

# **Appendix CC**

## **Avian Assessment Documentation**

# **Birds and Bird Habitat Baseline Review (WSP 2018)**

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# BOAT HARBOUR REMEDIATION PLANNING AND DESIGN

## BIRDS AND BIRD HABITAT BASELINE REVIEW

GHD LIMITED

SEPTEMBER 14, 2018

FINAL





# BOAT HARBOUR REMEDICATION PLANNING AND DESIGN

## BIRDS AND BIRD HABITAT BASELINE REVIEW

GHD LIMITED

**FINAL**

**WSP PROJECT NO.: 171-10478-00**

**DATE: SEPTEMBER 14, 2018**

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September 14, 2018

FINAL

**Attention: Peter Oram, P.Ge.**

GHD LIMITED  
45 Akerley Boulevard  
Dartmouth, NS B3B 1J7

Dear Mr. Oram:

**Subject: Boat Harbour Remediation Planning and Design – Birds and Bird Habitat Baseline Review**

WSP Canada Inc. was retained to complete an assessment of birds and bird habitat for the Boat Harbour Effluent Treatment Facility located in Pictou County, Nova Scotia, to gain an understanding of the current conditions in Boat Harbour. It is understood that GHD Limited is planning remedial action for Boat Harbour and requires a baseline condition report.

This report summarizes the findings of the birds and bird habitat baseline assessment.

Yours sincerely,

Tiffany T. MacAulay, M.Sc.  
Biologist

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Senior Biologist

WSP ref.: 171-10478-00

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# SIGNATURES

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# 1 INTRODUCTION

The following report presents the methodologies and results of all avian surveys that have been completed at the Boat Harbour Effluent Treatment Facility (BHETF) in 2017 and 2018. This includes:

- Fall migration monitoring (2017)
- Late winter and early spring bird survey (targeting raptor surveys) (2018)
- Spring migration monitoring (2018)
- Breeding bird point count survey and marsh monitoring (2018)
- Common Nighthawk survey (2018)

Chris Peppar, a sub-contracted ornithologist hired by WSP Canada, assisted WSP in the planning and execution of the field work, and to ensure that the quality of data is up to that of industry standard or above.

The purpose of the avian surveys at the BHETF are to determine baseline conditions, categorize habitat available for avian species, identify important bird areas on site, and identify species currently utilizing the habitats found on site.

## 2 BIRDS AND BIRD HABITAT

### 2.1 DESKTOP REVIEW

#### 2.1.1 MARITIMES BREEDING BIRD ATLAS

The Project Area (546 hectares (ha), of which 141 ha is Boat Harbour; see Appendix A, Figure A-1) is found within one Maritime Breeding Bird Atlas (MBBA) square, 20NR25, within the Cobequid region (Stewart R. L., et al., 2015). See Table 2.1 for summary of the species observed and survey effort for each MBBA Atlas. The complete list of species observed during the MBBA surveys is available in Appendix A.

**Table 2.1: Square 20NR25 species summary and survey effort from the MBBA**

ATLAS EDITION	NO. POSSIBLE BREEDER	NO. PROBABLE BREEDERS	NO. CONFIRMED BREEDERS	TOTAL NO. OF SPECIES	NO. HOURS SURVEYED
1 <sup>st</sup> Atlas	46	9	34	89	16
2 <sup>nd</sup> Atlas	24	46	39	109	81.2

Source: (Bird Studies Canada, 2018)

#### 2.1.2 IMPORTANT BIRD AREAS

The nearest Important Bird Area (IBA), is ~32 kilometres (km) northeast of the Project Area on the southeast coast of PEI, Highbank IBA. Cliffs of red Permian sandstone, 20-25 metres (m) high, extend along the coast for a distance of 8 km. Approximately 1.5% of the North American Great Cormorant (*Phalacrocorax carbo*) population nest within the IBA; averaging 92 nests per year. Other species that nest within the colony include Double-crested Cormorants (*Phalacrocorax auritus*), Black Guillemots (*Cephus grylle*) and Rock Doves (*Columba livia*). (IBA Canada)

The nearest IBA on mainland Nova Scotia is the Cobequid Bay IBA and it is located approximately 55 km southwest of the Project Area along the eastern arm of the Bay of Fundy. The Cobequid Bay, amongst other regions in the Bay of Fundy, are the last and most important stopover sites for the Semipalmated Sandpiper (*Calidris pusilla*). The sandpipers use the mud flats to feed and build up fat stores, which enables them to make the long non-stop southward migration flight over the Atlantic Ocean to South America over three to four days. Over 40,000 Semipalmated Sandpipers (approximately 1.2% of the global population) have been recorded in Cobequid Bay. Other shorebirds that use the area for staging during fall migration include Red Knot (*Calidris canutus*), Sanderling (*Calidris alba*), Least Sandpiper (*Calidris minutilla*), Dunlin (*Calidris alpina*), Short-billed Dowitcher (*Limnodromus griseus*) and White-rumped Sandpipers (*Calidris fuscicollis*). Large numbers of Canada Geese (*Branta canadensis*) can also be observed in Cobequid Bay during fall migration (approximately 2.6% of the Newfoundland and Labrador population). (IBA Canada)

#### 2.1.3 BIOLOGICALLY SIGNIFICANT AREAS

Two Biologically Significant Areas for breeding terns were identified within the vicinity of the Project Area: Pictou Bar Site of Ecological Significance (SES; approximately 800-metres north of the Project Area) and Ballast Island SES (approximately one-kilometre southwest of the Project Area).

An “at risk” population of Common Terns (*Sterna hirundo*) is present on Lighthouse Beach within Pictou Bar SES (Atlantic Canada Conservation Data Centre, 2017); the data for this nesting population was collected between 1999 and 2009 (Mark Elderkin, NSDNR, Pers. comm., 2018). A few pairs of Piping Plovers (*Charadrius melodus*) were also observed between 1979 and 1991, however this beach has since observed a lot of human disturbance and no Piping Plovers were seen during a shoreline survey conducted in 2001 (Mark Elderkin, NSDNR, Pers. comm., 2018).

An “of concern” population of “unclassified” Terns is present within the Ballast Island SES (Atlantic Canada Conservation Data Centre, 2017). In 2003, 220 nests were observed and in 2011, 48 nests were observed (Mark Elderkin, NSDNR, Pers. comm., 2018).

### 2.1.4 COLONIAL WATERBIRD DATABASE

The Waterbird Colony Database (Wilhem & Mahoney, 2017) has occurrence records of two Double-crested Cormorant (*Phalacrocorax auritus*) breeding colonies within proximity of the Project Area. One colony was observed on Pictou Warf, 2.7 km west of the Project Area, and consisted of 100 pairs with 100 active nests within a human-made marine habitat; this observation was recorded in 1972 (Wilhem & Mahoney, 2017). The second colony was observed on Pictou Landing, right at the western border of the Project Area boundary, and consisted of 71 breeding birds within a mainland coast marine habitat; this observation was made in 1987 (Wilhem & Mahoney, 2017).

## 2.2 RATIONALE FOR VALUED COMPONENTS SELECTION

Bird habitat may be altered or lost as a result of direct or indirect disturbances from the Project. Migratory birds and Species at Risk (SAR) are protected under federal legislation by the Migratory Birds Convention Act (MBCA) (Government of Canada, 1994) and SARA (Government of Canada, 2002). The Nova Scotia Wildlife Act protects all birds within the province by stating that, except with a permit issued by the minister, *no person shall destroy, take, possess, buy or sell any egg of a bird or turtle or disturb the nest of a bird or turtle; or use a snare, net or trap to take any bird* (Government of Nova Scotia, 1989).

## 2.3 BASELINE PROGRAM METHODOLOGY

The baseline monitoring program for avian species was completed by WSP and includes the surveys outlined in Table 2.2. Figures of the survey station locations for migration, winter and breeding surveys can be found in Appendix B, Figures B1-B3.

**Table 2.2: Avian surveys conducted as part of the baseline monitoring program**

SURVEY TYPE	DATES	EFFORT
Fall migration monitoring	September to October, 2017	23 line transects – 8 visits 2 vantage points – 3 visits (2 surveys per visit; 1.5 hrs each)
Late winter and early spring bird survey (targeting raptor species)	February 28-March 1, 2018 March 26-27, 2018	7 call playback (nocturnal) and 2 diurnal vantage points (2 hours at each station, conducted once per visit); 2 visits
Spring migration monitoring	April 27 and May 14, 2018	23 line transects – 2 visits 2 vantage points – 2 visits (4 hours at each station; 2 surveys per visit)
Breeding bird point count survey/Marsh Monitoring	June 6-7 (early) and July 28-28 (late), 2018	46 ten-minute point count stations - 2 visits
Common Nighthawk survey	June 26, 2018	6 call playback stations - 1 visit

### 2.3.1 FALL MIGRATION MONITORING

Fall migration monitoring was completed from September to November 2017 to determine the presence of priority bird species within the Project Area. Two survey methods were employed: Line transect surveys and diurnal vantage point watches. See Appendix B, Figure B1, for line transect and diurnal vantage point watch station locations.

#### LINE TRANSECT SURVEYS

Transects (i.e., point and line) are used to collect data for the estimation of avian richness and relative abundance within a specific area. Migrating birds are more mobile than breeding birds, as well as less vocal, therefore they are more difficult to count. Though both point and line transects are used during migration as methods to estimate avian richness and abundance, research comparing the two methods suggests that line transects can detect more species, more individuals, and are more time efficient than point counts (Wilson, Twedt, & Elliott, 2000). Furthermore, detection of species with a low probability of detection was shown to increase on line transects (Wilson, Twedt, & Elliott, 2000).

Twenty-three (23) line transects were spaced throughout the Project Area so that all habitat types were represented within the sample (see Table 2.3). Line transects were approximately 300 m in length (10-minute walk) and ran into each other to reduce travel time between transects. Estimated exact distances were estimated perpendicular to the transect line (Gregory, Gibbons, & Donald, 2004). Surveys were completed during eight (8) separate site visits, and began at dawn and continued until 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 date were also recorded. Species recorded outside of the 100-m radius, 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.

**Table 2.3: Transect locations and habitat descriptions**

TRANSECT	COORDINATES		HABITAT
	START	END	
PC1-PC2	20 T 526528 5055283	20 T 526771 5055471	Mature mixed woods
PC1-PC3	20 T 526528 5055283	20 T 526361 5055530	Pole/mature mixed woods
PC3-PC4	20 T 526361 5055530	20 T 526048 5055404	Pole/mature mixed woods
PC1-PC5	20 T 526528 5055283	20 T 526227 5055163	Mature mixed woods
PC5-PC6	20 T 526227 5055163	20 T 525891 5055094	Mature mixed woods
PC6-PC7	20 T 525891 5055094	20 T 525608 5055150	Mature mixed woods
PC7-PC8	20 T 525608 5055150	20 T 525649 5055345	Old pasture, apple trees, pond, mature mixed woods
PC7-PC9	20 T 525608 5055150	20 T 525237 5055300	Mature mixed woods
PC10-PC11	20 T 525124 5056032	20 T 525399 5055863	Pole hardwood
PC11-PC12	20 T 525399 5055863	20 T 525630 5055672	Pole hardwood
PC13-PC14	20 T 526634 5055895	20 T 526418 5056144	Old settling pond (now field), mature hardwood tree lines, settling ponds
PC13-PC15	20 T 526634 5055895	20 T 526872 5056070	Mature hardwood tree lines, settling ponds
PC16-PC17	20 T 526558 5056424	20 T 526264 5056328	Mature hardwood tree lines, settling ponds
PC18-PC19	20 T 525828 5056331	20 T 526164 5056127	Mature hardwood tree lines, settling ponds
PC20-PC21	20 T 528171 5057385	20 T 528143 5057076	Mature mixed woods
PC21-PC22	20 T 528143 5057076	20 T 528156 5056774	Mature mixed woods
PC22-PC23	20 T 528156 5056774	20 T 527993 5056753	Mature mixed woods, Boat Harbour
PC24-PC25	20 T 527316 5057413	20 T 527160 5057142	Mature hardwood/mixed woods
PC25-PC26	20 T 527160 5057142	20 T 526996 5057392	Mature hardwood/mixed woods
PC26-PC24	20 T 526996 5057392	20 T 527316 5057413	Mature hardwood/mixed woods
PC28-PC29	20 T 526655 5057585	20 T 526409 5057410	Mature mixed woods

TRANSECT	COORDINATES		HABITAT
	START	END	
PC29-PC30	20 T 526409 5057410	20 T 526285 5057126	Mature mixed woods
PC30-PC31	20 T 526285 5057126	20 T 526142 5056851	Mature mixed woods

## DIURNAL VANTAGE POINT WATCHES

Vantage point watches provide data that can be used to provide an overview of bird usage of the site, as well as quantify the level of flight activity and distribution over the Project Area. The two (2) vantage points are described in Table 2.4 .

**Table 2.4: Vantage point watch station locations and habitat descriptions**

STATION	COORDINATES	HABITAT/SITE DESCRIPTION
Watch 1	20 T 526817 5056275	Berm separating the boat harbour lagoon from the aeration ponds
Watch 2	20 T 528195 5058049	Boat Harbour outlet adjacent to Pictou Harbour, beach

The vantage points were chosen because:

- a) the Boat Harbour outlet station offered an open space for observing migratory raptors while also providing a good field of view over the beach and mudflats for observing usage of this area as a stop-over for migrating shorebirds; and
- b) the berm station was relatively central within the Project Area and has an extensive field of view (i.e., a few hundred metres in each direction). Furthermore, several species of waterfowl frequent the Boat Harbour lagoon, which is also visible from this location.

Three (3) diurnal point count surveys were conducted from mid-September to November 2017 to determine bird usage of the wetlands and waterways within the project area and the estuary exiting into the Pictou Harbour, as well as any migrating raptors. Before a raptor was officially recorded as “migrating”, it had to demonstrate a migratory pattern as opposed to a behavior indicative of a local bird. Raptors are counted as migrants if they are: using thermals, flying a straight course northeast, or are at a very high altitude. Raptors are not counted as migrants if they are: in view for extended periods of time, actively hunting, or flying the “wrong way”. These surveys were conducted from late morning to early afternoon, and each station was surveyed for 1.5 hours per 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, wind speed, and date were also recorded.

### 2.3.2 LATE WINTER AND EARLY SPRING RAPTOR SURVEYS

Priority bird species that could be observed within the Project Area include owls and other raptors; such as the Peregrine Falcon (*Falco peregrinus*; NS SAR, Vulnerable, 2007; SARA Special Concern) and Short-eared Owl (*Asio flammeus*; SARA Special Concern). Owls and other raptor species have earlier breeding seasons (December - May) and begin displaying breeding behaviours in late December. Therefore, in order to determine the presence of breeding raptor species within the Project Area, two survey methods were conducted through late winter and early spring. Some species of owl will call during the evening (i.e., Barred Owl) and others will call during the day (i.e., Snowy Owl and Short-Eared Owl), therefore both diurnal and nocturnal surveys for owls were conducted. These bird surveys will also address the over-wintering and resident bird populations within the Project Area through the non-migratory window. See Appendix B, Figure B2, for diurnal vantage point watch and nocturnal owl station locations.

## DIURNAL VANTAGE POINT WATCHES

The same vantage point watch stations used during fall migration were also used for the late winter/early spring raptor surveys. Diurnal vantage point watch count surveys were conducted in the morning at two (2) stations on March 1 and March 27, 2018. Each point was surveyed once per visit for a period of two hours. All birds observed, species and number of individuals, within an unlimited radius, were recorded. General observations, including the temperature, visibility, date, start and end time, location (UTM NAD83), distance from vantage point (m), bearing, flight height (m) and flight direction were also recorded. Bearings (in degrees) were taken for priority species observed during dedicated survey periods and incidentally.

## NOCTURNAL OWL SURVEY

Call playback survey methodology was used at seven (7) pre-determined stations to listen for nocturnal owls on February 28 and March 26, 2018. The Guidelines for Nocturnal Owl Monitoring in North America (Takats, et al., 2001) were used as a guide for developing the survey methodology. Listening stations were placed approximately 1 km apart in order to reduce the chances of detecting the same owl at multiple stations. The call playback survey consisted of silent listening periods followed by owl calls that lasted approximately 2-3 minutes; specifically: Northern Saw-whet Owl (*Aegolius acadicus*) at five-minutes, Barred Owl (*Strix varia*) at 10-minutes and Great Horned Owl (*Bubo virginianus*) at 12-minutes for a total survey time of approximately 15 to 18-minutes per station. Owls were recorded at the estimated actual distance and bearing (in degrees) from the broadcast station to where they were first heard calling. Table 2.5 presents the locations and habitat descriptions for each of the survey stations.

**Table 2.5: Nocturnal owl point count station locations and habitat descriptions**

STATION	ZONE	EASTING	NORTHING	HABITAT
NP1	20	526526.84	5055283.81	Mixed woods, young softwood stand, pole aged red pine stand
NP7	20	525625.08	5055146.21	Clearing, some mature softwoods, apple trees, pond
NP10	20	525128.55	5056006.67	Forest edge along Simpsons Road
NP21	20	528141.75	5057075.54	Mature softwood stand
NP24	20	527313.40	5057407.64	Mature mixed woods
NP29	20	526408.75	5057409.56	Mature softwood stand
Beach	20	528208.00	5058072.05	Open grass and sand dunes

### 2.3.3 SPRING MIGRATION MONITORING

Spring migration monitoring was completed on April 27 and May 14, 2018, to determine the presence of priority bird species within the Project Area. Two survey methods were employed: Line transect surveys and diurnal vantage point watches. The same line transects, vantage point watch stations and methods were used for spring, as for fall migration surveys. See Appendix B, Figure B1, for line transect and diurnal vantage point watch station locations.

### 2.3.4 BREEDING BIRD SURVEYS

Three survey types were employed within the Project Area to determine species composition and relative abundance of breeding birds: Breeding Bird Point Count Survey (North American Breeding Bird Survey, 2018), Marsh Monitoring Protocol (MMP) (Bird Studies Canada, 2014) and Common Nighthawk (*Chordeiles minor*) Survey (WildResearch, 2018). The methodologies for these surveys are described in the following sections. See Appendix B, Figure B3, for line transect and diurnal vantage point watch station locations.

## BREEDING BIRD POINT COUNTS

Two rounds of surveys for breeding birds were conducted on June 6-7 (early breeders) and July 26-28 (late breeders), 2018, at 46 point count stations within Project Area (see Table 2.6). 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.

Surveys began at, or within, half an hour of sunrise and were completed within four-and-a-half hours or by 10:00 a.m., whichever came 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 2.6: Breeding bird point count station locations and habitat descriptions**

STATION	ZONE	EASTING	NORTHING	HABITAT
ALD_1	20	524867	5055198	Forested area containing alders
ANTH_1	20	525791	5056484	Settling basin
ANTH_3	20	526883	5055758	Disposal cell
BEACH_1	20	528203	5058066	Beach at the northern end of the Project Area
BRIDGE_RC_IW	20	528108	5057433	Pictou Landing Rd. bridge, northern part of Project Area
BRUSH_1R	20	525654	5055227	Only brush habitat within the Project Area, adjacent to WL-14 (old numbering)
CC_1/MIX_8	20	526233	5055535	Clear cut area
CC_2R	20	526489	5055581	Clear cut area; old selective clear cut, now overgrown
CA_1R	20	525387	5056122	Area cleared to access the soil for creation of the berm
WETL_1*	20	526038	5055399	WL-13a
WETL_2*	20	525914	5056701	WL-16
WETL_3*	20	526626	5055983	WL-7
WETL_4	20	526450	5055351	WL-8
WETL_5*	20	528258	5057855	WL-22a
WETL_6R*	20	527037	5055610	WL-5a
WETL_7*	20	525924	5056244	WL-13a and b
GP_1	20	527889	5057549	Gravel pit
HARD_1	20	527311	5057299	Hardwood forest
HARD_2	20	526455	5057348	Hardwood forest

STATION	ZONE	EASTING	NORTHING	HABITAT
HARD_3	20	527538	5056982	Hardwood forest
HARD_4	20	527667	5057415	Hardwood forest
HARD_5	20	526420	5056782	Hardwood forest
IW_1	20	528006	5056748	Boat Harbour east
IW_2	20	527359	5057166	Boat Harbour north; station is also within WL-1a (old numbering)
IW_3	20	526564	5057499	Boat Harbour northwest; station is adjacent to WL-21b
IW_4	20	526150	5056429	Aeration stabilizing basin
IW_5	20	526703	5056284	Aeration stabilizing basin
IW_6R	20	526967	5056336	Boat Harbour south
IW_7	20	526860	5056097	Aeration stabilizing basin
IW_8	20	526147	5056128	Aeration stabilizing basin
IW_9	20	526428	5056140	Aeration stabilizing basin
MIX_1	20	528029	5057156	Mixed wood forest
MIX_2	20	527082	5057149	Mixed wood forest
MIX_3	20	526328	5057024	Mixed wood forest
MIX_4	20	526066	5057000	Mixed wood forest
MIX_5	20	525433	5056350	Mixed wood forest
MIX_6	20	525533	5055783	Mixed wood forest
MIX_7	20	526414	5056474	Mixed wood forest
MIX_9	20	526765	5055320	Mixed wood forest
PC_1	20	525131	5055321	Powerline corridor
SOFT_1	20	527489	5056223	Softwood forest
SOFT_2	20	527882	5056545	Softwood forest
SOFT_3	20	526139	5057235	Softwood forest
SOFT_4	20	525191	5055875	Softwood forest
SOFT_5	20	525791	5055816	Softwood forest
SOFT_6	20	526056	5055241	Softwood forest

**Note:** \* Stations were also surveyed using the MMP (six stations in total).

## MARSH MONITORING

The MMP (Bird Studies Canada, 2014) was used to determine species composition and relative abundance within the Project Area, specifically in the large wetlands that have open water and emergent vegetation on the fringe (i.e., WL-16, WL-13a, WL-13b, WL-5, WL-7, and WL-4) (Peter Thomas, CWS, Pers. comm., 2017). A total of six (6) marsh monitoring stations were surveyed (see Table 2.7). Surveys began at, or within, half an hour of sunrise and were completed within four-and-a-half hours or by 10:00 a.m., whichever came first. Weather conditions (e.g., precipitation and visibility) were monitored and confirmed to be within the parameters required by the MMP (Bird Studies Canada, 2014). Fifteen-minute point counts were conducted during two visits between May 15 and July 15, 2018. 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, background noise, and date were also recorded. Species recorded outside of the 100-m radius, between point counts, outside of the 15-minute survey window, and flyovers were recorded as incidentals. Bearings (in degrees) were taken for priority species observed during dedicated survey periods, as well as incidentally.

**Table 2.7: Marsh monitoring point count station locations and habitat descriptions**

STATION	ZONE	EASTING	NORTHING	HABITAT
WETL_1	20	526038	5055399	WL-13a is part of a swamp/marsh complex found in the western section of the Project Area and the entire complex has an approximate area of 36.62 hectares (ha). In the marsh portion of the wetland, cattails ( <i>Typha spp.</i> ) are the dominant herbaceous species.
WETL_2	20	525914	5056701	WL-16 is classified as a marsh found in the northwestern section of the Project Area, and has an approximate area of 15.61 ha.
WETL_3	20	526626	5055983	WL-7 is classified as a swamp/marsh complex found in the central section of the Project Area, and has an approximate area of 1.93 ha. Within the marsh portion of the wetland, cattails dominate the herbaceous stratum.
WETL_5	20	528258	5057855	WL-22a is part of a marsh/saltmarsh complex found in the northern-most section of the Project Area, the complex has a combined approximate area of 10.02 ha. Within the freshwater marsh cattails and hedge bindweed ( <i>Calystegia sepium</i> ) are the dominant species while in the saltmarsh, smooth cordgrass ( <i>Spartina alterniflora</i> ) is the dominant herbaceous species.
WETL_6R	20	527037	5055610	WL-5a is part of a swamp/marsh complex found in the southern section of the Project Area, and the complex has an approximate area of 0.15 ha. In the marsh area there are snags with the herbaceous layer dominated by rice cutgrass ( <i>Leersia oryzoides</i> ), with pockets of cattails, pockets of various sedges ( <i>Carex sp.</i> ) and pockets of burreed ( <i>Sparganium spp.</i> ) depending on the depth of water.
WETL_7	20	525924	5056244	WL-13a and b are part of a swamp/marsh complex found in the western section of the Project Area and the entire complex has an approximate area of 36.62 ha. In the marsh portion of the wetland, cattails are the dominant herbaceous species.

## 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 methodologies for Common Nighthawk surveys within the Project Area.

Common Nighthawks are broadly and evenly distributed throughout mainland Nova Scotia (Stewart R. L., 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 Species-at-Risk Act (Species at Risk Act, 2002, c.29) and as Threatened under the Nova Scotia Endangered Species Act (Endangered Species Act, 1998, amended 2010, c. 2, s. 99). Reasons

for their decline include declines in the insect population, alteration and loss of habitat, increased terrestrial predators, and climatic fluctuations (COSEWIC, 2007).

One visit was conducted within one-week of the June full moon, which occurred on June 28, 2018 (Time and Date, 2018). Six (6) call playback stations (see Table 2.8) were placed within suitable breeding habitat for Common Nighthawks within the Project Area. Habitats surveyed for Common Nighthawk breeding activity include areas around the sludge disposal cell, berm area, settling ponds, and the dune area near the coast (Peter Thomas, CWS, Pers. comm., 2017). Common Nighthawks are a crepuscular species; thus, they are most active at dawn and dusk (Brigham, Ng, Poulin, & Grindal, 2011). Surveys began at half-an-hour before sunset and ended at an hour after sunset. Stations were mostly spaced at least 800 m apart, though two stations were about 670 m from each other, 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 three-minute passive point count was conducted at each station, followed by a three-minute call playback survey. The call playback survey consisted of 30 seconds of the conspecific Common Nighthawk call followed by 30 seconds of silence or passive surveying, repeated for three minutes (i.e., three times) (Saskatchewan Ministry of Environment, 2015). The total time spent at each station was a minimum of six-minutes. 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.

**Table 2.8: Common Nighthawk point count station locations and habitat descriptions**

STATION	ZONE	EASTING	NORTHING	HABITAT
CONI-1	20	525245	5056095	Open area, cleared to create the berm at WC1
CONI-2	20	526496	5055771	Open field near disposal cell
CONI-3	20	526297	5056418	Recent clear-cut, within the last six-months, near the aeration stabilizing basin
CONI-4	20	525627	5055237	Open field associated with a wetland
CONI-5	20	528213	5058037	Beach and open field
CONI-6	20	528113	5057131	Mature softwood stand

## 2.4 BASELINE CONDITIONS

Baseline assessments for birds were completed from September 2017 through July 2018 by WSP biologists. These surveys resulted in the observation of 5,398 individuals (including incidental observations), representing 126 species within the Project Area (see

Table 2.9); see Appendix D for a complete list of the species observed within the Project Area and Appendix E for all the observations made of priority species. Of these, a total of 786 individual priority species were observed, representing 40 species; of the priority species observed, six were SAR and 34 were species of conservation concern (SOCC) (see Appendix E). Incidental observations for each survey type are defined as follows:

- Fall and spring migration line transects: Individuals observed at a distance greater than 100 m and outside each 10-minute line transect survey window.
- Fall and spring migration vantage point counts: Individuals observed outside of the dedicated survey window.
- Breeding bird point counts: Individuals observed at a distance greater than 100 m, those which simply flew over the point count location, those observed outside of the 10-minute survey window, and those observed outside of a designated point count location.

**Table 2.9: Summary of birds observed for each monitoring period**

SEASON	TOTAL # INDIVIDUALS		TOTAL # SPECIES	
	transect	vantage	transect	vantage
Fall migration 2017 <sup>a</sup>	1,932	798	74	52
Diurnal raptor 2018 <sup>a</sup>	n/a	287	n/a	30
Nocturnal owl 2018 <sup>a</sup>	8	n/a	3	n/a
Spring migration 2018 <sup>a</sup>	710	273	66	42
Breeding 2018 <sup>a,b</sup>	1,390	n/a	82	n/a

<sup>a</sup> includes incidental observations; <sup>b</sup> includes CONI and MMP survey observations; transects may be line or point transects depending on survey (see Table 2.2)

### 2.4.1 FALL MIGRATION MONITORING

The fall bird migration survey consisted of 23 line transects and dedicated surveys were conducted from September to November 2017, for a total of seven visits within the Project Area. During fall migration, 1,932 individuals (including incidental observations) were observed, representing 74 species. In total, 21 priority species were observed during fall migration surveys, of which one was a SAR: Eastern Wood-pewee (*Contopus virens*). Priority species and SAR will be discussed in further detail in Section 3 of this report.

Black-capped Chickadee (*Poecile atricapillus*) was the most abundant species observed (n=271), followed by Bonaparte's Gull (*Chroicocephalus philadelphia*) (n=255), Golden-crowned Kinglet (*Regulus satrapa*) (n=134), American Black Duck (*Anas rubripes*) (n=130), and American Robin (*Turdus migratorius*) (n=96).

### 2.4.2 FALL DIURNAL VANTAGE POINT WATCH COUNTS

During the fall diurnal vantage point watch counts, technicians encountered a total of 798 individuals (including incidental observation), representing 52 species. No SAR species were identified during these surveys, however several SOCC were identified, including the Semipalmated Plover (*Charadrius semipalmatus*), Least Sandpiper, Semipalmated Sandpiper, Willet (*Tringa semipalmata*), and Greater Yellowlegs (*Tringa melanoleuca*). American Black Duck was the most abundant species observed (n=109), followed by Bonaparte's Gull (n=100), Common Raven (*Corvus corax*; n=65), Bald Eagle (*Haliaeetus leucocephalus*; n=64), and Green Winged Teal (*Anas crecca*; n=52).

The diurnal vantage point watch stations used within the Project Area are found near large open bodies of water, as such, the occurrences of shorebirds and waterfowl were more common at the diurnal watch points than the fall migration line transect surveys, as these were conducted in more terrestrial habitats. Small to medium sized flocks of shorebirds often congregated in waterbodies visible from the diurnal vantage point locations including Boat Harbour, the Northumberland Strait, and edge habitat associated with those waterbodies.

### 2.4.3 LATE WINTER AND EARLY SPRING RAPTOR SURVEYS

#### DIURNAL VANTAGE POINT WATCHES

Diurnal vantage point watch count surveys took place on two occasions: March 1<sup>st</sup> and March 27<sup>th</sup>, 2018. During these surveys, technicians encountered a total of 287 individuals, representing 30 species. One SAR,

Evening Grosbeak, was observed during these surveys. Common Raven (n=62) was the most abundant species observed followed by, Lesser Scaup (*Aythya affinis*; n=49), American Crow (*Corvus brachyrhynchos*; n=37), Bald Eagle (n=32), and American Black Duck (n=18).

## NOCTURNAL OWL SURVEY

Three owl species were detected during the nocturnal owl surveys: Great Horned Owl, Barred Owl, and Northern Saw-whet Owl. None of the species detected were priority species. Broadcast stations are depicted in Appendix B, Figure B-2. Details of the observations are presented in Table 2.10.

**Table 2.10: Nocturnal owl survey results**

COMMON NAME	SCIENTIFIC NAME	NO. DETECTED	NO. STATIONS DETECTED
Great Horned Owl	<i>Bubo virginianus</i>	3	2
Barred Owl	<i>Strix varia</i>	3	3
Northern Saw-whet Owl	<i>Aegolius acadicus</i>	2	2

*Note:* Total number of stations at which owls were detected may not be the sum of the column above, as multiple species may have been recorded at the same location.

During the nocturnal owl survey conducted on February 28<sup>th</sup>, 2018, owls were only heard at one broadcast station (NP29). The species heard was the Barred Owl, one during the first five-minutes at the broadcast station, followed by a pair calling at the 10-minute interval.

During the nocturnal owl survey conducted on March 26<sup>th</sup>, 2018, several owls were heard at various broadcast stations including:

- Saw-whet Owl and Barred Owl responding to calls at broadcast station NP10
- Great Horned Owl pair, and one Saw-whet owl calling at broadcast station NP21
- Great Horned Owl pair calling at broadcast station NP24

### 2.4.4 SPRING MIGRATION MONITORING

The spring bird migration survey consisted of 23 line transects and dedicated surveys were conducted from April 27 and May 14, 2018, for a total of two visits within the Project Area. During spring migration, 710 individuals (including incidental observations) were observed, representing 66 species. In total, ten priority species were observed during spring migration surveys, of which one is a SAR: Evening Grosbeak. Priority species and SAR will be discussed in further detail in Section 2 of this report.

Black-capped Chickadee was the most abundant species observed (n=61), followed by American Goldfinch (*Spinus tristis*; n=49), Ovenbird (*Seiurus aurocapilla*; n=41), and American Robin (n=35). No large flocks of birds were observed.

### 2.4.5 SPRING DIURNAL VANTAGE POINT WATCH COUNTS

During the spring diurnal vantage point watch counts, technicians encountered a total of 273 individuals (including incidental observation), representing 42 species. In total, twelve priority species were observed during spring diurnal vantage point watch counts, of which one is a SAR: Barn Swallow (*Hirundo rustica*). Priority species and SAR will be discussed in further detail in Section 2 of this report.

American Black Duck was the most abundant species observed (n=35), followed by Red-breasted Merganser (*Mergus serrator*; n=25) and Lesser Scaup (n=19). The largest group of bird observed was a group of 19 Red-breasted Mergansers, which were observed foraging.

## **2.4.6 BREEDING BIRD SURVEYS**

### **BREEDING BIRD POINT COUNTS**

The breeding bird survey consisted of 46 point transects and dedicated surveys were conducted in June 2018, for a total of two visits within the Project Area. The MMP was integrated into the breeding bird survey, thus total counts for observations and species also include data collected as part of the integrated MMP. During the breeding season, 1,382 individuals (including incidental observations) were observed, representing 81 species. In total, 20 priority species were observed during breeding bird surveys, of which four were SAR: Eastern Wood-pewee, Bank Swallow (*Riparia riparia*), Evening Grosbeak and Canada Warbler. Priority species and SAR will be discussed in further detail in Section 2 of this report.

European Starling (*Sturnus vulgaris*) was the most abundant species observed (n=119), followed by Ovenbird (*Seiurus aurocapilla*; n=107).

### **MARSH MONITORING**

The MMP was integrated into the breeding bird survey. Sora (*Porzana carolina*) was the primary species observed during the dedicated survey periods. Sora were observed at WETL-6 (n=1; whinny call) and WETL-2R (n=1; “Ker-wee” call). The Sora at WETL-6 was observed on June 7, 2018, between minutes 8-9 and at a distance of 50-100 metres. The Sora at WETL-2R was observed on July 2, 2018, at a distance of 0-50 m.

### **COMMON NIGHTHAWK SURVEY**

A total of eight Common Nighthawks were observed during the Common Nighthawk survey that took place on June 26, 2018. Three were observed as a fly-by at the first point count station, CONI-1, four were observed foraging over the aeration ponds and one individual was flushed off the ground near CONI-5 while parking.

## **2.4.7 SUMMARY OF FINDINGS**

Baseline assessments for birds were completed from September 2017 through July 2018 by WSP biologists. These surveys resulted in the observation of 5,398 individuals (including incidental observations), representing 126 species within the Project Area. The highest number of birds (n=1,932) were observed during fall migration, but the highest species diversity was observed during the breeding season (n=82). Of the species observed, 40 were priority species, of which six were SAR (see Appendix E).

# 3 PRIORITY BIRD SPECIES

## 3.1 DESKTOP EVALUATION

A detailed desktop evaluation to determine the potential for the presence of priority species within the Project Area and its immediate surroundings was completed. This desktop evaluation was completed prior to the development of field programs with the purpose of advising survey requirements and their associated methodologies. Priority species, as defined by the *Guide to Addressing Wildlife Species and Habitat in and EA Registration Document* (Nova Scotia Environment and Labour, 2009), include:

- A SAR is any species which is listed as Endangered, Threatened or of Special Concern under the federal Species at Risk Act (SARA) (Government of Canada, 2002) and any species listed as Endangered, Threatened or Vulnerable under the provincial Nova Scotia Endangered Species Act (NS ESA) (Endangered Species Act, 1998, amended 2010, c. 2, s. 99).
- SOCC are species listed as S1-S3S4 (provincial rarity rankings) by the Atlantic Canada Conservation Data Centre (ACCDC) (see Table 3.1). Using the ACCDC provincial rarity rankings rather than the general status ranks was recommended by Mark Elderkin (Mark Elderkin, NSDNR, Pers. comm., 2018).

