Environmental Impact Statement for 4055 and 4120 Russell Road, Ottawa

Revised Report

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TABLE OF CONTENTS

1.0 INTRODUCTION 1
1.1 PROPERTY INFORMATION AND GENERAL EXISTING CONDITIONS 2

2.0 METHODS 5
2.1 REVIEW OF EXISTING INFORMATION 5
2.2 FIELD STUDIES 5
2.2.1 Headwater Drainage Features Assessment 6
2.2.2 Ecological Land Classification, Vegetation Inventory, and Tree Inventory 8
2.2.3 Amphibian Surveys 9
2.2.4 Turtle Surveys 11
2.2.5 Bird Surveys 12
2.2.6 Mammals 12

3.0 RESULTS 14
3.1 GEOLOGY AND SOILS 14
3.2 HEADWATER DRAINAGE FEATURES ASSESSMENT 17
3.2.1 General Reach Descriptions 17
3.2.2 Classification of Water Features 32
3.3 VEGETATION 36
3.3.1 Ecological Land Classification 36
3.3.2 Vegetation Inventory 50
3.3.3 Tree Inventory 50
3.4 WILDLIFE 57
3.4.1 Species at Risk 57
3.4.2 Amphibians 67
3.4.3 Reptiles 67
3.4.4 Birds 67
3.4.5 Mammals 70

4.0 PROJECT DESCRIPTION 71

5.0 IMPACT ASSESSMENT 73
5.1 IMPACTS TO SURFACE WATER FEATURES 73
5.2 IMPACTS TO TREES AND VEGETATION 73
5.3 IMPACTS TO SPECIES AT RISK 73
5.3.1 Barn Swallow 73
5.4 MONARCH 74
5.4.1 Bobolink 74
5.4.2 Bats 74

6.0 MITIGATIONS 74
6.1 SURFACE WATER FEATURES 74
6.2 MANAGEMENT RECOMMENDATIONS 76
6.3 TREES 77

6.4 WILDLIFE 78
6.4.1 Species at Risk 78
6.4.2 Barn Swallow 78
6.4.3 Bobolink 78
6.4.4 Bats 79
6.5 GENERAL WILDLIFE MITIGATIONS 79
6.6 LIGHTING 80

7.0 CLOSURE 83

8.0 LITERATURE CITED 84

List of Figures

Figure 1 Map showing existing Site conditions 4
Figure 2 Map showing the locations of amphibian survey stations, turtle survey stations, and breeding bird survey stations for the Site, 2019 13
Figure 3 Soils map for the Site (adapted from Marshall *et al.*, 1979) 15
Figure 4 Map showing the locations of surface water features on Site, 2019 18
Figure 5 Photos showing Reach 1 (looking downstream) on April 9th (A) and May 31st (B), 2019 20
Figure 6 Photo showing Reach 2 (taken from east bank near confluence with Reach 1) on April 9th, 2019 21
Figure 7 Photo showing Reach 3 (looking downstream) on April 9th, 2019 22
Figure 8 Photo of the cattail marsh on May 31st, 2019 (view is from the southwestern edge) 24
Figure 9 Photo of the manure pond located in the centre of the northern parcel (4055 Russell Road) on April 9th, 2019 25
Figure 10 Photo showing Reach 4 (looking downstream) on April 9th, 2019 26
Figure 11 Photo showing Reach 5 (looking upstream) on April 9th, 2019 27
Figure 12 Photo showing the start of Reach 6 on May 31st, 2019. The small ponded area with wetland vegetation that drains into Reach 6 is shown in the bottom left of the photo. 28
Figure 13 Photo showing the wet depression near the eastern edge of 4120 Russell Road on May 31st, 2019 30
Figure 14 Photo showing the small creek just outside of the western border of 4120 Russell Road that we were unable to access (view is looking upstream on April 9th, 2019) 31
Figure 15 Map showing Ecological Land Classification units for the Site, 2019 37
Figure 16 Photos showing the Dry-Moist Old Field Meadow Type (CUM1-1) on the northern (A) and southern (B) parcels of the Site (photos taken on May 31st, 2019). 39
Figure 17 Photo showing the Cattail Mineral Shallow Marsh Type (MAS2-1) on Site (photo taken on May 31st, 2019) 40
Figure 18 Photos showing the four Buckthorn Deciduous Hedgerow Thicket Types (THDM3-1) on Site (photos taken on May 31st, 2019) 42
Figure 19 Photos showing four of the five Naturalized Deciduous Hedgerow Ecosites (FODM11) on Site (photos taken on May 31st, 2019). Note that there is no photo for tree hedgerow D. 44
Figure 20 Photo showing the Dry-Fresh Manitoba Maple Deciduous Forest Type (FODM4-5) on Site (photo taken on May 31st, 2019) 45
Figure 21 Photo showing the Deciduous Cultural Plantation Ecosite (CUP1) on Site (photo taken on May 31st, 2019) 46
Figure 22 Photos showing the Reed Canary Grass Mineral Meadow Marsh Types (MAM2-1) on Site (photos taken on May 31, 2019). Photo A shows the “wet depression” described in the HDFA and photo B shows the <0.05 ha area located just north of the Deciduous Cultural Plantation Ecosite (CUP1) that drains into Reach 6. 48
Figure 23 Photo showing the Mineral Cultural Thicket Ecosite (CUT1) on Site (photo taken May 31, 2019) 49
Figure 24 Map showing enumerated trees and hedgerows on Site, 2019 56
Figure 25 Map showing the conceptual extent of Site development. The final development footprint will be confirmed during site plan applications. 72
Figure 26 Flow chart providing direction on management options based on reach classifications (adapted from pg. 20 of the HDF Guidelines) 75

List of Tables

Table 1 Summary of field visits to the Site in 2019 and 2020 6
Table 2 Data requirements for the Standard survey type as per the HDF Guidelines 7
Table 3 Description of the soil landscape units underlying the Site (adapted from Marshall *et al.*, 1979) 16
Table 4 Dimensions of water features on Site on April 12, 2019 (during the spring freshet) 17
Table 5 Hydrology classification of reaches on Site in 2019 32
Table 6 Riparian classification of reaches on Site in 2019 33
Table 7 Fish and fish habitat classification of reaches on Site in 2019 34
Table 8 Terrestrial habitat classification of reaches on Site in 2019 35
Table 9 Summary of functional classifications of reaches on Site in 2019 36
Table 10 Tree number, approximate location (northern vs. southern parcels), species, diameter at breast height (DBH), notes, and Ecological Land Classification (ELC) designation for all trees on Site that may be impacted by the proposed development 51
Table 11 Species at risk potential for the Site in 2019 58
Table 12 Species list and breeding status for birds observed during the three rounds of breeding bird surveys performed in the spring and summer on Site, 2019 68
Table 13 Summary of functional classifications and management for the HDFs on Site, 2019 76

List of Appendices

Appendix A: Survey Protocols
Appendix B: Ontario Wetland Evaluation System Assessment for the Site, 2019
Appendix C: Federal Wetland Functions Assessment for the Non-Wetland Depression on Site, 2020
Appendix D: Vascular Plant List for the Site, 2019
Appendix E: Qualifications of Report Authors

List of Acronyms and Abbreviations

BBS – Breeding Bird Survey
CEAA – *Canadian Environmental Assessment Act*
EA – Environmental Assessment
ECCC – Environment and Climate Change Canada
EIS – Environmental Impact Statement
ELC – Ecological Land Classification
ESA – *Endangered Species Act*
FLUDTA – Federal Land Use, Design, and Transaction Approval
IAA – *Impact Assessment Act*
KAL – Kilgour & Associates Ltd.
MMP – Marsh Monitoring Protocol
NCC – National Capital Commission
OWES – Ontario Wetland Evaluation System
RVCA – Rideau Valley Conservation Authority
SAR – Species at Risk
SARA – *Species at Risk Act*
TCR – Tree Conservation Report

1.0 INTRODUCTION

Kilgour and Associates Ltd. (KAL) was retained by AVENUE31 to provide the necessary environmental studies to support the consideration of a change of land use on a federally-owned property. The subject property consists of parcels located at 4055 and 4120 Russell Road in Ottawa (hereafter referred to as "the Site"; Figure 1). The federal lands of the Site are currently owned and managed by the National Capital Commission (NCC) for rural agricultural usage. The Site, however, is located immediately adjacent to both a wide swath of industrial lands and Highway 417 at a major entry point to the City of Ottawa. The Site thus has significant potential to be redeveloped for commercial/industrial usage.

While the property has been duly zoned by the City of Ottawa as an area of Employment Lands for commercial/industrial usage, a change of the existing land usage from agricultural to commercial/industrial, and the assignment of management and access rights to a commercial enterprise that would implement that new land use and would conduct the redevelopment of the Site accordingly, would be handled under a Federal Land Use, Design and Transaction Approval (FLUDTA). Before such a land-use change can be considered, the NCC is required to determine whether the associated redevelopment could cause significant adverse environmental effects as required by the *Canadian Environmental Assessment Act* (CEAA; 2012) and the *Impact Assessment Act* (IAA, 2019). On August 28, 2019, CEAA was replaced by IAA, but because this project was initiated prior to this change in legislation, the project will be reviewed under CEAA, 2012.

An Environmental Assessment must be completed for projects that meet the definition of a "project" under the IAA. A "project" is defined as a physical activity (such as construction, modification, operation, decommissioning, etc.) on a physical work (a human-built structure with a fixed locality) and located on federal lands. In order for a project to be considered a project it must meet each criterion (physical activity, physical work on federal lands) otherwise there is no legal obligation for the NCC to conduct an Environmental Assessment on the project. At this current (early) stage of review of the Site, a full Environmental Assessment is not required because, being only at the concept design stage, it does not meet the definition of a "project". To proceed with the FLUDTA, however, the NCC still requires some level of environmental review of the Site to ensure sustainable requirements are duly considered in the concept design in accordance with their Sustainable Development Strategy (http://ncc-ccn.gc.ca/our-plans/sustainable-development-strategy) and the Federal Sustainable Development Strategy (http://www.fsds-sfdd.ca/index.html#/en/goals/).

Apart from the NCC, the City of Ottawa also provides regulatory oversite. Site alteration generally (as per the City's Site Alteration By-law (2018)) and any Site Plan Application(s) to be filed must both be supported by an Environmental Impact Statement (EIS). As per Section 4.7.8 of the Official Plan (City of Ottawa, 2003) an EIS will be required because the proposed development is planned to occur within and/or near potentially sensitive natural heritage features, including habitat potentially used by species at risk (SAR). The intent of this EIS for the City at this stage, as it is with the NCC, is to consider the potential impacts to the natural heritage of both the Site and its surrounding areas of the proposed change of land usage. As such, this report does not provide a detailed site plan, but rather examines a likely extent of the development (i.e., the rough footprint of a future buildout).

This document has been written as an EIS to satisfy the requirements of the City of Ottawa. It has, however, also been scoped to support a FLUDTA application for concept design/"master site plan" project types, addressing points of interests and concerns raised by the NCC. The purposes of this EIS are therefore to 1) identify natural heritage features on or adjacent to the Site, 2) identify potential impacts of the proposed development to those features, and 3) identify mitigation measures to minimize or eliminate those impacts.

1.1 Property Information and General Existing Conditions

The Site is currently owned by the NCC and is composed of five parcels:

- 4055 Russell Road (PIN: 043510393);
- 4120 Russell Road (PIN: 041610168);
- A parcel directly south of 4055 Russell Road (unknown civic address; PIN: 043510384); and
- Two parcels directly southeast of 4120 Russell Road (unknown civic addresses; PINs: 041610158 and 041610159).

For the purposes of this report, the third parcel in the list above will be grouped with 4055 Russell Road and the last two parcels will be grouped with 4120 Russell Road.

The Site is approximately 40 ha and is zoned as IH – Heavy Industrial Zone and is therefore intended for industrial development with a wide range of uses. The northern parcel (4055 Russell Road) is bordered by a hydropower plant to the north, Highway 417 to the east, Hunt Club Road to the south, and Russell Road to the west. The southern parcels (4120 Russell Road) are bordered by a Heavy Industrial Zone to the north and west, Russell Road to the east, and a stormwater management pond and Hunt Club Road to the south.

At the time of writing this report, the Site predominantly consisted of fallow fields which were used for crops up until recently. The northern parcel still contained old soybean crop during our field visits throughout the spring and summer of 2019 (likely from 2018), while the southern parcels were likely last used for agriculture in approximately 2012 (based on aerial imagery; geoOttawa, 2019; Google Earth Pro). Most of the trees on Site are less than 40 years old, except for a small (<0.5 ha) cluster of trees directly east of a wetland in the northern parcel and two hedgerows on 4120 Russell Road (near the western and northeastern edges). Some of the trees in these areas existed prior to 1976 and thus the original trees here are over 40 years old (geoOttawa, 2019).

No natural heritage elements are specifically named or described on or adjacent to the Site in publicly available information. There are no Significant Valleylands, Significant Woodlands, or Life Science Areas of Natural and Scientific Interest nearby. The closest Provincially Significant Wetland, Mer Bleue, is ~3 km east of the Site.

The Site and adjacent lands lie within the Ottawa River East subwatershed of the Rideau Valley watershed. The northern parcel lies within the Ramsay Creek catchment while the southern parcels lie within the McEwan Creek catchment. The Ramsay Creek catchment drains a total area of 22.6 km^2 and makes up 0.53% of the Rideau Valley watershed. Land cover in the Ramsay Creek catchment is as follows: 59% agriculture, 30% forest, 6% urban, 2% rural, 2% wetland, and 1% unclassified (Rideau Valley Conservation Authority (RVCA), 2013). The McEwan Creek catchment is 24.9 km^2 and makes up 0.59% of the Rideau Valley watershed.

Land cover in the McEwan Creek catchment is predominantly urban (64%), followed by forest (13%), meadow (8%), agriculture (7%), and wetland (6%; RVCA, 2016). The Site and adjacent areas contain headwater features of both Ramsay Creek and McEwan Creek.

Figure 1 Map showing existing Site conditions

Legend

- Site boundary
- Property parcels

N

0 200 m

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KILGOUR & Associates

2.0 METHODS

2.1 Review of Existing Information

Colour digital aerial photographs from geoOttawa and Google Earth Pro were used to initially identify natural environment features in the area through a desktop review (as with the general descriptions above). Additional background information in this report was obtained from a combination of studies and reports performed within the general area of the Site (cited throughout) to review relevant information and to guide field studies (below). The review of existing information also included a desktop assessment of species listed under the federal *Species at Risk Act* (SARA) and the provincial *Endangered Species Act* (ESA) having some potential to occur in the broader area (i.e., within 1 km of the Site). Existing information was obtained from online sources, which include but are not limited to:

- Natural Heritage Information Centre (Ministry of Natural Resources and Forestry (MNRF), 2016);
- Species at Risk Public Registry (Government of Canada, 2019);
- Ontario Species at Risk List (Ministry of the Environment, Conservation and Parks (MECP), 2019);
- Ramsay Creek 2013 Summary Report (RVCA, 2013);
- McEwan Creek 2016 Summary Report (RVCA, 2016);
- Ontario Breeding Bird Atlas (Ontario Nature, 2019a);
- Herp Atlas (Ontario Nature, 2019b); and
- Bat Conservation International Species Profiles (BCI, 2016).

2.2 Field Studies

Detailed field studies were performed throughout the spring and early summer of 2019 to document the existing ecological conditions of the Site. These field studies included core surveys of flora and fauna. Standard and accepted methods were employed for all surveys (described in detail below). A summary of the field visits is outlined in Table 1.

Table 1 Summary of field visits to the Site in 2019 and 2020

Date	Purpose	Personnel	Average weather conditions
2019/04/09	HDFA #1	Katherine Black, Robert Hallett	10°C, light rain, 75-100% cloud cover, low wind
2019/04/18	WCF survey #1	Camille Tremblay, Tiera Zukerman	8°C, no rain, low wind
2019/04/25	WCF survey #2	Camille Tremblay	11°C, no rain, no wind
2019/05/06	Turtle survey #1	Clare Kilgour	23°C, 0-25% cloud cover, low wind
2019/05/07	Turtle survey #2	Anthony Francis and Heather Lindsay	16°C, 25-50% cloud cover, low wind
2019/05/08	Turtle survey #3	Heather Lindsay	14°C, 0-25% cloud cover, low wind
2019/05/16	WCF survey #3	Emina Alic, Tiera Zukerman, Melissa Henderson	12°C, no rain, low wind
2019/05/21	Turtle survey #4	Heather Lindsay	12°C, 25-50% cloud cover, low wind
2019/05/22	Turtle survey #5	Clare Kilgour	16°C, 0-25% cloud cover, low wind
2019/05/31	Bird survey #1, HDFA #2, ELC, OWES assessment	Anthony Francis, Katherine Black, Ken Allison	15°C, 75-100% cloud cover, low wind
2019/06/07	Mid-season frog survey	Anthony Francis	20°C (previous evenings that week were 10°C or less), 20% cloud cover, low wind, no precipitation
2019/06/17	Bird survey #2	Ken Allison	12°C, 0-25% cloud cover, low wind
2019/07/01	Bird survey #3	Ken Allison	18°C, 0-25% cloud cover, low wind
2019/07/10	HDFA #3, OWES assessment	Katherine Black, Heather Lindsay	19°C, 0-25% cloud cover, low wind
2019/07/10	Late-season frog survey	Anthony Francis	25°C, 0% cloud cover, low wind
2019/08/29	Tree survey	Katherine Black, Heather Lindsay	22°C, 75-100% cloud cover, medium wind

Table Notes: HDFA – Headwater Drainage Features Assessment
WCF – Western Chorus Frog
ELC – Ecological Land Classification
OWES – Ontario Wetland Evaluation System

2.2.1 Headwater Drainage Features Assessment

A full Headwater Drainage Features Assessment (HDFA) was performed for the Site. The HDFA provides a detailed description of water features on and directly adjacent to the Site following the field methods identified within *Evaluation, Classification and Management of Headwater Drainage Features Guidelines* written by Credit Valley Conservation Authority and Toronto Region Conservation Authority (2014), hereafter referred to as "the HDF Guidelines". Assessment and evaluation of the Site's water features will be conducted by RVCA based on descriptions provided in the HDFA.

The HDFA identifies and describes all water features occurring on and directly adjacent to the Site and evaluates a total of six reaches. A brief visual inspection of the Site was performed on April 9th, 2019 to document existing conditions of water features (feature types, physical characteristics of features, and riparian conditions) at their maximal extent under spring freshet conditions. Observations from this initial visit suggested that one of the six reaches was likely fish habitat and perennially flowing, and that most other

reaches on Site would likely be dry in the summer. During our second and third site visits on May 31st and July 10th, 2019, respectively, all reaches were dry except for Reaches 1 and 2, which were the only HDFs with defined channel forms. Since Reach 1 has perennial flow, the HDF Guidelines would call for a detailed "Diagnostic" level survey type for this reach. However, since Reach 1 (the Mather Award Drain) is not to be altered under the proposed development, Diagnostic surveys were not performed for this reach. Accordingly, "Standard" level surveys as per the HDF Guidelines were performed for the six reaches associated with the Site as most reaches were expected, upon the initial site visit, to be dry in the summer.

The Standard level of survey used in this HDFA follows the requirements of the HDF Guidelines, which are outlined in Table 2.

Table 2 Data requirements for the Standard survey type as per the HDF Guidelines

Survey Type	Sensitivity, Feature Form, and Flow	Mandatory Data Requirements		Additional Data Requirements for HDF Alterations	
		Flow Condition	Riparian	Fish and Fish Habitat	Terrestrial Assessment
Standard	Sensitive species/habitat possible and/or ill-defined form, intermittent flow likely	Ontario Stream Assessment Protocol (OSAP) S4.M10 (Headwaters)	OSAP S4.M10 (Headwaters)	OSAP S3.M1	Marsh Monitoring Protocol for Amphibians; Ecological Land Classification; Ontario Wetland Evaluation System (for wetlands ≥ 0.5 ha)

Table Notes: Adapted from pg. 10 of the HDF Guidelines (Credit Valley Conservation and Toronto Region Conservation Authority, 2014)

Following the headwaters sampling protocol (Ontario Stream Assessment Protocol (OSAP) S4.M10), a brief assessment was performed on April 9th, 2019 by KAL Biologists, Katherine Black and Robert Hallett, to characterize the amount of water and sediment transport and storage capacity within the HDFs on Site as well as their riparian and feature vegetation. Although the Standard survey type calls for an assessment of fish and fish habitat using OSAP S3.M1, electrofishing techniques were not employed since Reach 1, the only reach likely to support perennial fish habitat, is not to be altered under the proposed development plan. A fish species list for this reach was still obtained from publicly available data collected by RVCA to provide insight into the type of fish that have the potential to occur on Site. KAL Biologist, Anthony Francis, briefly re-visited all reaches on May 31st, 2019 to qualitatively assess late spring water levels and Ms. Black re-visited the site again on July 10th, 2019 to investigate summer water levels. An assessment of amphibian breeding and presence following the Marsh Monitoring Protocol (Appendix A) was performed by Dr. Francis for mid- and late-season breeding species on June 7th and July 10th, 2019, respectively. NCC Biologists (Camille Tremblay, Tiera Zukerman, Emina Alic, and Melissa Henderson) performed targeted amphibian surveys for Western Chorus Frog (listed as Special Concern under SARA and is an early-season breeder under the Marsh Monitoring Protocol) using Blazing Star Environmental Inc.'s draft protocol (Appendix A). Western Chorus Frog surveys were performed on April 18th, April 25th, and May 16th, 2019. More details on amphibian survey methods are below in Section 2.2.3. KAL Biologists, Ken Allison and Ms. Black, performed an Ecological Land Classification (ELC) for the riparian zone of each reach to document community type on May 31st, 2019. The wetland (cattail marsh) in the northwestern corner of the Site was further investigated on May 31st and July

10th, 2019 by Ms. Black using the Ontario Wetland Evaluation System protocol (OWES; Ms. Black is a certified wetland evaluator). OWES is a provincial protocol but has served as a basis for wetland habitat guidelines in federal projects (e.g., *How Much Habitat is Enough? Third Edition* - Environment Canada, 2013). The NCC agreed that OWES was an acceptable approach to use for this project as OWES is much more rigorous and comprehensive compared to the federal classification system (The Canadian Wetland Classification System).

