly all their prey in flight which requires open areas (ECCC 2022a). Suitable habitat for Bank Swallows is limited and they are not expected to occur frequently in the LAA.
Barn Swallow *Hirundo rustica*	*1888 3.1 ± 7.0 km from the PDA Centre*	Species is listed as threatened (SARA) special concern COSEWIC), endangered (NSESA) and ranked by the AC CDC as S3B for vulnerable in Nova Scotia for the breeding population. Barn Swallows typically inhabit open areas near human settlements and land uses including parks, ball fields, golf courses and agricultural fields where they forage for flying insects. These birds will typically construct their nests on human-made structures, and rarely in more natural locations such as cliffs, caves or hollowed trees (COSEWIC 2021). Suitable habitat for barn swallows is limited and they are not expected to occur frequently within the LAA.
Bobolink *Dolichonyx oryzivorus*	*2217 observations 7.2 ± 7.0 km from the PDA Centre*	Species is listed as threatened (SARA), special concern (COSEWIC), vulnerable (NSESA) and ranked by the AC CDC within Nova Scotia as S3B for vulnerable for the breeding population. Bobolinks typically occur in grassland habitats (ECCC 2022d). Suitable habitat for Bobolink is limited within the LAA, however, they were not detected during the 2021 or 2022 surveys and are not expected to occur frequently within the LAA.
Canada Warbler *Cardellina canadensis*	*1137 observations 3.1 ± 7.0 km from the PDA Centre*	Species is listed as threatened (SARA), special concern (COSEWIC), endangered (NSESA) and ranked by the AC CDC as S3B for vulnerable in Nova Scotia for the breeding population. Canada Warblers typically breed throughout Maritimes and southeastern Canada. This species prefers wet mixed forests with well-developed shrub layers, as well as regenerating areas (COSEWIC 2020). Canada Warblers were detected and suitable nesting habitat does exist within the LAA.
Chimney Swift *Chaetura pelagica*	*1301 6.5 ± 0.0 km from the PDA Centre*	Species is listed as threatened (SARA and COSEWIC), endangered (NSESA), and ranked by the AC CDC within Nova Scotia as S2S3B for vulnerable to imperiled for the breeding population and S1M as critically imperiled for the migratory population. Chimney Swifts are aerial foragers and tend to concentrate near water where insects are abundant (ECCC 2022c). Suitable habitat for is limited within the LAA, however, they were not detected during the 2021 or 2022 surveys and are not expected to occur frequently within the LAA.

Species	AC CDC	Potential Habitat within the LAA
Common Nighthawk *Chordeiles minor*	*424 observations 11.5 ± 7.0 km from the PDA Centre*	Species is listed as Threatened (SARA and NSESA), Special Concern (COSEWIC) and ranked by the AC CDC as S3B for vulnerable to imperiled in Nova Scotia for the breeding population and critically imperilled for the migrating population. They typically nest on the ground in open or sparsely vegetated habitats (ECCC 2016a). This species was detected within the LAA and suitable nesting habitat does exist within the LAA.
Eastern Wood-Pewee *Contopus virens*	*1256 observations 1.6 ± 0.0 km from the PDA Centre*	Species is listed as Special Concern (COSEWIC/SARA) and Vulnerable (NSESA), and ranked by the AC CDC as S3S4B for vulnerable to apparently secure in Nova Scotia for the breeding population. This species breeds in open woodland of all types in Nova Scotia, but shows a preference for forests with a dominance of deciduous trees. The Eastern Wood-pewee forages on flying insects in the middle canopy (COSEWIC 2012). This species was detected within the LAA in 2012 and 2022 and is likely to use the LAA for foraging and nesting purposes.
Evening Grosbreak *Coccothraustes vespertinus*	*683 observations 0.6 ± 0.0 km from the PDA Centre*	Species is listed as Special Concern (SARA and COSEWIC), Vulnerable (NSESA) and ranked by the AC CDC as S3B/N/M in Nova Scotia for vulnerable for the breeding, non-breeding and migratory populations. Evening Grosbeaks tend to nest in older growth and second-growth conifer-dominated forests. They primarily prey on insects and their larvae during the breeding season, on a wide variety of seeds and the leaf buds of many deciduous tree and shrub species over winter (ECCC 2022b). Evening Grosbreaks were identified during the 2021 and 2022 surveys and potential breeding habitat for the Evening Grosbreak does exist in very limited mature forested areas within the LAA.
Olive-sided Flycatcher *Contopus cooperi*	*998 observations 1.3 ± 0.0 km from the PDA Centre*	Species is listed as Threatened (SARA and NSESA), Special Concern (COSEWIC) and ranked by the AC CDC as S3B for vulnerable in Nova Scotia for the breeding population. This species nests in open, forested areas, often with many conspicuous perches (i.e., tall trees or snags alongside open areas) (ECCC 2016b). Olive-sided Flycatchers were detected in 2022 and suitable nesting habitat does exist within the LAA.

5.4 Assessment Conclusions

The proposed wind energy project, called the Westchester Wind Project (WWP or Project), consists of up to 12 wind turbine generators (WTGs) capable of producing up to 50 MW of renewable energy that will be connected to the existing Nova Scotia Power transmission grid via an overhead transmission line. The Project is located on a mixture of privately-owned blueberry fields, previously forested land and undeveloped forested land in Cumberland County near the communities of Westchester Station, Rose, and Londonderry.

The Project is located within the Nova Scotia Uplands – Cobequid Hills ecodistrict (Unit 340) (Neily et al. 2017). This ecodistrict is characterized by late successional Acadian shade tolerant hardwood forests (Neily et al. 2017). At higher elevations within this ecodistrict, such as those within the proposed PDA, softwood stands occur on moist, level terrain, with shade tolerant mixed-wood forests found along steep-sided ravines (Neily et al. 2017). The presence of these general habitat categories was confirmed through a two-year assessment of terrestrial habitats and vegetation. Additionally, the assessment of terrestrial habitats and vegetation further identified hardwood-dominated forest, mixed-wood and managed sugar-bush forests, conifer dominated forests and managed plantations, blueberry fields, recently cleared areas, and wetlands present within the terrestrial LAA for the Project.

Overall, habitat to support a healthy bird community throughout the year appears to exist within the LAA. It is likely that existing site land uses (e.g., recent forestry activities, blueberry agriculture, and trail recreational vehicle use) have influenced the bird community dynamics as a result of vegetation clearing and the generation of noise. There are existing cleared areas within the LAA which limit shelter to high winds and have likely contributed to the lower bird species diversity and abundance observed during the winter months within the LAA.

Point Count survey data indicate that the highest bird diversity within the LAA was observed during the spring migration period (i.e., mid-May to May 31), corresponded with the nesting period (i.e., mid-April to late-August) in the birding zone of the LAA (i.e., Nesting zone C3) (ECCC 2018). The LAA has abundant forest and shrub dominant habitat to support breeding of many forest-nesting bird species. Low bird diversity was observed during the winter field surveys, overall. Habitats within the LAA are exposed to high winds and it is likely that resident bird species would favour habitat present within the surrounding river valleys.

6.0 Effects Assessment and Mitigation Recommendations

The presences of habitat to support a healthy bird community throughout the year was confirmed through a two-year assessment of birds and bird habitats within the LAA. Existing site land uses have likely influenced the bird community dynamics as a result of historic and recent forestry activities within the LAA. As a result, there are existing cleared areas within the LAA which limit shelter to high winds and have likely contributed to the lower bird species diversity and abundance observed during the winter months within the LAA.

To minimize the potential impact of the Project on natural landscapes and undisturbed natural habitat, the proposed locations for the WTGs were selected in areas previously cut through forestry activities and used for agricultural operations when feasible. The Project aims to benefit the region by providing an environmentally friendly and productive source of renewable energy for Nova Scotia while limiting potential disturbance of environmental features.

6.1 Identification of Potential Environmental Effects

The Project is located in an area where bird populations and habitat are present and a key environmental concern associated with wind projects is the potential for effects to birds (e.g., collisions) and their habitat. Birds, including species at risk and species of conservation concern, are considered important features and valued environmental components (VECs) related to the Project. The identification of anticipated potential interactions between the Project and bird and bird habitats are presented below.

6.1.1 Approach to Project Components

The Project has three main distinct phases during each of which the potential interactions with the surrounding environment are considered distinct. Unplanned events are considered separately from the phases.

The phases of the Project include:

1. *Planning, Site Preparation and Construction Phase;*
2. *Operation Phase; and*
3. *Decommissioning Phase*.

The Project interaction matrix in Table 20 is used as an initial screening to assist in determining if it is possible that there could be an interaction between the activities being carried out in each phase of the Project and birds and their habitat.

Table 20: Project Interactions with Environmental Components

Valued Environmental Component	Project Phases			
	Planning, Site Preparation and Construction Phase	Operation Phase	Decommissioning Phase	Unplanned Events
Birds and Bird Habitat	✓	✓	✓	✓

Legend: ✓ = Potential interaction identified

Those Project phases for which a checkmark is provided indicates that the Project may interact with birds, and thus an environmental effects assessment is warranted. In this case, it is possible that interactions could occur during each phase of the Project, as discussed below. Mitigation measures for unplanned events (including but not limited to potential accidents, malfunctions or severe weather events) are also included in Table 21 below.