**Table 3.1: ACCDC S-Rank definitions**

S-RANK	DEFINITION
SX	<b>Presumed Extirpated</b> - 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	<b>Critically Imperiled</b> - 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	<b>Imperiled</b> - 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	<b>Vulnerable</b> - 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	<b>Apparently Secure</b> - Uncommon but not rare; some cause for long-term concern due to declines or other factors.
S5	<b>Secure</b> - Common, widespread, and abundant in the province.
SNR	<b>Unranked</b> - Nation or state/province conservation status not yet assessed.
SU	<b>Unrankable</b> - Currently unrankable due to lack of information or due to substantially conflicting information about status or trends.
SNA	<b>Not Applicable</b> - A conservation status rank is not applicable because the species is not a suitable target for conservation activities.
S#S#	<b>Range Rank</b> - 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).

S-RANK	DEFINITION
SH	<b>Possibly Extirpated (Historical)</b> - 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 20-40 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 (Atlantic Canada Conservation Data Centre, 2018)

A list of priority species for each taxonomic group was developed in accordance with the steps defined in *the Guide to Addressing Wildlife Species and Habitat in and EA Registration Document* (Nova Scotia Environment and Labour, 2009), with the exception that ACCDC provincial rarity rankings were used in a place of general status ranks, as previously mentioned. A complete list of priority species for the Project Area is available in Appendix E

## 3.2 RATIONALE FOR VALUED COMPONENT SELECTION

In Canada, federal, provincial and territorial governments share the responsibility of protecting species and their habitats. The 1996 Accord for the Protection of SAR commits the federal government, provinces and territories to establish complementary legislation and programs (i.e., recovery plans for species classified as threatened or endangered) to protect Canada's SAR, as per Canada's commitments under the Convention on Biological Diversity. Species listed under the federal SARA (Government of Canada, 2002) and provincial ESA (Endangered Species Act, 1998, amended 2010, c. 2, s. 99) have legal protection.

The ACCDC, like other Canadian conservation data centres, serves as a source for reliable and up to date scientific information for the plants, animals and ecological communities within its jurisdiction. In collaboration with provincial and federal experts, ACCDC assesses and ranks the conservation status of species in order to identify gaps in the knowledge for species ranked as critically imperiled (S1) to vulnerable (S3). These species may or may not have legal protection.

Species are often 'at risk' as a result of human activities that pose a threat to their survival. Thus, it is important that their presence, use of and distribution within a Project Area is understood through baseline field surveys so that appropriate mitigation measures may be implemented to minimize project-related effects.

## 3.3 BASELINE CONDITIONS

Specific survey methodologies for priority species are described in the previous section of this report. This section will, in further detail, describe and discuss the findings of these surveys as they relate to priority species.

### 3.3.1 PRIORITY BIRD SPECIES

A total of 40 priority bird species were observed during dedicated bird surveys within the Project Area; of these, six were SAR. Appendix E presents the complete list of priority bird species observed within the Project Area. SAR are discussed individually.

## **COMMON NIGHTHAWK**

The Common Nighthawk is designated as “Threatened” under Schedule 1 of SARA and NSESA. ACCDC ranks the Common Nighthawk as a SOCC, specifically the breeding (S2B) population within the province, which is ranked as “Imperiled”.

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 R. L., 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 that took place on June 26, 2018. The majority of individuals observed were foraging over the aeration ponds. No observations of courtship behaviours (i.e., “booming”) or diversion displays were observed.

## **EASTERN WOOD-PEWEE**

The Eastern Wood-pewee is designated as “Special Concern” under Schedule 1 of SARA and as “Vulnerable” under NSESA. ACCDC ranks the Eastern Wood-pewee as a SOCC, specifically the breeding (S3S4B) population within the province, which is ranked as “Vulnerable to Apparently Secure”.

In Canada, the Eastern Wood-pewee breeds from southeastern Saskatchewan to the Maritime Provinces (COSEWIC, 2012). The Eastern Wood-pewee is widespread throughout the Maritimes but absent from areas where fir and black spruce dominate, such as the highlands and Cape Breton Taiga (Stewart R. L., et al., 2015). The species is not particularly abundant at any location, but larger concentrations are found in Western NS and the Valley and Central Lowlands of NS, as well as along the Saint John River Valley and Northumberland Strait (Stewart R. L., et al., 2015). Causes for the population decline of this species might be linked to habitat loss or degradation on its wintering grounds or changes in availability of insect prey (COSEWIC, 2012).

Four Eastern Wood-pewees were observed at various locations during the fall bird migration survey in 2017.

The Eastern Wood-pewee was observed during both fall migration (n=4) and breeding season (n=16). In the fall, four individuals were observed on four different transects: PC1-PC2, PC29-PC30, PC5-PC6, and PC6-PC7; all of these transects go through mature mixed woods habitat. During the breeding season, the 16 birds were observed at 14 point count locations across the Project Area in various habitat types, including brush, cleared area, hardwood forest, inland water, mixed wood forest, softwood forest and wetland habitats.

## **BANK SWALLOW**

The Bank Swallow is designated as “Threatened” under Schedule 1 of SARA and as “Endangered” under NSESA. ACCDC ranks the Bank Swallow as a SOCC, specifically the breeding (S2S3B) population within the province, which is ranked as “Imperiled to Vulnerable”.

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 PEI 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 with 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 R. L., et al., 2015)

Two Bank Swallows were observed during the breeding season at waypoint WETL\_5. There is no known breeding habitat for Bank Swallows within the Project Area, therefore they may have just been passing through the Project Area. However, suitable breeding habitat for the species does exist in proximity of the Project Area.



## BARN SWALLOW

The Barn Swallow is designated as “Threatened” under Schedule 1 of SARA and as “Endangered” under NSESA. ACCDC ranks the Barn Swallow as a SOCC, specifically the breeding (S2S3B) population within the province, which is ranked as “Imperiled to Vulnerable”.

The Barn Swallow is near the eastern edge of its range in the Maritimes, a range that extends west through the Boreal Forest and south through central Mexico. In the Maritimes, the species is most commonly associated with agricultural areas close to aquatic habitats, particularly the Grand Lake Lowlands and NS’s Valley and Central Lowlands. (Stewart R. L., et al., 2015)

Three Barn Swallows were observed flying within the Project Area during spring migration. Observations of the species breeding within the Project Area was noted during a meeting with CWS in December 2017, however no evidence of breeding was observed at any of the buildings in 2018 during the survey periods.

## EVENING GROSBEEK

The Evening Grosbeak is designated as “Special Concern” under Schedule 1 of SARA and as “Vulnerable” under NSESA. ACCDC ranks the Evening Grosbeak as a SOCC, specifically the breeding (S3S4B) and non-breeding (S3N) populations within the province, which are ranked as “Vulnerable to Apparently Secure” and “Vulnerable”, respectively.

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 R. L., 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 R. L., et al., 2015). However, in the Maritimes, the Evening Grosbeak is generally associated with older softwood and mixed forests, though it will also use partial cuttings of mature stands (Stewart R. L., et al., 2015). Fluctuations of Evening Grosbeak populations are likely linked to fluctuations of Spruce Budworm (*Choristoneura fumiferana* Clemens), which occur naturally every 25-40 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).

Five Evening Grosbeaks were observed incidentally during a late winter and early spring vantage point watch survey in 2018. Outside of the breeding season, Evening Grosbeaks can be found in both softwood and hardwood forests, as well as in urban and suburban areas (The Cornell Lab of Ornithology, n.d.).

Evening Grosbeaks were observed during the late winter/early (n=5), spring migration (n=5) and breeding (n=7) seasons. During the late winter/early spring vantage point watch count surveys, Evening Grosbeaks were observed at WC1, thus at the berm separating the boat harbour lagoon from the aeration ponds. During the spring migration line transect surveys, the species was observed at PC7-PC8 (Old pasture, apple trees, pond, mature mixed woods), PC22-PC23 (mature mixed woods and Boat Harbour), PC28-PC29 (mature mixed woods), and PC30-PC31 (mature mixed woods). Finally, during the breeding season Evening Grosbeaks were observed at Waypoints ALD\_1 and WETL\_2; ALD\_1 is a forested area containing alders, and WETL\_2 is located by WL-16, which is classified as a marsh.

## CANADA WARBLER

The Canada Warbler is designated as “Threatened” under Schedule 1 of SARA and as “Endangered” under NSESA. ACCDC ranks the Canada Warbler as a SOCC, specifically the breeding (S3B) population within the province, which is 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 R. L., et al., 2015)

Canada Warblers were observed at eight different locations within the Project Area during the breeding season: BRUSH\_1 (n=1), CC\_1/MIX\_9 (n=1), CC\_2R (n=1), IW\_2 (n=1), MIX\_4 (n=3), SOFT\_5 (n=2), WETL\_1 (n=1), and WETL\_4 (n=1), thus within a variety of habitats. The species was observed in suitable breeding habitat, thus it is likely breeding within the Project Area.

## 4 CLOSURE

*This report was prepared by WSP Canada Inc. for the account of the GHD Limited. The disclosure of any information contained in this report is the sole responsibility of the intended recipient. The material in it reflects WSP's best judgement in light of the information available to it at the time of preparation. Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. WSP accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report. This limitations statement is considered part of this report.*

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This report has been prepared by Tiffany MacAulay, M.Sc. Internal senior technical review has been provided by Christina LaFlamme, M.Sc., EP. Technical limitations associated with the report can be found in Appendix F.

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# APPENDIX

# A MARITIMES BREEDING BIRD ATLAS





LEGEND:

— 20NR25 Boundary

- - - BOAT HARBOUR STUDY AREA BOUNDARY



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PROJECT:  
PROJECT:  
**BOAT HARBOUR REMEDIATION,  
PLANNING AND DESIGN**

PROJECT NO.: 171-10478



FIGURE:  
TITLE:  
**PROJECT AREA WITHIN MARITIME  
BREEDING BIRD ATLAS (2006-2010)  
SQUARE 20NR25**

FIGURE NO.: **A1** REVISION NO.: **0**

SCALE:  
0 125 250 500 750 1,000  
Metres  
1:20,000

DATUM: NAD 83 CSRS PROJECTION: UTM ZONE 20 NORTH

DRAWN BY: J.LOVITT CHECKED BY: C. LAFLAMME

CREATED DATE: 2018-08-10 REVISION DATE: 2018-08-10





**Square Summary (20NR25)**

#species (1st atlas)				#species (2nd atlas)				#hours		#pc done	
poss	prob	conf	total	poss	prob	conf	total	1st	2nd	road	offrd
46	9	34	89	24	46	39	109	16	81.2	16	0

**Region summary (#21: Cobequid)**

#squares	#sq with data		#species		#pc done	target #pc
	1st	2nd	1st	2nd		
67	62	65	146	167	508	251

**Target number of point counts in this square:** 14 road side, 1 off road (1 in Mature coniferous). Please try to ensure that each off-road station is located such that the entire 100m radius circle is within the prescribed habitat.

SPECIES	Code		%	
	1st	2nd	1st	2nd
Canada Goose		FY	0	53
Wood Duck		P	20	52
Gadwall ‡			0	3
Eurasian Wigeon ‡			0	0
American Wigeon		H	12	26
American Black Duck	NE	FY	66	81
Mallard	H	T	9	60
<u>Blue-winged Teal</u>	P		27	26
Northern Shoveler ‡			3	4
Northern Pintail			8	1
Green-winged Teal	H	T	24	56
Ring-necked Duck	P	FY	32	72
Greater Scaup †			0	0
Common Eider ‡§			0	1
Hooded Merganser	P	FY	9	50
Common Merganser	H	H	25	55
<u>Red-breast Merganser</u>	H		4	7
Gray Partridge			6	4
Ring-necked Pheasant		S	20	69
Ruffed Grouse	FL	H	58	86
Spruce Grouse			20	30
Common Loon		H	29	35
Pied-billed Grebe		FY	24	30
Double-crest Cormorant §	NY	NY	8	12
<u>American Bittern</u>			22	55
Great Blue Heron §	ON	H	29	13
Turkey Vulture ‡			0	0
Osprey	ON	NY	22	50
Bald Eagle □	H	NY	27	83

SPECIES	Code		%	
	1st	2nd	1st	2nd
Northern Harrier		H	46	76
Sharp-shinned Hawk			22	38
Northern Goshawk		H	12	20
Broad-winged Hawk	H	H	32	55
Red-tailed Hawk	H	H	46	72
Virginia Rail †			6	9
Sora		FY	16	52
Common Gallinule †			3	1
American Coot †			4	0
Semipalmated Plover †			6	0
Piping Plover †	NE	D	3	3
Killdeer	FL	FY	56	64
Spotted Sandpiper	H	FY	50	70
Greater Yellowlegs †			0	3
Willet		FY	14	24
Wilson's Snipe	H	T	62	73
American Woodcock	H	D	22	81
Ring-billed Gull ‡§			0	0
Herring Gull §			8	10
Great Black-backed Gull §			8	6
Common Tern §	H	NE	9	12
Arctic Tern ‡§			1	0
Black Guillemot ‡§			0	3
Rock Pigeon	H	AE	59	78
Mourning Dove	FL	FY	27	95
Yellow-billed Cuckoo ‡		H	0	1
Black-billed Cuckoo		S	9	26
<u>Great Horned Owl</u>			40	63
Barred Owl		T	35	69

SPECIES	Code		%	
	1st	2nd	1st	2nd
Short-eared Owl †			1	1
North Saw-whet Owl			11	36
Common Nighthawk †	H	D	29	55
Chimney Swift †			32	23
Ruby-thr Hummingbird	H	H	61	100
Belted Kingfisher	ON	P	51	93
Yellow-bellied Sapsucker		T	50	83
Downy Woodpecker	FL	A	48	89
Hairy Woodpecker	FL	FY	54	87
Am Three-toed Woodpecker †			0	0
Black-back Woodpecker			20	26
Northern Flicker	H	FS	80	98
Pileated Woodpecker	H	P	45	80
<u>American Kestrel</u>	H		50	75
Merlin		NY	16	47
Olive-sided Flycatcher †		T	38	66
Eastern Wood-Pewee	H	D	56	70
Yellow-bellied Flycatcher		T	30	56
Alder Flycatcher	H	T	79	100
Willow Flycatcher †			1	1
Least Flycatcher	H	T	59	84
<u>Eastern Phoebe</u>			12	58
Gr Crested Flycatcher			6	4
Eastern Kingbird	H	D	45	47
Blue-headed Vireo	H	CF	61	92
Philadelphia Vireo ‡			1	3
Red-eyed Vireo	FL	T	82	100
<u>Gray Jay</u>			45	58
Blue Jay	FL	FY	70	96

[next page >>](#)



## Maritimes Breeding Bird Atlas - Summary Sheet for Square 20NR25 (page 2 of 2)

SPECIES	Code		%		SPECIES	Code		%		SPECIES	Code		%	
	1st	2nd	1st	2nd		1st	2nd	1st	2nd		1st	2nd	1st	2nd
American Crow	AY	NY	87	100	Black-white Warbler	H	T	77	87	Dark-eyed Junco	A	T	70	92
Common Raven	H	T	69	100	<u>Tennessee Warbler</u>	H		75	43	Scarlet Tanager †			4	1
Horned Lark †			1	1	Nashville Warbler	H	T	48	86	Northern Cardinal ‡		FY	0	10
Tree Swallow	H	AE	80	93	Mourning Warbler			33	49	Rose-breast Grosbeak	H	T	69	56
Bank Swallow §		H	56	43	Common Yellowthroat	AY	CF	82	100	Indigo Bunting ‡			1	3
Cliff Swallow §	ON	NY	38	36	American Redstart	AY	CF	85	98	Bobolink	H	T	70	69
Barn Swallow	H	P	85	90	<u>Cape May Warbler</u>	AY		32	16	Red-wing Blackbird	FL	CF	67	84
Black-capp Chickadee	FL	CF	67	98	Northern Parula		T	72	96	Rusty Blackbird †			24	21
Boreal Chickadee	H	T	53	66	Magnolia Warbler	H	T	72	96	Common Grackle	AY	CF	75	96
Red-breast Nuthatch		T	70	81	<u>Bay-breasted Warbler</u>	H		40	49	Brown-head Cowbird	H	T	43	18
White-breast Nuthatch	P	H	11	15	Blackburnian Warbler	P	T	54	83	Orchard Oriole †		S	0	1
Brown Creeper		P	14	50	Yellow Warbler	AY	CF	74	92	<u>Baltimore Oriole</u>	AY		11	13
Winter Wren		S	38	80	Chestn-sided Warbler	H	T	61	86	Pine Grosbeak			29	4
Golden-crown Kinglet	H	T	69	87	Blackpoll Warbler			12	12	Purple Finch	H	T	67	93
Ruby-crown Kinglet	H	T	79	92	Black-thr Blue Warbler		S	8	43	House Finch †			1	4
Eastern Bluebird †		T	1	16	<u>Palm Warbler</u>			22	75	Red Crossbill †		T	17	15
Veery	A	T	54	61	Yellow-rumped Warbler	H	T	67	98	<u>White-winged Crossbill</u>			54	64
Bicknell's Thrush †			1	0	Black-thr Green Warbler	H	D	69	83	Pine Siskin		S	59	58
Swainson's Thrush	H	S	66	89	Canada Warbler †	AY	A	35	52	American Goldfinch	FL	S	82	100
Hermit Thrush	H	T	74	96	Wilson's Warbler			11	10	Evening Grosbeak	H	T	50	55
<u>Wood Thrush †</u>	T		4	9	Chipping Sparrow	FL	S	69	86	House Sparrow	FL	S	79	36
American Robin	AY	CF	90	100	Vesper Sparrow †			4	10					
Gray Catbird	AY	H	54	58	Savannah Sparrow	H	FY	74	86					
<u>Northern Mockingbird †</u>	NY		4	3	Nelson's Sh.-tail Sparrow		CF	16	21					
European Starling	FL	CF	77	93	Song Sparrow	FL	DD	87	100					
Bohemian Waxwing ‡			0	0	<u>Lincoln's Sparrow</u>	A		45	63					
Cedar Waxwing	H	FY	70	100	Swamp Sparrow	H	FY	51	95					
Ovenbird	NE	FY	70	93	White-throat Sparrow	NE	DD	77	100					
North Waterthrush		T	30	55	White-crown Sparrow ‡			0	1					

This list includes all species found during the Maritimes Breeding Bird Atlas (1st atlas: 1986-1990, 2nd atlas: 2006-2010) in the region #21 (Cobequid). Underlined species are those that you should try to add to this square (20NR25). They have not yet been reported during the 2nd atlas, but were found during the 1st atlas in this square or have been reported in more than 50% of the squares in this region during the 2nd atlas so far. "Code" is the code for the highest breeding evidence for that species in square 20NR25 during the 2nd and 1st atlas respectively. The % columns give the percentage of squares in that region where that species was reported during the 2nd and 1st atlas (this gives an idea of the expected chance of finding that species in region #21). Rare/Colonial Species Report Forms should be completed for species marked: § (Colonial), ‡ (regionally rare), † (rare in the Maritimes) or ♂ (rare in the Maritimes, documentation only required for confirmed records). Current as of 13/07/2018. An up-to-date version of this sheet is available from <http://www.mba-aom.ca/jsp/summaryform.jsp?squareID=20NR25?lang=en>

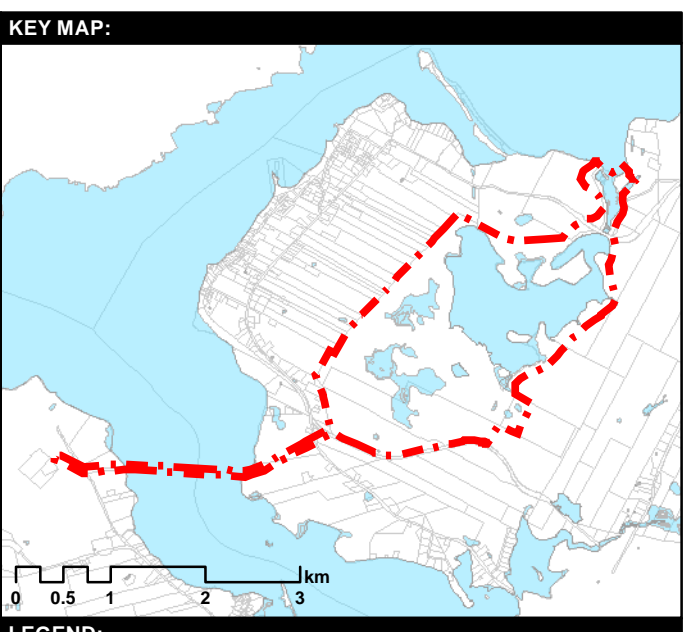
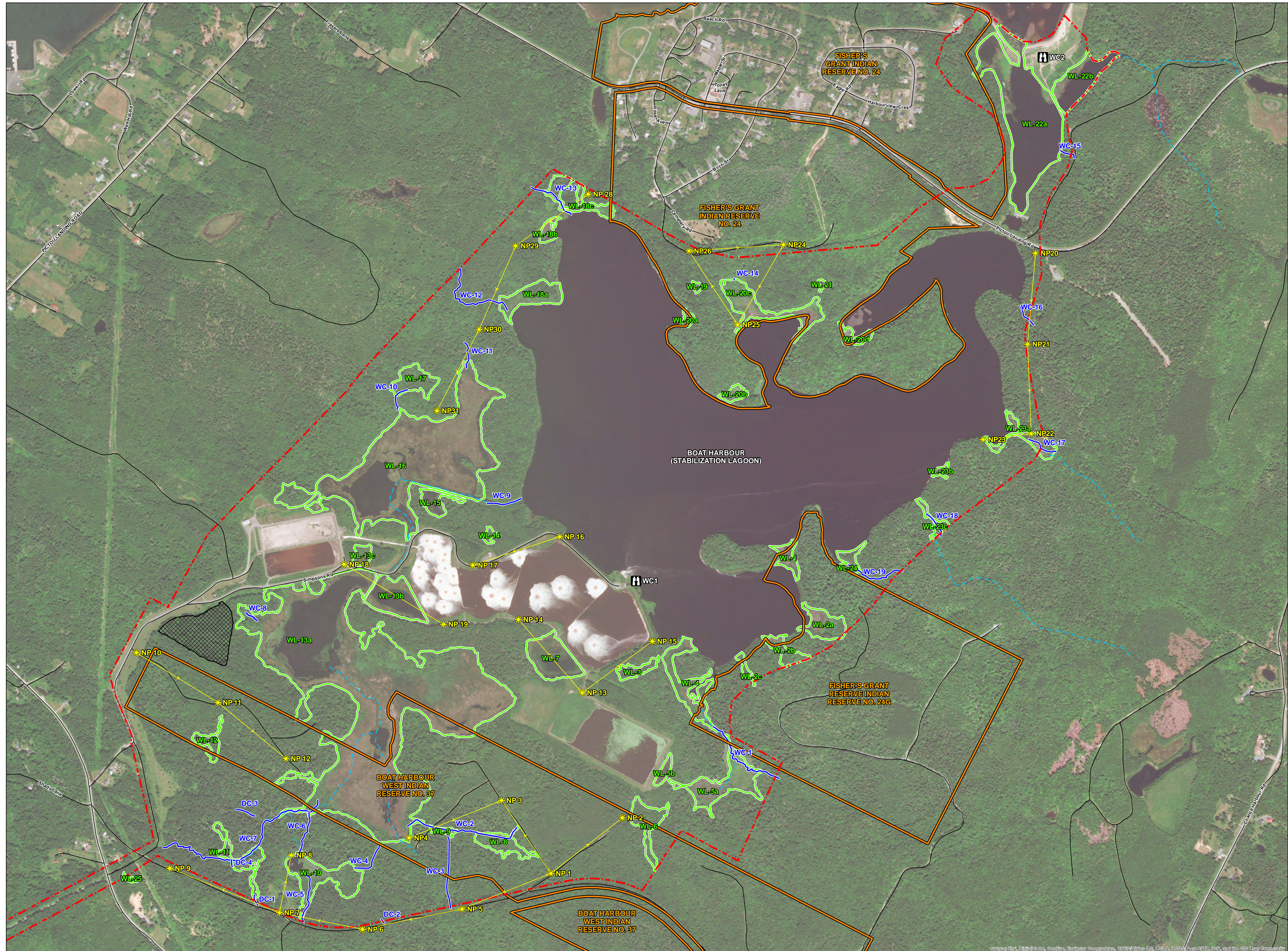
[<< previous page](#)

# APPENDIX

# B

## FIGURES





- LEGEND:**
- VANTAGE POINT WATCH STATIONS
  - START AND END WAYPOINTS FOR LINE TRANSECTS
  - LINE TRANSECTS
  - FIELD DELINEATED WATERCOURSE (WSP, 2017)
  - WATERCOURSE (DC - drainage channel)
  - WATERCOURSE (GHQ)
  - FIELD DELINEATED WETLAND BOUNDARY (WSP, 2017)
  - ROADS (GeoNova)
  - APPROXIMATE LOCATION OF CLEARED AREA
  - FIRST NATIONS TERRITORY BOUNDARY
  - BOAT HARBOUR STUDY AREA BOUNDARY



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**PROJECT:**  
PROJECT: BOAT HARBOUR REMEDIATION, PLANNING AND DESIGN

PROJECT NO.: 171-10478  
CLIENT:

**FIGURE:**  
TITLE: BIRD MIGRATION SURVEY LINE TRANSECTS AND VANTAGE POINT WATCH STATIONS

FIGURE NO.: B1 REVISION NO.: 0

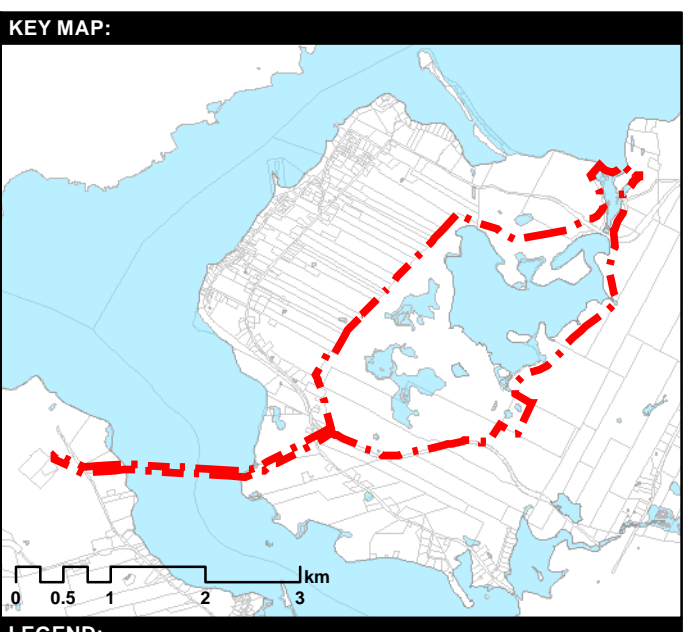
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DATUM: NAD 83 CSRS PROJECTION: UTM ZONE 20 NORTH

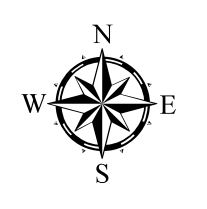
DRAWN BY: T. MOREHOUSE CHECKED BY: C. LAFAMME

CREATED DATE: 2018-05-09 REVISION DATE: 2018-08-02





- LEGEND:**
- VANTAGE POINT WATCH STATIONS
  - NOCTURNAL OWL BROADCASTING STATIONS
  - FIELD DELINEATED WATERCOURSE (WSP, 2017)
  - WATERCOURSE (Geo)
  - FIELD DELINEATED WETLAND BOUNDARY (WSP, 2017)
  - ROADS (GeoNVA)
  - APPROXIMATE LOCATION OF CLEARED AREA
  - FIRST NATIONS TERRITORY BOUNDARY
  - BOAT HARBOUR STUDY AREA BOUNDARY



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**PROJECT:**  
PROJECT: BOAT HARBOUR REMEDIATION, PLANNING AND DESIGN

PROJECT NO.: 171-10478

CLIENT:

**FIGURE:**  
TITLE: LATE WINTER AND EARLY SPRING RAPTOR SURVEY STATIONS

FIGURE NO.: B2 REVISION NO.: 0

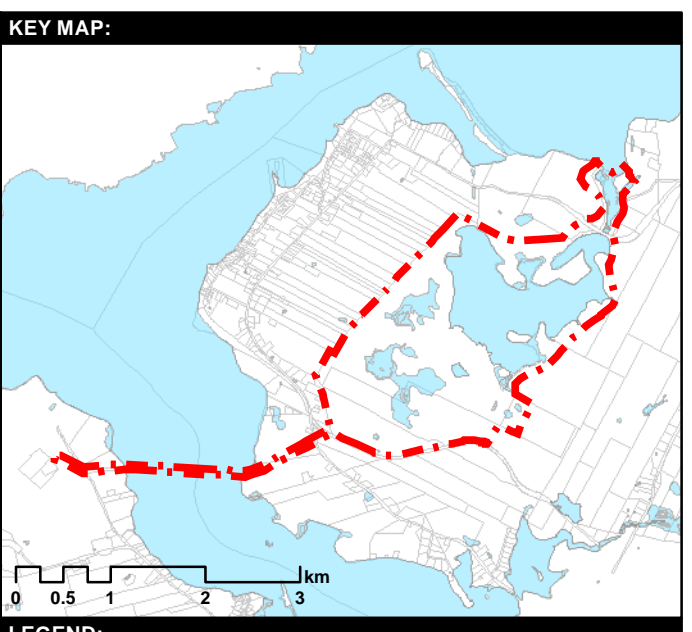
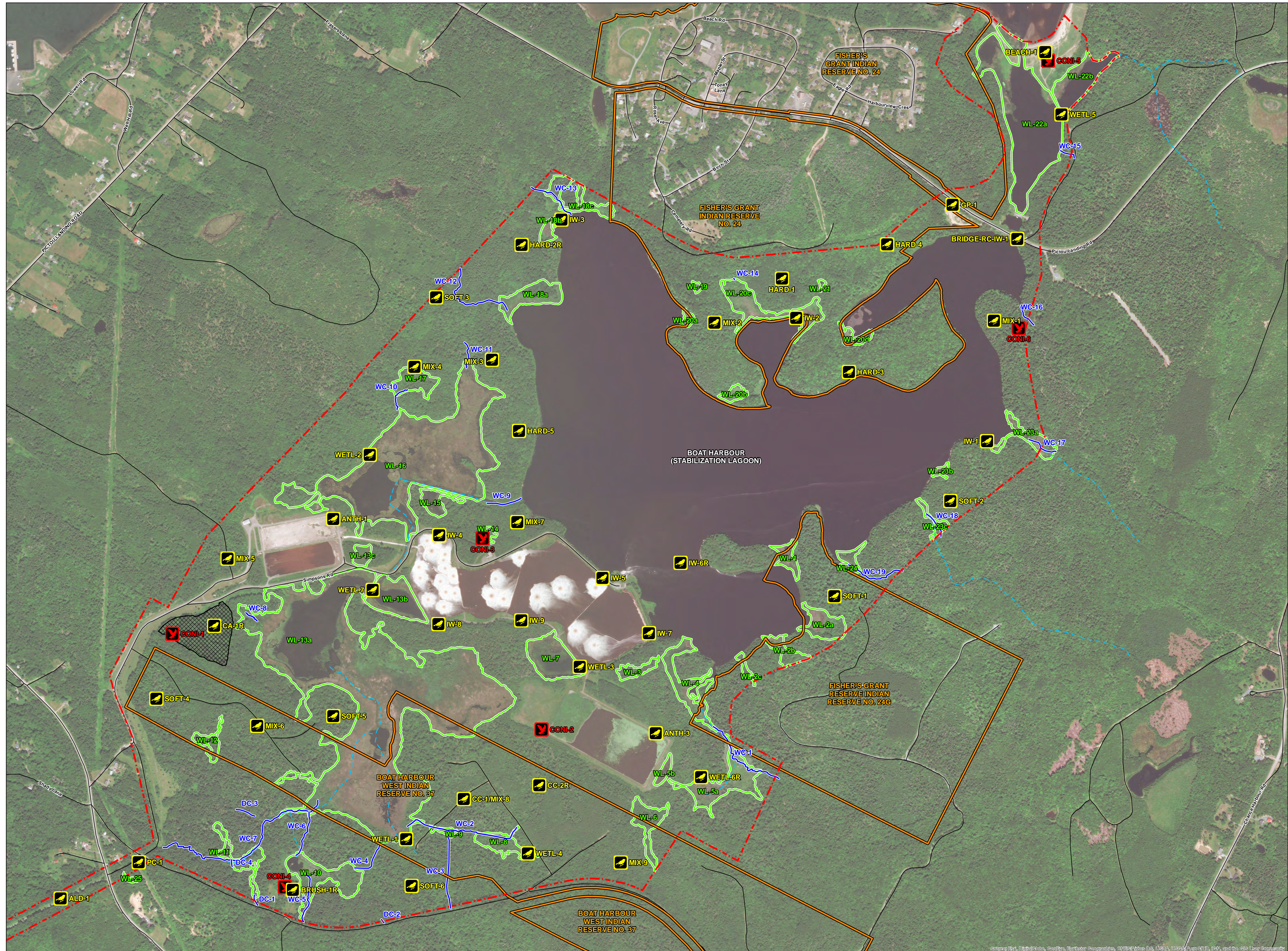
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DATUM: NAD 83 CSRS PROJECTION: UTM ZONE 20 NORTH

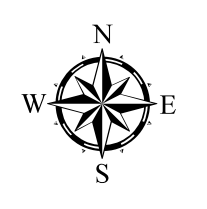
DRAWN BY: T. MOREHOUSE CHECKED BY: C. LAFLAMME

CREATED DATE: 2018-05-01 REVISION DATE: 2018-08-02





- LEGEND:**
- BREEDING BIRD POINT COUNT SURVEY STATIONS (REVISED - June 2018)
  - COMMON NIGHTHAWK SURVEY STATIONS
  - FIELD DELINEATED WATERCOURSE (WSP, 2017)
  - WATERCOURSE (GHD)
  - FIELD DELINEATED WETLAND BOUNDARY (WSP, 2017)
  - ROADS (GeoNova)
  - APPROXIMATE LOCATION OF CLEARED AREA
  - FIRST NATIONS TERRITORY BOUNDARY
  - BOAT HARBOUR STUDY AREA BOUNDARY



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**PROJECT:**  
PROJECT: BOAT HARBOUR REMEDIATION, PLANNING AND DESIGN

**PROJECT NO.:** 171-10478  
**CLIENT:**

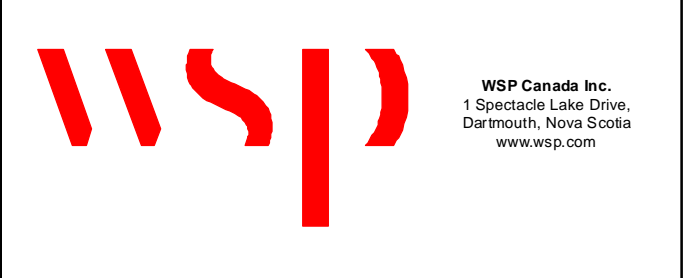
**FIGURE:**  
TITLE: BREEDING BIRD & COMMON NIGHTHAWK SURVEY STATIONS

**FIGURE NO.:** B3 **REVISION NO.:** 0

**SCALE:**  
0 50 100 200 300 400 METERS  
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**DATUM:** NAD 83 CSRS **PROJECTION:** UTM ZONE 20 NORTH