2.2.2 Ecological Land Classification, Vegetation Inventory, and Tree Inventory

All of the natural vegetation communities on Site were visited on May 31st, 2019 by Mr. Allison and Ms. Black and again on July 1st, 2019 by Mr. Allison. Each community was identified and mapped in the field using the standard Ecological Land Classification (ELC) methods for Ontario (Lee et al., 1998). This method results in a standardized description of each vegetation community, giving information on vegetation type and soils. Where possible, communities were mapped to the most detailed level of 'vegetation type'. In some cases, where a suitable vegetation type did not exist, or mapping to this level did not provide a great deal of additional information, communities are described using the higher level of 'ecosite' type. Representative photos of each vegetation community were taken and are included with the community descriptions in this report.

During the visits to each vegetation community throughout the spring and summer, a detailed vegetation inventory of all vascular plants was developed. Where identification was uncertain, specimens were collected and identified later using conventional taxonomic literature and detailed examination as required. Species and communities of significance (federal, provincial, or regional) were determined using accepted status lists and publications, including the federal Species at Risk Public Registry (Government of Canada, 2019), the Ontario Species at Risk List (MECP, 2019), the Natural Heritage Information Centre (MNRF, 2016), and *Appendix A – Vascular Plants of the City of Ottawa, with the Identification of Significant Species* by Daniel Brunton (2005).

On August 29th, 2019 Ms. Black and Ms. Lindsay surveyed all treed areas on Site to check for Butternut (*Juglans cinerea*; listed as Endangered under ESA and SARA), assess the potential for bat presence based on the presence of wildlife trees (e.g., those with cavities, dead leaf cluster, and/or snags ideal for bat roosting), and to document trees that may be impacted by the proposed development. Tree survey data were recorded in accordance with the City's Tree Conservation Report (TCR) Guidelines (City of Ottawa, 2014). However, this document does not act as a TCR for the Site because at this stage in the project the exact number and location of trees to be removed has not yet been determined. Regardless, trees in areas that fell within the initial (broad) footprint of the development were surveyed. Trees with diameter at breast height (DBH) ≥ 10 cm standing in open areas were individually recorded and mapped. Several hedgerows and clusters of trees on Site contain too many trees to practically list every individual over 10 cm DBH. For these areas, only significantly sized trees (i.e., generally >35 cm DBH) were individually identified and mapped. Note that NCC requires the total number of trees on Site with DBH ≥10 cm that may be impacted by the proposed development to determine how many trees need to be compensated (NCC uses a 2:1 compensation ratio for tree removal; two trees need to be planted for every tree removed). Accordingly, once detailed site plans are created, all trees on Site with DBH ≥ 10 cm that are likely to be impacted by each phase of development will need to be enumerated and mapped if they were not captured in our preliminary tree survey.

Incidental wildlife observations were recorded while conducting vegetation work on Site.

2.2.3 Amphibian Surveys

Frog surveys performed by KAL followed techniques in the Marsh Monitoring Protocol (Bird Studies Canada, 2008; Appendix A). This protocol calls for multiple survey stations at a site. However, it was identified during initial Site visits that potential frog habitat on Site beyond early spring (i.e., given the generally dry conditions over most of the landscape immediately following the spring freshet) is limited to the cattail marsh adjacent to the road in the northwest corner of the northern parcel. A single frog survey point located on the roadside, midway along the length of the cattail marsh, provided a suitable vantage from which to listen for frogs in a 180° arc with a 200 m listening radius (station MMP-1 in Figure 2). While frog presence could also be possible in the Mather Award Drain on the northern parcel (i.e., Reach 1, though unlikely given the fish community known to occur there), this feature was not specifically targeted for frog surveys because it would not be altered under any proposed development plan. While no formal frog surveys were conducted here, incidental observations were still possible as KAL crews walked past the area while accessing other areas of the Site throughout the field campaign. No frogs were observed near or in Reach 1 during any visits to the Site in 2019.

The Marsh Monitoring Protocol advises that each station be visited a minimum of three times at night, no less than 15 days apart, during the spring and early summer. Following this protocol, frog surveys are dependent on nighttime air temperature:

- Early breeders (Wood Frog, Western Chorus Frog, Spring Peeper): above 5°C;
- Mid-season breeders (Mink Frog, American Toad, Gray Treefrog): above 10°C; and
- Late breeders (Green Frog, Bullfrog): above 17°C.

Frog surveys began one half hour after sunset and ended before 1:00 am on evenings with appropriate temperatures and light winds. Mid- and late-season frog surveys were conducted on June 7th and July 10th, 2019 as outlined in Table 1 (see below for early-season frog surveys).

NCC Biologists (Camille Tremblay, Tiera Zukerman, Emina Alic, and Melissa Henderson) performed targeted frog surveys for Western Chorus Frog (listed as Special Concern under SARA) using Blazing Star Environmental Inc.'s draft protocol (Appendix A). Although this protocol is intended primarily for Western Chorus Frog, all early breeding frog species generally occurring in the area would be detectable under this protocol. This protocol calls for a minimum of three visits to multiple survey stations capturing representative Western Chorus Frog habitat on Site between 10am and 6pm between mid-March and early May (depending on the year and when Western Chorus Frogs in the area are calling). NCC Biologists used a local reference site where a reliable chorus of Western Chorus Frogs was known to occur to determine when calling had started in the area. As per Blazing Star Environmental Inc.'s draft protocol, Western Chorus Frog surveys were conducted on mornings/early afternoons with air temperatures above 10°C, light or no wind, and no rain. Surveys were conducted from eight stations (stations WCF-A1, WCF-A2, and WCF-B through G on Figure 2) centred less than 75 m away from the targeted habitat.

Additional observations of amphibians were made by KAL throughout the spring and summer during other visits. In most vegetation communities, particularly in wooded areas, rocks, fallen wood, and other debris were turned over to check for salamanders.

2.2.4 Turtle Surveys

Due to the presence of surface water on and directly adjacent to the Site, five rounds of basking turtle surveys were performed to assess the potential presence of at-risk turtles. Visual encounter surveys were completed following MNRF's Survey Protocol for Blanding's Turtle in Ontario (2015; Appendix A). Although this protocol is intended primarily for Blanding's Turtle, all turtle species generally occurring in the area would be detectable under this protocol.

This protocol requires that potential habitat for turtles be visited under the following conditions:

- After ice off, and no later than June 15th;
- If air temperature is between 5 and 15˚C, surveys are to take place during sunny periods, between 10:00am and 5:00pm, when basking sites are receiving full sunlight;
- If air temperature is between 15 and 25˚C, surveys are to take place during sunny periods between 8:00am and 12:00pm, when basking sites are receiving full sunlight or during overcast periods from 9:00am until 4:00pm if air temperature is higher than water temperature; and
- Five surveys must be spread over a period of at least three weeks, at sites with no previous documentation of the species.

Turtle surveys were completed via foot along all surface water features that were considered, at a minimum, marginal turtle habitat and/or travel corridors (stations T-A through T-E on Figure 2).

The survey route included five survey stations where surveyors stopped and scanned the area with binoculars from a distance of ~50 m to prevent any turtles from being startled before being observed. The limited vegetation present along these surface water features in the spring and early summer allowed these features to be effectively scanned with binoculars from a distance. Specific dates and weather conditions of turtle surveys are shown in Table 1.

Rocks, fallen wood, and other debris on Site were turned over to check for snakes throughout the field campaign. Potential basking sites for snakes were also investigated.

2.2.5 Bird Surveys

Breeding bird surveys were performed via point count surveys following the Ontario Breeding Bird Atlas Guide for Participants (2001; Appendix A). Breeding bird surveys are to be completed from survey stations that, combined, provide suitable viewing of all habitats on Site on calm weather days with light wind (less than 3 on the Beaufort scale) and no precipitation. Six breeding bird survey stations were established in representative habitats across the Site (stations BBS-1 through BBS-6 on Figure 2).

As per the Ontario Breeding Bird Atlas, surveys must take place between sunrise and five hours after sunrise between May 24 and July 10, with a minimum of 15 days between survey dates. This protocol calls for two surveys per year during the breeding bird window. However, an additional (third) bird survey is required under MNRF protocols for at-risk birds that use field habitats. Since we believed the site had the potential for SAR birds that use field habitats (Barn Swallow, Bobolink, and Eastern Meadowlark), KAL biologists conducted three rounds of breeding bird surveys. Specific dates and weather conditions for bird surveys are shown in Table 1. All incidental observations were recorded while moving between survey points as well as during other Site visits. Birds were identified by song and/or direct visual observation.

The designation of regionally rare bird species was based on an analysis of data from the Atlas of Breeding Birds of Ontario (Cadman *et al*., 1987) based on Hill's Site Regions, now Ecoregions.

2.2.6 Mammals

As explained in Section 2.2, the potential presence of bats was assessed during the tree inventory conducted on August 29th, 2019 by actively looking for trees with cavities and snags ideal for bat roosting. The interior and exterior of the house and agricultural structures near the manure pond on the northern parcel were checked during every field visit by KAL in 2019.

During these inspections, there were no signs of bat presence (bats, guano, etc.), but there were several areas on structures that would allow for bat entrance/egress and therefore these structures have the potential to support maternity roosts. Under provincial guidelines, buildings are not considered Significant Wildlife Habitat (MNRF, 2015a). However, NCC (federal) lands are subject to the Policy Regarding the Identification of Anthropogenic Structures as Critical Habitat (SARA Policies and Guidelines Series; Government of Canada, 2019), under which anthropogenic structures can be considered critical SAR habitat. As such, detailed bat monitoring must be implemented during the breeding season (e.g., June) immediately prior to the demolition of the houses on Site to determine the potential for bat presence and any necessary mitigation. In addition to the houses on the northern parcel, this parcel contains several open agricultural structures. KAL and NCC agree that detailed bat monitoring is not necessary for these structures as they were assessed as having a low potential for the presence of maternity roosts due to their open nature (i.e., they are exposed to the elements; these structures would be more suitable for day-roosting).

Detailed bat monitoring was not performed in wooded areas on Site due to the absence of potential maternity roosting habitat defined in provincial bat monitoring guidelines (details in Section 3.4.5 below).

Incidental observations of other mammals present in the study area were collected during all Site visits. Mammal observations were limited to sightings of scat, tracks, and in some cases, direct observations.

Figure 2 Map showing the locations of amphibian survey stations, turtle survey stations, and breeding bird survey stations for the Site, 2019

Legend

Site boundary

Survey Stations

- Birds
- Frogs
- Turtles

N

0 200 m

Project: AVE866
Created By: AF
MTM Zone 9
(NAD 83)
Printed on: 2020-03-27

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3.0 RESULTS

3.1 Geology and Soils

The surficial geology of the Ramsay Creek catchment (northern parcel of the Site) consists of 53% clay, 44% sand, and 3% organic deposits (RVCA, 2013). The surficial geology of the McEwan Creek catchment (southern parcels) consists of 62% clay, 32% sand, 3% diamicton, 3% gravel, and 1% Paleozoic bedrock (RVCA, 2016). The specific soil units that underly the Site (as per Marshall *et al.,* 1979) are shown in Figure 3 and are described in Table 3. Note that the soil units described in Table 3 represent the parent material of the Site. The surface material has been worked over throughout several decades of ongoing agriculture (from prior to 1965 to early to late 2010s). However, a significant change in topography still exists near the centre of 4120 Russell Road (X1 on Figure 5). Other than this area, the Site is relatively and consistently flat.

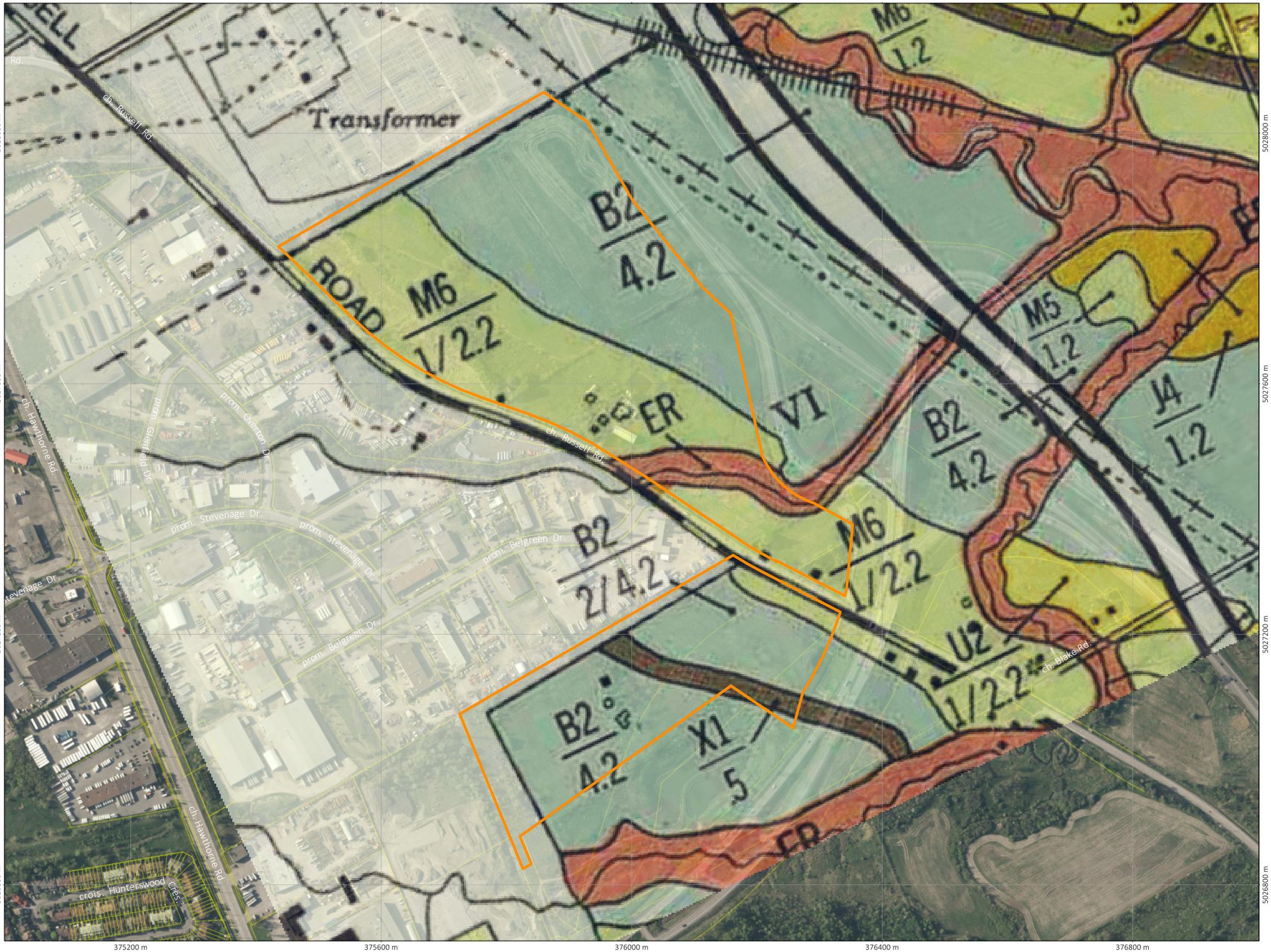

Figure 3 Soils map for the Site (adapted from Marshall et al., 1979)

Legend

Site boundary

N

0 200 m

Project: AVE866
Created By: AF
MTM Zone 9
(NAD 83)
Printed on: 2020-03-27

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Table 3 Description of the soil landscape units underlying the Site (adapted from Marshall *et al.*, 1979)

Soil Landscape Unit	Description of Soil Landscape Unit	Main Surface Texture	Soil Association	Description of Soil Association
B2	Dominantly poorly drained Bearbrook series (Orthic Humic Gleysol) on level to very gently sloping topography with slopes between 0 and 2%.	Moderately fine: Clay loam, silty clay loam, sandy clay loam.	Bearbrook	Neutral, very fine textured marine materials that contain reddish brown layers of varying thickness with a depth of 2 m.
M6	Dominatly poorly drained Allendale series (Orthic Humic Gleysol) found on level to very gently sloping topography with slopes between 0 and 2%.	Coarse: Sand, loamy sand, loamy fine sand	Manotick	Strongly acidic, coarse textured marine and estuarine veneer (25 to 100 cm) overlying neutral, moderately fine to fine textured marine clay.
ER	Eroded gullies, steep valley walls, and narrow creek beds.	N/A	N/A	N/A
X1	Clay escarpments with moderately fine to fine surface textures found on strongly sloping topography with slopes between 9 and 15%.	Fine: Sandy clay, clay, silty clay.	Escarpment	Steeply sloping bedrock scarps and clay escarpments.

3.2 Headwater Drainage Features Assessment

3.2.1 General Reach Descriptions

Dimensions of the HDFs evaluated in this report are shown in Table 4 and photos of each HDF are shown in-text below. Mean bankfull width, mean wetted width, and mean depth were estimated in the field on April 9th, 2019. Approximate feature length was estimated using desktop mapping tools (geoOttawa, 2019 and Manifold GIS). The areas of the cattail marsh and "wet depression" were estimated using a combination of desktop mapping tools and field delineation. All HDFs on Site are shown in Figure 4.

Table 4 Dimensions of water features on Site on April 12, 2019 (during the spring freshet)

Water feature	Length (m)	Mean Bankfull Width (m)	Mean Wetted Width (m)	Mean Depth (cm)
Cattail Marsh	Area = 2 ha	N/A	N/A	8
Reach 1	354*	4.3	3.3	22
Reach 2	380	6.7	1	10
Reach 3	132	3.8	1.5	8
Reach 4	175	3.4	1.5	35
Reach 5	154	4.9	0.4	9
Reach 6	90	2	1.2	6
"Wet depression"	Area = 0.28 ha	N/A	N/A	N/A

Table Notes: *Length of portion of Reach 1 occurring on Site. All other lengths indicate total length.

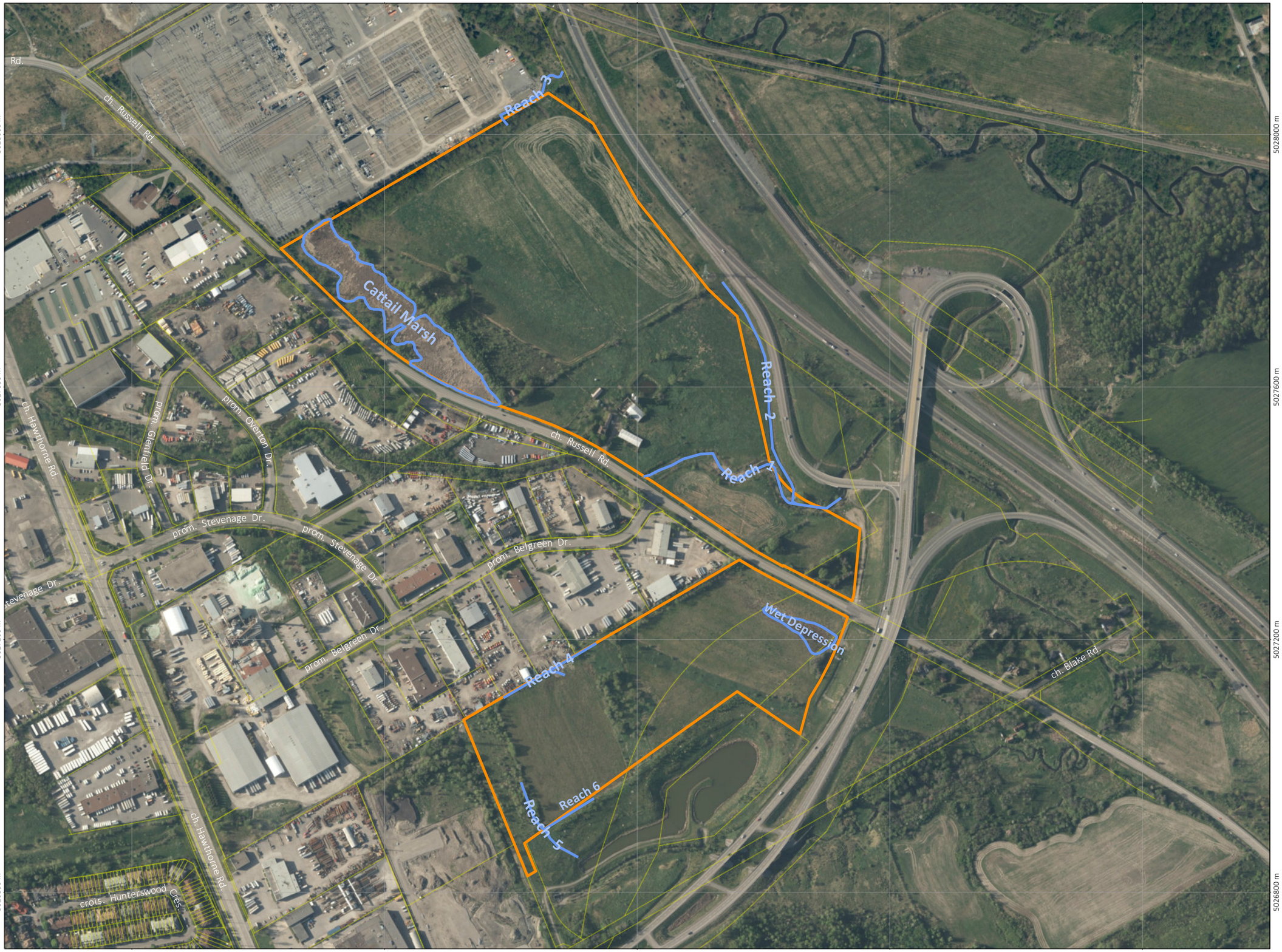

Figure 4 Map showing the locations of surface water features on Site, 2019

Legend

- Site boundary
- Drainage Feature

N

0 200 m

Project: AVE866
Created By: AF
MTM Zone 9
(NAD 83)
Printed on: 2020-03-28

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3.2.1.1 Water Features of 4055 Russell Road (Northern Parcel)

Reaches 1, 2, and 3

Reach 1 (Mather Award Drain; Figure 5) is the only perennially flowing reach on Site and is an HDF of Ramsay Creek. It flows from the west through industrial parks, enters the property through a box culvert under Russell Road, and continues east through the Site and under Highway 417 until its confluence with Ramsay Creek. The portion of this HDF running through the Site is approximately 354 m long and is slightly sinuous. The substrate consists primarily of cobble rocks with larger rocks dispersed throughout, underlain by finer gravel and coarse sand. The channel is well defined with evidence of sedimentation and sorted substrate. It has minimal submerged aquatic vegetation; the channel is predominantly open flowing water. The banks consist mainly of scrubland (Willow (*Salix*), Alder (*Alnus*), and White Poplar (*Populus alba*) shrubs) along with cattails (*Typha* spp.) and Common Reed (invasive *Phragmites australis*) on the edges of the channel. The lands to the north and south (beyond the riparian vegetation line) are fallow fields previously used for soybean crop.