Table 21: Potential Interactions and Proposed Mitigation for Birds

Potential Interactions with Wildlife	Proposed Mitigation Measures
Temporary disturbance of foraging fauna and loss of breeding and foraging habitat during Project activities due to increased human presence, noise and Project footprint.	1. Vegetation will be retained to the extent possible to maintain bird habitat and glyphosate pesticides will not be used; 2. The Project footprint will be limited to only that which is necessary to enable the Project to be carried out; 3. Existing roads and trails will be utilized to limit disturbance outside the Project footprint and minimize the interactions with wildlife and wildlife habitat; 4. Tree and vegetation clearing shall not be undertaken during the breeding bird season (Mid-April to Late-August) to the extent possible. Should clearing be required during the breeding bird season the proponent will consult with CWS for appropriate mitigation measures, including but not limited to nesting surveys; 5. Should clearing and grubbing be required during the region's breeding bird season, the Project area will be visually checked on a daily basis for nesting migratory birds. Should a nesting migratory bird be identified within the work area, ECCC/ Canadian Wildlife Service (CWS) will be notified and an appropriate no-work buffer zone (in consultation with ECCC/CWS) will be applied around the nest until the nest has been fledged. No flagging of the nest will occur to minimize chances of predation;

Potential Interactions with Wildlife	Proposed Mitigation Measures
	6. Workers will be familiarized with the SAR and SOCC that were identified at the site during the biophysical assessments prior to work commencing; 7. Stockpiling of fill and excavated materials will be minimized to deter the potential for nesting by Bank Swallows or other ground nesting species (e.g., common nighthawk); 8. Fill/excavation material piles will be at low angles, if left standing for long durations; 9. All workers will adhere to the Migratory Birds Convention Act, 1994 and the Migratory Birds Regulations; 10. All workers will adhere to the provincial Nova Scotia Endangered Species Act and federal Species at Risk Acts; and 11. Reduced speeds will be employed in the vicinity of wildlife. <u>Mitigation Measures for Unplanned Events</u> 1. Equipment shall be kept in good working order and maintained so as to reduce risk of spills/leaks and to avoid water contamination. Spill response kits must be readily available for each piece of equipment, on site workers are required be knowledgeable on emergency spill response protocols and initiate corrective measures immediately to minimise any impacts to the surrounding environment; 2. Where applicable, secondary containment and limited quantities of chemicals and fuels required to be store on site shall be in an area away from the surrounding terrestrial environment, or direct pathways (i.e., ditches) to the surrounding environment, all chemicals and fuels will be stored in appropriate containers designed for the reduction of potential spills or leaks; 3. Refueling, oiling, and maintenance of equipment will be completed in specifically designated areas located at least 30 m away from any watercourse, wetland, or well to minimize potential effects that could arise in the event of a spill; and 4. If contaminated soil is encountered, it will be reported to NSE and managed utilizing the Nova Scotia Contaminated Site Regulations.

Potential Interactions with Wildlife	Proposed Mitigation Measures
Construction lighting may alter the behavior of birds.	1. To minimize disruptions with wildlife activity at night, the Project construction activities will be limited to daylight hours when possible; 2. Necessary construction lighting will be pointed downwards; and, 3. Lighting will be shielded downward; and 4. Instruction will be given to maintenance staff to ensure all work lights are turned off upon leaving the site particularly during foul weather events.
During operation there is a possibility that migrating birds could collide with the wind turbines and Project infrastructure.	1. A comprehensive Adaptive Management Plan will be developed and implemented in consultation with CWS and NSDNRR. This includes the development of a follow-up avian mortality survey that will be conducted after the Project commissioning; 2. During the first year, post construction monitoring events will be targeted to capture the morning following nights with favorable tail wind conditions; 3. Blade feathering will be employed as required, and remote shutdown will be employed when appropriate. 4. Should unexpected negative impact to migration flyways occur, appropriate actions will be taken in consultation with CWS and NSDNRR and following the Adaptive Management Plan; and 5. Non-operational towers shall be dismantled if not expected to be put back into operation.
Birds may alter their migration flyways and/or local flight paths to avoid wind turbines.	1. A comprehensive Adaptive Management Plan will be developed and implemented in consultation with CWS and NSDNRR. This includes the development of a follow-up avian mortality survey that will be conducted after the Project commissioning; 2. Should unexpected negative impact to migration flyways occur, appropriate actions will be taken in consultation with CWS and NSDNRR and following the Adaptive Management Plan; and 3. Non-operational towers shall be dismantled if not expected to be put back into operation.

Potential Interactions with Wildlife	Proposed Mitigation Measures
Lighting on turbines can result in adverse impacts on birds. The Proponent recognizes that nocturnal migrant and night-flying seabirds are the birds most at risk of attraction to lights.	1. Lighting requirements will meet, but not exceed, Transport Canada standards to minimize the potential impacts to migratory birds; 2. Only the required amount of pilot warning and obstruction avoidance lighting will be used; 3. Only lights with short flash durations and the ability to emit no light during the 'off phase' of the flash (i.e. as allowed by strobes and modern LED lights) will be installed on tall structures; 4. Lights will operate at the minimum intensity and minimum number of flashes per minute (longest duration between flashes) allowable by Transport Canada; 5. Instruction will be given to wind farm maintenance staff to ensure all work lights are turned off upon leaving the site particularly during extreme weather events; and 6. A follow up avian mortality survey will be conducted after the wind farm commissioning, and appropriate actions will be taken in consultation with CWS and NSDNRR.
Fog events can impair avian visibility, increasing the likelihood of mortality from collision with wind turbines.	1. Instructions will be given to wind farm maintenance staff to ensure all work lights are turned off upon leaving the site particularly during foul weather events.

A post-construction bird mortality survey will be conducted and appropriate actions will be taken in consultation with CWS and NSDNRR. Post-construction monitoring will include targeted events to capture the morning following favourable tail wind conditions.

6.1.2 Identification of Potential Environmental Effects

Without mitigation, the Project has the potential to cause a negative impact to birds and their habitat. The potential impacts of the Project to birds and bird habitat include the following:

- Loss of habitat due to project infrastructure and crane pads during construction, operation, and decommissioning;
- Temporary disturbance, or displacement from surrounding habitat, during Project construction and decommissioning activities due to increased human presence, noise, lighting and anthropogenic footprint;
- During operation there is a possibility that migrating birds could collide with the wind turbines and Project infrastructure. In addition, birds may alter their migration flyways and/or local flight paths to avoid wind turbines;
- Nocturnal migrant and night-flying seabirds that are most at risk of attraction to lights may be attracted to the operational lighting of the Project;

- Fog events can impair avian visibility, increasing the likelihood of mortality from collision with wind turbines; and
- Potential impacts as a result of unplanned events.

During operation, the key potential effect of the Project to birds will be potential impacts to flight paths of migrating birds. The predicted mortality rate of birds due to collision and/or habitat loss cannot be accurately predicted prior to the operational phase. The implementation of a robust post- construction biophysical assessments will improve our understanding of the potential interactions between wind projects and wildlife. The post-construction monitoring programs will aid in the identification of potential interactions and determination of when to implement certain mitigation measures (i.e., reporting to CWS or implementing a temporary shutdown) to reduce further impacts. In addition, birds may alter their migration flyways and/or local flight paths to avoid wind turbines. Although the predicted mortality rate of birds due to collision and/or habitat loss cannot be accurately predicted prior to the operational phase, technology and more robust post- construction biophysical assessments have improved understanding of the potential interactions between wind projects and wildlife.

Through vegetation clearing and the construction of additional access roads and other linear infrastructure, the Project will decrease the availability of bird habitat by vegetation clearing within the required footprint.

During the construction and decommissioning phases interactions are possible as a result of disturbance caused by noise, the loss of habitat within the PDA, and the temporary disruption of nesting habitat (specifically for Common Nighthawks); however, the Project layout was designed with specific effort to minimize the disruption to terrestrial habitats and limit construction as much as feasible to areas that have previously been developed or are undergoing regular disturbance due to forestry or agricultural (i.e., blueberry fields and maple sugary) practices. Though initial loss of habitat will be during the construction phase, loss of habitat will continue throughout the operational phase, in addition to noise disturbances throughout the operational phase. Noise disturbances throughout the operational phase includes from the WTGs and noise from maintenance and post-construction monitoring.

A radar and acoustic monitoring program was completed in 2021 and 2022 and is reported separately (Appendix G of the Addendum)). The data from the radar and acoustic monitoring surveys suggest that during the spring season (and to a lesser extent during the fall) when high migration activity occurred, a subset of those nights showed relatively higher densities of migration within the Rotor Swept Area (RSA). However, there were other high-migration nights when the relative density of migration was greater above the RSA.

A more exhaustive summary of potential interactions of the Project with birds and bird habitat and the proposed mitigation measures are summarized below in Table 21 above.

6.1.3 Standard Mitigation of Potential Environmental Effects

Standard mitigation has been identified for the anticipated interaction and/or effect in relation to bird and bird habitat in an attempt to prevent the interaction from occurring if possible, or to reduce the magnitude, geographic extent, frequency, duration, reversibility, or ecological/socioeconomic context of the interaction. Best management practices (based on industry guidelines and regulatory guidance documents) have been proposed as mitigation measures. In addition, several acts, codes, regulations and guidelines may require appropriate actions be conducted as mitigation measures prior to or during the interaction.

The federal and provincial legislation and codes that could apply to the Project include (but may not be limited to):

- *Migratory Bird Convention Act (ECCC 1994)*
- *Canadian Environmental Protection Act* and regulations (ECCC 1999);
- *Species at Risk Act* (ECCC 2002);
- *Transportation of Dangerous Goods Act*, and regulations (TC 1992);
- Nova Scotia Environment Act and regulations (NSG 1994-95);
- Nova Scotia Endangered Species Act, and regulations (NSG 1998a);
- Nova Scotia Wilderness Areas Protection Act (NSG 1998b), and regulations; and
- Contingency Planning Guidelines (NSECC 2021).

To further reduce the likelihood of interactions between any phase of the Project and birds and bird habitat, the mitigation measures, summarized above in Table 21 will be followed.

6.2 Residual Environmental Effects

The Project will be developed in such a way as to minimize the area of disturbance within the Project site and revegetation of the site will be promoted at the earliest opportunity. The final Project layout will take into account appropriate buffers for any identified SAR/SOCC.

The predicted mortality rate of birds due to collision and/or habitat loss cannot be accurately predicted prior to the operation of the Project as there is little correlation between pre-construction activity levels and operational mortality, however, it is anticipated that the mortality rate of birds from collision or habitat loss during Project operation, if at all, will be low. Mabee et al. (2006) reported that migration altitudes averaged 410 m a.g.l within the ground to 1.5 km altitude range, and nightly averages ranged from 214 to 769 m. It is important to note that the percent of targets detected in that study was relatively uniform between 0 and 500 m a.g.l., which would indicate that there isn't a greater risk of avian collision at specific elevations.

