CHALEUR VENTUS WIND ENERGY PROJECT

APPENDIX G - AVIAN SURVEY REPORT, RESIDUAL ENVIRONMENTAL EFFECTS AND DETERMINATION OF SIGNIFICANCE

CHALEUR VENTUS LIMITED PARTNERSHIP

October 2019

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1 INTRODUCTION

Wind farms in New Brunswick represent some of the largest such projects in Atlantic Canada, currently having over 294 megawatts (MW) in wind generating capacity (The Maritimes Energy Association, 2019). The government of New Brunswick is committed to increasing the amount of electricity from new renewable sources in New Brunswick to 40% by 2020 (The Maritimes Energy Association, 2019).

Rapid growth and expansion of windfarms, in general, has an increasingly significant effect on birds particularly resulting from the increase in average wind turbine size. Bird collisions are likely to increase with turbine height because as turbines increase in size, the blades reach higher into the average "flight zone" of nocturnal migrating birds. Because a wind energy facility could potentially put birds at risk through collisions with wind turbines, and through alteration of breeding and stop-over habitat, comprehensive studies are required to assess the risk to birds and to identify site-specific mitigation measures. Therefore, this report provides a summary of the Avian Studies completed in support of the Chaleur Ventus Wind Energy Project (Project) Registration Document that was submitted to with the Sustainable Development, Planning and Impact Evaluation Branch, Department of Environment and Local Government in September of 2019.

1.1 PROJECT OVERVIEW

Chaleur Ventus Limited Partnership (CVLP) is proposing the development of the Project. The Project is located on privately owned land south of route 303 in Gloucester County, New Brunswick, and will have an aggregate electrical capacity of 20 megawatts (MW). The Project will consist of five wind energy converters (WECs), access roads, collection system, substation, and associated temporary laydown areas required for construction. An approximate 9 kilometre (km) transmission line is proposed that runs south and southwest from the Project area to a proposed substation that will be located on Crown land approximately 2.8 km southeast of Saint-Leolin.

The Project is expected to consist of Enercon E-126 WECs with a nominal power of 4 MW. Each assembly will consist of the tower, hub, nacelle, rotor blades, and controller, with a total height of 179.5 to 194.5 metres (m) and is dependant on WEC availability from Enercon. The total WEC rotor diameter will be 127 m. It is anticipated that each WEC will be erected on a concrete foundation. The dimensions, depth, and type of foundation will depend on an evaluation of the local soil, surficial geology characteristics, wind forces at the location, and site-specific details of each location.

2 METHODS

2.1 STUDY AREAS

Two study areas were selected for the 2018 and 2019 field programs. The WEC Site includes the five WEC locations selected for the Project and one alternative WEC location. The Collection Line includes the tapline portion of the collection system.

2.2 PRIORITY SPECIES

A detailed desktop evaluation to determine the potential for the presence of priority species within the Project area and its immediate surroundings was completed prior to the development of field programs with the purpose of advising survey requirements and their associated methods. Priority species within 5 km of the Project, and

environmentally sensitive and protected areas are described in Section 4.8.3 and Section 4.9 of the Registration Document.

For the purpose of this report, priority species include the following:

- A Species at Risk (SAR) is any species which is listed as Endangered, Threatened or of Special Concern under the federal *Species at Risk Act* (*SARA*; 2002, c.29) (Government of Canada, 2002) and any species listed as Endangered, Threatened or Special Concern under the New Brunswick *Species at Risk Act* (*NB SARA*; S.N.B. 2012, c.6);
- Species of conservation concern (SOCC) are species listed as S1-S3S4 (provincial rarity rankings or S-Rank) by the Atlantic Canada Conservation Data Centre (ACCDC; Table 1).

Table 1 ACCDC S-Rank definitions

S-RANK	DEFINITION
SX	**Presumed Extirpated** - Species or community is believed to be extirpated from the province. Not located despite intensive searches of historical sites and other appropriate habitat, and virtually no likelihood that it will be rediscovered.
S1	**Critically Imperiled** - Critically imperiled in the province because of extreme rarity (often 5 or fewer occurrences) or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation from the state/province.
S2	**Imperiled** - Imperiled in the province because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation from the nation or state/province.
S3	**Vulnerable** - Vulnerable in the province due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation.
S4	**Apparently Secure** - Uncommon but not rare; some cause for long-term concern due to declines or other factors.
S5	**Secure** - Common, widespread, and abundant in the province.
SNR	**Unranked** - Nation or state/province conservation status not yet assessed.
SU	**Unrankable** - Currently unrankable due to lack of information or due to substantially conflicting information about status or trends.
SNA	**Not Applicable** - A conservation status rank is not applicable because the species is not a suitable target for conservation activities.
S#S#	**Range Rank** - A numeric range rank (e.g., S2S3) is used to indicate any range of uncertainty about the status of the species or community. Ranges cannot skip more than one rank (e.g., SU is used rather than S1S4).
SH	**Possibly Extirpated (Historical)** - Species or community occurred historically in the nation or state/province, and there is some possibility that it may be rediscovered. Its presence may not have been verified in the past 20-40 years. A species or community could become SH without such a 20 to 40 year delay if the only known occurrences in a province were destroyed or if it had been extensively and unsuccessfully looked for. The SH rank is reserved for species or communities for which some effort has been made to relocate occurrences, rather than simply using this status for all elements not known from verified extant occurrences.
Not Provided	Species is not known to occur in the province.

Source: ACCDC, 2018

2.3 SCOPE OF FIELD INVESTIGATIONS

Tables 2 and 3 present summaries of the avian field investigations that were conducted in 2018 and 2019 for the Project.

Table 2 Summary of Avian Field Investigations Completed at the WEC Site in 2018 and 2019

SEASON	FIELD SURVEY DATES	MONITORING BEHAVIOUR	SURVEY METHODS	HABITAT INVESTIGATED ON PROPERTY	EFFORT	FINDINGS (PRIORITY SPECIES)
Fall	August 14 to October 10th, 2018	Fall migration	Line transects (stopover count)	All available habitat types	8 visits*; one survey weekly	Bald Eagle, Ring-billed Gull and Spotted Sandpiper.
Fall	August 13 to October 23, 2018	Fall migration	Watch counts (passage migration)	Counts from suitable vantage points	10 visits**; one survey weekly	Bald Eagle, Evening Grosbeak, Peregrine Falcon, Snow Goose, Spotted Sandpiper and Wilson's Snipe.
Winter	January to March, 2019	Winter residents	Line transects	All available habitat types	3 visits; monthly from January to March	Pine Grosbeak and Pine Siskin.
Spring	April 6 to May 29, 2019	Spring migration	Line transects (stopover count)	All available habitat types	10 visits; one survey weekly	Bald Eagle, Cape May Warbler, Evening Grosbeak, Olive-sided Flycatcher, Pine Siskin, Rusty Blackbird and Wilson's Snipe.
Spring	April 7 to May 28, 2019	Spring migration	Watch counts (passage migration)	Counts from suitable vantage points	10 visits; one survey weekly	Bald Eagle, Cape May Warbler, Pine Siskin, Redhead, Rusty Blackbird, Spotted Sandpiper, Turkey Vulture, and Wilson's Snipe.
Spring	May 12 and 28, 2019	Nocturnal owl	Call playback at count stations	Forested habitats	2 visits	No priority species observed.
Summer	June 17 and July 3, 2019	Common Nighthawk	Passive (6-minute) count stations	Open habitats	2 visits	No priority species observed.
Summer	June 13, 14, and 18; July 3 to 4, 2019	Breeding birds	10-minute point counts	All available habitat types	2 visits	Bank Swallow, Blackpoll Warbler, Canada Warbler, Pine Siskin and Spotted Sandpiper.

Notes: *Line transect surveys were not conducted the week of September 25 to 29, 2018, because of moose hunting season – there was evidence of moose hunting on-site: hide in clearcut. Line transect surveys were not conducted after a gunshot was heard within the WEC Site on October 10, 2018 – the team decided it was not safe to continue line transect surveys beyond this date due to frequent hunting activity being observed. ** Watch count surveys were not conducted the week of September 25 to 29, 2018, because of moose hunting season; Line transect survey not conducted the week of August 27th due to poor weather conditions

Table 3 Summary of Avian Field Investigations Completed Along the Collection Line in 2019

SEASON	FIELD SURVEY DATES	MONITORING BEHAVIOUR	SURVEY METHODS	HABITAT INVESTIGATED ON PROPERTY	EFFORT	FINDINGS (PRIORITY SP.)
Spring	May 13, 2019	Nocturnal owl	Call playback at count stations	Forested habitats	2 visits	No priority species observed.
Summer	June 18 and July 4, 2019	Common Nighthawk	Passive (6-minute) count stations	Open habitats	2 visits	Common Nighthawk and incidental Canada Warbler.
Summer	June 18-19 and July 5 to 6, 2019	Breeding birds (incl. Rusty Blackbirds)	10-minute point counts and call-playback for Rusty Blackbirds at stations with suitable habitat	All available habitat types	2 visits	Cape May Warbler, Olive-sided Flycatcher, Pine Siskin, Spotted Sandpiper and Wilson's Snipe.

For the purpose of this report, birds have been divided into seven groups:

- **Waterfowl:** Ducks, geese, or other large aquatic birds, especially when regarded as game.
- **Shorebirds:** Waders; from the Order Charadriiformes
- **Other waterbirds**: Includes seabirds (i.e., marine birds), grebes (Order Podicipediformes), loons (Order Gaviiformes), Ciconiiformes (e.g., herons, egrets, and ibises), pelicans (Order Pelicaniformes), Gruiformes (i.e., cranes and rails), kingfishers. gulls and dippers (the only family of passerines considered waterbirds).
- **Diurnal raptors:** Birds within the families Accipitridae (e.g., hawks, eagles, and harriers), Pandidonidae (i.e. Osprey), Falconidae (i.e. falcons), Cathartidae (i.e., new world vultures), and one species from the Order Strigiformes (i.e., Hawk Owl).
- **Nocturnal raptors:** Birds of the Order Strigiformes (i.e., owls; with exception of the Hawk Owl, which is a diurnal species of owl).
- **Passerines:** Any bird of the Order Passeriformes, which includes more than half of all bird species. This is with exception of the dippers, which are a passerine considered a waterbird.
- **Other landbirds:** Birds within the Orders Galliformes (i.e,. quail, pheasant, and grouse), Columbiformes (i.e., pigeons and doves), Cuculiformes (i.e., cuckoos), Caprimulgiformes (i.e., nighthawks and whip-poor-wills), Apodiformes (i.e., swifts and hummingbirds), and Piciformes (i.e., woodpeckers, flickers and sapsuckers).

2.4 FALL AND SPRING MIGRATION

Fall migration surveys were conducted between August 15th and October 31st, 2018, and spring migration surveys were conducted between April 6th and June 4, 2019. Three 1,600 m line transects (T1 to T3) and two vantage point watch count stations (VP1 and VP2) were selected to reflect habitat availability within the Project area (see Appendix B, Figure B-1). Survey effort is presented in Section 2.3, Tables 2 and 3.

2.4.1 *LINE TRANSECTS*

Three parallel 1,600 m line transects were placed within the WEC Site so that all habitat types were represented within the sample and so that the transects went through or near the proposed turbine locations. All birds heard were recorded and distances were estimated perpendicular to the transect line. Surveys were completed during 8 separate site visits in the fall (2018) and 10 visits in the spring (2019), and began at sunrise and continued till around noon. For each line transect, a record was made of the start and end times, and a hand-held GPS unit was used to geo-reference its location (UTM NAD83). General observations, including the temperature, visibility, wind speed and direction, and date were also recorded. Species recorded between transects, and outside of the survey window were recorded as incidentals. Bearings (in degrees) were taken for priority species observed during dedicated survey periods, as well as incidentally.

2.4.2 *VANTAGE POINT WATCH COUNTS*

Vantage point watch counts provide data that can be used to give an overview of bird usage within the site, as well as quantify the level of flight activity and distribution over the Project area. Sites were selected that had open landscapes allowing for a clear view of the surrounding airspace. The vantage point watch stations are described in Table 4.

Table 4 Locations and Site Descriptions of Vantage Point Watch Counts

STATION	COORDINATES (UTM NAD83)	SITE DESCRIPTION
VP1	20T 342391m E 5297913m N	Gravel pit with a large clear-cut to the west. Other directions are forested.
VP2	20T 343758m E 5298011m N	Gravel pit/dirt bike recreation area surrounded by forest.
VP1	20T 342391m E 5297913m N	Gravel pit with a large clear-cut to the west. Other directions are forested.

These surveys started at 9 am and continued for 6 hours (3 hours at each station); station start times were alternated at each visit. All bird species encountered (by ear or sight) at each location during the surveys were recorded on standard bird monitoring field forms. For each station, a record was made of the start and end times, and a hand-held GPS unit was used to geo-reference its location (UTM NAD83). General observations, including the temperature, visibility, date, distance from vantage point (m), bearing, flight height (m), and flight direction were also recorded. Flight height was recorded within three categories relative to rotor swept area, these are presented in Table 5.

Table 5 Flight Height Relative to Rotor Swept Area

FLIGHT HEIGHT	DESCRIPTION
0-50 m	Below rotor swept area
51-180 m	Within rotor swept area
>180 m	Above rotor swept area

Note: The rotor swept area is considered 5 to 180 m for the 116 m hub height turbines that were defined at the time of the field survey.

2.5 WINTER BIRDS

Three line transects (see Appendix B, Figure B-2) were placed within the WEC Site so that all habitat types were represented within the sample and so that the transects passed through or near the proposed turbine locations. All birds heard were recorded and distances were estimated perpendicular to the transect line (Gregory, Gibbons, & Donald, 2004). Surveys were completed during three separate site visits and began at sunrise and continued till around noon. For each line transect, a record was made of the start and end times, and a hand-held GPS unit was used to geo-reference its location (UTM NAD83). General observations, including the temperature, visibility, wind speed and direction, and date were also recorded. Species recorded between transects, and outside of the survey window were recorded as incidentals. Bearings (in degrees) were taken for priority species observed during dedicated survey periods, as well as incidentally.

2.6 NOCTURNAL OWL

Call playback survey method was used at 10 pre-determined stations (see Appendix B, Figures B-3 and B-4) within the WEC Site (n=5) and along the Collection Line (n=5) to listen for nocturnal owls on May 12, 13 and 28, 2019. The Guidelines for Nocturnal Owl Monitoring in North America (Takats et al., 2001) was used as a guide for developing the survey methods. Broadcasting stations were placed approximately 1 km apart to reduce the chances of detecting the same owl at multiple stations. The call playback survey consists of silent listening periods followed by owl calls that last approximately two to three minutes. Field staff made a conscious effort to access these broadcast stations as quietly as possible, as well as to keep quiet at each station to minimize the possibility of "spooking" avian species present in the area. Owls were recorded at the estimated actual distance and bearing (in degrees) from the broadcast station to where they were first heard calling.

2.7 BREEDING BIRD

Two survey types were employed within the Project area to determine species composition and relative abundance of breeding birds including: Breeding Bird Point Count Survey (North American Breeding Bird Survey, 2018) and Common Nighthawk (*Chordeiles minor*) Survey (WildResearch, 2018). The methods for these surveys are described in the following sections. See Appendix B, Figures B-5 to B-8 for point count station locations.

2.7.1 *BREEDING BIRD POINT COUNT SURVEY (WEC SITE)*

Two rounds of surveys for breeding birds were conducted on June 13, 14 and 18 (early breeders), and July 3 to 4, 2019, at 32 point count stations within the WEC Site (see Appendix B; Figure B-5). Survey station locations were identified using stratified random sampling to ensure proper habitat coverage and an unbiased estimate of relative densities of species within the Project area. Survey station locations and habitat descriptions are presented in Table 6.

Surveys began at, or within, half an hour of sunrise and were completed within 4.5 hours or by 10:00 a.m., whichever occurred first. Weather conditions (e.g., precipitation and visibility) were monitored and confirmed to be within the parameters required by monitoring programs such as Environment and Climate Change Canada's Breeding Bird Survey. Bird observations were recorded at estimated exact distances and flyovers. For each point count, a record was made of the start and end times and a hand-held GPS unit was used to geo-reference its location (UTM NAD83). General observations, including the temperature, visibility, wind speed and date were also recorded. Species recorded outside of the 100-m radius, between point counts, outside of the 10-minute survey window and flyovers were recorded as incidentals. Bearings (in degrees) were taken for priority observed during dedicated survey periods and incidentally.

Table 6 Breeding Bird Point Count Station Locations and Habitat Descriptions for the WEC Site

STATION	ZONE	EASTING	NORTHING	HABITAT
WETL-1	20T	342375	5296334	Mixedwood treed swamp
WETL-2	20T	344055	5297827	Black Spruce bog
WETL-3	20T	343560	5297690	Black spruce swamp; taller trees
WETL-4	20T	343509	5298372	Mixedwood treed swamp
WETL-5	20T	342436	5298515	Cedar swamp, taller trees
WETL-6	20T	342041	5297892	Black spruce swamp, stunted trees
WETL-7	20T	342540	5297280	Cedar swamp, no shrubby understory
WETL-8	20T	343092	5297785	Alder/deciduous regen. swamp
HARD-1	20T	342999	5298111	Medium-aged deciduous forest
HARD-2	20T	343264	5298817	Mature hardwoods, some coniferous
HARD-3	20T	342293	5296977	Medium and mature-aged deciduous/mixedwood
MHARD-1	20T	342644	5296891	Medium and mature-aged mixedwood
MIX-1	20T	343276	5297962	Medium-aged mixedwood
MIX-2	20T	342763	5297971	Medium and mature-aged mixedwood
MMIX-1	20T	341418	5298713	Mature-aged mixedwood
WT-1	20T	342292	5297228	Mature-aged mixedwood
WT-2	20T	342186	5297620	Regenerating clear-cut surrounded by medium and mature-aged mixedwood
WT-3	20T	342241	5298056	Regenerating clear-cut surrounded by medium and mature-aged mixed forest
WT-4	20T	342853	5298433	Regenerating mixedwood
WT-5	20T	343354	5298620	Medium-aged deciduous forest
WT-6	20T	343659	5298155	Medium and mature-aged mixedwood
WT-7	20T	343800	5297765	Small dump surrounded by medium-aged deciduous forest
CC-1	20T	342296	5297823	Young deciduous regenerating forest
CC-2	20T	343746	5297964	Small quarry surrounded by medium-aged hardwoods
FP-1	20T	341254	5298532	Young coniferous forest, spaced
AGR-1	20T	342066	5296860	Blueberry fields
RES-1	20T	344140	5299180	Residential, scattered shrubs, tree line to west
IND-1	20T	342442	5297940	Old road quarry, scrub deciduous, surrounded by medium-aged mixedwood
SOFT-1	20T	342391	5296596	Small softwood stand surrounded by medium-aged deciduous trees
SOFT-2	20T	342152	5297439	Medium and mature-aged fir forest
W-1	20T	343175	5298414	Small pond surrounded by medium-aged deciduous trees
UNCL-1	20T	342844	5299108	Alders mixed with regeneration deciduous trees

Note: Habitats described in this table are those observed within a 100-m radius of the point-count station.