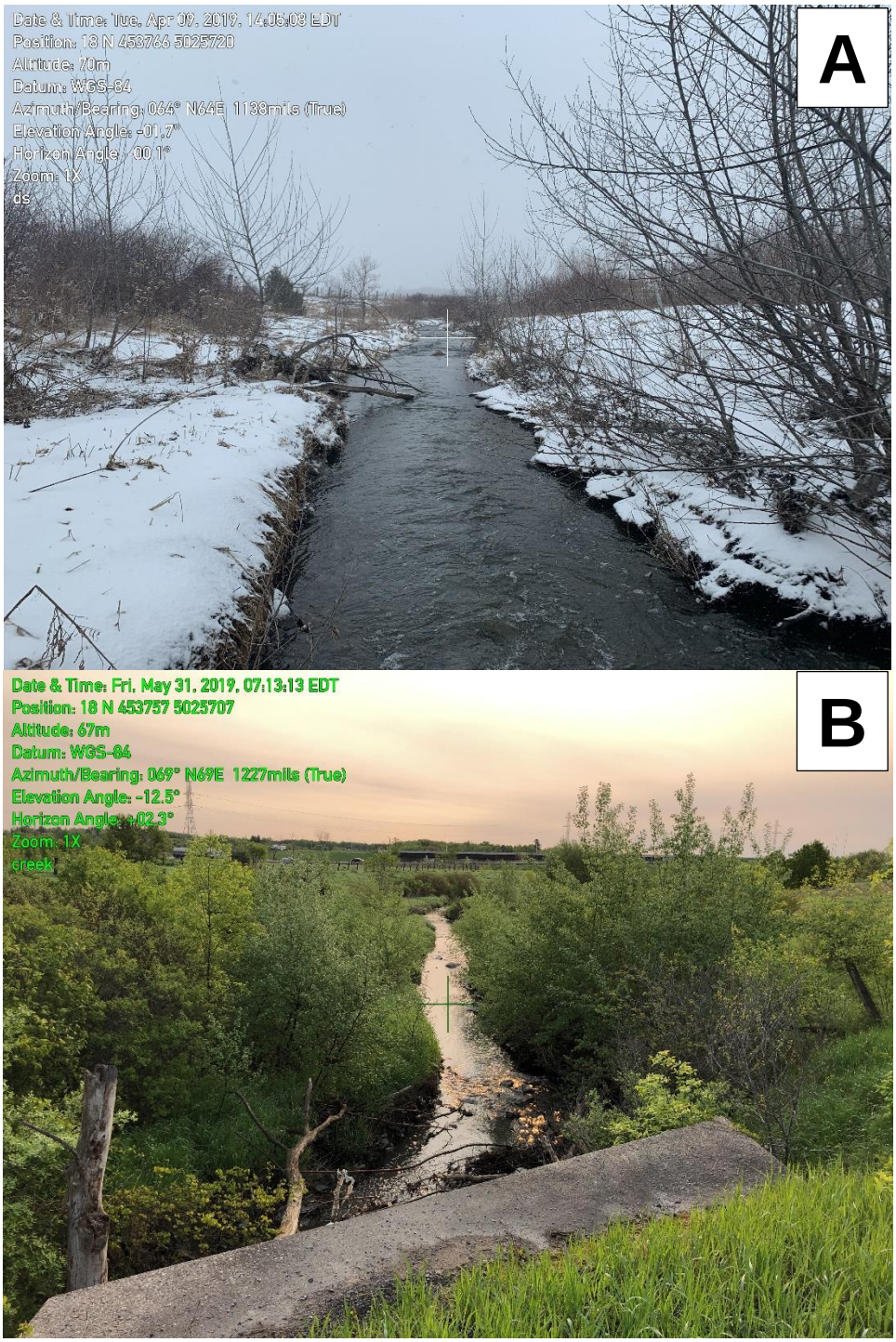

Figure 5 Photos showing Reach 1 (looking downstream) on April 9th (A) and May 31st (B), 2019

Reach 2 (Figure 6) is part of a ditch with a defined channel that was presumably constructed to capture stormwater runoff from Highway 417. Closer to the southeastern corner of the Site, it drains from north to south and connects with Reach 1 on the Site. Only a very small length of Reach 2 (~15 m) actually falls on the Site; most of it is outside of the property line. There is a small check dam in Reach 2 upstream of where it crosses the Site, and further upstream there is a small culvert where the feature then straightens out (running parallel to Highway 417) along the northeastern edge of the northern parcel. However, the portion of this reach northwest of the culvert was dry in the early spring and summer, and so only the wetted portion is considered in this report (i.e., the length in Table 2 reflects the length of the wetted portion of the feature during our first spring visit). Reach 2 had standing water in the spring and scattered patches of puddles in the summer that were intermittently connected by narrow trickles of interstitial flow. The channel has dense patches of cattails and Common Reed throughout. The substrate is cobble rock and the banks have rip-rap with some Willow and Buckthorn (*Rhamnus* spp.) shrubs scattered higher up on the banks. Lands to the west are fallow fields previously used for soybean crop and the Hunt Club Road off-ramp from Highway 417 is directly to the east.

Figure 6 Photo showing Reach 2 (taken from east bank near confluence with Reach 1) on April 9th, 2019

Reach 3 (Figure 7) is an old tile drain output along the northern edge of 4055 Russell Road (technically falls outside the Site boundary). This drainage ditch has an organic substrate underlain by silty clay and is dense with non-aquatic graminoids. The channel is not well defined; it is essentially a narrow depression with the same vegetation in the channel as the banks. Upstream of the tile drain output is a dry ditch abundant with cut logs and other woody debris. The northern edge of the drainage ditch is the property/fence line, and beyond that is a hydropower plant. Heading south from the drainage ditch is a small, disturbed meadow area dominated by Eastern Cottonwood (*Populus deltoides*) saplings, then a hedgerow of mainly Lombardy Poplars (*Populus nigra*) followed by a fallow field where the tile drain system removes water from. This feature presumably holds meltwater during the spring freshet and captures stormwater runoff from the hydropower plant and is otherwise dry in the summer. It likely drains into the ditch outside the northeastern edge of the parcel, although as previously mentioned, this ditch was dry during all three field visits (same ditch described above; northwest of Reach 2).

Figure 7 Photo showing Reach 3 (looking downstream) on April 9th, 2019

Cattail Marsh

Additional data requirements for HDF alterations include evaluating wetlands ≥ 0.5 ha using OWES methods. The wetland in the northwestern corner of the Site is a cattail marsh approximately 2 ha in size (Figure 8). It is a homogenous marsh with only one vegetation community and one dominant form and species (robust emergent and Broadleaf Cattail (*Typha latifolia*), respectively) based on classification used in OWES. It has no significant biological, social, or otherwise "special" features. It does, however, likely play an important role in stormwater attenuation as it is an isolated wetland. Note that the HDF guidelines only consider wetlands as HDFs if they are connected downstream through surface flow. This wetland is therefore not considered an HDF because it is not connected to any HDFs upstream or downstream via surface water. It likely mainly receives water from precipitation and stormwater runoff from Russell Road to the west along with some groundwater input, although there were no obvious groundwater seeps. The water table was above the surface in the spring and then the soil surface was dry in the summer.

Historical photos indicate that an agricultural drain used to flow into this wetland from the northwest. The hydropower plant north of the marsh was expanded some time before 1991, which is likely when the connection to the drain was removed. The marsh then became an isolated wetland and imagery indicates that it filled in with more cattails over time, effectively 'closing' patchy areas that previously contained open water. A driveway was also constructed through this wetland prior to 1965, which bisected the marsh as it extended from Russell Road to a homestead east of the marsh. The homestead was removed some time before 1999 which is when the driveway through the marsh started naturally regenerating. It now makes up a disconnected causeway through the marsh with tall shrubs.

While this wetland is not considered an HDF and is not being evaluated as one, it was evaluated using OWES methods for full due diligence. Ms. Black's evaluation of this wetland following OWES resulted in a score of 325 (see Appendix B for details of the OWES review), which is well below the score required for the provincially significant designation (600 points).

Figure 8 Photo of the cattail marsh on May 31st, 2019 (view is from the southwestern edge)

Manure Pond

A constructed manure pond exists on top of a small hill in the centre of the northern parcel (18 T 453092 5027417; Figure 99). This pond was not assessed for this HDFA as it is not connected to any HDFs on Site and is essentially a waste basin that was previously used to manage and treat refuse created from animal feeding operations.

Figure 9 Photo of the manure pond located in the centre of the northern parcel (4055 Russell Road) on April 9th, 2019

3.2.1.2 **Water Features of 4120 Russell Road (Southern Parcels)**

Reaches 4, 5, and 6

Reach 4 (Figure 1010) is a linear drainage ditch along the northern property line of 4120 Russell Road that contained standing water in the spring but was dry in the summer. To the north is an industrial park, and to the south is a fallow field/meadow. This reach was likely intended to aid in drainage of the industrial park to the north but no longer appears to provide this function. There are two linear vegetated depressions on relatively elevated areas in the fallow field south to southeast of Reach 4 that were likely once deep tire tracks. These depressions were linear puddles in the spring that were draining into Reach 4 but were dry in the summer (Reach 4 itself was also dry at this point). Reach 4 drains from east to west into a small patch of cattails at the western end of the ditch. The channel is not well defined, has an organic substrate, and contains graminoids and herbs that are also growing on and beyond the banks. There are several Buckthorns scattered along the northern bank.

Figure 10 Photo showing Reach 4 (looking downstream) on April 9th, 2019

Reach 5 (Figure 111) is a small swale that starts within the southern end of a tree hedgerow that runs parallel to the western border of 4120 Russell Road. It drains southward into a stormwater management pond off the property. The treed banks of Reach 5 consist predominantly of Green Ash (*Fraxinus pennsylvanica*) and Red Osier Dogwood (*Cornus sericea*) while the non-treed portion consists of Goldenrods (*Solidago* spp.), Common Milkweed (*Asclepias syriaca*), and graminoids. The channel has an organic substrate and is not well-defined; it is a depression with the same vegetation as the banks.

Figure 11 Photo showing Reach 5 (looking upstream) on April 9th, 2019

Reach 6 (Figure 122) is a small swale located on the southern edge of 4120 Russell Road. In the spring, there was a small area (<0.05 ha) with ponded water and wetland vegetation in a relatively elevated area east to northeast of Reach 6. During spring freshet this drains into Reach 6, which connects with Reach 5 to the west to drain into the stormwater pond south of the Site. Both Reaches 5 and 6 were dry in the summer, but the small wet area that drains into Reach 6 still had some shallow standing water. Like Reach 5, the channel of Reach 6 has an organic substrate and is not well defined; it is a depression with the same graminoids that exist on the banks. The north bank of Reach 6 is dominated by graminoids and low shrubs while the south bank is dominated by tall shrubs and planted trees (Poplars, Maples, etc.).

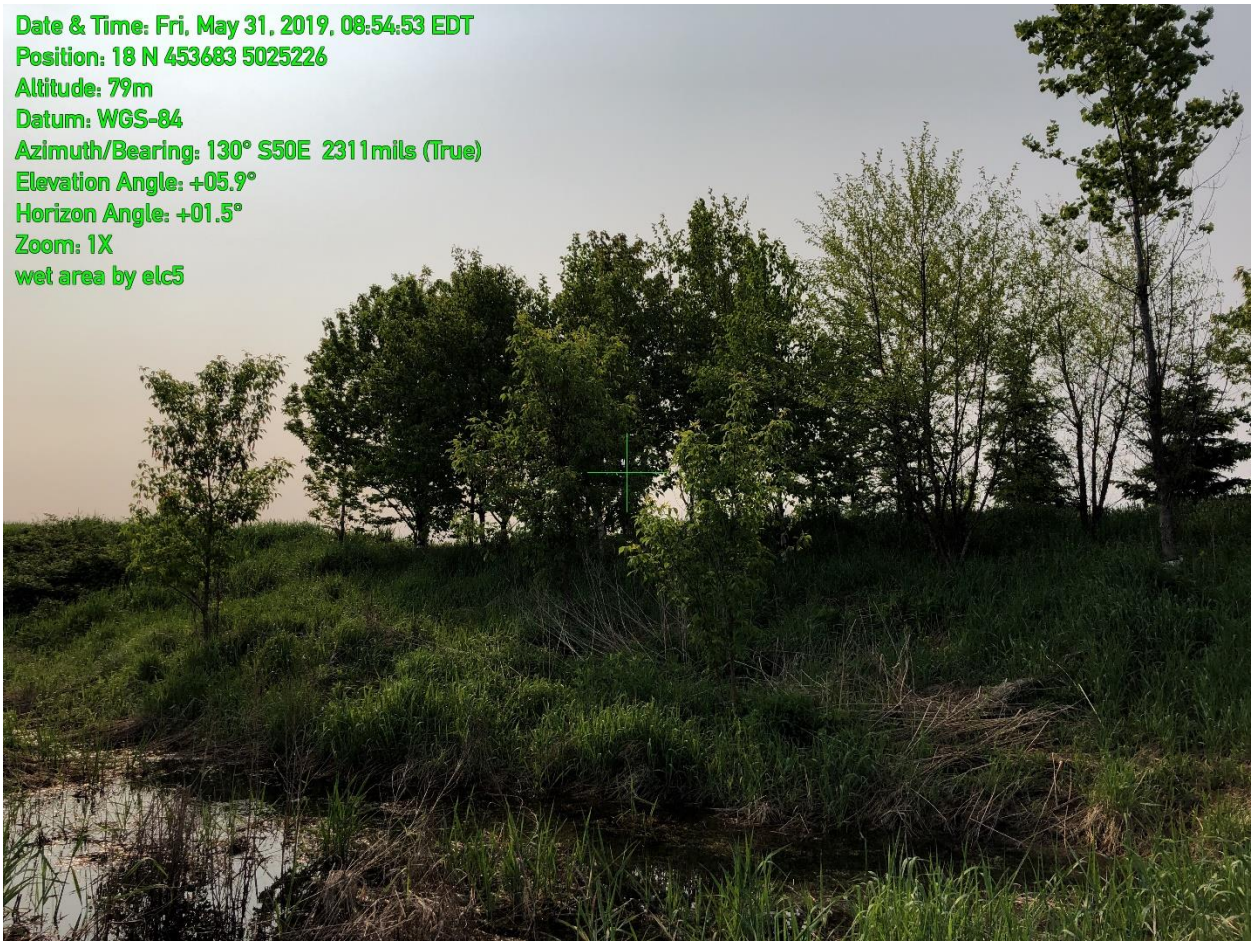

Figure 12 Photo showing the start of Reach 6 on May 31st, 2019. The small ponded area with wetland vegetation that drains into Reach 6 is shown in the bottom left of the photo.

"Wet depression"

Close to the northeastern edge of 4120 Russell Road is a wet depression just under 0.5 ha in size that contains wetland vegetation (Reed Canary Grass (*Phalaris arundinacea*), Purple Loosestrife (*Lythrum salicaria*), Willows, cattails, etc.; Figure 13). Although this small depression has wetland plant species cover >50% of total plant cover, it does not meet the size requirements of OWES (≥ 0.5 ha) to be a "true" wetland. Further, this area does not have standing water or pools >20% ground coverage as wetlands defined in ELC (Lee et al., 1998; but see ELC classification below). In addition, this wet depression does not have wetland soils (no signs of mottling or gley) based on two soil cores that were sampled from the wet depression on August 29, 2019. Like the cattail marsh on the northern parcel, the water table in this feature was slightly above the surface in the spring and then the soil surface was dry in the summer (water table rarely/briefly above the substrate surface). The depression does not have a defined inlet; its primary source of water is likely run-off water during the spring freshet from the steep slope that bisects the southern parcels (the depression is located along the toe of the slope). This feature drains east into a culvert under Hunt Club Road and out into a small channel that feeds into an HDF of McEwan Creek (the feature described below).

This feature was not directly connected to any of the HDFs on Site and is not a wetland as defined above so was therefore not evaluated as an HDF or a wetland. However, federal lands are subject to the *Federal Policy on Wetland Conservation* (1991) with the goal of "no net loss of wetland functions". The federal wetland classification system (Hanson et al., 2008) uses the National Wetlands Working Group's (1988) definition of a wetland: "*land that is saturated with water long enough to promote wetland or aquatic processes as indicated by poorly drained soils, hydrophytic vegetation, and various kinds of biological activity which are adapted to a wet environment*". This definition does not specify size criteria for wetlands as in OWES, and therefore the subject wet depression may be considered a wetland from a federal perspective simply due to the presence of hydrophytic vegetation. Therefore, for full due diligence, we used the wetland ecological functions assessment tool provided in the federal wetland classification guidelines (Appendix A in Hanson et al., 2008; see Appendix C for our rough work). Note that this assessment tool is high-level, largely qualitative, does not use a numerical scoring system as in OWES (OWES is a much more robust method for evaluating wetlands), and is primarily based on approaches used in the state of Wisconsin.

Based on our field investigations and the federal wetland functions assessment tool, the wet depression has very limited biological functions, no social functions, limited hydrological functions, and no special or unique features. Based on field surveys conducted in 2019 by KAL and NCC, there is no evidence that this wet depression provides habitat for amphibians, turtles, wetland birds, fish, rare flora or fauna, SAR, or other species of any significance. It is instead a small depression that, in the absence of agricultural activities in recent years, has remained saturated enough in the spring to promote the establishment of hydrophytic vegetation, with most of the vegetation being non-native. The hydrological functions of this wet depression were limited to holding and conveying meltwater in the spring to the tributary described below. Given that this feature only provides minimal hydrological function in the spring, there would be no net loss of wetland functions if this wet depression were removed so long as the conveyance of meltwater and stormwater off Site follows similar flow paths (i.e., water is conveyed off Site into the same downstream features). Further, if this wet depression were ≥ 0.5 ha and qualified as a wetland under OWES, its evaluation score would fall well below the minimum 600 points required to score as provincially

significant due to its lack of biological, social, and hydrological functions and special features. For context, the cattail marsh on the northern parcel scored 325 points, and that wetland provides significantly more hydrological function than the subject feature.

Figure 13 Photo showing the wet depression near the eastern edge of 4120 Russell Road on May 31st, 2019

Tributary (off property)

There is a tributary of McEwan Creek just outside of the western border of 4120 Russell Road that we were unable to access (we did not have permission from the owner of the property that this feature crosses; Figure 144). Based on available imagery (geoOttawa, 2019; Google Earth Pro) and Ontario Flow Assessment Tool (Ministry of Natural Resources and Forestry (MNRF), 2019), this tributary flows from the west through neighbouring industrial parks and then sharply curves south near the northwestern corner of 4120 Russell and then east into McEwan Creek. Based on what we could see from the edge of the Site, this tributary has relatively steep banks (compared to those on Site) that contain scattered tall shrubs and trees. Given its location and its lack of connectivity to any HDFs on Site, this feature was not evaluated as an HDF.

Figure 14 Photo showing the small creek just outside of the western border of 4120 Russell Road that we were unable to access (view is looking upstream on April 9th, 2019)

3.2.2 Classification of Water Features

The purpose of this section of the report is to apply the appropriate classifications to the water features being assessed and identify the functions provided by these features. The individual/segmented classifications (hydrology, riparian, fish and fish habitat, terrestrial habitat) for each reach, as outlined in the following tables, are combined in Table 9 below to include the composite results based on the highest level of function observed in a reach.