A comprehensive Adaptive Management Plan will be developed and implemented in consultation with CWS and NSDNRR. This includes the development of a follow-up avian mortality survey that will be conducted after the Project commissioning.

With the proposed mitigation measures employed, the significance of residual effects on birds is predicted to be minor; however, post-construction monitoring and adaptive management plans will include monitoring the effects on the bird SAR and SoCC identified above in Section 7.2.2.

6.3 Cumulative Environmental Effects

Cumulative effects are changes to the environment that are caused by an action in combination with other past, present and future human actions (GoC 2022). Specific to the nature of the undertaking, cumulative effects are combined impacts that may occur when wind power projects or other types of projects are located in the same region (NSECC 2021). The potential for cumulative effects to birds and their habitats are expected to be minimal and limited to the addition of new infrastructure constructed at the site. Further cumulative effects are not anticipated for these mitigation measures or as a result of the construction of new infrastructure as they will utilize existing corridors.

This area of the province has a number of existing wind energy developments. The nearest wind farms are as follows:

- Higgins Mountain Wind Phase I, a 3.6 MW project located approximately 9 km east from the Project. This project was commissioned in 2006;
- Fitzpatrick Mountain Wind, a 0.8 MW project located approximately 28 km from the Project. This project was commissioned in 2007;
- Nuttby Mountain Wind, a 50.6 MW project located approximately 40 km east from the Project. This project was commissioned in 2010;
- Amherst Wind, a 32 MW project located approximately 45 km from the Project. This project was commissioned in 2012;
- In order to further mitigate risk to bats during the Project phases, there will be a concerted effort to use existing corridors found on-site, to limit over story removal, and vegetation management. Additional anthropogenic activities and developments near the Project include, but are not limited to:A quarry that has proposed an expansion from 4 hectares (ha) to 40.36 ha to the north of the site and is situated approximately 0.5 km from the PDA;
- Public roads including highway 104 boarding the LAA to the east;
- Roads for historical and ongoing agricultural and forestry activities located within the LAA;
- Recreational trails for motorized vehicles (heavy equipment, passenger vehicles, and recreational vehicles including All Terrain Vehicles and snowmobiles) located throughout the LAA; and
- Telecommunication towers and the associated overhead power lines and access routes located within the LAA.

The anticipated cumulative effects on birds and bird habitats are anticipated to be very low. By following the Adaptive Management Plan and through engagement of regulatory authorities regional population-wide effects due to the cumulative residual effects of each existing land uses are considered unlikely. In order to further mitigate risk to bird habitat during the Project phases, there will be a concerted effort to use existing corridors found on site, to limit over story removal, and vegetation management.

7.0 Summary and Conclusion

The information provided in this document is based on the current available design/planning information and existing environment information obtained during focused field surveys conducted throughout 2021 and 2022. Based on the results of the desktop and field surveys for birds and proposed mitigation measures, it was concluded that the potential for impact on birds within the Project Developmental Area is low. In order to further mitigate risk to birds during the Project phases, there will be a concerted effort to use existing corridors found on site, to limit over story removal, and apply industry best practices and the use to stringent mitigation measures and monitoring.

This report has been prepared for the Environmental Assessment and associated Addendum of the Westchester Wind Project. The Project is expected to provide renewable electricity to Nova Scotia and support Nova Scotia Power in attaining their future renewable energy targets.

8.0 Closure

This report was prepared by Dillon Consulting Limited (Dillon) for Natural Forces Developments Limited Partnership (the Proponent) on behalf of the Westchester Wind Limited Partnership, in support of the Westchester Wind Project Addendum (2022). Dillon has used the degree of care and skill ordinarily exercised under similar circumstances at the time the work was performed by reputable members of the environmental consulting profession practicing in Canada. Dillon assumes no responsibility for conditions which were beyond its scope of work. There is no warranty expressed or implied by Dillon.

The material in the report reflects Dillon's best judgment in light of the information available to Dillon at the time of preparation. Any use which a third party makes of this report, or any reliance on or decisions made based on it, are the responsibilities of such third parties. Dillon accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

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Appendix A

Master Bird List and Bird Survey Data

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Table A.1: Master List of Bird Species Observed During Biophysical Environmental Surveys Conducted During 2021 and 2022 for the Westchester Wind Project

Common Name	Scientific Name	S-rank	COSEWIC Status	SARA Status	NS ESA Status	Survey Type	2021 Winter	2021 Spring	2021 Summer	2021 Fall	2022 Spring	2022 Summer	2022 Fall	Comments
Alder Flycatcher	*Empidonax alnorum*	S5B				PC		X	X	X	X			
American Black Duck	*Anas rubripes*	S5B,S5N				PC		X	X					
American Crow	*Corvus brachyrhynchos*	S5				PC/DW	X	X	X	X	X	X	X	
American Goldfinch	*Spinus tristis*	S5				PC		X	X	X	X	X	X	
*American Kestrel	*Falco sparverius*	S3B, S4S5M				PC/DWC/Inc		X	X	X	X	X	X	Observed during sensitive breeding season
American Pipit	*Anthus rubescens*	S4M				PC				X				
American Redstart	*Setophaga ruticilla*	S5B				PC		X	X	X	X	X		
*American Robin	*Turdus migratorius*	S5B, S3N				DWC/PC		X	X	X	X	X	X	Observed both during breeding and non-breeding season - considered sensitive in non-breeding season
American Woodcock	*Scolopax minor*	S5B				BNO/PC/Inc.		X		X	X	X		
Bald Eagle	*Haliaeetus leucocephalus*	S5	NAR			DWC/PC	X	X		X	X		X	
Barn Swallow	*Hirundo rustica*	S3B	SC	T	E	DWC					X			Observed during breeding season (sensitive period)
Barred Owl	*Strix varia*	S5				BNO		X					X	
*Bay-breasted Warbler	*Setophaga castanea*	S3S4B, S4S5M				PC/Inc.		X	X	X	X	X	X	Observed during breeding season (sensitive period)
Belted Kingfisher	*Megaceryle alcyon*	S4S5B				DWC/PC		X		X	X			
Black-and-White Warbler	*Mniotilta varia*	S5B				PC		X	X	X	X	X	X	
Blackburnian Warbler	*Setophaga fusca*	S4B, S5M				PC		X	X	X	X	X	X	
Black-capped Chickadee	*Poecile atricapillus*	S5				PC	X	X	X	X	X	X	X	
*Blackpoll Warbler	*Setophaga striata*	S3B, S5M				PC		X		X			X	Not observed during sensitive breeding season. Considered secure during migration.
Black-throated Blue Warbler	*Setophaga caerulescens*	S5B				PC		X	X		X	X	X	
Black-throated Green Warbler	*Setophaga virens*	S5B				PC		X	X	X	X	X	X	
Blue Jay	*Cyanocitta cristata*	S5				PC	X	X	X	X	X	X	X	
Blue-headed Vireo	*Vireo solitarius*	S5B				PC		X	X	X	X	X	X	
*Boreal Chickadee	*Poecile hudsonicus*	S3				PC/Inc.	X	X	X	X	X	X	X	Observed in all seasons
Broad-winged Hawk	*Buteo platypterus*	S5B				DWC/Inc.		X	X		X		X	
Brown Creeper	*Certhia americana*	S5				PC		X		X			X	

Common Name	Scientific Name	S-rank	COSEWIC Status	SARA Status	NS ESA Status	Survey Type	2021 Winter	2021 Spring	2021 Summer	2021 Fall	2022 Spring	2022 Summer	2022 Fall	Comments
Canada Goose	*Branta canadensis*	SUB,S4N,S5M Exotic Breeding				PC		X		X	X		X	
*Canada Jay	*Perisoreus canadensis*	S3				DWC/PC		X	X	X	X	X	X	Observed during breeding season
Canada Warbler	*Cardellina canadensis*	S3B	SC	T	E	PC/Inc.		X		X			X	Not observed during sensitive breeding season
*Cape May Warbler	*Setophaga tigrina*	S3B,SUM				PC/Inc.		X	X	X	X	X		Observed during sensitive breeding season
Cedar Waxwing	*Bombycilla cedrorum*	S5B				PC			X	X	X	X	X	
Chestnut-sided Warbler	*Setophaga pensylvanica*	S5B				PC		X	X		X	X	X	
Common Grackle	*Quiscalus quiscula*	S5B				PC		X	X	X		X		
Common Nighthawk	*Chordeiles minor*	S3B	SC	T	T	Br.CNHk			X					Observed during sensitive breeding season
Common Loon	*Gavia immer*	S4B	NAR			PC						X		
Common Raven	*Corvus corax*	S5				PC/DWC	X	X	X	X	X	X	X	
Common Yellowthroat	*Geothlypis trichas*	S5B				PC		X	X	X	X	X	X	
*Cooper's Hawk	*Accipiter cooperii*	S1?B,SUN,SUM	NAR			DWC							X	Not observed during sensitive breeding season
Dark-eyed Junco	*Junco hyemalis*	S4S5				PC	X	X	X	X	X	X	X	
Double-crested Cormorant	*Phalacrocorax auritus*	S5B	NAR			PC				X				
Downy Woodpecker	*Dryobates pubescens*	S5				PC		X	X	X	X	X	X	
Eastern Wood-Pewee	*Contopus virens*	S3S4B	SC	SC	V	PC					X	X		Observed during sensitive breeding season
Evening Grosbreak	*Coccothraustes vespertinus*	S3B, S3N, S3M	SC	SC	V	PC		X	X		X			Observed during breeding and non-breeding seasons (both sensitive).
Golden-crowned Kinglet	*Regulus satrapa*	S5				PC	X	X	X	X	X	X	X	
Hairy Woodpecker	*Dryobates villosus*	S5				PC		X	X	X	X	X	X	
Hermit Thrush	*Catharus guttatus*	S5B				PC		X	X	X	X	X	X	
Herring Gull	*Larus argentatus*	S5				DWC				X			X	
Least Flycatcher	*Empidonax minimus*	S4S5B, S5M				PC		X	X	X	X	X		
Lincoln's Sparrow	*Melospiza lincolnii*	S4B, S5M				PC		X	X	X	X	X	X	
Magnolia Warbler	*Setophaga magnolia*	S5B				PC		X	X	X	X	X	X	
Merlin	*Falco columbarius*	S5B	NAR			PC/Inc.		X					X	
Mourning Dove	*Zenaida macroura*	S5				PC		X			X	X	X	
Mourning Warbler	*Geothlypis philadelphia*	S4B, S5M				PC		X	X	X	X	X	X	