2.7.2 *BREEDING BIRD POINT COUNT SURVEY (COLLECTION LINE)*

Two rounds of surveys for breeding birds were conducted on June 18 to 19 (early breeders), and July 5 to 6, 2019, at 24 point count stations along the Collection Line (see Appendix B; Figure B-6). Because this was a linear survey, survey station locations were placed approximately every 250 to 300 m along the Collection Line. Survey station locations and habitat descriptions are presented in Table 7.

Surveys began at, or within, half an hour of sunrise and were completed within 4.5 hours or by 10:00 a.m., whichever occurred first. Weather conditions (e.g., precipitation and visibility) were monitored and confirmed to be within the parameters required by monitoring programs such as Environment and Climate Change Canada's

Breeding Bird Survey. Bird observations were recorded at estimated exact distances and flyovers. For each point count, a record was made of the start and end times and a hand-held GPS unit was used to geo-reference its location (UTM NAD83). General observations, including the temperature, visibility, wind speed and date were also recorded. Species recorded outside of the 100-m radius, between point counts, outside of the 10-minute survey window and flyovers were recorded as incidentals. Bearings (in degrees) were taken for priority observed during dedicated survey periods and incidentally.

Table 7 Breeding Bird Point Count Station Locations and Habitat Descriptions Along the Collection Line

STATION	ZONE	EASTING	NORTHING	HABITAT
1	20T	342378.39	5296793.35	Small field surrounded by mixedwood
2	20T	342195.54	5296470.47	Mature mixedwood near houses
3	20T	341929.87	5296348.26	Medium and mature-aged deciduous forest and mixedwood
4	20T	341645.30	5296253.38	Small field surrounded by medium and mature-aged mixedwood
5	20T	341360.79	5296158.41	Field surrounded by mature mixedwood
6	20T	341080.25	5296052.55	Mature hardwood near field
7	20T	340802.07	5295940.52	Medium and mature-aged mixedwood
8	20T	340344.80	5295756.03	Medium and mature-aged mixedwood near small field
9	20T	340164.01	5295510.44	Medium-aged hardwood
10	20T	340251.35	5295223.53	Medium and mature-aged deciduous forest
11	20T	340338.47	5294936.52	Mature deciduous forest and mixedwood
12	20T	340425.60	5294649.51	Medium-aged mixedwood
13	20T	340512.74	5294362.50	Medium-aged mixedwood
14	20T	340599.89	5294075.50	Mature-aged mixedwood
15	20T	340687.06	5293788.49	Conifererous swamp
16	20T	340450.11	5293696.70	Medium and mature-aged deciduous forest
17	20T	340209.33	5293597.12	Young-aged deciduous regenerative forest
18	20T	340027.03	5293364.36	Mature-aged mixedwood
19	20T	340034.90	5293068.41	Mature-aged mixedwood
20	20T	339938.62	5292791.02	Medium and mature-aged mixedwood
21	20T	339780.22	5292542.93	Medium and mature-aged mixedwood
22	20T	339649.88	5292279.39	Medium-aged mixedwood
23	20T	339520.02	5291830.32	Blueberry fields surrounded by medium and mature-aged coniferous forest
24	20T	339536.86	5291558.15	Power corridor surrounded by medium and mature-aged coniferous forest

2.7.3 *COMMON NIGHTHAWK SURVEY*

The Canadian Nightjar Survey Protocol (WildResearch, 2018) and other provincial survey protocols for Common Nighthawks (Saskatchewan Ministry of Environment, 2015) were used to inform the development of methods for Common Nighthawk surveys within the Study Area.

Common Nighthawks are evenly distributed throughout New Brunswick, with the greatest probability of observing them being throughout central New Brunswick in areas managed for timber harvest (Stewart et al., 2015). However, like most aerial insectivores, their numbers have been declining and the species has been listed as Threatened in Schedule 1 of the federal *SARA*, Special Concern under COSEWIC, Threatened under the *NB SARA*, and ACCDC S3B, S4M. Reasons for their decline include declines in the insect population, alteration and loss of habitat, increased terrestrial predators and climatic fluctuations (COSEWIC, 2007).

Passive count stations were placed within suitable breeding habitat for Common Nighthawks within the WEC Site and along the Collection Line (see Appendix B, Figure B-7 and B-8). Common Nighthawks are a crepuscular species; thus, they are most active at dawn and dusk (Brigham et al., 2011). Surveys began at half-an-hour before

sunset and ended at an hour after sunset. Stations were spaced at least 800 m apart and all Common Nighthawks seen or heard within 400 m of the survey station were recorded. Birds detected beyond 400 m were recorded, but as incidental observations. A six-minute passive point count was conducted at each station. For each station, a record was made of the start and end times, and a hand-held GPS unit was used to geo-reference its location (UTM NAD83). General observations, including the temperature, visibility, wind speed, background noise, cloud cover, moon visibility, and date were also recorded.

3 RESULTS

Incidental observations are not included in total counts for individuals observed or total number of species observed. Additional species observed are noted in the text, but not included in tables in this section. For a complete list of species observed (including incidental observations), see Appendix A, Tables A-1 and A-2.

3.1 PRIORITY SPECIES

A total of 107 species were observed within the WEC Site and 62 species were observed along the Collection Line; these numbers include incidental observations. In total, 18 priority species including 8 SAR and 10 SOCC were observed across all avian surveys related to the Project. SAR are discussed individually in the following sections.

3.1.1 *BALD EAGLE*

The Bald Eagle (*Haliaeetus leucocephalus*) is designated as "Endangered" under *NB SARA*. There is no Recovery Strategy for the Bald Eagle.

The Bald Eagle is widespread across the Maritimes, with most observations in New Brunswick being from the Valley Lowlands, particularly along the Saint John River Valley. The Bald Eagle has adapted to a wide range of habitats, exploiting aquatic and grassland habitats throughout the Maritimes. In the Maritimes it is most strongly associated with open-water habitats. (Stewart et al., 2015)

A total of four Bald Eagles were observed moving through the WEC Site during the spring (n=2) and fall migration (n=12) periods. No large stick nests were observed along the Collection Line or within the WEC Site.

3.1.2 *BANK SWALLOW*

The Bank Swallow (*Riparia riparia*) is designated as "Threatened" under Schedule 1 of *SARA* and COSEWIC. ACCDC ranks the Bank Swallow as a SOCC, both the breeding (S2S3B) and the aggregating transient (i.e., during the migratory period; S2S3M) populations within the province, which are ranked as "Imperiled to Vulnerable". There is no Recovery Strategy for the Bank Swallow.

The Bank Swallow is a Holarctic species; thus, its range includes all areas south of the tree line, east of the Rockies, and north of the southern deserts and plains. In the Maritimes, Bank Swallows are most abundant along the alluvial shorelines and open areas of Prince Edward Island and the Northumberland Strait. In this part of its range, it is most strongly associated with coastal habitats such as beaches and dunes and with other open foraging areas, such as cultivated grasslands, bare lands, and bogs. Along will other aerial insectivores, the reasons for this species' decline is unknown, however the loss of nesting habitat due to coastal development and shoreline erosion from increasingly severe storms, may be one regional, contributing factor. (Stewart et al., 2015)

Eight Bank Swallows (i.e., four observed during dedicated survey and four incidentally) were observed calling within the WEC Site during the breeding bird surveys on June 13th and July 3rd, 2019, near stations Mix-1, Wetl-8, W-1 and Wetl-8 (Figure B-5). There is no known breeding habitat for Bank Swallows within the Project area, therefore they were likely just passing through.

3.1.3 *CANADA WARBLER*

The Canada Warbler (*Cardellina canadensis*) is designated as "Threatened" under Schedule 1 of *SARA*, COSEWIC and *NB SARA*. ACCDC ranks the Canada Warbler as a SOCC, specifically the breeding (S3B) and aggregating transient (S3M) populations within the province, which is are both ranked as "Vulnerable".

Most of the Canada Warbler's breeding range is within Canada, extending from the Maritimes across the Northern Forests and patchily down the Appalachians. In the Maritimes, the Canada Warbler is widely distributed. The species is associated with mature cedar swamps and other wet habitats such as beaver ponds and forested wetlands, as well as with complex, mature or regenerating mixed forests, partial cuts, and shrublands. Forest structural diversity appears to be more important than tree species composition. Factors associated with the decline of the Canada warbler include forestry practices that reduce available understorey, as well as the degradation or loss of forested wetlands. (Stewart et al., 2015)

One Canada Warbler was heard singing during the breeding bird survey on the WEC site at station Wetl-8, which is in an alder and regenerating deciduous treed swamp. Another single Canada Warbler was observed incidentally during the Common Nighthawk survey along the collection line near CONI-10 in a treed swamp on June 18, 2019. The species was observed in suitable breeding habitat; thus, it is likely breeding within the Project area.

3.1.4 *COMMON NIGHTHAWK*

The Common Nighthawk is designated as "Threatened" under Schedule 1 of *SARA* and *NB SARA*, and as Special Concern under COSEWIC. ACCDC ranks the Common Nighthawk as a SOCC, specifically the breeding (S3B) population within the province, which is ranked as "Vulnerable".

The Common Nighthawk is broadly and evenly distributed through the Maritimes, though is absent from the Cape Breton Highlands and much of Prince Edward Island (Stewart et al., 2015). In Canada, this species has shown both long (4.2% per year decline from 1968 to 2005) and short-term (6.6% per year from 1995 to 2005) declines in population, according to data from the Breeding Bird Survey (BBS) (COSEWIC, 2007). The breeding habitat of the Common Nighthawk is variable and includes open habitats where the ground is devoid of vegetation, such as sand dunes, beaches, logged areas, burned-over areas, forest clearings, rocky outcrops, rock barrens, prairies, peat bogs, pastures, and flat gravel roofs (COSEWIC, 2007).

Common Nighthawks were observed during the dedicated Common Nighthawk survey along the collection line, but none were observed within the WEC Site. Ten Common Nighthawk observations were made between stations CONI-10 to CONI-14 (Figure B-8); these birds were either heard calling or booming[1]. These observations indicate that Common Nighthawks were likely breeding in suitable habitats along the proposed collection line. It is assumed that, despite a lack of direct observations, that Common Nighthawks would also be breeding where suitable habitat is available within the WEC site.

3.1.5 *EVENING GROSBEAK*

The Evening Grosbeak (*Coccothraustes vespertinus*) is designated as "Special Concern" under Schedule 1 of *SARA* and COSEWIC. ACCDC ranks the Evening Grosbeak as a SOCC, specifically the breeding (S3B) and non-breeding (S3S4N) populations within the province, which are ranked as "Vulnerable" and "Vulnerable to Apparently Secure", respectively. There is no Recovery Strategy for the Evening Grosbeak.

In Canada, the distribution for this species includes all Canadian provinces and territories except Nunavut (COSEWIC, 2016). The Evening Grosbeak is widely distributed across Nova Scotia, as well as the rest of the Maritimes, but its largest areas of abundance are in the Northern Uplands of New Brunswick and Western Nova Scotia (Stewart et al., 2015). The preferred nesting habitat of this species is difficult to define because it depends on insect outbreaks, thus it will take advantage of many habitat types (Stewart et al., 2015). However, in the Maritimes,

[1] The booming sound made by Common Nighthawks is made by wind rushing though their feathers as they dive. This is part of the male's courtship display, which involved calling repeatedly, then plunging into a steep dive – at which point the "booming" sound in created. Male nighthawks also use this display to establish and protect territory.

the Evening Grosbeak is generally associated with older softwood and mixed forests, though it will also use partial cuttings of mature stands (Stewart et al., 2015). Outside of the breeding season, they are largely dependent on seed crops (COSEWIC, 2016). Fluctuations of Evening Grosbeak populations are likely linked to fluctuations of Spruce Budworm (*Choristoneura fumiferana*), which occur naturally every 25 to 40 years in eastern Canada (COSEWIC, 2016). Other threats to the population of Evening Grosbeaks include mortality from window strikes, a reduction of mature and old growth mixed wood forests due to commercial forest management, and mortality from road collisions (COSEWIC, 2016).

Evening Grosbeaks were observed during the fall migration watch count and spring migration line transect surveys. A single male Evening Grosbeak was heard calling near VP2 on August 21, 2018 (Figure B-1). Three Evening Grosbeaks were observed during the line transects on May 23 (n=1) and 29, 2019 (n=1), both on T2 (Figure B-1).

3.1.6 *OLIVE-SIDED FLYCATCHER*

The Olive-sided Flycatcher (*Contopus cooperi*) is designated as "Threatened" under Schedule 1 of *SARA*, "Special Concern" under COSEWIC and "Threatened" under *NB SARA*. ACCDC ranks the Olive-sided Flycatcher as a SOCC, specifically the breeding (S3B) and aggregating transient (S3M) populations within the province, which are both ranked as "Vulnerable".

In the Maritimes, the Olive-sided Flycatcher is typically found in moist, mixed coniferous forest with both mature and regenerating components, adjacent to shrubby forested wetlands, bogs, fens, beaver ponds, or clear-cuts. (Stewart et al., 2015). Declines in this species' population may include changes in habitat and insect populations on both their breeding and wintering grounds. (Stewart et al., 2015).

One individual was heard singing near point-count station 22 during the breeding bird survey along the Collection Line on June 19, 2019 (Figure B-6). Another individual was incidentally observed singing from T3 during the spring migration line transect survey on June 4, 2019. Both observations were made in suitable breeding habitat for this species.

3.1.7 *PEREGRINE FALCON*

The Peregrine Falcon (*Falco peregrinus*) is designated as "Special Concern" under Schedule 1 of *SARA*, and as "Endangered" under *NB SARA*. ACCDC ranks the Peregrine Falcon as a SOCC, specifically the breeding (S1B) and aggregating transient (S3M) populations within the province, which are ranked as "Critically Imperiled" and "Vulnerable", respectively.

The Peregrine Falcon's preferred nesting habitat is cliffs facing open hunting areas. There is not any suitable breeding habitat for this species within the Project area, the single individual that was observed during the fall migration watch count survey on September 19, 2018, was likely resting while passing through the WEC Site.

3.1.8 *RUSTY BLACKBIRD*

The Rusty Blackbird (*Euphagus carolinus*) is designated as "Special Concern" under Schedule 1 of *SARA*, COSEWIC and *NB SARA*. ACCDC ranks the Rusty Blackbird as a SOCC, specifically the breeding (S3B) and aggregating transient (S3M) populations within the province, which are both ranked as "Vulnerable".

In the Maritimes, the Rusty Blackbird is associated with forested wetlands and beaver ponds that are surrounded by regenerating coniferous and mixed forest. Regenerating clear-cuts and plantations are also used. (Stewart et al., 2015)

Rusty Blackbirds were observed twice during the spring migration surveys; one bird was observed during the watch count survey on May 28, 2019, and a flock of 30 birds was observed during the line transect survey on May 2, 2019. Call-playback was used during the breeding bird surveys at sites with suitable breeding habitat for the species, but none were observed during the breeding period along the Collection Line or in the WEC Site.

3.2 FALL MIGRATION

3.2.1 *LINE TRANSECTS*

During the line transect surveys, there were 651 individual birds observed (excluding incidental observations), representing 39 species and 6 unidentified species (Table 8). Of these, three are priority species: Bald Eagle, Ring-billed Gull (*Larus delawarensis*) and Spotted Sandpiper (*Actitis macularius*). The most abundant species observed was Black-capped Chickadee (*Poecile atricapillus*; n=113), followed by Cedar Waxwing (*Bombycilla cedrorum*; n=104). Variable sized flocks of Cedar Waxwings, a highly gregarious species, were observed from early to mid-September 2018. Assumingly, these birds migrated south after this period.

Table 8 Species Observed During Line Transect Surveys in Fall 2018

COMMON NAME	SCIENTIFIC NAME	#	COMMON NAME	SCIENTIFIC NAME	#
Alder Flycatcher	*Empidonax alnorum*	6	Mourning Dove	*Zenaida macroura*	2
American Crow	*Corvus brachyrhynchos*	10	Northern Flicker	*Colaptes auratus*	19
American Goldfinch	*Spinus tristis*	33	Osprey	*Pandion haliaetus*	3
American Kestrel	*Falco sparverius*	2	Palm Warbler	*Setophaga palmarum*	1
American Robin	*Turdus migratorius*	28	Red-breasted Nuthatch	*Sitta canadensis*	22
Bald Eagle*	*Haliaeetus leucocephalus*	1	Red-eyed Vireo	*Vireo olivaceus*	15
Black-and-white Warbler	*Mniotilta varia*	8	Ring-billed Gull**	*Larus delawarensis*	1
Black-capped Chickadee	*Poecile atricapillus*	113	Rose-breasted Grosbeak	*Pheucticus ludovicianus*	1
Black-throated Green Warbler	*Setophaga virens*	3	Ruby-crowned Kinglet	*Regulus calendula*	3
Blue Jay	*Cyanocitta cristata*	42	Ruffed Grouse	*Bonasa umbellus*	1
Blue-headed Vireo	*Vireo solitarius*	1	Sharp-shinned Hawk	*Accipiter striatus*	2
Boreal Chickadee	*Poecile hudsonicus*	2	Song Sparrow	*Melospiza melodia*	9
Broad-winged Hawk	*Buteo platypterus*	1	Spotted Sandpiper**	*Actitis macularius*	1
Canada Goose	*Branta canadensis*	0	Unidentified Bird	Aves (gen, sp)	26
Canada Jay	*Perisoreus canadensis*	7	Unidentified Larus Gull	Larus (sp)	2
Cedar Waxwing	*Bombycilla cedrorum*	104	Unidentified Hawk	Accipitridae (gen, sp)	15
Common Raven	*Corvus corax*	18	Unidentified Sparrow	Passerellidae (gen, sp)	8
Common Yellowthroat	*Geothlypis trichas*	12	Unidentified Warbler	Parulidae (gen, sp)	4
Dark-eyed Junco	*Junco hyemalis*	8	Unidentified Woodpecker	Picinae (gen, sp)	1
Double-crested Cormorant	*Phalacrocorax auritus*	29	White-throated Sparrow	*Zonotrichia albicollis*	33
Downy Woodpecker	*Dryobates pubescens*	11	Yellow-bellied Sapsucker	*Sphyrapicus varius*	1
Golden-crowned Kinglet	*Regulus satrapa*	24	Yellow-rumped Warbler	*Setophaga coronata*	16
Hermit Thrush	*Catharus guttatus*	2	-	-	-

Notes: *SAR; **SOCC. Species listed in alphabetical order.