**DRAWN BY:** T. MOREHOUSE **CHECKED BY:** C. LAFLAMME  
**CREATED DATE:** (YYYY-MM-DD) 2018-07-12 **REVISION DATE:** (YYYY-MM-DD) 2018-08-02



# APPENDIX

**C**

ALL SPECIES OBSERVED



## Appendix C

Table C-1: All species observed across all survey periods (September 2017 to July 2018)

Project: Boat Harbour Planning and Remediation (WSP ref. 171-10478)

Common Name	Scientific Name	COSEWIC	NS Status	S-Rank	Fall Mig. (2017) - T	Fall Mig. (2017) - WC	Winter/Spring raptors (2018)*	Spring Mig. (2018) - T	Spring Mig. (2018) - WC	Breeding (2018)**	Total
Canada Goose	<i>Branta canadensis</i>	.	.	SNAB,S4N	18	0	0	11	2	79	110
Wood Duck	<i>Aix sponsa</i>	.	.	S5B	23	9	0	4	6	5	47
Blue-winged Teal****	<i>Spatula discors</i>	.	.	S3S4B	0	0	0	0	0	5	5
Mallard	<i>Anas platyrhynchos</i>	.	.	S5	2	0	4	0	0	1	7
American Black Duck X Mallard Hybrid	<i>Anas rubripes x platy.</i>	.	.	.	0	0	0	1	0	0	1
American Black Duck	<i>Anas rubripes</i>	.	.	S5	130	109	18	21	35	81	394
Green-winged Teal	<i>Anas crecca</i>	.	.	S4S5B	35	52	0	14	14	22	137
Ring-necked Duck	<i>Aythya collaris</i>	.	.	S5B	4	5	1	9	0	6	25
Lesser Scaup	<i>Aythya affinis</i>	.	.	SNA	0	3	49	8	19	0	79
Surf Scoter	<i>Melanitta perspicillata</i>	.	.	S4N	6	0	0	0	0	0	6
White-winged Scoter	<i>Melanitta fusca</i>	.	.	S4N	0	2	0	0	0	0	2
Long-tailed Duck	<i>Clangula hyemalis</i>	.	.	S5N	0	0	5	0	0	0	5
Common Goldeneye****	<i>Bucephala clangula</i>	.	.	S2B,S5N	0	0	14	0	0	0	14
Hooded Merganser	<i>Lophodytes cucullatus</i>	.	.	S5B	5	0	9	2	7	0	23
Common Merganser	<i>Mergus merganser</i>	.	.	S5	0	0	2	0	0	0	2
Red-breasted Merganser****	<i>Mergus serrator</i>	.	.	S3S4B,S5N	8	5	4	0	25	0	42
Ring-necked Pheasant	<i>Phasianus colchicus</i>	.	.	SNA	8	1	1	3	3	7	23
Ruffed Grouse	<i>Bonasa umbellus</i>	.	.	S5	2	0	0	5	0	1	8
Horned Grebe***	<i>Podiceps auritus</i>	SC	.	S4N	0	1	0	0	0	0	1
Mourning Dove	<i>Zenaidura macroura</i>	.	.	S5	0	2	2	5	1	7	17
Ruby-throated Hummingbird	<i>Archilochus colubris</i>	.	.	S5B	0	0	0	0	0	2	2
Sora	<i>Porzana carolina</i>	.	.	S5B	0	0	0	1	0	5	6
Black-bellied Plover****	<i>Pluvialis squatarola</i>	.	.	S3M	1	0	0	0	0	0	1
Semipalmated Plover****	<i>Charadrius semipalmatus</i>	.	.	S1B,S3S4M	4	7	0	0	0	0	11
Killdeer****	<i>Charadrius vociferus</i>	.	.	S3B	0	0	0	0	2	7	9
Dunlin	<i>Calidris alpina</i>	.	.	S4M	4	0	0	0	0	0	4
Least Sandpiper****	<i>Calidris minutilla</i>	.	.	S1B,S3M	0	2	0	0	1	0	3
White-rumped Sandpiper****	<i>Calidris fuscicollis</i>	.	.	S3M	3	20	0	0	0	0	23
Pectoral Sandpiper****	<i>Calidris melanotos</i>	.	.	S2S3M	1	3	0	0	0	0	4
Semipalmated Sandpiper****	<i>Calidris pusilla</i>	.	.	S3M	2	37	0	0	0	0	39
Wilson's Snipe****	<i>Gallinago delicata</i>	.	.	S3B	0	0	0	1	0	0	1
Spotted Sandpiper****	<i>Actitis macularia</i>	.	.	S3S4B	0	0	0	0	10	17	27
Lesser Yellowlegs****	<i>Tringa flavipes</i>	.	.	S3M	9	11	0	0	0	0	20
Willet****	<i>Tringa semipalmata</i>	.	.	S2S3B	1	1	0	0	4	0	6
Greater Yellowlegs****	<i>Tringa melanoleuca</i>	.	.	S3B,S3S4M	20	20	0	0	5	0	45
Bonaparte's Gull	<i>Chroicocephalus philadelphia</i>	.	.	S5M	255	100	0	0	0	32	387
Ring-billed Gull	<i>Larus delawarensis</i>	.	.	SUB,S5N	9	8	1	0	5	0	23
Herring Gull	<i>Larus argentatus</i>	.	.	S5	8	17	3	0	1	0	29
Great Black-backed Gull	<i>Larus marinus</i>	.	.	S4S5	0	1	0	0	0	0	1
Common Tern****	<i>Sterna hirundo</i>	NAR	.	S3B	1	0	0	2	3	3	9
Red-throated Loon	<i>Gavia stellata</i>	.	.	S4N	0	2	0	0	0	0	2
Common Loon	<i>Gavia immer</i>	NAR	.	S4B,S4N	0	0	0	0	0	1	1
Common Nighthawk***	<i>Chordeiles minor</i>	T	Threatened	S2B	0	0	0	0	0	8	8
Northern Gannet	<i>Morus bassanus</i>	.	.	SHB,S5M	0	35	0	0	0	0	35
Double-crested Cormorant	<i>Phalacrocorax auritus</i>	NAR	.	S4B	0	36	0	0	0	0	36
American Bittern****	<i>Botaurus lentiginosus</i>	.	.	S3S4B	0	0	0	0	0	3	3
Great Blue Heron	<i>Ardea herodias</i>	.	.	S4B	1	1	0	6	3	3	11
Osprey	<i>Pandion haliaetus</i>	.	.	S4B	0	0	0	0	0	0	0
Northern Harrier****	<i>Circus hudsonius</i>	NAR	.	S3S4B	2	3	0	0	0	0	5
Sharp-shinned Hawk	<i>Accipiter striatus</i>	NAR	.	S5	1	2	0	0	0	0	3
Northern Goshawk****	<i>Accipiter gentilis</i>	NAR	.	S3S4	0	0	0	1	0	0	1
Bald Eagle	<i>Haliaeetus leucocephalus</i>	NAR	.	S5	8	64	32	2	15	4	125
Broad-winged Hawk	<i>Buteo platypterus</i>	.	.	S5B	0	0	0	3	1	0	4
Red-tailed Hawk	<i>Buteo jamaicensis</i>	NAR	.	S5	1	3	2	0	0	0	6
Great Horned Owl	<i>Bubo virginianus</i>	.	.	S4	0	0	3	0	0	0	3
Barred Owl	<i>Strix varia</i>	.	.	S5	0	0	3	0	0	7	10
Northern Saw-whet Owl	<i>Aegolius acadicus</i>	.	.	S4B	0	0	2	0	0	0	2

Belted Kingfisher	<i>Megaceryle alcyon</i>	.	.	S5B	1	1	0	2	8	3	15
Red-bellied Woodpecker	<i>Melanerpes carolinus</i>	.	.	SUB	0	0	0	2	0	0	2
Yellow-bellied Sapsucker	<i>Sphyrapicus varius</i>	.	.	S4S5B	5	0	0	27	2	13	47
Downy Woodpecker	<i>Dryobates pubescens</i>	.	.	S5	13	1	0	10	0	3	27
Hairy Woodpecker	<i>Dryobates villosus</i>	.	.	S5	9	4	1	5	0	7	26
Northern Flicker	<i>Colaptes auratus</i>	.	.	S5B	17	5	1	18	1	2	44
Pileated Woodpecker	<i>Pileatus pileatus</i>	.	.	S5	20	4	4	9	1	3	41
Eastern Wood-Pewee***	<i>Contopus virens</i>	SC	Vulnerable	S3S4B	4	0	0	0	0	16	20
Yellow-bellied Flycatcher****	<i>Empidonax flaviventris</i>	.	.	S3S4B	1	0	0	0	0	0	1
Alder Flycatcher	<i>Empidonax alnorum</i>	.	.	S5B	0	0	0	0	0	28	28
Least Flycatcher	<i>Empidonax minimus</i>	.	.	S4S5B	0	0	0	3	0	12	15
Blue-headed Vireo	<i>Vireo solitarius</i>	.	.	S5B	10	0	0	10	0	11	31
Red-eyed Vireo	<i>Vireo olivaceus</i>	.	.	S5B	24	0	0	0	0	54	78
Blue Jay	<i>Cyanocitta cristata</i>	.	.	S5	88	31	8	31	6	28	192
American Crow	<i>Corvus brachyrhynchos</i>	.	.	S5	64	22	37	12	17	23	175
Common Raven	<i>Corvus corax</i>	.	.	S5	55	65	62	7	9	10	208
Tree Swallow	<i>Tachycineta bicolor</i>	.	.	S4B	0	0	0	1	9	11	21
Bank Swallow***	<i>Riparia riparia</i>	T	Endangered	S2S3B	0	0	0	0	0	2	2
Barn Swallow***	<i>Hirundo rustica</i>	T	Endangered	S2S3B	0	0	0	0	3	0	3
Black-capped Chickadee	<i>Poecile atricapillus</i>	.	.	S5	271	16	6	61	6	40	400
Red-breasted Nuthatch****	<i>Sitta canadensis</i>	.	.	S3	87	3	1	17	1	11	120
Brown Creeper	<i>Certhia americana</i>	.	.	S5	37	1	1	11	0	4	54
Winter Wren	<i>Troglodytes hiemalis</i>	.	.	S5B	0	0	0	0	0	2	3
Golden-crowned Kinglet	<i>Regulus satrapa</i>	.	.	S5	134	7	0	12	0	17	170
Ruby-crowned Kinglet****	<i>Regulus calendula</i>	.	.	S3S4B	6	0	0	8	1	6	21
Veery****	<i>Catharus fuscescens</i>	.	.	S3S4B	0	0	0	0	0	10	10
Swainson's Thrush****	<i>Catharus ustulatus</i>	.	.	S3S4B	0	0	0	0	0	3	3
Hermit Thrush	<i>Catharus guttatus</i>	.	.	S5B	15	0	0	13	0	13	41
American Robin****	<i>Turdus migratorius</i>	.	.	S5B,S3N	96	8	1	35	2	29	171
Gray Catbird****	<i>Dumetella carolinensis</i>	.	.	S3B	1	0	0	0	0	0	1
European Starling	<i>Sturnus vulgaris</i>	.	.	SNA	0	0	0	6	3	121	130
Cedar Waxwing	<i>Bombicilla cedrorum</i>	.	.	S5B	36	16	0	0	0	8	60
American Pipit	<i>Anthus rubescens</i>	.	.	S4M	3	2	0	0	0	0	5
Evening Grosbeak***	<i>Coccothraustes vespertinus</i>	SC	Vulnerable	S3S4B,S3N	0	0	5	5	0	7	17
Purple Finch****	<i>Haemorhous purpureus</i>	.	.	S4S5B,S3S4N	35	1	1	23	1	10	71
White-winged Crossbill	<i>Loxia leucoptera</i>	.	.	S4S5	0	0	0	0	0	2	2
Pine Siskin****	<i>Spinus pinus</i>	.	.	S2S3	13	0	0	1	0	2	16
American Goldfinch	<i>Spinus tristis</i>	.	.	S5	56	4	2	49	6	53	170
Lapland Longspur****	<i>Calcarius lapponicus</i>	.	.	S3?N	2	0	0	0	0	0	2
American Tree Sparrow	<i>Spizelloides arborea</i>	.	.	S5N	0	0	0	1	0	0	1
Chipping Sparrow	<i>Spizella passerina</i>	.	.	S4B	0	0	0	2	0	4	6
Savannah Sparrow	<i>Passerculus sandwichensis</i>	.	.	S4S5B	7	1	0	0	3	0	11
Nelson's Sparrow****	<i>Ammodramus nelsoni</i>	NAR	.	S3S4B	0	0	0	0	0	1	1
Song Sparrow	<i>Melospiza melodia</i>	.	.	S5B	40	3	8	17	3	24	95
Swamp Sparrow	<i>Melospiza georgiana</i>	.	.	S5B	16	0	0	8	0	26	50
White-throated Sparrow	<i>Zonotrichia albicollis</i>	.	.	S5B	10	0	0	20	0	21	51
Dark-eyed Junco	<i>Junco hyemalis</i>	.	.	S4S5	10	0	0	8	0	1	19
Red-winged Blackbird	<i>Agelaius phoeniceus</i>	.	.	S4B	18	1	2	19	7	45	92
Common Grackle	<i>Quiscalus quiscula</i>	.	.	S5B	0	14	0	19	9	44	86
Ovenbird	<i>Seiurus aurocapilla</i>	.	.	S5B	5	0	0	41	0	109	155
Northern Waterthrush	<i>Parkesia noveboracensis</i>	.	.	S4B	0	0	0	2	0	4	6
Black-and-white Warbler	<i>Mniotilta varia</i>	.	.	S5B	8	0	0	16	0	23	47
Tennessee Warbler****	<i>Oreothlypis peregrina</i>	.	.	S3S4B	0	0	0	1	0	1	2
Nashville Warbler	<i>Oreothlypis ruficapilla</i>	.	.	S4S5B	2	0	0	0	0	2	4
Common Yellowthroat	<i>Geothlypis trichas</i>	.	.	S5B	13	0	0	6	0	36	55
American Redstart	<i>Setophaga ruticilla</i>	.	.	S4S5B	0	0	0	1	0	24	25
Northern Parula	<i>Setophaga americana</i>	.	.	S5B	9	0	0	8	0	29	46
Magnolia Warbler	<i>Setophaga magnolia</i>	.	.	S5B	12	0	0	7	0	29	48
Bay-breasted Warbler****	<i>Setophaga castanea</i>	.	.	S3S4B	0	0	0	0	0	1	1
Blackburnian Warbler	<i>Setophaga fusca</i>	.	.	S4B	1	0	0	3	0	12	16
Yellow Warbler	<i>Setophaga petechia</i>	.	.	S5B	1	0	0	1	0	14	16
Chestnut-sided Warbler	<i>Setophaga pensylvanica</i>	.	.	S5B	0	0	0	2	0	10	12



Blackpoll Warbler****	<i>Setophaga striata</i>	.	.	S3S4B	35	0	0	0	0	0	35
Black-throated Blue Warbler	<i>Setophaga caerulescens</i>	.	.	S5B	0	0	0	0	0	2	2
Palm Warbler	<i>Setophaga palmarum</i>	.	.	S5B	1	0	0	3	0	1	5
Yellow-rumped Warbler	<i>Setophaga coronata</i>	.	.	S5B	26	16	0	32	5	10	89
Black-throated Green Warbler	<i>Setophaga virens</i>	.	.	S5B	11	0	0	17	1	22	51
Canada Warbler***	<i>Cardellina canadensis</i>	T	Endangered	S3B	0	0	0	0	0	11	11
Rose-breasted Grosbeak****	<i>Pheucticus ludovicianus</i>	.	.	S2S3B	0	0	0	0	0	2	2
Unidentified Bird	Aves (gen, sp)	.	.	.	32	10	0	4	4	12	62
<b>Totals</b>					<b>1,932 ind.; 74 sp.</b>	<b>798 ind.; 52 sp.</b>	<b>295 ind.; 33 sp.</b>	<b>710 ind.; 66 sp.</b>	<b>273 ind.; 42 sp.</b>	<b>1,390 ind.; 82 sp.</b>	<b>5,398 ind.; 126 sp.</b>

**Notes:**

\* includes results from both the diurnal vantage point watch counts and the nocturnal owl surveys.

\*\* includes results from the breeding bird survey point counts, marsh monitoring, and the Common Nighthawk surveys.

\*\*\* SAR (provincial and/or federal listing in related legislation)

\*\*\*\* Species of conservation concern (AC CDC)

For COSEWIC listings: SC=Special Concern, T=Threatened, E=Endangered and NAR=Not at Risk.

# APPENDIX

# D

## BIRD SURVEY DATA



Appendix D - Bird Survey Data

Table D-1: Fall Migration Diurnal Vantage Point Watch Count Survey Data, 2017

Project Number: 171-10478

Site Number	Date	Survey Period	Species Name	Species Code	No. of Birds	Distance (m)	Bearing	Flight Height (m)	Flight Direction	Comments
Watch 1	September 25, 2017	12:55-2:25	Common Grackle	COGR	14	0	NW	50	SE	watching harbour
			American Black Duck	ABDU	39	100	NE	-	-	-
			Green-winged Teal	GWTE	19	100	NE	-	-	-
			Bald Eagle	BAEA	3	1000	SE	-	-	Soaring
			Hairy Woodpecker	HAWO	1	500	SE	-	-	-
			-	Warb sp.	2	0	NW	50	S	-
			Yellow-rumped Warbler	YRWA	1	0	NW	50	SE	-
			Double-crested Cormorant	DCCO	1	200	NE	-	-	-
			Blue Jay	BLJA	3	0	NW	50	SE	-
			Black-capped Chickadee	BCCH	2	400	SE	-	-	-
			Wood Duck	WODU	1	400	NW	-	-	-
			Common Raven	CORA	1	500	SE	-	-	-
			American Goldfinch	AMGO	2	100	NW	-	-	-
			-	Warb sp.	3	0	SE	-	-	-
			Sharp-shinned Hawk	SSHA	1	800	NW	-	-	-
			Common Raven	CORA	2	1000	NW	-	-	-
			-	Pass sp.	3	800	NW	-	E	Seen in scope
			Yellow-rumped Warbler	YRWA	2	0	SE	50	NW	-
			Bald Eagle	BAEA	3	1000	NW	-	-	-
-	Warb sp.	2	0	SE	50	NW	-			
Watch 2	September 25, 2017	2:39-4:09	Pileated Woodpecker	PIWO	1	200	NE	-	-	watching beach
			Greater Yellowlegs	GRYE	5	50	NW	-	-	-
			Common Raven	CORA	1	300	NE	-	-	-
			Willet	WILL	1	50	NW	-	-	-
			American Crow	AMCR	5	300	NW	-	-	-
			Lesser Yellowlegs	LEYE	2	50	NW	-	-	-
			Northern Gannet	NOGA	30	2000	NW	-	-	-
			Savannah Sparrow	SAVS	1	0	NW	-	-	-
			Blue Jay	BLJA	2	100	NE	-	-	-
			Double-crested Cormorant	DCCO	1	100	NW	50	S	-
			Bald Eagle	BAEA	21	2000	NW	-	-	-
			Ring-billed Gull	BOGU	1	200	NW	-	-	-
			Ring-billed Gull	RBGU	1	200	NW	-	-	-
			Yellow-rumped Warbler	YRWA	3	200	NE	-	-	-
			Herring Gull	HERG	2	2000	NW	-	-	-
			Double-crested Cormorant	DCCO	5	1000	NW	-	-	-
			Great Blue Heron	GBHE	1	50	NW	-	-	-
			Cedar Waxwing	CEDW	1	50	NW	50	E	-
			Semipalmated Sandpiper	SESA	25	400	NE	-	-	-
			Sharp-shinned Hawk	SSHA	1	400	NW	50	E	-
Bald Eagle	BAEA	4	100	SE	50	N	-			

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Table D-1: Fall Migration Diurnal Vantage Point Watch Count Survey Data, 2017

Project Number: 171-10478

Site Number	Date	Survey Period	Species Name	Species Code	No. of Birds	Distance (m)	Bearing	Flight Height (m)	Flight Direction	Comments
Watch 2	Sept 26, 2017	11:20-12:50	Bonaparte's Gull	BOGU	83	100	NW	-	-	-
			Lesser Yellowlegs	LEYE	5	100	NW	-	-	-
			Semipalmated Plover	SEPL	7	100	NE	-	-	-
			Blue Jay	BLJA	2	300	NW	-	-	-
			Yellow-rumped Warbler	YRWA	1	200	NW	-	-	-
			Bald Eagle	BAEA	1	400	NW	-	-	-
			Red-breasted Merganser	RBME	5	200	NW	-	-	-
			Double-crested Cormorant	DCCO	2	100	NW	50	S	-
			Semipalmated Sandpiper	SESA	3	0	NW	-	-	-
			Ring-necked Pheasant	RNEP	1	300	NW	-	-	-
			Belted Kingfisher	BEKI	1	300	NW	-	-	-
			Northern Flicker	NOFL	1	200	NE	50	SW	-
			American Black Duck	ABDU	6	200	NW	-	-	-
			Semipalmated Sandpiper	SESA	5	300	NW	-	-	-
			Pileated Woodpecker	PIWO	1	300	SW	-	-	-
			Greater Yellowlegs	GRYE	2	100	NW	-	-	-
			Downy Woodpecker	DOWO	1	300	NW	-	-	-
Watch 1	September 26, 2017	1:15-2:45	American Black Duck	ABDU	15	400	SW	-	-	-
			Wood Duck	WODU	4	400	SW	-	-	-
			Green-winged Teal	GWTE	9	50	NW	-	-	-
			Yellow-rumped Warbler	YRWA	2	0	SW	-	NE	-
			Golden-crowned Kinglet	GCKI	1	0	SW	-	-	-
			Bald Eagle	BAEA	1	200	SW	-	-	-
			Common Raven	CORA	1	1000	SW	-	-	-
			Blue Jay	BLJA	3	500	SW	50	N	-
			Black-capped Chickadee	BCCH	2	50	NW	-	-	-
			Song Sparrow	SOSP	1	100	SW	-	-	-
Watch 1	October 12, 2017	11:09-12:39	Ring-necked Duck	RNDU	5	500	NW	-	-	-
			American Black Duck	ABDU	13	500	NE	-	-	-
			Green-winged Teal	GWTE	3	500	NE	-	-	-
			Common Raven	CORA	3	1000	NE	-	-	-
			Red-tailed Hawk	RTHA	1	2000	NW	-	-	-
			Blue Jay	BLJA	2	300	NE	50	E	-
			American Crow	AMCR	2	500	SW	-	-	-
			Yellow-rumped Warbler	YRWA	1	0	NE	-	-	-
			Blue Jay	BLJA	2	500	SW	50	NE	Along tree line
			Bald Eagle	BAEA	2	1000	NW	-	-	-
			Green-winged Teal	GWTE	1	500	SW	-	-	-
			White-rumped Sandpiper	WRSA	3	50	NE	50	N	Landed on berm
			Blue Jay	BLJA	2	500	NW	50	S	Along tree line

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Table D-1: Fall Migration Diurnal Vantage Point Watch Count Survey Data, 2017

Project Number: 171-10478

Site Number	Date	Survey Period	Species Name	Species Code	No. of Birds	Distance (m)	Bearing	Flight Height (m)	Flight Direction	Comments
Watch 1	Oct 12, 2017	13:00-2:30	American Black Duck	ABDU	4	100	SW	50	N	-
			American Black Duck	ABDU	6	100	NW	50	S	-
			Herring Gull	HERG	1	100	NW	-	-	-
			Greater Yellowlegs	GRYE	6	50	NW	-	-	On beach
			White-rumped Sandpiper	WRSA	4	50	NW	-	-	On beach
			Pectoral Sandpiper	PESA	1	50	NW	-	-	On beach
			Semipalmated Sandpiper	SESA	1	50	NW	-	-	On beach
			Lesser Yellowlegs	LEYE	1	50	NW	-	-	On beach
			Common Raven	CORA	6	300	NE	-	-	-
			Bald Eagle	BAEA	2	300	NE	-	-	-
			Green-winged Teal	GWTE	9	100	NW	-	-	-
			Blue Jay	BLJA	1	100	NE	50	S	-
			Northern Flicker	NOFL	1	200	NE	-	-	-
			Great Black-backed Gull	GBBG	1	100	NE	50	W	-
			Herring Gull	HERG	5	100	NE	50	W	-
			Bonaparte's Gull	BOGU	6	200	NW	-	-	-
			Herring Gull	HERG	2	100	SW	50	N	-
			Northern Harrier	NOHA	1	100	SE	50	N	-
			Watch 2	October 13, 2017	12:21-1:51	Blue Jay	BLJA	2	400	SE
Black-capped Chickadee	BCCH	2				400	SE	-	-	-
Northern Flicker	NOFL	1				400	SE	-	-	-
American Crow	AMCR	5				500	SE	-	-	-
Greater Yellowlegs	GRYE	2				100	NW	-	-	-
Pileated Woodpecker	PIWO	1				400	SE	-	-	-
Common Raven	CORA	3				50	NE	50	W	-
American Black Duck	ABDU	5				100	NW	-	-	-
Hairy Woodpecker	HAWO	1				100	NE	50	W	-
Pectoral Sandpiper	PESA	2				50	NW	-	-	-
White-rumped Sandpiper	WRSA	6				50	NW	-	-	-
Semipalmated Sandpiper	SESA	2				100	NW	-	-	-
Herring Gull	HERG	1				300	NW	-	-	-
Bonaparte's Gull	BOGU	2				600	NW	-	-	-
Ring-billed Gull	RBGU	6				300	NW	-	-	-
Yellow-rumped Warbler	YRWA	2				200	SE	-	-	-
Lesser Yellowlegs	LEYE	1				200	NW	-	-	-
Green-winged Teal	GWTE	5				200	NW	-	-	-
Bald Eagle	BAEA	4				200	NW	-	-	-

Appendix D - Bird Survey Data

Table D-1: Fall Migration Diurnal Vantage Point Watch Count Survey Data, 2017

Project Number: 171-10478

Site Number	Date	Survey Period	Species Name	Species Code	No. of Birds	Distance (m)	Bearing	Flight Height (m)	Flight Direction	Comments
Watch 2	Oct 13, 2017	2:02-3:32	Lesser Scaup	LESC	3	200	NW	-	-	-
			Red-winged Blackbird	RWBL	1	300	NE	-	-	-
			Common Raven	CORA	8	1000	NW	-	-	-
			Bald Eagle	BAEA	3	1000	NW	-	-	-
			Herring Gull	HERG	4	1000	NW	-	-	-
			Blue Jay	BLJA	2	500	SE	50	N	-
			Common Raven	CORA	3	1000	NE	-	-	-
			Bald Eagle	BAEA	2	1000	NE	-	-	-
			Green-winged Teal	GWTE	1	500	NW	-	-	-
			Common Raven	CORA	1	0	NW	100	SE	-
			Bald Eagle	BAEA	1	0	SE	100	NW	-
			American Black Duck	ABDU	3	200	NE	50	W	-
			Yellow-rumped Warbler	YRWA	1	50	SW	-	-	-
			Song Sparrow	SOSP	1	50	SW	-	-	-
			American Pipit	AMPI	1	50	NW	-	-	-
			Watch 2	October 23, 2017	11:50-1:20	American Black Duck	ABDU	2	100	NW
Bald Eagle	BAEA	3				100	NW	-	-	-
White-rumped Sandpiper	WRSR	4				50	NW	-	-	-
Greater Yellowlegs	GRYE	3				50	NW	-	-	-
Yellow-rumped Warbler	YRWA	1				100	NE	-	-	-
Song Sparrow	SOSP	1				50	NW	-	-	-
Lesser Yellowlegs	LEYE	1				50	NW	-	-	-
Herring Gull	HERG	1				50	SW	50	N	-
Blue Jay	BLJA	2				200	NW	-	-	-
Hairy Woodpecker	HAWO	1				200	NE	-	-	-
Least Sandpiper	LESA	2				50	NW	-	-	-
Northern Flicker	NOFL	1				100	NW	-	-	-
American Crow	AMCR	4				200	NE	50	W	-
Common Raven	CORA	1				300	NW	-	-	-
Ring-billed Gull	RBGU	1				200	NW	-	-	-
Cedar Waxwing	CEDW	12				200	NW	-	-	-
Bonaparte's Gull	BOGU	2				200	NW	-	-	-
Black-capped Chickadee	BCCH	2				200	NE	-	-	-
Horned Grebe	HGR	1				400	NW	-	-	-
Golden-crowned Kinglet	GCKI	1				300	NE	-	-	-
Double-crested Cormorant	DCCO	27	2000	NE	50	W	-			
Northern Harrier	NOHA	1	200	NE	50	S	-			
Red-tailed Hawk	RTHA	1	200	NE	-	-	-	Soaring		

Appendix D - Bird Survey Data

Table D-1: Fall Migration Diurnal Vantage Point Watch Count Survey Data, 2017

Project Number: 171-10478

Site Number	Date	Survey Period	Species Name	Species Code	No. of Birds	Distance (m)	Bearing	Flight Height (m)	Flight Direction	Comments
Watch 2	Oct 23, 2017	2:12-3:42	Lesser Yellowlegs	LEYE	1	50	NW	-	-	Roosting and feeding
			Greater Yellowlegs	GRYE	2	50	NW	-	-	Roosting and feeding
			White-rumped Sandpiper	WRSA	3	50	NW	-	-	Roosting and feeding
			American Pipit	AMPI	1	50	NW	-	-	-
			Northern Flicker	NOFL	1	200	NE	-	-	-
			American Robin	AMRO	1	200	NE	-	-	-
			Red-throated Loon	RTLO	2	300	NW	-	-	-
			Bonaparte's Gull	BOGU	6	200	NW	-	-	-
			White-winged Scoter	WWSC	2	500	NW	-	-	-
			Common Raven	CORA	1	500	SE	-	-	-
			Bald Eagle	BAEA	1	200	NE	-	-	-
			American Crow	AMCR	5	300	NE	-	-	-
			Semipalmated Sandpiper	SESA	1	50	NW	-	-	Roosting and feeding
			Cedar Waxwing	CEDW	3	200	NE	-	-	-
			American Goldfinch	AMGO	1	200	NE	-	-	-
			Red-breasted Nuthatch	RBNU	1	200	NE	-	-	-
			Blue Jay	BLJA	2	300	SW	-	-	-
			Northern Gannet	NOGA	5	1000	NW	-	-	-
			Herring Gull	HERG	1	1000	NW	-	-	-
			Watch 1	October 24, 2017	11:00-12:30	American Black Duck	ABDU	4	50	NE
American Robin	AMRO	3				100	SW	-	-	-
Golden-crowned Kinglet	GCKI	3				0	SE	-	-	-
Black-capped Chickadee	BCCH	3				0	SE	-	-	-
Northern Harrier	NOHA	1				300	SE	100	N	-
Common Raven	CORA	3				300	SE	100	N	-
Red-breasted Nuthatch	RBNU	1				0	SE	-	-	-
Yellow-rumped Warbler	YRWA	2				0	SE	-	-	-
American Goldfinch	AMGO	1				0	SE	-	-	-
Blue Jay	BLJA	2				0	NE	50	SW	-
Pileated Woodpecker	PIWO	1				0	NW	-	-	-
American Black Duck	ABDU	2				0	NE	-	-	-
Mourning Dove	CORA	2				2000	NW	100	E	-
Purple Finch	MODO	2				500	NW	50	E	-
Purple Finch	PUFI	1				0	NW	100	S	-
American Black Duck	ABDU	8				100	NW	50	E	-
Bald Eagle	BAEA	4				500	NW	50	E	-
Common Raven	CORA	2				500	NW	50	E	-
Blue Jay	BLJA	1				500	NE	50	S	-
Common Raven	CORA	4				500	NE	50	W	-
Green-winged Teal	GWTE	2				500	NE	-	-	-
Common Raven	CORA	1				0	NW	50	S	-
Bald Eagle	BAEA	1				0	NW	50	S	-

Appendix D - Bird Survey Data

Table D-1: Fall Migration Diurnal Vantage Point Watch Count Survey Data, 2017

Project Number: 171-10478

Site Number	Date	Survey Period	Species Name	Species Code	No. of Birds	Distance (m)	Bearing	Flight Height (m)	Flight Direction	Comments
Watch 1	Oct 24, 2017	11:00-12:30	American Black Duck	ABDU	1	400	NW	-	-	-
Watch 1	Oct 24, 2017	12:30-2:00	Common Raven	CORA	9	600	NE	200	W	-
			Bald Eagle	BAEA	4	600	NE	200	W	-
			American Black Duck	ABDU	1	600	NW	-	-	-
			Common Raven	CORA	5	600	NE	100	W	-
			Blue Jay	BLJA	2	500	SE	-	-	-
			Hairy Woodpecker	HAWO	1	0	SW	-	-	-
			Wood Duck	WODU	1	0	SE	-	-	-
			Common Raven	CORA	2	300	NW	50	E	-
			Brown Creeper	BRCR	1	0	SW	-	-	-
			Bald Eagle	BAEA	2	500	NW	100	E	-
			American Robin	AMRO	1	100	NE	-	-	-
			American Robin	AMRO	3	0	SE	50	W	-
			American Crow	AMCR	1	100	SE	50	W	-
			Common Raven	CORA	6	400	NE	100	W	-
			Red-tailed Hawk	RTHA	1	100	SE	100	S	-
			Golden-crowned Kinglet	GCKI	2	50	NW	-	-	-
			Blue Jay	BLJA	1	50	NW	-	-	-
			Bald Eagle	BAEA	2	500	NE	100	W	-
			Wood Duck	WODU	3	500	NE	-	-	-
			Green-winged Teal	GWTE	3	500	NW	-	-	-
Red-breasted Nuthatch	RBNU	1	0	SE	-	-	-			
Greater Yellowlegs	BCCH	5	0	SE	-	-	-			
Watch 2	September 14, 2017	11:20	Lesser Yellowlegs	GRYE	4	100	NW	-	-	passing
			Bonaparte's Gull	LEYE	1	100	NW	-	-	passing
			Red-breasted Merganser	BOGU	112	150	NW	-	-	passing
			Pileated Woodpecker	RBME	4	150	NW	-	-	passing
			Blue Jay	PIWO	1	100	SW	-	-	passing
			American Crow	BLJA	2	100	SW	-	-	passing
			Black-bellied Plover	AMCR	4	200	NE	-	-	passing
			Savannah Sparrow	BBPL	1	150	NW	-	-	passing
			Great Blue Heron	SAVS	1	0	NE	-	-	passing
			American Black Duck	GBHE	1	150	NW	-	-	passing
			Canada Goose	ABDU	21	100	NW	-	-	passing
			Common Raven	CANG	15	100	NW	-	-	passing
			Blue Jay	CORA	1	200	NW	-	-	passing
			Watch 2	September 26, 2017	08:57	Savannah Sparrow	BLJA	1	300	NW
Bonaparte's Gull	SAVS	2				0	NW	-	-	passing
American Black Duck	BOGU	106				100	NW	-	-	passing
Belted Kingfisher	ABDU	7				100	NW	-	-	passing
Ring-billed Gull	BEKI	1				200	NW	-	-	passing
American Crow	RBGU	1				100	NW	-	-	passing
Herring Gull	AMCR	3				500	NW	-	-	passing
Common Raven	HERG	2				200	NE	-	-	passing
Semipalmated Plover	CORA	1				300	NWW	-	-	passing
Red-breasted Merganser	SEPL	4				200	NW	-	-	passing
Northern Flicker	RBME	4				300	NW	-	-	passing
Bald Eagle	NOFL	1				300	NW	-	-	passing
Yellow-rumped Warbler	BAEA	1				200	NW	50m +	East	passing
Common Tern	YRWA	1				100	NW	-	-	passing
Greater Yellowlegs	COTE	1				500	NW	-	-	passing
Lesser Yellowlegs	GRYE	7				100	NW	-	-	passing
Greater Yellowlegs	LEYE	3				100	NW	-	-	passing
Watch 2	October 12, 2017	10:33	Ring-billed Gull	GRYE	4	200	NW	-	-	passing
			Bald Eagle	RBGU	2	300	NE	-	-	passing
			Common Raven	BAEA	2	500	NW	-	-	passing
			Common Raven	CORA	4	500	NW	-	-	passing
			American Black Duck	CORA	16	0	NW	-50m	Northeast	passing
			Bonaparte's Gull	ABDU	1	100	NW	-50m	East	passing
			Blue Jay	BOGU	9	300	NE	-50m	West	passing
			Dunlin	BLJA	1	600	SW	-	-	passing
			Lapland Longspur	DUNL	4	200	NW	-	-	passing
			White-rumped Sandpiper	LALO	1	50	NW	-	-	passing
Watch 2	October 12, 2017	10:33	Pectoral Sandpiper	WRSA	3	300	NW	-	-	passing
			Semipalmated Sandpiper	PESA	1	300	NW	-	-	passing
			Green-winged Teal	SESA	1	200	NW	-	-	passing
			Northern Harrier	GWTE	3	200	NW	-	-	passing
			American Pipit	NOHA	1	50	SW	-	-	passing
			Yellow-rumped Warbler	AMPI	2	0	NW	-	-	passing
			Surf Scoter	YRWA	1	0	NW	-	-	passing
			Ring-necked Pheasant	SUSC	6	1000	NW	-	-	passing
Watch 2	October 24, 2017	09:50	American Pipit	RNEP	7	100	SW	-	-	passing
			American Robin	AMPI	1	0	NW	-	-	passing
			Bonaparte's Gull	AMRO	3	200	NW	-	-	passing
			Herring Gull	BOGU	2	100	NW	-	-	passing
			Semipalmated Sandpiper	HERG	3	100	NE	-	-	passing
			Lesser Yellowlegs	SESA	1	0	NE	-	-	passing
			Greater Yellowlegs	LEYE	1	0	NE	-	-	passing
			Song Sparrow	GRYE	3	50	NW	-	-	passing
			American Crow	SOSP	6	0	NW	-	-	passing