Common Name	Scientific Name	S-rank	COSEWIC Status	SARA Status	NS ESA Status	Survey Type	2021 Winter	2021 Spring	2021 Summer	2021 Fall	2022 Spring	2022 Summer	2022 Fall	Comments
Nashville Warbler	*Oreothlypis ruficapilla*	S4B, S5M				PC		X	X	X	X	X	X	
Northern Flicker	*Colaptes auratus*	S5B				PC		X	X	X	X	X	X	
*Northern Goshawk	*Accipiter gentilis*	S3S4	NAR			PC/DWC					X		X	Observed during breeding season
Northern Harrier	*Circus hudsonius*	S4B,S4S5M	NAR			PC/DW/Inc.		X	X	X	X	X	X	
Northern Parula	*Setophaga americana*	S5B				PC		X	X	X	X	X	X	
Northern Waterthrush	*Parkesia noveboracensis*	S4B, S5M				PC		X						
Olive-sided Flycatcher	*Contopus cooperi*	S3B	SC	T	T	PC						X		Observed during sensitive breeding season
Osprey	*Pandion haliaetus*	S4S5B, S5M				DWC		X						
Ovenbird	*Seiurus aurocapilla*	S5B				PC		X	X	X	X	X	X	
Palm Warbler	*Setophaga palmarum*	S5B				PC		X	X	X	X		X	
*Philadelphia Vireo	*Vireo philadelphicus*	S2?B,SUM				PC							X	Observed outside of sensitive breeding season
Pileated Woodpecker	*Dryocopus pileatus*	S5				PC	X	X		X	X	X	X	
*Pine Siskin	*Spinus pinus*	S3				PC					X	X	X	Observed in all seasons except winter
*Purple Finch	*Haemorhous purpureus*	S4S5B, S3S4N, S5M				PC		X	X	X	X	X	X	Observed during sensitive non-breeding season.
*Red Crossbill	*Loxia curvirostra*	S3S4				PC			X	X	X	X		Observed during breeding season
Red-breasted Nuthatch	*Sitta canadensis*	S4S5				PC/Inc.	X	X	X	X	X	X	X	
Red-eyed Vireo	*Vireo olivaceus*	S5B				PC		X	X	X	X	X	X	
Red-tailed Hawk	*Buteo jamaicensis*	S5				PC/DW	X	X		X	X		X	
Ring-necked Pheasant	*Phasianus colchicus*	SNA				PC		X	X					
*Rose-breasted Grosbeak	*Pheucticus ludovicianus*	S3B				PC/Inc.					X			Observed outside sensitive breeding season
Ruby-crowned Kinglet	*Regulus calendula*	S4B, S5M				PC		X	X	X	X	X	X	
Ruby-throated Hummingbird	*Archilochus colubris*	S5B				PC				X	X			
Ruffed Grouse	*Bonasa umbellus*	S5				PC/Inc.		X	X	X	X	X	X	
Savannah Sparrow	*Passerculus sandwichensis*	S4S5B, S5M				PC		X	X	X	X	X	X	

Common Name	Scientific Name	S-rank	COSEWIC Status	SARA Status	NS ESA Status	Survey Type	2021 Winter	2021 Spring	2021 Summer	2021 Fall	2022 Spring	2022 Summer	2022 Fall	Comments
Sharp-shinned Hawk	*Accipiter striatus*	S5	NAR	NAR		DWC/PC/Inc.		X		X	X		X	
Snow Bunting	*Plectrophenax nivalis*	S5N				PC	X							
Song Sparrow	*Melospiza melodia*	S5B				PC		X	X	X	X	X	X	
Spruce Grouse	*Falcipennis canadensis*	S4				PC				X				
Swainson's Thrush	*Catharus ustulatus*	S4B,S5M				PC		X	X		X	X	X	
Swamp Sparrow	*Melospiza georgiana*	S5B				PC		X	X	X	X	X	X	
*Turkey Vulture	*Cathartes aura*	S2S3B,S4S5M				DW/Inc.		X			X	X	X	Observed during breeding season
White-breasted Nuthatch	*Sitta carolinensis*	S4				PC				X	X	X	X	
White-throated Sparrow	*Zonotrichia albicollis*	S4S5B, S5M				PC		X	X	X	X	X	X	
White-winged Crossbill	*Loxia leucoptera*	S4S5				DWC/PC	X			X	X	X	X	
Winter Wren	*Troglodytes hiemalis*	S5B				PC		X	X	X	X	X	X	
Yellow Warbler	*Setophaga petechia*	S5B				PC		X					X	
Yellow-bellied Sapsucker	*Sphyrapicus varius*	S5B				PC		X	X		X	X		
Yellow-rumped Warbler	*Setophaga coronata*	S5B				DWC/PC		X	X	X	X	X	X	

Notes:
Bold indicates a species is considered a SAR
* indicates a species is considered a SoCC
S-rank refers to the Sub-national (Provincial) rank provided by the AC CDC and includes the following: S1 Critically Imperiled, S2 Imperiled, S3 Vulnerable, S4 Apparently Secure, S5 Secure and SU Unrankable. Rankings are frequently paired with the following breeding status qualifiers: B Breeding, N Non-breeding and M Migrant.

Spring Diurnal Watch Count Results

Table A3: 2021 Spring Diurnal Watch Count Results

Survey Time	Total survey time (mins)	Common name	Scientific Name	S-Rank	# Detected	Seen	Heard	Est. Distance (m)	Est. Bearing	Pass Height (m)	Pass Direction	Comments
07-May-21 Watch Location 2												
9:20	0	Northern Harrier	*Circus hudsonius*	S4B,S4S5M	1	passing		500	SW	100-250	E	
		Northern Harrier	*Circus hudsonius*	S4B,S4S5M	1	passing			W	100-250	N	Possibly same bird
		Northern Flicker	*Colaptes auratus*	S5B	2	local		300	W	<50	N	moving across blueberry fields
		American Robin	*Turdus migratorius*	S5B,S3N	11	local		100	S	<50		foraging in blueberry fields
9:50	30	Sharp-shinned Hawk	*Accipiter striatus*	S5	1	passing		250	W	50-100	SW	
		Common Raven	*Corvus corax*	S5	1	passing		500	N	100-250	S	
10:20	60	Osprey	*Pandion haliaetus*	S4S5B, S5M	1	passing		500	W	100-250	SE	
		American Crow	*Corvus brachyrhynchos*	S5	3	passing		250	N	<50	SE	moving just over canopy height
		Common Raven	*Corvus corax*	S5	2	passing		250	S	50-100	NW	
		Blue Jay	*Cyanocitta cristata*	S5	3	local		250	NW	<50	E	
10:50	90	Red-tailed Hawk	*Buteo jamaicensis*	S5	1	passing		1000	NW	100-250	S	
11:20	120	Red-tailed Hawk	Buteo jamaicensis	S5	1	circling		500	W	250+	SE	soaring, gaining altitude
		Broad-winged Hawk	*Buteo platypterus*	S5B	1	passing		1000	W	100-250	N	
11:50	150	passerine spp.	-		3	passing		100	W	50-100	E	suspected warblers
		Common Raven	*Corvus corax*	S5	1	passing		100	W	50-100	N	
		Turkey Vulture	*Cathartes aura*	S2S3B,S4S5M	1	passing		500	SW	100-250	NW	may have been foraging/ searching for carrion
		Red-tailed Hawk	*Buteo jamaicensis*	S5	1	circling		1000	SW	250+	E	soaring, gaining altitude
12:20	180	Belted Kingfisher	*Megaceryle alcyon*	S4S5B	1	passing	call	250	N	50-100	S	agitated, calling
		Northern Harrier	*Circus hudsonius*	S4B,S4S5M	1	local		250	S	<50		hunting over blueberry fields
12:50	210	American Crow	*Corvus brachyrhynchos*	S5	2	passing		500	SW	50-100	W	
13:20	240	SURVEY END										
14-May-21 Watch Location 1												
9:30	0	Common Yellowthroat	*Geothlypis trichas*	S5B	2	local	sing	100				
		American Kestrel	*Falco sparverius*	S3B, S4S5M	2	perched		250	W			male and female perched, possible pair
		Northern Flicker	*Colaptes auratus*	S5B	1	local		100	N	<50	N	moving over cut area
10:00	30	American Crow	*Corvus brachyrhynchos*	S5	2	passing		1000	SW	50-100	SE	
		American Goldfinch	*Spinus tristis*	S5	2	passing		250	SW	50-100	NE	
		Blue Jay	*Cyanocitta cristata*	S5	1	local	call	100	E	<50	SE	
		passerine spp.	-		1	passing		50	SW	50-100	NE	likely a warbler
10:30	60	Turkey Vulture	*Cathartes aura*	S2S3B,S4S5M	1	passing		1000	N	100-250	NE	
		American Crow	*Corvus brachyrhynchos*	S5	2	passing		500	S	50-100	E	
		American Kestrel	*Falco sparverius*	S3B, S4S5M	2	perched		250	SW	<50	SW	likely same two birds seen earlier
		Common Grackle	*Quiscalus quiscula*	S5B	1	passing	call	250	W	50-100	E	