Table 5 Hydrology classification of reaches on Site in 2019

Reach	Hydrology Classification				
	Assessment Periods	**Flow Conditions**	**Flow Classification**	**Comments/modifiers**	**Hydrological Function**
Reach 1	-April 9th, 2019 -May 31st, 2019 -July 10th, 2019	-Flowing water -Flowing water -Flowing water	Perennial	Flowing creek that is a headwater feature of Ramsay Creek.	**Important functions**
Reach 2	-April 9th, 2019 -May 31st, 2019 -July 10th, 2019	-Standing water -Scattered puddles connected by interstitial flow -Scattered puddles	Intermittent	Defined channel that was presumably constructed to capture stormwater runoff from the Hunt Club Road off-ramp from Highway 417.	**Valued functions**
Reach 3	-April 9th, 2019 -May 31st, 2019 -July 10th, 2019	-Standing water -Dry -Dry	Standing water or Dry	Old tile drainage ditch from soybean (now fallow) field to the south of this reach.	**Limited Functions**
Reach 4	-April 9th, 2019 -May 31st, 2019 -July 10th, 2019	-Standing water -Dry -Dry	Standing water or Dry	Ditch presumably created from dredging to serve part of the industrial park to the north but does not appear to be used for this presently.	**Limited Functions**
Reach 5	-April 9th, 2019 -May 31st, 2019 -July 10th, 2019	-Standing water -Dry -Dry	Standing water or Dry	Swale that drains into a stormwater pond south of 4120 Russell Road.	**Limited Functions**
Reach 6	-April 9th, 2019 -May 31st, 2019 -July 10th, 2019	-Standing water -Dry -Dry	Standing water or Dry	Swale that drains into a stormwater pond south of 4120 Russell Road.	**Limited Functions**

Table 6 Riparian classification of reaches on Site in 2019

Reach	Riparian Classification			
	OSAP Description	**OSAP Riparian Code**	**ELC Code**	**Riparian Condition**
Reach 1	RUB – Scrubland LUB – Scrubland	RUB – 5 LUB - 5	Thicket (CUT)	**Important Functions**
Reach 2	RUB – Meadow LUB – Meadow	RUB – 4 LUB - 4	Meadow (CUM)	**Valued Functions**
Reach 3	RUB – Meadow LUB – Meadow	RUB – 4 LUB - 4	Meadow (CUM)	**Valued Functions**
Reach 4	RUB – Meadow LUB – None	RUB – 4 LUB – 1	- Meadow (CUM) -	**Limited to Valued Functions**
Reach 5	RUB – Scrubland LUB – Scrubland	RUB – 5 LUB - 5	Thicket (CUT)	**Important Functions**
Reach 6	RUB – Scrubland LUB – Meadow	RUB – 5 LUB - 4	- Thicket (CUT) - Meadow (CUM)	**Valued to Important Functions**

Table Notes: OSAP – Ontario Stream Assessment Protocol
ELC – Ecological Land Classification
RUB – Right upstream bank
LUB – Left upstream bank

Table 7 Fish and fish habitat classification of reaches on Site in 2019

Drainage Feature	Fish and Fish Habitat Classification		
	Fish Observation	**Fish and Fish Habitat Designation**	**Comments/modifiers**
Reach 1	Fish species likely to be present based on RVCA's Ramsay Creek 2013 Summary Report*: Bluegill, Bluntnose Minnow, Brassy Minnow, Brook Stickleback, Carps and Minnows, Central Mudminnow, Common Shiner, Creek Chub, *Etheostoma* spp., Fathead Minnow, *Lepomis* spp., Largemouth Bass, Longnose Dace, Logperch, Northern Redbelly Dace, Pumpkinseed, Rock Bass, Trout-Perch, and White Sucker. No species at risk (SAR) observed.	**Important Functions**	This reach provides suitable habitat for spawning/rearing, feeding, cover, refuge, and migration for several not-at-risk fish species and contributes to downstream habitat in Ramsay Creek.
Reach 2	Scattered puddles were too small to effectively electro-fish in the late spring and early summer. No fish were incidentally observed.	**Contributing Functions**	The downstream end of this reach (near its confluence with Reach 1) could be accessible to fish during the spring freshet but is quickly reduced to isolated small puddles in the late spring. Reach 2 likely conveys some water and allochthonous material to downstream habitat in Reach 1.
Reach 3	Dry by May 31st. No fish present.	**Limited Functions**	This reach does not connect to any water features upstream or downstream (i.e., no allochthonous input).
Reach 4	Dry by May 31st. No fish present.	**Limited Functions**	This reach does not connect to any water features upstream or downstream (i.e., no allochthonous input).
Reach 5	Dry by May 31st. No fish present.	**Contributing Functions**	Allochthonous transport through feature to downstream habitat (stormwater pond).
Reach 6	Dry by May 31st. No fish present.	**Contributing Functions**	Allochthonous transport through feature to downstream habitat (stormwater pond).

*Table Notes: Fish observation data shown for Reach 1 are those collected from RVCA's 2013 sampling site located just upstream of the confluence of Reach 1 and Ramsay Creek. Therefore, the data shown above for Reach 1 are representative of fish species that have a high potential of occurring in Reach 1. Note that electrofishing techniques were not employed since Reach 1, the only reach likely to support perennial fish habitat, is not to be altered under the proposed development plan. The HDF Guidelines only require a classification of fish and fish habitat if an alteration to a feature is proposed.

Table 8 Terrestrial habitat classification of reaches on Site in 2019

Drainage Feature	Description	Amphibians*	Terrestrial Classification
Reach 1	Very small (<0.2 ha cumulatively) wetland areas within the corridor. There are no upstream forest or wetland features, thus the riparian zone does not provide a corridor connection.	No frogs were observed in the vicinity of the feature.	**Contributing Functions**
Reach 2	No adjacent wetland areas. No upstream forest or wetland features thus the riparian zone does not provide a corridor connection.	No frogs were observed in the vicinity of the feature.	**Limited Functions**
Reach 3	No adjacent wetland areas. There are no upstream forest or wetland features thus the riparian zone does not provide a corridor connection.	No frogs were observed in the vicinity of the feature.	**Limited Functions**
Reach 4	No adjacent wetland areas. There are no upstream forest or wetland features thus the riparian zone does not provide a corridor connection.	No frogs were observed in the vicinity of the feature.	**Limited Functions**
Reach 5	No adjacent wetland areas. There are no upstream forest or wetland features thus the riparian zone does not provide a corridor connection.	No frogs were observed in the vicinity of the feature.	**Limited Functions**
Reach 6	No adjacent wetland areas. There are no upstream forest or wetland features thus the riparian zone does not provide a corridor connection.	No frogs were observed in the vicinity of the feature.	**Limited Functions**

Tables Notes: *Note that no frogs were observed on Site during any frog surveys performed by both KAL and NCC.

Table 9 Summary of functional classifications of reaches on Site in 2019

Drainage Feature	Hydrology Classification	Riparian Classification	Fish Habitat	Terrestrial Habitat
Reach 1	Important Functions	Important Functions	Important Functions	Contributing Functions
Reach 2	Valued Functions	Valued Functions	Contributing Functions	Limited Functions
Reach 3	Limited Functions	Valued Functions	Limited Functions	Limited Functions
Reach 4	Limited Functions	Limited to Valued Functions	Limited Functions	Limited Functions
Reach 5	Limited Functions	Important Functions	Contributing Functions	Limited Functions
Reach 6	Limited Functions	Valued to Important Functions	Contributing Functions	Limited Functions

3.3 Vegetation

3.3.1 Ecological Land Classification

The following section is split up based on Ecological Land Classification (ELC) vegetation types/ecosites found on Site. A total of nine distinct (i.e., mappable) ELC units (ecosites/vegetation types) were delineated on Site (Figure 15).

Seven of these units have terrestrial classifications and two of them have wetland (marsh) classifications. Each ELC unit and the dominant vegetation therein (if appropriate) is described in detail below. The ELC designations below were used in subsequent analyses in Section 3.4.1 to identify potential habitat that may be used by species of interest (e.g., SAR) occurring or potentially occurring on Site.

Figure 15 Map showing Ecological Land Classification units for the Site, 2019

Legend

Site boundary

ELC unit

- CUM1-1
- CUP1
- CUT1
- CVR_4
- FODM11
- FODM4-5
- MAM2-1
- MAS2-1
- THDM3-1

N

0 200 m

Project: AVE866
Created By: AF
MTM Zone 9
(NAD 83)
Printed on: 2020-03-28

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Dry-Moist Old Field Meadow Type (CUM1-1)

This vegetation type is the most dominant classification on Site; it consists of the fallow fields that make up the majority of both the northern and southern parcels (Figure 166). These vegetation communities are on unconsolidated mineral substrates with tree and shrub cover less than 25%. These open communities originated from anthropogenic and culturally based disturbances (agriculture) and include a large proportion of introduced species. The dominant species here are Quack Grass (*Elymus repens*), Reed Canary Grass, Kentucky Bluegrass (*Poa pratensis*), Common Dandelion (*Taraxacum officinale*), Smooth (Common) Brome Grass (*Bromus inermis*), Goldenrod (*Solidago*) spp., and White Clover (*Trifolium repens*).

Figure 16 Photos showing the Dry-Moist Old Field Meadow Type (CUM1-1) on the northern (A) and southern (B) parcels of the Site (photos taken on May 31st, 2019).

Cattail Mineral Shallow Marsh Type (MAS2-1)

This vegetation type is the same cattail marsh described in the HDFA and OWES assessment (Figure 177). It is located on the western edge of 4120 Russell Road and is approximately 2 ha in size. It has a water table that seasonally drops below the substrate surface; the water table was above the surface in the spring and then the substrate surface was dry in the summer. It is a homogenous marsh with only one vegetation community and dominant form and species (robust emergent and Broadleaf Cattail, respectively) based on classification used in OWES. The substrate material is coarse mineral sand (sand, loamy sand, loamy fine sand) over clay.

Figure 17 Photo showing the Cattail Mineral Shallow Marsh Type (MAS2-1) on Site (photo taken on May 31st, 2019)

Buckthorn Deciduous Hedgerow Thicket Type (THDM3-1)

This vegetation type makes up four hedgerows of mainly tall deciduous shrubs on Site (Figure 188): a linear hedgerow parallel to the western border of 4120 Russell Road ("Thicket Hedgerow A"), a cluster of shrubs east of the cattail marsh described above ("Thicket Hedgerow B"), a linear hedgerow in the centre of 4055 Russell Road ("Thicket Hedgerow C"), and a linear hedgerow near the southwestern corner of 4055 Russell Road ("Thicket Hedgerow D"). These hedgerows have the following approximate dimensions, respectively: 215 m long and 40 m wide, 165 m long and 25 m wide, 120 m long and 8 m wide, and 95 m long and 25 m wide.

Thicket Hedgerows A to D all existed prior to 1976 and were left intact during historical and recent agricultural operations on Site. They are all currently in the process of natural regeneration by woody species (tall shrub cover greater than 60%). Thicket Hedgerow A is dominated by European Buckthorn (*Rhamnus cathartica)*, Glossy Buckthorn (*Rhamnus frangula*), Hawthorn (*Crataegus* sp.), Meadowsweet (*Spiraea alba*), and Red Osier Dogwood. Like Thicket hedgerow A, Thicket Hedgerow B existed prior to 1976 and was left intact during agricultural operations and is in the process of natural regeneration. The area east of Thicket Hedgerow B that was previously used for agriculture was left to fallow prior to 2011. This area has since filled in with tall shrubs and young trees and is dominated by European Buckthorn, Glossy Buckthorn, and Trembling Aspen (*Populus tremuloides*). Thicket Hedgerows C and D are dominated by European Buckthorn, Glossy Buckthorn, and Manitoba Maple (*Acer negundo*).

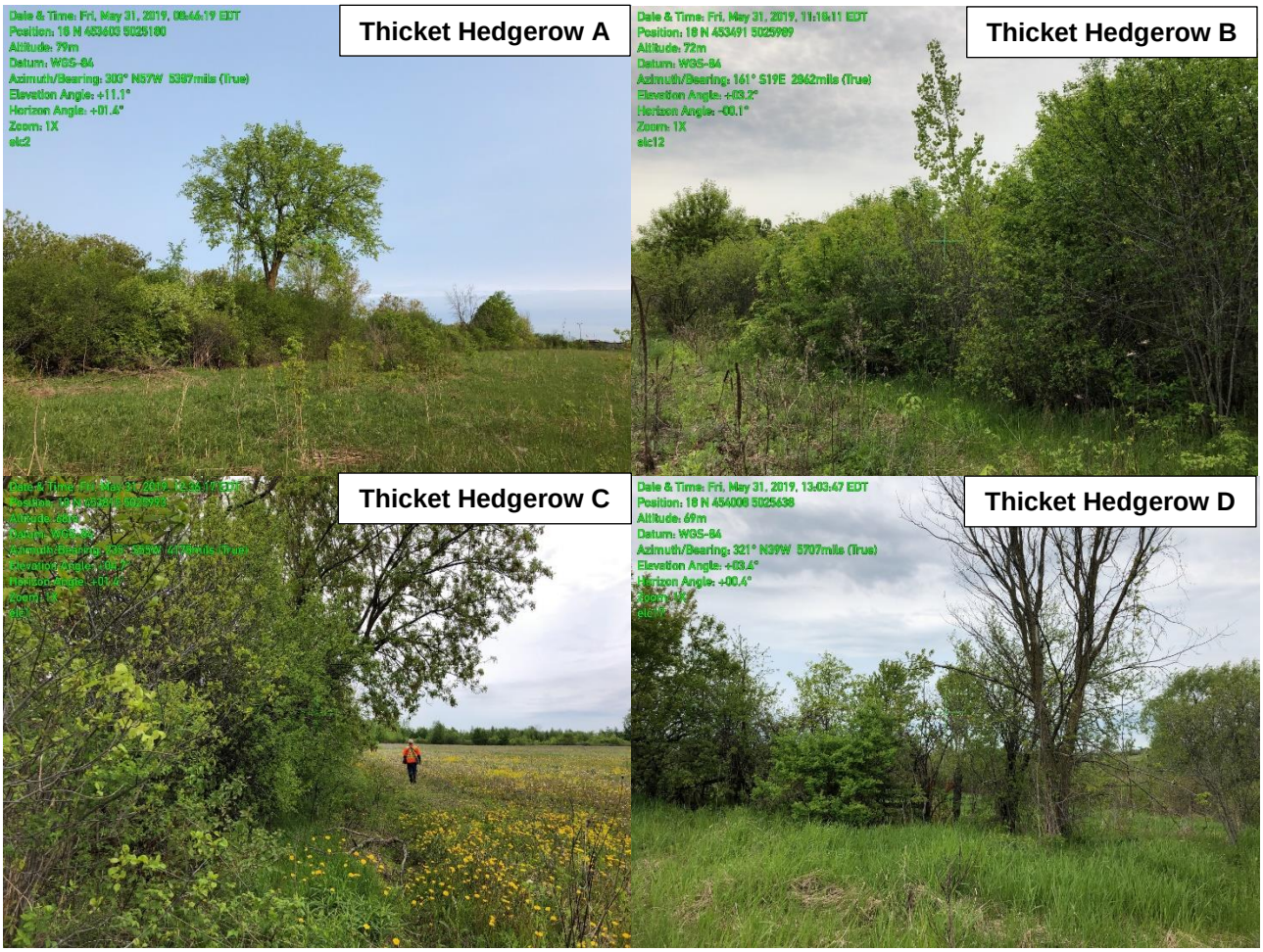

Figure 18 Photos showing the four Buckthorn Deciduous Hedgerow Thicket Types (THDM3-1) on Site (photos taken on May 31st, 2019)

Naturalized Deciduous Hedgerow Ecosite (FODM11)

There are five hedgerows of mainly deciduous trees (greater than 25% tree cover) on Site that are classified as Naturalized Deciduous Hedgerow Ecosite (FODM11; Figure 199): a linear hedgerow along the northeastern border of 4120 Russell Road ("Tree Hedgerow A"), a linear hedgerow along the western border of the cattail marsh on 4055 Russell Road ("Tree Hedgerow B"), a cluster of trees east of the cattail marsh ("Tree Hedgerow C"), a linear hedgerow along the northeastern edge of the cattail marsh ("Tree Hedgerow D"), and a linear hedgerow along the northern edge of 4055 Russell Road ("Tree Hedgerow E"). These hedgerows have the following approximate dimensions, respectively: 250 m long and 25 m wide, 275 m long and 45 m wide, 0.5 ha in area (cluster), 165 m long and 20 m wide, and 375 m long and 30 m wide. Note that although the FODM11 ecosite is a subcategory of deciduous forest (FOD) systems under ELC, the FODM11 ecosite itself does not represent a forest.

All these tree hedgerows are currently in the process of natural regeneration by woody species. Tree Hedgerow A existed prior to 1976 and was left intact during historical and recent agricultural operations on Site. Its dominant species are Green Ash (all dying or already dead), Manitoba Maple, European Buckthorn, Hawthorn, Meadowsweet, and Poison Ivy (*Toxicodendron rydbergii*). The trees of Tree Hedgerow B likely colonized post-construction of Russell Road (prior to 1965) and were not impacted by agricultural operations on Site. Tree Hedgerow B is dominated by Green Ash, American Elm (*Ulmus americana*), and Staghorn Sumac (*Rhus hirta*). Tree Hedgerow C consists of what was originally two parallel hedgerows of native trees that surrounded the homestead that was once east of the cattail marsh. The original hedgerows here have since filled in and this area is now a mixed cluster of native forest species (Eastern Cottonwood, American Beech (*Fagus grandifolia*), Red Maple (*Acer rubrum*), Trembling Aspen, Yellow Birch (*Betula alleghaniensis*), Bur Oak (*Quercus macrocarpa*), Trout Lily (*Erythronium americanum*), Canada Mayflower (*Maianthemum canadense*), several fern species) and introduced species/"garden escapes" (Glossy and European Buckthorn, Staghorn Sumac, Lilac (*Syringa* sp.)). Although this cluster is not a naturalized forest, it contains the most naturalized area on Site and the largest trees on Site (see Section 3.3.3. below for tree sizes), and some parts of this cluster have an intact forest floor. Deciduous trees and tall shrubs from this cluster extend along the northeastern edge of the cattail marsh to form Tree Hedgerow D. The groundcover of Tree Hedgerow D is not naturalized like Tree Hedgerow (cluster) C. The area directly east of Tree Hedgerow D was used for agriculture up until the early 2000s (prior to 2005) but the hedgerow itself was left intact. Tree Hedgerow E is a line of predominantly mature Lombardy Poplars. This hedgerow separates the hydropower plant and the fallow field that makes up most of 4055 Russell Road and was likely planted in conjunction with the expansion of the hydropower plant prior to 1991. In addition to Lombardy Poplars, Tree Hedgerow E contains Silver Maples (*Acer saccharinum*) that have white spiral tree guards indicative of planting. Lombardy Poplars are often used as windbreak and landscape trees in plantings because of their fast growth. Other planted species in this hedgerow include White Birch (*Betula papyrifera*) and White Spruce (*Picea glauca*).

Figure 19 Photos showing four of the five Naturalized Deciduous Hedgerow Ecosites (FODM11) on Site (photos taken on May 31st, 2019). Note that there is no photo for tree hedgerow D.

Dry-Fresh Manitoba Maple Deciduous Forest Type (FODM4-5)

This vegetation unit makes up a small (~0.6 ha) cluster of mainly Manitoba Maples near the centre of 4120 Russell Road (Figure 2020). Prior to 1965 this area had a farmhouse and a few farm buildings which were cleared some time before 1999, which is around the time the Manitoba Maples started colonizing the area. There are six medium-sized White Spruce trees towards the northeastern edge of this cluster that likely colonized around the same time as the Manitoba Maples here. This area has filled in with mainly non-native species over time, including Smooth Brome Grass, Garlic Mustard (*Alliaria petiolata*), European Buckthorn, and Dog-strangling Vine (*Cynanchum rossicum*). This cluster also contains a small (~0.01 ha) area with ponded water that is likely a result of the foundation of the farm buildings that were once here. Note that this feature held water throughout the spring and summer but was not considered an HDF because it is not connected to any surface water features on Site.

Figure 20 Photo showing the Dry-Fresh Manitoba Maple Deciduous Forest Type (FODM4-5) on Site (photo taken on May 31st, 2019)

Deciduous Cultural Plantation Ecosite (CUP1)

This ecosite consists of a linear hedgerow along the southern border of 4120 Russell Road and the parcel to the south that contains the stormwater management pond (Figure 211). This hedgerow technically falls off Site, but portions of tree canopies do fall within the Site boundary. This hedgerow is ~375 m long and ~20 m wide and contains mainly deciduous trees that were planted in conjunction with the construction of the stormwater management pond (planting was prior to 2014). There are some conifers mixed in (White Spruce, Tamarack (*Larix laricina*), and Blue Spruce (*Picea pungens*)), but this hedgerow is dominated by deciduous trees (mainly Maple, Poplar, and Birch species).

Figure 21 Photo showing the Deciduous Cultural Plantation Ecosite (CUP1) on Site (photo taken on May 31st, 2019)

Reed Canary Grass Mineral Meadow Marsh Type (MAM2-1)

This vegetation type makes up two small areas on Site: the <0.5 ha area described as a "wet depression" in the HDFA (near the eastern edge of 4120 Russell Road) and the <0.05 ha area located just north of the Deciduous Cultural Plantation Ecosite (CUP1; described as draining into Reach 6 in the HDFA; Figure 22). As outlined in preceding sections, the wet depression described in the HDFA is not a "true" wetland by OWES or ELC definitions, but we included it under the Reed Canary Grass Mineral Meadow Marsh Type (MAM2-1) here because it has the potential to turn into a true meadow marsh in the long term if the area were to be left unaltered. This open community originated from agriculture and now has a large proportion of introduced species, including Reed Canary Grass and Purple Loosestrife, which are typical of disturbed meadow marsh communities. This area was used for agriculture prior to 1965 and up until sometime between 2008 and 2011. At this time, the area was left to fallow and would have been classified as Dry-Moist Old Field Meadow Type (CUM1-1) along with most of the adjacent open field areas on Site. However, its location in a relatively lower-lying area has, over time, allowed it to accumulate water during the spring freshet such that the water table is briefly above the substrate surface in the spring, hence the current meadow marsh-type vegetation cover.