3.2.2 *VANTAGE POINT WATCH COUNTS*

SPECIES DIVERSITY AND RELATIVE ABUNDANCE

During the vantage point watch count surveys, there were 1,374 individual birds observed across the 2 stations representing 48 species and 7 unidentified species; one additional species, Blue-winged Teal (*Spatula discors*), was observed incidentally (Table 9). Of these, six were priority species: Bald Eagle, Evening Grosbeak, Peregrine Falcon, Snow Goose (*Anser caerulescens*), Spotted Sandpiper and Wilson's Snipe (*Gallinago delicata*). The most abundant species observed was American Robin (*Turdus migratorius*; n=263), followed by Canada Goose (*Branta canadensis*; n=197), Dark-eyed Junco (*Junco hyemalis*; n=135), and Cedar Waxwing (n=128).

Table 9 Species Observed During Vantage Point Watch Count Surveys in Fall 2018

COMMON NAME	SCIENTIFIC NAME	#	COMMON NAME	SCIENTIFIC NAME	#
Alder Flycatcher	*Empidonax alnorum*	1	Merlin	*Falco columbarius*	1
American Black Duck	*Anas rubripes*	2	Mourning Dove	*Zenaida macroura*	7
American Crow	*Corvus brachyrhynchos*	26	Nashville Warbler	*Oreothlypis ruficapilla*	2
American Goldfinch	*Spinus tristis*	63	Northern Flicker	*Colaptes auratus*	31
American Kestrel	*Falco sparverius*	8	Osprey	*Pandion haliaetus*	4
American Redstart	*Setophaga ruticilla*	3	Peregrine Falcon*	*Falco peregrinus*	1
American Robin	*Turdus migratorius*	263	Pileated Woodpecker	*Dryocopus pileatus*	2
Bald Eagle*	*Haliaeetus leucocephalus*	1	Red-breasted Nuthatch	*Sitta canadensis*	6
Black-capped Chickadee	*Poecile atricapillus*	22	Red-eyed Vireo	*Vireo olivaceus*	1
Blue Jay	*Cyanocitta cristata*	73	Red-tailed Hawk	*Buteo jamaicensis*	1
Blue-headed Vireo	*Vireo solitarius*	1	Ruby-throated Hummingbird	*Archilochus colubris*	2
Broad-winged Hawk	*Buteo platypterus*	32	Savannah Sparrow	*Passerculus sandwichensis*	4
Canada Goose	*Branta canadensis*	197	Semipalmated Plover	*Charadrius semipalmatus*	1
Cedar Waxwing	*Bombycilla cedrorum*	128	Sharp-shinned Hawk	*Accipiter striatus*	3
Chestnut-sided Warbler	*Setophaga pensylvanica*	1	Snow Goose**	*Anser caerulescens*	1
Common Loon	*Gavia immer*	1	Song Sparrow	*Melospiza melodia*	53
Common Raven	*Corvus corax*	22	Spotted Sandpiper**	*Actitis macularius*	1
Common Yellowthroat	*Geothlypis trichas*	1	Unidentifed Bird	Aves (gen, sp)	91
Dark-eyed Junco	*Junco hyemalis*	135	Unidentified Duck	Anatinae (gen, sp)	14
Double-crested Cormorant	*Phalacrocorax auritus*	53	Unidentified Hawk	Accipitridae (gen, sp)	27
Downy Woodpecker	*Dryobates pubescens*	5	Unidentified Larus Gull	Larus (sp)	13
Eastern Phoebe	*Sayornis phoebe*	1	Unidentified Shorebird	Aves (gen, sp)	3
Evening Grosbeak*	*Coccothraustes vespertinus*	1	Unidentified Sparrow	Passerellidae (gen, sp)	8
Great Black-backed Gull	*Larus marinus*	2	Unidentified Warbler	Parulidae (gen, sp)	7
Hairy Woodpecker	*Dryobates villosus*	2	White-crowned Sparrow	*Zonotrichia leucophrys*	5
Hermit Thrush	*Catharus guttatus*	1	White-throated Sparrow	*Zonotrichia albicollis*	30
Herring Gull	*Larus argentatus*	5	Wilson's Snipe**	*Gallinago delicata*	1
Mallard	*Anas platyrhynchos*	3	Yellow-bellied Sapsucker	*Sphyrapicus varius*	1

Notes: *SAR; **SOCC. Species listed in alphabetical order.

FLIGHT HEIGHT

Of the birds observed, 303 (22% of all individuals observed) were within the rotor swept area (i.e., between 51 and 180 m; Table 10).

Table 10 Summary of Flyovers Observed During the Fall Migration Period

TOTAL BIRDS OBSERVED		FLYING OVER STUDY AREA		FLYING WITHIN ROTOR SWEPT AREA (51-180m)	
# Individuals	**# Species**	**# Individuals**	**# Species**	**# Individuals**	**# Species**
1374	48	597	25	303	14

Notes: Incidental observations were not included in counts.

Waterfowl accounted for over half of birds observed flying within the rotor swept area (n=193; 63.70%), followed by passerines (n=56; 18.48%), other waterbirds (n=34; 11.22%) and diurnal raptors (n=20; 6.60%; Table 11).

Table 11 Flight Height Characteristics by Species Group During the Fall Migration Period

SPECIES GROUP	TOTAL # INDIVIDUALS	TOTAL # SPECIES*	TOTAL % OF FLYOVERS	INDIVIDUALS IN RELATION TO ROTOR SWEPT AREA (AND % OF FLYOVERS)		
				Under (0-50m)	Within (51-180m)	Above (>180m)
Waterfowl	215	4	36.01	**3** (1.61)	**193** (63.70)	**19** (17.59)
Shorebirds	4	1	0.67	**4** (2.15)	**0** (0)	**0** (0)
Other waterbirds	74	4	12.40	**3** (1.61)	**34** (11.22)	**37** (34.26)
Diurnal raptors	70	6	11.73	**6** (3.23)	**20** (6.60)	**44** (40.74)
Passerines	227	7	38.02	**163** (87.63)	**56** (18.48)	**8** (7.41)
Other landbirds	7	3	1.17	**7** (3.76)	**0** (0)	**0** (0)
Totals	**597**	**25**	**100**	**186** (100)	**303** (100)	**108** (100)

Notes: *Unidentified species were not included in the species count.

The majority of the birds observed flying within the rotor swept area were Canada Geese. None of the species observed flying within the rotor swept area were priority species. A detailed account of avian flyovers observed during the fall bird migration vantage point watch count surveys is presented in Table 12.

Table 12 Flight Height Characteristics by Species Group During the Fall Migration Period

Common Name	# Individuals observed from 0-50m				# Individuals observed from 51-180m (i.e., within the rotor swept area)				# Individuals observed at >180m				Grand totals for flyovers	
	VP1	VP2	Total	%	VP1	VP2	Total	%	VP1	VP2	Total	%	#	%
Waterfowl														
American Black Duck	-	-	-	-	2	-	2	0.66	-	-	-	-	2	0.34
Canada Goose	-	-	-	-	87	100	187	61.72	10	-	10	9.26	197	33.00
Mallard	2	-	2	1.08	-	-	-	-	-	-	-	-	2	0.34
Snow Goose**	1	-	1	0.54	-	-	-	-	-	-	-	-	1	0.17
Unidentified Duck	-	-	-	-	-	4	4	1.32	8	1	9	8.33	13	2.18
Shorebirds														
Spotted Sandpiper**	1	-	1	0.54	-	-	-	-	-	-	-	-	1	0.17
Unidentified Shorebird	-	3	3	1.61	-	-	-	-	-	-	-	-	3	0.50
Other waterbirds														
Common Loon	1	-	1	0.54	-	-	-	-	-	-	-	-	1	0.17
Double-crested Cormorant	-	-	-	-	15	5	20	6.60	24	9	33	30.56	53	8.88
Great Black-backed Gull	-	-	-	-	2	-	2	0.66	-	-	-	-	2	0.34
Herring Gull	-	1	1	0.54	2	1	3	0.99	1	-	1	0.93	5	0.84
Unidentified *Larus* Gull	1	-	1	0.54	7	2	9	2.97	2	1	3	2.78	13	2.18
Diurnal raptors														
American Kestrel	-	1	1	0.54	2	-	2	0.66	-	-	-	-	3	0.50
Bald Eagle*	1	-	1	0.54	-	-	-	-	-	-	-	-	1	0.17
Broad-winged Hawk	2	-	2	1.08	2	3	5	1.65	6	19	25	23.15	32	5.36
Osprey	-	1	1	0.54	2	1	3	0.99	-	-	-	-	4	0.67
Red-tailed Hawk	-	-	-	-	-	-	-	-	1	-	1	0.93	1	0.17
Sharp-shinned Hawk	1	-	1	0.54	2	-	2	0.66	-	-	-	-	3	0.50
Unidentified Hawk	-	-	-	-	4	4	8	2.64	7	11	18	16.67	26	4.36
Passerines														
American Crow	3	4	7	3.76	10	2	12	3.96	-	-	-	-	19	3.18

Common Name	# Individuals observed from 0-50m				# Individuals observed from 51-180m (i.e., within the rotor swept area)				# Individuals observed at >180m				Grand totals for flyovers	
	VP1	VP2	Total	%	VP1	VP2	Total	%	VP1	VP2	Total	%	#	%
American Goldfinch	10	24	34	18.28	-	-	-	-	-	-	-	-	34	5.70
American Robin	11	-	11	5.91	5	-	5	1.65	-	-	-	-	16	2.68
Blue Jay	8	7	15	8.06	3	-	3	0.99	-	-	-	-	18	3.02
Cedar Waxwing	30	30	60	32.26	3	8	11	3.63	2	-	2	1.85	73	12.23
Common Raven	4	5	9	4.84	4	4	8	2.64	-	-	-	-	17	2.85
Song Sparrow	1	1	2	1.08	-	-	-	-	-	-	-	-	2	0.34
Unidentified Bird	17	8	25	13.44	2	15	17	5.61	-	-	-	-	42	7.04
Unidentified Warbler	-	-	-	-	-	-	-	-	-	6	6	5.56	6	1.01
Other landbirds														
Mourning Dove	-	3	3	1.61	-	-	-	-	-	-	-	-	3	0.50
Northern Flicker	2	1	3	1.61	-	-	-	-	-	-	-	-	3	0.50
Ruby-throated Hummingbird	1	-	1	0.54	-	-	-	-	-	-	-	-	1	0.17
Grand Total	**97**	**89**	**186**	**100**	**154**	**149**	**303**	**100**	**61**	**47**	**108**	**100**	**597**	**100**

Notes: *SAR; **SOCC. Species listed in alphabetical order.

3.3 SPRING MIGRATION

3.3.1 *LINE TRANSECTS*

During the line transect surveys, there were 863 individual birds observed (excluding incidental observations), representing 67 species and 4 unidentified species (Table 13); Two additional species were observed incidentally: Herring Gull (*Larus argentatus*) and Olive-sided Flycatcher (*Contopus cooperi*). Of these, seven are priority species: Bald Eagle, Cape May Warbler (*Setophaga tigrina*), Evening Grosbeak, Olive-sided Flycatcher, Pine Siskin (*Spinus pinus*), Rusty Blackbird and Wilson's Snipe. The most abundant species observed was American Robin (n=108), followed by White-throated Sparrow (*Zonotrichia albicollis*; n=96).

Table 13 Species Observed During Line Transect Surveys in Spring 2019

COMMON NAME	SCIENTIFIC NAME	#	COMMON NAME	SCIENTIFIC NAME	#
Alder Flycatcher	*Empidonax alnorum*	3	Mallard	*Anas platyrhynchos*	18
American Black Duck	*Anas rubripes*	1	Merlin	*Falco columbarius*	2
American Crow	*Corvus brachyrhynchos*	46	Mourning Dove	*Zenaida macroura*	1
American Goldfinch	*Spinus tristis*	21	Nashville Warbler	*Oreothlypis ruficapilla*	1
American Redstart	*Setophaga ruticilla*	10	Northern Flicker	*Colaptes auratus*	17
American Robin	*Turdus migratorius*	108	Northern Parula	*Setophaga americana*	9
American Woodcock	*Scolopax minor*	1	Northern Saw-Whet Owl	*Aegolius acadicus*	1
Bald Eagle*	*Haliaeetus leucocephalus*	1	Northern Waterthrush	*Parkesia noveboracensis*	11
Bay-breasted Warbler	*Setophaga castanea*	1	Osprey	*Pandion haliaetus*	2
Belted Kingfisher	*Megaceryle alcyon*	3	Ovenbird	*Seiurus aurocapilla*	24
Black-and-white Warbler	*Mniotilta varia*	11	Palm Warbler	*Setophaga palmarum*	4
Blackburnian Warbler	*Setophaga fusca*	1	Pileated Woodpecker	*Dryocopus pileatus*	2
Black-capped Chickadee	*Poecile atricapillus*	53	Pine Siskin**	*Spinus pinus*	5
Black-throated Blue Warbler	*Setophaga caerulescens*	4	Purple Finch	*Haemorhous purpureus*	18
Black-throated Green Warbler	*Setophaga virens*	15	Red-breasted Nuthatch	*Sitta canadensis*	4
Blue Jay	*Cyanocitta cristata*	11	Red-eyed Vireo	*Vireo olivaceus*	1
Blue-headed vireo	*Vireo solitarius*	12	Red-winged Blackbird	*Agelaius phoeniceus*	1
Boreal Chickadee	*Poecile hudsonicus*	2	Ruby-crowned Kinglet	*Regulus calendula*	55
Brown Creeper	*Certhia americana*	4	Ruffed Grouse	*Bonasa umbellus*	10
Canada Jay	*Perisoreus canadensis*	2	Rusty Blackbird*	*Euphagus carolinus*	30
Cape May Warbler**	*Setophaga tigrina*	2	Song Sparrow	*Melospiza melodia*	4
Chestnut-sided Warbler	*Setophaga pensylvanica*	3	Swainson's Thrush	*Catharus ustulatus*	8
Chipping Sparrow	*Spizella passerina*	2	Swamp Sparrow	*Melospiza georgiana*	2
Common Grackle	*Quiscalus quiscula*	6	Tennessee Warbler	*Oreothlypis peregrina*	1
Common Loon	*Gavia immer*	4	Tree Swallow	*Tachycineta bicolor*	21
Common Raven	*Corvus corax*	5	Unidentified Bird	Aves (gen, sp)	4
Common Yellowthroat	*Geothlypis trichas*	9	Unidentified Duck	Anatinae (gen, sp)	1
Dark-eyed Junco	*Junco hyemalis*	4	Unidentified Haemorhous Finch	Haemorhous (sp)	2
Double-crested Cormorant	*Phalacrocorax auritus*	10	Unidentified Woodpecker	Picinae (gen, sp)	2
Downy Woodpecker	*Dryobates pubescens*	13	White-throated Sparrow	*Zonotrichia albicollis*	96

COMMON NAME	SCIENTIFIC NAME	#	COMMON NAME	SCIENTIFIC NAME	#
Evening Grosbeak*	*Coccothraustes vespertinus*	3	Wilson's Snipe**	*Gallinago delicata*	5
Fox Sparrow	*Passerella iliaca*	1	Winter Wren	*Troglodytes hiemalis*	13
Golden-crowned Kinglet	*Regulus satrapa*	13	Yellow Warbler	*Setophaga petechia*	2
Hermit Thrush	*Catharus guttatus*	23	Yellow-bellied Sapsucker	*Sphyrapicus varius*	21
Least Flycatcher	*Empidonax minimus*	3	Yellow-rumped Warbler	*Setophaga coronata*	35
Magnolia Warbler	*Setophaga magnolia*	18	-	-	-

Notes: *SAR; **SOCC. Species listed in alphabetical order.

3.3.2 *VANTAGE POINT WATCH COUNTS*

SPECIES DIVERSITY AND ABUNDANCE

During the vantage point watch count surveys, there were 759 individual birds observed across the two stations representing 65 species and 4 unidentified species (Table 14); two additional species, American Bittern (*Botaurus lentiginosus*) and Yellow Warbler (*Setophaga petechia*), were observed incidentally. Of these, eight were priority species: Bald Eagle, Evening Grosbeak, Cape May Warbler, Pine Siskin, Redhead (*Aythya americana*), Rusty Blackbird, Spotted Sandpiper, Turkey Vulture (*Cathartes aura*) and Wilson's Snipe. The most abundant species observed was American Crow (*Corvus brachyrhynchos*; n=95), followed by American Robin (n=76).