Appendix D - Bird Survey Data

Table D-1: Fall Migration Diurnal Vantage Point Watch Count Survey Data, 2017

Project Number: 171-10478

Site Number	Date	Survey Period	Species Name	Species Code	No. of Birds	Distance (m)	Bearing	Flight Height (m)	Flight Direction	Comments
			Downy Woodpecker	AMCR	1	300	NW	-	-	passing
			Bald Eagle	DOWO	1	200	SW	-	-	passing
			Golden-crowned Kinglet	BAEA	1	300	NE	-	-	passing
			Green-winged Teal	GCKI	2	200	NW	-	-	passing
			Ring-billed Gull	GWTE	4	100	SW	-	-	passing
			Common Raven	RBGU	1	200	NW	-	-	passing
			American Goldfinch	CORA	1	500	SW	-	-	passing
				AMGO	3	100	NW	-	-	passing

Appendix D - Bird Survey Data  
 Table D-2: Fall Migration Line Transect Survey Data, 2017  
 Project Number: 171-10478

Site Number	Date	Survey Start	Species Name	Species Code	No. of Birds	Distance (m)	Bearing	Fly-by	Passage Height (m)	Passage Direction	Behaviour / Comments
PC1-PC2	September 8, 2017	07:15	Hermit Thrush	HETH	1	0	SE	-	-	-	passing
			White-throated Sparrow	WTSP	2	0	SE	-	-	-	passing
			Black-and-white Warbler	BAWW	1	0	SE	-	-	-	passing
			Eastern Wood-Pewee	EAWP	1	50	SE	-	-	-	passing
			Ovenbird	OVEN	2	0	SE	-	-	-	passing
			Magnolia Warbler	MAWA	1	0	SE	-	-	-	passing
PC1-PC3	September 8, 2017	07:26	Brown Creeper	BRCR	1	50	SE	-	-	-	passing
			Blue Jay	BLJA	2	100	NE	-	-	-	passing
			Black-and-white Warbler	BAWW	1	0	SW	-	-	-	passing
			Magnolia Warbler	MAWA	2	0	SW	-	-	-	passing
			Red-eyed Vireo	REVI	3	0	NW	-	-	-	passing
			Yellow-bellied Flycatcher	YBFL	1	0	NW	-	-	-	passing
PC3-PC4	September 8, 2017	07:38	Common Raven	CORA	1	500	SW	-	-	-	passing
			Ruby-crowned Kinglet	RCKI	2	0	NW	-	-	-	passing
			Blue Jay	BLJA	1	200	NW	-	-	-	passing
			Golden-crowned Kinglet	GCKI	6	50	NW	-	-	-	passing
			Black-and-white Warbler	BAWW	2	0	NW	-	-	-	passing
			Pileated Woodpecker	PIWO	1	50	NW	-	-	-	passing
			Cedar Waxwing	CEDW	1	50	NW	-	-	-	passing
			Red-eyed Vireo	REVI	1	0	NW	-	-	-	passing
			Black-capped Chickadee	BCCH	8	0	NW	-	-	-	passing
			Magnolia Warbler	MAWA	3	0	NW	-	-	-	passing
			Blue-headed Vireo	BHVI	1	50	NW	-	-	-	passing
			Red-breasted Nuthatch	RBNU	1	50	NW	-	-	-	passing
			American Goldfinch	AMGO	2	50	NW	-	-	-	passing
			Black-throated Green Warbler	BTNW	1	50	NW	-	-	-	passing
			Bald Eagle	BAEA	1	100	NW	-	-	-	passing
PC1-PC5	September 8, 2017	08:15	Common Raven	CORA	2	300	NW	-	-	-	passing
			Northern Flicker	NOFL	4	300	NW	-	-	-	passing
PC5-PC6	September 8, 2017	08:25	Red-eyed Vireo	REVI	1	0	NW	-	-	-	passing
			Black-capped Chickadee	BCCH	3	0	NW	-	-	East	passing
PC6-PC7	September 8, 2017	08:33	Golden-crowned Kinglet	GCKI	4	0	SW	-	-	-	passing
			-	warb sp.	1	0	SW	-	-	-	passing
			Eastern Wood-Pewee	EAWP	1	100	SW	-	-	-	passing
			American Goldfinch	AMGO	1	50	SW	-	-	-	passing
PC6-PC7	September 8, 2017	08:33	Red-eyed Vireo	REVI	1	100	NW	-	-	-	passing
			Northern Parula	NOPA	3	50	SW	-	-	-	passing
			Golden-crowned Kinglet	GCKI	3	0	SW	-	-	-	passing
			Ovenbird	OVEN	2	0	SW	-	-	-	passing
			Hermit Thrush	HETH	1	0	SW	-	-	-	passing
			White-throated Sparrow	WTSP	1	0	SW	-	-	-	passing
			Cedar Waxwing	CEDW	1	100	NE	-	-	-	passing
			Blue Jay	BLJA	4	50	NW	-	-	-	passing
			Black-throated Green Warbler	BTNW	3	0	NW	-	-	-	passing
			Black-and-white Warbler	BAWW	2	0	NW	-	-	-	passing
			Blue-headed Vireo	BHVI	1	0	NW	-	-	-	passing
American Goldfinch	AMGO	4	0	NW	-	-	-	passing			
Downy Woodpecker	DOWO	1	50	NW	-	-	-	passing			

Appendix D - Bird Survey Data  
 Table D-2: Fall Migration Line Transect Survey Data, 2017  
 Project Number: 171-10478

Site Number	Date	Survey Start	Species Name	Species Code	No. of Birds	Distance (m)	Bearing	Fly-by	Passage Height (m)	Passage Direction	Behaviour / Comments
PC6-PC7	September 8, 2017	08:33	Brown Creeper	BRCR	2	0	NW	-	-	-	passing
			Eastern Wood-Pewee	EAWP	1	100	SW	-	-	-	passing
			Hairy Woodpecker	HAWO	1	0	SE	-	-	-	passing
PC7-PC8	September 8, 2017	09:24	Blue Jay	BLJA	3	0	SE	-	-	-	passing
			Hairy Woodpecker	HAWO	1	0	SE	-	-	-	passing
			Black-throated Green Warbler	BTNW	1	0	NE	-	-	-	passing
			Black-capped Chickadee	BCCH	2	0	NE	-	-	-	passing
			Blue-headed Vireo	BHVI	1	0	NE	-	-	-	passing
			Northern Parula	NOPA	1	0	NE	-	-	-	passing
			Downy Woodpecker	DOWO	1	0	NE	-	-	-	passing
			Cedar Waxwing	CEDW	3	0	NW	-	-	-	passing
			Song Sparrow	SOSP	1	0	NW	-	-	-	passing
			Northern Flicker	NOFL	1	100	NW	-	-	-	passing
			Magnolia Warbler	MAWA	2	0	NE	-	-	-	passing
			Nashville Warbler	NAWA	1	0	NE	-	-	-	passing
			Purple Finch	PUFI	1	100	SE	-	-	-	passing
			Common Yellowthroat	COYE	2	0	NE	-	-	-	passing
			Red-eyed Vireo	REVI	2	0	NE	-	-	-	passing
			Sharp-shinned Hawk	SSHA	1	0	NE	-	-	-	passing
			Yellow-bellied Sapsucker	YBSA	1	0	NE	-	-	-	passing
			Cedar Waxwing	CEDW	20	0	SE	-	-	-	passing
Swamp Sparrow	SWSP	1	50	SE	-	-	-	passing			
Gray Catbird	GRCA	1	0	SE	-	-	-	passing			
Red-breasted Nuthatch	RBNU	1	0	SE	-	-	-	passing			
PC7-PC9	September 8, 2017	09:51	Black-throated Green Warbler	BTNW	3	0	NE	-	-	-	passing
			Blue Jay	BLJA	2	0	NE	-	-	-	passing
			Black-capped Chickadee	BCCH	4	0	NE	-	-	-	passing
			Red-eyed Vireo	REVI	2	0	NE	-	-	-	passing
			Black-and-white Warbler	BAWW	1	0	NE	-	-	-	passing
			Red-breasted Nuthatch	RBNU	1	0	NE	-	-	-	passing
			Downy Woodpecker	DOWO	1	0	NE	-	-	-	passing
			Magnolia Warbler	MAWA	1	0	NE	-	-	-	passing
PC10-PC11	September 8, 2017	10:24	American Robin	AMRO	4	50	NE	-	-	-	passing
			Blue Jay	BLJA	1	100	NE	-	-	-	passing
			Northern Parula	NOPA	1	0	NE	-	-	-	passing
			Black-capped Chickadee	BCCH	1	0	NE	-	-	-	passing
PC11-PC12	September 8, 2017	10:37	Magnolia Warbler	MAWA	2	0	NE	-	-	-	passing
			American Goldfinch	AMGO	1	100	SE	-	-	-	passing
PC13-PC14	September 8, 2017	11:16	Common Raven	CORA	1	200	SE	-	-	-	passing
			Black-capped Chickadee	BCCH	3	50	NW	-	-	-	passing
			American Black Duck	ABDU	6	100	NE	-	-	-	passing
			Ring-necked Duck	RNDU	1	0	NE	-	-	-	passing
			Blue Jay	BLJA	2	100	SE	-	-	-	passing
PC13-PC15	September 8, 2017	11:41	Northern Parula	NOPA	1	0	SE	-	-	-	passing
			American Goldfinch	AMGO	1	50	SW	-	-	-	passing
PC16-PC17	September 8, 2017	11:53	Common Raven	CORA	1	300	NW	-	-	-	passing
			Black-capped Chickadee	BCCH	5	0	NW	-	-	-	passing
PC18-PC19	September 8, 2017	12:20	Wood Duck	WODU	1	200	SW	-	-	-	passing
			Hooded Merganser	HOME	3	200	SW	-	-	-	passing
			Ring-necked Duck	RNDU	2	200	SW	-	-	-	passing
			Black-capped Chickadee	BCCH	2	0	SW	-	-	-	passing
			Red-eyed Vireo	REVI	1	0	SW	-	-	-	passing
			Cedar Waxwing	CEDW	3	0	SW	-	-	-	passing
			Red-breasted Nuthatch	RBNU	1	0	SW	-	-	-	passing
PC20-PC21	September 14, 2017	07:12	Wood Duck	WODU	3	-	-	-	-	-	passing
			Lesser Yellowlegs	LEYE	1	-	-	-	-	-	passing
			Yellow-bellied Sapsucker	YBSA	1	-	-	-	-	-	passing
			American Robin	AMRO	2	-	-	-	-	-	passing
			Pileated Woodpecker	PIWO	1	-	-	-	-	-	passing
			American Robin	AMRO	1	100	SE	-	-	-	passing
			Common Raven	CORA	1	100	SW	-	-	-	passing
			Pileated Woodpecker	PIWO	1	300	SW	-	-	-	passing
			-	Warb sp.	1	50	SW	-	-	-	passing
			Common Yellowthroat	COYE	1	100	SW	-	-	-	passing
PC21-PC22	September 14, 2017	07:29	Red-breasted Nuthatch	RBNU	2	0	SW	-	-	-	passing
			Black-capped Chickadee	BCCH	3	0	NW	-	-	-	passing
			Common Raven	CORA	1	500	SW	-	-	-	passing
			Blue Jay	BLJA	1	0	SW	Y	50m+	-	passing
			Ovenbird	OVEN	1	0	SW	-	-	-	passing
PC22-PC23	September 14, 2017	07:40	Yellow-rumped Warbler	YRWA	1	0	SW	-	-	-	passing
			Brown Creeper	BRCR	1	50	NE	-	-	-	passing
			-	Warb sp.	4	0	NW	-	-	-	passing
			Golden-crowned Kinglet	GCKI	2	0	SE	-	-	-	passing
			Downy Woodpecker	DOWO	1	0	SE	-	-	-	passing
			Yellow-rumped Warbler	YRWA	1	0	NW	-	-	-	passing
			Green-winged Teal	GWTE	5	400	NE	-	-	-	passing
			Wood Duck	WODU	1	300	NE	-	-	-	passing
PC24-PC25	September 14, 2017	08:31	Mallard	MALL	2	0	NE	-	-	-	passing
			Red-winged Blackbird	RWBL	1	0	NE	-	-	-	passing
			Yellow Warbler	YEWA	1	0	NW	-	-	-	passing
			Northern Parula	NOPA	1	0	NW	-	-	-	passing
			Red-eyed Vireo	REVI	1	0	NW	-	-	-	passing
			Yellow-rumped Warbler	YRWA	1	0	NW	-	-	-	passing
			Black-and-white Warbler	BAWW	1	0	NW	-	-	-	Singing
			Yellow-bellied Sapsucker	YBSA	1	0	NW	-	-	-	passing
			Blue-headed Vireo	BHVI	1	100	NE	-	-	-	Singing
			Red-breasted Nuthatch	RBNU	2	100	NW	-	-	-	passing
			Hairy Woodpecker	HAWO	1	50	NW	-	-	-	passing
Green-winged Teal	GWTE	3	0	SE	-	-	-	passing			
Ring-necked Duck	RNDU	1	50	SE	-	-	-	passing			
American Black Duck	ABDU	2	100	SE	-	-	-	passing			
Common Raven	CORA	1	200	SE	-	-	-	passing			
Swamp Sparrow	SWSP	3	0	SE	-	-	-	passing			

**Appendix D - Bird Survey Data**  
**Table D-2: Fall Migration Line Transect Survey Data, 2017**  
**Project Number: 171-10478**

Site Number	Date	Survey Start	Species Name	Species Code	No. of Birds	Distance (m)	Bearing	Fly-by	Passage Height (m)	Passage Direction	Behaviour / Comments
PC24-PC25	September 14, 2017	08:31	Ruby-crowned Kinglet	RCKI	1	100	NW	-	-	-	passing
			Blue Jay	BLJA	2	100	NW	-	-	-	passing
PC25-PC26	September 14, 2017	09:07	Hairy Woodpecker	HAWO	1	0	NE	-	-	-	passing
			Black-capped Chickadee	BCCH	1	0	NW	-	-	-	passing
			Blue Jay	BLJA	2	50	NW	-	-	-	passing
PC26-PC24	September 14, 2017	09:18	Red-eyed Vireo	REVI	1	100	SE	-	-	-	passing
			Black-capped Chickadee	BCCH	4	0	NW	-	-	-	passing
			Blue Jay	BLJA	1	200	SE	-	-	-	passing
PC28-PC29	September 14, 2017	10:02	Red-breasted Nuthatch	RBNU	1	100	SW	-	-	-	passing
			Blue Jay	BLJA	3	0	SW	-	-	-	passing
			Common Yellowthroat	COYE	1	0	SE	-	-	-	passing
			Black-capped Chickadee	BCCH	2	0	SE	-	-	-	passing
			Wood Duck	WODU	1	200	SE	-	-	-	passing
			American Robin	AMRO	1	100	SW	-	-	-	passing
			American Goldfinch	AMGO	1	100	SW	-	-	-	passing
			American Black Duck	ABDU	2	0	SE	-	-	-	passing
			Song Sparrow	SOSP	1	0	SE	-	-	-	passing
			Black-capped Chickadee	BCCH	4	0	SE	-	-	-	passing
			Black-throated Green Warbler	BTNW	1	0	SE	-	-	-	passing
			Blue-headed Vireo	BHVI	1	0	SE	-	-	-	passing
			Brown Creeper	BRCR	1	0	SE	-	-	-	passing
			Red-breasted Nuthatch	RBNU	1	50	SE	-	-	-	passing
Golden-crowned Kinglet	GCKI	2	50	SE	-	-	-	passing			
PC29-PC30	September 14, 2017	10:20	Northern Flicker	NOFL	1	200	NE	-	-	-	passing
			Hermit Thrush	HETH	2	0	SE	-	-	-	CF
			Hairy Woodpecker	HAWO	1	50	SE	-	-	-	passing
			Eastern Wood-Pewee	EAWP	1	50	SE	-	-	-	passing
			Black-capped Chickadee	BCCH	3	50	SE	-	-	-	passing
			American Goldfinch	AMGO	1	0	SE	-	-	-	passing
			Purple Finch	PUFI	1	100	SE	-	-	-	passing
			White-throated Sparrow	WTSP	1	50	SE	-	-	-	passing
			Golden-crowned Kinglet	GCKI	1	50	NE	-	-	-	passing
			-	Empidonax sp.	1	50	SW	-	-	-	passing
PC30-PC31	September 14, 2017	10:35	Golden-crowned Kinglet	GCKI	4	50	SW	-	-	-	passing
			-	Warb sp.	1	50	SW	-	-	-	passing
			Blue Jay	BLJA	2	200	SW	-	-	-	passing
			Purple Finch	PUFI	1	100	SW	-	-	-	passing
			Black-capped Chickadee	BCCH	2	100	SW	-	-	-	passing
			Pine Siskin	PISI	1	0	NW	-	-	-	passing
			Common Yellowthroat	COYE	1	0	SE	-	-	-	passing
			Red-breasted Nuthatch	RBNU	1	50	NW	-	-	-	passing
PC1-PC3	September 25, 2017	07:13	American Goldfinch	AMGO	1	100	SE	-	-	-	passing
			Golden-crowned Kinglet	GCKI	2	0	NE	-	-	-	passing
			Blackpoll Warbler	BLPW	6	0	NE	-	-	-	passing
			Purple Finch	PUFI	1	0	SE	-	-	-	passing
			Red-breasted Nuthatch	RBNU	2	50	SE	-	-	-	passing
			American Robin	AMRO	1	50	SE	-	-	-	passing
			Blue Jay	BLJA	1	50	SE	-	-	-	passing
PC3-PC4	September 25, 2017	07:33	Red-eyed Vireo	REVI	1	0	NW	-	-	-	passing
			Black-capped Chickadee	BCCH	4	0	NE	-	-	-	passing
			Golden-crowned Kinglet	GCKI	4	50	NW	-	-	-	passing
			Blue-headed Vireo	BHVI	1	0	NW	-	-	-	slnging
			Blackpoll Warbler	BLPW	6	0	NW	-	-	-	passing
			Purple Finch	PUFI	1	0	NW	Y	SE	150m+	passing
			Pileated Woodpecker	PIWO	1	200	NW	-	-	-	passing
			Black-capped Chickadee	BCCH	4	0	SW	-	-	-	passing
			American Goldfinch	AMGO	8	0	SE	-	N	50m +	passing
			White-throated Sparrow	WTSP	2	0	SE	-	-	-	passing
PC1-PC5	September 25, 2017	08:06	Blue Jay	BLJA	2	100	SE	-	-	-	passing
			Yellow-rumped Warbler	YRWA	1	50	NW	-	-	-	passing
			Red-breasted Nuthatch	RBNU	2	50	NW	-	-	-	passing
			Common Raven	CORA	3	0	NE	-	west	-50m	passing
			Swamp Sparrow	SWSP	2	0	NW	-	-	-	passing
			Common Yellowthroat	COYE	1	0	NW	-	-	-	passing
			Ruby-crowned Kinglet	RCKI	1	0	NW	-	-	-	passing
			American Crow	AMCR	2	300	NW	-	-	-	passing
			Brown Creeper	BRCR	1	50	SW	-	-	-	passing
			Golden-crowned Kinglet	GCKI	4	0	SW	-	-	-	passing
			Red-breasted Nuthatch	RBNU	3	0	SW	-	-	-	passing
			Brown Creeper	BRCR	1	0	SW	-	-	-	passing
			Hairy Woodpecker	HAWO	1	0	SE	-	-	-	passing
			Black-capped Chickadee	BCCH	3	0	SE	-	-	-	passing
PC5-PC6	September 25, 2017	08:21	Blackpoll Warbler	BLPW	2	0	SE	-	-	-	passing
			Hermit Thrush	HETH	1	0	SE	-	-	-	passing
			Blue Jay	BLJA	2	200	SE	-	-	-	passing
			Golden-crowned Kinglet	GCKI	1	0	SE	-	-	-	passing
			Blackpoll Warbler	BLPW	1	0	SE	-	-	-	passing
			American Crow	AMCR	2	500	SE	-	-	-	passing
			Common Raven	CORA	2	0	NW	-	E	-50m	passing
PC6-PC7	September 25, 2017	08:36	Red-breasted Nuthatch	RBNU	2	50	NW	-	-	-	passing
			Northern Parula	NOPA	1	0	NE	-	-	-	passing
			Brown Creeper	BRCR	1	0	NW	-	-	-	passing
			Yellow-bellied Sapsucker	YBSA	1	0	NW	-	-	-	passing
			Red-eyed Vireo	REVI	1	0	NE	-	-	-	passing
			American Goldfinch	AMGO	2	0	SE	-	-	-	passing
			Nashville Warbler	NAWA	1	0	SE	-	-	-	passing
			Blackpoll Warbler	BLPW	3	0	SE	-	-	-	passing
			Red-breasted Nuthatch	RBNU	3	0	SE	-	-	-	passing
			Golden-crowned Kinglet	GCKI	4	0	SE	-	-	-	passing
PC7-PC8	September 25, 2017	08:54	Black-capped Chickadee	BCCH	4	0	SE	-	-	-	passing
			Dark-eyed Junco	DEJU	1	0	SE	-	-	-	passing
			Blue Jay	BLJA	1	0	SE	-	-	-	passing
			Purple Finch	PUFI	1	50	SE	-	-	-	passing
			Pileated Woodpecker	PIWO	1	200	SW	-	-	-	passing
			Pileated Woodpecker	PIWO	1	100	SW	-	-	-	passing
			American Crow	AMCR	3	0	SE	-	-	-	passing
			Black-capped Chickadee	BCCH	5	50	SE	-	-	-	passing
Common Raven	CORA	1	200	SW	-	-	-	passing			

Appendix D - Bird Survey Data  
 Table D-2: Fall Migration Line Transect Survey Data, 2017  
 Project Number: 171-10478

Site Number	Date	Survey Start	Species Name	Species Code	No. of Birds	Distance (m)	Bearing	Fly-by	Passage Height (m)	Passage Direction	Behaviour / Comments
PC7-PC8	September 25, 2017	08:54	Song Sparrow	SOSP	5	0	SE	-	-	-	Agitated
			American Goldfinch	AMGO	4	0	SE	-	-	-	passing
			Hermit Thrush	HETH	2	50	SE	-	-	-	passing
			Blackpoll Warbler	BLPW	3	0	SE	-	-	-	passing
			Black-throated Green Warbler	BTNW	1	0	SE	-	-	-	passing
			Swamp Sparrow	SWSP	2	0	SE	-	-	-	passing
			Blue Jay	BLJA	2	100	SE	-	-	-	passing
			Common Yellowthroat	COYE	2	0	SE	-	-	-	passing
			Red-breasted Nuthatch	RBNU	3	0	SE	-	-	-	passing
PC7-PC9	September 25, 2017	09:41	Blue-headed Vireo	BHVI	1	50	NW	-	-	-	slnging
			Black-capped Chickadee	BCCH	4	0	SE	-	-	-	passing
			Blue Jay	BLJA	1	50	SW	-	-	-	passing
			American Crow	AMCR	2	300	SW	-	-	-	passing
			Downy Woodpecker	DOWO	1	50	SW	-	-	-	passing
			Blackpoll Warbler	BLPW	4	0	SW	-	-	-	passing
			Black-throated Green Warbler	BTNW	1	0	SW	-	-	-	passing
			Northern Flicker	NOFL	1	100	SW	-	-	-	passing
			Hermit Thrush	HETH	2	0	SW	-	-	-	passing
			Blackburnian Warbler	BLBW	1	0	SW	-	-	-	passing
			Red-eyed Vireo	REVI	2	0	SW	-	-	-	passing
			Golden-crowned Kinglet	GCKI	3	0	SW	-	-	-	passing
PC10-PC11	September 25, 2017	10:17	Hairy Woodpecker	HAWO	1	50	NW	-	-	-	passing
			Black-capped Chickadee	BCCH	3	0	SE	-	-	-	passing
			Red-breasted Nuthatch	RBNU	2	0	SE	-	-	-	passing
PC11-PC12	September 25, 2017	10:27	American Crow	AMCR	2	300	NW	-	-	-	passing
			Red-breasted Nuthatch	RBNU	1	0	NW	-	-	-	passing
			Golden-crowned Kinglet	GCKI	2	0	NW	-	-	-	passing
			Hermit Thrush	HETH	1	0	NW	-	-	-	passing
			Blue Jay	BLJA	2	100	SW	-	-	-	passing
			Red-tailed Hawk	RTHA	1	0	NE	Y	SW	100m+	passing
			Red-eyed Vireo	REVI	2	0	SE	-	-	-	passing
			Cedar Waxwing	CEDW	2	50	SE	-	-	-	passing
			Blackpoll Warbler	BLPW	2	0	NW	-	-	-	passing
			Purple Finch	PUFI	2	100	NW	-	-	-	passing
			Black-capped Chickadee	BCCH	2	50	SE	-	-	-	passing
			American Goldfinch	AMGO	1	50	SE	-	-	-	passing
			White-throated Sparrow	WTSP	1	50	SE	-	-	-	passing
			American Robin	AMRO	2	0	SE	-	-	-	passing
			Common Yellowthroat	COYE	2	0	SE	-	-	-	passing
PC13-PC15	September 25, 2017	11:10	Blue-headed Vireo	BHVI	1	100	SE	-	-	-	slnging
			Northern Flicker	NOFL	1	100	SE	-	-	-	passing
			American Black Duck	ABDU	24	100	NE	-	-	-	passing
			Green-winged Teal	GWTE	10	100	NE	-	-	-	passing
			Song Sparrow	SOSP	5	0	SW	-	-	-	passing
			Common Yellowthroat	COYE	1	0	SW	-	-	-	passing
			Common Raven	CORA	1	200	SW	-	-	-	passing
PC16-PC17	September 25, 2017	11:26	American Goldfinch	AMGO	1	100	SW	-	-	-	passing
			Northern Flicker	NOFL	1	0	SW	-	-	-	passing
PC16-PC17	September 25, 2017	11:26	Wood Duck	WODU	2	50	SE	-	-	-	passing
			Green-winged Teal	GWTE	1	50	SW	-	-	-	passing
			American Black Duck	ABDU	5	50	SW	-	-	-	passing
			Black-capped Chickadee	BCCH	2	0	NE	-	-	-	passing
			Swamp Sparrow	SWSP	1	0	NE	-	-	-	passing
			Song Sparrow	SOSP	1	0	NE	-	-	-	passing
			Common Yellowthroat	COYE	1	0	NE	-	-	-	passing
			Golden-crowned Kinglet	GCKI	2	0	SW	-	-	-	passing
PC18-PC19	September 25, 2017	11:32	Downy Woodpecker	DOWO	1	50	SW	-	-	-	passing
			Common Raven	CORA	2	50	SE	Y	NW	100m+	passing
			Song Sparrow	SOSP	3	0	NW	-	-	-	passing
			Black-capped Chickadee	BCCH	5	50	NW	-	-	-	passing
			Wood Duck	WODU	2	50	SW	-	-	-	passing
			Yellow-rumped Warbler	YRWA	1	0	NW	-	-	-	passing
			Blue Jay	BLJA	2	100	NW	-	-	-	passing
			Red-breasted Nuthatch	RBNU	1	50	NW	-	-	-	passing
			Greater Yellowlegs	GRYE	1	300	NW	-	-	-	passing
			Blue-headed Vireo	BHVI	1	200	NW	-	-	-	passing
			Pileated Woodpecker	PIWO	1	100	SW	-	-	-	passing
			PC20-PC21	September 26, 2017	07:15	Purple Finch	PUFI	1	100	SW	-
Blackpoll Warbler	BLPW	1				0	SE	-	-	-	passing
Magnolia Warbler	MAWA	1				0	SE	-	-	-	passing
Swamp Sparrow	SWSP	1				0	SE	-	-	-	passing
Red-breasted Nuthatch	RBNU	2				100	SW	-	-	-	passing
Yellow-rumped Warbler	YRWA	12				-	-	-	-	-	passing
Swamp Sparrow	SWSP	1				-	-	-	-	-	passing
Song Sparrow	SOSP	2				-	-	-	-	-	passing
Savannah Sparrow	SAVS	3				-	-	-	-	-	passing
Northern Flicker	NOFL	1				-	-	-	-	-	passing
Bonaparte's Gull	BOGU	26				-	-	-	-	-	passing
American Black Duck	ABDU	20				-	-	-	-	-	passing
Willet	WILL	1				-	-	-	-	-	passing
Greater Yellowlegs	GRYE	1				-	-	-	-	-	passing
Lesser Yellowlegs	LEYE	3				-	-	-	-	-	passing
PC21-PC22	September 26, 2017	07:48	Northern Parula	NOPA	1	-	-	-	-	-	passing
			Bald Eagle	BAEA	3	-	-	-	-	-	passing
			Black-capped Chickadee	BCCH	4	-	-	-	-	-	passing
			Pileated Woodpecker	PIWO	1	100	NE	-	-	-	passing
			Blackpoll Warbler	BLPW	2	0	SE	-	-	-	passing
			Black-capped Chickadee	BCCH	6	0	SE	-	-	-	passing
			Golden-crowned Kinglet	GCKI	3	0	SE	-	-	-	passing
			Red-breasted Nuthatch	RBNU	2	0	SE	-	-	-	passing
			Golden-crowned Kinglet	GCKI	1	0	NW	-	-	-	passing
			American Crow	AMCR	1	400	NE	-	-	-	passing
			Blackpoll Warbler	BLPW	2	0	NW	-	-	-	passing
			PC22-PC23	September 26, 2017	08:00	Black-capped Chickadee	BCCH	4	50	SW	-
Golden-crowned Kinglet	GCKI	4				50	SW	-	-	-	passing
Common Raven	CORA	1				100	SE	-	-	-	passing
American Crow	AMCR	2				200	SE	-	-	-	passing
Swamp Sparrow	SWSP	2				50	SE	-	-	-	passing

Appendix D - Bird Survey Data  
 Table D-2: Fall Migration Line Transect Survey Data, 2017  
 Project Number: 171-10478

Site Number	Date	Survey Start	Species Name	Species Code	No. of Birds	Distance (m)	Bearing	Fly-by	Passage Height (m)	Passage Direction	Behaviour / Comments
PC22-PC23	September 26, 2017	08:00	American Goldfinch	AMGO	2	50	SE	-	-	-	passing
			Common Yellowthroat	COYE	1	50	SE	-	-	-	passing
			Blackpoll Warbler	BLPW	2	0	SE	-	-	-	passing
			Brown Creeper	BRCR	1	50	SE	-	-	-	passing
			Wood Duck	WODU	5	0	NW	-	-	-	passing
			Blue Jay	BLJA	1	300	NW	-	-	-	passing
			Hermit Thrush	HETH	1	0	SW	-	-	-	passing
			Yellow-bellied Sapsucker	YBSA	1	0	SW	-	-	-	passing
			Black-capped Chickadee	BCCH	5	0	SW	-	-	-	passing
			Red-eyed Vireo	REVI	1	0	SW	-	-	-	passing
PC24-PC25	September 26, 2017	09:28	Common Raven	CORA	1	500	SW	-	-	-	passing
			Blue Jay	BLJA	1	300	SW	-	-	-	passing
			Brown Creeper	BRCR	3	0	SW	-	-	-	passing
			Black-capped Chickadee	BCCH	8	0	SW	-	-	-	passing
			Red-breasted Nuthatch	RBNU	3	0	SW	-	-	-	passing
PC25-PC26	September 26, 2017	09:50	Golden-crowned Kinglet	GCKI	3	-	-	-	-	-	passing
			Red-breasted Nuthatch	RBNU	3	-	-	-	-	-	passing
			Black-capped Chickadee	BCCH	4	-	-	-	-	-	passing
PC26-PC24	September 26, 2017	10:01	Golden-crowned Kinglet	GCKI	2	50	NW	-	-	-	passing
			Black-capped Chickadee	BCCH	2	50	NW	-	-	-	passing
			Blue Jay	BLJA	4	0	NW	-	-	-	passing
PC28-PC29	September 26, 2017	10:25	Green-winged Teal	GWTE	2	0	SW	-	-	-	passing
			Black-capped Chickadee	BCCH	4	50	NW	-	-	-	passing
PC29-PC30	September 26, 2017	10:32	Golden-crowned Kinglet	GCKI	2	0	NW	-	-	-	passing
			Blue Jay	BLJA	1	0	NW	-	-	-	passing
PC30-PC31	September 26, 2017	10:46	Blue-headed Vireo	BHVI	1	500	NW	-	-	-	passing
			Black-capped Chickadee	BCCH	4	0	SW	-	-	-	passing
			Swamp Sparrow	SWSP	1	0	SW	-	-	-	passing
			Golden-crowned Kinglet	GCKI	2	0	SW	-	-	-	passing
			Red-breasted Nuthatch	RBNU	2	0	SW	-	-	-	passing
			Downy Woodpecker	DOWO	1	50	SW	-	-	-	passing
			American Black Duck	ABDU	1	50	SE	-	-	-	passing
Northern Flicker	NOFL	1	100	SE	-	-	-	passing			
PC20-PC21	October 12, 2017	07:29	-	Warb sp.	1	50	SW	-	-	-	passing
			Wood Duck	WODU	1	-	-	-	-	-	passing
			American Black Duck	ABDU	30	-	-	-	-	-	passing
			Ring-billed Gull	RBGU	5	-	-	-	-	-	passing
			Lapland Longspur	LALO	1	-	-	-	-	-	passing
			Northern Harrier	NOHA	1	-	-	-	-	-	passing
			American Robin	AMRO	2	-	-	-	-	-	passing
			Golden-crowned Kinglet	GCKI	2	0	SW	-	-	-	passing
			Blue Jay	BLJA	1	50	SW	-	-	-	passing
PC21-PC22	October 12, 2017	07:40	Cedar Waxwing	CEDW	2	50	SW	-	-	-	passing
			Pileated Woodpecker	PIWO	1	50	SW	-	-	-	passing
			Golden-crowned Kinglet	GCKI	1	0	NE	-	-	-	passing
			Black-capped Chickadee	BCCH	2	0	NW	-	-	-	passing
PC22-PC23	October 12, 2017	07:50	Red-breasted Nuthatch	RBNU	1	50	NW	-	-	-	passing
			Brown Creeper	BRCR	1	50	NW	-	-	-	passing
			Blue Jay	BLJA	2	200	NE	-	-	-	passing
			Common Raven	CORA	3	200	NE	-	-	-	passing
			Black-capped Chickadee	BCCH	2	100	NE	-	-	-	passing
			Wood Duck	WODU	4	300	NE	-	-	-	passing
			Green-winged Teal	GWTE	4	300	NE	-	-	-	passing
PC26-PC24	October 12, 2017	08:35	American Crow	AMCR	2	100	NE	-	-	-	passing
			Northern Flicker	NOFL	1	100	NE	-	-	-	passing
			Black-capped Chickadee	BCCH	3	0	NW	-	-	-	passing
			Golden-crowned Kinglet	GCKI	2	50	NE	-	-	-	passing
			Ruffed Grouse	RUGR	1	100	NW	-	-	-	passing
			Red-breasted Nuthatch	RBNU	2	50	NW	-	-	-	passing
PC25-PC26	October 12, 2017	08:44	Brown Creeper	BRCR	4	0	SE	-	-	-	passing
			Hermit Thrush	HETH	2	0	SW	-	-	-	passing
			Black-capped Chickadee	BCCH	4	50	SW	-	-	-	passing
			Golden-crowned Kinglet	GCKI	2	50	SW	-	-	-	passing
			Ruffed Grouse	RUGR	1	0	SW	-	-	-	passing
PC24-PC25	October 12, 2017	08:56	Red-breasted Nuthatch	RBNU	3	-	-	-	-	-	passing
			Brown Creeper	BRCR	2	-	-	-	-	-	passing
			American Crow	AMCR	5	500	NE	-	-	-	passing
			Blue Jay	BLJA	1	-	-	-	-	-	passing
PC28-PC29	October 12, 2017	09:20	Hermit Thrush	HETH	1	50	NE	-	-	-	slinging
			Black-capped Chickadee	BCCH	4	50	SW	-	-	-	passing
			Golden-crowned Kinglet	GCKI	2	50	SW	-	-	-	passing
			Red-breasted Nuthatch	RBNU	3	50	SW	-	-	-	passing
			Golden-crowned Kinglet	GCKI	2	0	SW	-	-	-	passing
			Common Raven	CORA	2	400	NW	-	-	-	passing
PC30-PC31	October 12, 2017	09:37	Blue Jay	BLJA	1	100	SW	-	-	-	passing
			Red-breasted Nuthatch	RBNU	2	50	NW	-	-	-	passing
			Golden-crowned Kinglet	GCKI	2	50	NW	-	-	-	passing
			Black-capped Chickadee	BCCH	4	50	NW	-	-	-	passing
			Brown Creeper	BRCR	1	50	NW	-	-	-	passing
PC1-PC3	October 13, 2017	07:39	Northern Flicker	NOFL	1	100	SE	-	-	-	passing
			American Robin	AMRO	3	100	SW	-	-	-	passing
			Blue Jay	BLJA	3	100	SW	-	-	-	passing
			Black-capped Chickadee	BCCH	5	0	SW	-	-	-	passing
			-	Blackbird sp.	20	200	NE	-	-	-	passing
			Purple Finch	PUFI	2	0	SW	Y	100m+	Northeast	passing
			American Goldfinch	AMGO	3	100	NW	-	-	-	passing
			Dark-eyed Junco	DEJU	2	0	NW	-	-	-	passing
			Yellow-rumped Warbler	YRWA	1	0	SW	-	-	-	passing
PC3-PC4	October 13, 2017	07:51	Red-breasted Nuthatch	RBNU	1	50	SW	-	-	-	passing
			Golden-crowned Kinglet	GCKI	2	0	NW	-	-	-	passing
PC3-PC4	October 13, 2017	07:51	Ruby-crowned Kinglet	RCKI	1	0	NW	-	-	-	passing
			Black-capped Chickadee	BCCH	2	50	SW	-	-	-	passing
PC3-PC4	October 13, 2017	07:51	Yellow-rumped Warbler	YRWA	1	0	NW	-	-	-	passing