The latter of the small areas that make up the Reed Canary Grass Mineral Meadow Marsh Type (MAM2-1) has the same history and description as the wet depression but is an "inclusion" under this vegetation type rather than a mappable ELC unit due to its small size. This area is also dominated by Reed Canary Grass and Purple Loosestrife and has a high relative cover of Hard-stemmed Bulrush (*Schoenoplectus acutus*).

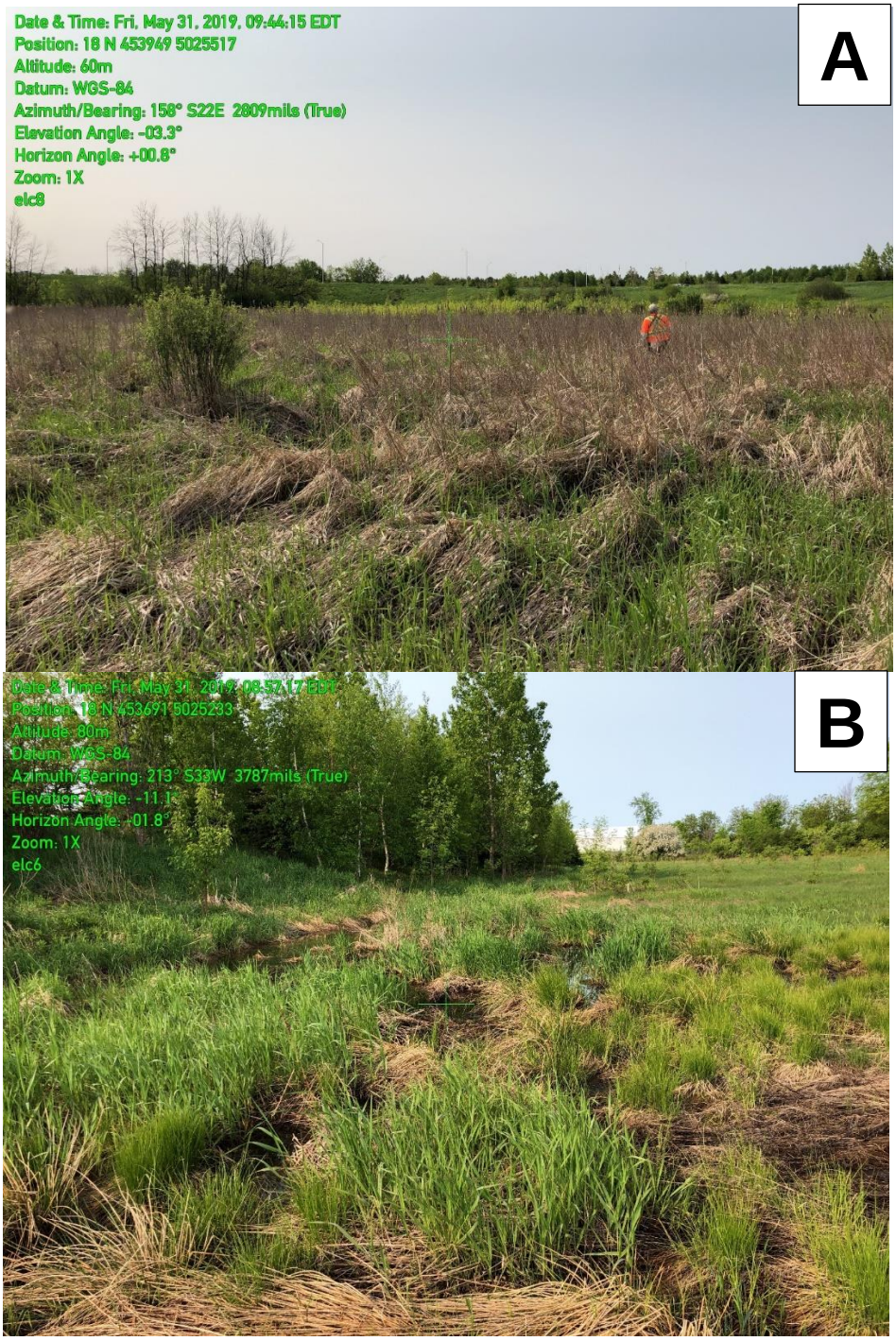

Figure 22 Photos showing the Reed Canary Grass Mineral Meadow Marsh Types (MAM2-1) on Site (photos taken on May 31, 2019). Photo A shows the "wet depression" described in the HDFA and photo B shows the <0.05 ha area located just north of the Deciduous Cultural Plantation Ecosite (CUP1) that drains into Reach 6.

Mineral Cultural Thicket Ecosite (CUT1)

This ecosite consists of the riparian zone of Reach 1 (Figure 233). It contains mainly Willows, Speckled Alder (*Alnus incana*), and White Poplar on the banks with cattails and Common Reed on the edges of the channel. Based on historical imagery, it appears this area may have been altered through historical agricultural operations on Site, but not to the extent that most of the Site has been altered (i.e., the banks were not directly cropped or grazed but were likely mowed/maintained up until the early 2000s). Sometime prior to 2005 the areas just beyond the banks (outside of this ecosite, falling under Dry-Moist Old Field Meadow Type (CUM1-1)) were sparsely planted with trees. It appears that the banks were left to naturally re-vegetate at this point as shrub cover in this ecosite becomes more evident in the imagery at this time. The soils here are shallow, with clay loam to a depth of 60-75cm underlain by rock. It is possible that riprap was added around the same time that the areas just beyond the banks were planted with trees (prior to 2005), which may explain the shallow rock in this ecosite, but it is not clear from the imagery if this is the case.

Figure 23 Photo showing the Mineral Cultural Thicket Ecosite (CUT1) on Site (photo taken May 31, 2019)

Rural Property Ecosite (CVR_4)

This ecosite encompasses the houses, agricultural buildings, and manure pond on the northern parcel. Note that most of the buildings had points of entry/egress for wildlife, such as broken windows and/or open doors.

3.3.2 Vegetation Inventory

In addition to the detailed ELC above, Appendix D includes a comprehensive species list of all vascular vegetation on Site. No federally significant plant species were found on Site. A total of nine provincially rare (Brunton, 2005) plant species were observed on Site: Scots Pine (Pinus *sylvestris*), Lombardy Poplar (*Populus nigra*), Siberian Crab Apple (*Malus baccata*), Flowering Crab Apple (*Malus floribunda*), Siberian Elm (*Ulmus pumila*), Siberian-pea (*Caragana arborescens*), Goat's-rue (*Galega officinalis*), Velvet-leaf (*Abutilon theophrasti*), and Black Knapweed (*Centaurea nigra*). All these species are non-native, and the former four species are frequently planted. As such, KAL does not consider these species as ecologically significant. Two regionally significant (Brunton, 2005) plant species were found on Site: Broom Sedge (*Carex scoparia*) and Hard-stemmed Bulrush (*Schoenoplectus acutus*). As per Brunton (2005), regionally significant plant species are those that are known from 10 or fewer contemporary populations (post-1969) in the City of Ottawa. Both these species were observed in low abundance in the small (<0.05 ha) area east to northeast of Reach 6 that contained standing water during the spring and early summer (drains into Reach 6 during the spring freshet but then Reach 6 quickly dries). Appendix D also denotes 24 species observed on Site as 'uncommon' per Brunton (2005); those species are found only occasionally within suitable habitat, often in small numbers. The habitat of 'uncommon' species is often geographically limited as well (Brunton, 2005). Despite their 'uncommon' designation per Brunton (2005), these 24 species are frequently planted, are considered 'weeds' or are common in disturbed/fallow environments, and/or are invasive species.

3.3.3 Tree Inventory

All trees that were enumerated on Site using the methods in Section 2.2.2 are described below in Table 10 and mapped on Figure 24.

Note that trees with DBH ≥ 10 cm standing in open areas within the development footprint were individually recorded and mapped. Several hedgerows and clusters of trees (enumerated as C# and H# under Tree Number in Table 10, respectively) on Site contain too many trees to practically list every individual over 10 cm DBH. For these areas, only significantly sized trees (i.e., generally > 35 cm DBH) were individually identified and are enumerated with the hedgerow/cluster number in which they are located along with a sub-number (e.g., "C3-1") under Tree Number to differentiate from trees < 35 cm DBH in a given hedgerow/cluster. Note that ELC designations in Table 10 refer to those discussed in Section 3.3.1. The ELC designations in Table 10 group multiple hedgerows into the same polygon based on similar vegetation and soil characteristics, whereas the Tree Number column further divides hedgerows based on their location to increase spatial detail in Figure 24.

Table 10 Tree number, approximate location (northern vs. southern parcels), species, diameter at breast height (DBH), notes, and Ecological Land Classification (ELC) designation for all trees on Site that may be impacted by the proposed development

Tree Number	Northern or Southern Parcels?	Species	Size (cm)	Notes	ELC Polygon
1	Northern	Blue Spruce	25	Three individuals	CUM1-1
C1	Northern	Red Maple	40		CUM1-1
C1	Northern	White Spruce	40		CUM1-1
C1	Northern	Manitoba Maple	10	Three stems	CUM1-1
C1	Northern	Red Maple	127	Big cavities	CUM1-1
C1	Northern	Manitoba Maple	15	Two stems	CUM1-1
H1	Northern	White Cedar	10 to 25	Hedgerow of mainly White Cedar	CUM1-1
H1	Northern	Black Walnut	22	Two stems	CUM1-1
2	Northern	American Elm	20		CUM1-1
3	Northern	Manitoba Maple	20	Five stems	CUM1-1
4	Northern	White Oak	50		CUM1-1
5	Northern	White spruce	25		CUM1-1
6	Northern	Basswood cultivar	52		CUM1-1
7	Northern	Black Walnut	30		CUM1-1
8	Northern	Common Apple	12	Two stems	CUM1-1
9	Northern	White Oak	15	Two stems	CUM1-1
10	Northern	White Birch	35	Two stems; one stem completely dead	CUM1-1
H2	Northern	Green Ash	30	Several dead, some with peeling bark	THDM3-1; "Thicket Hedgerow C"
C2	Northern	Eastern Cottonwood	35	Live epicormic branching; a lot of dead branches and peeling bark	CUM1-1
C2	Northern	Eastern Cottonwood	20	No crown, only live epicormic branching	CUM1-1
C2	Northern	Eastern Cottonwood	25		CUM1-1
C2	Northern	Eastern Cottonwood	55		CUM1-1
11	Northern	Eastern Cottonwood	75		CUM1-1
12	Northern	Green Ash	40	Lots of peeling bark, woodpecker holes	CUM1-1
13	Northern	American Elm	25		CUM1-1
14	Northern	Blue Spruce	30		CUM1-1

Tree Number	Northern or Southern Parcels?	Species	Size (cm)	Notes	ELC Polygon
H3	Northern	Common Apple	10		THDM3-1; "Thicket Hedgerow C"
H3	Northern	Sugar Maple	15		THDM3-1; "Thicket Hedgerow C"
H3	Northern	Sugar Maple	40	Three stems	THDM3-1; "Thicket Hedgerow C"
H3	Northern	Red Maple	20	Three stems	THDM3-1; "Thicket Hedgerow C"
H3	Northern	Red Maple	10 to 45	Several individuals in a cluster	THDM3-1; "Thicket Hedgerow C"
H3	Northern	Green Ash	20-40	Six dead individuals, no bark left	THDM3-1; "Thicket Hedgerow C"
H3	Northern	Manitoba Maple	10 to 15		THDM3-1; "Thicket Hedgerow C"
H3	Northern	Siberian Elm	10	Two individuals	THDM3-1; "Thicket Hedgerow C"
15	Northern	American Elm	12		CUM1-1
16	Northern	Manitoba Maple	10 to 25	Several individuals	CUM1-1
H4	Northern	Eastern Cottonwood	15 to 20		THDM3-1; Thicket Hedgerow B"
H4	Northern	White Birch	10 to 15	Three individuals	THDM3-1; Thicket Hedgerow B"
H4	Northern	Trembling Aspen	10 to 15		THDM3-1; Thicket Hedgerow B"
H4	Northern	Manitoba Maple	10 to 15		THDM3-1; Thicket Hedgerow B"
H4	Northern	Siberian Elm	12		THDM3-1; Thicket Hedgerow B"
H4	Northern	White Birch	10 to 15	Several young individuals	THDM3-1; Thicket Hedgerow B"
H4	Northern	Trembling Aspen	10 to 15	Several young individuals	THDM3-1; Thicket Hedgerow B"
C3	Northern	Trembling Aspen	10 to 30	Several individuals	FODM11; "Tree Hedgerow (cluster) C"
C3	Northern	White Birch	10 to 20	Several individuals	FODM11; "Tree Hedgerow (cluster) C"

Tree Number	Northern or Southern Parcels?	Species	Size (cm)	Notes	ELC Polygon
C3	Northern	Mountain Ash	15		FODM11; "Tree Hedgerow (cluster) C"
C3	Northern	Bur Oak	15-20	Several individuals	FODM11; "Tree Hedgerow (cluster) C"
C3	Northern	American Beech	10 to 30	Several individuals	FODM11; "Tree Hedgerow (cluster) C"
C3	Northern	Red Maple	10	Several individuals	FODM11; "Tree Hedgerow (cluster) C"
C3	Northern	Black Cherry	12 to 30	Several individuals	FODM11; "Tree Hedgerow (cluster) C"
C3	Northern	American Elm	10 to 15	Several individuals	FODM11; "Tree Hedgerow (cluster) C"
C3	Northern	White Cedar	10		FODM11; "Tree Hedgerow (cluster) C"
C3-1	Northern	Eastern Cottonwood	55		FODM11; "Tree Hedgerow (cluster) C"
C3-2	Northern	Sugar Maple	47		FODM11; "Tree Hedgerow (cluster) C"
C3-3	Northern	Eastern Cottonwood	55 to 85	Hedgerow within C3 of 13 large individuals	FODM11; "Tree Hedgerow (cluster) C"
C3-4	Northern	Red Maple	42		FODM11; "Tree Hedgerow (cluster) C"
C3-5	Northern	Yellow Birch	43		FODM11; "Tree Hedgerow (cluster) C"
C3-6	Northern	Red Maple	115	Cavities and peeling bark; one stem dead, the other healthy; two bee nests in cavities	FODM11; "Tree Hedgerow (cluster) C"
C3-7	Northern	Red Maple	63		FODM11; "Tree Hedgerow (cluster) C"
C3-8	Northern	American Beech	86		FODM11; "Tree Hedgerow (cluster) C"
C3-9	Northern	Eastern Cottonwood	96	Dead, peeling bark	FODM11; "Tree Hedgerow (cluster) C"
C3-10	Northern	Eastern Cottonwood	149	Dying; peeling bark, hollows	FODM11; "Tree Hedgerow (cluster) C"

Tree Number	Northern or Southern Parcels?	Species	Size (cm)	Notes	ELC Polygon
C3-11	Northern	Red Maple	37		FODM11; "Tree Hedgerow (cluster) C"
C3-12	Northern	Eastern Cottonwood	94	Some branch dieback	FODM11; "Tree Hedgerow (cluster) C"
C3-13	Northern	Sugar Maple			FODM11; "Tree Hedgerow (cluster) C"
C3-14	Northern	Yellow Birch	62		FODM11; "Tree Hedgerow (cluster) C"
C3-15	Northern	Red Maple	44		FODM11; "Tree Hedgerow (cluster) C"
H5	Northern	White Cedar	15		FODM11; "Tree Hedgerow D”
H5	Northern	Green Ash	10 to 20	Several dead individuals with no bark	FODM11; "Tree Hedgerow D”
H5	Northern	Red Maple	10 to 15	Several individuals	FODM11; "Tree Hedgerow D”
H5	Northern	Manitoba Maple	10 to 15	Several individuals	FODM11; "Tree Hedgerow D”
H5	Northern	Trembling Aspen	10 (largest)	Several young individuals	FODM11; "Tree Hedgerow D”
H5	Northern	Bur Oak	12		FODM11; "Tree Hedgerow D”
C4	Southern	Manitoba Maple	10 to 30	Several individuals	FODM4-5
C4	Southern	White Spruce	10 to 30	Six individuals; hollows created by wildlife on one individual	FODM4-5
H6	Southern	Common Apple	15		FODM11; "Tree Hedgerow B”
H6	Southern	American Elm	20 to 25	Several individuals	FODM11; "Tree Hedgerow B”
H6-1	Southern	American Elm	68		FODM11; "Tree Hedgerow B”
H6-2	Southern	American Elm	51		FODM11; "Tree Hedgerow B”
H6-3	Southern	Basswood	10 to 57	Several individuals in a cluster	FODM11; "Tree Hedgerow B”

Tree Number	Northern or Southern Parcels?	Species	Size (cm)	Notes	ELC Polygon
H6	Southern	Bur Oak	10 to 12	Several individuals	FODM11; "Tree Hedgerow B"
H6	Southern	Manitoba Maple	10 to 20	Several individuals	FODM11; "Tree Hedgerow B"
H6	Southern	Green Ash	10 to 15	Several dead individuals, most of bark is gone	FODM11; "Tree Hedgerow B"
H7	Southern	Bur Oak	10 to 15		FODM11; "Tree Hedgerow A"
H7	Southern	Manitoba Maple	10 to 20	Several dying individuals	FODM11; "Tree Hedgerow A"
H7	Southern	American Elm	10		FODM11; "Tree Hedgerow A"
H7-1	Southern	Bur Oak	68		FODM11; "Tree Hedgerow A"
H7-2	Southern	Unknown sp.	73	Dead with peeling bark	FODM11; "Tree Hedgerow A"
H7	Southern	Large Tooth Aspen	10		FODM11; "Tree Hedgerow A"
H7-3	Southern	Large Tooth Aspen	54		FODM11; "Tree Hedgerow A"
H7-4	Southern	Large Tooth Aspen	76	Forked; both branches have crown dieback and peeling bark but tree is still alive	FODM11; "Tree Hedgerow A"
H7-5	Southern	Crack Willow	80	Two stems	FODM11; "Tree Hedgerow A"
H8	Northern	Lombardy Poplar	20 to 30	Hedgerow of mainly Lombardy Poplar; evidence of planting	FODM11; "Tree Hedgerow E"

Table Notes: This table does not mention "Thicket Hedgerow D" because this hedgerow did not contain any trees ≥ 10 cm DBH.

Figure 24 Map showing all enumerated trees and hedgerows on Site for the Tree Conservation Report, 2019

Legend

- Site boundary
- Trees
- Hedgerow
- # Tree Number
- C# Cluster Number
- H# Hedgerow Number

N

0 200 m

Project: AVE866
Created By: AF
MTM Zone 9
(NAD 83)
Printed on: 2020-03-30

KILGOUR & Associates

The Site does not contain any Significant Woodlands, which in the City's Urban Boundary are defined as woodlands that are 0.8 ha in size or larger with trees 40 years of age or older at the time of evaluation (as per the City's draft guidelines, 2018). Although the Site contains several trees that are older than 40 years old (based on publicly available aerial imagery) and several specimen (large, high quality) trees, none of the treed areas individually make up 0.8 ha. There are no surface water features, steep slopes, or rare communities within any treed areas on Site. Tree Hedgerow (cluster) C (east of the cattail marsh on the northern parcel) may provide some greenspace linkage to the cattail marsh. However, since the cattail marsh was evaluated as providing minimal ecological function and non-Significant Wildlife Habitat, it is unlikely that this ~0.5 ha cluster of trees is used regularly by wildlife as a corridor to/from the marsh. The ecological significance of the several large, dead trees within Tree Hedgerow C as it pertains to bats is discussed below in Table 11. Note that no Butternuts were found on or adjacent to the Site.

3.4 Wildlife

3.4.1 Species at Risk

The potential for SAR to occur on Site, based on our review of existing information, ELC delineations (habitat categorization), and field surveys, is indicated below in Table 11. Further details regarding at-risk frogs, turtles, birds, and bats based on our field observations are included in the following sections.