Survey Time	Total survey time (mins)	Common name	Scientific Name	S-Rank	# Detected	Seen	Heard	Est. Distance (m)	Est. Bearing	Pass Height (m)	Pass Direction	Comments
11:00	90	Bald Eagle	*Haliaeetus leucocephalus*	S5	1	circling		1000	SW	100-250	W	gaining altitude, fading westward (adult)
		Turkey Vulture	*Cathartes aura*	S2S3B,S4S5M	1	passing		1000	NW	100-250	W	possibly same bird as earlier
		Blue Jay	*Cyanocitta cristata*	S5	1	local	call	100	E	<50	S	moving just above canopy level
11:30	120	White-throated Sparrow	*Zonotrichia albicollis*	S4S5B, S5M	1	local	sing	50	SW			
12:00	150	Canada Goose	*Branta canadensis*	SUB,S4N,S5M Exotic Breeding	2	passing		250	W	100-250	E	
		Bald Eagle	*Haliaeetus leucocephalus*	S5	1	passing		500	S	100-250	E	immature bird, different than one seen earlier
12:30	180	Red-tailed Hawk	*Buteo jamaicensis*	S5	1	circling	call	500	SE	100-250	E	gaining altitude, occasionally calling/ screeching
13:00	210	Blue Jay	*Cyanocitta cristata*	S5	4	passing		250	W	100-250	N	
		American Goldfinch	*Spinus tristis*	S5	1	passing	call	100	S	100-250	NE	
		passerine spp.	-		3	passing	call	100	W	100-250	E	
		Common Raven	*Corvus corax*	S5	1	passing		500	NW	100-250	SW	
13:30	240	SURVEY END										
15-May-21 Watch Location 2												
8:40	0	Common Grackle	*Quiscalus quiscula*	S5B	1	passing		50	NE	50-100	S	
		American Crow	*Corvus brachyrhynchos*	S5	2	passing		500	NW	50-100	E	
9:10	30	American Crow	*Corvus brachyrhynchos*	S5	1	passing		250	NW	50-100	E	
		warbler spp.	-		1	passing		500	SE	50-100	NW	
		American Robin	*Turdus migratorius*	S5B,S3N	1	passing		500	SW	50-100	E	
		Blue Jay	*Cyanocitta cristata*	S5	1	passing		50	S	50-100	N	
9:40	60	Bald Eagle	*Haliaeetus leucocephalus*	S5	1	passing		500	SE	50-100	NE	
		Yellow-rumped Warbler	*Setophaga coronata*	S5B	1	passing		0	S	50-100	N	
		Common Grackle	*Quiscalus quiscula*	S5B	9	passing		1000	SW	50-100	E	
10:10	90	American Goldfinch	*Spinus tristis*	S5	1	passing		0	NW	50-100	SE	
		American Robin	*Turdus migratorius*	S5B,S3N	1	passing		250	SW	50-100	E	
		Yellow-rumped Warbler	*Setophaga coronata*	S5B	1	passing		0	S	50-100	N	
10:40	120	Red-tailed Hawk	*Buteo jamaicensis*	S5	2	hunting		1000	SE	100-250		
		Common Raven	*Corvus corax*	S5	1	passing		1000	SW	50-100	E	
		American Goldfinch	*Spinus tristis*	S5	1	passing		50	S	50-100	N	
		Turkey Vulture	*Cathartes aura*	S2S3B,S4S5M	1	passing		2000	S	100-250	NW	
		Blue Jay	*Cyanocitta cristata*	S5	4	passing		500	NW	50-100	S	
		Purple Finch	*Haemorhous purpureus*	S4S5B, S3S4N, S5M	1	passing		0	S	50-100	NE	
		Sharp-shinned Hawk	*Accipiter striatus*	S5	1	passing		1000	SW	100-250	E	riding updrafts, gradually moving east
11:10	150	Red-tailed Hawk	*Buteo jamaicensis*	S5	1	hunting		1000	SW	100-250	SE	
		passerine spp.	-	-	1	passing		500	NW	100-250	E	

Survey Time	Total survey time (mins)	Common name	Scientific Name	S-Rank	# Detected	Seen	Heard	Est. Distance (m)	Est. Bearing	Pass Height (m)	Pass Direction	Comments
		Red-tailed Hawk	*Buteo jamaicensis*	S5	1	hunting		2000	SE	100-250		
		Blue Jay	*Cyanocitta cristata*	S5	1	passing		250	SW	50-100	E	
11:40	180	Red-tailed Hawk	*Buteo jamaicensis*	S5	2	hunting		2000	S	100-250		
12:10	210	Common Raven	*Corvus corax*	S5	1	soaring		2000	S	250+		
		Northern Harrier	*Circus hudsonius*	S4B,S4S5M	1	passing		500	SE	100-250	N	
12:40	240	SURVEY END										
20-May-21 Watch Location 2												
8:50	0	American Kestrel	*Falco sparverius*	S3B, S4S5M	1	passing		250	NW	<50	SE	
9:20	30	American Kestrel	*Falco sparverius*	S3B, S4S5M	1	passing		250	NW	<50	SE	
9:50	60	*no birds detected*	-									
10:20	90	*no birds detected*	-									
10:50	120	Common Raven	*Corvus corax*	S5	1	passing		1000	SW	50-100	E	
11:20	150	Blue Jay	*Cyanocitta cristata*	S5	1	passing		0	N	50-100	S	
		Red-tailed Hawk	*Buteo jamaicensis*	S5	1	passing		500	SW	100-250	N	
11:50	180	American Robin	*Turdus migratorius*	S5B,S3N	1	passing		100	NE	50-100	SW	
		American Goldfinch	*Spinus tristis*	S5	1	passing		50	SE	50-100	W	
12:20	210	Common Raven	*Corvus corax*	S5	1	passing		1000	SE	50-100	N	
		Sharp-shinned Hawk	*Accipiter striatus*	S5	1	passing		100	SE	100-250	N	
12:50	240	SURVEY END										
8:50	0	American Kestrel	*Falco sparverius*	S3B, S4S5M	1	passing		250	NW	<50	SE	
9:20	30	American Kestrel	*Falco sparverius*	S3B, S4S5M	1	passing		250	NW	<50	SE	
9:50	60	*no birds detected*	-									
10:20	90	*no birds detected*	-									
10:50	120	Common Raven	*Corvus corax*	S5	1	passing		1000	SW	50-100	E	
11:20	150	Blue Jay	*Cyanocitta cristata*	S5	1	passing		0	N	50-100	S	
		Red-tailed Hawk	*Buteo jamaicensis*	S5	1	passing		500	SW	100-250	N	
11:50	180	American Robin	*Turdus migratorius*	S5B,S3N	1	passing		100	NE	50-100	SW	
		American Goldfinch	*Spinus tristis*	S5	1	passing		50	SE	50-100	W	
12:20	210	Common Raven	*Corvus corax*	S5	1	passing		1000	SE	50-100	N	
		Sharp-shinned Hawk	*Accipiter striatus*	S5	1	passing		100	SE	100-250	N	
12:50	240	SURVEY END										
21-May-21 Watch Location 1												
9:20	0	Blue Jay	*Cyanocitta cristata*	S5	2	local	call	100	E	<50	NE	staying just above canopy level
		American Kestrel	*Falco sparverius*	S3B, S4S5M	1	local		250	W	<50	W	(male) hunting over cut area, erratic flight (hawking?)
9:50	30	American Kestrel	*Falco sparverius*	S3B, S4S5M	1	perched		250	W			same bird (male), perched amongst dead/dying trees

Survey Time	Total survey time (mins)	Common name	Scientific Name	S-Rank	# Detected	Seen	Heard	Est. Distance (m)	Est. Bearing	Pass Height (m)	Pass Direction	Comments
		American Crow	*Corvus brachyrhynchos*	S5	2	passing		500	SW	50-100	NW	
10:20	60	Blue Jay	*Cyanocitta cristata*	S5	1	passing		250	W	50-100	E	
		Common Grackle	*Quiscalus quiscula*	S5B	1	passing	call	250	NE	50-100	W	
		duck spp.	-		2	passing		500	W	100-250	E	probably American Black Duck
10:50	90	*no birds detected*										
11:20	120	Northern Harrier	*Circus hudsonius*	S4B,S4S5M	1	passing		500	NE	50-100	SW	dipping lower over cut area to hunt
11:50	150	Common Raven	*Corvus corax*	S5	2	passing		1000	NW	50-100	N	
		American Goldfinch	*Spinus tristis*	S5	1	passing	call	50	SW	50-100	N	
12:20	180	Hairy Woodpecker	*Dryobates villosus*	S5	1	passing		100	NE	<50	SE	just staying above canopy level
		Blue Jay	*Cyanocitta cristata*	S5	1	passing		250	NW	<50	SW	
12:50	210	American Kestrel	*Falco sparverius*	S3B, S4S5M	1	perched		250	W			(female) perched in same patch of trees the male was in earlier
		American Crow	*Corvus brachyrhynchos*	S5	5	passing		1000	SE	50-100	SW	
		American Goldfinch	*Spinus tristis*	S5	2	passing		100	W	50-100	E	
13:20	240	SURVEY END										
Totals	1,200 (20h)				146							