**Appendix D - Bird Survey Data**  
**Table D-2: Fall Migration Line Transect Survey Data, 2017**  
**Project Number: 171-10478**

Site Number	Date	Survey Start	Species Name	Species Code	No. of Birds	Distance (m)	Bearing	Fly-by	Passage Height (m)	Passage Direction	Behaviour / Comments
PC3-PC4	October 13, 2017	07:51	Red-breasted Nuthatch	RBNU	2	0	NW	-	-	-	passing
			Pileated Woodpecker	PIWO	1	300	NW	-	-	-	passing
			American Robin	AMRO	4	50	NE	Y	50m+	West	passing
			Ruby-crowned Kinglet	RCKI	1	0	NW	-	-	-	passing
			Song Sparrow	SOSP	1	0	SW	-	-	-	passing
			Black-capped Chickadee	BCCH	7	0	SW	-	-	-	passing
			Dark-eyed Junco	DEJU	1	0	SW	-	-	-	passing
			Hairy Woodpecker	HAWO	1	100	SW	-	-	-	passing
			Purple Finch	PUFI	2	50	SE	-	-	-	passing
			American Goldfinch	AMGO	3	0	NE	Y	50m+	South	passing
			American Crow	AMCR	5	500	NW	-	-	-	passing
			Brown Creeper	BRCR	1	0	NW	-	-	-	passing
Northern Flicker	NOFL	1	100	SW	-	-	-	passing			
PC1-PC5	October 13, 2017	08:31	Red-breasted Nuthatch	RBNU	2	0	NW	-	-	-	passing
			Black-capped Chickadee	BCCH	3	0	NW	-	-	-	passing
			American Goldfinch	AMGO	3	0	NW	-	-	-	passing
			Golden-crowned Kinglet	GCKI	4	0	NW	-	-	-	passing
			Yellow-rumped Warbler	YRWA	1	0	NW	-	-	-	passing
PC5-PC6	October 13, 2017	08:42	Blue Jay	BLJA	2	300	SW	-	-	-	passing
			Purple Finch	PUFI	3	0	NE	-	-	-	passing
			Black-capped Chickadee	BCCH	4	0	NW	-	-	-	passing
			Yellow-rumped Warbler	YRWA	1	0	NW	-	-	-	passing
			Golden-crowned Kinglet	GCKI	3	50	NW	-	-	-	passing
PC6-PC7	October 13, 2017	08:52	Brown Creeper	BRCR	2	50	NW	-	-	-	passing
			Blue Jay	BLJA	2	50	NW	-	-	-	passing
			Black-capped Chickadee	BCCH	3	0	NE	-	-	-	passing
			Golden-crowned Kinglet	GCKI	1	0	NE	-	-	-	passing
			Red-breasted Nuthatch	RBNU	2	0	NE	-	-	-	passing
PC7-PC9	October 13, 2017	08:59	Black-capped Chickadee	BCCH	3	50	NW	-	-	-	passing
			Red-breasted Nuthatch	RBNU	2	50	NW	-	-	-	passing
			Golden-crowned Kinglet	GCKI	1	0	SE	-	-	-	passing
PC7-PC8	October 13, 2017	09:16	Song Sparrow	SOSP	1	50	SE	-	-	-	passing
			Black-capped Chickadee	BCCH	4	50	SE	-	-	-	passing
			American Goldfinch	AMGO	2	50	SE	-	-	-	passing
			Yellow-rumped Warbler	YRWA	1	50	NW	-	-	-	passing
			Hermit Thrush	HETH	1	50	NW	-	-	-	passing
			American Robin	AMRO	2	100	NW	-	-	-	passing
			Blackpoll Warbler	BLPW	1	50	SW	-	-	-	passing
PC10-PC11	October 13, 2017	10:01	Golden-crowned Kinglet	GCKI	2	50	SW	-	-	-	passing
			American Robin	AMRO	4	100	SW	-	-	-	passing
			Purple Finch	PUFI	2	50	SE	-	-	-	passing
			Black-capped Chickadee	BCCH	3	50	NE	-	-	-	passing
			Golden-crowned Kinglet	GCKI	4	50	NE	-	-	-	passing
			American Goldfinch	AMGO	1	100	NE	-	-	-	passing
			Red-breasted Nuthatch	RBNU	1	50	NW	-	-	-	passing
PC11-PC12	October 13, 2017	10:14	Brown Creeper	BRCR	1	50	NW	-	-	-	passing
			Black-capped Chickadee	BCCH	6	0	NW	-	-	-	passing
			Purple Finch	PUFI	1	0	NW	-	-	-	passing
PC11-PC12	October 13, 2017	10:14	Blue Jay	BLJA	2	0	NW	-	-	-	passing
			Red-breasted Nuthatch	RBNU	2	0	NW	-	-	-	passing
			Golden-crowned Kinglet	GCKI	2	0	NE	-	-	-	passing
PC13-PC15	October 13, 2017	10:53	White-throated Sparrow	WTSP	2	0	NE	-	-	-	passing
			Song Sparrow	SOSP	3	0	SE	-	-	-	passing
			Savannah Sparrow	SAVS	1	0	SE	-	-	-	passing
			Canada Goose	CANG	3	200	NE	Y	?	West	passing
			Black-capped Chickadee	BCCH	2	0	NE	-	-	-	passing
PC16-PC17	October 13, 2017	11:18	Common Raven	CORA	2	300	NE	-	-	-	passing
			Golden-crowned Kinglet	GCKI	2	0	NE	-	-	-	passing
PC18-PC19	October 13, 2017	11:39	Song Sparrow	SOSP	1	0	NE	-	-	-	passing
			Song Sparrow	SOSP	4	50	NW	-	-	-	passing
			Black-capped Chickadee	BCCH	6	50	NW	-	-	-	passing
			Hooded Merganser	HOME	2	300	SW	-	-	-	passing
			Northern Flicker	NOFL	1	100	NW	-	-	-	passing
			Wood Duck	WODU	1	200	NE	-	-	-	passing
			Swamp Sparrow	SWSP	1	0	NW	-	-	-	passing
			White-throated Sparrow	WTSP	1	0	NW	-	-	-	passing
			American Goldfinch	AMGO	3	0	NE	-	-	-	passing
			Pileated Woodpecker	PIWO	1	0	NE	-	-	-	passing
			Downy Woodpecker	DOWO	1	0	NE	-	-	-	passing
			Brown Creeper	BRCR	1	0	NE	-	-	-	passing
PC1-PC3	October 23, 2017	07:34	Ring-necked Pheasant	RNEP	1	0	NE	-	-	-	passing
			American Black Duck	ABDU	2	0	NW	-	-	-	passing
			Golden-crowned Kinglet	GCKI	4	0	NE	-	-	-	passing
			Red-breasted Nuthatch	RBNU	2	0	NE	-	-	-	passing
			American Crow	AMCR	2	100	NE	-	-	-	passing
			Black-capped Chickadee	BCCH	1	0	NE	-	-	-	passing
			Dark-eyed Junco	DEJU	1	0	NE	-	-	-	passing
			Herring Gull	HERG	3	0	NE	-	-	-	passing
			American Robin	AMRO	3	0	NE	Y	50m+	South	passing
PC3-PC4	October 23, 2017	07:52	Purple Finch	PUFI	1	50	NE	-	-	-	passing
			Brown Creeper	BRCR	1	50	SW	-	-	-	passing
			American Goldfinch	AMGO	1	50	SW	-	-	-	passing
			Blue Jay	BLJA	1	0	SW	-	-	-	passing
			American Crow	AMCR	5	200	SE	-	-	-	passing
			Pine Siskin	PISI	5	100	SE	Y	50m+	Northwest	passing
			American Robin	AMRO	37	100	SE	-	50m+	Northwest	passing
			Blue Jay	BLJA	2	50	SW	-	-	-	passing
			Purple Finch	PUFI	8	50	NW	-	-	-	passing
			-	Duck sp	3	100	SE	Y	100m+	Northwest	passing
			Yellow-rumped Warbler	YRWA	2	50	SE	-	-	-	passing
			American Black Duck	ABDU	1	50	SE	-	-	-	passing
Black-capped Chickadee	BCCH	12	0	SE	-	-	-	passing			
Brown Creeper	BRCR	1	0	SE	-	-	-	passing			
Pileated Woodpecker	PIWO	1	0	SE	-	-	-	passing			
Pine Siskin	PISI	4	0	SE	-	-	-	passing			
Red-winged Blackbird	RWBL	11	100	NE	Y	100m+	Southeast	passing			

Appendix D - Bird Survey Data  
 Table D-2: Fall Migration Line Transect Survey Data, 2017  
 Project Number: 171-10478

Site Number	Date	Survey Start	Species Name	Species Code	No. of Birds	Distance (m)	Bearing	Fly-by	Passage Height (m)	Passage Direction	Behaviour / Comments
PC1-PC5	October 23, 2017	08:22	Black-capped Chickadee	BCCH	3	50	SW	-	-	-	passing
			Red-breasted Nuthatch	RBNU	2	50	SW	-	-	-	passing
			Blue Jay	BLJA	3	50	SW	-	-	-	passing
			American Robin	AMRO	1	100	SW	Y	50m+	North	passing
			American Robin	AMRO	2	50	SW	-	-	-	passing
			Golden-crowned Kinglet	GCKI	2	50	SW	-	-	-	passing
PC5-PC6	October 23, 2017	08:29	Dark-eyed Junco	DEJU	1	50	SW	-	-	-	passing
			Golden-crowned Kinglet	GCKI	2	50	SW	-	-	-	passing
			Red-breasted Nuthatch	RBNU	2	50	SW	-	-	-	passing
			Blue Jay	BLJA	1	100	SE	-	-	-	passing
			American Robin	AMRO	2	100	NW	-	-	-	passing
			Pileated Woodpecker	PIWO	1	200	SE	-	-	-	passing
			Black-capped Chickadee	BCCH	5	0	NW	-	-	-	passing
PC6-PC7	October 23, 2017	08:39	Brown Creeper	BRCR	1	50	NE	-	-	-	passing
			Red-breasted Nuthatch	RBNU	1	0	SW	-	-	-	passing
PC7-PC8	October 23, 2017	08:47	Blue Jay	BLJA	2	50	NW	-	-	-	passing
			Black-capped Chickadee	BCCH	2	50	NW	-	-	-	passing
			American Robin	AMRO	2	200	NW	-	-	-	passing
			Pileated Woodpecker	PIWO	1	0	NW	-	-	-	passing
			Golden-crowned Kinglet	GCKI	4	0	NW	-	-	-	passing
			Red-breasted Nuthatch	RBNU	3	0	NW	-	-	-	passing
			Swamp Sparrow	SWSP	1	0	SW	-	-	-	passing
			Song Sparrow	SOSP	1	0	SW	-	-	-	passing
			Purple Finch	PUFI	2	0	NW	-	-	-	passing
			Palm Warbler	PAWA	1	0	SE	-	-	-	passing
			Pine Siskin	PISI	2	50	NE	-	-	-	passing
			Brown Creeper	BRCR	1	0	NE	-	-	-	passing
			Downy Woodpecker	DOWO	1	0	NE	-	-	-	passing
			Red-winged Blackbird	RWBL	4	0	NE	Y	50m+	East	passing
PC7-PC9	October 23, 2017	09:22	American Robin	AMRO	4	0	NE	-	-	-	passing
			Golden-crowned Kinglet	GCKI	4	0	NE	-	-	-	passing
			Black-capped Chickadee	BCCH	3	0	NE	-	-	-	passing
			Purple Finch	PUFI	1	50	NE	-	-	-	passing
			American Goldfinch	AMGO	1	50	SW	Y	50m+	East	passing
			Red-breasted Nuthatch	RBNU	2	0	SW	-	-	-	passing
			Blue Jay	BLJA	2	100	SW	-	-	-	passing
			Hairy Woodpecker	HAWO	1	100	SW	-	-	-	passing
PC10-PC11	October 23, 2017	09:48	Black-capped Chickadee	BCCH	3	0	NE	-	-	-	passing
			American Robin	AMRO	4	100	NE	Y	50m+	West	passing
			Blue Jay	BLJA	2	200	SW	-	-	-	passing
			American Crow	AMCR	2	300	NE	-	-	-	passing
			Red-breasted Nuthatch	RBNU	1	50	NE	-	-	-	passing
			Purple Finch	PUFI	1	100	SW	-	-	-	passing
			Golden-crowned Kinglet	GCKI	1	50	SE	-	-	-	passing
American Goldfinch	AMGO	1	50	SE	-	-	-	passing			



Appendix D - Bird Survey Data  
 Table D-2: Fall Migration Line Transect Survey Data, 2017  
 Project Number: 171-10478

Site Number	Date	Survey Start	Species Name	Species Code	No. of Birds	Distance (m)	Bearing	Fly-by	Passage Height (m)	Passage Direction	Behaviour / Comments
PC11-PC12	October 23, 2017	09:59	American Robin	AMRO	2	50	SW	-	-	-	passing
			Blue Jay	BLJA	1	100	SW	-	-	-	passing
			American Robin	AMRO	2	200	NW	Y	100m+	Southeast	passing
			Black-capped Chickadee	BCCH	2	100	NW	-	-	-	passing
			American Crow	AMCR	3	300	NW	-	-	-	passing
PC13-PC15	October 23, 2017	10:33	American Crow	AMCR	3	300	SW	-	-	-	passing
			Blue Jay	BLJA	2	200	SW	-	-	-	passing
			Black-capped Chickadee	BCCH	3	100	NW	-	-	-	passing
			Green-winged Teal	GWTE	2	50	SE	-	-	-	passing
PC16-PC17	October 23, 2017	10:54	Purple Finch	PUFI	1	50	NW	-	-	-	passing
			Black-capped Chickadee	BCCH	4	50	NW	-	-	-	passing
			American Black Duck	ABDU	2	100	SW	Y	50m+	East	passing
			American Crow	AMCR	4	100	NW	-	-	-	passing
			Song Sparrow	SOSP	1	0	SW	-	-	-	passing
PC18-PC19	October 23, 2017	11:13	Cedar Waxwing	CEDW	3	0	SW	-	-	-	passing
			American Robin	AMRO	4	100	SW	-	-	-	passing
			Blue Jay	BLJA	1	100	SW	-	-	-	passing
			Wood Duck	WODU	2	100	SE	-	-	-	passing
			Red-winged Blackbird	RWBL	2	0	NE	Y	-50m	South	passing
			American Goldfinch	AMGO	2	0	SE	-	-	-	passing
			Song Sparrow	SOSP	4	0	SW	-	-	-	passing
			Dark-eyed Junco	DEJU	3	0	SW	-	-	-	passing
			Red-breasted Nuthatch	RBNU	1	0	SW	-	-	-	passing
PC28-PC29	October 24, 2017	07:46	Cedar Waxwing	CEDW	1	50	SW	-	-	-	passing
			Black-capped Chickadee	BCCH	3	0	SW	-	-	-	passing
			American Goldfinch	AMGO	1	50	SW	-	-	-	passing
			Brown Creeper	BRCR	1	0	SW	-	-	-	passing
			American Black Duck	ABDU	2	50	SW	-	-	-	passing
			American Robin	AMRO	2	100	SW	-	-	-	passing
			Black-capped Chickadee	BCCH	8	0	SE	-	-	-	passing
PC29-PC30	October 24, 2017	08:07	Downy Woodpecker	DOWO	1	50	SE	-	-	-	passing
			Golden-crowned Kinglet	GCKI	2	0	SE	-	-	-	passing
			Common Raven	CORA	2	500	SE	-	-	-	passing
			Pileated Woodpecker	PIWO	1	0	SE	-	-	-	passing
			Blue Jay	BLJA	1	200	SW	-	-	-	passing
PC30-PC31	October 24, 2017	08:17	American Crow	AMCR	3	500	SW	-	-	-	passing
			Downy Woodpecker	DOWO	1	50	SW	-	-	-	passing
			Black-capped Chickadee	BCCH	14	50	SE	-	-	-	passing
			Common Raven	CORA	1	300	SW	-	-	-	passing
			Golden-crowned Kinglet	GCKI	4	50	SE	-	-	-	passing
			Pileated Woodpecker	PIWO	2	50	SW	-	-	-	passing
			Red-breasted Nuthatch	RBNU	4	50	SW	-	-	-	passing
			American Goldfinch	AMGO	1	50	SW	-	-	-	passing
			Brown Creeper	BRCR	1	50	NW	-	-	-	passing
			Purple Finch	PUFI	1	50	SE	-	-	-	passing
American Robin	AMRO	2	50	NE	-	-	-	passing			
Blue Jay	BLJA	1	100	NE	-	-	-	passing			

Appendix D - Bird Survey Data

Table D-2: Fall Migration Line Transect Survey Data, 2017

Project Number: 171-10478

Site Number	Date	Survey Start	Species Name	Species Code	No. of Birds	Distance (m)	Bearing	Fly-by	Passage Height (m)	Passage Direction	Behaviour / Comments
PC26-PC24	October 24, 2017	08:59	Brown Creeper	BRCR	1	50	SW	-	-	-	passing
			Black-capped Chickadee	BCCH	2	50	SW	-	-	-	passing
			American Crow	AMCR	2	300	SW	-	-	-	passing
			Blue Jay	BLJA	1	300	SW	-	-	-	passing
			Golden-crowned Kinglet	GCKI	3	50	SW	-	-	-	passing
PC25-PC26	October 24, 2017	09:11	Downy Woodpecker	DOWO	1	50	SE	-	-	-	passing
			Common Raven	CORA	1	200	SW	-	-	-	passing
			Golden-crowned Kinglet	GCKI	2	50	NW	-	-	-	passing
			Brown Creeper	BRCR	1	50	NW	-	-	-	passing
			Black-capped Chickadee	BCCH	3	50	NE	-	-	-	passing
			Purple Finch	PUFI	1	100	NW	-	-	-	passing
			American Goldfinch	AMGO	1	100	SE	-	-	-	passing
			Pine Siskin	PISI	1	100	SW	-	-	-	passing
American Black Duck	ABDU	4	100	SE	-	-	-	passing			
Green-winged Teal	GWTE	1	100	SE	-	-	-	passing			
PC24-PC25	October 24, 2017	09:23	Golden-crowned Kinglet	GCKI	3	50	SW	-	-	-	passing
			Common Raven	CORA	1	300	NE	-	-	-	passing
			Black-capped Chickadee	BCCH	3	50	NW	-	-	-	passing
PC20-PC21	October 24, 2017	10:24	Blue Jay	BLJA	1	200	SW	-	-	-	passing
			American Crow	AMCR	2	200	SW	-	-	-	passing
			Pileated Woodpecker	PIWO	1	200	NW	-	-	-	passing
			Golden-crowned Kinglet	GCKI	2	50	NE	-	-	-	passing
PC21-PC22	October 24, 2017	10:32	Brown Creeper	BRCR	1	50	NE	-	-	-	passing
			Pileated Woodpecker	PIWO	1	50	SW	-	-	-	passing
			Common Raven	CORA	1	50	SW	-	-	-	passing
			American Crow	AMCR	4	50	SW	-	-	-	passing
PC22-PC23	October 24, 2017	10:43	Red-breasted Nuthatch	RBNU	1	50	SW	-	-	-	passing
			Black-capped Chickadee	BCCH	3	50	SW	-	-	-	passing
			Golden-crowned Kinglet	GCKI	1	0	SW	-	-	-	passing
			Brown Creeper	BRCR	1	0	SE	-	-	-	passing

Appendix D - Bird Survey Data

Table D-3: Nocturnal Owl Survey Data, 2018

Project Number: 171-10478

Site Number	Date	Time	Action	Response
NP24	28-Feb-18	7:36-7:41 PM	Saw Whet Call at 5:00	None
		7:42-7:47 PM	Barred Owl Call at 10:00	None
		7:48-7:53 PM	Great Horned Owl Call at 12:00	None
NP29	28-Feb-18	8:07- 8:13 PM	Saw Whet Call at 5:00	Barred Owl
		8:14- 8:19 PM	Barred Owl Call at 10:00	Barred Owl Pair
		8:20- 8:25 PM	Great Horned Owl Call at 12:00	None
NP21	28-Feb-18	8:44- 8:49 PM	Saw Whet Call at 5:00	None
		8:50- 8:55 PM	Barred Owl Call at 10:00	None
		8:56- 9:01 PM	Great Horned Owl Call at 12:00	None
BEACH	28-Feb-18	9:09- 9:14 PM	Saw Whet Call at 5:00	None
		9:15- 9:20 PM	Barred Owl Call at 10:00	None
		9:21- 9:26 PM	Great Horned Owl Call at 12:00	None
NP1	28-Feb-18	9:46- 9:51 PM	Saw Whet Call at 5:00	None
		9:52- 9:57 PM	Barred Owl Call at 10:00	None
		9:58-10:03 PM	Great Horned Owl Call at 12:00	None
NP7	28-Feb-18	10:05-10:10 PM	Saw Whet Owl Call at 5:00	None
		10:11-10:16 PM	Barred Owl Call at 10:00	None
		10:17-10:22 PM	Great Horned Owl Call at 12:00	None
NP10	28-Feb-18	10:32-10:37 PM	Saw Whet Owl Call at 5:00	None
		10:38-10:43 PM	Barred Owl Call at 10:00	None
		10:44-10:49 PM	Great Horned Owl Call at 12:00	None
NP10	26-Mar-18	8:00-8:05 PM	Saw Whet Call	None
		8:06-8:11 PM	Barred Owl Call	Saw Whet responding (50m NE), Barred owl responding (800m NW)
		8:12-8:17 PM	Great Horned Owl Call	Barred and saw whet continue to call back
NP1	26-Mar-18	8:41-8:46 PM	Saw Whet Call	None
		8:47-8:52 PM	Barred Owl Call	None
		8:53-8:58 PM	Great Horned Owl Call	None
NP7	26-Mar-18	9:03-9:08 PM	Saw Whet Call	None
		9:09-9:14 PM	Barred Owl Call	None
		9:15-9:20 PM	Great Horned Owl Call	None
NP24	26-Mar-18	9:37-9:42 PM	Saw Whet Call	None
		9:43-9:48 PM	Barred Owl Call	Great horned pair calling (~1km E)
		9:49-9:54 PM	Great Horned Owl Call	1 Great Horned calling (~1km E)
NP29	26-Mar-18	10:08-10:13 PM	Saw Whet Call	None
		10:14-10:19 PM	Barred Owl Call	None
		10:20-10:25 PM	Great Horned Owl Call	None
NP21	26-Mar-18	10:39-10:44 PM	Saw Whet Call	Great horned pair (800m SE)
		10:45-10:50 PM	Barred Owl Call	Saw Whet (50m NW), 1 Great Horned (800m SE)
		10:51-10:56 PM	Great Horned Owl Call	Saw Whet continued to call
BEACH	26-Mar-18	11:07-11:12 PM	Saw Whet Call	None
		11:13-11:18 PM	Barred Owl Call	None
		11:19-11:24 PM	Great Horned Owl Call	None

Appendix D - Bird Survey Data

Table D-4: Late Winter/Early Spring Diurnal Vantage Point Watch Count Data, 2018

Project Number: 171-10478

Site Number	Date	Survey Start	Survey End	Species Name	Species Code	No. of Birds	Distance (m)	Bearing	Fly-by	Behaviour / Comments	
WC1	1/Mar/18	7:10:00	7:40:00	Bald Eagle	BAEA	2	100	SE-NW	Y		
				Common Raven	CORA	2	-	-	-	-	
				Bald Eagle	BAEA	1	1000	SE-NW	Y		
				American Crow	AMCR	4	-	-	-	-	
				Red-tailed Hawk	RTHA	1	50	NW-S	Y		
				Pileated Woodpecker	PIWO	1	200	SE-NW	Y		
WC1	1/Mar/18	7:40:00	8:10:00	Bald Eagle	BAEA	1	-	-	-	In trees across the water	
				Common Raven	CORA	1	-	-	-	-	
				Song Sparrow	SOSP	2	-	-	-	-	Singing
				Bald Eagle	BAEA	2	1000	-	-	-	In trees across the water
				Bald Eagle	BAEA	1	100	NE-NW	-	-	Almost grabbed raven
				Bald Eagle	BAEA	1	800	NE	-	-	Sitting in pine tree
WC1	1/Mar/18	8:40:00	9:10:00	Bald Eagle	BAEA	2	500	SE-N	Y	All six BAEA seen at one time (this and previous three obs.)	
				Ring-necked Duck	RNDU	1	-	-	-	-	In water
				Bald Eagle	BAEA	1	200	-	-	-	Across field in tree
				Bald Eagle	BAEA	1	100	NE-S	Y	-	
				Red-tailed Hawk	RTHA	1	200	-	-	-	Sitting in tree across field
				Hairy Woodpecker	HAWO	1	-	-	-	-	
WC2	1/Mar/18	9:31:00		Blue Jay	BLJA	3	-	-	-		
				Black-capped Chickadee	BCCH	2	-	-	-	-	
				Song Sparrow	SOSP	2	-	-	-	-	Singing
				Bald Eagle	BAEA	1	100	-	Y	-	Soaring
				American Crow	AMCR	5	-	-	-	-	
				Common Raven	CORA	19	-	-	-	-	
WC2	1/Mar/18	10:01:00	10:31:00	Common Goldeneye	COGO	13	-	-	-		
				Red-breasted Merganser	RBME	4	-	-	-	-	
				Long-tailed Duck	LTDU	5	-	-	-	-	
				American Black Duck	ABDU	10	-	-	-	-	
				Mallard	MALL	2	-	-	-	-	
				Pileated Woodpecker	PIWO	1	-	-	-	-	
WC2	1/Mar/18	10:31:00	11:01:00	Bald Eagle	BAEA	4	3000	-	-	Across harbour	
				Common Raven	CORA	35	-	-	-	-	Across harbour near eagle
				Common Raven	CORA	1	50	NW-SE	-	-	Carrying nest material
WC2	1/Mar/18	10:31:00	11:01:00	Bald Eagle	BAEA	1	50	SE-N	Y		
				Bald Eagle	BAEA	9	3000	-	-	-	Across water
				Herring Gull	HERG	3	-	-	-	-	
WC2	1/Mar/18	11:01:00	11:31:00	Hooded Merganser	HOME	4	100	-	-	In pond	
				Common Merganser	COME	2	50	NW-S	Y		
				Lesser Scaup	LESC	49	-	-	-	-	
WC1	27/Mar/18	7:25:00	7:55:00	Pileated Woodpecker	PIWO	1	-	-	-		
				Common Raven	CORA	2	-	-	-	-	
				Black-capped Chickadee	BCCH	2	-	-	-	-	
				Song Sparrow	SOSP	1	-	-	-	-	
				Red-winged Blackbird	RWBL	1	-	-	-	-	
				Hooded Merganser	HOME	1	-	-	-	-	
WC1	27/Mar/18	7:55:00	8:25:00	Common Goldeneye	COGO	1	-	-	-		
				Bald Eagle	BAEA	1	800	NE	-	-	In tree line
				American Robin	AMRO	1	-	-	-	-	
				Northern Flicker	NOFL	1	-	-	-	-	
				American Black Duck	ABDU	2	-	-	-	-	
				Purple Finch	PUFI	1	-	-	-	-	
WC1	27/Mar/18	8:25:00	8:05:00	Red-winged Blackbird	RWBL	1	-	-	-		
				Red-breasted Nuthatch	RBNH	1	-	-	-	-	
				Song Sparrow	SOSP	1	-	-	-	-	
				Blue Jay	BLJA	2	-	-	-	-	
				American Crow	AMCR	20	-	-	-	-	
				Pileated Woodpecker	PIWO	1	-	-	-	-	
WC2	27/Mar/18	9:54:00	10:24:00	Evening Grosbeak	EVGR	5	-	-	-		
				Brown Creeper	BRCR	1	-	-	-	-	
				Hooded Merganser	HOME	4	-	-	-	-	
				Common Raven	CORA	2	-	-	-	-	
				American Crow	AMCR	8	-	-	-	-	
				Black-capped Chickadee	BCCH	2	-	-	-	-	
WC2	27/Mar/18	10:24:00	10:54:00	Song Sparrow	SOSP	2	-	-	-		
				American Black Duck	ABDU	6	-	-	-	-	
				Mourning Dove	MODD	2	-	-	-	-	
				Bald Eagle	BAEA	1	1000	N	-	-	On ice flow
				Ring-necked Pheasant	RNEP	1	-	-	-	-	
				Blue Jay	BLJA	3	-	-	-	-	
WC2	27/Mar/18	10:54:00	11:24:00	Bald Eagle	BAEA	1	200	SE	-		
				Bald Eagle	BAEA	2	3000	N	-	-	On ice
WC2	27/Mar/18	11:24:00	11:54:00	Ring-billed Gull	RBGU	1	50	-	-		
				Mallard	MALL	2	-	-	-	-	
WC2	27/Mar/18	11:24:00	11:54:00	American Goldfinch	AMGO	2	-	-	-		



Appendix D - Bird Survey Data  
 Table D-5: Spring Migration Vantage Point Watch Count Survey Data, 2018  
 Project Number: 171-10478

Site Number	Date	Survey Start	Survey End	Species Name	Species Code	No- of Birds	Distance (m)	Bearing	Fly-by	Passage Height (m)	Passage Direction	Behaviour / Comments
PCSH1	May 14, 2018	10:19:00	14:19	CORA	Common Raven	1	50	ne	-	-50	South...	passing
				EUST	European Starling	3	50	nw	-	-50	east	passing
				AMCR	American Crow	1	100	ne	-	-	-	passing
				BAEA	Bald Eagle	1	300	ne	-	50+	West	passing
				BAEA	Bald Eagle	1	100	se	-	50+	North	passing
				TRES	Tree Swallow	4	0	nw	-	-	-	foraging
				GRYE	Greater Yellowlegs	1	100	nw	-	-	-	foraging
				AMRO	American Robin	1	150	nw	-	-	-	singing
				COTE	Common Tern	2	100	ne	-	-	-	fishing
				RBME	Red-breasted Merganser	6	300	nw	-	-	-	fishing
				PUFI	Purple Finch	1	150	ne	-	-	-	singing
				LESA	Least Sandpiper	1	100	nw	-	-	-	calling
				AMGO	American Goldfinch	2	50	nw	-	-	-	calling
				AMCR	American Crow	2	100	sw	-	-	-	passing
				RBME	Red-breasted Merganser	19	500	nw	-	-	-	fishing
				GWTE	Green-winged Teal	1	150	nw	-	-50	South	passing
				AMGO	American Goldfinch	1	100	nw	-	-	-	calling
				COGR	Common Grackle	3	150	nw	-	-	-	calling
				BEKI	Belted Kingfisher	2	100	nw	-	-	-	fishing
				SPSA	Spotted Sandpiper	1	100	nw	-	-	-	calling
BAEA	Bald Eagle	2	100	ne	-	50+	West	passing				
BTNW	Black-throated Green Warbler	1	150	ne	-	-	-	singing				



Appendix D - Bird Survey Data  
 Table D-6: Spring Migration Line Transect Survey Data, 2018  
 Project Number: 171-10478