Table 14 Species Observed During Vantage Point Watch Count Surveys in Spring 2019

COMMON NAME	SCIENTIFIC NAME	#	COMMON NAME	SCIENTIFIC NAME	#
American Black Duck	*Anas rubripes*	7	Mallard	*Anas platyrhynchos*	12
American Crow	*Corvus brachyrhynchos*	95	Merlin	*Falco columbarius*	1
American Goldfinch	*Spinus tristis*	34	Nashville Warbler	*Oreothlypis ruficapilla*	1
American Kestrel	*Falco sparverius*	2	Northern Flicker	*Colaptes auratus*	22
American Redstart	*Setophaga ruticilla*	3	Northern Waterthrush	*Parkesia noveboracensis*	1
American Robin	*Turdus migratorius*	76	Osprey	*Pandion haliaetus*	11
American Tree Sparrow	*Spizelloides arborea*	1	Ovenbird	*Seiurus aurocapilla*	1
Bald Eagle*	*Haliaeetus leucocephalus*	1	Palm Warbler	*Setophaga palmarum*	3
Belted Kingfisher	*Megaceryle alcyon*	8	Pileated Woodpecker	*Dryocopus pileatus*	1
Black-and-white Warbler	*Mniotilta varia*	1	Pine Siskin**	*Spinus pinus*	50
Black-capped Chickadee	*Poecile atricapillus*	15	Purple Finch	*Haemorhous purpureus*	3
Black-throated Green Warbler	*Setophaga virens*	2	Red-breasted Nuthatch	*Sitta canadensis*	1
Blue Jay	*Cyanocitta cristata*	14	Red-eyed Vireo	*Vireo olivaceus*	1
Blue-headed Vireo	*Vireo solitarius*	1	Redhead**	*Aythya americana*	1
Broad-winged Hawk	*Buteo platypterus*	4	Red-winged Blackbird	*Agelaius phoeniceus*	2
Brown Creeper	*Certhia americana*	1	Ruby-crowned Kinglet	*Regulus calendula*	17
Canada Goose	*Branta canadensis*	17	Rusty Blackbird*	*Euphagus carolinus*	1
Canada Jay	*Perisoreus canadensis*	1	Savannah Sparrow	*Passerculus sandwichensis*	1
Cape May Warbler**	*Setophaga tigrina*	1	Semipalmated Plover	*Charadrius semipalmatus*	12
Chipping Sparrow	*Spizella passerina*	4	Sharp-shinned Hawk	*Accipiter striatus*	1
Common Grackle	*Quiscalus quiscula*	14	Snow Bunting	*Plectrophenax nivalis*	25
Common Merganser	*Mergus merganser*	4	Song Sparrow	*Melospiza melodia*	29
Common Raven	*Corvus corax*	21	Spotted Sandpiper**	*Actitis macularius*	2
Common Yellowthroat	*Geothlypis trichas*	5	Tree Swallow	*Tachycineta bicolor*	13
Dark-eyed Junco	*Junco hyemalis*	8	Turkey Vulture**	*Cathartes aura*	1

COMMON NAME	SCIENTIFIC NAME	#	COMMON NAME	SCIENTIFIC NAME	#
Double-crested Cormorant	*Phalacrocorax auritus*	43	Unidentified Hawk	Accipitridae (gen, sp)	2
Downy Woodpecker	*Dryobates pubescens*	5	Unidentified Sparrow	Passerellidae (gen, sp)	1
Fox Sparrow	*Passerella iliaca*	1	Unidentified Warbler	Parulidae (gen, sp)	1
Great Black-backed Gull	*Larus marinus*	10	Unidentified Woodpecker	Picinae (gen, sp)	1
Great Blue Heron	*Ardea herodias*	1	White-throated Sparrow	*Zonotrichia albicollis*	41
Hairy Woodpecker	*Dryobates villosus*	2	Wilson's Snipe**	*Gallinago delicata*	2
Hermit Thrush	*Catharus guttatus*	4	Winter Wren	*Troglodytes hiemalis*	3
Herring Gull	*Larus argentatus*	41	Yellow-bellied Sapsucker	*Sphyrapicus varius*	14
Least Flycatcher	*Empidonax minimus*	1	Yellow-rumped Warbler	*Setophaga coronata*	31
Magnolia Warbler	*Setophaga magnolia*	2			

Notes: *SAR; **SOCC. Species listed in alphabetical order.

FLIGHT HEIGHT

Of the birds observed, 191 (25% of all individuals observed) were within the rotor swept area (i.e., between 51 and 180 m; Table 15).

Table 15 Summary of Flyovers Observed During the Spring Migration Period

TOTAL BIRDS OBSERVED		FLYING OVER STUDY AREA		FLYING WITHIN ROTOR SWEPT AREA (51-180m)	
# Individuals	**# Species**	**# Individuals**	**# Species**	**# Individuals**	**# Species**
759	65	378	30	191	18

Notes: Incidental observations were not included in counts.

Other waterbirds accounted for almost half of birds observed flying within the rotor swept area (n=86; 45.03%), followed by passerines (n=70; 36.65%), waterfowl (n=23; 12.04%) and diurnal raptors (n=10; 5.24%; Table 16).

Table 16 Flight Height Characteristics by Species Group During the Spring Migration Period

SPECIES GROUP	TOTAL # INDIVIDUALS	TOTAL # SPECIES*	TOTAL % OF FLYOVERS	INDIVIDUALS IN RELATION TO ROTOR SWEPT AREA (AND % OF FLYOVERS)		
				Under (0-50m)	Within (51-180m)	Above (>180m)
Waterfowl	35	4	9.21	**12** (7.10)	**23** (12.04)	**0** (0)
Shorebirds	12	1	3.16	**12** (7.10)	**0** (0)	**0** (0)
Other waterbirds	98	5	25.79	**5** (2.96)	**86** (45.03)	**7** (35.00)
Diurnal raptors	22	7	5.79	**2** (1.18)	**10** (5.24)	**10** (50.00)
Passerines	205	11	53.95	**132** (78.11)	**70** (36.65)	**3** (15.00)
Other landbirds	6	2	1.58	**4** (2.37)	**2** (1.05)	**0** (0)
Totals	**378**	**30**	**100**	**169** (100)	**191** (100)	**20** (100)

Notes: *Unidentified species were not included in the species count.

A detailed account of avian flyovers observed during the fall bird migration vantage point watch count surveys is presented in Table 17.

Table 17 Flight Height Characteristics by Species Group During the Spring Migration Period

Common Name	# Individuals observed from 0-50m				#. Individuals observed from 51-180m (i.e., within the rotor swept area)				# Individuals observed at >180m				Grand totals for flyovers	
	VP1	VP2	Total	%	VP1	VP2	Total	%	VP1	VP2	Total	%	No.	%
Waterfowl														
American Black Duck	2	4	6	3.55	-	-	-	-	-	-	-	-	6	1.58
Canada Goose	-	-	-	-	17	-	17	8.90	-	-	-	-	17	4.47
Common Merganser	-	-	-	-	-	4	4	2.09	-	-	-	-	4	1.05
Mallard	4	2	6	3.55	2	-	2	1.05	-	-	-	-	8	2.11
Shorebirds														
Semipalmated Plover	-	12	12	7.10	-	-	-	-	-	-	-	-	12	3.16
Other waterbirds														
Belted Kingfisher	-	4	4	2.37	-	-	-	-	-	-	-	-	4	1.05
Double-crested Cormorant	-	1	1	0.59	18	16	34	17.80	4	3	7	35.00	42	11.05
Great Black-backed Gull	-	-	-	-	-	10	10	5.24	-	-	-	-	10	2.63
Great Blue Heron	-	-	-	-	-	1	1	0.52	-	-	-	-	1	0.26
Herring Gull	-	-	-	-	-	41	41	21.47	-	-	-	-	41	10.79
Diurnal raptors														
American Kestrel	-	-	-	-	-	-	-	-	-	1	1	5.00	1	0.26
Bald Eagle*	-	-	-	-	-	-	-	-	1	-	1	5.00	1	0.26
Broad-winged Hawk	-	1	1	0.59	1	2	3	1.57	-	-	-	-	4	1.05
Merlin	-	-	-	-	1	-	1	0.52	-	-	-	-	1	0.26
Osprey	-	-	-	-	1	3	4	2.09	3	4	7	35.00	11	2.89
Sharp-shinned Hawk	-	-	-	-	-	1	1	0.52	-	-	-	-	1	0.26
Turkey Vulture**	-	-	-	-	-	1	1	0.52	-	-	-	-	1	0.26
Unidentified Hawk	-	1	1	0.59	-	-	-	-	1	-	1	5.00	2	0.53
Passerines														
American Crow	14	5	19	11.24	34	15	49	25.65	2	1	3	15.00	71	18.68
American Goldfinch	3	2	5	2.96	-	-	-	-	-	-	-	-	5	1.32
American Robin	8	18	26	15.38	1	2	3	1.57	-	-	-	-	29	7.63

Common Name	# Individuals observed from 0-50m				#. Individuals observed from 51-180m (i.e., within the rotor swept area)				# Individuals observed at >180m				Grand totals for flyovers	
	VP1	VP2	Total	%	VP1	VP2	Total	%	VP1	VP2	Total	%	No.	%
American Tree Sparrow	-	-	-	-	-	1	1	0.52	-	-	-	-	1	0.26
Blue Jay	1	3	4	2.37	2	-	2	1.05	-	-	-	-	6	1.58
Common Grackle	1	8	9	5.33	-	-	-	-	-	-	-	-	9	2.37
Common Raven	2	-	2	1.18	7	8	15	7.85	-	-	-	-	17	4.47
Pine Siskin**	50	-	50	29.59	-	-	-	-	-	-	-	-	50	13.16
Snow Bunting	4	5	9	5.33	-	-	-	-	-	-	-	-	9	2.37
Song Sparrow	-	1	1	0.59	-	-	-	-	-	-	-	-	1	0.26
Tree Swallow	2	5	7	4.14	-	-	-	-	-	-	-	-	7	1.84
Other landbirds														
Northern Flicker	1	1	2	1.18	2	-	2	1.05	-	-	-	-	4	1.05
Yellow-bellied Sapsucker	-	1	1	0.59	-	-	-	-	-	-	-	-	1	0.26
Unidentified Woodpecker	-	1	1	0.59	-	-	-	-	-	-	-	-	1	0.26
Grand Total	**94**	**75**	**169**	**100**	**86**	**105**	**191**	**100**	**11**	**9**	**20**	**100**	**378**	**100**

Notes: Six individuals were recorded as flyovers, but without flight height information; these six individuals were excluded from analysis. *SAR; **SOCC. Species listed in alphabetical order.

3.4 WINTER BIRDS

Bird abundance during the survey was low and only 60 individuals of 11 species were observed visually or by ear (Table 18). Of the species observed, only the Pine Siskin is a priority species during the month observed (ACCDC S3); the Pine Grosbeak (*Pinicola enucleator*) is only a priority species during the breeding season (ACCDC S2B). The most abundant species observed was Black-capped Chickadee (n=28), followed by Pine Siskin (n=11); other species were observed in small numbers (≤5 individuals). Overall species abundance and diversity were low.

Table 18 Species Observed During Winter Line Transect Surveys in 2019

COMMON NAME	SCIENTIFIC NAME	#
American Crow	*Corvus brachyrhynchos*	5
American Goldfinch	*Spinus tristis*	2
Black-capped Chickadee	*Poecile atricapillus*	28
Boreal Chickadee	*Poecile hudsonicus*	3
Canada Jay	*Perisoreus canadensis*	2
Common Raven	*Corvus corax*	2
Downy Woodpecker	*Dryobates pubescens*	3
Hairy Woodpecker	*Dryobates villosus*	1
Pine Grosbeak**	*Pinicola enucleator*	11
Pine Siskin**	*Spinus pinus*	1
Ruffed Grouse	*Bonasa umbellus*	1
Unidentified Woodpecker	Picinae (gen, sp)	1

Notes: *SAR; **SOCC. Species listed in alphabetical order.

3.5 NOCTURNAL OWL

No owls were observed calling within the WEC Site, however one Great Horned Owl (*Bubo virginianus*) was observed during the dedicated survey along the collection line near station 11. In addition, another Great Horned Owl was observed incidentally near station 7 and a possible Northern Saw-whet Owl (*Aegolius acadicus*) was observed near station 8 (Figure B-4).

3.6 BREEDING BIRDS

3.6.1 *SPECIES DIVERSITY AND RELATIVE ABUNDANCE (WEC SITE)*

During the dedicated breeding bird survey within the WEC Site, a total of 833 individuals were observed, representing 69 species (Table 19). An additional four species were observed incidentally: Double-crested Cormorant (*Phalacrocorax auritus*), Gray Catbird (*Dumetella carolinensis*), Great Blue Heron (*Ardea herodias*), Osprey (*Pandion haliaetus*). In total, five priority species were observed: Bank Swallow, Blackpoll Warbler (*Setophaga striata*), Canada Warbler, Pine Siskin and Spotted Sandpiper. The most abundant species was White-throated Sparrow (n=77).

Table 19 Species Observed During Dedicated Point Count Surveys within the WEC Site in 2019

COMMON NAME	SCIENTIFIC NAME	#	COMMON NAME	SCIENTIFIC NAME	#
Alder Flycatcher	*Empidonax alnorum*	34	Least Flycatcher	*Empidonax minimus*	6
American Crow	*Corvus brachyrhynchos*	8	Lincoln's Sparrow	*Melospiza lincolnii*	4
American Goldfinch	*Spinus tristis*	23	Magnolia Warbler	*Setophaga magnolia*	40
American Redstart	*Setophaga ruticilla*	39	Mallard	*Anas platyrhynchos*	2
American Robin	*Turdus migratorius*	46	Mourning Dove	*Zenaida macroura*	2
American Woodcock	*Scolopax minor*	1	Nashville Warbler	*Oreothlypis ruficapilla*	38
Bank Swallow*	*Riparia riparia*	4	Northern Flicker	*Colaptes auratus*	5
Bay-breasted Warbler	*Setophaga castanea*	4	Northern Parula	*Setophaga americana*	13
Belted Kingfisher	*Megaceryle alcyon*	1	Northern Waterthrush	*Parkesia noveboracensis*	5
Black-and-white Warbler	*Mniotilta varia*	35	Ovenbird	*Seiurus aurocapilla*	35
Blackburnian Warbler	*Setophaga fusca*	2	Palm Warbler	*Setophaga palmarum*	8
Black-capped Chickadee	*Poecile atricapillus*	20	Pileated Woodpecker	*Dryocopus pileatus*	3
Blackpoll Warbler**	*Setophaga striata*	1	Pine Siskin**	*Spinus pinus*	1
Black-throated Blue Warbler	*Setophaga caerulescens*	23	Purple Finch	*Haemorhous purpureus*	13
Blue Jay	*Cyanocitta cristata*	11	Red-breasted Nuthatch	*Sitta canadensis*	8
Blue-headed Vireo	*Vireo solitarius*	12	Red-eyed Vireo	*Vireo olivaceus*	39
Boreal Chickadee	*Poecile hudsonicus*	1	Rock Pigeon	*Columba livia*	1
Broad-winged Hawk	*Buteo platypterus*	2	Ruby-crowned Kinglet	*Regulus calendula*	23
Brown Creeper	*Certhia americana*	1	Savannah Sparrow	*Passerculus sandwichensis*	3
Canada Jay	*Perisoreus canadensis*	4	Song Sparrow	*Melospiza melodia*	10
Canada Warbler*	*Cardellina canadensis*	1	Spotted Sandpiper**	*Actitis macularius*	1
Cedar Waxwing	*Bombycilla cedrorum*	4	Swainson's Thrush	*Catharus ustulatus*	34
Chestnut-sided Warbler	*Setophaga pensylvanica*	6	Swamp Sparrow	*Melospiza georgiana*	3
Chipping Sparrow	*Spizella passerina*	3	Tennessee Warbler	*Oreothlypis peregrina*	3
Common Grackle	*Quiscalus quiscula*	7	Tree Swallow	*Tachycineta bicolor*	2
Common Loon	*Gavia immer*	1	Veery	*Catharus fuscescens*	10
Common Raven	*Corvus corax*	2	White-throated Sparrow	*Zonotrichia albicollis*	77
Common Yellowthroat	*Geothlypis trichas*	48	White-winged Crossbill	*Loxia leucoptera*	4
Dark-eyed Junco	*Junco hyemalis*	5	Wilson's Warbler	*Cardellina pusilla*	1
Downy Woodpecker	*Dryobates pubescens*	2	Winter Wren	*Troglodytes hiemalis*	11
Eastern Phoebe	*Sayornis phoebe*	1	Yellow Warbler	*Setophaga petechia*	2
European Starling	*Sturnus vulgaris*	5	Yellow-bellied Flycatcher	*Empidonax flaviventris*	17
Golden-crowned Kinglet	*Regulus satrapa*	6	Yellow-bellied Sapsucker	*Sphyrapicus varius*	13
Hairy Woodpecker	*Dryobates villosus*	2	Yellow-rumped Warbler	*Setophaga coronata*	8
Hermit Thrush	*Catharus guttatus*	23	-	-	-

Notes: *SAR; **SOCC. Species listed in alphabetical order.

3.6.2 *SPECIES DIVERSITY AND RELATIVE ABUNDANCE (COLLECTION LINE)*

During the dedicated breeding bird survey along the Collection Line, a total of 606 individuals were observed, representing 59 species and 1 unidentified species (Table 20). In total, five priority species were observed: Cape May Warbler, Olive-sided Flycatcher, Pine Siskin, Spotted Sandpiper and Wilson's Snipe. The most abundant species was Ovenbird (*Seiurus aurocapilla*; n=49), followed by Red-eyed Vireo (*Vireo olivaceus*; n=48).

Table 20 Species Observed During Dedicated Point Count Surveys Along the Collection Line in 2019

COMMON NAME	SCIENTIFIC NAME	#	COMMON NAME	SCIENTIFIC NAME	#
Alder Flycatcher	*Empidonax alnorum*	9	Mourning Dove	*Zenaida macroura*	3
American Crow	*Corvus brachyrhynchos*	6	Nashville Warbler	*Oreothlypis ruficapilla*	20
American Goldfinch	*Spinus tristis*	8	Northern Flicker	*Colaptes auratus*	8
American Kestrel	*Falco sparverius*	1	Northern Parula	*Setophaga americana*	19
American Redstart	*Setophaga ruticilla*	39	Northern Waterthrush	*Parkesia noveboracensis*	1
American Robin	*Turdus migratorius*	16	Olive-sided Flycatcher*	*Contopus cooperi*	1
Bay-breasted Warbler	*Setophaga castanea*	13	Ovenbird	*Seiurus aurocapilla*	49
Black-and-white Warbler	*Mniotilta varia*	24	Pileated Woodpecker	*Dryocopus pileatus*	1
Blackburnian Warbler	*Setophaga fusca*	7	Pine Siskin**	*Spinus pinus*	1
Black-capped Chickadee	*Poecile atricapillus*	6	Purple Finch	*Haemorhous purpureus*	3
Black-throated Blue Warbler	*Setophaga caerulescens*	2	Red-breasted Nuthtach	*Sitta canadensis*	5
Black-throated Green Warbler	*Setophaga virens*	16	Red-eyed Vireo	*Vireo olivaceus*	48
Blue Jay	*Cyanocitta cristata*	8	Ruby-crowned Kinglet	*Regulus calendula*	11
Blue-headed Vireo	*Vireo solitarius*	8	Ruby-throated Humingbird	*Archilochus colubris*	6
Broad-winged Hawk	*Buteo platypterus*	1	Ruffed Grouse	*Bonasa umbellus*	1
Brown Creeper	*Certhia americana*	1	Savannah Sparrow	*Passerculus sandwichensis*	4
Cape May Warbler**	*Setophaga tigrina*	1	Song Sparrow	*Melospiza melodia*	8
Cedar Waxwing	*Bombycilla cedrorum*	6	Spotted Sandpiper*	*Actitis macularius*	4
Chestnut-sided Warbler	*Setophaga pensylvanica*	2	Swainson's Thrush	*Catharus ustulatus*	22
Chipping Sparrow	*Spizella passerina*	12	Swamp Sparrow	*Melospiza georgiana*	1
Common Grackle	*Quiscalus quiscula*	2	Tree Swallow	*Tachycineta bicolor*	3
Common Raven	*Corvus corax*	2	Unidentified Woodpecker	*Picinae (gen, sp)*	1
Common Yellowthroat	*Geothlypis trichas*	26	Veery	*Catharus fuscescens*	2
Dark-eyed Junco	*Junco hyemalis*	6	White-throated Sparrow	*Zonotrichia albicollis*	43
Double-crested Cormorant	*Phalacrocorax auritus*	3	White-winged Crossbill	*Loxia leucoptera*	12
Eastern Phoebe	*Sayornis phoebe*	1	Wilson's Snipe**	*Gallinago delicata*	1
Golden-crowned Kinglet	*Regulus satrapa*	5	Winter Wren	*Troglodytes hiemalis*	6
Hermit Thrush	*Catharus guttatus*	20	Yellow-bellied Flycatcher	*Empidonax flaviventris*	4
Least Flycatcher	*Empidonax minimus*	13	Yellow-bellied Sapsucker	*Sphyrapicus varius*	24
Magnolia Warbler	*Setophaga magnolia*	24	Yellow-rumped Warbler	*Setophaga coronata*	6

Notes: *SAR; **SOCC. Species listed in alphabetical order.