Table A3: 2022 Spring Diurnal Watch Count Results

Survey Time	Total survey time (mins)	Common name	Scientific Name	S-Rank	# Detected	Seen	Heard	Est. Distance (m)	Est. Bearing	Pass Height (m)	Pass Direction	Comments
11-May-22 Watch Location 2												
9:45	0	Common Raven	*Corvus corax*	S5	1	perched						Perched atop weeds near T7/T10
		White-winged Crossbill	*Loxia leucoptera*	S4S5	3			<50	SW		NE	
10:15	30	American Robin	*Turdus migratorius*	S5B, S3N	1	local						
		Yellow-rumped Warbler	*Setophaga coronata*	S5B	5	Local						
		Bald Eagle	*Haliaeetus leucocephalus*	S5	1	flying		3000		>300		Juvenile
10:45	60	Turkey Vulture	*Cathartes aura*	S2S3B, S4S5M	1			1250	S	50-100	N	Gaining altitude T6/T8
		Red-tailed Hawk	*Buteo jamaicensis*	S5	1	flying		3000	N	>300	SE	Kettling
		Bald Eagle	*Haliaeetus leucocephalus*	S5	1	Flying		2000	E	50-100	N	Adult. Kettling, lost sight behind ridgeline
11:15	90	Bald Eagle	*Haliaeetus leucocephalus*	S5	1	flying		1500	NW	>100	SE	Adult.
		Yellow-rumped Warbler	*Setophaga coronata*	S5B	2	Local						Subcanopy
11:45	120	Northern Harrier	*Circus hudsonius*	S4B, S4S5M	1	Foraging		<50				Male, ofraging over cleared area
		Common Raven	*Corvus corax*	S5	2	Passing		100-200	SE		NW	
		Bald Eagle	*Haliaeetus leucocephalus*	S5	3	Flying		>300	SE		NW	All adult
		Common Raven	*Corvus corax*	S5	2			100-200		1500		Over canopy on ridge
12:15	150	Bald Eagle	*Haliaeetus leucocephalus*	S5	1	Flying		1000		>300		
		Passerine			2			100-200	W		SE	Over canopy
		Yellow-rumped Warbler	*Setophaga coronata*	S5B	1	Local						Over fields
		Canada Jay	*Perisoreus canadensis*	S3	1	Local						Over fields
		Passerine			1	Local		100				Over canopy
		Turkey Vulture	*Cathartes aura*	S2S3B, S4S5M	1			200	E		SW	Across blueberry field, gained altitude and was over valley between observation point and Rose Array

Survey Time	Total survey time (mins)	Common name	Scientific Name	S-Rank	# Detected	Seen	Heard	Est. Distance (m)	Est. Bearing	Pass Height (m)	Pass Direction	Comments
		Northern Harrier	*Circus hudsonius*	S4B, S4S5M	1	Foraging		<50				Male. Foraging at bat pole
		Bald Eagle	*Haliaeetus leucocephalus*	S5	2	Flying		>300		4000		Soaring, gaining altitude
		Common Raven	*Corvus corax*	S5	1	flying		50-100	E		W	Over canopy
12:45	180	Red-tailed Hawk	*Buteo jamaicensis*	S5	2	Flying		3000		>300		Adult. Soaring, gaining altitude
		Passerine				Local						Sub-canopy
		Northern Goshawk	*Accipiter gentilis*	S3S4	1			1000				Juvenile. Just above trees and before entering canopy.
		Common Raven	*Corvus corax*	S5	1			1500				Small accipiter/falcon harassing the raven just over canopy
		Small accipiter/falcon			1			1500				Small accipiter/falcon harassing the raven just over canopy
		Common Raven	*Corvus corax*	S5	1							Low over fields sub canopy
		Northern Harrier	*Circus hudsonius*	S4B, S4S5M	1	Hunting		50-100				At bat pole hunting
		American Crow	*Corvus brachyrhynchos*	S5	3			500				Sub-canopy over fields
13:15	210	Turkey Vulture	*Cathartes aura*	S2S3B, S4S5M	4			2000	W	100-200	SE	All 4 went down near bat pole, possibly for kill or road kill
		Northern Harrier	*Circus hudsonius*	S4B, S4S5M	1	hunting		<50				At bat pole
		Red-tailed Hawk	*Buteo jamaicensis*	S5	1			100-200		800		
		American Robin	*Turdus migratorius*	S5B, S3N	1	local						Over fields
		Broad-winged Hawk	*Butea platypterus*	S5B	1	perched		500-600				Edge of fields
13:45	240	SURVEY END										
19-May-22 Watch Location 2												
10:00	0	None			0							
10:30	30	Red-tailed Hawk	*Buteo jamaicensis*	S5	1	Circling		1500	W	100-400		
		Common Raven	*Corvus corax*	S5	2			1000	NW	50	SW	
		Red-tailed Hawk	*Buteo jamaicensis*	S5	1			500	S	20		Low over field
		Northern Harrier	*Circus hudsonius*	S4B, S4S5M	1			1500		20		Low over field
11:00	60	None			0							
11:30	90	Turkey Vulture	*Cathartes aura*	S2S3B, S4S5M	1			1500	WNW	100	W	
12:00	120	Barn Swallow	*Hirundo rustica*	S3B	1	Foraging		100	S	20		Foraging over field
		Common Raven	*Corvus corax*	S5	1	Flying, Local		500	S	50		
12:30	150	None			0							
13:00	180	SURVEY END										
Totals	420 (7 hours)				62							

Fall Diurnal Watch Count Results

Table A6: 2021 Fall Diurnal Watch Count Results

Survey Time	Total survey time (mins)	Common name	Scientific Name	S-Rank	# Detected	Seen	Heard	Est. Distance (m)	Est. Bearing	Pass Height (m)	Pass Direction	Comments
07-Sep-21 Watch Location 2												
11:10	0	Red-tailed Hawk	*Buteo jamaicensis*	S5	1	passing		1000	W	50-100	N	
		Savannah Sparrow	*Passerculus sandwichensis*	S4S5B,S5M	3	local		100	S	<50		
		Red-tailed Hawk	*Buteo jamaicensis*	S5	1	hunting		250	W	<50		stooped into field
11:40	30	Sharp-shinned Hawk	*Accipiter striatus*	S5	1	hunting		500	W	<50		
		Red-tailed Hawk	*Buteo jamaicensis*	S5	1	passing		500	W	50-100	SW	
		raptor spp.	-		1	passing		5000	W	100-250	SW	stooped into trees
		Double-crested Cormorant	*Phalacrocorax auritus*	S5B	1	passing		3000	NW	250+	NE	circling to gain altitude, looked like it eventually headed ne
		Common Raven	*Corvus corax*	S5	1	passing		500	NW	50-100	E	
		warbler spp.	-		1	passing		250	W	<50	E	
12:10	60	Sharp-shinned Hawk	*Accipiter striatus*	S5	1	passing		500	SW	<50	S	
		Common Raven	*Corvus corax*	S5	1	passing		500	W	<50	NE	
		American Goldfinch	*Spinus tristis*	S5	1	passing		100	S	<50	NW	
12:40	90	Bald Eagle	*Haliaeetus leucocephalus*	S5	2	circling		2000	E	100-250		circling near communications tower
		Red-tailed Hawk	*Buteo jamaicensis*	S5	1	hunting		2000	E	100-250	E	
13:10	120	Red-tailed Hawk	*Buteo jamaicensis*	S5	1	passing		1000	NW	100-250	SW	
		Common Raven	*Corvus corax*		1	passing		1000	S	50-100	S	
		Common Raven	*Corvus corax*		1	passing		1000	N	100-250	E	
		warbler spp.	-		1	passing		50	NW	50-100	S	fighting wind to get south
13:40	150	Common Raven	*Corvus corax*		1	passing		250	NE	<50	W	
		Sharp-shinned Hawk	*Accipiter striatus*	S5	1	passing		1000	SE	50-100	NE	
		Red-tailed Hawk	*Buteo jamaicensis*	S5	1	hunting		500	S	100-250	N	
		Sharp-shinned Hawk	*Accipiter striatus*	S5	1	passing		1000	S	50-100	E	stooped into trees
14:10	180	SURVEY END										
15-Sep-21 Watch Location 2												
10:00	0	Canada Goose	*Branta canadensis*	SUB,S4N,S5M Exotic Breeding	11	passing		2000	SW	<50	NE	
		Yellow-rumped Warbler	*Setophaga coronata*	S5B	1	passing		0	E	<50	W	
		Herring Gull	*Larus argentatus*	S5	2	passing		3000	N	100-250	S	
		Herring Gull	*Larus argentatus*	S5	3	passing		500	SE	<50	W	
10:30	30	*no birds detected*	-									
11:00	60	*no birds detected*	-									
11:30	90	Bald Eagle	*Haliaeetus leucocephalus*	S5	1	circling		2000	N	250+		circling to gain altitude. looked like it was slowly making its way south

Survey Time	Total survey time (mins)	Common name	Scientific Name	S-Rank	# Detected	Seen	Heard	Est. Distance (m)	Est. Bearing	Pass Height (m)	Pass Direction	Comments
12:00	120	raptor spp.	-		1	circling		2000	N	250+		lost bird when switching to scope
		passerine spp.	-		2	passing		500	SE	<50	N	
12:30	150	buteo spp.	-		2	passing		2000	SE	100-250	N	probably Red-tailed hawks
		Red-tailed Hawk	*Buteo jamaicensis*	S5	1	passing		2000	SE	100-250	N	
		Bald Eagle	*Haliaeetus leucocephalus*	S5	1	passing		3000	SE	250+	N	
		warbler spp.	-		1	passing		250	NE	<50	SE	
		Savannah Sparrow	*Passerculus sandwichensis*	S4S5B,S5M	1	local	calling			<50		
13:00	180	passerine spp.	-		2	passing		100	S	<50	N	
13:30	210	Common Raven	*Corvus corax*	S5	1	circling		2000	N	250+		
14:00	240	SURVEY END										
27-Sep-21 Watch Location 1												
11:00	0	American Kestrel	*Falco sparverius*	S3B, S4S5M	1	passing		250	W	<50	SW	(female) hunting in cutover areas
		Yellow-rumped Warbler	*Setophaga coronata*	S5B	1	passing		50	NE	<50	SW	
11:30	30	American Crow	*Corvus brachyrhynchos*	S5	5	passing		500	SW	50-100	N	
		Canada Goose	*Branta canadensis*	SUB,S4N,S5M Exotic Breeding	5	passing		100	E	50-100	W	family group?
		passerine spp.	-		2	passing		100	NE	50-100	NW	small, finch or warbler
12:00	60	Red-tailed Hawk	*Buteo jamaicensis*	S5	1	passing		500	SE	50-100	E	
		Blue Jay	*Cyanocitta cristata*	S5	2	local	calling	100	NE	<50	SE	staying within or just above canopy
12:30	90	American Crow	*Corvus brachyrhynchos*	S5	3	passing		250	S	<50	W	
		Bald Eagle	*Haliaeetus leucocephalus*	S5	1	passing		1000	SW	100-250	W	mature, adult bird
		American Robin	*Turdus migratorius*	S5B,S3N	2	passing		250	N	<50	SW	
13:00	120	raptor spp. (buteo)	-		1	passing		1000	S	50-100	E	initial take was Broad-winged Hawk
13:30	150	Common Raven	*Corvus corax*	S5	1	passing	calling	500	NE	?		only heard, moved away
		American Kestrel	*Falco sparverius*	S3B, S4S5M	1	perch		250	W			(female)
14:00	180	SURVEY END										
08-Oct-21 Watch Location 1												
10:10	0	raptor spp.	-		1	passing		1000	SE	50-100	N	
10:40	30	American Kestrel	*Falco sparverius*	S3B, S4S5M	1	passing		1000	SE	50-100	NW	
		passerine spp.	-		3	passing		1000	NE	50-100	S	
		Red-tailed Hawk	*Buteo jamaicensis*	S5	1	passing		1000	E	50-100	NW	birds staying low in wind, flying north, then banking west when reaching valley to north
		raptor spp.	-		1	passing		3000	SW	100-250	S	
		Northern Harrier	*Circus hudsonius*	S3S4B	1	passing		1000	NE	50-100	W	male
		Common Raven	*Corvus corax*	S5	9	passing		2000	NE	50-100	W	
		Sharp-shinned Hawk	*Accipiter striatus*	S5	1	passing		1000	NE	50-100	W	stooped into woods
11:10	60	Red-tailed Hawk	*Buteo jamaicensis*	S5	1	passing		1000	NE	50-100	NW	
		passerine spp.	-		1	passing		1000	NE	50-100	W	