Site Number	Date	Survey Start	Survey End	Species Name	Species Code	No- of Birds	Distance (m)	Bearing	Fly-by	Passage Height (m)	Passage Direction	Behaviour / Comments
5-4	May 14, 2018	06:50	07:00	Mourning Dove	MODO	1	100	300	-	-	-	Calling
				Ruby-crowned Kinglet	RCKI	1	40	210	-	-	-	Singing
				Black-throated Green Warbler	BTNW	1	30	260	-	-	-	Singing
				Black-throated Green Warbler	BTNW	1	40	210	-	-	-	Singing
1-5	May 14, 2018	07:14	07:36	Purple Finch	PUFI	1	15	270	-	-	-	Local movement
				Yellow-rumped Warbler	YRWA	3	15	270	-	-	-	Local movement
				Ovenbird	OVEN	1	30	250	-	-	-	Singing
				Ovenbird	OVEN	1	75	170	-	-	-	Singing
				American Robin	AMRO	1	10	230	Yes	0-10	SW	Fly-By
				Blue Jay	BLJA	2	40	200	-	-	-	Calling
				Downy Woodpecker	DOWO	1	15	250	-	-	-	Local movement
				Black-capped Chickadee	BCCH	1	15	330	-	-	-	Calling
				Black-and-white Warbler	BAWW	1	20	300	-	-	-	Singing
				Golden-crowned Kinglet	GCKI	1	15	210	-	-	-	Singing
				Yellow-bellied Sapsucker	YBSA	1	20	30	-	-	-	Foraging
				Yellow-rumped Warbler	YRWA	3	20	320	-	-	-	Local movement
				Hermit Thrush	HETH	1	8	240	-	-	-	Foraging
				Ovenbird	OVEN	1	20	280	-	-	-	Singing
				Golden-crowned Kinglet	GCKI	1	15	150	-	-	-	Singing
				Black-throated Green Warbler	BTNW	1	60	290	-	-	-	Singing
				Northern Flicker	NOFL	1	100	310	-	-	-	Calling
				Unidentified Woodpecker	UNWO	1	30	250	-	-	-	Drumming
				Black-capped Chickadee	BCCH	1	20	260	-	-	-	Local movement
				White-throated Sparrow	WTSP	2	15	320	-	-	-	Local movement
				Black-throated Green Warbler	BTNW	1	20	330	-	-	-	Singing
				6-7	May 14, 2018	07:41	07:54	Ovenbird	OVEN	1	30	220
Northern Parula	NOPA	1	15					130	-	-	-	Singing
Black-throated Green Warbler	BTNW	1	20					320	-	-	-	Singing
American Goldfinch	AMGO	1	60					160	-	-	-	Singing
Ovenbird	OVEN	1	75					310	-	-	-	Singing
Black-capped Chickadee	BCCH	1	60					140	-	-	-	Calling
Hermit Thrush	HETH	1	50					200	-	-	-	Calling
Northern Parula	NOPA	1	20					250	-	-	-	Singing
Ovenbird	OVEN	1	20					180	-	-	-	Singing
Red-breasted Nuthatch	RBNU	1	100					180	-	-	-	Calling
Blue-headed Vireo	BHVI	1	40					280	-	-	-	Singing
Black-throated Green Warbler	BTNW	1	20					200	-	-	-	Singing
Song Sparrow	SOSP	2	10					20	-	-	-	Local movement
7-8	May 14, 2018	07:55	08:07					Black-and-white Warbler	BAWW	1	40	310
				American Goldfinch	AMGO	1	75	320	-	-	-	Singing
				Blue Jay	BLJA	3	100	0	-	-	-	Calling
				Pileated Woodpecker	PIWO	1	80	110	-	-	-	Calling
				Ovenbird	OVEN	1	50	350	-	-	-	Singing
				Ovenbird	OVEN	1	80	60	-	-	-	Singing
				Canada Goose	CANG	1	7	120	-	-	-	Swimming
				Blue Jay	BLJA	1	100	130	Yes	10-50	SW	Fly-by
				Downy Woodpecker	DOWO	1	15	150	Yes	0-10	W	Fly by
				Black-capped Chickadee	BCCH	1	3	210	-	-	-	Foraging
7-9	May 14, 2018	08:14	08:32	American Robin	AMRO	1	20	270	-	-	-	Perched
				American Goldfinch	AMGO	1	30	330	-	-	-	Singing
				Ovenbird	OVEN	1	30	290	-	-	-	Singing
				Ovenbird	OVEN	1	10	330	-	-	-	Singing
				Downy Woodpecker	DOWO	1	10	170	-	-	-	Calling
				Blue-headed Vireo	BHVI	1	15	250	-	-	-	Singing
				Black-capped Chickadee	BCCH	2	10	260	-	-	-	Calling
				Magnolia Warbler	MAWA	1	15	210	-	-	-	Singing
				Blue-headed Vireo	BHVI	1	20	30	-	-	-	Singing
				Yellow-rumped Warbler	YRWA	1	15	290	-	-	-	Singing
				Yellow-rumped Warbler	YRWA	1	30	300	-	-	-	Singing
				Red-breasted Nuthatch	RBNU	1	75	330	-	-	-	Singing
				White-throated Sparrow	WTSP	2	5	0	-	-	-	Foraging
				Golden-crowned Kinglet	GCKI	1	10	30	-	-	-	Singing
				Black-and-white Warbler	BAWW	1	15	270	-	-	-	Singing
				Chestnut-sided Warbler	CSWA	2	8	70	-	-	-	Singing



Appendix D - Bird Survey Data  
 Table D-6: Spring Migration Line Transect Survey Data, 2018  
 Project Number: 171-10478

Site Number	Date	Survey Start	Survey End	Species Name	Species Code	No- of Birds	Distance (m)	Bearing	Fly-by	Passage Height (m)	Passage Direction	Behaviour / Comments				
13-14	May 14, 2018	09:03	09:16	Red-winged Blackbird	RWBL	2	15	240	-	-	-	Calling				
				Red-winged Blackbird	RWBL	1	20	50	-	-	-	Calling				
				Ovenbird	OVEN	1	100	90	-	-	-	Singing				
				Black-capped Chickadee	BCCH	2	15	350	-	-	-	Calling				
				Canada Goose	CANG	1	20	265	-	-	-	Swimming				
				Ring-necked Duck	RNDU	1	75	280	-	-	-	Swimming				
				Red-winged Blackbird	RWBL	1	20	330	-	-	-	Calling				
				Common Grackle	COGR	2	85	265	-	-	-	Perched				
13-15	May 14, 2018	09:20	09:35	Red-winged Blackbird	RWBL	1	20	290	-	-	-	Calling				
				Blue-headed Vireo	BHVI	1	20	145	-	-	-	Singing				
				Common Yellowthroat	COYE	1	60	120	-	-	-	Singing				
				Black-and-white Warbler	BAWW	1	20	150	-	-	-	Singing				
				Ruby-crowned Kinglet	RCKI	1	75	125	-	-	-	Singing				
				American Goldfinch	AMGO	2	5	80	Yes	0-10	SE	Fly-by				
				White-throated Sparrow	WTSP	1	8	170	-	-	-	Chipping				
				Yellow-rumped Warbler	YRWA	5	10	50	-	-	-	Local movement				
				Red-winged Blackbird	RWBL	1	10	240	Yes	0-10	W	Local movement				
				Unidentified Shorebird	UNSH	1	10	120	-	-	-	Bad lighting				
				Northern Flicker	NOFL	1	75	160	-	-	-	Calling				
				16-17	May 14, 2018	09:44	09:54	Black-and-white Warbler	BAWW	1	30	180	-	-	-	Singing
Ring-necked Pheasant	RNEP	1	30					230	-	-	-	Calling				
18-19	May 14, 2018	10:03	10:20	European Starling	EUST	2	15	30	-	-	-	Around building				
				Ruby-crowned Kinglet	RCKI	1	15	230	-	-	-	Singing				
				American Crow	AMCR	1	300	290	Yes	10-50	W	Fly-by				
				Red-winged Blackbird	RWBL	1	30	30	-	-	-	Calling				
				Ovenbird	OVEN	1	20	180	-	-	-	Singing				
				Common Raven	CORA	2	0	0	Yes	10-50	S	Calling				
				American Goldfinch	AMGO	2	10	300	Yes	0-10	E	Calling				
				Yellow-rumped Warbler	YRWA	1	10	230	-	-	-	Singing				
				Common Grackle	COGR	1	30	340	-	-	-	Perched				
				Swamp Sparrow	SWSP	1	10	350	-	-	-	Local movement				
				European Starling	EUST	3	15	290	Yes	10-50	E	Fly-by				
				American Black Duck	ABDU	1	40	50	-	-	-	Swimming				
				Bald Eagle	BAEA	1	100	330	Yes	10-50	S	Fly-by				
				Ring-necked Pheasant	RNEP	1	10	230	-	-	-	Calling				
				1-3	April 27, 2018	06:46	-	American Goldfinch	AMGO	2	0	ne	-	-	-	singing
Purple Finch	PUFI	2	50					sw	-	-	-	singing				
Brown Creeper	BRCR	1	50					sw	-	-	-	calling				
Yellow-bellied Sapsucker	YBSA	1	100					sw	-	-	-	drumming				
Black-capped Chickadee	BCCH	2	0					sw	-	-	-	calling				
Canada Goose	CANG	2	0					se	-	-50	west	calling				
American Robin	AMRO	2	0					se	-	-	-	singing				
Pileated Woodpecker	PIWO	1	150					nw	-	-	-	calling				
Golden-crowned Kinglet	GCKI	1	0					ne	-	-	-	calling				
Dark-eyed Junco	DEJU	1	500					sw	-	-	-	singing				
American Crow	AMCR	1	500					sw	-	-	-	calling				
Red-breasted Nuthatch	RBNU	1	50					ne	-	-	-	calling				
Mourning Dove	MODO	1	50					sw	-	-	-	singing				
Common Raven	CORA	1	0					ne	-	-50	south	calling				
Hermit Thrush	HETH	2	0					ne	-	-	-	calling				
White-throated Sparrow	WTSP	1	0					ne	-	-	-	singing				
Blue Jay	BLJA	1	50					ne	-	-	-	calling				
3-4	April 27, 2018	07:06	-					Black-capped Chickadee	BCCH	3	0	nw	-	-	-	calling
								Yellow-rumped Warbler	YRWA	1	0	ne	-	-	-	calling
								Yellow-bellied Sapsucker	YBSA	2	50	sw	-	-	-	calling
				Red-breasted Nuthatch	RBNU	1	50	nw	-	-	-	calling				
				Blue Jay	BLJA	1	50	nw	-	-	-	calling				
				American Goldfinch	AMGO	1	50	nw	-	-	-	calling				
				Blackbird species	blackbird sp	1	50	ne	-	50+	sw	calling				
				American Robin	AMRO	3	100	nw	-	-	-	calling				
				Mourning Dove	MODO	1	100	ne	-	-	-	calling				
				Ring-necked Duck	RNDU	1	100	ne	-	-	-	calling				
				Pileated Woodpecker	PIWO	1	100	nw	-	-	-	calling				
				Purple Finch	PUFI	1	100	nw	-	-	-	singing				
				Palm Warbler	PAWA	1	0	nw	-	-	-	singing				
				Dark-eyed Junco	DEJU	1	50	sw	-	-	-	singing				
				Swamp Sparrow	SWSP	2	50	sw	-	-	-	singing				
				Common Grackle	COGR	8	50	ne	-	-	-	singing				
				American Black Duck	ABDU	3	0	ne	-	-	-	flushed				



Appendix D - Bird Survey Data  
 Table D-6: Spring Migration Line Transect Survey Data, 2018  
 Project Number: 171-10478

Site Number	Date	Survey Start	Survey End	Species Name	Species Code	No- of Birds	Distance (m)	Bearing	Fly-by	Passage Height (m)	Passage Direction	Behaviour / Comments				
28-29	May 14, 2018	06:51	-	Hairy Woodpecker	HAWO	1	0	sw	-	-	-	calling				
				Blue-headed Vireo	BHVI	1	100	sw	-	-	-	singing				
				American Black Duck	ABDU	2	50	sw	-	-	-	in water				
				White-throated Sparrow	WTSP	1	0	sw	-	-	-	calling				
				Yellow Warbler	Yewa	1	0	nw	-	-	-	singing				
				Northern Parula	NOPA	1	50	ne	-	-	-	singing				
				American Robin	AMRO	2	100	nw	-	-	-	calling				
				Golden-crowned Kinglet	GCKI	1	100	nw	-	-	-	singing				
				Common Grackle	COGR	2	150	sw	-	-	-	calling				
				Brown Creeper	BRCR	1	50	sw	-	-	-	singing				
				Hermit Thrush	HETH	1	0	se	-	-	-	calling				
				Evening Grosbeak	EVGR	1	150	sw	-	-	-	calling				
29-30	May 14, 2018	07:22	-	Ovenbird	OVEN	3	0	ne	-	-	-	singing				
				Red-breasted Nuthatch	RBNU	1	50	ne	-	-	-	calling				
				Yellow-bellied Sapsucker	YBSA	2	50	nw	-	-	-	calling				
				Blue-headed Vireo	BHVI	1	50	nw	-	-	-	singing				
				American Goldfinch	AMGO	2	50	sw	-	-	-	calling				
				Black-and-white Warbler	BAWW	1	50	sw	-	-	-	singing				
				Common Yellowthroat	COYE	1	50	sw	-	-	-	singing				
				Black-throated Green Warbler	BTNW	1	100	ne	-	-	-	singing				
				Blackburnian Warbler	BLBW	1	50	nw	-	-	-	singing				
				American Goldfinch	AMGO	1	50	nw	-	-	-	calling				
				Purple Finch	PUFI	1	100	nw	-	-	-	singing				
				30-31	May 14, 2018	07:38	-	Evening Grosbeak	EVGR	2	50	nw	-	100m+	SE	calling
Common Grackle	COGR	1	100					se	-	-	-	calling				
Common Yellowthroat	COYE	2	100					se	-	-	-	singing				
Ovenbird	OVEN	4	50					nw	-	-	-	singing				
Red-winged Blackbird	RWBL	4	150					se	-	-	-	calling				
Black-and-white Warbler	BAWW	1	0					sw	-	-	-	singing				
White-throated Sparrow	WTSP	1	100					se	-	-	-	singing				
Black-throated Green Warbler	BTNW	1	100					se	-	-	-	singing				
Blue-headed Vireo	BHVI	2	0					sw	-	-	-	singing				
Northern Parula	NOPA	1	100					sw	-	-	-	singing				
Yellow-rumped Warbler	YRWA	1	50					ne	-	-	-	singing				
Yellow-bellied Sapsucker	YBSA	2	0					ne	-	-	-	calling				
Downy Woodpecker	DOWO	1	50					nw	-	-	-	calling				
Blackburnian Warbler	BLBW	1	0					nw	-	-	-	singing				
Wilson's Snipe	WISN	1	50					nw	-	-	-	winnowing				
Northern Parula	NOPA	1	50					nw	-	-	-	singing				
Northern Flicker	NOFL	1	100					nw	-	-	-	calling				
Blue Jay	BLJA	2	150					nw	-	-	-	calling				
Swamp Sparrow	SWSP	1	50					sw	-	-	-	singing				
Least Flycatcher	LEFL	1	0					sw	-	-	-	singing				
Magnolia Warbler	MAWA	1	50					nw	-	-	-	singing				
Golden-crowned Kinglet	GCKI	1	50					nw	-	-	-	calling				
Green-winged Teal	GWTE	2	-					-	-	-	-	in water				
20-21	May 14, 2018	08:49	-					Downy Woodpecker	DOWO	1	50	se	-	-	-	calling
				Ovenbird	OVEN	3	0	se	-	-	-	singing				
				American Goldfinch	AMGO	1	0	sw	-	-	-	calling				
				Belted Kingfisher	BEKI	1	100	sw	-	-	-	calling				
				Yellow-bellied Sapsucker	YBSA	1	50	sw	-	-	-	calling				
				Northern Flicker	NOFL	1	50	sw	-	-	-	calling				
				Black-throated Green Warbler	BTNW	1	50	se	-	-	-	singing				
				Blue Jay	BLJA	2	100	se	-	-	-	calling				
				White-throated Sparrow	WTSP	2	0	se	-	-	-	agitated				
				Winter Wren	WIWR	1	100	se	-	-	-	singing				
				Yellow-rumped Warbler	YRWA	1	0	nw	-	-	-	calling				
				Black-and-white Warbler	BAWW	1	50	se	-	-	-	singing				
21-22	May 14, 2018	09:03	-	Black-throated Green Warbler	BTNW	2	100	se	-	-	-	singing				
				Ovenbird	OVEN	2	50	se	-	-	-	singing				
				Black-and-white Warbler	BAWW	1	50	se	-	-	-	singing				
				Yellow-rumped Warbler	YRWA	2	50	nw	-	-	-	singing				
				Blue Jay	BLJA	2	0	sw	-	-	-	calling				
				Ruby-crowned Kinglet	RCKI	1	150	sw	-	-	-	singing				
				Hermit Thrush	HETH	2	0	nw	-	-	-	singing				
				American Goldfinch	AMGO	1	0	nw	-	50+	East	calling				
				Purple Finch	PUFI	1	50	nw	-	-	-	calling				
				Pileated Woodpecker	PIWO	1	150	se	-	-	-	calling				
				22-23	May 14, 2018	09:14	-	Common Yellowthroat	COYE	1	50	sw	-	-	-	singing
								Ruby-crowned Kinglet	RCKI	1	100	sw	-	-	-	singing
Yellow-rumped Warbler	YRWA	1	50					sw	-	-	-	singing				
Northern Waterthrush	NOWA	1	50					se	-	-	-	singing				
Dark-eyed Junco	DEJU	2	0					se	-	-	-	calling				
Magnolia Warbler	MAWA	2	0					ne	-	-	-	singing				
Evening Grosbeak	EVGR	1	150					se	-	100+	North	calling				
Black-and-white Warbler	BAWW	1	50					ne	-	-	-	singing				
Green-winged Teal	GWTE	4	0					sw	-	-	-	flushed				
Blackburnian Warbler	BLBW	1	0					se	-	-	-	singing				
Ovenbird	OVEN	3	0					sw	-	-	-	singing				
Swamp Sparrow	SWSP	1	0					ne	-	-	-	calling				
Black-and-white Warbler	BAWW	1	0	sw	-	-	-	singing								
Sora	SORA	1	100	se	-	-	-	calling								

Appendix D - Bird Survey Data  
 Table D-7: Breeding Bird Survey Data, 2018  
 Project Number: 171-10478

Site Number	Date	Survey Start	Survey End	Species Name	Species Code	No- of Birds	Distance (m)	Bearing	Fly-by	Behaviour / Comments
BRUSH_1R	6/Jun/18	5:33:00	5:43:00	Alder Flycatcher	ALFL	1	50	60	-	Singing
				Alder Flycatcher	ALFL	1	60	120	-	Singing
				Ovenbird	OVEN	1	60	90	-	Singing
				Black-capped Chickadee	BCCH	1	40	70	-	Singing
				Ovenbird	OVEN	1	20	10	-	Singing
				Red-breasted Nuthatch	RBNH	1	75	10	-	Singing
				Red-eyed Vireo	REVI	1	40	300	-	Singing
				Blue Jay	BLJA	1	200	305	-	Calling
				Black-and-white Warbler	BAWW	1	15	335	-	Singing
				Purple Finch	PUFI	1	70	70	-	Singing
				Golden-crowned Kinglet	GCKI	1	15	75	-	Singing
				Blackburnian Warbler	BLBW	1	5	340	-	Singing
				Ovenbird	OVEN	1	25	10	-	Singing
				Black-throated Green Warbler	BTNW	1	50	330	-	Singing
				American Goldfinch	AMGO	1	15	340	-	Singing
Golden-crowned Kinglet	GCKI	1	10	50	-	Singing				
Ovenbird	OVEN	1	100	60	-	Singing				
Chipping Sparrow	CHSP	1	60	80	-	Singing				
Blue-headed Vireo	BHVI	1	20	310	-	Singing				
Blue Jay	BLJA	1	100	300	-	Calling				
Ring-necked Pheasant	RNEP	1	100	340	-	Singing				
Black-capped Chickadee	BCCH	1	50	0	-	Singing				
Tennessee Warbler	TEWA	1	15	0	-	Singing				
Northern Waterthrush	NOWA	1	20	130	-	Singing				
Ovenbird	OVEN	1	40	130	-	Singing				
Ovenbird	OVEN	1	20	230	-	Singing				
Blue Jay	BLJA	1	30	90	-	Calling				
Red-eyed Vireo	REVI	1	40	20	-	Singing				
Magnolia Warbler	MAWA	1	10	320	-	Singing				
Magnolia Warbler	MAWA	1	10	260	-	Singing				
Black-and-white Warbler	BAWW	1	10	270	-	Singing				
American Goldfinch	AMGO	1	15	160	-	Singing				
Magnolia Warbler	MAWA	1	30	270	-	Singing				
Yellow-rumped Warbler	YRWA	1	60	50	-	Singing				
Ovenbird	OVEN	1	20	320	-	Singing				
Nashville Warbler	NAWA	1	20	170	-	Singing				
Blue Jay	BLJA	2	50	330	-	Calling				
Yellow-bellied Sapsucker	YBSA	1	50	290	-	Drumming				
Brown Creeper	BRCR	1	15	310	-	Singing				
Magnolia Warbler	MAWA	1	40	340	-	Singing				
Northern Parula	NOPA	1	10	220	-	Singing				
Northern Parula	NOPA	1	40	110	-	Singing				
Mourning Dove	MODD	1	50	260	-	Calling				
Swamp Sparrow	SWSP	1	30	280	-	Singing				
Common Grackle	COGR	2	60	340	-	Calling				
Red-winged Blackbird	RWBL	1	60	350	-	Calling				
Red-winged Blackbird	RWBL	1	150	340	-	Calling				
Ovenbird	OVEN	1	40	120	-	Singing				
Common Grackle	COGR	1	70	320	Y	.				
Common Grackle	COGR	2	50	280	-	Local movement				
Blue-headed Vireo	BHVI	1	10	30	-	Singing				
Bald Eagle	BAEA	1	80	320	Y	.				
Common Grackle	COGR	3	60	345	-	Local movement				
Common Grackle	COGR	1	40	320	-	Calling/perched				
American Goldfinch	AMGO	1	30	260	-	Singing				
Tree Swallow	TRES	1	50	355	-	Foraging				
Northern Parula	NOPA	1	40	60	-	Singing				
Common Grackle	COGR	3	U	U	-	.				
MMP - WETL-1	6/Jun/18	8:01:00	8:11:00	American Goldfinch	AMGO	1	U	U	-	.
MIX_9	6/Jun/18	8:42:00	8:52:00	Swainson's Thrush	SWTH	1	50	320	-	Singing
				Ovenbird	OVEN	1	30	200	-	Singing
				Red-eyed Vireo	REVI	1	30	180	-	Singing
				Golden-crowned Kinglet	GCKI	1	20	165	-	Singing
				American Robin	AMRO	1	100	340	-	Singing
				Yellow-rumped Warbler	YRWA	1	15	310	-	Singing
				Red-eyed Vireo	REVI	1	30	230	-	Singing
IW_8	6/Jun/18	9:16:00	9:26:00	Song Sparrow	SOSP	1	40	330	-	.
				Common Grackle	COGR	1	75	310	-	Singing
				Common Yellowthroat	COYE	1	10	320	-	Singing
				American Robin	AMRO	1	100	280	-	Calling
IW_9	6/Jun/18	9:27:00	9:37:00	Common Raven	CORA	1	70	300	-	.
				Common Raven	CORA	1	70	300	-	.
418_KILL	6/Jun/18			Killdeer	KILL	1	-	-	-	.
IW_7	6/Jun/18	9:42:00	9:52:00	Ovenbird	OVEN	1	60	190	-	Singing
				Alder Flycatcher	ALFL	1	20	160	-	Singing
				Song Sparrow	SOSP	1	30	340	-	Singing
				Alder Flycatcher	ALFL	1	75	340	-	Singing
				White-throated Sparrow	WTSP	1	60	190	-	Singing
				Yellow Warbler	YEWA	1	50	5	-	Singing
				American Goldfinch	AMGO	1	40	170	Y	Flight call
				American Crow	AMCR	1	150	200	-	Calling
				Black-capped Chickadee	BCCH	1	15	140	-	Singing
				Golden-crowned Kinglet	GCKI	1	15	140	-	Singing
				Blue-headed Vireo	BHVI	1	20	50	-	Singing
				Black-capped Chickadee	BCCH	1	20	150	-	Singing
				Blackburnian Warbler	BLBW	1	5	50	-	Singing
				Blackburnian Warbler	BLBW	1	20	330	-	Singing
				Ovenbird	OVEN	1	100	160	-	Singing
Ring-necked Pheasant	RNEP	1	200	230	-	Calling				
419_VEER	7/Jun/18			Veery	VEER	1	40	10	-	Singing
MIX_6	7/Jun/18	5:27:00	5:37:00	Blue-headed Vireo	BHVI	1	20	350	-	Singing
				Ovenbird	OVEN	1	60	40	-	Singing
				American Robin	AMRO	1	50	70	-	Singing
				Ovenbird	OVEN	1	40	30	-	Singing
				Chestnut-sided Warbler	CSWA	1	50	300	-	Singing
				Northern Parula	NOPA	1	30	10	-	Singing
				Northern Parula	NOPA	1	40	210	-	Singing
				White-throated Sparrow	WTSP	1	60	20	-	Singing
				Black-capped Chickadee	BCCH	1	40	20	-	Singing
				Black-throated Green Warbler	BTNW	1	40	180	-	Singing
				Ovenbird	OVEN	1	20	240	-	Singing
				American Robin	AMRO	1	100	270	-	Singing
				Black-capped Chickadee	BCCH	1	60	260	-	Calling
				American Goldfinch	AMGO	1	100	55	-	Singing
				Chestnut-sided Warbler	CSWA	1	20	40	-	Singing
Chestnut-sided Warbler	CSWA	1	40	330	-	Singing				
SOFT_5	7/Jun/18	5:54:00	6:04:00	American Robin	AMRO	1	50	280	Y	.
				Mourning Dove	MODD	1	150	60	-	Calling
				Common Yellowthroat	COYE	1	30	50	-	Singing
				Black-capped Chickadee	BCCH	1	100	150	-	.
				Alder Flycatcher	ALFL	1	100	110	-	Calling
				Unidentified Bird	UNBI	1	100	120	-	.
				Black-and-white Warbler	BAWW	1	30	40	-	Singing
				Alder Flycatcher	ALFL	1	50	10	-	Singing
				Song Sparrow	SOSP	1	50	350	-	Singing
				Ovenbird	OVEN	1	60	180	-	Singing
				American Crow	AMCR	2	30	300	Y	Singing
				Red-eyed Vireo	REVI	1	60	290	-	Singing
				American Robin	AMRO	1	80	210	-	Singing
				Northern Parula	NOPA	1	80	210	-	Singing

LA_ID	DATE	START	END	SPECIES	COUNT	TIME	ACTIVITY
WETL_7 + MMP	7/Jun/18	6:49:00	6:59:00	Black-capped Chickadee	1	60	90
				American Robin	1	60	250
				Ring-necked Pheasant	1	150	250
				Killdeer	1	60	40
				American Crow	1	120	320
				Eastern Wood-pewee	1	90	190
				Blue Jay	2	75	195
				North American Beaver	1	15	150
				Red-winged Blackbird	1	20	70
				Common Yellowthroat	1	60	195
				Least Flycatcher	1	60	0
				Alder Flycatcher	1	60	30
				Veery	1	150	310
				Common Yellowthroat	3	30	280
				Swamp Sparrow	2	20	230
American Goldfinch	1	30	250				
Snowshoe Hare	1	0	0				
American Goldfinch	1	20	250				
Common Grackle	1	50	280				
Red-winged Blackbird	1	60	280				
Least Flycatcher	1	70	210				
American Black Duck	2	40	70				
Northern Parula	1	75	140				
Spotted Sandpiper	1	30	310				
Red-winged Blackbird	3						
American Black Duck	3						
American Black Duck	1	75	300				
Alder Flycatcher	1	30	170				
Red-winged Blackbird	1	30	220				
Red-winged Blackbird	2	80	310				
Alder Flycatcher	1	50	320				
American Goldfinch	1	30	170				
Unidentified Woodpecker	1	100	150				
Common Yellowthroat	1	60	250				
Killdeer	1	10	165				
Mourning Dove	1						
Canada Goose	10	80	230				
Green-winged Teal	1	20	230				
Green-winged Teal	2	70	200				
Blue-winged Teal	2	60	210				
Red-winged Blackbird	1	60	250				
Red-winged Blackbird	1	70	140				
Red-eyed Vireo	1	20	320				
Alder Flycatcher	1	100	210				
White-throated Sparrow	1	30	150				
Common Yellowthroat	1	60	190				
Unidentified Shorebird	1	50	220				
Blue Jay	1	200	210				
Ovenbird	1	200	210				
Red-winged Blackbird	1	40	100				
White-throated Sparrow	1	20	170				
Red-eyed Vireo	1	75	80				
Ovenbird	1	30	240				
Alder Flycatcher	1	30	270				
Eastern Wood-pewee	1	75	150				
Chestnut-sided Warbler	1	80	180				
Hermit Thrush	1	70	150				
Mourning Dove	1	100	80				
Blue Jay	1	50	100				
Black-and-white Warbler	1	100	150				
Northern Parula	1	30	260				
Tree Swallow	1	50	240				
Sora	1						
White-throated Sparrow	1						
Black-capped Chickadee	1						
Common Yellowthroat	1						
Unidentified Woodpecker	1						
American Goldfinch	1						
Common Yellowthroat	1	5	100				
Common Grackle	1	20	140				
Song Sparrow	1	5	50				
Yellow Warbler	1	15	140				
Common Grackle	1	30	190				
American Goldfinch	1	30	180				
American Robin	1	100	115				
Least Flycatcher	1	20	195				
Red-eyed Vireo	1	30	195				
Ovenbird	1	60	30				
Ovenbird	1	15	355				
Common Grackle	1	40	40				
Blackburnian Warbler	1	30	335				
Yellow Warbler	1	20	100				
American Robin	1	60	110				
American Goldfinch	1	75	110				
Blue Jay	1	75	110				
White-throated Sparrow	1	80	110				
Bald Eagle	1	200	100				
Maritime Gartersnake	1						
American Redstart	1	60	110				
American Redstart	1	60	110				
American Redstart	1	15	125				
Canada Goose	6						
Spotted Sandpiper	2						
American Black Duck	2	10	30				
Common Grackle	1	20	150				
Eastern Wood-pewee	1	60	70				
Spotted Sandpiper	2	30	80				
Tree Swallow	1	0	0				
American Robin	1	80	310				
Ovenbird	1	80	290				
Blackburnian Warbler	1	80	285				
Song Sparrow	1	20	300				
Unidentified Duck	1	75	350				
American Robin	1	75	55				
Ovenbird	1	40	150				
Eastern Wood-pewee	1	50	80				
American Crow	1	80	40				
Ovenbird	1	80	185				
Ovenbird	1	50	90				
Black-capped Chickadee	1	20	260				
Red-eyed Vireo	1	30	120				
Black-and-white Warbler	1	20	210				
Red-breasted Nuthatch	1	15	70				
Unidentified Bird	1	50	230				
Eastern Wood-pewee	1	50	60				
Alder Flycatcher	1	85	80				
North American Beaver	1	40	50				
American Goldfinch	1	30	110				
Common Yellowthroat	1	40	110				
Mallard	1	45	50				
Song Sparrow	1	80	60				
American Black Duck	1	20	10				
Chipping Sparrow	1	90	100				

				Ovenbird	OVEN	1	100	30	-	Singing
				Ovenbird	OVEN	1	15	250	-	Singing
				Chestnut-sided Warbler	CSWA	1	30	30	-	Singing
				Blackburnian Warbler	BLBW	1	60	230	-	Singing
				Black-throated Green Warbler	BTNW	1	80	230	-	Singing
				Hermit Thrush	HETH	1	50	170	-	Singing
				Ovenbird	OVEN	1	75	170	-	Singing
				American Redstart	AMRE	1	20	190	-	Singing
				Red-breasted Nuthatch	RBNH	1	60	200	-	Calling
				Palm Warbler	PAWA	1	75	180	-	Singing
				Red-breasted Nuthatch	RBNH	1	40	265	-	Calling
				Blue Jay	BLJA	3	40	275	-	Calling
				Eastern Wood-pewee	EAWP	1	50	90	-	Singing
				Red-eyed Vireo	REVI	1	15	220	-	Singing
				Ovenbird	OVEN	1	20	200	-	Singing
				Black-and-white Warbler	BAWW	1	30	100	-	Singing
				Red-eyed Vireo	REVI	1	40	80	-	Singing
				Magnolia Warbler	MAWA	1	25	70	-	Singing
				Least Flycatcher	LEFL	1	30	280	-	Calling
				Song Sparrow	SOSP	1	15	205	-	Singing
				Ovenbird	OVEN	1	5	340	-	Singing
				American Redstart	AMRE	1	5	255	-	Singing
				Sora	SORA	1	30	185	-	Calling
				Swamp Sparrow	SWSP	1	60	155	-	Singing
				Alder Flycatcher	ALFL	1	75	90	-	Calling
				Canada Warbler	CAWA	1	20	305	-	Singing
				Northern Parula	NOPA	1	30	350	-	Singing
				Black-and-white Warbler	BAWW	1	20	190	-	Singing
				Red-eyed Vireo	REVI	1	40	330	-	Singing
				Eastern Wood-pewee	EAWP	1	75	150	-	Singing
				American Goldfinch	AMGO	1	20	160	-	Flight call
				Black-capped Chickadee	BCCH	1	60	320	-	Calling
				Alder Flycatcher	ALFL	1	60	350	-	Singing
				American Robin	AMRO	1	75	70	-	Singing
				Ovenbird	OVEN	1	80	95	-	Singing
				Common Yellowthroat	COYE	1	80	30	-	Singing
				Song Sparrow	SOSP	1	80	20	-	Singing
				Veery	VEER	1	100	70	-	Singing
				Song Sparrow	SOSP	1	100	120	-	Singing
				Ovenbird	OVEN	1	90	240	-	Singing
				American Crow	AMCR	1	200	190	Y	Calling
				American Crow	AMCR	2	50	80	Y	Calling
				Ring-necked Pheasant	RNEP	1	75	30	-	Calling
				American Black Duck	ABDU	6	60	210	-	Foraging in settling pond
				Ovenbird	OVEN	1	50	320	-	Singing
				Song Sparrow	SOSP	1	80	230	-	Singing
				Common Grackle	COGR	2	40	190	-	Local movement
				Common Grackle	COGR	1	50	280	-	Local movement
				European Starling	EUST	12	30	175	-	Perched on blue gas cylo
				American Black Duck	ABDU	2	75	260	-	On settling pond
				European Starling	EUST	6	100	190	-	Local movement
				American Black Duck	ABDU	5	100	200	-	Foraging on settling pond
				European Starling	EUST	100	120	200	-	Foraging on settling pond
				American Robin	AMRO	3	120	200	-	Foraging on settling pond
				Common Yellowthroat	COYE	1	60	170	-	Foraging on settling pond
				Alder Flycatcher	ALFL	1	70	190	-	Foraging on settling pond
				Least Flycatcher	LEFL	1	50	230	-	Foraging on settling pond
				Common Yellowthroat	COYE	1	80	300	-	Foraging on settling pond
				Common Raven	CORA	2	50	220	-	Calling
				Black-capped Chickadee	BCCH	1	70	180	-	Singing
				American Redstart	AMRE	1	60	190	-	Singing
				American Black Duck	ABDU	1	60	300	Y	.
				Northern Waterthrush	NOWA	1	60	185	-	Singing
				Killdeer	KILL	1	-	-	-	.
				Common Grackle	COGR	1	-	-	-	.
				Song Sparrow	SOSP	1	-	-	-	.
				Black-capped Chickadee	BCCH	1	-	-	-	.
				European Starling	EUST	1	-	-	-	.
				Red-eyed Vireo	REVI	1	-	-	-	.
				Red-winged Blackbird	RWBL	1	-	-	-	.
				American Goldfinch	AMGO	1	-	-	-	.
				Red-eyed Vireo	REVI	1	20	110	-	Singing
				Common Yellowthroat	COYE	1	30	230	-	Singing
				Chipping Sparrow	CHSP	1	70	240	-	Singing
				Yellow Warbler	YWA	1	20	200	-	Singing
				Red-eyed Vireo	REVI	1	30	200	-	Singing
				Yellow Warbler	YWA	1	40	260	-	Singing
				American Black Duck	ABDU	1	50	345	Y	.
				American Black Duck	ABDU	10	10	300	-	Swimming
				Red-winged Blackbird	RWBL	1	5	300	-	Calling
				Killdeer	KILL	1	70	205	-	Calling
				Yellow Warbler	YWA	1	40	190	-	Singing
				Red-winged Blackbird	RWBL	1	80	215	-	Singing
				Alder Flycatcher	ALFL	1	70	190	-	Singing
				Common Yellowthroat	COYE	1	90	310	-	Singing
				Black-and-white Warbler	BAWW	1	50	210	-	Singing
				Ring-necked Duck	RNDU	2	50	280	-	Swimming
				Green-winged Teal	GWTE	2	30	250	-	Swimming
				American Black Duck	ABDU	1	-	-	-	.
				European Starling	EUST	1	-	-	-	.
				Spotted Sandpiper	SPSA	3	0	0	-	At point; calling
				Song Sparrow	SOSP	1	20	25	-	Singing
				Unidentified Warbler	UNWA	1	5	60	-	Chipping
				American Goldfinch	AMGO	1	70	320	-	Flight call
				Red-eyed Vireo	REVI	1	60	165	-	Singing
				Yellow-bellied Sapsucker	YBSA	1	40	210	-	Foraging
				Green-winged Teal	GWTE	3	50	185	-	Foraging/swimming/displaying
				Blue-winged Teal	BWTE	3	70	200	-	Foraging/swimming/displaying
				Hermit Thrush	HETH	1	80	160	-	Singing
				American Robin	AMRO	1	60	160	-	Calling
				Ring-necked Pheasant	RNEP	1	100	260	-	Calling
				Red-eyed Vireo	REVI	1	40	320	-	Singing
				Common Yellowthroat	COYE	1	100	260	-	Singing
				Common Grackle	COGR	3	80	260	-	Local movement
				American Goldfinch	AMGO	1	30	190	-	Local movement
				Red-winged Blackbird	RWBL	1	80	210	-	Calling
				American Goldfinch	AMGO	1	60	180	-	Flight call
				Least Flycatcher	LEFL	1	75	160	-	Calling
				Tree Swallow	TRES	2	30	230	-	Nest cavity in tree; feeding young
				Wood Duck	WODU	2	50	170	-	Flushed out of wetland
				Black-and-white Warbler	BAWW	1	20	280	-	Singing
				American Crow	AMCR	1	100	320	-	Calling
				Winter Wren	WIWR	1	80	150	-	Singing
				Northern Waterthrush	NOWA	1	70	160	-	Singing
				American Robin	AMRO	1	60	240	-	Perched in a tree
				White-throated Sparrow	WTSP	1	100	130	-	Singing
				Swamp Sparrow	SWSP	1	60	270	-	Singing
				Green Frog	Green Frog	2 or 3	30	250	-	Calling
				Ovenbird	OVEN	1	20	260	-	Singing
				Eastern Wood-pewee	EAWP	1	75	260	-	Singing
				Ruby-crowned Kinglet	RCKI	1	-	-	-	.
				Ovenbird	OVEN	1	-	-	-	.
				Blue Jay	BLJA	1	-	-	-	.