3.6.3 *COMMON NIGHTHAWK SURVEYS*

No Common Nighthawks were observed within the WEC site. However, seven observations of Common Nighthawks were made along the Collection Line on June 18, 2019, and three were observed on July 4, 2019 (Table 21). In addition, one Canada Warbler was heard at CONI-10 in June.

Table 21 Common Nigthawk Observations Along the Collection Line in 2019

STATION	HABITAT	OBSERVATIONS	
		June 18, 2019	July 4, 2019
CONI-7	Agricultural field	None observed.	None observed.
CONI-8	Forested and within 100m of Agricultural field	None observed.	None observed.
CONI-9	Mature hardwood	None observed.	None observed.
CONI-10	Treed swamp	None observed, but Canada Warbler incidentally observed.	One distant bird calling (peent) from 1 to 3 mins; east (1 km).
CONI-11	Forested	None observed.	One bird 400 m away and 200 m high south. Calling (peent) and booming from 1 to 6 mins.
CONI-12	Forested and open habitat	One distant bird booming at 3 to 6 mins, 1 km south	One bird 400 m away and 200 m high; booming and calling (peent) from 4 to 6 min.
CONI-13	Forested and open habitat	Two birds booming and calling (peent) from 0 to 6 mins; 1 south and 1 southeast, both 400 m away at >100m high.	None observed.
CONI-14	Forested and open habitat	Four birds booming and calling (peent); 2 northwest and 2 southeast.	None observed.

3.7 SUMMARY

In total, 107 species were observed within the WEC site and 62 species along the Collection Line. The higher number of species within the WEC Site compared to the Collection Line is largely due to the greater amount of survey effort within the WEC site compared to the proposed collection line.

The highest number of birds was observed during the fall bird migration watch count surveys (n=1,374) within the WEC Site. Species diversity was similar across surveys during the spring migration and breeding periods, which is expected due to the birds being easier to differentiate at these times of the year when they are more vocal and in breeding plumages. Lower species diversity in the fall is likely due to birds being less vocal and out of their breeding plumages, making them more difficult to locate and identify. Species diversity was lowest in the winter, which was expected.

In both the spring and fall, about a quarter of the birds observed during watch count surveys were flying through the rotor swept area. In the fall, of the birds flying through the rotor swept area, the majority (64%) were waterfowl, specifically Canada Geese – several large flocks were observed during this period. In the spring, the majority were in the "other waterbirds" group (45%), consisting mainly of gulls and cormorants; passerines were a close second (38%). The Project area is situated on the Acadian Peninsula, so it is possible the greater numbers of waterfowl and other waterbirds, compared to other groups, is attributable to movement between water sources and nearby available habitat for these species. Most of the wetland habitat, with exception of a small open wetland east of WT3 (i.e., in the gravel pit area), is forested, thus does not provide adequate habitat to allow for staging of large flocks of waterfowl or shorebirds during migration.

A total of 18 priority species were observed across all surveys, 8 SAR and 10 SOCC. These species, however, made up a small percentage of the total birds observed within the Project area.

4 IDENTIFICATION OF ENVIRONMENTAL EFFECTS

The identification of all potential interactions between the Project and VECs was completed in the Registration Document. It was determined that the following Project-Bird interactions have potential to result in residual effects because mitigation cannot remove the interaction. Therefore, further analysis is required to determine the significance of these Project effects (Section 5).

- Construction and operation of the Project may result in birds colliding with WECs
- Construction and operation of the Project may cause birds to alter their migration flyways
- Construction and operation of the Project may displace birds from previously used habitats in the Project area

5 CLASSIFICATION OF RESIDUAL ENVIRONMENTAL EFFECTS AND DETERMINATION OF SIGNIFICANCE

The residual effects classification is based on the magnitude, geographic extent, duration/frequency, reversibility and ecological context and is to describe residual effects predicted for the Project. The criteria are used to describe the nature and type of an effect on VECs. The residual effects classification is then used to determine the environmental significance of Project effects to VECs. The approach and criteria used to classify residual effects and determine their significance is presented in the Registration Document in Section 6.

5.1 RESIDUAL EFFECTS ON BIRDS FROM COLLISIONS AND DISPLACEMENT

The effects of a wind farm on birds are variable and depend on factors such as the development design, topography of the area, habitats affected, and the bird community in the wind farm area (Drewitt and Langston, 2006). Although some effects are related to construction (e.g., habitat alteration), most potential effects on avifauna are related to mortality resulting from direct collision and sensory disturbance.

The most apparent potential effect of the Project on birds is direct mortality resulting from collision with WEC blades during the operational phase. Most evidence suggests that mortality levels resulting from WEC collisions are low (Environment Canada et al., 2012). A recent review of Canadian wind farms concluded that less than 0.2% of the population of any species is affected by either collision with, or displacement by, WECs (Zimmerling et al., 2013).

Collision risk is greater on or near areas used by large numbers of foraging or roosting birds or in important migratory flyways (Drewitt and Langston, 2006). The probability of raptor collision with WECs depends on the species, WEC height, and local topography (de Lucas et al., 2008). Collision risk can be greatly reduced by incorporating knowledge of the avifauna into the design and placement of wind power infrastructure. Available research suggests that the probability of large-scale fatality events occurring at wind farms is low (Kerlinger et al., 2010). Migratory movements of passerines, shorebirds, waterfowl, and birds of prey were observed over the Project area, thus there is the possibility of collisions with WECs and other Project infrastructure. However, implementation of appropriate mitigation measures should reduce collision risk.

Sensory disturbance to birds can occur during the construction, operation and maintenance, and decommissioning of the Project, and can be caused by the increased presence of personnel, vehicle movement, operation of heavy equipment, and the operation of the WECs (Drewitt and Langston, 2006). It is thought that sensory disturbance to birds may have a greater population impact than collisions, although research is lacking in this area (Kingsley and Whittam, 2005). Some studies have shown that birds will exhibit avoidance behaviours, leading to a variable degree of displacement from previously used habitat (Drewitt and Langston, 2006). However, while birds may avoid specific sites, the evidence does not suggest that birds abandon the general area as a whole. Other research indicates that the presence of WECs has no effect on the distribution of the bird community (Devereux et al., 2008) and birds may habituate to the presence of operating WECs (Madsen and Boertmann, 2008). The Project has been sited to avoid environmentally sensitive areas thereby minimizing disturbance to new areas which can reduce displacement effects to birds.

A total of 18 priority species were observed across all surveys, 8 SAR and 10 SOCC. These species, however, made up a small percentage of the total birds observed within the Project area (Section 3.7).

The Project may result in habitat loss and accidental mortality, both high level of concern threats to the Canada Warbler according to the species' Recovery Strategy (Environment Canada, 2016a). WECs are currently located outside of wetland habitat, however site roads may go through some forested wetland habitat, which may reduce habitat availability on-site for this species. During their nocturnal migration, Canada Warblers can collide with wind turbines. According to a recent study (Zimmerling et al, 2013) approximately 70 Canada Warblers are predicted to die annually as a result of collisions with wind turbines in Canada. Mitigation measures can be applied that reduce the chances of collision during periods of migration.

The Project may result in accidental mortality, a medium level of concern threat to the Common Nighthawk according to the species' Recovery Strategy (Environment Canada, 2016b). Accidental mortality due to the Project may result from destruction of nests and broods from vehicle traffic, and collisions with WECs and overhead transmission lines. Common Nighthawks may use dirt roads for nesting, putting their nests and broods at risk of collision with vehicle traffic (Brigham et al., 2011). Common Nighthawks are aerial insectivores that feed primarily at dusk and dawn at heights varying from 1 m to more than 80 m (Environment Canada, 2016); thus, within the rotor swept area, which puts it as risk of collision. Male Common Nighthawks, particularly during courtship, are known to collide with telephone and power lines (Erickson, 2005).

Evening Grosbeaks are attracted to roads to feed on grit and salt in the winter, spring and fall (Campbell et al., 2001), which puts them at risk of collision with vehicles. Furthermore, when taken in excess, road salts are known to be toxic to birds, because the kidney of terrestrial birds is not efficient at removing excess sodium (Mineau and Brownlee, 2005). Overconsumption of sodium chloride can also cause reduced vigilance and motor function, which may also increase the risk of vehicle collision when flocks feed on the roadside (Mineau and Brownlee, 2005). Furthermore, when they are present in large densities (i.e., in the case of a Spruce Budworm infestation), they are also at greater risk of collisions on the road (Campbell et al., 2001). Alternatives to road salt on access roads and within the Project area should be considered to reduce the risk of vehicle collisions, especially during periods of high species density.

In total, 107 species were observed within the WEC site and 62 species along the Collection Line. The higher number of species within the WEC Site compared to the Collection Line is largely due to the greater amount of survey effort within the WEC site compared to the proposed collection line.

The highest number of birds was observed during the fall bird migration watch count surveys (n=1,374) within the WEC Site and about a quarter were flying through the rotor swept area (Section 3.7). Therefore, birds may be more at risk of collision with WECs during this period:

- Kettles of hawks were observed moving over the Project area from mid- to end of August 2018.
- Large flocks of geese were observed through September and October.
- One large flock of American Robins was observed mid-October and large numbers of Cedar waxwings were also observed from mid-August to mid-September 2018.

5.2 CUMULATIVE RESIDUAL EFFECTS

Cumulative residual environmental effects are defined as the sum of residual environmental effects from all past, current, and reasonably foreseeable projects and/or activities on the physical, biological, social and cultural components of the environment. In addition, natural disturbances such as fire, floods, insects, disease, and climate change can contribute to cumulative residual environmental effects.

The Project will implement mitigation practices to limit incremental environmental effects from the Project that will occur. Implementation of the mitigation for this Project is expected to result in minor changes to the biophysical and socio-economic environments from the Project relative to baseline conditions. Effects on VECs from surrounding land use and peat harvesting operations are not expected to overlap with effects on VECs in the local area. As such, no cumulative residual environmental effects are expected. As the Project progresses, CVLP will develop site-specific mitigation to further reduce the potential for cumulative environmental effects as required.

5.3 DETERMINATION OF SIGNIFICANCE

The collision of birds with WECs and other Project infrastructure and displacement of birds from the Project area was determined to be moderate in magnitude because it is unknown what the effects would be at the population level (Table 22). The incremental effects from the Project are predicted to be local in geographic extent and the effects are expected to be reversible following decommissioning and reclamation (long-term). The incremental contribution of the Project to existing conditions is not likely to decrease the resilience and increase the risk to local or sub-regional bird populations in the area. Therefore, the Project is predicted to not have significant adverse effects on birds. Confidence in this prediction is moderate because of limited knowledge about the resilience of bird populations in the area. To test the prediction of significance presented in this assessment and to reduce uncertainty, a Post-Construction Monitoring program will be implemented (Section 9 of Registration Document). If the Project is found to be causing significant mortality during post-construction monitoring, additional mitigation will be evaluated.

Table 22 Summary of Residual Effects Classification and Predicted Significance

POTENTIAL INTERACTION AND RESIDUAL ENVIRONMENTAL EFFECT	MAGNITUDE	GEOGRAPHIC EXTENT	FREQUENCY	DURATION	REVERSIBILITY	SIGNIFICANCE
Construction and operation of the Project may result in birds colliding with WECs	Moderate	Local	Continuous	Long-term	Reversible	Not Significant
Construction and operation of the Project may cause birds to alter their migration flyways	Moderate	Local	Continuous	Long-term	Reversible	Not Significant
Construction and operation of the Project may displace birds from previously used habitats in the Project area	Moderate	Local	Continuous	Long-term	Reversible	Not Significant

6 ADDITIONAL RECOMMENDED MITIGATIONS

The following mitigations have been identified, in addition to those in the Registration Document:

- Construction activities will follow activity restriction guidelines and setback distances for birds.
- Above-ground collector lines should be marked with bird diverters at appropriate locations to reduce or avoid collision fatalities with birds, as necessary. The Project area was identified as a high use area during spring and fall migration.
- To discourage ground-nesting or burrow-nesting species (i.e., Common Nighthawk and Turkey Vulture), large piles or patches of bare soil should not be left uncovered or un-vegetated during the breeding season.
- Should any ground- or burrow-nesting species initiate breeding activities on stockpiles or exposed areas, the Proponent will work with Canadian Wildlife Service and New Brunswick Department of Environment and Local Government to develop buffer and non-disturbance distances and zones that incorporate adaptive management.
- The Wilson's Snipe has an aerial display flight during the breeding season, thus is potentially at a higher risk of collision with turbine blades. To the extent possible, WECs were sited at least 100 m away from wetlands.
- If necessary, foraging sources identified near turbines, which attract SAR will be removed, modified or relocated. This includes the removal of carcasses that may attract carrion feeders, such as the Turkey Vulture.
- Species-specific mitigation measures aimed at alerting the birds to the turbines or affecting bird behaviour may be considered. The methods employed will depend on the species affected since the efficacy of such measures is dependent on the birds' perception and response to the sensory cues (May et al., 2015). These include, but are not limited to:
    - Mitigation measures based on passive visual cues may be implemented (e.g., use of marking, reducing motion smear, reflectors or UV-coating).
    - Mitigation measures based on active visual cues may be implemented (e.g., minimal use of turbine lighting, adjustment of turbine lighting regimes, visual deterrence or laser).

7 BIBLIOGRAPHY

- ACCDC (2018). Understanding Ranks. Available at: http://www.accdc.com/en/rank-definitions.html. Accessed September 2019
- Brigham, M. R., J. Ng, R.G. Poulin, and S.D. Grindal. (2011). Common Nighthawk (*Chordeiles minor*), version 2.0. The Birds of North America. (P. G. Rodewald, Ed.) Ithaca, New York, USA: Cornell Lab of Ornithology. Available at: https://www.allaboutbirds.org/guide/Common_Nighthawk/lifehistory. Accessed March 2018.
- Campbell, R. W., N.K. Dawe, I. McTaggart-Cowan, J.M. Cooper, G.W. Kaiser, A.C. Stewart, and M.C. McNall. (2001). Passerines: Wood-Warblers through Old World Sparrows. In The Birds of British Columbia. Vol. IV. Vancouver, British Columbia: UBC Press.
- COSEWIC (2007). COSEWIC assessment and status report on the Common Nighthawk *Chordeiles minor* in Canada. vi + 25 pp. Ottawa: Committee on the Status of Endangered Wildlife in Canada.
- COSEWIC (2016). COSEWIC assessment and status report on the Evening Grosbeak, Coccothraustes vespertinus, in Canada. Ottawa: Committee on the Status of Endangered Wildlife in Canada. Retrieved from https://www.sararegistry.gc.ca/document/default_e.cfm?documentID=3190
- de Lucas, M., G.F. Janss, D.P. Whitfield, and M. Ferrer (2008). Collision fatality of raptors in wind farms does not depend on raptor abundance. Journal of Applied Ecology, 45:1695-1703.
- Devereux, C. L., M.J. Denny, and M.J. Whittingham (2008). Minimal effects of wind turbines on distribution and wintering farmland birds. Journal of Applied Ecology, 45:1689-1694.
- Drewitt, A. L., and R.H. Langston (2006). Assessing the impacts of wind farms on birds. Ibis, 148:29-42.
- Environment Canada (2016a). Recovery Strategy for the Canada Warbler (*Cardellina canadensis*) in Canada. Species at Risk Act Recovery Strategy Series. Ottawa: Environment Canada.
- Environment Canada (2016b). Recovery Strategy for the Common Nighthawk (*Chordeiles minor*). Species at Risk Act Recovery Strategy Series. Ottawa.
- Environment Canada, Canadian Wind Energy Association, Bird Studies Canada and the Ministry of Natural Resources. (2012). Wind Energy Bird and Bay Monitoring Database: Summary of Findings from Post-Construction Monitoring Reports.
- Erickson, L. (2005). Species profile: The Uncommon Common Nighthawk. BirdWatching. Available at: https://www.birdwatchingdaily.com/news/species-profiles/species-profile-nighthawk/. Accessed September 2019.
- Gregory, R.D., Gibbons, D.W., and Donald, P.F. 2004. Bird census and survey techniques. Pp. 17-55, *In* W.J. Sutherland, I. Newton, and R.E. Green (Eds.). Bird Ecology and Conservation: A Handbook of Techniques. Oxford university Press, New York, NY. 408 pp.
- Kerlinger, P., J.L. Gehring, W.P. Erickson, R. Curry, A. Jain, and J. Guarnaccia. (2010). Night migrant fatalities and obstruction lighting at wind turbines in North America. The Wilson Journal of Ornithology, 122:744-754.
- Kingsley, A., and B. Whittam. (2005). Wind turbines and birds: A background review for environmental assessment. Available at: https://tethys.pnnl.gov/sites/default/files/publications/Kingsley-2005.pdf. Accessed September 2019.
- Madsen, J., and D. Boertmann (2008). Animal behavioral adaptation to changing landscapes: Spring-staging geese habituate to wind farms. Landscape Ecology, 23:1007-1011.
- May, R., O. Reitan, K. Bevanger, S.-H. Lorentsen, and T. Nygård (2015). Mitigating wind-turbine induced avian mortality: Sensory, aerodynamic and cognitive constraints and options. Renewable and Sustainable Energy Reviews, 42:170-181.
- Mineau, P., and L.J. Brownlee (2005). Road salts and birds: an assessment of the risk with particular emphasis on winter finch mortality. Wildlife Society Bulletin, 33:835-841.