Survey Time	Total survey time (mins)	Common name	Scientific Name	S-Rank	# Detected	Seen	Heard	Est. Distance (m)	Est. Bearing	Pass Height (m)	Pass Direction	Comments
11:40	90	Red-tailed Hawk	*Buteo jamaicensis*	S5	1	passing		1000	W	100-250	W	
12:10	120	Common Raven	*Corvus corax*	S5	1	passing		2000	NE	100-250	W	
		Northern Harrier	*Circus hudsonius*	S3S4B	1	passing		1000	W	50-100	W	female
12:40	150	raptor spp.	-		1	passing		2000	W	250+	SW	
13:10	180	raptor spp.	-		1	passing		3000	-	250+	NW	lost when switching to scope
13:40	210	Red-tailed Hawk	*Buteo jamaicensis*	S5	1	hunting		1000	NE	100-250	N	slowly making way north
14:10	240	SURVEY END										
Totals	840 (14h)				107							

Table A6: 2022 Fall Diurnal Watch Count Results

Survey Time	Total survey time (mins)	Common name	Scientific Name	S-Rank	# Detected	Seen	Heard	Est. Distance (m)	Est. Bearing	Pass Height (m)	Pass Direction	Comments
12-Sep-22 Watch Location 2												
11:30	0	*No birds detected*										
12:00	30	Turkey Vulture	*Cathartes aura*	S2S3B,S4S5M	3	Passing		1000	NE	100+	S	
		Common Raven	*Corvus corax*	S5	2	Soaring		2000	NW	50+		
12:30	60	Red-tailed Hawk	*Buteo jamaicensis*	S5	1	Passing		2000	NE	100+	W	
		Red-tailed Hawk	*Buteo jamaicensis*	S5	1	Soaring		1000	NW	250+		
13:00	90	Common Raven	*Corvus corax*	S5	2	Passing		100	SE	50+	NW	
13:30	120	Northern Harrier	*Circus hudsonius*	S3S4B	1	Soaring		1000	N	100+		
		Large accipiter species			2	Soaring		1000	S	100+	SW	Riding thermals, eventually flew west
14:00	150	*No birds detected*										
14:30	180	Warbler species			2	Passing		50	E	50+	N	
15:00	210	Cooper's Hawk		S1?B,SUN,SUM	1	Hunting		0	S			Landed in tree 10 ft away, possibly hunting juno
15:30	240	SURVEY END										
29-Sep-22 Watch Location 2												
10:40	0	*No birds detected*										
11:10	30	Northern Harrier	*Circus hudsonius*	S3S4B	1	Hunting		1000	SW			
		Red-tailed Hawk	*Buteo jamaicensis*	S5	3	Soaring		1000	SE	500	SW	
11:45	60	Red-tailed Hawk	*Buteo jamaicensis*	S5	1	Soaring		2000	NW	250	NW	
		Turkey Vulture	*Cathartes aura*	S2S3B,S4S5M	1	Passing		3000	W	100	NW	
		Common Raven	*Corvus corax*	S5	2	Agitated		50				
		Common Raven	*Corvus corax*	S5	1	Passing		2000	W			
		Broad-winged Hawk	*Buteo platypterus*	S5B	1	Passing		2000	E			
		Common Raven	*Corvus corax*	S5	1	Calling		1000	NW	50+	NW	
		Sharp-shinned Hawk	*Accipiter striatus*	S5	2	Soaring		2000	SW	100+		
12:15	90	Bald Eagle	*Haliaeetus leucocephalus*	S5	1	Passing		2000	NE			
		Common Raven	*Corvus corax*	S5	1	Passing		500	NE	50+	NW	
		Bald Eagle	*Haliaeetus leucocephalus*	S5	1	Soaring		3000	E			
		Bald Eagle	*Haliaeetus leucocephalus*	S5	2	Calling		2000	N	50+		Juvenile
		Sharp-shinned Hawk	*Accipiter striatus*	S5	1	Soaring		1000	E	100+	E	
		American Kestrel	*Falco sparverius*	S3B,S4S5M	1	Soaring		500	SW	100		
		Bald Eagle	*Haliaeetus leucocephalus*	S5	1	Soaring		2000	SW	250		Juvenile
		Common Raven	*Corvus corax*	S5	1	Soaring		1000	N	250		
12:45	120	Common Raven	*Corvus corax*	S5	6	Soaring		5000	W			
		Bald Eagle	*Haliaeetus leucocephalus*	S5	1	Soaring		2000	E	100	E	
		Herring Gull	*Larus argentatus*	S5	6	Soaring		3000	E			
		Northern Goshawk	*Circus hudsonius*	S3S4	1	Soaring		500	SW	50+		
		Common Raven	*Corvus corax*	S5	1	Soaring		1000	N	500	W	
13:15	150	Sharp-shinned Hawk	*Accipiter striatus*	S5	1	Soaring		0	SW	50+		
		Common Raven	*Corvus corax*	S5	1	Soaring		500	W			
		Red-tailed Hawk	*Buteo jamaicensis*	S5	1	Soaring		2000	NE	100+	E	

Survey Time	Total survey time (mins)	Common name	Scientific Name	S-Rank	# Detected	Seen	Heard	Est. Distance (m)	Est. Bearing	Pass Height (m)	Pass Direction	Comments
13:45	180	Red-tailed Hawk	*Buteo jamaicensis*	S5	1	Soaring		2000	N	250	E	
		Bald Eagle	*Haliaeetus leucocephalus*	S5	1	Passing		1000	SW	250	W	
		Red-tailed Hawk	*Buteo jamaicensis*	S5	1	Passing		1000	W			
		Red-tailed Hawk	*Buteo jamaicensis*	S5	1	Passing		1000	N	100+	E	
		Common Raven	*Corvus corax*	S5	1	Passing		2000	SW			
		Bald Eagle	*Haliaeetus leucocephalus*	S5	1	Passing		3000	NE			
14:14	210	SURVEY END										
Totals	450 (7.5h)				66							

Survey Location	Number Detected	Common Name	Scientific Name	Estimated Distance (m)	Estimated Direction	SARA	NS ESA	S-rank
1	nil	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2	1	Common Nighthawk	*Chordeiles minor*	500	NW	T	T	S3B
3	2	Common Nighthawk	*Chordeiles minor*	100-200	NW	T	T	S3B
4	nil	n/a	n/a	n/a	n/a	n/a	n/a	n/a
5	nil	n/a	n/a	n/a	n/a	n/a	n/a	n/a
6	nil	n/a	n/a	n/a	n/a	n/a	n/a	n/a

Date	21-Jun-21
Start Time	2100
End Time	2315
Total Time (hours)	2.25
Areas Surveyed	CONI Survey
Start Temp. (°C)	24°C
End Temp.(°C)	19°C
Ceiling Start (m)	10,000m
Ceiling End (m)	10,000m
Avg. Wind Speed (km/hr)	20
Gust Wind Speed (km/hr	31
Avg. Wind Direction	S
Avg. Cloud Cover (%)	40%
Precipitation	none
Background Noise	none
Visibility	18km
Comments	Clear, but clouded over

Survey Location	Number Detected	Common Name	Scientific Name	Estimated Distance (m)	Estimated Direction	S-rank
1	2	American Woodcock	*Scolopax minor*	100-250	North	S5B
2	1	American Woodcock	*Scolopax minor*	200	South	S5B
3	nil	n/a	n/a	n/a	n/a	n/a
4	1	Barred Owl	*Strix varia*	400	SW	S5
5	nil	n/a	n/a	n/a	n/a	n/a
6	2	American Woodcock	*Scolopax minor*	100-250	North	S5B

Date	28-Apr-21	03-May-21	07-May-21	14-May-21	15-May-21	20-May-21	21-May-21	26-May-21	07-Jun-21
Areas Surveyed	T1, T2	T1	T2	T1	T2	T2	T1	T1, T2	T1, T2
Start Temp. (°C)	5°C	3°C	1°C	4°C	5°C	3°C	7°C	15°C	16°C
End Temp. (°C)	9°C	8°C	2°C	9°C	10°C	6°C	11°C	11°C	18°C
Avg. Wind Speed (km/hr)	5	11	13	6	5	3	15	18	22
Gust Wind Speed (km/hr)	11	25	21	11	8	6	25	31	33
Avg. Wind Direction	NE	NE	NW	W	NW	N	SW	SW	S
Avg. Cloud Cover (%)	10%	0%	50%	20%	30%	80%	30%	80%	60%
Precipitation	none	none	none	none	none	none	none	none	none
Background Noise	none	none	distant machinery	none	none	distant machinery	none	distant machinery	none
Visibility (m)	>1000m	>1000m	>1000m	>1000m	>1000m	>1000m	>1000m	>1000m	>1000m
Comments	Clear and sunny	Clear and sunny, but gusty and cold	Partly cloudy, cold	Clear and sunny	Mostly sunny	Mostly cloudy	Mostly clear and sunny, gusty	Overcast, but clearing late morning	Gusty