Table 11 Species at risk potential for the Site in 2019

Species Name	Provincial (ESA) Status	Federal (SARA) Status	Habitat Requirement	Habitat on Site	Project Concerns Associated with Habitat on Site
Birds					
Bank Swallow (*Riparia riparia*)	Threatened	Threatened	Nest in banks or earthen walls cut by meandering streams and rivers, but artificial banks may also be used. Foraging occurs over fields, streams, wetlands, farmlands, and still water.	Open fallow fields across the Site (CUM1-1) may provide suitable foraging habitat. No available nesting habitat on Site. The banks of Ramsay Creek and/or McEwan Creek may provide nesting habitat (both <1 km away), but there are no recorded observations of Bank Swallow in the area.	Negligible potential for presence. Not a concern for this project.
Barn Swallow (*Hirundo rustica*)	Threatened	Threatened	Terrestrial open and anthropogenic structures for nesting; near open areas for feeding.	Open fallow fields across the Site (CUM1-1) and the cattail marsh on Site provide suitable foraging habitat. There are several abandoned farm buildings and structures on the northern parcel (CVR_4) as well as adjacent to the Site (cemetery, industrial buildings) that may provide suitable nesting habitat. There are no previous records of occurrences within 2 km of the Site.	Barn Swallows were observed foraging over fallow fields on the northern and southern parcels on May 31st (six individuals at BBS-6 on Figure 2 and July 1st, 2019 (two individuals at BBS-3 and three at BBS-6). KAL Biologists checked all structures on Site, on the cemetery west of the northern parcel, and viewed structures (industrial buildings) on nearby private property from the road in an effort to locate nests. No nests were found. The maximum distance from a Barn Swallow nest that is protected under the ESA (i.e., Category 3 habitat) is 200 m. However, Barn Swallow typically feed beyond 200 m from their nests. It is possible that there are nests located beyond 200 m on nearby private property and the birds from these nests are foraging on the Site. As such, additional searches are needed to locate the nests which will determine if any Barn Swallow compensation efforts are necessary

Species Name	Provincial (ESA) Status	Federal (SARA) Status	Habitat Requirement	Habitat on Site	Project Concerns Associated with Habitat on Site
					(i.e., if nests are beyond 200 m from the Site, no compensation is required).
Bobolink (*Dolichonyx oryzivorus*)	Threatened	Threatened	Periodically mown, dry meadow for nesting. Habitat (meadow) should be >10 ha, and preferably >30 ha before Bobolink are attracted to the Site. Not near tall trees.	Open fallow fields across the Site (CUM1-1) may provide suitable nesting and foraging habitat, though the habitat is marginal at best.	Three Bobolink were observed around the old farm buildings on the northern parcel by NCC Biologists on May 16th, 2019. No Bobolink were observed during KAL's three rounds of breeding bird surveys in 2019. As such, the individuals observed by NCC Biologists were likely just passing through on their way to better habitat as it was relatively early in the breeding season during a late spring (Bobolink in the area were likely establishing territories and breeding later than 'normal' in 2019). Given their transient presence, we can confidently conclude that Bobolink were not using the Site as breeding or nesting habitat in 2019. However, it is still not impossible that a nest could occur in the fallow fields. To ensure no impacts to this species, no construction or other development activities should occur within the fallow fields between April 1st and August 31st (breeding bird period recognized by NCC; personal communication, T. Zukerman) without first ensuring the absence of grassland bird nests during that period. If any at-risk bird species are nesting in these areas, construction must be delayed until all nestlings are fledged.
Canada Warbler *(Wilsonia Canadensis)*	Special Concern	Threatened	Prefers to nest in a range of wet forest types with a well-developed understory.	No suitable habitat on the Site or adjacent areas and no records of occurrences within 2 km of the Site.	Negligible potential for presence. Not a concern for this project.
Chimney Swift (*Chaetura pelagica*)	Threatened	Threatened	Nests in open chimneys and, very rarely, in tree	There are several abandoned buildings on the northern	Chimney Swift was not observed during any surveys and there are no

Species Name	Provincial (ESA) Status	Federal (SARA) Status	Habitat Requirement	Habitat on Site	Project Concerns Associated with Habitat on Site
			hollows (trees > 60 cm DBH). Tend to forage close to water as this is where the flying insects they eat congregate.	parcel (CVR_4) that may provide nesting and roosting habitat, although only one building has a chimney, and a small one at that. The cluster of trees east of the cattail marsh contains two trees with DBH > 60cm with hollows, though they do not make up an old growth forest consistent with non-urban habitat of Chimney Swift. The tributary on Site (Reach 1) and surrounding creeks may provide foraging habitat.	records of it occurring in the area. Negligible potential for presence. Not a concern for this project.
Common Nighthawk (*Chordeiles minor*)	Special Concern	Threatened	Nests in wide variety of open sites, including beaches, fields, and gravel rooftops.	No suitable habitat on the Site or adjacent areas and no records of occurrences within 2 km of the Site.	Negligible potential for presence. Not a concern for this project.
Eastern Meadowlark (*Sturnella magna*)	Threatened	Threatened	Periodically mown, dry meadow for nesting. Habitat (meadow) should be >10 ha, and preferably >30 ha before Eastern Meadowlark are attracted to the Site. Not near tall trees.	Open fallow fields across the Site (CUM1-1) may provide suitable nesting and foraging habitat, though the habitat is marginal at best.	No Eastern Meadowlark were observed during any surveys and there are no records of occurrences in the area. However, similar to Bobolink, it is still not impossible that a nest could occur in the fallow fields on Site. To ensure no impacts to this species, no construction or other development activities should occur within the fallow fields between April 1st and August 31st (breeding bird period recognized by NCC; personal communication, T. Zukerman) without first ensuring the absence of grassland bird nests during that period. If any at-risk bird species are nesting in these areas, construction must be delayed until all nestlings are fledged.

Species Name	Provincial (ESA) Status	Federal (SARA) Status	Habitat Requirement	Habitat on Site	Project Concerns Associated with Habitat on Site
Eastern Wood-Pewee (*Contopus virens)*	Special Concern	Special Concern	Woodland species, often found near clearings and edges.	No suitable habitat on the Site or adjacent areas and no records of occurrences within 2 km of the Site.	Negligible potential for presence. Not a concern for this project.
Evening Grosbeak *(Coccothraustes vespertinus)*	Special Concern	Special Concern	Nests in trees or large shrubs; prefers mature mixed-wood forests dominated by fir species, White Spruce, and/or Trembling Aspen but will also use deciduous forests, parklands, and orchards.	No suitable habitat on the Site or adjacent areas and no records of occurrences within 2 km of the Site.	Negligible potential for presence. Not a concern for this project.
Grasshopper Sparrow (*Ammodramus savannarum*)	Special Concern	Special Concern	Prefers open grasslands with well-drained, sandy soil but will also nest in hayfields, pastures, alvars, prairies, and occasionally grain crops (e.g., barley).	Open fallow fields across the Site (CUM1-1) may provide suitable nesting and foraging habitat.	This species was not observed during the 2019 field campaign. There are also no records of it occurring within 2 km of the Site. Therefore, this species is not a concern for this project.
Least Bittern (*Ixobrychus exilis*)	Threatened	Threatened	Found in large (> 5-10 ha) marshes with tall emergent vegetation (usually cattails), relatively stable water levels (usually 10-50 cm), and about 50% open water interspersed in small pockets throughout vegetated areas.	The cattail marsh on Site is too small (= 2 ha), does not have any areas of open water, does not have a stable water table, and is subject to frequent traffic and industrial noise.	Negligible potential for presence. Not a concern for this project.
Olive-sided Flycatcher *(Contopus cooperi)*	Special Concern	Threatened	Found along edges of coniferous and mixed forests often adjacent to rivers or wetlands.	No suitable habitat on the Site or adjacent areas and no records of occurrences within 2 km of the Site.	Negligible potential for presence. Not a concern for this project.
Rusty Blackbird *(Euphagus carolinus)*	Special Concern	Special Concern	Breeds in habitats that are dominated by coniferous forest with wetlands nearby. Often	May occur in agricultural lands to the east and/or south of the Site, but these lands are surrounded by better	Negligible potential for presence. Not a concern for this project.

Species Name	Provincial (ESA) Status	Federal (SARA) Status	Habitat Requirement	Habitat on Site	Project Concerns Associated with Habitat on Site
			forages in agricultural lands.	habitat than the Site and are separated from the Site by highway 417 and Hunt Club Road. No suitable habitat on the Site and no records of occurrences within 2 km of the Site.	
Wood Thrush (*Hylocichla mustelina*)	Special Concern	Threatened	Deciduous or mixed woodlands.	No suitable habitat on the Site or adjacent areas and no records of occurrences within 2 km of the Site.	Negligible potential for presence. Not a concern for this project.
Mammals					
Little Brown Bat (*Myotis lucifugus*)	Endangered	Endangered	Widespread, roosting in trees and buildings. Hibernate in caves or abandoned mines.	The Site contains several large dying/dead trees with snags, cavities, and/or peeling bark that may be suitable for roosting habitat. However, suitable trees are in low density and not in suitable forest forms. The houses and old farm structures on the northern parcel may also provide roosting habitat, but no bats or guano were observed in any buildings.	Even though the Site contains trees that have some roosting potential, there are no forested areas on Site that would support maternal roosting colonies. The two houses on the northern parcel have the potential to support maternal roosting colonies based on the presence of potential entrance/egress points. NCC (federal) lands are subject to the Policy Regarding the Identification of Anthropogenic Structures as Critical Habitat (SARA Policies and Guidelines Series; Government of Canada, 2019), under which anthropogenic structures can be considered critical SAR habitat. As such, detailed bat monitoring must be implemented during the breeding season (e.g., June) immediately prior to the demolition of the houses on Site to determine the potential for bat presence and any necessary mitigation. KAL and NCC agree that detailed bat monitoring is not necessary for the open agricultural structures on the northern parcel as they were assessed as having a low

Species Name	Provincial (ESA) Status	Federal (SARA) Status	Habitat Requirement	Habitat on Site	Project Concerns Associated with Habitat on Site
					potential for the presence of maternity roosts due to their open nature (i.e., they are exposed to the elements; these structures would be more suitable for day-roosting). In addition to performing detailed bat monitoring prior to the demolition of the houses on Site, no clearing of trees should take place between May and August inclusive without first confirming the absence of bats. Trees should not be cleared within the month of June at all. If all these mitigations are followed, Little Brown Bat will not be a concern for this project.
Tri-Coloured Bat (*Perimyotis subflavus*)	Endangered	Endangered	Widespread, roosting in trees and buildings. Hibernate in caves or abandoned mines.	The Site contains several large dying/dead trees with snags, cavities, and/or peeling bark that may be suitable for roosting habitat. However, suitable trees are in low density and not in suitable forest forms. The houses and old farm structures on the northern parcel may also provide roosting habitat, but no bats or guano were observed in any buildings.	Even though the Site contains trees that have some roosting potential, there are no forested areas on Site that would support maternal roosting colonies. The two houses on the northern parcel have the potential to support maternal roosting colonies based on the presence of potential entrance/egress points. NCC (federal) lands are subject to the Policy Regarding the Identification of Anthropogenic Structures as Critical Habitat (SARA Policies and Guidelines Series; Government of Canada, 2019), under which anthropogenic structures can be considered critical SAR habitat. As such, detailed bat monitoring must be implemented during the breeding season (e.g., June) immediately prior to the demolition of the houses on Site to determine the potential for bat presence and any necessary mitigation. KAL and NCC agree that

Species Name	Provincial (ESA) Status	Federal (SARA) Status	Habitat Requirement	Habitat on Site	Project Concerns Associated with Habitat on Site
					detailed bat monitoring is not necessary for the open agricultural structures on the northern parcel as they were assessed as having a low potential for the presence of maternity roosts due to their open nature (i.e., they are exposed to the elements; these structures would be more suitable for day-roosting). In addition to performing detailed bat monitoring prior to the demolition of the houses on Site, no clearing of trees should take place between May and August inclusive without first confirming the absence of bats. Trees should not be cleared within the month of June at all. If all these mitigations are followed, Tri-Coloured Bat will not be a concern for this project.
Northern Long-Eared Bat (*Myotis septentrionalis*)	Endangered	Endangered	Associated with boreal forests, choosing to roost under loose bark and in the cavities of trees. Hibernate in caves or abandoned mines.	The Site and adjacent areas do not have suitable forest habitat.	Negligible potential for presence. Not a concern for this project.
Eastern Small-Footed Bat (*Myotis leibii*)	Endangered	Not at Risk	Coniferous forest in hilly country. Hibernate in smaller caves. Subject to air movement.	The Site and adjacent areas do not have suitable forest habitat.	Negligible potential for presence. Not a concern for this project.
Reptiles					
Blanding's Turtle (*Emydoidea blandingii*)	Threatened	Threatened	Shallow water usually in large wetlands or shallow lakes. Can be found far from water bodies if searching for mates or nesting sites, which usually contain gravel, cobble, and/or sand.	There are records of Blanding's Turtle occurrences within the 10 x 10 km Herp Atlas square that contains the Site sometime after 1999 (Ontario Nature, 2019b). However, there is no typical turtle habitat on Site, and these occurrences are likely	No turtles were observed on Site during any surveys. Negligible potential for presence. Not a concern for this project.

Species Name	Provincial (ESA) Status	Federal (SARA) Status	Habitat Requirement	Habitat on Site	Project Concerns Associated with Habitat on Site
				limited to the more suitable habitats in nearby Ramsay and McEwan Creeks. Reach 1 (Mather Award Drain) may act as a travel corridor, but this is unlikely given that the Site is bordered by highway 417, major roads, and industrial parks (travel barriers). Reach 1 also has a cobble/rocky bottom unsuitable for turtle overwintering.	
Milksnake (*Lampropeltis triangulum*)	Not at Risk	Special Concern	Found in a variety of habitats but tends to use open habitats such as rocky outcrops, fields, and forest edges. In rural areas this snake may be common, especially around barns where they thrive on abundant mice.	Open fallow fields and abandoned buildings on Site may provide habitat. Buildings on Site were thoroughly inspected, and no signs of snakes or their prey (mice) were observed. There are no records of Milksnake occurrences within the 10 x 10 km Herp Atlas Square that contains the Site (Ontario Nature, 2019b).	No snakes were observed on Site during any surveys. Negligible potential for presence. Not a concern for this project.
Snapping Turtle (*Chelydra serpentina)*	Special Concern	Special Concern	Prefers shallow water usually in large wetlands or shallow lakes. Can be found far from water bodies if searching for mates or nesting sites, which usually contain gravel, cobble, and/or sand.	There are records of Snapping Turtle occurrences within the 10 x 10 km Herp Atlas square that contains the Site sometime after 1999 (Ontario Nature, 2019b). However, there is no typical turtle habitat on Site, and these occurrences are likely limited to the more suitable habitats in nearby Ramsay and McEwan Creeks. Reach 1 (Mather Award Drain) may act as a travel corridor, but	No turtles were observed on Site during any surveys. Negligible potential for presence. Not a concern for this project.

Species Name	Provincial (ESA) Status	Federal (SARA) Status	Habitat Requirement	Habitat on Site	Project Concerns Associated with Habitat on Site
				this is unlikely given that the Site is bordered by highway 417, major roads, and industrial parks. This tributary also has a cobble/rocky bottom unsuitable for turtle overwintering.	
Amphibians					
Western Chorus Frog (*Pseudacris triseriata*)	Not at Risk	Threatened	Forest openings around woodland ponds, damp meadows, bottomland swamps, temporary ponds and ditches. Overwinters underground or under surface cover such as fallen logs.	There are several temporary wet depressions on Site (as described in the HDFA component of this report). However, there are no records of Western Chorus Frog occurrences within the 10 x 10 km Herp Atlas Square that contains the Site (Ontario Nature, 2019b).	No Western Chorus Frogs were observed on Site during any surveys. Negligible potential for presence. Not a concern for this project.
Vascular Plants					
Butternut (*Juglans cinerea*)	Endangered	Endangered	Variable but typically on well-drained soils.	No individuals were observed on Site or within 50 m of the Site.	Negligible potential for presence. Not a concern for this project.
Arthropods					
Monarch (*Danaus plexippus*)	Special Concern	Special Concern	Larvae (caterpillars) feed on Milkweed plants (*Asclepias* spp.) in meadows and open areas where Milkweed grows. Adult butterflies are found in farmlands, meadows, open wetlands, prairies, roadsides, city gardens, and parks where wildflowers provide nectar.	Open fallow fields across the Site (CUM1-1) provide suitable feeding habitat for larvae and adults.	A single adult was observed flying over the cattail marsh in the northern parcel on May 31st, 2019. Milkweed is present on the Site, albeit in low abundance. No larvae were observed. No where on Site would constitute Significant Wildlife Habitat for this species given the lack of critical habitat and low abundance of individuals observed (MNRF, 2015a). In addition, Special Concern species do not receive species or habitat protection under ESA/SARA. Therefore, this species is not a concern for this project.

3.4.2 Amphibians

No amphibians were observed visually or audibly directly on Site during any field visits (including during amphibian surveys conducted by both KAL and NCC). Two Gray Tree Frogs were heard calling (calling Code 1) on June 7th, 2019 approximately 150 m southwest of KAL's frog survey station. These individuals were likely located in the upstream portion of Reach 1 on the west side of Russell Road. A single American Toad was seen in the fallow field north of the old farm buildings in the northern parcel on July 10th, 2019. No salamanders were observed on Site.

Given the very low abundance of amphibians on Site, nowhere on Site is Significant Amphibian Breeding Habitat as per the Significant Wildlife Habitat Criteria Schedules for Ecoregion 6E (MNRF, 2015a). None of the areas on Site are considered important for amphibian biodiversity as surveys confirmed the absence of breeding amphibian populations.

3.4.3 Reptiles

No reptiles were observed on Site during any field visits. The only area on Site with some potential (albeit very low) for turtles to occur is within Reach 1 (Mather Award Drain) on the northern parcel. This tributary could potentially act as a travel corridor, but this is very unlikely given that the Site is bordered by a 400 series highway, major roads, and industrial parks (travel barriers). The rocky/gravel substrate of this drain is not suitable for turtle overwintering. Regardless, this feature is not to be altered under the proposed development plan, thus retaining any travel corridor function it may provide.

The only potential turtle habitat adjacent to the Site is the stormwater management pond south of 4120 Russell Road, but no turtles were observed here during field visits, and it is not suitable habitat for at-risk turtles (Midland Painted Turtle may be the only species to use this pond). However, this pond does not have sufficient basking sites or aquatic vegetation and is therefore unlikely to support even Midland Painted Turtles.

3.4.4 Birds

A total of 37 species were observed during breeding bird surveys (Table 12). The most abundant species on Site was European Starling (*Sturnus vulgaris*), followed by Song Sparrow (*Melospiza melodia*), Red-winged Blackbird (*Agelaius phoeniceus*), and American Goldfinch (*Spinus tristis*).

Table 12 Species list and breeding status for birds observed during the three rounds of breeding bird surveys performed in the spring and summer on Site, 2019

Common Name	Scientific Name	Breeding Status	Common Name	Scientific Name	Breeding Status
Alder Flycatcher	*Empidonax alnorum*	S	Gray Catbird	*Dumetella carolinensis*	T
American Bittern	*Botaurus lentiginosus*	X	Hairy Woodpecker	*Picoides villosus*	H
American Crow	*Corvus brachyrhynchos*	P	House Finch	*Carpodacus mexicanus*	P
American Goldfinch	*Carduelis tristis*	P	Killdeer	*Charadrius vociferus*	X
American Redstart	*Setophaga ruticilla*	T	Least Flycatcher	*Empidonax minimus*	T
American Robin	*Turdus migratorus*	FY	Mallard	*Anas platyrhynchos*	FY
American Woodcock	*Scolopax minor*	X	Mourning Dove	*Zenaida macroura*	P
Baltimore Oriole	*Icterus galbula*	T	Northern Cardinal	*Cardinalis cardinalis*	T
Barn Swallow	*Hirundo rustica*	H	Northern Flicker	*Colaptes auratus*	T
Black-capped Chickadee	*Poecile atricapillus*	H	N. Rough-winged Swallow	*Stelgidopteryx serripennis*	H
Brown-headed Cowbird	*Molothrus ater*	S	Pileated Woodpecker	*Dryocopus pileatus*	H
Blue Jay	*Cyanocitta cristata*	H	Ring-billed Gull	*Larus delawarensis*	X
Brown Thrasher	*Toxostoma rufa*	S	Rock Dove	*Columba livia*	P
Clay-coloured Sparrow	*Spizella pallida*	T	Red-winged Blackbird	*Agelaius phoeniceus*	NE
Cedar Waxwing	*Bombycilla cedrorum*	P	Savannah Sparrow	*Passerculus sandwichensis*	T
Chipping Sparrow	*Spizella passerina*	T	Song Sparrow	*Melospiza melodia*	P
Common Grackle	*Quiscalus quiscula*	CF	Spotted Sandpiper	*Actitis macularius*	H
Common Raven	*Corvus corax*	H	Swamp Sparrow	*Melospiza georgiana*	T
Common Yellowthroat	*Geothlypis trichas*	P	Tennessee Warbler	*Oreothlypis peregrina*	X
Chestnut-sided Warbler	*Setophaga pensylvanica*	S	Tree Swallow	*Tachycineta bicolor*	H
Double-crested Cormorant	*Phalacrocorax auritus*	X	Virginia Rail	*Rallus limicola*	P
Eastern Kingbird	*Tyrannus tyrannus*	P	Warbling Vireo	*Vireo gilvus*	T
Eastern Phoebe	*Sayornis phoebe*	V	Willow Flycatcher	*Empidonax traillii*	T

Common Name	Scientific Name	Breeding Status	Common Name	Scientific Name	Breeding Status
European Starling	*Sturnus vulgaris*	CF	Wild Turkey	*Meleagris gallopavo*	D
Great Blue Heron	*Ardea herodias*	X	Yellow Warbler	*Setophaga petechia*	T

Table Notes: Breeding Status codes: X = species observed in breeding season (no breeding evidence); H = species observed in breeding season in suitable nesting habitat; S = singing male(s) present or breeding calls heard in suitable nesting habitat; P = pair observed in suitable habitat in nesting season; T = permanent territory presumed through registration of territorial song, or the occurrence of an adult in the same place within a breeding habitat on at least two days a week or more apart during breeding season; D = courtship or display; V = visiting probable nest site; FY = recently fledged young or downy young; CF = adult carrying food for young; NE = nest containing eggs.