Wetland	Date	Start Time	End Time	Species	Code	Count	Notes	Behavior	
WMP - WETL_DR	27/Jul/18	7:50:00	7:40:00	White-throated Sparrow	WTSP	1			
				Eastern Wood-pewee	EAWP	1			
				American Robin	AMRO	1			
				Canada Goose	CANG	6	60	240	Swimming
IW-6R	27/Jul/18	7:57:00	8:07:00	Spotted Sandpiper	SPSA	1	70	285	Perched on floaters
				American Black Duck	ABDU	3	75	0	Swimming
				American Black Duck	ABDU	3	15	110	Fished
				Unidentified Duck	UNDU	2	20	20	Swimming
				Alder Flycatcher	ALFL	1	75	230	Singing
				Green-winged Teal	GWTE	1	75	0	Swimming
				Yellow Warbler	YEWA	1	80	280	Singing
IW_5	27/Jul/18	8:11:00	8:21:00	Yellow Warbler	YEWA	1	10	60	Singing
				American Goldfinch	AMGO	3	8	40	Y Flight call
				Unidentified Sparrow	UNSP	1	30	165	Foraging
				Song Sparrow	SOSP	1	15	40	Singing
				American Goldfinch	AMGO	1	20	320	Calling
				Great Blue Heron	GBHE	1	60	290	Y
				Least Flycatcher	LEFL	1	40	40	Calling
MIX_7	27/Jul/18	8:27:00	8:37:00	Yellow Warbler	YEWA	1	50	110	Singing
				Red-eyed Vireo	REVI	1	15	90	Singing
				Killdeer	KILL	1	75	255	Calling from clearcut
				Song Sparrow	SOSP	1	20	270	Foraging
IW_4	27/Jul/18	8:44:00	8:54:00	American Redstart	AMRE	1	10	25	Singing
				Killdeer	KILL	1	60	90	Calling
				Common Tern	COTE	1	100	290	Y
				American Goldfinch	AMGO	1	40	290	Local movement
MIX_5	27/Jul/18	9:02:00	9:12:00	Northern Parula	NOPA	1	20	50	Singing
				American Goldfinch	AMGO	1	40	340	Y Flight call
				Red-eyed Vireo	REVI	1	30	20	Singing
				American Goldfinch	AMGO	1	15	220	Y Flight call
				Black-and-white Warbler	BAWW	1	20	250	Singing
				Ovenbird	OVEN	1	75	250	Singing
				Black-and-white Warbler	BAWW	2	20	170	Chipping
SOFT_4	27/Jul/18	9:28:00	9:38:00	Chestnut-sided Warbler	CSWA	1	40	70	Singing
				Northern Parula	NOPA	1	70	60	Singing
				Golden-crowned Kinglet	GCKI	1	10	130	Singing
				Red-breasted Nuthatch	RBNH	1	75	200	Calling
				American Goldfinch	AMGO	1	50	80	Flight call
				Red-eyed Vireo	REVI	1	50	170	Singing
				Common Yellowthroat	COYE	1	20	160	Singing
WETL_5	28/Jul/18	5:00:00	5:10:00	Black-capped Chickadee	BCCH	1	100	300	Singing
				Swamp Sparrow	SWSP	1	35	330	Singing
				Unidentified Duck	UNDU	1	100	200	ABDU?
				Common Grackle	COGR	1	50	40	Y
				Spotted Sandpiper	SPSA	1	70	315	Local movement
				Song Sparrow	SOSP	2	15	350	Foraging
				Song Sparrow	SOSP	1	90	60	Singing
BEACH_1	28/Jul/18	5:20:00	5:30:00	Song Sparrow	SOSP	1	80	125	Singing
				Green-winged Teal	GWTE	2	40	0	Resting on beach
				Spotted Sandpiper	SPSA	1	40	0	Local movements
				European Starling	EUST	1	15	30	Local movements
				Tree Swallow	TRES	2	75	320	Foraging
				Bald Eagle	BAEA	1	80	320	Local movement
				Eastern Wood-pewee	EAWP	1	40	165	Singing
MIX_2	28/Jul/18	5:52:00	6:02:00	Northern Parula	NOPA	1	30	110	Singing
				Red-eyed Vireo	REVI	1	50	315	Singing
				Red-eyed Vireo	REVI	1	75	140	Singing
				Black-and-white Warbler	BAWW	1	20	160	Singing
				Chipping Sparrow	CHSP	1	100	60	Singing
				Downy Woodpecker	DOWD	1	75	130	Singing
				Least Flycatcher	LEFL	1	50	10	Drumming
				Ovenbird	OVEN	1	100	30	Calling
				American Black Duck	ABDU	8	75	160	Singing
				American Black Duck	ABDU	8	75	160	Foraging/Swimming
IW_3	28/Jul/18	6:34:00	6:44:00	Green-winged Teal	GWTE	3	75	160	Foraging/Swimming
				Wood Duck	WODU	1	75	160	Foraging/Swimming
				American Black Duck	ABDU	5	75	160	Foraging/Swimming
				Ring-necked Duck	RNDU	2	75	160	Foraging/Swimming
				Ovenbird	OVEN	1	75	50	Singing
				Spotted Sandpiper	SPSA	1	150	150	Calling
				Black-capped Chickadee	BCCH	7	25	0	Local movement
				Swamp Sparrow	SWSP	1	10	185	Singing
				American Goldfinch	AMGO	6	0	0	Calling
				Eastern Wood-pewee	EAWP	1	50	30	Singing
HARD_2R	28/Jul/18	6:57:00	7:07:00	Ovenbird	OVEN	1	30	330	Singing
				Red-eyed Vireo	REVI	1	20	90	Singing
				Yellow-bellied Sapsucker	YBSA nest cavity	1	10	310	Can hear chicks begging
				Black-throated Green Warbler	BTNW	1	40	240	Singing
SOFT_3	28/Jul/18	7:18:00	7:28:00	Ovenbird	OVEN	1	40	190	Singing
				Ovenbird	OVEN	1	40	70	Singing
				Red-eyed Vireo	REVI	1	50	90	Singing
				Black-throated Green Warbler	BTNW	1	50	95	Singing
MIX_3	28/Jul/18	7:40:00	7:50:00	American Robin	AMRO	1	60	10	Calling
				Ovenbird	OVEN	1	75	290	Singing
				Black-and-white Warbler	BAWW	1	75	10	Singing
				Red-breasted Nuthatch	RBNH	1	100	0	Singing
				Red-eyed Vireo	REVI	1	80	90	Singing
				Common Yellowthroat	COYE	1	100	195	Singing
				Nashville Warbler	NAWA	1	100	220	Singing
HARD_5	28/Jul/18	8:10:00	8:20:00	Golden-crowned Kinglet	GCKI	1	50	300	Singing
				Black-capped Chickadee	BCCH	1	30	280	Singing
				Northern Parula	NOPA	1	30	320	Singing
				Ovenbird	OVEN	1	40	355	Singing
				Unidentified Woodpecker	UNWD	1	75	210	Drumming
				Red-breasted Nuthatch	RBNH	1	75	260	Calling
				Ovenbird	OVEN	1	80	190	Singing
MIX_4	28/Jul/18	8:52:00	9:02:00	Red-eyed Vireo	REVI	1	20	150	Singing
				Golden-crowned Kinglet	GCKI	1	60	90	Singing
				Eastern Wood-pewee	EAWP	1	50	20	Singing
				Least Flycatcher	LEFL	2	10	90	Singing
				Swamp Sparrow	SWSP	1	5	130	Local movements
				Downy Woodpecker	DOWD	1	20	260	Calling
				American Goldfinch	AMGO	1	8	100	Calling
WETL_2R	28/Jul/18	9:19:00	9:29:00	Green Frog	Green Frog	1	-	-	Several in wetland
				Red-winged Blackbird	RWBL	1	30	260	Calling
				Red-winged Blackbird	RWBL	2	50	260	Calling
				Sora	SORA	1	30	110	Calling
				Red-winged Blackbird	RWBL	1	12	165	Chipping
				Red-winged Blackbird	RWBL	1	75	110	Calling
				Ovenbird	OVEN	1	-	-	-
MMP - WETL_2R	28/Jul/18	9:29:00	9:39:00	American Robin	AMRO	1	-	-	-
				Common Raven	CORA	1	-	-	-
				American Black Duck	ABDU	1	-	-	-
				American Bittern	AMBI	1	100	sw	raining, hard to hear distant birds
				Common Grackle	COGR	1	50	se	-
				Red-winged Blackbird	RWBL	5	0	sw	-
				Ovenbird	OVEN	2	100	sw	-

WEL_2	6/Jun/18		Ruby-crowned Kinglet	RCKI	1	150	ne		
			Common Yellowthroat	COYE	1	50	nw		
			American Robin	AMRO	1	50	ne		
			Veery	VEER	1	150	sw		
			Tree Swallow	TRES	3	50	se		
			Swamp Sparrow	SWSP	2	0	sw		
			American Bittern	AMBI	1	100	sw		
			Common Grackle	COGR	1	100	sw		
			Red-winged Blackbird	RWBL	5	0	sw		
			Swamp Sparrow	SWSP	1	0	se		
			Northern Parula	NOPA	1	50	nw		
			Black-throated Green Warbler	BTNW	1	50	ne		
			Blackburnian Warbler	BLBW	1	50	ne		
			Ovenbird	OVEN	3	0	nw		
			Common Yellowthroat	COYE	1	50	nw		
			American Bittern	AMBI	1	100	se		
			Ovenbird	OVEN	3	0	nw		
			Swamp Sparrow	SWSP	2	0	se		
			Ruby-crowned Kinglet	RCKI	1	150	se		
			Black-throated Green Warbler	BTNW	1	50	ne		
			Red-winged Blackbird	RWBL	5	50	se		
			Northern Parula	NOPA	1	50	nw		
			Magnolia Warbler	MAWA	1	50	ne		
			Evening Grosbeak	EVGR	1	100	nw		
Barred Owl	BADO	2							
MIX_4	6/Jun/18		Canada Warbler	CAWA	1	0	sw		waypoint 341
			Ruby-crowned Kinglet	RCKI	1	100	ne		
			Magnolia Warbler	MAWA	2	0	se		
			Hermit Thrush	HETH	1	0	sw		
			Ovenbird	OVEN	2	50	ne		
			Blue Jay	BLJA	1	100	sw		
			Swamp Sparrow	SWSP	1	0	sw		
			Common Yellowthroat	COYE	1	50	sw		
			Brown Creeper	BRCR	2	50	sw		
			Red-eyed Vireo	REVI	1	50	nw		
			Black-throated Blue Warbler	BTBW	1	50	nw		
			American Redstart	AMRE	1	50	sw		
			Common Grackle	COGR	1	50	sw		
			White-throated Sparrow	WTSP	1	50	se		
			Swainson's Thrush	SWTH	1	0	sw		
			Common Grackle	COGR	3	100	se		
			Ovenbird	OVEN	2	50	ne		
			Red-eyed Vireo	REVI	1	50	ne		
			Black-throated Blue Warbler	BTBW	1	50	nw		
			Magnolia Warbler	MAWA	2	0	sw		
			American Redstart	AMRE	1	0	sw		
			Yellow-rumped Warbler	YRWA	1	50	sw		
			American Crow	AMCR	1	300	sw		
			Northern Parula	NOPA	1	50	ne		
Yellow-bellied Sapsucker	YBSA	1	100	nw					
Ruby-crowned Kinglet	RCKI	1	150	se					
White-throated Sparrow	WTSP	1	100	se					
Common Yellowthroat	COYE	1	50	ne					
Hairy Woodpecker	HAWO	1	50	ne					
Blue-headed Vireo	BHVI	1	100	nw					
American Robin	AMRO	1	50	ne					
Mourning Dove	MODO	1	300	sw					
Bay-breasted Warbler	BBWA	1	0	nw		more mixed woods than hardwoods			
Ovenbird	OVEN	2	50	sw					
Yellow Warbler	YEWA	1	50	ne					
Red-eyed Vireo	REVI	1	100	sw					
American Redstart	AMRE	1	0	se					
Northern Flicker	NOFL	1	150	sw					
Yellow-bellied Sapsucker	YBSA	1	150	sw					
Ovenbird	OVEN	2	50	nw					
Red-eyed Vireo	REVI	1	50	sw					
Black-throated Green Warbler	BTNW	2	50	nw					
American Goldfinch	AMGO	1	0	sw					
Black-capped Chickadee	BCCH	2	50	se					
Common Tern	COTE	2	300	se					
Golden-crowned Kinglet	GCKI	1	50	nw					
Ovenbird	OVEN	2	0	sw					
Black-throated Green Warbler	BTNW	1	0	sw					
Common Yellowthroat	COYE	1	50	ne					
American Robin	AMRO	1	50	se					
Yellow-bellied Sapsucker	YBSA	1	0	nw					
Hairy Woodpecker	HAWO	2				waypoint 342			
Veery	VEER	1	50	se					
Tree Swallow	TRES	1	0	se					
Northern Parula	NOPA	1	50	nw					
American Redstart	AMRE	2	0	nw					
Hairy Woodpecker	HAWO	2	50	ne					
Common Yellowthroat	COYE	1	100	ne					
Veery	VEER	2	0	sw					
Ovenbird	OVEN	2	50	ne					
American Crow	AMCR	2	300	ne					
American Robin	AMRO	1	100	ne					
Common Grackle	COGR	1	50	nw					
Alder Flycatcher	ALFL	1	50	sw					
Chestnut-sided Warbler	CSWA	1	100	se					
Ruffed Grouse	RUGR	1	50	nw					
Ring-necked Duck	RNDU	2	50	se		y			
Northern Parula	NOPA	1	50	ne					
Hermit Thrush	HETH	1	100	nw					
Yellow Warbler	YEWA	1	100	se					
Ovenbird	OVEN	3	0	ne					
American Redstart	AMRE	3	0	nw					
American Crow	AMCR	2	500	sw					
American Goldfinch	AMGO	1	50	se					
Black-and-white Warbler	BAWW	1	50	ne					
Least Flycatcher	LEFL	2	0	nw					
Red-eyed Vireo	REVI	1	50	nw					
Yellow-bellied Sapsucker	YBSA	1	50	se					
Swamp Sparrow	SWSP	1	50	se					
Blue Jay	BLJA	1	100	sw					
Song Sparrow	SCSP	1	100	se					
Ovenbird	OVEN	2	50	se					
Red-winged Blackbird	RWBL	1	300	se					
Black-and-white Warbler	BAWW	1	50	nw					
Common Raven	CORA	1	150	se					
Red-eyed Vireo	REVI	1	100	se					
American Goldfinch	AMGO	1	50	nw					
American Redstart	AMRE	1	50	se					
Common Yellowthroat	COYE	1	100	sw					
Purple Finch	PUFI	1	100	se					
Alder Flycatcher	ALFL	1	100	se					
Common Yellowthroat	COYE	2	0	se					
Yellow Warbler	YEWA	1	0	sw					
Common Raven	CORA	2	100	sw		fly calling			
Barred Owl	BADO	2	100	sw					
Ovenbird	OVEN	2	50	nw					
Black-and-white Warbler	BAWW	1	50	ne					
Red-eyed Vireo	REVI	1	50	nw					
IW_2	6/Jun/18								



				Swamp Sparrow	SWSP	1	0	se			
				American Goldfinch	AMGO	2	50	ne			
				Red-winged Blackbird	RWBL	1	150	se			
				Alder Flycatcher	ALFL	2	50	ne			
				American Redstart	AMRE	1	50	ne			
				Green-winged Teal	GWTE	2	0	se			
				Yellow-rumped Warbler	YRWA	1	50	ne			
				Red-eyed Vireo	REVI	1	50	nw			
				American Redstart	AMRE	2	0	ne			
				Ovenbird	OVEN	1	50	nw			
				Red-winged Blackbird	RWBL	1	300	ne			
				American Goldfinch	AMGO	1	0	se			
				Belted Kingfisher	BEKI	1	300	ne			
				Ruby-throated Hummingbird	RTHU	1	0	se			
				Common Loon	COLO	1	1000	sw			
				Barred Owl	BADD	2	500	se			
				Common Yellowthroat	COYE	1	50	se			
				Black-capped Chickadee	BCCH	2	50	se			
				American Robin	AMRO	1	100	sw			
				Common Grackle	COGR	1	50	sw			
				Canada Goose	CANG	56	500	sw	Y		
				American Black Duck	ABDU	2	100	se			
				Ovenbird	OVEN	2	300	se			
				Song Sparrow	SOSP	1	0	ne			
				American Crow	AMCR	2	500	nw			
				Black-capped Chickadee	BCCH	1	50	nw			
				American Robin	AMRO	1	300d	se			
				Spotted Sandpiper	SPSA	1	150	ne			
				Common Raven	CORA	1	500	sw			
				Blue Jay	BLJA	1	300	nw			
				Wood Duck	WODU	1	0	sw			
				Green-winged Teal	GWTE	1	100	sw			Y
				American Goldfinch	AMGO	2	50	nw			
				Common Yellowthroat	COYE	1	100	se			
				Blackburnian Warbler	BLBW	1	0	nw			
				Ovenbird	OVEN	3	0	ne			
				Sora	SORA	1	150	sw			
				Red-eyed Vireo	REVI	1	50	nw			
				Blue Jay	BLJA	1	150	nw			
				Hermit Thrush	HETH	1	50	sw			
				Belted Kingfisher	BEKI	1	150	sw			
				Black-and-white Warbler	BAWW	1	0	sw			
				Ovenbird	OVEN	1	0	sw			
				Alder Flycatcher	ALFL	1	50	se			
				Black-capped Chickadee	BCCH	1	50	se			
				Black-throated Green Warbler	BTNW	1	50	se			
				Blue Jay	BLJA	1	100	ne			
				Swamp Sparrow	SWSP	1	50	se			
				Red-eyed Vireo	REVI	1	50	sw			
				Song Sparrow	SOSP	1	100	sw			
				Yellow-rumped Warbler	YRWA	1	50	se			
				American Goldfinch	AMGO	1	0	sw			
				Common Raven	CORA	1	500	nw			
				Yellow-bellied Sapsucker	YBSA	1	300	nw			
				Purple Finch	PUFI	1	100	sw			
				Magnolia Warbler	MAWA	1	100	se			
				Green-winged Teal	GWTE	2	100	ne			
				Sora	SORA	1	0	se			
				Magnolia Warbler	MAWA	2	50	sw			
				Black-and-white Warbler	BAWW	1	50	sw			
				American Goldfinch	AMGO	2	50	nw			
				Ovenbird	OVEN	2	0	ne			
				Hermit Thrush	HETH	1	50	se			
				Swamp Sparrow	SWSP	1	100	nw			
				Swainson's Thrush	SWTH	1	50	sw			
				Golden-crowned Kinglet	GCKI	2	50	sw			
				Common Grackle	COGR	1	0	se			
				Yellow-bellied Sapsucker	YBSA	1	150	sw			
				Pileated Woodpecker	PIWO	1	150	sw			
				Northern Waterthrush	NOWA	1	100	nw			
				White-winged Crossbill	WWCR	2	0	se	Y		
				Black-capped Chickadee	BCCH	1	50	se			
				Pine Siskin	PISI	1	50	se	Y		
				Common Grackle	COGR	1	50	nw			
				Yellow-rumped Warbler	YRWA	1	0	sw			
				American Goldfinch	AMGO	1	0	sw			
				Red-winged Blackbird	RWBL	1	150	nw			
				Black-throated Green Warbler	BTNW	1	50	se			
				Swamp Sparrow	SWSP	1	100	nw			
				Ovenbird	OVEN	2	50	ne			
				Blue Jay	BLJA	1	100	ne			
				Black-capped Chickadee	BCCH	2	0	sw			
				Common Yellowthroat	COYE	1	100	nw			
				Song Sparrow	SOSP	2	50	nw			
				Wood Duck	WODU	1	100	nw			
				Green-winged Teal	GWTE	3	100	ne			
				Magnolia Warbler	MAWA	2	150	nw			
				Northern Parula	NOPA	1	150	nw			
				Red-breasted Nuthatch	RBNU	1	150	nw			
				American Goldfinch	AMGO	2	50	nw			
				Black-and-white Warbler	BAWW	1	150	nw			
				Common Yellowthroat	COYE	1	50	nw			
				Common Grackle	COGR	1	150	nw			
				Blue Jay	BLJA	1	150	nw			
				Swamp Sparrow	SWSP	2	0	nw			
				Bank Swallow	BANS	2	0	ne			
				Yellow Warbler	YEWA	1	100	ne			
				American Black Duck	ABDU	16	150	ne	Y		
				Great Blue Heron	GBHE	1	150	nw			
				Canada Goose	CANG	1	100	ne	Y		
				Red-winged Blackbird	RWBL	1	100	nw			
				Belted Kingfisher	BEKI	1	100	nw			
				Bald Eagle	BAEA	1	150	ne			
				Bonaparte's Gull	BOGU	2	150	nw			
				Black-throated Green Warbler	BTNW	2	150	nw			
				Eastern Wood-pewee	EAWP	1	150	nw			
				Ovenbird	OVEN	1	150	nw			
				Ring-necked Pheasant	RNEP	1	150	nw			
				Bonaparte's Gull	BOGU	30	100	nw			
				Great Blue Heron	GBHE	1	100	nw			
				Red-winged Blackbird	RWBL	1	100	sw			
				Song Sparrow	SOSP	1	100	sw			
				Black-capped Chickadee	BCCH	2	100	sw			
				Mourning Dove	MODO	1	50	se			
				Blue Jay	BLJA	1	100	sw			
				Ovenbird	OVEN	1	150	nw			
				Red-eyed Vireo	REVI	1	150	nw			
				Alder Flycatcher	ALFL	1	50	se			
				Swamp Sparrow	SWSP	1	50	sw			
				Common Grackle	COGR	6	0	ne			
				Spotted Sandpiper	SPSA	4	50	nw			
				Nelson's Sparrow	NESP	1	50	nw			
				Eastern Wood-pewee	EAWP	1	100	sw			

HARD_4	7/Jun/18			Ovenbird	OVEN	2	0	ne						
				Yellow-rumped Warbler	YRWA	1	0	ne						
				Common Yellowthroat	COYE	1	100	se						
				American Redstart	AMRE	1	0	se						
				Blue-headed Vireo	BHVI	1	50	sw						
PC_1	7/Jun/18			Ovenbird	OVEN	2	0	nw						
				Chestnut-sided Warbler	CSWA	1	0	nw						
				Alder Flycatcher	ALFL	1	50	nw						
				Common Yellowthroat	COYE	1	50	sw						
				American Redstart	AMRE	1	50	nw						
				Ring-necked Pheasant	RNEP	1	100	ne						
				Blue Jay	BLJA	1	100	ne						
				American Crow	AMCR	1	100	sw						
				American Goldfinch	AMGO	1	50	ne						
				Cedar Waxwing	CEDW	1	0	ne						
				Black-and-white Warbler	BAWW	1	0	sw						
				ALD_1	7/Jun/18			Purple Finch	PUFI	1	0	se		
								Magnolia Warbler	MAWA	1	50	se		
Black-capped Chickadee	BCCH	1	50					sw						
Ovenbird	OVEN	2	50					sw						
Rose-breasted Grosbeak	RBGR	1	100					nw						
Yellow Warbler	YEWB	1	0					nw						
Red-eyed Vireo	REVI	2	0					sw						
Northern Parula	NOPA	1	50					ne						
Veery	VEER	1	50					sw						
Common Grackle	COGR	1	100					nw						
Chestnut-sided Warbler	CSWA	1	0					nw						
Evening Grosbeak	EVGR	6												
MIX_9	28/Jun/18	5:09:00						Blackburnian Warbler	BLBW	2	0	ne		singing
				Hermit Thrush	HETH	2	50	ne		singing				
				Magnolia Warbler	MAWA	1	50	nw		singing				
				Ovenbird	OVEN	2	50	sw		singing				
				Black-throated Green Warbler	BTNW	1	50	sw		singing				
				Yellow-rumped Warbler	YRWA	1	0	North		singing				
				Yellow-bellied Sapsucker	YBSA	1	150	sw		drumming				
				Red-breasted Nuthatch	RBNH	1	0	south		calling				
				Golden-crowned Kinglet	GCKI	1	50	nw		calling				
				Red-eyed Vireo	REVI	1	100	sw		singing				
				Purple Finch	PUFI	1	100	north		calling				
				Northern Parula	NOPA	1	50	se		singing				
				American Robin	AMRO	1	100	nw		singing				
WETL_4	28/Jun/18	5:31:00		Magnolia Warbler	MAWA	1	50	nw		singing				
				Canada Warbler	CAWA	1	0	nw		singing				
				Brown Creeper	BRCK	1	50	sw		singing				
				Red-eyed Vireo	REVI	2	50	se		singing				
				Ovenbird	OVEN	1	50	ne		singing				
				Black-throated Green Warbler	BTNW	1	50	se		singing				
				American Crow	AMCR	1	500	ne		calling				
				Barred Owl	BADO	1				flushed				
				White-throated Sparrow	WTSP	2	0	ne		singing				
				Northern Parula	NOPA	1	0	ne		singing				
				Hermit Thrush	HETH	1	50	North		calling				
				Canada Warbler	CAWA	1	0	North		singing				
				Ruby-crowned Kinglet	RCKI	1	0	ne		singing				
CC_2R	28/Jun/18	5:56:00		Magnolia Warbler	MAWA	1	50	sw		singing				
				Ovenbird	OVEN	2	50	se		singing				
				Black-and-white Warbler	BAWW	1	0	east		singing				
				Hermit Thrush	HETH	1	100	sw		singing				
				Magnolia Warbler	MAWA	2	0	North		agitated				
				Red-eyed Vireo	REVI	1	50	West		singing				
				White-throated Sparrow	WTSP	2	50	nw		singing				
				Black-throated Green Warbler	BTNW	1	50	sw		singing				
				Yellow-rumped Warbler	YRWA	1	50	sw		singing				
				Black-and-white Warbler	BAWW	1	0	nw		singing				
				White-throated Sparrow	WTSP	1	100	sw		singing				
				Magnolia Warbler	MAWA	2	50	North		singing				
				CC_1/MIX_8	28/Jun/18	6:12:00		Blue Jay	BLJA	1	150	sw		calling
Ovenbird	OVEN	1	100					ne		singing				
Hermit Thrush	HETH	1	100					North		singing				
Golden-crowned Kinglet	GCKI	1	50					south		calling				
Purple Finch	PUFI	1	50					North		singing				
Red-eyed Vireo	REVI	2	100					nw		singing				
Yellow-rumped Warbler	YRWA	1	50					sw		singing				
Black-throated Green Warbler	BTNW	1	100					sw		singing				
Canada Warbler	CAWA	1	100					North		singing				
American Redstart	AMRE	1	50					North		singing				
American Crow	AMCR	3	500					south		calling				
Pine Siskin	PISI	1	100					nw		calling				
WETL_1	28/Jun/18	6:39:00						Blue-headed Vireo	BHVI	2	0	se		agitated
				Mourning Dove	MODO	1	0	south		calling				
				Black-capped Chickadee	BCCH	2	50	south		calling				
				Hairy Woodpecker	HAWO	2	0	se		foraging				
				Swamp Sparrow	SWSP	2	50	North		singing				
				Canada Warbler	CAWA	1	0	east		cf				
				Ovenbird	OVEN	1	100	se		singing				
				Northern Parula	NOPA	1	50	nw		singing				
				Golden-crowned Kinglet	GCKI	1	0	south		calling				
				Red-eyed Vireo	REVI	2	100	nw		singing				
				Alder Flycatcher	ALFL	1	50	nw		calling				
				Black-throated Green Warbler	BTNW	1	50	se		singing				
				Red-winged Blackbird	RWBL	1	100	North		singing				
American Robin	AMRO	1	100	West		calling								
Magnolia Warbler	MAWA	1	50	se		singing								
Northern Flicker	NOFL	1	100	east		calling								
Pileated Woodpecker	PIWO	1	150	nw		calling								
American Goldfinch	AMGO	1	50	ne		calling								
Purple Finch	PUFI	1	100	ne		calling								
WETL_1-MMP	28/Jun/18	6:49:00		Swamp Sparrow	SWSP	2	100	North		singing				
				Northern Parula	NOPA	1	50			singing				
				Alder Flycatcher	ALFL	1	50			calling				
				Black-throated Green Warbler	BTNW	1	50			singing				
				Blue-headed Vireo	BHVI	1	0			singing				
SOFT_6	28/Jun/18	7:11:00		Ovenbird	OVEN	1	100			singing				
				Red-winged Blackbird	RWBL	1	100	North		calling				
				Red-breasted Nuthatch	RBNH	1	50	sw		calling				
				Red-eyed Vireo	REVI	1	50	sw		singing				
				Hermit Thrush	HETH	1	100	south		singing				
				Ovenbird	OVEN	2	100	east		singing				
				Black-throated Green Warbler	BTNW	2	50	south		singing				
				White-throated Sparrow	WTSP	1	100	sw		singing				
				Golden-crowned Kinglet	GCKI	1	0	sw		singing				
				Blue-headed Vireo	BHVI	1	100	North		singing				
				American Goldfinch	AMGO	1	50	nw		calling				
				Magnolia Warbler	MAWA	1	50	south		singing				
				Ruby-throated Hummingbird	RTHU	1	0	sw		calling				
BRUSH_1	28/Jun/18	7:49:00		Alder Flycatcher	ALFL	2	0	east		calling				
				Magnolia Warbler	MAWA	1	0	North		singing				
				Red-eyed Vireo	REVI	1	50	se		singing				
				American Redstart	AMRE	1	50	ne		singing				
				Cedar Waxwing	CEDW	1	50	nw		calling				
				Northern Parula	NOPA	1	0	nw		calling				
				Dark-eyed Junco	DEJU	1	50	ne		singing				
				Ovenbird	OVEN	2	100	se		singing				

				Blue Jay	BLJA	1	100	West	.	calling
				Canada Warbler	CAWA	1	.	.	.	singing
				Eastern Wood-pewee	EAWP	1	.	.	.	singing
				Ovenbird	OVEN	1	.	.	.	ne
				Yellow-bellied Sapsucker	YBSA	1	150	sw	.	calling
				Pileated Woodpecker	PWWD	1	300	east	.	calling
				Chestnut-sided Warbler	CSWA	1	0	south	.	singing
				Ovenbird	OVEN	2	50	North	.	singing
				White-throated Sparrow	WTSP	1	0	nw	.	calling
				Common Yellowthroat	COYE	1	50	south	.	singing
				Blue Jay	BLJA	1	100	sw	.	calling
				Common Raven	CORA	1	1000	West	.	calling
				Red-breasted Nuthatch	RBNU	1	0	ne	.	calling
				American Crow	AMCR	1	500	sw	.	calling
				Red-eyed Vireo	REVI	1	50	North	.	calling
				American Robin	AMRO	1	150	se	.	singing
				Veery	VEER	2	0	North	.	cf
				Blue Jay	BLJA	1	50	North	.	calling
				Ovenbird	OVEN	1	50	nw	.	singing
				Cedar Waxwing	CEDW	3	50	sw	y	passing
				Red-eyed Vireo	REVI	1	50	ne	.	singing
				Rose-breasted Grosbeak	RBGR	1	50	nw	y	passing
				Golden-crowned Kinglet	GCKI	1	0	North	.	singing
				American Redstart	AMRE	.	.	.	.	.
				Blue-headed Vireo	BHVI	1	0	nw	.	singing
				Purple Finch	PUFI	2	100	se	.	singing
				Northern Parula	NOPA	1	50	nw	.	singing
				Magnolia Warbler	MAWA	1	50	North	.	singing
				Blackburnian Warbler	BLBW	1	0	nw	.	singing
				Eastern Wood-pewee	EAWP	1	0	ne	.	singing
				Downy Woodpecker	DDWD	1	0	south	.	calling
				Black-capped Chickadee	BCCH	1	1	sw	.	calling
				American Crow	AMCR	1	300	south	.	calling
				Cedar Waxwing	CEDW	2	50	south	.	calling
				American Goldfinch	AMGO	1	50	sw	.	calling
				Ovenbird	OVEN	1	50	North	.	singing
				Winter Wren	WIWR	1	50	nw	.	singing
				Purple Finch	PUFI	1	100	West	.	singing
				American Redstart	AMRE	1	50	east	.	singing
				Northern Parula	NOPA	2	50	east	.	singing
				Ovenbird	OVEN	1	100	se	.	singing
				American Goldfinch	AMGO	1	50	sw	.	calling
				Red-eyed Vireo	REVI	2	50	se	.	singing
				Golden-crowned Kinglet	GCKI	1	0	North	.	calling
				Cedar Waxwing	CEDW	1	0	North	.	calling
				White-throated Sparrow	WTSP	1	50	nw	.	singing
				Yellow-bellied Sapsucker	YBSA	1	0	east	.	calling
				White-throated Sparrow	WTSP	1	100	West	.	singing
				Canada Warbler	CAWA	1	50	North?	.	singing
				Magnolia Warbler	MAWA	1	50	ne	.	singing
				Yellow-bellied Sapsucker	YBSA	1	50	east	.	calling
				Golden-crowned Kinglet	GCKI	1	50	nw	.	calling
				Blue Jay	BLJA	1	150	nw	.	calling
				Ovenbird	OVEN	1	100	north	.	singing
				Common Yellowthroat	COYE	1	100	north	.	singing
				Northern Parula	NOPA	1	50	ne	.	singing
				White-throated Sparrow	WTSP	2	0	nw	.	calling
				American Goldfinch	AMGO	1	0	West	.	calling
				Blackburnian Warbler	BLBW	1	0	south	.	singing
				Canada Warbler	CAWA	1	.	.	.	singing