Date	28-Jun-21	25-Aug-21	07-Sep-21	15-Sep-21	27-Sep-21	08-Oct-21
Areas Surveyed	T1, T2	T1, T2	T1, T2	T1,T2	T1, T2	T1, T2
Start Temp. (°C)	20°C	20°C	14°C	5°C	12°C	11°C
End Temp. (°C)	22°C	24°C	17°C	11°C	14°C	11°C
Avg. Wind Speed (km/hr)	20	10	16	12	14	22
Gust Wind Speed (km/hr)	30	16	24	22	21	37
Avg. Wind Direction	SW	W	SW	S	W	N
Avg. Cloud Cover (%)	20%	0%	50%	60%	20%	10%
Precipitation	none	none	none	none	none	none
Background Noise	none	none	distant machinery	distant machinery	distant machinery	distant machinery
Visibility (m)	>1000m	>1000m	>1000m	>1000m	>1000m	>1000m
Comments	Sunny and clear, gusty	Sunny, humid	Overcast, but cleared to scattered clouds	Overcast, but cleared	Clear, sunny	clear, gusty

Date	07-May-21	14-May-21	15-May-21	20-May-21	21-May-21	21-Jun-21	07-Sep-21	15-Sep-21
Start Time	920	930	840	850	920	2100	1110	1000
End Time	1320	1330	1240	1250	1320	2315	1410	1400
Total Time (hours)	4	4	4	4	4	2.25	3	4
Areas Surveyed	Skywatch 2 (T1)	Skywatch 1 (PC3)	Skywatch 2 (T1)	Skywatch 2 (T1)	Skywatch 1 (PC3)	CONI Survey	Skywatch 2 (T1)	Skywatch 2 (T1)
Start Temp. (°C)	3°C	9°C	11°C	7°C	13°C	24°C	17°C	11°C
End Temp.(°C)	12°C	14°C	16°C	14°C	21°C	19°C	21°C	17°C
Ceiling Start (m)	300m	9100m	9100m	300m	9100m	10,000m	9100m	9100m
Ceiling End (m)	500m	9100m	9100m	9100m	9100m	10,000m	9100m	9100m
Avg. Wind Speed (km/hr)	12	10	12	2	17	20	19	21
Gust Wind Speed (km/hr)	18	22	18	3	28	31	29	44
Avg. Wind Direction	NW	NW	N	N	SW	S	SW	S
Avg. Cloud Cover (%)	70%	50%	10%	40%	20%	40%	40%	80%
Precipitation	none	none	none	none	none	none	none	none
Background Noise	none	none	none	none	none	none	none	none
Visibility	20km	24km	28km	24km	29km	18km	23km	29km
Comments	mostly cloudy, sunny breaks	Mostly sunny w/ passing clouds	Sunny and clear	Mostly sunny w/ passing clouds	Mostly sunny and clear	Clear, but clouded over	Scattered clouds	Overcast, wind picked up over time

Date	27-Sep-21	08-Oct-21
Start Time	1100	1010
End Time	1400	1410
Total Time (hours)	3	4
Areas Surveyed	Skywatch 1 (PC3)	Skywatch 1 (PC3)
Start Temp. (°C)	15°C	11°C
End Temp.(°C)	17°C	11°C
Ceiling Start (m)	9100m	9100m
Ceiling End (m)	9100m	9100m
Avg. Wind Speed (km/hr)	17	25
Gust Wind Speed (km/hr	30	38
Avg. Wind Direction	W	NNE
Avg. Cloud Cover (%)	30%	30%
Precipitation	none	none
Background Noise	distant noise	none
Visibility	27km	24km
Comments	Clear, sunny	sunny, clear, gusty

Date	29-Apr-22	11-May-22	19-May-22	24-May-22	30-May-22	31-May-22	07-Jun-22
Areas Surveyed	Avian Transect 1	Avian Transect 1 & 2	Avian Transect 1 & 2	Avian Transect 1 & 2	Avian Transect #2	Avian Transect #1	Avian Transect #1 & #2
Surveyor(s)	CK	CK & DC	DC & CK/KC	CK & DC	CK	CK	CK & DC
~Start Time	6:00	5:30	5:30	5:30	5:30	5:30	5:00
~End Time	11:00	10:00	10:00	9:30	8:30	10:00	9:15
Start Temp. (°C)	4 (1)	2 (2)	4 (2)	2 (-1)	13 (13)	7 (6)	7 (6)
Start Conditions	Heavy Fog, overcast	Partly cloudy	Mostly clear	Partly cloudy	Overcast	Overcast	Partly cloudy
Start Cloud Cover (%)	100%	40%	10%	40%	100%	100%	20%
Start Wind Speed (km/hr	8	2	9	7	10	9	6
Start Gust Speed (km/hr)	12	3	13	11	15	14	9
Start Wind Direction	N	NE	W	SW	W	NW	S
End Temp. (°C)	4 (1)	10 (10)	10 (8)	8 (6)	15 (15)	9 (6)	12 (12)
End Conditions	Heavy Fog, overcast	Mostly cloudy	Clear	Overcast	Mostly cloudy	Partly Cloudy	Clear and Sunny
End Cloud Cover (%)	100%	70%	10%	90%	80%	30%	0%
End Wind Speed (km/hr)	13	5	12	10	4	20	2
End Gust Speed (km/hr)	20	7	18	16	6	30	4
End Wind Direction	NE	E	NW	N	SW	N	W
Precipitation	ntermittent light rair	none	none	none	none	none	none
Background Noise	distant highway traffic, quarry	distant highway traffic, quarry	distant highway traffic, quarry	distant highway traffic, quarry	distant highway traffic, quarry	distant highway traffic, quarry	distant highway traffic, quarry
Other notes	Fog remained heavy throughout the morning						

* the weather condition did not inhibit bird surveys on that day

Date	08-Jul-22	14-Jul-22	29-Aug-22	31-Aug-22	12-Sep-22	29-Sep-22	13-Oct-22
Areas Surveyed	Avian Transect #1	Avian Transect #2	Avian Transect #1	Avian Transect #2	ian Transect #1 &	ian Transect #1 &	Avian Transect #1 & #2
Surveyor(s)	DC	CK	CP	CP	CK & CP	CP & DC	CK & CP
~Start Time	5:00	5:00	7:00	7:00	7:00		8:30
~End Time	11:00	9:00		11:30	11:30		12:30
Start Temp. (°C)	14 (14)	15 (15)	13.9	19 (21)	11 (10)	7	8 (6)
Start Conditions	Overcast	Clear	*	Partly cloudy	mostly sunny	*	Overcast
Start Cloud Cover (%)	90%	0%	*	40%	10%	*	90%
Start Wind Speed (km/hr	3	3	1	18	10	2	19
Start Gust Speed (km/hr)	5	4	*	27	15	*	28
Start Wind Direction	SE	SW	S	S	SW	N	S
End Temp. (°C)	20 (21)	21 (25)	21	23 (29)	22 (24)	18	16 (15)
End Conditions	Partly cloudy	Mostly cloudy	*	Mostly cloudy	partly cloudy	*	partly cloudy
End Cloud Cover (%)	40%	80%	*	80%	30%	*	40%
End Wind Speed (km/hr)	16	8	17	23	5	14	17
End Gust Speed (km/hr)	24	12	*	34	7	*	26
End Wind Direction	S	NE	W	S	NW	W	S
Precipitation	none	none	none	none	none	none	none
Background Noise	distant highway traffic, quarry	distant highway traffic, quarry	distant highway traffic, quarry	distant highway traffic, quarry	distant highway traffic, quarry	distant highway traffic, quarry	distant highway traffic, quarry
Other notes				gusty - depressed bird activity			

* the weather condition did not inhibit bird surveys on that day

Diurnal Watch Weather

Date		11-May-22	19-May-22	12-Sep-22	29-Sep-22
Surveyor(s)		CK & DC	DC	CP	CP & DC
Start Time		10:00	10:15	11:30	
End Time		14:00	13:15	15:30	
Total Time (hours)		4h (8 blocks)	3h (6 blocks)	4h (8 blocks)	
Areas Surveyed		Diurnal Watch #1 (PC#11)	Diurnal Watch #1 (PC#11)	Diurnal Watch #1 (PC#11)	
Start Temp. (°C)		10 (10)	10 (8)	23 (24)	7
Start Conditions		Mostly cloudy	Clear	partly cloudy	*
Start Cloud Cover (%)		70%	10%	30%	*
Start Wind Speed (km/hr)		5	12	5	2
Start Gust Speed (km/hr)		7	18	7	*
Start Wind Direction		E	NW	NW	N
Start Visibility (km)		12.0km	25.0km	40.0 km	*
Ceiling Start (m)		no ceiling	no ceiling	no ceiling	no ceiling
End Temp.(°C)		18 (18)	13 (12)	25 (28)	18
End Conditons		Sun and cloud	Sun and cloud	partly cloudy	*
End Cloud Cover (%)		50%	25%	30%	*
End Wind Speed (km/hr)		11	6	8	14
End Gust Speed (km/hr)		17	9	12	*
End Wind Direction		SE	NW	N	W
End Visibility (km)		28	27	42.0km	*
Ceiling End (m)		no ceiling	no ceiling	no ceiling	no ceiling
Precipitation		none	none	none	none
Background Noise		quarry and distant highway	quarry and distant highway	quarry and distant highway	quarry and distant highway
Comments					

* the weather condition did not inhibit bird surveys on that day