- North American Breeding Bird Survey (2018). Laurel, Maryland: U.S. Geological Survey, Patuzent Wildlife Research Centre. Available at: http://www.pwrc.usgs.gov/bbs/participate/training/ appendixA.html. Accessed March 2018.
- Saskatchewan Ministry of Environment. (2015). Common Nighthawk Survey Protocol. Albert Street, Regina, Saskatchewan: Fish and Wildlife Branch Technical Report No. 2015-15.0.
- *Species at Risk Act* (2002, c.29). Justice Laws Website. Available at: from http://laws-lois.justice.gc.ca/eng/acts/s-15.3/FullText.html. Accessed March 2018.
- *Species at Risk Act* (2012, c.6). Legislative Assembly of New Brunswick.
- Stewart, R. L., K.A. Bredin, A.R. Couturier, A.G. Horn, D. Lepage, S. Makepeace, P.D. Taylor, M.-A. Villard, and R.M. Whittam (eds) (2015). Second Atlas of Breeding Birds of the Maritime Provinces. Bird Studies Canada, Environment Canada, Natural History Society of Prince Edward Island, Nature New Brunswick, New Brunswick Department of Natural Resources, Nova Scotia Bird Society, Nova Scotia Department of Natural Resources, and Prince Edward Island Department of Agriculture and Forestry. 528+28 pp. Available at: https://www.mba-aom.ca/pdfs/atlas_en_000-042.pdf#page=12. Accessed September 2019.
- Takats, L. D., D.L. Francis, G.L. Holroyd, J.R. Duncan, K.M. Mazur, R.J. Cannings, W. Harris, and D. Holt (2001). Guidelines for Nocturnal Owl Monitoring in North America. Edmonton, Alberta: Beaverhill Bird Observatory and Bird Studies Canada. Available at: https://www.bsc-eoc.org/download/Owl.pdf. Accessed September 2019.
- The Maritimes Energy Association (2019). Wind Power - New Brunswick. Available at: https://www.maritimesenergy.com/page.asp?ID=64. Accessed August 2019.
- WildResearch (2019). Canadian Nightjar Survey Protocol. E. Knight, K. Hannah, M. Brigham, J. McCracken, G. Falardeau, M.-F. Julien, and J.-S. Guénette (eds.). Available at: http://wildresearch.ca/wp-content/uploads/2019/05/National-Nightjar-Survey-Protocol-WildResearch-2019.pdf. Accessed September 2019.
- Zimmerling, J. R., A.C. Pomeroy, M.V. d'Entremont, and C.M. Francis (2013). Canadian estimate of bird mortality due to collisions and direct habitat loss associated with wind turbine development. Avian Conservation and Ecology, 8:10. Available at: https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=3&ved=2ahUKEwiXooDp6uzkAhWDJjQIHfeMD1oQFjACegQIARAC&url=https%3A%2F%2Fwww.ace-eco.org%2Fvol8%2Fiss2%2Fart10%2FACE-ECO-2013-609.pdf&usg=AOvVaw0zN-eDVb54Xu7HdO5jmHyC. Accessed September 2019.

A MASTER AVIAN SPECIES LISTS

Table A-1 Chaleur Ventus Master Avian Species List for the WTG Site (107 species observed, including incidentals)

Common Name	Scientific Name	ACCDC (S-rank)[1]	*NB SARA*	COSEWIC	*SARA*	Preferred Nesting Habitat[2]	Typical Nest Timing[3]	2018 Surveys		2019 Surveys					
								Fall Migration		Winter Residents	Spring Migration		Nocturnal Owl	Common Nighthawk	Breeding Bird
								Line transects	Watch count		Line transects	Watch count			
Alder Flycatcher	*Empidonax alnorum*	S5B, S5M	-	-	-	Low in shrubbery.	Mid-June to early August	●	●	-	●	-	-	-	●
American Bittern	*Botaurus lentiginosus*	S4B, S4S5M	-	-	-	-	-	-	-	-	-	♦	-	-	-
American Black Duck	*Anas rubripes*	S5B, S4N, S5M	-	-	-	-	-	-	●	-	●	●	-	-	-
American Crow	*Corvus brachyrhynchos*	S5	-	-	-	Trees.	Mid-April to mid-July	●	●	●	●	●	-	-	●
American Goldfinch	*Carduelis tristis*	S5	-	-	-	Shrub or sapling in open areas.	Late June to end of Sept.	●	●	●	●	●	-	-	●
American Kestrel	*Falco sparverius*	S4B, S4S5M	-	-	-	-	-	●	●	-	-	●	-	-	-
American Redstart	*Setophaga ruticilla*	S5B, S5M	-	-	-	Small trees.	Late May to mid-July	-	-	-	●	●	-	-	●
American Robin	*Turdus migratorius*	S5B, S5M	-	-	-	Everywhere.	May to end of July	●	●	-	●	●	-	-	●
American Tree Sparrow	*Spizelloides arborea*	S5N, S5M	-	-	-	-	-	-	-	-	-	●	-	-	-
American Woodcock	*Scolopax minor*	S5B, S5M	-	-	-	Open habitat near moist areas.	Mid-April to late June	-	-	-	●	-	-	-	●
Bald Eagle	*Haliaeetus leucocephalus*	S4	Endangered	Not at Risk	-	-	-	●	●	-	●	●	-	-	-
Bank Swallow	*Riparia riparia*	S2S3B, S2S3M	-	Threatened	Threatened (Sch.1)	Open country, near water.	Late May to late July	-	-	-	-	-	-	-	●
Bay-breasted Warbler	*Dendroica castanea*	S4B, S4S5M	-	-	-	Conifers.	Late May to early Aug.	●	-	-	●	-	-	-	●
Belted Kingfisher	*Megaceryle alcyon*	S5B, S5M	-	-	-	Vertical bank near water.	Late April to late July	-	-	-	●	●	-	-	●
Black-and-white Warbler	*Mniotilta varia*	S5B, S5M	-	-	-	Ground among trees.	Late May to mid-July	-	-	-	●	●	-	-	●
Blackburnian Warbler	*Dendroica fusca*	S5B, S5M	-	-	-	Conifers.	Late May to mid-July	-	-	-	●	-	-	-	●
Black-capped Chickadee	*Poecile atricapilla*	S5	-	-	-	Nest cavities in rotten tree stumps.	Early May to early July	●	●	●	●	●	-	-	●
Blackpoll Warbler	*Setophaga striata*	S3S4B, S5M	-	-	-	Northern spruce woodland or deciduous thickets.	June to early August	-	-	-	-	-	-	-	●
Black-throated Blue Warbler	*Setophaga caerulescens*	S5B, S5M	-	-	-	Deciduous or mixedwood.	Late May to late July	-	-	-	●	-	-	-	●
Black-throated Green Warbler	*Dendroica virens*	S5B, S5M	-	-	-	-	-	●	-	-	●	●	-	-	-
Blue Jay	*Cyanocitta cristata*	S5	-	-	-	Trees.	Late April to early July	●	●	-	●	●	-	-	●
Blue-headed Vireo	*Vireo solitarius*	S5B, S5M	-	-	-	Forest.	Mid-May to late July	●	●	-	●	●	-	-	●
Blue-winged Teal	*Spatula discors*	S4B, S4M	-	-	-	-	-	–	♦	-	-	-	-	-	–
Boreal Chickadee	*Poecile hudsonica*	S4	-	-	-	Cavities of dead trees.	Mid May to late July	●	-	●	●	-	-	-	●
Broad-winged Hawk	*Buteo platypterus*	S5B,S5M	-	-	-	Forest.	Early May to early August	●	●	-	-	●	-	-	●
Brown Creeper	*Certhia americana*	S5	-	-	-	Mature forest, old dead trunks.	Early May to mid-July	-	-	-	●	●	-	-	●
Canada Goose	*Branta canadensis*	SNAB, S5M	-	-	-	-	-	●	●	-	-	●	-	-	-
Canada Jay	*Perisoreus canadensis*	S4	-	-	-	Woodland, particularly mixed, cultivated areas near trees and parkland.	March to mid-May*	●	-	●	●	●	-	-	●
Canada Warbler	*Wilsonia canadensis*	S3B, S3M	Threatened	Threatened	Threatened (Sch.1)	Variety of forest types, prefer wet mixed forest with welldeveloped shrub layer.	June to late July	-	-	-	-	-	-	-	●

Common Name	Scientific Name	ACCDC (S-rank)[1]	*NB SARA*	COSEWIC	*SARA*	Preferred Nesting Habitat[2]	Typical Nest Timing[3]	2018 Surveys		2019 Surveys					
								Fall Migration		Winter Residents	Spring Migration		Nocturnal Owl	Common Nighthawk	Breeding Bird
								Line transects	Watch count		Line transects	Watch count			
Cape May Warbler	*Setophaga tigrina*	S3B, S4S5M	-	-	-	-	-	-	-	-	•	•	-	-	–
Cedar Waxwing	*Bombycilla cedrorum*	S5B, S5M	-	-	-	Open woods.	Mid June to late August	•	•	-	-	-	-	-	•
Chestnut-sided Warbler	*Dendroica pensylvanica*	S5B, S5M	-	-	-	Low shrubs, raspberry canes.	Late May to mid-July	-	•	-	•	-	-	-	•
Chipping Sparrow	*Spizella passerina*	S5B, S5M	-	-	-	Edges, woods.	Late May to late July	-	-	-	•	•	-	-	•
Common Grackle	*Quiscalus quiscula*	S5B, S5M	-	-	-	Open and cultivated country, especially wetter areas.	Late April to early July	-	-	-	•	•	-	-	•
Common Loon	*Gavia immer*	S4B, S4M, S4N	-	Not at Risk	-	Large, deep lakes in bare or wooded country.	Mid-May to late July	-	•	-	•	-	-	-	•
Common Merganser	*Mergus merganser*	S5B, S4N, S5M	-	-	-	-	-	-	-	-	-	•	-	-	-
Common Raven	*Corvus corax*	S5	-	-	-	Trees, cliffs, buildings.	Begins mid-April*	•	•	•	•	•	-	-	•
Common Yellowthroat	*Geothlypis trichas*	S5B, S5M	-	-	-	Brushy areas.	Late May to late July	•	•	-	•	•	-	-	•
Dark-eyed Junco	*Junco hyemalis*	S5	-	-	-	Forest edge.	Mid-May to early August	•	•	-	•	•	-	-	•
Double-crested Cormorant	*Phalacrocorax auritus*	S5B, S5M	-	Not at Risk	-	Larger water on small islands or islets, isolated rocks, trees, cliff ledges.	May to early August	•	•	-	•	•	-	-	♦
Downy Woodpecker	*Picoides pubescens*	S5	-	-	-	Open, deciduous dominant forests, natural cavities.	Early May to mid-July	•	•	•	•	•	-	-	•
Eastern Phoebe	*Sayornis phoebe*	S5B, S5M	-	-	-	Around farms or other buildings near fresh running water.	Early May to late July	-	•	-	-	-	-	-	•
European Starling	*Sturnus vulgaris*	SNA	-	-	-	Cavities in trees, structures.	Late April to early July	-	-	-	-	-	-	-	•
Evening Grosbeak	*Coccothraustes vespertinus*	S3B, S3S4N, SUM	-	Special Concern	Special Concern (Sch.1)	-	-	-	•	-	•	-	-	-	-
Fox Sparrow	*Passerella iliaca*	S4B, S5M	-	-	-	-	-	-	-	-	•	•	-	-	-
Golden-crowned Kinglet	*Regulus satrapa*	S5	-	-	-	Coniferous forest.	Early May to early August	•	-	-	•	-	-	-	•
Gray Catbird	*Dumetella carolinensis*	S4B, S4M	-	-	-	Low thick vegetation, often bordering woodland marshes and watercourses.	Late May to late July	-	-	-	-	-	-	-	♦
Great Black-backed Gull	*Larus marinus*	S5	-	-	-	-	-	-	•	-	-	•	-	-	-
Great Blue Heron	*Ardea herodias*	S4B, S4M	-	-	-	By fresh or salt water, in colonies.	Mid-April to mid-August	-	-	-	-	•	-	-	♦
Hairy Woodpecker	*Picoides villosus*	S5	-	-	-	Mature forests, woodlots, forest edges, open woodlands.	Late April to late June	-	•	•	-	•	-	-	•
Hermit Thrush	*Catharus guttatus*	S5B, S5M	-	-	-	Ground nester.	Mid-May to late July	•	•	-	•	•	-	-	•
Herring Gull	*Larus argentatus*	S5	-	-	-	-	-	-	•	-	♦	•	-	-	-
Least Flycatcher	*Empidonax minimus*	S5B, S5M	-	-	-	Broad-leafed woods.	Late May to mid-July	-	-	-	•	•	-	-	•
Lincoln's Sparrow	*Melospiza lincolnii*	S4B, S5M	-	-	-	Ground.	Mid-May to mid-July	-	-	-	-	-	-	-	•
Magnolia Warbler	*Dendroica magnolia*	S5B, S5M	-	-	-	Conifers.	Late May to late July	-	-	-	•	•	-	-	•

Common Name	Scientific Name	ACCDC (S-rank)[1]	*NB SARA*	COSEWIC	*SARA*	Preferred Nesting Habitat[2]	Typical Nest Timing[3]	2018 Surveys		2019 Surveys					
								Fall Migration		Winter Residents	Spring Migration		Nocturnal Owl	Common Nighthawk	Breeding Bird
								Line transects	Watch count		Line transects	Watch count			
Mallard	*Anas platyrhynchos*	S5B, S4N, S5M	-	-	-	Dry ground near water.	Mid-April to mid-July	-	•	-	•	•	-	-	•
Merlin	*Falco columbarius*	S5B, S5M	-	-	-	-	-	-	•	-	•	•	-	-	-
Mourning Dove	*Zenaida macroura*	S5B, S5M, S4N	-	-	-	Trees, open-grown conifers (e.g., windbreaks).	Late April to early August	•	•	-	•	-	-	-	•
Nashville Warbler	*Vermivora ruficapilla*	S5B, S5M	-	-	-	Open woods/shrubs.	Late May to mid-July	-	•	-	•	•	-	-	•
Northern Flicker	*Colaptes auratus*	S5B, S5M	-	-	-	Cavities.	Early May to late July	•	•	-	•	•	-	-	•
Northern Parula	*Parula americana*	S5B, S5M	-	-	-	Bearded lichen in conifer.	June to end of July	-	-	-	•	-	-	-	•
Northern Saw-whet Owl	*Aegolius acadicus*	S5B, S5M	-	-	-	-	-	-	-	-	•	-	-	-	-
Northern Waterthrush	*Parkesia noveboracensis*	S4B, S5M	-	-	-	Root tangles of fallen trees, in clumps of vegetation near water, or inside niches in the banks of streams.	Mid-May to early July	-	-	-	•	•	-	-	•
Olive-sided Flycatcher	*Contopus cooperi*	S3B, S3M	Threatened	Special Concern	Threatened (Sch.1)	-	-	-	-	-	♦	-	-	-	-
Osprey	*Pandion haliaetus*	S4S5B, S5M	-	-	-	Site in open surroundings with a wide, sturdy base.	Begins early June*	•	•	-	•	•	-	-	♦
Ovenbird	*Seiurus aurocapilla*	S5B, S5M	-	-	-	Ground.	Late May to mid-July	-	-	-	•	•	-	-	•
Palm Warbler	*Dendroica palmarum*	S5B, S5M	-	-	-	Shrub bogs.	Mid-May to late July	•	-	-	•	•	-	-	•
Peregrine Falcon (anatum/tundrius)	*Falco peregrinus*	S1B, S3M	Endangered	Not at Risk	Special Concern (Sch.1)	-	-	-	•	-	-	-	-	-	-
Pileated Woodpecker	*Dryocopus pileatus*	S5	-	-	-	Cavity nester.	End of April to early July	-	•	-	•	•	-	-	•
Pine Grosbeak	*Pinicola enucleator*	S2B, S4S5N, S4S5M	-	-	-	-	-	-	-	•	-	-	-	-	-
Pine Siskin	*Carduelis pinus*	S3	-	-	-	Conifers.	Early April to early August	-	-	•	•	•	-	-	•
Purple Finch	*Carpodacus purpureus*	S4S5B, SUN, S5M	-	-	-	Conifers.	Mid-May to late July	-	-	-	•	•	-	-	•
Red-breasted Nuthatch	*Sitta canadensis*	S5	-	-	-	Excavated from dead trees.	Early May to early July	•	•	-	•	•	-	-	•
Red-eyed Vireo	*Vireo olivaceus*	S5B, S5M	-	-	-	Forest.	June to end of July	•	•	-	•	•	-	-	•
Redhead	*Aythya americana*	S1B, S1M	-	-	-	-	-	-	-	-	-	•	-	-	-
Red-tailed Hawk	*Buteo jamaicensis*	S4	-	-	-	-	-	-	•	-	-	-	-	-	-
Red-winged Blackbird	*Agelaius phoeniceus*	S4B, S4M	-	-	-	-	-	-	-	-	•	•	-	-	-
Ring-billed Gull	*Larus delawarensis*	S3S4B, S5M	-	-	-	-	-	•	-	-	-	-	-	-	-
Rock Pigeon	*Columba livia*	SNA	-	-	-	Buildings, concrete structures.	April to September*	-	-	-	-	-	-	-	•
Rose-breasted Grosbeak	*Pheucticus ludovicianus*	S4B, S4M	-	-	-	-	-	•	-	-	-	-	-	-	-
Ruby-crowned Kinglet	*Regulus calendula*	S4B, S5M	-	-	-	Conifers.	Mid-May to end of July	•	-	-	•	•	-	-	•
Ruby-throated Hummingbird	*Archilochus colubris*	S5B, S5M	-	-	-	-	-	-	•	-	-	-	-	-	-
Ruffed Grouse	*Bonasa umbellus*	S5	-	-	-	-	-	•	-	•	•	-	-	-	-