One listed SAR, Barn Swallow (*Hirundo rustica*; listed as Threatened under ESA and SARA), was observed during breeding bird surveys. Barn Swallows were observed foraging over the fallow fields on the northern and southern parcels during two breeding bird surveys: on May 31st, 2019 six individuals were observed at BBS-6; and on July 1st, 2019 two individuals were observed at BBS-3 and three at BBS-6 (Figure 2). KAL Biologists searched for nests on all structures on Site, on structures in the cemetery west of the northern parcel, and the industrial buildings adjacent to the Site (checked buildings on private property from the road with binoculars). No Barn Swallow nests were found. Although KAL Biologists did not locate any Barn Swallow nests, it is possible that there are nests on other nearby structures on private property that could not be adequately searched from the road. It is likely that the nests are located beyond 200 m from the Site (i.e., beyond protected Category 3 habitat under the ESA) as Barn Swallows that were observed on Site were seen flying towards the centre of the industrial park west of the Site (west of the northern parcel, north of the southern parcels). The centre of this industrial park is over 200 m away from the Site. Only the area within 200 m of a nest is protected under the ESA as feeding (Category 3) habitat for Barn Swallow even though they can be found feeding beyond 200 m from their nests. Since the exact location of nests could not be determined at the time of writing this report due to restricted access to the potential nesting areas (private property), additional searches are needed to locate the nests. The location of nests will determine if any Barn Swallow compensation works are necessary based on the distance(s) of nests from the Site (i.e., if nests are beyond 200 m from the Site, no compensation is required).

Three male Bobolink (*Dolichonyx oryzivorus*; listed as Threatened under ESA and SARA) individuals were observed around the old farm buildings on the northern parcel by NCC Biologists on May 16th, 2019. No Bobolink were observed by KAL Biologists during our three rounds of breeding bird surveys in 2019. As such, the individuals observed by NCC Biologists were likely just passing through on their way to better habitat as it was relatively early in the breeding season during a late spring (Bobolink in the area were likely establishing territories and breeding later than 'normal' in 2019). Given their transient presence, we can confidently conclude that Bobolink were not using the Site as breeding or nesting habitat in 2019.

Two regionally rare bird species (Cadman *et al*., 1987) were observed on Site. Dark-eyed Junco (*Junco hyemalis*) was observed along the hedgerow of trees on the northern border of 4120 Russell Road on April 9th, 2019 (i.e., the onset of the breeding bird window recognized by NCC; personal communication, T. Zukerman). Tennessee Warbler (*Leiothlypis peregrina*) was observed during the breeding season at BBS-3 (see Figure 2) on May 31st, 2019. These birds are not protected under ESA or SARA, but they are protected under the *Migratory Birds Convention Act* (Government of Canada, 1994; see Section 6.4.2 below).

3.4.5 Mammals

Across several Site visits, KAL and NCC Biologists saw the following mammals and/or signs of them (chews, scat, dens, etc.): Coyote, Raccoon, Deer, Porcupine, and hare (unknown species). The fallow field composition of the Site makes it unlikely to support a large and diverse mammal community. The linear nature of the few hedgerows and limited tree cover on Site would provide only limited cover for wildlife and very minimal connectivity to other areas as most of the surrounding area is already developed.

3.4.5.1 Bats

Based on our tree inventory, the Site contains several large dying/dead trees with snags, cavities, and/or peeling bark that may be suitable for bat roosting habitat. However, suitable trees are in low density and not in suitable forest forms. Note that habitats with the FOD (Deciduous Forest) ELC code are considered candidate Significant Wildlife Habitat for bat maternity colonies per MNRF (2011, 2015a). Based on our ELC, there are two vegetation classes that fall under FOD: FODM11 (Naturalized Deciduous Hedgerow Ecosite) and FODM4-5 (Dry-Fresh Manitoba Maple Deciduous Forest Type). However, the FOD vegetation classes on Site are not considered candidate Significant Wildlife Habitat for bats for several reasons. Areas on Site delineated as FODM11 are linear hedgerows containing mainly deciduous trees that are currently in the process of natural regeneration. These hedgerows are dominated by trees, but they do not have a forest form. Similarly, the FODM4-5 type is a loose cluster of ~25 trees (mainly Manitoba Maples) and does not have a typical forest form. Based on the dimensions of the hedgerows indicated in Section 3.3.1, the areas of Tree Hedgerows A through C are less than 1 ha while Tree Hedgerows B and E are just over 1 ha in area. The FODM4-5 cluster is ~0.3 ha. The Significant Wildlife Habitat Criterion Schedules for Ecoregion 6E (MNRF, 2015a) indicate that candidate maternity colonies are typically found in mature deciduous or mixed forest stands with greater than 10 large diameter trees (>25 cm DBH) per hectare. Tree Hedgerow C is the only treed area on Site that contains greater than 10 large diameter trees (see Section 3.3.3), but its size alone (0.5 ha) would render it as having a low potential to support maternity colonies. None of these hedgerows or clusters are forest stands, and none of them meet the snag/cavity tree counts per unit area per *Bats and Bat Habitats: Guidelines for Wind Power Projects* (minimum of 10 snags/cavity trees for areas ≤10 ha; MNRF, 2011). Tree Hedgerow C had the greatest amount of snag/cavity trees per area, but it only contained three trees with features suitable for bat roosting (snags, cavities, and peeling bark). As such, there is very low potential for maternity roosting colonies to occur in treed areas on Site.

The houses and old farm structures on the northern parcel may provide roosting habitat (points of potential entry/egress were observed), but no bats or guano were observed in any buildings. Under provincial guidelines, buildings are not considered Significant Wildlife Habitat (MNRF, 2015a). However, NCC (federal) lands are subject to the Policy Regarding the Identification of Anthropogenic Structures as Critical Habitat (SARA Policies and Guidelines Series; Government of Canada, 2019), under which anthropogenic structures can be considered critical SAR habitat. Consequently, further studies are required to assess the potential presence of bats in the houses on the northern parcel prior to their demolition (more details in in Section 6.4.1).

4.0 PROJECT DESCRIPTION

The proposed concept plan involves developing a business park that would cover most of the Site but would incorporate several green areas and renaturalized areas (Figure 25). Yellow areas in Figure 25 indicate areas that would most likely be developed; other areas would generally remain undeveloped. Please note, however, at this phase of the project, the footprint is still conceptual and may be subject to small adjustments. The final details of the future Site layout will be determined and specified through detailed site plan applications that would be submitted for each phase of development. Reach 1 and adjacent lands extending beyond the 30 m minimum creek setback would not be developed under the proposed concept design. Additional areas along the edges of most of the Site will likely be incorporated into green spaces. Developed areas are unlikely to stretch fully to the boundaries of both parcels, so hedgerows and HDFs along the edges of the Site may be retained to the fullest extent practical. The cattail marsh on the northern parcel and wet depression on the southern parcel will likely be developed.

Figure 25 Map showing the proposed development areas for the Site, 2019

Legend

- Site boundary
- Developable Land
- Developable with replacement of wetland function

N

0 200 m

Project: AVE866
Created By: AF
MTM Zone 9
(NAD 83)
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KILGOUR & Associates

5.0 IMPACT ASSESSMENT

5.1 Impacts to Surface Water Features

Reach 1 (and the areas adjacent to it), Reach 2, and Reach 3 are not to be altered under the proposed development plan. The proposed development will respect a minimum 30 m setback for Reach 1 to protect this feature. The proposed development plan also includes several areas intended for green space and renaturalization. Reaches 4, 5, and 6 are the only HDFs that are likely to be altered. These reaches demonstrated limited hydrological function and do not directly provide fish or amphibian habitat. The cattail marsh on the northern parcel will likely be developed. This isolated wetland likely plays an important role in stormwater attenuation so removing or significantly altering this detention area would likely aggravate stormwater runoff, though this function could be replicated in stormwater management systems (e.g. ponds and/or bioswales) to be constructed on Site. It has no other significant hydrological, biological, social, or otherwise "special" features or functions. The wet depression on the southern parcel (not a "true" wetland) will also likely be developed, but this feature provides very limited biological functions, no social functions, limited hydrological functions, and no special or unique features.

5.2 Impacts to Trees and Vegetation

At this early stage in the project it is difficult to determine what areas would need to be cleared to support the proposed development. It is possible that vegetation along the edges of the Site will be retained and/or incorporated into green spaces. The following hedgerows would likely be removed given their proximity to the proposed location of buildings in the concept plan (refer to Figure 15): Thicket Hedgerows A, B, and C; Tree Hedgerows C and D (a portion of Tree Hedgerow E may be cleared); and the Dry-Fresh Manitoba Maple Deciduous Forest Type (FODM4-5; Manitoba Maple cluster) in the centre of 4120 Russell Road. None of these hedgerows or tree clusters, or any vegetation communities on Site for that matter, are considered important habitat to wildlife. None of the hedgerows or tree clusters that are likely to be altered contain any rare or at-risk species or communities. The only vegetation community that will likely be altered that may be considered unique relative to the rest of the Site is Tree Hedgerow (cluster) C due to the several large and old specimen trees it contains. This cluster contains the most naturalized area and the largest trees on Site and some parts of this cluster have an intact forest floor that contrasts with the rest of the Site, the majority of which is fallow fields and thicket. However, this naturalized hedgerow only forms an area of ~0.5 ha and does not provide any Significant Wildlife Habitat, and as such, does not warrant any protection.

Hedgerows and tree clusters that will likely remain unaltered under the proposed development are Thicket Hedgerow D and Tree Hedgerows A, B, and E.

5.3 Impacts to Species at Risk

5.3.1 Barn Swallow

Barn Swallow is the only protected SAR (i.e., listed as Threatened under ESA and SARA) that was observed using the Site as habitat. Barn Swallow was not using the Site as nesting habitat (i.e., no nests were found on Site) in 2019, but it was observed using the Site as foraging habitat. Most of the fallow fields that Barn Swallows were observed foraging over will likely be removed under the proposed development. However,

Reach 1 and adjacent lands will remain intact or be managed as green space which should provide some remaining foraging habitat for Barn Swallow.

5.4 Monarch

A single adult Monarch was observed on Site throughout the entire 2019 field campaign, suggesting that its presence was transient. This species and its habitat do not receive protection under ESA or SARA due to Monarch's listing as Special Concern. Habitat containing a species of Special Concern can be considered candidate Significant Wildlife Habitat (MNRF, 2015a); however, the single adult Monarch observed on Site was seen flying over the cattail marsh on Site (not typical field/meadow habitat) and was likely only "passing through". No other adults or larvae were observed on Site, and the Site itself contains a very low abundance of Milkweed plants despite consisting largely of fallow fields. Accordingly, Monarch is not a concern for this project and no impacts are anticipated to this species under the proposed development.

5.4.1 Bobolink

The presence of Bobolink early in the breeding season during a late spring was likely transient, so this species is not a concern for this project.

5.4.2 Bats

The proposed development requires the demolition of the buildings on the northern parcel. These buildings have the potential to provide roosting habitat for bats, so further studies are required prior to demolition to document the presence/absence of bats and to determine any necessary mitigations.

6.0 MITIGATIONS

6.1 Surface Water Features

The classification categories identified in Section 3.2.2 provide the basis of the management recommendations provided in Table 13 below. The following flow chart (Figure 26) combines and translates the classification results into management recommendations.

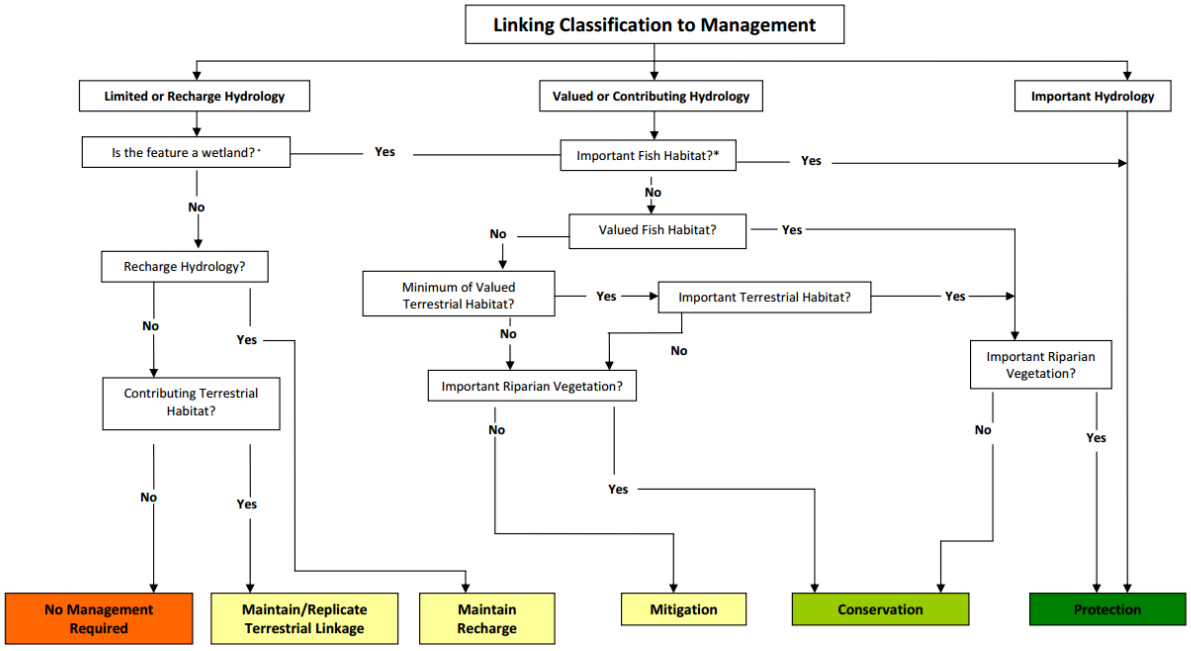

Figure 26 Flow chart providing direction on management options based on reach classifications (adapted from pg. 20 of the HDF Guidelines)

Table 13 Summary of functional classifications and management for the HDFs on Site, 2019

Drainage Feature	Hydrology Classification	Riparian Classification	Fish Habitat	Terrestrial Habitat	Management Recommendation
Reach 1	Important Functions	Important Functions	Important Functions	Contributing Functions	**Protection**
Reach 2	Valued Functions	Valued Functions	Contributing Functions	Limited Functions	**Mitigation**
Reach 3	Limited Functions	Valued Functions	Limited Functions	Limited Functions	**No Management Required**
Reach 4	Limited Functions	Limited to Valued Functions	Limited Functions	Limited Functions	**No Management Required**
Reach 5	Limited Functions	Important Functions	Contributing Functions	Limited Functions	**No Management Required**
Reach 6	Limited Functions	Valued to Important Functions	Contributing Functions	Limited Functions	**No Management Required**

6.2 Management Recommendations

Based on the classifications of the HDFs on Site and the decision-making tool above (Figure 26), only Reaches 1 and 2 require management implications for development proposals. Reaches 1 and 2 are to remain unaltered under the proposed development plan accordingly. Reaches 3-6 may be altered with no management required.

Reach 1

Reach 1 and the areas adjacent to it are not to be altered under the proposed development plan and thus meets the recommended management directive of Protection. Natural Channel Design or wetland design techniques should be used to restore and enhance existing habitat features along Reach 1 if and where needed. Stormwater management systems for the Site must be designed to avoid impacts (i.e., changes in temperature, sediment load, and hydroperiod) to this headwater feature. The City will require a 30 m setback on either side of the channel to protect this feature, and this has already been incorporated into the proposed concept design.

Reach 2

The management recommendation of Mitigation for Reach 2 means this feature may be maintained or, if necessary, relocated. If the feature is to be relocated, it must remain open, the hydroperiod must be maintained, and it must have a connection downstream. Natural Channel Design techniques are not required for relocation. The function of this feature can be replicated using bioswales, vegetated swales, Low Impact Development techniques, or by constructed wetlands, all of which can be incorporated into the stormwater management plans for the Site.

Cattail marsh

Management recommendations for the cattail marsh are worth mentioning here, even though the feature is not considered an HDF. Despite having a low OWES score (largely because it is relatively small and lacks biological and social significance), this wetland likely plays an important role in stormwater attenuation because it is an isolated wetland with no surface outflow. It is also at the top of its catchment basin and surrounded on three sides by impervious surfaces, and so removing or significantly altering this detention area could aggravate stormwater runoff downstream. As such, this feature may be considered for full retention in its current state and/or for incorporation into the stormwater management plans for the Site. However, as the habitat provided by the existing configuration is limited (as evidenced by general lack of wildlife presence here) the primary functionality of the feature for stormwater management could likely be replicated through other stormwater management options such as pond and/or bioswale systems. As this is a federal property, it is recommended that Environment and Climate Change Canada (ECCC) be provided the option to comment on proposed stormwater management systems for the Site as development plans are established to ensure their concurrence that existing wetland function is being adequately replicated.

Wet depression

As explained in Section 3.2.1.2, this feature is not considered a true wetland due to its small size and lack of wetland functions. The hydrological functions of this wet depression were limited to holding and conveying meltwater in the spring to a small tributary off Site. Given that this feature only provides minimal hydrological function in the spring and then quickly dries in the summer, there would be no net loss of wetland functions if this wet depression were removed so long as the conveyance of meltwater and stormwater off Site follows similar flow paths (i.e., water is conveyed off Site into the same downstream features).

Note that the above recommendations focus on the individual assessment of HDFs. The cumulative effects and threshold of changes downstream, however, should also be considered and monitored to ensure no major changes in sedimentation, chemistry, or temperature.

6.3 Trees

Please note that this report does not constitute permission to remove any trees from the Site. Removal of trees can only be undertaken upon the issuance of a land access permit from the NCC and a tree removal permit from the City of Ottawa. This report also does not serve as a TCR; further tree surveys are required to identify and map all trees to potentially be impacted as specific site plans are generated for each phase of development. NCC requires the total number of trees on Site with DBH ≥10 cm that may be impacted by each phase of development to determine how many trees need to be compensated (NCC uses a 2:1 compensation ratio for tree removal). Accordingly, as detailed site plans are created, all trees within a development phase with DBH ≥ 10 cm that are likely to be impacted will need to be enumerated and mapped if they were not captured in our preliminary tree survey.

Since the project is in an early stage, we recommend the following general protection measures during construction. More detailed mitigation measures should be included in the TCR(s) for each phase of development.

- Tree removal on Site should be limited to that which is necessary to accommodate construction.
- To minimize impact to remaining trees during Site development:
    - Erect a fence beyond the critical root zone (CRZ; i.e., 10x the DBH) of trees. The fence should be highly visible (orange construction fence) and paired with erosion control fencing. Pruning of branches is recommended in areas of potential conflict with construction equipment;
    - Do not place any material or equipment within the CRZ of trees;
    - Do not attach any signs, notices, or posters to any trees;
    - Do not raise or lower the existing grade within the CRZ of trees without approval;
    - Tunnel or bore when digging within the CRZ of a tree;
    - Do not damage the root system, trunk, or branches of any remaining trees; and
    - Ensure that exhaust fumes from all equipment are not directed towards any tree's canopy.

6.4 Wildlife

6.4.1 Species at Risk

6.4.2 Barn Swallow

The only protected SAR that was observed on Site and assessed as having some potential to interact with the proposed development is Barn Swallow. To ensure no impacts to this species, additional searches are needed to locate Barn Swallow nests before the commencement of Site works. The location of nests will determine if any Barn Swallow compensation works are necessary. If nests are located beyond 200 m from the Site, no compensation is required. If a nest is located within 200 m of the Site, the Site will be considered protected foraging (Category 3) habitat and the project will need to be registered with the MECP prior to the commencement of Site works indicating the presence of Barn Swallow at the Site. The proponent must then comply with all obligations imposed by the Site registration including, but not necessarily limited to, the creation and maintenance of a new nesting structure. If a registration is required, the species will impose no further constraints on development once the project is so registered and complies with MECP's obligations.

6.4.3 Bobolink

It is unlikely that Bobolink use the Site as breeding or nesting habitat. However, it is still not impossible that a nest could occur in the fallow fields. To ensure no impacts to this species, no construction or other development activities should occur within the fallow fields between April 1st and August 31st (breeding bird period recognized by NCC; personal communication, T. Zukerman) without first ensuring the absence of grassland bird nests during that period. If any at-risk bird species are nesting in these areas, construction must be delayed until all nestlings are fledged.

6.4.4 Bats

As explained in preceding sections, detailed bat monitoring must be implemented during the breeding season (e.g., June) immediately prior to the demolition of the houses on Site to determine the potential for at-risk bat presence and any necessary mitigation. In addition to the two houses on the northern parcel, this parcel contains several open agricultural structures. KAL and NCC agree that detailed bat monitoring is not necessary for these structures as they were assessed as having a low potential for the presence of maternity roosts due to their open nature (i.e., they are exposed to the elements; these structures would be more suitable for day-roosting). Detailed bat monitoring should be performed for the two houses via acoustic surveys following the MNRF Guelph District's survey methods (2014) to determine if they provide roosting habitat for at-risk bats and/or maternal colonies. This is currently the protocol recommended by the NCC for confirming the presence/absence of Little Brown Myotis, Northern Myotis, and Eastern Small-footed Myotis where it is determined that potentially suitable habitat is present in buildings. Note that if not-at-risk bats are found in any buildings to be demolished they should be permanently and humanely evicted by a qualified person. However, if buildings are known to contain at-risk bats, they cannot be altered while at-risk bats are present. Therefore, if at-risk bats are present in buildings on Site, the buildings cannot be removed during the breeding/roosting season (May to September inclusive; MNRF, 2015b).

The presence of at-risk bats or maternal colonies in wooded areas on Site, although unlikely, cannot be dismissed completely. To prevent impacts to bats in wooded areas, no clearing of trees on Site should take place between May to September inclusive without first confirming the absence of bats (MNRF, 2015b). Trees should not be cleared within the month of June at all.

6.5 General Wildlife Mitigations

During several field visits to the Site, common wildlife species were observed, all of which are represented throughout the developed adjacent landscape. The following mitigation measures shall be implemented on Site during construction of the project to generally protect wildlife:

- Areas shall not be cleared during sensitive times of the year for wildlife (breeding season; early spring to early summer), unless mitigation measures are implemented and/or the habitat has been inspected by a qualified Biologist.
- Do not harm, feed, or unnecessarily harass wildlife.
- Manage waste to prevent attracting wildlife to the Site. Effective mitigation measures include litter prevention and keeping all trash secured in wildlife-proof containers and promptly removing it from the Site, especially during warm weather.
- Drive slowly and avoid hitting wildlife.
- Manage stockpiles and equipment on Site to prevent wildlife from being attracted to artificial habitat. Cover and contain any piles of soil, fill, brush, rocks and other loose materials and cap ends of pipes where necessary to keep wildlife out. Ensure that trailers, bins, boxes, and vacant buildings are secured at the end of each work day to prevent access by wildlife.
- Check the entire work site for wildlife prior to beginning work each day.