Appendix D - Bird Survey Data

Table D-8: Common Nighthawk Survey Data, 2018

Project Number: 171-10478

Site Number	Date	Survey Start	Species Name	Species Code	No. of Birds	Distance (m)	Bearing	Fly-by	Passage Height (m)	Passage Direction	Behaviour / Comments
CONI-1	26-Jun-18	20:24	Common Nighthawk	CONI	3						
CONI-3	26-Jun-18	20:52	Common Nighthawk	CONI	4	150	125				
444	26-Jun-18	21:07	Common Nighthawk	CONI	2	50	10				Incidental near CONI-2
445	26-Jun-18	21:57	Common Nighthawk	CONI	1						Incidental near CONI-5

# APPENDIX

**E**

ALL PRIORITY SPECIES  
OBSERVED

Appendix E

Table E-1: All priority species observed across all survey periods (September 2017 to July 2018)

Project: Boat Harbour Planning and Remediation (WSP ref. 171-10478)

Common Name	Scientific Name	COSEWIC	NS Status	S-Rank	Fall Mig. (2017) - T	Fall Mig. (2017) - WC	Winter/Spring raptors (2018)*	Spring Mig. (2018) - T	Spring Mig. (2018) - WC	Breeding (2018)**	Total
Blue-winged Teal****	<i>Spatula discors</i>	.	.	S3S4B	0	0	0	0	0	5	5
Common Goldeneye****	<i>Bucephala clangula</i>	.	.	S2B,S5N	0	0	14	0	0	0	14
Red-breasted Merganser****	<i>Mergus serrator</i>	.	.	S3S4B,S5N	8	5	4	0	25	0	42
Black-bellied Plover****	<i>Pluvialis squatarola</i>	.	.	S3M	1	0	0	0	0	0	1
Semipalmated Plover****	<i>Charadrius semipalmatus</i>	.	.	S1B,S3S4M	4	7	0	0	0	0	11
Killdeer****	<i>Charadrius vociferus</i>	.	.	S3B	0	0	0	0	2	7	9
Least Sandpiper****	<i>Calidris minutilla</i>	.	.	S1B,S3M	0	2	0	0	1	0	3
White-rumped Sandpiper****	<i>Calidris fuscicollis</i>	.	.	S3M	3	20	0	0	0	0	23
Pectoral Sandpiper****	<i>Calidris melanotos</i>	.	.	S2S3M	1	3	0	0	0	0	4
Semipalmated Sandpiper****	<i>Calidris pusilla</i>	.	.	S3M	2	37	0	0	0	0	39
Wilson's Snipe****	<i>Gallinago delicata</i>	.	.	S3B	0	0	0	1	0	0	1
Spotted Sandpiper****	<i>Actitis macularius</i>	.	.	S3S4B	0	0	0	0	10	17	27
Lesser Yellowlegs****	<i>Tringa flavipes</i>	.	.	S3M	9	11	0	0	0	0	20
Willet****	<i>Tringa semipalmata</i>	.	.	S2S3B	1	1	0	0	4	0	6
Greater Yellowlegs****	<i>Tringa melanoleuca</i>	.	.	S3B,S3S4M	20	20	0	0	5	0	45
Common Tern****	<i>Sterna hirundo</i>	NAR	.	S3B	1	0	0	2	3	3	9
Common Nighthawk***	<i>Chordeiles minor</i>	T	Threatened	S2B	0	0	0	0	0	8	8
American Bittern****	<i>Botaurus lentiginosus</i>	.	.	S3S4B	0	0	0	0	0	3	3
Northern Harrier****	<i>Circus hudsonius</i>	NAR	.	S3S4B	2	3	0	0	0	0	5
Northern Goshawk****	<i>Accipiter gentilis</i>	NAR	.	S3S4	0	0	0	1	0	0	1
Eastern Wood-Pewee***	<i>Cantopus virens</i>	SC	Vulnerable	S3S4B	4	0	0	0	0	16	20
Yellow-bellied Flycatcher****	<i>Empidonax flaviventris</i>	.	.	S3S4B	1	0	0	0	0	0	1
Bank Swallow***	<i>Riparia riparia</i>	T	Endangered	S2S3B	0	0	0	0	0	2	2
Barn Swallow***	<i>Hirundo rustica</i>	T	Endangered	S2S3B	0	0	0	0	3	0	3
Red-breasted Nuthatch****	<i>Sitta canadensis</i>	.	.	S3	87	3	1	17	1	11	120
Ruby-crowned Kinglet****	<i>Regulus calendula</i>	.	.	S3S4B	6	0	0	8	1	6	21
Veery****	<i>Catharus fuscescens</i>	.	.	S3S4B	0	0	0	0	0	10	10
Swainson's Thrush****	<i>Catharus ustulatus</i>	.	.	S3S4B	0	0	0	0	0	3	3
American Robin****	<i>Turdus migratorius</i>	.	.	S5B,S3N	96	8	1	35	2	29	171
Gray Catbird****	<i>Dumetella carolinensis</i>	.	.	S3B	1	0	0	0	0	0	1
Evening Grosbeak***	<i>Coccothraustes vespertinus</i>	SC	Vulnerable	S3S4B,S3N	0	0	5	5	0	7	17
Purple Finch****	<i>Haemorhous purpureus</i>	.	.	S4S5B,S3S4N	35	1	1	23	1	10	71
Pine Siskin****	<i>Spinus pinus</i>	.	.	S2S3	13	0	0	1	0	2	16
Lapland Longspur****	<i>Calcarius lapponicus</i>	.	.	S3?N	2	0	0	0	0	0	2
Nelson's Sparrow****	<i>Ammospiza nelsoni</i>	NAR	.	S3S4B	0	0	0	0	0	1	1
Tennessee Warbler****	<i>Oreothlypis peregrina</i>	.	.	S3S4B	0	0	0	1	0	1	2
Bay-breasted Warbler****	<i>Setophaga castanea</i>	.	.	S3S4B	0	0	0	0	0	1	1
Blackpoll Warbler****	<i>Setophaga striata</i>	.	.	S3S4B	35	0	0	0	0	0	35
Canada Warbler***	<i>Cardellina canadensis</i>	T	Endangered	S3B	0	0	0	0	0	11	11
Rose-breasted Grosbeak****	<i>Pheucticus ludovicianus</i>	.	.	S2S3B	0	0	0	0	0	2	2
<b>Totals</b>					<b>332 ind.; 21 sp.</b>	<b>121 ind.; 13 sp.</b>	<b>26 ind.; 6 sp.</b>	<b>94 ind.; 10 sp.</b>	<b>58 ind.; 12 sp.</b>	<b>155 ind.; 21 sp.</b>	<b>786 ind.; 40 sp.</b>
					<b>1 SAR and 20 SOCC</b>	<b>13 SOCC</b>	<b>1 SAR and 5 SOCC</b>	<b>1 SAR and 9 SOCC</b>	<b>1 SAR and 11 SOCC</b>	<b>5 SAR and 16 SOCC</b>	<b>6 SAR and 34 SOCC</b>

Notes:

\* includes results from both the diurnal vantage point watch counts and the nocturnal owl surveys.

\*\* includes results from the breeding bird survey point counts, marsh monitoring, and the Common Nighthawk surveys.

\*\*\* SAR (provincial and/or federal listing in related legislation)

\*\*\*\* Species of conservation concern (AC CDC)

For COSEWIC listings: SC=Special Concern, T=Threatened, E=Endangered and NAR=Not at Risk.

# APPENDIX

**F**

LIMITATIONS





## LIMITATIONS

### **Limited use**

*This Report was prepared for GHD Limited, solely for their exclusive use to provide an Assessment of current environmental conditions in association with the Site. WSP will not be responsible for any use of this report by any other party, for any decisions to be made based on it, or for the consequences thereof, unless written reliance is granted by WSP. Unless otherwise agreed in writing by WSP, it shall not be used to express or imply warranty as to the suitability of the property for a particular purpose. WSP disclaims responsibility of consequential financial effects on transactions or property values, or requirements for follow-up actions and costs.*

### **Excerpts**

*The Report is intended to be used in its entirety. No excerpts may be taken to be representative of the findings in the assessment.*

### **Information from others**

*In evaluating the Site, WSP has relied in good faith on information provided by others, as noted in the Report. WSP has assumed that the information provided is correct and WSP assumes no responsibility for the accuracy, completeness or workmanship of any such information.*

### **Standard of care**

*This project has been carried out using investigation techniques and engineering analysis methods consistent with those ordinarily exercised by WSP and other engineering/scientific practitioners, working under similar conditions and subject to the time, financial and physical constraints applicable to this project. The conclusions presented in this Report are based on Work undertaken by trained professional and technical staff and the reasonable and professional interpretation using accepted engineering and scientific practices current at the time the work was performed. Conclusions presented in this report should not be construed as legal advice. WSP makes no other representations whatsoever, including those concerning the legal significance of its findings, or as to other legal matters touched on in the Report, including, but not limited to, ownership of any property, or the application of any law to the findings of the Assessment.*

### **Limited scope**

*The Report summarizes WSP's review of available data in accordance with the principal components of the stated regulations, standards and guidelines and the scope, terms and conditions of the contract or proposal to which the Assignment was conducted. No other warranties are either expressed or implied with respect to the professional services provided under the terms of the contract or proposal and represented in this Report. Conditions may exist which were not detected given the nature of the inquiry WSP was retained to undertake with respect to the Site. Additional environmental studies and actions may be recommended.*

### **Changes over time**

*The Report is based on data and information collected at the time of this Assessment, as stated in the Report. Site use or conditions change and the information and conclusions in the Report may no longer apply following the date of this Report. If any conditions become apparent that differ significantly from that presented in this Report, we request that we be notified to reassess the conclusions and recommendations provided herein. WSP disclaims any obligation to update this Report for conditions that may be identified after the date of this Report; however, WSP reserves the right to amend or supplement this report based on additional information, documentation or evidence.*

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# **Early Shorebird Migration and Bank Swallow Roost Surveys (WSP 2019)**

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# BOAT HARBOUR REMEDIATION PLANNING AND DESIGN

## EARLY SHOREBIRD MIGRATION AND BANK SWALLOW ROOST SURVEYS

GHD LIMITED

NOVEMBER 2019





# BOAT HARBOUR REMEDICATION PLANNING AND DESIGN

## EARLY SHOREBIRD MIGRATION AND BANK SWALLOW ROOST SURVEYS

GHD LIMITED

**WSP PROJECT NO.: 171-10478**  
**DATE: NOVEMBER 5, 2019**

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November 5, 2019

GHD LIMITED  
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Dear Sir/Madam:

**Subject: Boat Harbour Remediation Planning and Design – Early Shorebird Migration and Bank Swallow Roost Surveys**

WSP Canada Inc. was retained to complete a supplemental assessment of early shorebird migration and Bank Swallow roost surveys for the Boat Harbour Effluent Treatment Facility (BHETF) located in Pictou County, Nova Scotia, to address comments received back from Environment and Climate Change Canada (ECCC) on the Birds and Bird Habitat Baseline report, submitted September 14, 2018.

Yours sincerely,

A handwritten signature in black ink, appearing to read 'Tiffany T. MacAulay'.

Tiffany T. MacAulay, MSc  
Biologist (NS)

A handwritten signature in blue ink, appearing to read 'Sean Cassidy'.

Sean Cassidy, P.Eng.  
Director, Environment (NS)

WSP ref.: 171-10478

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# SIGNATURES

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# 1 INTRODUCTION

WSP Canada Inc. (WSP) received comments from Environment and Climate Change Canada (ECCC) on July 8, 2019, pertaining to the avian surveys that were conducted as part of the baseline surveys program for the Boat Harbour Remediation project (“Project”), specifically in the Birds and Bird Habitat Baseline report, dated September 14, 2018, ECCC noted that the watch count surveys commenced later than expected (i.e., September 2017) for migrating shorebirds, as many shorebird species would have already moved through the region as their migration peaks in August. ECCC suggested that another series of shorebird surveys from the watch count stations should be conducted this year from mid-July to mid-September to fill this gap.

In addition, ECCC noted that the impacts to Bank Swallows (*Riparia riparia*) should be re-assessed to address the relatively recent knowledge that this species will travel many kilometers during the breeding season to roost in wetland habitat in the evenings, only to return to the colony sites the following morning (Saldanha, 2016). As a result, the wetland habitat within the Project area may be important for this species, as there are several cattail marshes on and surrounding the site.

This report presents the results of these surveys, which were conducted between July 25<sup>th</sup> and September 12<sup>th</sup>, 2019.



## 2 METHODOLOGY

A summary of the early shorebird migration and Bank Swallow roost surveys is presented in Table 1. Figures of the watch count station locations are available in Appendix A, Figure 1.

**Table 1: Avian surveys conducted in 2019**

Season	Field survey dates	Monitoring Behaviour	Survey Methods	Habitat investigated on property	Effort
Fall	July 25 <sup>th</sup> till September 12 <sup>th</sup> , 2019	Shorebird migration	Watch counts	Beach near Boat Harbour estuary and inland berm	8 visits; one survey weekly
Fall	August 7 <sup>th</sup> to 28 <sup>th</sup> , 2019	Bank Swallow roost	Watch counts	Cattail habitat	4 visits; one survey weekly

### 2.1 SHOREBIRD MIGRATION SURVEYS

Eight weekly visits starting July 25, 2019, were conducted at the berm within the Boat Harbour Effluent Treatment Facility (BHETF) stabilization lagoon and at the beach located adjacent to the estuary outlet (see Appendix A, Figure 1); Table 2 presents the descriptions of the two watch count stations.

**Table 2: Shorebird migration watch count station locations**

Station name	Location			Description
	Zone	Easting	Northing	
WC1	20T	526825.06 m E	5056279.31 m N	Berm
WC2	20T	528242.88 m E	5058108.10 m N	Beach adjacent to Boat Harbour estuary outlet

The following surveys were completed within two-hours of high or low tide:

#### Estuary outlet beach

- Two 30-minute surveys: One (1) around low tide and one (1) at high tide, to capture both foraging and roosting shorebird activity.

#### Berm in stabilization lagoon

- One (1) 30-minute survey at high tide, to capture potential roosting shorebird activity.

For each 30-minute survey, all shorebirds observed (using a spotting scope and binoculars) were recorded. Data including species, number, age, sex, and behaviour were collected.

### 2.2 BANK SWALLOW ROOST SURVEYS

Four weekly visits starting August 7<sup>th</sup>, 2019, were conducted at two watch stations near the estuary and two stations within Boat Harbour to determine whether or not the cattail habitat is being used by roosting Bank Swallows. Table 3 presents descriptions of the four watch count stations.

**Table 3: Bank Swallow roost watch count station locations**

Station name	Location			Description
	Zone	Easting	Northing	
BANS-1	20T	528072.64 m E	5057447.26 m N	Estuary causeway; Pictou Landing Road
BANS-2	20T	528250.12 m E	5057871.56 m N	Estuary
BANS-3	20T	526825.06 m E	5056279.31 m N	Berm in stabilization lagoon
BANS-4	20T	525915.39 m E	5056244.48 m N	Former settling ponds 1 and 2
BANS-5*	20T	526085.44 m E	5056444.33 m N	Former settling pond 3

**Note:** \* Survey conducted here on August 28<sup>th</sup> in place of BASW-4.

Twenty-minute surveys were conducted from each of the four stations from 20-minutes before sunset till 20-minutes after sunset; thus, for a period of 40 minutes over two evenings (Saldanha, 2016). Observers were looking for signs of Bank Swallow roosting activity to identify roosting sites; thus, flocks of Bank Swallows observed in circling flocks above suitable roosting habitat before descending into the cattails (Saldanha, 2016). Sites for the surveys were chosen based on the presence of suitable roosting habitat within wetlands that may be affected as part of the remediation process.

# 3 RESULTS & CONCLUSIONS

## 3.1 SHOREBIRD MIGRATION

A total of 827 individual shorebirds, totalling 13 species, were observed across the survey period. The majority of shorebirds were observed during low tide at the beach near the BHETF estuary outlet (n=480; WC2), followed by the estuary outlet (n=262; WC2) at low tide and, finally, the inland BHETF berm (n=85; WC1) at high tide. It is not surprising that the majority of birds were observed at WC2, as there was more foraging habitat available, as well as sheltered areas (i.e., tall grass) for roosting. See Table 4.

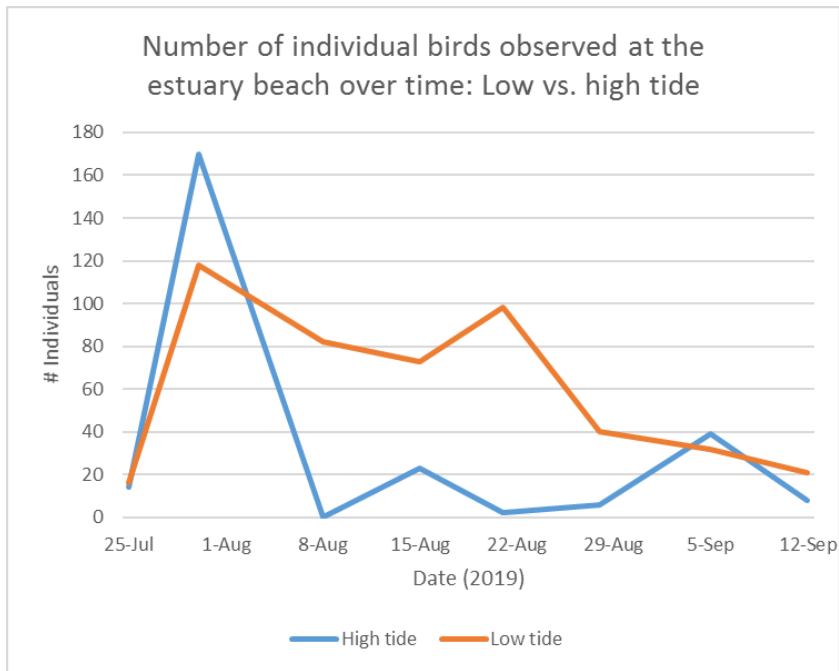
The most abundance species was the Semipalmated Sandpiper (*Calidris pusilla*; n=334) followed by Semipalmated Plover (*Charadrius semipalmatus*; n=194) and Lesser Yellowlegs (*Tringa flavipes*; n=165). None of the shorebird species observed were Species at Risk (SAR), but all were ranked as Species of Conservation Concern (SOCC)<sup>1</sup> by the Atlantic Canada Conservation Data Centre (AC CDC). See Table 4.

**Table 4: Diversity and abundance of shorebird species at all watch count stations**

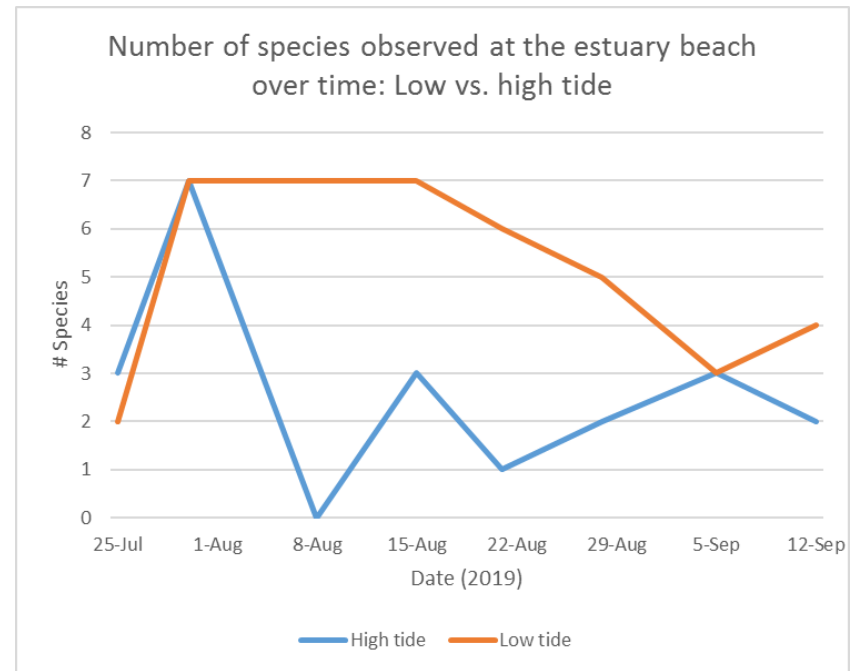
Common name	Scientific name	AC CDC	Watch count station				Total
			WC1	WC2		Total	
			Tide				
			High	High	Low		
Black-bellied Plover	<i>Pluvialis squatarola</i>	S3M	-	-	3	3	3
Greater Yellowlegs	<i>Tringa melanoleuca</i>	S3B, S3S4M	8	17	37	54	62
Killdeer	<i>Charadrius vociferus</i>	S3B	4	-	-	-	4
Least Sandpiper	<i>Calidris minutilla</i>	S1B, S3M	2	-	3	3	5
Lesser Yellowlegs	<i>Tringa flavipes</i>	S3M	13	48	104	152	165
Ruddy Turnstone	<i>Arenaria interpres</i>	S3M	-	3	13	16	16
Semipalmated Plover	<i>Charadrius semipalmatus</i>	S1B, S3S4M	2	47	145	192	194
Semipalmated Sandpiper	<i>Calidris pusilla</i>	S3M	32	141	161	302	334
Short-billed Dowitcher	<i>Limnodromus griseus</i>	S3M	9	-	-	-	9
Spotted Sandpiper	<i>Actitis macularius</i>	S3S4B	11	3	1	4	15
White-rumped Sandpiper	<i>Calidris fuscicollis</i>	S3M	2	-	7	7	9
Willet	<i>Tringa semipalmata</i>	S2S3B	1	3	6	9	10
Wilson's Snipe	<i>Gallinago delicata</i>	S3B	1	-	-	-	1
Grand Total			85	262	480	742	827

<sup>1</sup> Species ranked by AC CDC as S1-S3S4 are considered SOCC.

At WC2, in general, the number of individuals (Figure A) and species (Figure B) was greater at low tide, when the mud flats are exposed, versus high tide. There is also a downward trend in abundance and species diversity over time. The greatest abundance and highest species diversity were observed in early August.

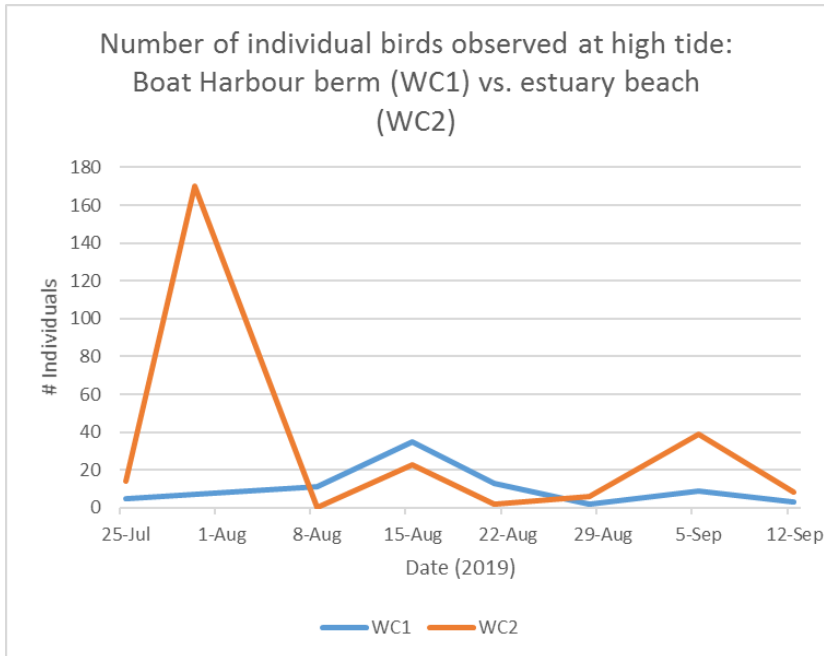


**Figure A: Number of individual shorebirds observed at the beach (WC2) overtime; low versus high tide.**

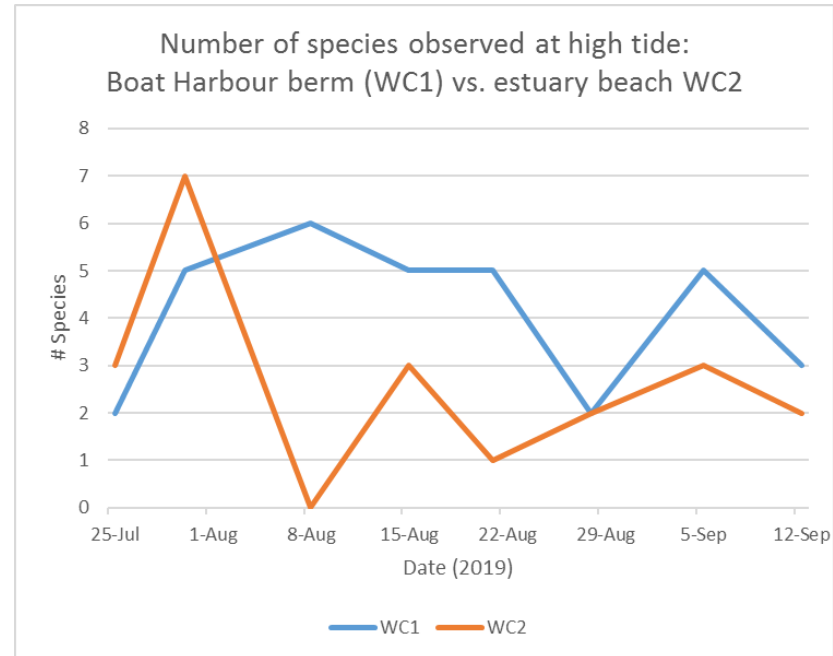


**Figure B: Number of shorebird species observed at the beach (WC2) overtime; low versus high tide.**

At high tide, with exception of the August 1<sup>st</sup> visit when 170 Semipalmated Sandpipers were observed at WC2, the number of individual shorebirds were similar at WC1 and WC2 (Figure C). Species diversity, on the other hand, was slightly higher on average at WC1 (Figure D).



**Figure C: Number of individual shorebirds observed at high tide; Boat Harbour berm (WC1) versus estuary beach (WC2).**



**Figure D: Number of shorebird species observed at high tide; Boat Harbour berm (WC1) versus estuary beach (WC2).**

A summary of the survey data collected is presented in Table 5.

**Table 5: Summary of early fall shorebird migration surveys 2019**

Visit #	Date	Station	Tide	Tide time	Start time	End time	Temp. (°C)	Wind (km/hr)	Wind Direction	Cloud (%)	Survey Effort (total mins.)	# Individuals	# Species
1	25-Jul	WC2	Low	11:05 AM	12:30 PM	1:00 PM	22	15 km/hr, gust 22	NW	70	30	16	2
		WC1	High	5:26 AM	3:26 PM	3:56 PM	23	16 km/hr, gust 24	NW	100	30	5	2
		WC2	High	5:26 AM	4:25 PM	4:55 PM	23	14 km/hr, gust 20	NW	95	30	14	3
2	30-Jul	WC1	High	8:40 AM	9:05 AM	9:35 AM	24	7 km/hr, gust 11	SW	40	30	7	5
		WC2	High	8:40 AM	10:00 AM	10:30 AM	27	7 km/hr, gust 11	SW	40	30	170	7
		WC2	Low	3:57 PM	2:00 PM	2:30 PM	30	6 km/hr, gust 9	NE	40	30	118	7
3	8-Aug	WC2	Low	11:03 AM	10:20 AM	10:50 AM	20	17 km/hr, gust 26	S	30	30	82	7
		WC2	High	5:40 PM	5:21 PM	5:51 PM	23	26 km/hr, gust 39	S	90	30	0	0
		WC1	High	5:40 PM	6:40 PM	7:10 PM	22	24 km/hr, gust 36	S	95	30	11	6
4	15-Aug	WC2	High	10:38 AM	11:30 AM	12:00 PM	23	5 km/hr, gust 7	E	40	30	23	3
		WC1	High	10:38 AM	12:00 PM	12:30 PM	24	7 km/hr, gust 11	NE	40	30	35	5
		WC2	Low	5:30 PM	6:45 PM	7:15 PM	25	6 km/hr, gust 9	NE	40	30	73	7
5	21-Aug	WC1	High	3:06 PM	1:11 PM	1:41 PM	30	21 km/hr, gust 31	SW	30	30	13	5
		WC2	High	3:06 PM	2:00 PM	2:30 PM	30	21 km/hr, gust 32	SW	50	30	2	1
		WC2	Low	9:01 PM	7:01 PM	7:31 PM	27	12 km/hr, gust 17	S	75	30	98	6
6	28-Aug	WC1	High	8:18 AM	8:20 AM	8:50 AM	15	8 km/hr, gust 12	W	10	30	2	2
		WC2	High	8:18 AM	9:15 AM	9:45 AM	17	14 km/hr, gust 21	W	5	30	6	2

Visit #	Date	Station	Tide	Tide time	Start time	End time	Temp. (°C)	Wind (km/hr)	Wind Direction	Cloud (%)	Survey Effort (total mins.)	# Individuals	# Species
		WC2	Low	3:36 PM	4:15 PM	4:45 PM	25	14 km/hr. gust 21	NW	1	30	40	5
7	5-Sep	WC2	Low	9:33 AM	10:37 AM	11:07 AM	16	22 km/hr, gust 33	NW	85	30	32	3
		WC1	High	4:19 PM	2:19 PM	2:49 PM	18	21 km/hr, gust 31	NW	10	30	9	5
		WC2	High	4:19 PM	3:25 PM	3:55 PM	19	17 km/hr, gust 26	NW	5	30	39	3
8	12-Sep	WC2	High	9:36 AM	10:30 AM	11:00 AM	12	15 km/hr, gust 23	N	100	30	8	2
		WC1	High	9:36 AM	11:00 AM	11:30 AM	12	17 km/hr, gust 26	N	100	30	3	3
		WC2	Low	4:26 PM	2:28 PM	2:58 PM	14	16 km/hr, gust 24	N	95	30	21	4

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## 3.2 BANK SWALLOW ROOSTS

No Bank Swallows were observed during the dedicated roost surveys. However, an incidental observation of about 60 Bank Swallows and 12 Barn Swallows (*Hirundo rustica*) were observed foraging near the berm (BASW-3; see Appendix A, Figure 1) on September 12, 2019 (i.e., post hurricane Dorian, which came through the area on September 7, 2019). There were reports in Nova Scotia of large numbers of swallows being brought in by Hurricane Dorian, thus we assume that these swallows were a result of hurricane Dorian and not typical for the area. This also suggests that this area provides good foraging and/or refuge for these species.

Adult Bank Swallows no longer roost inside nest burrows once the young are 12 days old. During breeding, post-breeding and migration, Bank Swallows roost overnight in large groups, generally in reed or cane beds, or other areas of dense vegetation over water or large wetlands (Winkler, 2006). Recent research on Bank Swallow roosting behaviour has found that Bank Swallows will roost within 35km of their breeding area (Saldanha, 2016). However, it has also been observed that roosting sites will change from night to night (Saldanha, 2016). As a result, Bank Swallow roosting behaviour makes it difficult to determine roosting habitat use within the Study area. Bank Swallow breeding colonies are known to be present in proximity to the Study Area and based on the limited knowledge we have of Bank Swallow roost habitat, it can be assumed that suitable habitat is available within the Study Area for this species and that a lack of detection during the dedicated surveys does not mean non-use of the site for roosting.



## 4 REFERENCES

- Kirk, D. A., Lindsay, K. E., & Brook, R. W. (2011). Risk of agricultural practices and habitat change to farmland birds. *Avian Conservation and Ecology* 6(1), 5.
- Saldanha, S. (2016, August). Foraging and Roosting Habitat Use of Nesting Bank Swallows in Sackville, NB. *MSc Thesis*. Halifax, Nova Scotia, Canada. Retrieved from <https://dalspace.library.dal.ca/bitstream/handle/10222/72205/Saldanha-Sarah-MSc-BIO-August-2016.pdf?sequence=3&isAllowed=y>
- Winkler, D. W. (2006). Roosts and migrations of swallows. *Hornero* 21, 85-97.

# APPENDIX

## A FIGURES





- LEGEND:**
- SHOREBIRD MIGRATION
  - BANK SWALLOW ROOST
  - BERM
  - BOAT HARBOUR STUDY AREA BOUNDARY

NOTE: Figure is for Shorebird Migration and Bank Swallow Roost 2019 Surveys Report

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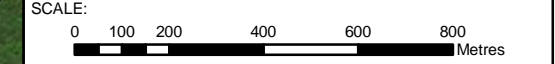
**PROJECT:**  
PROJECT: SHOREBIRD MIGRATION & BANK SWALLOW ROOST 2019 SURVEYS

PROJECT NO.: 171-10478



**FIGURE:**  
TITLE: SHOREBIRD MIGRATION & BANK SWALLOW ROOST WATCH COUNT STATION LOCATIONS

FIGURE NO.: 1 REVISION NO.: 0



DATUM: NAD 83 CSRS PROJECTION: UTM ZONE 20 NORTH

DRAWN BY: T. MOREHOUSE CHECKED BY: T. MacAULAY

CREATED DATE: (YYYY-MM-DD) 2019-09-28 REVISION DATE: (YYYY-MM-DD) 2019-09-30

**WSP Canada Inc.**  
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# APPENDIX

# B

## PHOTOGRAPHIC LOGS





Photo 1: Beach looking west from watch count station (WC2), July 25, 2019



Photo 2: Beach looking north from watch count station, July 25, 2019



Photo 3: Beach looking east from watch count station, July 25, 2019



Photo 4: Beach at low tide (1 of 2), July 30, 2019



Photo 5: Beach at low tide (2 of 2), July 30, 2019



Photo 6: Grass used for shelter adjacent to beach, September 12, 2019



Photo 7: Dead Semipalmated Plover near beach (1 of 2), September 12, 2019



Photo 8: Dead Semipalmated Plover near beach (2 of 2), September 12, 2019



Photo 9: Berm (WC1) in stabilization lagoon (1 of 4), July 25, 2019



Photo 10: Berm in stabilization lagoon (2 of 4), July 25, 2019



Photo 11: Berm in stabilization lagoon (3 of 4), July 25, 2019



Photo 12: Berm in stabilization lagoon (4 of 4), July 25, 2019



Photo 13: Shorebird foraging habitat near berm (1 of 4), August 8, 2019



Photo 14: Shorebird foraging habitat near berm (2 of 4), August 8, 2019



Photo 15: Shorebird foraging habitat near berm (3 of 4), August 8, 2019



Photo 16: Shorebird foraging habitat near berm (4 of 4), August 8, 2019





Photo 17: Bank and Barn Swallows foraging (1 of 4), September 12, 2019



Photo 18: Bank and Barn Swallows foraging (2 of 4), September 12, 2019



Photo 19: Bank and Barn Swallows foraging (3 of 4), September 12, 2019



Photo 20: Bank and Barn Swallows foraging (4 of 4), September 12, 2019



Photo 1: BANS-1 looking south (1 of 2), August 7, 2019



Photo 2: BANS-1 looking south (2 of 2), August 7, 2019



Photo 3: BANS-1 looking north (1 of 2), August 7, 2019



Photo 4: BANS-1 looking north (2 of 2), August 7, 2019



Photo 5: BANS-2 looking south, August 8, 2019



Photo 6: BANS-2 looking west, August 8, 2019



Photo 7: BANS-2 looking northwest, August 8, 2019



Photo 8: BANS-2 looking east, August 8, 2019



Photo 9: BANS-3 (1 of 2) berm in stabilization lagoon, July 25, 2019



Photo 10: BANS-3 (1 of 2) berm in stabilization lagoon, July 25, 2019



Photo 11: BANS-4, former settling pond 2, August 7, 2019



Photo 12: BANS-4, former settling pond 1, August 7, 2019