Common Name	Scientific Name	ACCDC (S-rank)[1]	*NB SARA*	COSEWIC	*SARA*	Preferred Nesting Habitat[2]	Typical Nest Timing[3]	2018 Surveys		2019 Surveys					
								Fall Migration		Winter Residents	Spring Migration		Nocturnal Owl	Common Nighthawk	Breeding Bird
								Line transects	Watch count		Line transects	Watch count			
Rusty Blackbird	*Euphagus carolinus*	S3B, S3M	Special Concern	Special Concern	Special Concern (Sch.1)	Trees and shrubs near water.	-	-	-	-	•	•	-	-	-
Savannah Sparrow	*Passerculus sandwichensis*	S4S5B, S5M	-	-	-	On the ground.	Mid-May to end of July	-	•	-	-	•	-	-	•
Semipalmated Plover	*Charadrius semipalmatus*	SNRB, S4S5M	-	-	-	-	-	-	•	-	-	•	-	-	-
Sharp-shinned Hawk	*Accipiter striatus*	S4B, S5M	-	-	-	-	-	•	•	-	-	•	-	-	-
Snow Bunting	*Plectrophenax nivalis*	S5N, S5M	-	-	-	-	-	-	-	-	-	•	-	-	-
Snow Goose	*Anser caerulescens*	S2M	-	-	-	-	-	-	•	-	-	-	-	-	-
Song Sparrow	*Melospiza melodia*	S5B, S5M	-	-	-	Shrubbery.	Early May to late July	•	•	-	•	•	-	-	•
Spotted Sandpiper	*Actitis macularius*	S3S4B, S5M	-	-	-	Edge of a body of water, on the ground.	Mid-May to early July	•	•	-	-	•	-	-	•
Swainson's Thrush	*Catharus ustulatus*	S5B, S5M	-	-	-	Deciduous shrubs.	Late May to mid-July	-	-	-	•	-	-	-	•
Swamp Sparrow	*Melospiza georgiana*	S5B, S5M	-	-	-	In a patch of vegetation less than 3-feet off the ground, or on the ground.	Early May to early July	-	-	-	•	-	-	-	•
Tennessee Warbler	*Oreothlypis peregrina*	S4B, S5M	-	-	-	Ground in hummock or at base of small shrub or tree.	Late May to early July	-	-	-	•	-	-	-	•
Tree Swallow	*Tachycineta bicolor*	S4B, S4M	-	-	-	Cavity nester.	Early May to early July	-	-	-	•	•	-	-	•
Turkey Vulture	*Cathartes aura*	S3B, S3M	-	-	-	-	-	-	-	-	-	•	-	-	-
Veery	*Catharus fuscescens*	S4B, S4M	-	-	-	On or near the ground.	Mid-May to mid-July	-	-	-	-	-	-	-	•
White-crowned Sparrow	*Zonotrichia leucophrys*	S4M	-	-	-	-	-	-	•	-	-	-	-	-	-
White-throated Sparrow	*Zonotrichia albicollis*	S5B, S5M	-	-	-	Ground at forest edge.	Late May to late July	•	•	-	•	•	-	-	•
White-winged Crossbill	*Loxia leucoptera*	S5	-	-	-	Spruce tree near trunk.	Begins early February*	-	-	-	-	-	-	-	•
Wilson's Snipe	*Gallinago delicata*	S3S4B, S5M	-	-	-	-	-	-	•	-	•	•	-	-	-
Wilson's Warbler	*Cardellina pusilla*	S4B, S5M	-	-	-	Small depressions on the ground.	Late May to late July	-	-	-	-	-	-	-	•
Winter Wren	*Troglodytes troglodytes*	S5B, S5M	-	-	-	Cavities.	Early May to early August	-	-	-	•	•	-	-	•
Yellow Warbler	*Dendroica petechia*	S5B, S5M	-	-	-	Edges and disturbed areas.	Late May to mid-July	-	-	-	•	♦	-	-	•
Yellow-bellied Flycatcher	*Empidonax flaviventris*	S4S5B, S5M	-	-	-	Ground, Under Roots, rotten logs.	Early June to early August	-	-	-	-	-	-	-	•
Yellow-bellied Sapsucker	*Sphyrapicus varius*	S5B, S5M	-	-	-	Cavity nester.	Mid-May to late July	•	•	-	•	•	-	-	•
Yellow-rumped Warbler	*Dendroica coronata*	S5B, S5M	-	-	-	Forest with conifers.	Late May to late July	•	-	-	•	•	-	-	•
Species Count (+# = species only observed incidentally)								**39**	**48(+1)**	**11**	**67(+2)**	**65(+2)**	**0**	**0**	**69(+4)**
Individuals observed (including unidentified species, but excluding incidental observations)								**651**	**1,374**	**60**	**863**	**759**	**0**	**0**	**833**

Notes:

Rarity Rankings and legal protection are current as of August 2019

♦ Species only observed incidentally during survey

1 Atlantic Canada Conservation Data Centre (ACCDC) S-ranks for Vertebrates in New Brunswick.

2 Preferred nesting habitats only noted for species observed during breeding season. Typical nest timing for Ecodistrict Northumberland Strait, Nesting Zone C3, New Brunswick; only included for species observed during the breeding season.

3 Nesting period from Baicich, P.J., and C.J.O Harrison (2005). Nests, Eggs, and Nestlings of North American Birds (2nd Edition). Princeton, New Jersey: Princeton University Press.

Cells highlights in light gray indicate Species of Conservation Concern (SOCC) - S1 to S3S4

Cells highlighted in dark gray indicate Species at Risk (SAR)

Table A-2 Chaleur Ventus Master Avian Species List for the Collection Line (62 species)

Common Name	Scientific Name	ACCDC (S-rank)[1]	*NB SARA*	COSEWIC	*SARA*	Preferred Nesting Habitat[2]	Typical Nest Timing[3]	2019 Surveys		
								Nocturnal Owl	Common Nighthawk	Breeding Bird
Alder Flycatcher	*Empidonax alnorum*	S5B, S5M	-	-	-	Low in shrubbery.	Mid-June to early August	-	-	•
American Crow	*Corvus brachyrhynchos*	S5	-	-	-	Trees.	Mid-April to mid-July	-	-	•
American Goldfinch	*Carduelis tristis*	S5	-	-	-	Shrub or sapling in open areas.	Late June to end of Sept.	-	-	•
American Kestrel	*Falco sparverius*	S4B, S4S5M	-	-	-	Tree cavity.	Mid-April to early August	-	-	•
American Redstart	*Setophaga ruticilla*	S5B, S5M	-	-	-	Small trees.	Late May to mid-July	-	-	•
American Robin	*Turdus migratorius*	S5B, S5M	-	-	-	Everywhere.	May to end of July	-	-	•
Bay-breasted Warbler	*Dendroica castanea*	S4B, S4S5M	-	-	-	Conifers.	Late May to early Aug.	-	-	•
Black-and-white Warbler	*Mniotilta varia*	S5B, S5M	-	-	-	Ground among trees.	Late May to mid-July	-	-	•
Blackburnian Warbler	*Dendroica fusca*	S5B, S5M	-	-	-	Conifers.	Late May to mid-July	-	-	•
Black-capped Chickadee	*Poecile atricapilla*	S5	-	-	-	Nest cavities in rotten tree stumps.	Early May to early July	-	-	•
Black-throated Blue Warbler	*Setophaga caerulescens*	S5B, S5M	-	-	-	Deciduous or mixedwood.	Late May to late July	-	-	•
Black-throated Green Warbler	*Dendroica virens*	S5B, S5M	-	-	-	Coniferous or mixed forest.	June to late July	-	-	•
Blue Jay	*Cyanocitta cristata*	S5	-	-	-	Trees.	Late April to early July	-	-	•
Blue-headed Vireo	*Vireo solitarius*	S5B, S5M	-	-	-	Forest.	Mid-May to late July	-	-	•
Broad-winged Hawk	*Buteo platypterus*	S5B,S5M	-	-	-	Forest.	Early May to early August	-	-	•
Brown Creeper	*Certhia americana*	S5	-	-	-	Mature forest, old dead trunks.	Early May to mid-July	-	-	•
Canada Warbler	*Wilsonia canadensis*	S3B, S3M	Threatened	Threatened	Threatened (Sch.1)	Variety of forest types, prefer wet mixed forest with well-developed shrub layer.	June to late July	-	♦	□
Cape May Warbler	*Setophaga tigrina*	S3B, S4S5M	-	-	-	Spruce trees, 40-50 ft above ground.	June to late July	-	-	•
Cedar Waxwing	*Bombycilla cedrorum*	S5B, S5M	-	-	-	Open woods.	Mid-June to late August	-	-	•
Chestnut-sided Warbler	*Dendroica pensylvanica*	S5B, S5M	-	-	-	Low shrubs, raspberry canes.	Late May to mid-July	-	-	•
Chipping Sparrow	*Spizella passerina*	S5B, S5M	-	-	-	Edges, woods.	Late May to late July	-	-	•
Common Grackle	*Quiscalus quiscula*	S5B, S5M	-	-	-	Open and cultivated country, especially wetter areas.	Late April to early July	-	-	•
Common Nighthawk	*Chordeiles minor*	S3B, S4M	Threatened	Special Concern	Threatened (Sch.1)	Open habitats.	Begins late May/early June*	-	•	□
Common Raven	*Corvus corax*	S5	-	-	-	Trees, cliffs, buildings.	Begins mid-April*	-	-	•
Common Yellowthroat	*Geothlypis trichas*	S5B, S5M	-	-	-	Brushy areas.	Late May to late July	-	-	•
Dark-eyed Junco	*Junco hyemalis*	S5	-	-	-	Forest edge.	Mid-May to early August	-	-	•
Double-crested Cormorant	*Phalacrocorax auritus*	S5B, S5M	-	Not at Risk	-	Larger water on small islands or islets, isolated rocks, trees, cliff ledges.	May to early August	-	-	•
Eastern Phoebe	*Sayornis phoebe*	S5B, S5M	-	-	-	Around farms or other buildings near fresh running water.	Early May to late July	-	-	•
Golden-crowned Kinglet	*Regulus satrapa*	S5	-	-	-	Coniferous forest.	Early May to early August	-	-	•
Great Horned Owl	*Bubo virginianus*	S4	-	-	-	Trees, adopting nests built by another species.	Early April start*	•	-	-
Hermit Thrush	*Catharus guttatus*	S5B, S5M	-	-	-	Ground nester.	Mid-May to late July	-	-	•
Least Flycatcher	*Empidonax minimus*	S5B, S5M	-	-	-	Broad-leafed woods.	Late May to mid-July	-	-	•
Magnolia Warbler	*Dendroica magnolia*	S5B, S5M	-	-	-	Conifers.	Late May to late July	-	-	•
Mourning Dove	*Zenaida macroura*	S5B, S5M, S4N	-	-	-	Trees, open-grown conifers (e.g., windbreaks).	Late April to early August	-	-	•
Nashville Warbler	*Vermivora ruficapilla*	S5B, S5M	-	-	-	Open woods/shrubs.	Late May to mid-July	-	-	•

Common Name	Scientific Name	ACCDC (S-rank)[1]	*NB SARA*	COSEWIC	*SARA*	Preferred Nesting Habitat[2]	Typical Nest Timing[3]	2019 Surveys		
								Nocturnal Owl	Common Nighthawk	Breeding Bird
Northern Flicker	*Colaptes auratus*	S5B, S5M	-	-	-	Cavities.	Early May to late July	-	-	•
Northern Parula	*Parula americana*	S5B, S5M	-	-	-	Bearded lichen in conifer.	June to end of July	-	-	•
Northern Saw-whet Owl	*Aegolius acadicus*	S5B, S5M	-	-	-	Previously excavated holes in dead snags.	Bgins mid-March/April, ends by late June*	♦	-	-
Olive-sided Flycatcher	*Contopus cooperi*	S3B, S3M	Threatened	Special Concern	Threatened (Sch.1)	Trees.	Early June to early August	-	-	•
Ovenbird	*Seiurus aurocapilla*	S5B, S5M	-	-	-	Ground.	Late May to mid-July	-	-	•
Pileated Woodpecker	*Dryocopus pileatus*	S5	-	-	-	Cavity nester.	End of April to early July	-	-	•
Pine Siskin	*Carduelis pinus*	S3	-	-	-	Conifers.	Early April to early August	-	-	•
Purple Finch	*Carpodacus purpureus*	S4S5B, SUN, S5M	-	-	-	Conifers.	Mid-May to late July	-	-	•
Red-breasted Nuthatch	*Sitta canadensis*	S5	-	-	-	Excavated from dead trees.	Early May to early July	-	-	•
Red-eyed Vireo	*Vireo olivaceus*	S5B, S5M	-	-	-	Forest.	June to end of July	-	-	•
Ruby-crowned Kinglet	*Regulus calendula*	S4B, S5M	-	-	-	Conifers.	Mid-May to end of July	-	-	•
Ruby-throated Hummingbird	*Archilochus colubris*	S5B, S5M	-	-	-	Slender, often descending branch, usually of deciduous trees.	Begins early June*	-	-	•
Ruffed Grouse	*Bonasa umbellus*	S5	-	-	-	Base of tree.	Begins early May*	-	-	•
Savannah Sparrow	*Passerculus sandwichensis*	S4S5B, S5M	-	-	-	On the ground.	Mid-May to end of July	-	-	•
Song Sparrow	*Melospiza melodia*	S5B, S5M	-	-	-	Shrubbery.	Mid-May to late July	-	-	•
Spotted Sandpiper	*Actitis macularius*	S3S4B, S5M	-	-	-	Edge of a body of water, on the ground.	Mid-May to early July	-	-	•
Swainson's Thrush	*Catharus ustulatus*	S5B, S5M	-	-	-	Deciduous shrubs.	Late May to mid-July	-	-	•
Swamp Sparrow	*Melospiza georgiana*	S5B, S5M	-	-	-	In a patch of vegetation less than 3-feet off the ground, or on the ground.	Early May to early July	-	-	•
Tree Swallow	*Tachycineta bicolor*	S4B, S4M	-	-	-	Cavity nester.	Early May to early July	-	-	•
Veery	*Catharus fuscescens*	S4B, S4M	-	-	-	On or near the ground.	Mid-May to mid-July	-	-	•
White-throated Sparrow	*Zonotrichia albicollis*	S5B, S5M	-	-	-	Ground at forest edge.	Late May to late July	-	-	•
White-winged Crossbill	*Loxia leucoptera*	S5	-	-	-	Spruce tree near trunk.	Begins early February*	-	-	•
Wilson's Snipe	*Gallinago delicata*	S3S4B, S5M	-	-	-	On the ground close to or even surrounded by water.	Early May to mid-July	-	-	•
Winter Wren	*Troglodytes troglodytes*	S5B, S5M	-	-	-	Cavities.	Early May to early August	-	-	•
Yellow-bellied Flycatcher	*Empidonax flaviventris*	S4S5B, S5M	-	-	-	Ground, Under Roots, rotten logs.	Early June to early August	-	-	•
Yellow-bellied Sapsucker	*Sphyrapicus varius*	S5B, S5M	-	-	-	Cavity nester.	Mid-May to late July	-	-	•
Yellow-rumped Warbler	*Dendroica coronata*	S5B, S5M	-	-	-	Forest with conifers.	Late May to late July	-	-	•
Species Count								**1(+1)**	**1(+1)**	**59**
Individuals observed (including unidentified species)								**2**	**7**	**620**

Notes:

Rarity Rankings and legal protection are current as of August 2019

♦ Species only observed incidentally during survey

1 Atlantic Canada Conservation Data Centre (ACCDC) S-ranks for Vertebrates in New Brunswick.

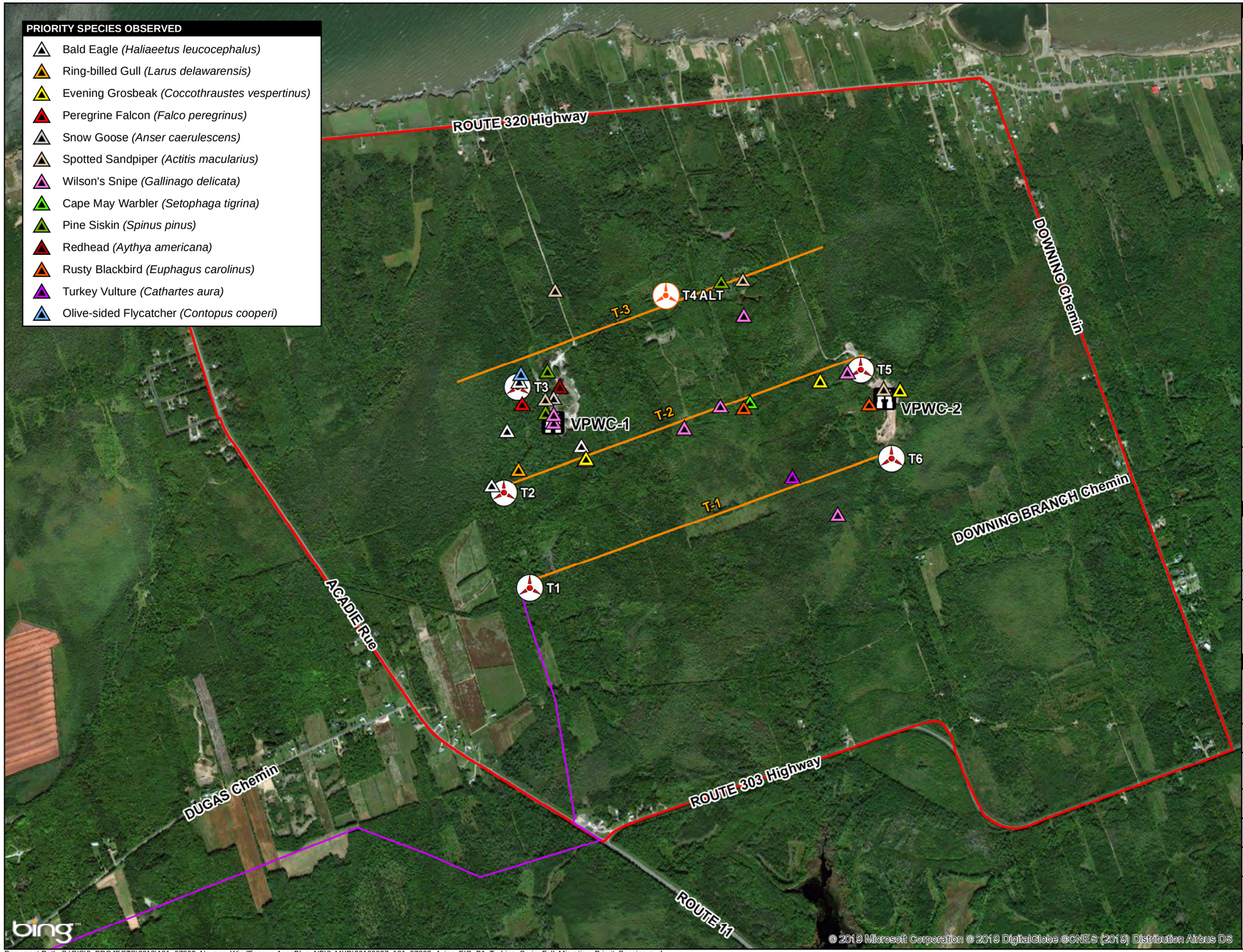
2 Preferred nesting habitats only noted for species observed during breeding season. Typical nest timing for Ecodistrict Northumberland Strait, Nesting Zone C3, New Brunswick; only included for species observed during the breeding season.

3 Nesting period from Baicich, P.J., and C.J.O Harrison (2005). Nests, Eggs, and Nestlings of North American Birds (2nd Edition). Princeton, New Jersey: Princeton University Press.

Cells highlights in light gray indicate Species of Conservation Concern (SOCC) - S1 to S3S4

Cells highlighted in dark gray indicate Species at Risk (SAR)

B FIGURES



PRIORITY SPECIES OBSERVED

- Bald Eagle *(Haliaeetus leucocephalus)*
- Ring-billed Gull *(Larus delawarensis)*
- Evening Grosbeak *(Coccothraustes vespertinus)*
- Peregrine Falcon *(Falco peregrinus)*
- Snow Goose *(Anser caerulescens)*
- Spotted Sandpiper *(Actitis macularius)*
- Wilson's Snipe *(Gallinago delicata)*
- Cape May Warbler *(Setophaga tigrina)*
- Pine Siskin *(Spinus pinus)*
- Redhead *(Aythya americana)*
- Rusty Blackbird *(Euphagus carolinus)*
- Turkey Vulture *(Cathartes aura)*
- Olive-sided Flycatcher *(Contopus cooperi)*

KEY MAP:

LEGEND:

- WATCH COUNT STATIONS
- TURBINE LAYOUT
- ALTERNATE TURBINE LAYOUT
- TAPLINE
- SPRING AND FALL BIRD MIGRATION SURVEY LINE TRANSECTS
- PROJECT AREA - WTG SITE

N W E S

PROJECT:

PROJECT:
CHALEUR VENTUS WIND ENERGY PROJECT

PROJECT NO.:
181-07802

CLIENT:
CHALEUR VENTUS LIMITED PARTNERSHIP

FIGURE:

TITLE:
SPRING & FALL BIRD MIGRATION SURVEY LINE TRANSECTS, WATCH COUNT STATIONS & PRIORITY SPECIES OBSERVATIONS

FIGURE NO.:	REVISION NO.:
B-1	0

SCALE: 0 100 200 400 600 800 Metres

DATUM:	PROJECTION:
NAD 83 CSRS	NB Stereographic
DRAWN BY:	CHECKED BY:
T. MOREHOUSE	T. MacAULAY
CREATED DATE: (YYYY-MM-DD) 20190819	REVISION DATE: (YYYY-MM-DD) 2019-09-30

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Dartmouth, Nova Scotia
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LEGEND:

TURBINE LAYOUT

ALTERNATE TURBINE LAYOUT

ROUTE 320 Highway

ACADIE Rue

DOWNING Chemin

DOWNING BRANCH Chemin

DUGAS Chemin

ROUTE 303 Highway

ROUTE 11 Hig

T1

T2

T3

T4 ALT

T5

T6

TRANSECT 1

TRANSECT 2

TRANSECT 3

bing

KEY MAP:

LEGEND:

PRIORITY SPECIES

Pine Grosbeak *(Pinicola enucleator)*

Pine Siskin *(Spinus pinus)*

WINTER BIRD SURVEY TRANSECTS

TAPLINE

PROJECT AREA - WTG SITE

N
W E
S

PROJECT:

PROJECT:
CHALEUR VENTUS WIND ENERGY PROJECT

PROJECT NO.:
181-07802

CLIENT:
CHALEUR VENTUS LIMITED PARTNERSHIP

FIGURE:

TITLE:
WINTER BIRD SURVEY TRANSECTS

FIGURE NO.:	REVISION NO.:
B-2	**0**

SCALE:
0 100 200 400 600 800 Metres

DATUM:	PROJECTION:
NAD 83 CSRS	NB Stereographic
DRAWN BY:	CHECKED BY:
T. MOREHOUSE	T. MacAULAY
CREATED DATE: (YYYY-MM-DD) 2019-08-19	REVISION DATE: (YYYY-MM-DD) 2019-09-30

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PROPOSED TURBINE LOCATIONS:

TURBINE LAYOUT

ALTERNATE TURBINE LAYOUT

ROUTE 320 Highway

ACADIE Rue

DOWNING Chemin

DOWNING BRANCH Chemin

DUGAS Chemin

ROUTE 303 Highway

ROUTE 11 Hig

OWL-4

OWL-2

T4 ALT

T5

T3

T6

OWL-1

T2

OWL-3

T1

OWL-5

bing

KEY MAP:

LEGEND:

NOCTURNAL OWL OBSERVATION STATIONS

TAPLINE

PROJECT AREA - WTG SITE

*NOTE: No Owl Observations

N
W E
S

PROJECT:

PROJECT:
CHALEUR VENTUS WIND ENERGY PROJECT

PROJECT NO.:
181-07802

CLIENT:
CHALEUR VENTUS LIMITED PARTNERSHIP

FIGURE:

TITLE:
NOCTURNAL OWL OBSERVATION STATIONS

FIGURE NO.:	REVISION NO.:
B-3	**0**

SCALE:
0 100 200 400 600 800 Metres

DATUM:	PROJECTION:
NAD 83 CSRS	NB Stereographic
DRAWN BY:	CHECKED BY:
T. MOREHOUSE	T. MacAULAY
CREATED DATE: (YYYY-MM-DD) 2019-08-19	REVISION DATE: (YYYY-MM-DD) 2019-09-30

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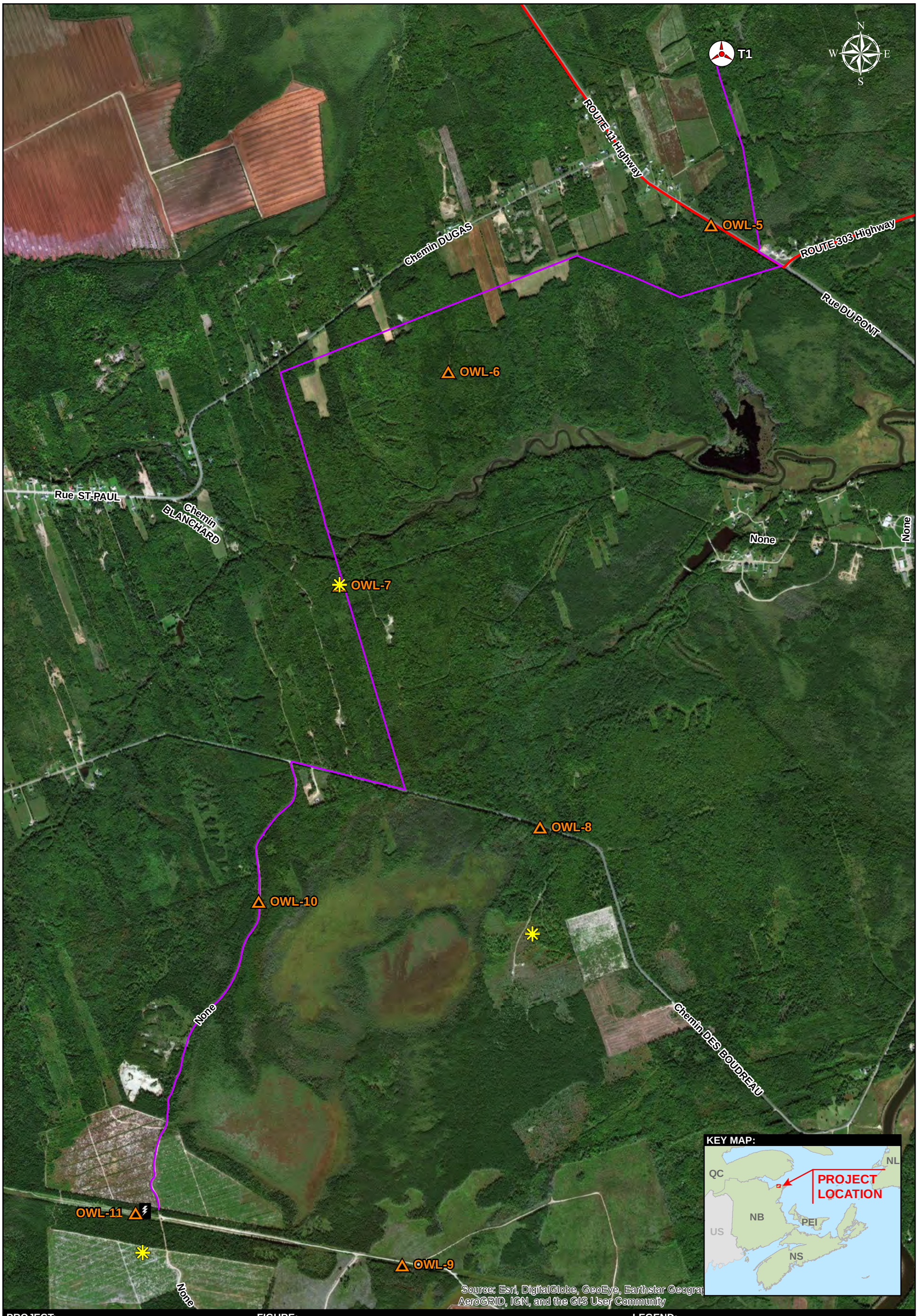

PROJECT:

PROJECT:
CHALEUR VENTUS WIND ENERGY PROJECT

PROJECT NO.: **181-07802**

CLIENT:
CHALEUR VENTUS LIMITED PARTNERSHIP

FIGURE:

TITLE:
NOCTURNAL OWL OBSERVATION STATIONS

FIGURE NO.: **B-4**

REVISION NO.: **0**

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DISCLAIMER:

DATUM: NAD 83 CSRS

PROJECTION: UTM ZONE 20 NORTH

DRAWN BY: T. MOREHOUSE

CHECKED BY: T. MacAULAY

CREATED DATE: (YYYY-MM-DD) 2019-08-19

REVISION DATE: (YYYY-MM-DD) 2019-09-30

LEGEND:

- OWL OBSERVATIONS (Approximate Location)
- NOCTURNAL OWL OBSERVATION STATIONS
- SUBSTATION
- TURBINE LAYOUT
- TAPLINE
- PROJECT AREA - WTG SITE

SCALE: 1:17,500
0 100 200 400 600 800 1,000 Metres

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PROPOSED TURBINE LOCATIONS:

TURBINE LAYOUT

ALTERNATE TURBINE LAYOUT

ROUTE 320 Highway

UNCL-1

RES-1

HARD-2

MMIX-1

WT-5

FP-1

WETL-5

T4 ALT WT-4

W-1

WETL-4

DOWNING Chemin

ACADIE Rue

T5 WT-6

HARD-1

T3 WT-3

MIX-2

MIX-1

CC-2

IND-1

WETL-6

CC-1

WETL-8

WETL-2

T6 WT-7

WETL-3

T2 WT-2

DOWNING BRANCH Chemin

SOFT-2

WETL-7

T1 WT-1

HARD-3

AGR-1

MHARD-1

SOFT-1

DUGAS Chemin

WETL-1

ROUTE 303 Highway

ROUTE 11 Hi

bing

KEY MAP:

LEGEND:

PRIORITY SPECIES

- Bank Swallow *(Riparia riparia)*
- Blackpoll Warbler *(Setophaga striata)*
- Canada Warbler *(Cardellina canadensis)*
- Pine Siskin *(Spinus pinus)*
- Spotted Sandpiper *(Actitis macularius)*
- BREEDING BIRD SURVEY STATIONS
- TAPLINE
- PROJECT AREA - WTG SITE

N W E S

* NOTE: No CONI observed

PROJECT:

PROJECT:
CHALEUR VENTUS WIND ENERGY PROJECT

PROJECT NO.: **181-07802**

CLIENT:
CHALEUR VENTUS LIMITED PARTNERSHIP

FIGURE:

TITLE:
BREEDING BIRD SURVEY STATIONS & PRIORITY SPECIES OBSERVATIONS

FIGURE NO.:	REVISION NO.:
B-5	0

SCALE: 0 100 200 400 600 800 Metres

DATUM:	PROJECTION:
NAD 83 CSRS	NB Stereographic
DRAWN BY:	CHECKED BY:
T. MOREHOUSE	T. MacAULAY
CREATED DATE: (YYYY-MM-DD) 2019-08-19	REVISION DATE: (YYYY-MM-DD) 2019-09-30

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PROPOSED SITE LAYOUT:

- TURBINE LAYOUT
- SUBSTATION
- TAPLINE
- PROJECT AREA - WTG SITE

SOFT-2
WT-1
T1
WETL-7
HARD-3
MHARD-1
AGR-1
1
SOFT-1
2
3
WETL-1
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
ROUTE 11 Highway
ROUTE 303 Highway
Chemin DUGAS
Rue DU PONT
Rue ST-PAUL
Chemin BLANCHARD
Chemin DES BOUDREAU
None
None
None
N
S
E
W

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geograp
AeroGRID, IGN, and the GIS User Community

KEY MAP:

PROJECT:

PROJECT:
CHALEUR VENTUS WIND ENERGY PROJECT

PROJECT NO.: **181-07802**

CLIENT:
CHALEUR VENTUS LIMITED PARTNERSHIP

FIGURE:

TITLE:
BREEDING BIRD SURVEY STATIONS & PRIORITY SPECIES OBSERVATIONS

FIGURE NO.: **B-6**

REVISION NO.: **0**

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DISCLAIMER:

DATUM: NAD 83 CSRS

PROJECTION: UTM ZONE 20 NORTH

DRAWN BY: T. MOREHOUSE

CHECKED BY: T. MacAULAY

CREATED DATE: (YYYY-MM-DD) 2019-08-19

REVISION DATE: (YYYY-MM-DD) 2019-09-30

LEGEND:

PRIORITY SPECIES

- Cape May Warbler *(Setophaga tigrina)*
- Olive-sided Flycatcher *(Contopus cooperi)*
- Pine Siskin *(Spinus pinus)*
- Wilson's Snipe *(Gallinago delicata)*
- BREEDING BIRD SURVEY STATIONS

SCALE: 1:17,500
0 100 200 400 600 800 1,000 Metres

Document Path: S:\GIS\2_PROJECTS\2018\181_07802_Naveco_WindEnergy_AnseBlue_NB\8_MXD\20190827_181_07802_Avian_FIG_B6_CL_BreedingBird.mxd

PROPOSED TURBINE LOCATIONS:

TURBINE LAYOUT

ALTERNATE TURBINE LAYOUT

ROUTE 320 Highway

ACADIE Rue

DOWNING Chemin

DOWNING BRANCH Chemin

DUGAS Chemin

ROUTE 303 Highway

ROUTE 11

CONI-1

CONI-2

CONI-3

CONI-4

CONI-5

T1

T2

T3

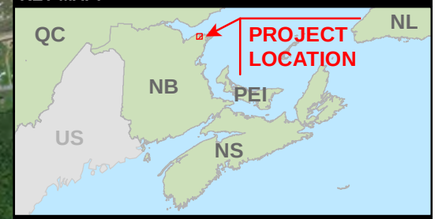
T4 ALT

T5

T6

bing

KEY MAP:



LEGEND:

COMMON NIGHTHAWK SURVEY STATIONS

TAPLINE

PROJECT AREA - WTG SITE

N
W E
S

* NOTE: No CONI observed

PROJECT:

PROJECT:
CHALEUR VENTUS WIND ENERGY PROJECT

PROJECT NO.:
181-07802

CLIENT:
CHALEUR VENTUS LIMITED PARTNERSHIP

FIGURE:

TITLE:
COMMON NIGHTHAWK SURVEY STATIONS

FIGURE NO.:	REVISION NO.:
B-7	**0**

SCALE:
0 100 200 400 600 800 Metres

DATUM:	PROJECTION:
NAD 83 CSRS	NB Stereographic
DRAWN BY:	CHECKED BY:
T. MOREHOUSE	T. MacAULAY
CREATED DATE: (YYYY-MM-DD) 2019-08-19	REVISION DATE: (YYYY-MM-DD) 2019-09-30

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PROPOSED SITE LAYOUT:

- TURBINE LAYOUT
- SUBSTATION
- TAPLINE
- PROJECT AREA - WTG SITE

T1
CONI-6
CONI-7
CONI-8
CONI-9
CONI-10
CONI-11
CONI-12
CONI-13
CONI-14
ROUTE 11 Highway
ROUTE 303 Highway
Chemin DUGAS
Rue DU PONT
Rue ST-PAUL
Chemin BLANCHARD
Chemin DES BOUDREAU
None
None
None
N
W
E
S
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geograp
AeroGRID, IGN, and the GIS User Community

KEY MAP:

PROJECT:

PROJECT:
CHALEUR VENTUS WIND ENERGY PROJECT

PROJECT NO.: **181-07802**

CLIENT:
CHALEUR VENTUS LIMITED PARTNERSHIP

FIGURE:

TITLE:
COMMON NIGHTHAWK SURVEY STATIONS & PRIORITY SPECIES OBSERVATIONS

FIGURE NO.: **B-8**

REVISION NO.: **0**

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DISCLAIMER:

DATUM: NAD 83 CSRS

PROJECTION: UTM ZONE 20 NORTH

DRAWN BY: T. MOREHOUSE

CHECKED BY: T. MacAULAY

CREATED DATE: (YYYY-MM-DD) 2019-08-19

REVISION DATE: (YYYY-MM-DD) 2019-09-30

LEGEND:

PRIORITY SPECIES OBSERVATIONS

- Canada Warbler *(Cardellina canadensis)*
- Common Nighthawk *(Chordeiles minor)*
- COMMON NIGHTHAWK SURVEY STATIONS

SCALE: 1:17,500
0 100 200 400 600 800 1,000 Metres

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