- Inspect protective fencing and/or other installed wildlife exclusion measures daily and after each rain event to ensure their integrity and continued function.
- Monitor construction activities to ensure compliance with the project-specific protocol (where applicable) or any other requirements.
- If SAR are encountered on Site, immediately stop all work and comply with the project-specific SAR protocol (where applicable; e.g., contact project Biologist to determine next steps).
- Buildings on Site should be inspected to ensure the absence of snakes, bats, and any other wildlife immediately prior to demolition. Bats may day-roost in buildings while snakes may be present in building foundations/walls in search of food, shelter, and/or overwintering habitat. Any wildlife present in buildings should be removed and safely relocated by a qualified person.
- The *Migratory Birds Convention Act* (Government of Canada, 1994) protects the nests and young of migratory breeding birds in Canada. The NCC recognizes April 1st to August 31st as the breeding bird period for the Ottawa area (personal communication, T. Zukerman). As such, clearing of trees or vegetation should take place between April 1st and August 31st, unless a qualified Biologist has determined that no nesting is occurring within 5 days prior to the clearing (City of Ottawa, 2015).
- Follow the best practices for the construction and maintenance of bird-safe buildings, such as applying visual markers on windows to prevent birds from colliding with glass and reducing the intensity and direction of night lighting (turn off lights at night if possible). See https://flap.org/workplaces-safe-for-birds/ for more resources and tips on designing and maintaining bird-friendly buildings. See Section 6.5 for further discussion of issues related to lighting.

6.6 Lighting

Light pollution from urbanization is a long-standing issue, with broad potential for ecological impacts unless properly mitigated. For both birds and bats, concerns have been raised regarding possible behavioural changes in the face of increasing illumination in urban areas, though the primary concerns surrounding artificial lighting are mostly related to the introduction of new light sources to previously unlit areas (Gaston et al., 2012).

There are two general sets of possible impacts to area fauna that relate to lighting. The first are impacts to birds (and bats) that may nest immediately within or adjacent to areas subject to illumination. The current Site, however, already has some level of constant exposure to lighting from the north end from the hydropower station, from the west side from the industrial areas there, and from the south side from street lighting from Hunt Club Road. As most of the development is proposed for central portions of the Site, the only remaining nesting spaces would occur along the edges of the Site (i.e., areas in which nesting birds are currently all urban tolerant species). The hydropower station to the north appears to have the lowest level of lighting, with night illumination consisting of lower intensity, downward facing elements that do not cast light far beyond the edges of the property. This approach to lighting is recommended for any proposed development on the Site.

The second general type of impact from lighting is to birds not living within the direct vicinity but that may have migratory routes that pass over illuminated areas. Many studies discuss the impacts of artificial lighting during migration as migratory routes pass over illuminated areas. Impacts can be due to use by birds of environmental and celestial light for orientation and flight trajectory. Horizontal light, stars, and lunar illumination provide visual cues for migrating birds when weather conditions permit. The magnetic orientation system of many bird species relies on sensory input related to incident light as well as magnetite receptors, which functionally allow these birds to navigate based on their location relative to the magnetic poles (Ritz *et al*., 2000; Wiltschko *et al*., 2011a; Wiltschko and Wiltschko, 2013). The light-reliant portion of this system receives input from blue-sensitive pigment in the bird's retina (Wiltschko et al., 2011b), making migratory birds particularly susceptible to disorientation from white, red, or yellow light (white: Verheijen, 1960; Evans Ogden, 1996; red and yellow: Wiltschko and Wiltschko, 1999; Wiltschko and Wiltschko, 2002; Gauthreaux and Belser, 2006). Artificial lighting may impact migratory birds due to its ability to reroute them, increasing the chances for collision, exhaustion, and delayed arrival to breeding or overwintering areas (Rich and Longcore, 2006). Red light, more than light of any other wavelength, has the ability to attract birds from a distance, inducing hovering and circling behaviour that increases risk of collision and exhaustion (Gauthreaux and Belser, 2006). It has been noted that after an hour of exposure to light of longer wavelengths, birds regained orientation as their magnetite sensing system took over (Wiltschko et al., 2011a). Migratory birds show normal orientation behaviour in blue (443 nm) and green (565 nm) wavelengths of light (Wiltschko and Wiltschko, 1999). Many investigations have recognized green light as being the least impactful (Wiltschko and Wiltschko, 1995; Wiltschko et al., 2000, 2001; Wiltschko and Wiltschko, 2001; Poot et al., 2008). Bird responses to all light conditions will be strongest on overcast evenings when visual cues are naturally obscured (Poot et al., 2008).

In considering the potential significance of these types of effects on migrating birds, it must be noted that the Site is already subject to light leakage from surrounding municipal lighting. Additional lighting would be unlikely to draw birds any closer to existing hazard structures. Nor would additional lighting draw birds dangerously away from safe landing areas more than any other existing lighting in the area. The area does not need to be protected as a shadowed refuge for sensitive species. Accordingly, we do not consider the addition of lights to this are as being likely to impose further impacts to migrating birds, beyond any effects already caused by lighting in adjacent areas, if best practices are followed to limit light intensity.

Gaston et al. (2012) provide useful considerations when addressing mitigation options of potential lighting impacts. These considerations apply to both birds and bats. Mitigation recommendations addressing these considerations would be in agreement with mitigation strategies independently proposed by Rich and Longcore (2006), as well as the Toronto-based Fatal Light Awareness Program (FLAP). For this project, mitigations must consider:

- **Naturally Unlit Areas** - Areas that have been shaded from sky glow in highly developed centres provide refuge as well as corridors for movement in nocturnal species. Treed areas and areas otherwise secluded from artificial lighting should be preserved and expanded as much as possible to allow the continued use of these areas by sensitive species. Areas already illuminated by neighbouring light sources, however (such as treed areas on the periphery of the Site), do not generally serve as such a refuge.

- **Duration of Artificial Light** - Day *et al.* (2015) noted that bat activity peaks most significantly an hour after sunset, thus it is recommended that municipal lighting be switched off before midnight. The FLAP program mentioned above (Evans Ogden, 1996) recommends keeping lights off between the hours of 11PM and 7AM. Other nocturnal species also benefit from nighttime shut-off or reduction of lighting, with a window of midnight to dawn being recommended as generally protective/light-free (Rich and Longcore, 2006). The use of lighting should be timed accordingly as much as possible.
- **Light Leakage** - To prevent light leakage and minimizing addition to skyglow effects, best practice is to direct lights towards the ground (Rich and Longcore, 2006). Controlling for reflection and glare will also help in limiting light leakage.
- **Intensity of Light** - Flashing or strobing lights do not attract or disorient birds as readily as constant lighting (Avery *et al*., 1976). White strobe lights may induce non-linear flight patterns in nearby birds but do not cause hovering or circling behaviour (Gauthreaux and Belser, 2006). If the use of flashing lights instead of constant lighting is not an option, dimming of lights generally can act to reduce unintended light spill into areas that do not require illumination and will reduce the area of potential ecological impact. With respect to dimming though, according to Lewanzik and Voigt (2017), illuminance level is not an impacting factor in nighttime bat activity for both photophobic and light-tolerant species when light emitting diodes (LEDs) are used. This same study concluded that LED lighting is preferable to other forms (mercury vapour), as it restores a more natural level of competition between photophobic and light tolerant bat species due to their reduced attractiveness to insects. Lighting should use LED lights in the smallest numbers possible that may still provide suitable lighting.
- **Spectrum of Light** - Generally, green light is recommended as the least disorienting to migratory bird species, while all light of lower wavelengths (blue to green) is preferable to light of higher wavelengths (yellow to red). White light includes the higher wavelength portion of the spectrum, and as such also introduces the possibility of disorientation in nearby birds (Verheijen, 1960; Evans Ogden, 1996; Poot *et al*., 2008).

7.0 CLOSURE

It is our professional opinion that no negative impacts are anticipated to significant natural heritage features or SAR or their habitat under the proposed site usage if the recommended mitigations are followed.

This report was prepared for exclusive use by R. Michel Pilon and/or the NCC. It may be distributed only by R. Michel Pilon and/or the NCC. Questions relating to the data and interpretation can be addressed to the undersigned.

Respectfully submitted,

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8.0 LITERATURE CITED

Avery, M., P. Springer, and J. Cassel. 1976. The effects of a tall tower on nocturnal bird migration: A portable ceilometer study. The Auk 93(2):281-291.

Bat Conservation International (BCI). 2016. Species Profiles. Available at: http://www.batcon.org/resources/media-education/species-profiles

Brunton, D.F. 2005. Vascular Plants of the City of Ottawa, with Identification of Significant Species. Appendix A of Ottawa's Urban Natural Areas Environmental Evaluation Study. City of Ottawa, March 2005.

Cadman, M.D., P.F.J. Eagles, and F.M. Helleiner. 1987. Atlas of Breeding Birds of Ontario. University of Waterloo Press, Waterloo, Ontario.

City of Ottawa. 2003. Official Plan – Volume 1 – Section 4.7.8 – Environmental Impact Statement. Available at: https://ottawa.ca/en/city-hall/planning-and-development/official-plan-and-master-plans/official-plan/volume-1-official-plan/section-4-review-development-applications#4-7-environmental-protection

City of Ottawa. 2014. Tree Conservation Report Guidelines (Online). Available at: https://ottawa.ca/en/residents/water-and-environment/trees-and-community-forests/protection#tree-conservation-report-guidelines

City of Ottawa. 2015. Environmental Impact Statement Guidelines - Appendix 10: Mitigation Measures for the City of Ottawa. Available at: https://documents.ottawa.ca/sites/default/files/documents/eis_guidelines2015_en.pdf

City of Ottawa. 2018. Site Alteration By-law 2018-164. Available online at: https://ottawa.ca/en/living-ottawa/water/stormwater-and-drainage/site-alteration-law-2018-164

City of Ottawa. 2018. Significant Woodlands: Guidelines for Identification, Evaluation, and Impact Assessment (draft guidelines). Available at: https://documents.ottawa.ca/sites/default/files/significant_woodlands_draft_guidelines_FINAL.pdf

Credit Valley Conservation Authority and Toronto Region Conservation Authority. 2014. Evaluation, Classification, and Management of Headwater Drainage Features Guidelines ("HDF Guidelines"). Available at: https://cvc.ca/wp-content/uploads/2014/02/HDFA-final.pdf

Day, J., J. Baker, H. Schofield, F. Matthews, and K. Gaston. 2015. Part-night lighting: implications for conservation. Animal Conservation 19(6).

Environment Canada. 2013. How Much Habitat is Enough? Third Edition. Environment Canada, Toronto, Ontario. Available at: https://www.ec.gc.ca/nature/default.asp?lang=en&n=e33b007c-1#_03

Evans Ogden, L. 1996. Collision course: The hazards of lighted structures and windows to migrating birds. Fatal Light Awareness Program (FLAP) 3.

Gaston, K., T. Davies, J. Bennie, and J. Hopkins. 2012. Review: Reducing the ecological consequences of night-time light pollution: options and developments. Journal of Applied Ecology 49(6).

Gauthreaux, S., and C. Belser. 2006. Effects of artificial night lighting on migrating birds. Ecological Consequences of Artificial Night Lighting. 67-93.

geoOttawa. 2019. Interactive web mapping application to see numerous City of Ottawa datasets. Available at: http://maps.ottawa.ca/geoottawa/

Government of Canada. 1991. *The Federal Policy on Wetland Conservation*. Ottawa, Ontario. 15 pp.

Government of Canada. 1994. Migratory Birds Convention Act, 1994 (S.C. 1994, c. 22). Available at: https://laws-lois.justice.gc.ca/eng/acts/m-7.01/

Government of Canada. 2012. *Canadian Environmental Assessment Act,* 2012 (S.C. 2012, c.19, s. 52). Available online at: https://laws-lois.justice.gc.ca/eng/acts/c-15.21/

Government of Canada. 2019. *Impact Assessment Act*, 2019 (S.C. 2019, c. 28, s. 1). Available online at: https://laws-lois.justice.gc.ca/eng/acts/I-2.75/page-1.html

Government of Canada. 2019. Policy Regarding the Identification of Anthropogenic Structures as Critical Habitat. *Species at Risk Act:* Policies and Guidelines Series. Government of Canada, Ottawa. 6 pp.

Government of Canada. 2019. Species at Risk Public Registry. Available at: http://www.registrelep-sararegistry.gc.ca/sar/index/default_e.cfm

Lee, H.R., W. Bakowsky, J. Riley, J. Bowles, M. Puddister, P. Uhlig, and S. McMurray. 1998. Ecological Land Classification for Southern Ontario: First Approximation and its Application. Ontario Ministry of Natural Resources, North Bay.

Lewanzik, D., and C. Voigt. 2017. Transition from conventional to light-emitting diode street lighting changes activity of urban bats. Journal of Applied Ecology 54: 264-271.

Ministry of Natural Resources. 2011. Bats and Bat Habitats: Guidelines for Wind Power Projects. Available at: https://www.ontario.ca/document/bats-and-bat-habitats-guidelines-wind-power-projects

Ministry of Natural Resources. 2014. Ontario Wetland Evaluation System: Southern Manual. 3rd Edition, Version 3.3. Available at: https://dr6j45jk9xcmk.cloudfront.net/documents/2685/stdprod-103924.pdf

Ministry of Natural Resources. 2014. Significant Wildlife Habitat Criteria Schedules for Ecoregion 6E. Available at: https://www.ontario.ca/document/significant-wildlife-habitat-ecoregional-criteria-schedules-ecoregion-6e

Ministry of Natural Resources and Forestry. 2014. Use of Buildings and Isolated Trees by Species at Risk Bats. Survey Methodology. Guelph, Ontario. 1 pp.

Ministry of Natural Resources and Forestry. 2015a. Significant Wildlife Habitat Criteria Schedules for Ecoregion 6E. OMNRF Regional Operations Division: Southern Region Resources Section, Peterborough, Ontario. 39 pp.

Ministry of Natural Resources and Forestry. 2015b. Technical Note: Species at Risk (SAR) Bats. OMNRF Regional Operations Division. 37 pp.

Ministry of Natural Resources and Forestry. 2016. Natural Heritage Information Centre: Make Natural Heritage Map. Available At: https://www.ontario.ca/page/make-natural-heritage-area-map

Ministry of Natural Resources and Forestry. 2019. Ontario Flow Assessment Tool. Interactive wed mapping tool to calculate information about Ontario's watersheds. Available at: https://www.gisapplication.lrc.gov.on.ca/OFAT/Index.html?site=OFAT&viewer=OFAT&locale=en-US

Ministry of Environment, Conservation and Parks. 2019. Species at Risk in Ontario. Available at: https://www.ontario.ca/page/species-risk-ontario

National Wetlands Working Group (eds.). 1988. Wetlands of Canada. Environment Canada and Polyscience Publications Inc., Ottawa, ON.

Marshall, I.B., J. Dumanski, E.C. Huffman, and P.J. Lajoie (Ontario Ministry of Agriculture and Food). 1987. Soils of the Regional Municipality of Ottawa-Carleton (Excluding the Ottawa Urban Fringe) Sheet 3, Ontario, Soil Survey Point No 58. Copies available from: Communications Branch, Ontario Ministry of Agriculture and Food, Parliament Buildings, Toronto, Ontario, M7A 2B2.

Ontario Nature. 2019a. Ontario Breeding Bird Atlas. Available at: https://ontarionature.org/programs/citizen-science/breeding-bird-atlas/

Ontario Nature. 2019b. Herp Atlas. Available at: https://ontarionature.org/programs/citizen-science/reptile-amphibian-atlas/species/

Poot, H., B. Ens, H. de Vries, M. Donners, M. Wernand, and J. Marquenie. 2008. Green light for nocturnally migrating birds. Ecology and Society 13(2): 47.

Rich, C., and T. Longcore, editors. 2006. Ecological consequences of artificial night lighting. Island Press, Washington, DC.

Rideau Valley Conservation Authority. 2013. Ramsay Creek 2013 Summary Report. Available at: https://www.rvca.ca/media/k2/attachments/Final_CSW2013_RamsayCreek.pdf

Rideau Valley Conservation Authority. 2016. McEwan Creek 2016 Summary Report. Available at: https://www.rvca.ca/rvca-publications/city-stream-watch-reports/mcewan-creek-2016-summary-report

Ritz, T., S. Adem, and K. Schulten. 2000. A model for photoreceptor-based magnetoreception in birds. Biophysical Journal 78: 707-718.

Stanfield, L. (eds). 2017. Ontario Stream Assessment Protocol (OSAP) – Version 10. Available at: https://s3-ca-central-1.amazonaws.com/trcaca/app/uploads/2019/06/05112225/osap-master-version-10-july1-accessibility-compliant_editfootnoteS1M4.pdf

Wiltschko, R., S. Denzau, D. Gehring, P. Thalau, and W. Wiltschko. 2011a. Magnetic orientation of migratory robins, Erithacus rubecula, under long-wavelength light. The Journal of Experimental Biology 214: 3096-3101.

Wiltschko, W., M. Gesson, and R. Wiltschko. 2001. Magnetic compass orientation of European robins under 565 nm green light. Naturwissenschaften 88: 387-367.

Wiltschko, W., and R. Wiltschko. 1995. Migratory orientation of European Robins is affected by the wavelength of light as well as by a magnetic pulse. Journal of Comparative Physiology A 177(3): 363-369.

Wiltschko, W., and R. Wiltschko. 1999. The effect of yellow and blue light on magnetic compass orientation in European robins, Erithacus rubecula. Journal of Comparative Physiology A 184: 295-299.

Wiltschko, W., R. Wiltschko, and U. Munro. 2000. Light-dependent magnetoreception in birds: the effect of intensity of 565 nm green light. Naturwisseschaften 87: 366-369.

Wiltschko, W., and R. Wiltschko. 2002. Magnetic compass orientation in birds and its physiological basis. Naturwissenschaften 89(10): 445-452.

Wiltschko, W., R. Wiltschko, and T. Ritz. 2011b. The mechanism of the avian magnetic compass. Procedia Chemistry 3: 276-284.

Wiltschko, W., and R. Wiltschko. 2013. The magnetite-based receptors in the beak of birds and their role in avian navigation. Journal of Comparative Physiology. A, Neuroethology, Sensory, Neural, and Behavioural Physiology 199(2): 89-98.

Verheijen, F. 1960. The mechanisms of the trapping effect of artificial light sources upon animals. Archives Néerlandaises de Zoologie 13(1).

Appendix A: Survey Protocols


Spring Peeper by Mary Gartshore

Marsh Monitoring Program

Participant's Handbook

For Surveying Amphibians

Revised 2008

BIRD STUDIES CANADA
ÉTUDES D'OISEAUX CANADA
understand appreciate conserve
comprendre apprécier conserver

MARSH MONITORING PROGRAM

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Environment Canada Environnement Canada

About This Participants Handbook

We want to clearly instruct participants in all aspects of the Marsh Monitoring Program (MMP). Please read this booklet thoroughly and adhere to the protocol carefully. If you have any questions, comments or recommendations, please give us a call at 1-888-448-2473 ext. 212.

Participant information is divided into three booklets: **Getting Started**, **Surveying Amphibians** and **Surveying Birds. Getting Started** provides background about the MMP, describes how routes are assigned/selected, what an MMP station is and how to place them on a route. **Getting Started** also covers the marsh habitat description protocol. The **Amphibian** and **Marsh Bird** survey booklets each contain detailed survey instructions, important tips to conduct a successful survey, and example forms to help you become familiar with each of the MMP survey types.

During your first survey year, you will receive the **Getting Started** booklet and one or both of the **Amphibian** and **Marsh Bird survey** booklets depending on the survey type(s) you have chosen. **It is a good idea to review these booklets prior to each survey season to refresh your memory and build confidence**.

CONTENTS

AMPHIBIAN SURVEYS 1

Amphibians in the Great Lakes Basin **1**

When Should I Do My Amphibian Surveys? 3
- Amphibian Survey Guidelines 4
- Other Considerations 5

Doing the Survey 5
- Getting Started 5

Counting Amphibian Calls 6
- Call Level Code and Abundance Count 6
- Mapping and Recording Amphibians 7

Summarizing Amphibian Data 7
- Sample Amphibian Data Form 8
- Sample Amphibian Route Sumamry Form 14

APPENDIX 1: Safety First! 11

APPENDIX 2: Tips for Fillin in Scannable Forms 11

APPENDIX 3: Background Noise Codes 12

APPENDIX 4: Beaufort Wind Scale 12

SPRING REFRESHER 13

Suggested Citation: Marsh Monitoring Program Participant's Handbook Surveying Amphibians. 2008 Edition. 20 pages. Published by Bird Studies Canada in cooperation with Environment Canada and the U.S. Environmental Protection Agency. February 2008.

AMPHIBIAN SURVEYS

Amphibians require shallow aquatic habitats for mating, egg incubation and larval development with the adults of many species continuing to live in or near water, traveling only small distances during their lifespan. This dependence on water is in part due to their porous skin, making them particularly susceptible to changes in local environmental conditions. These combined characteristics and the familiar mating calls of the males, make amphibians ideal indicators of local ecosystem health and an easy and fun group to monitor for both the experienced and novice naturalist.

MMP amphibian surveys are limited to easily detected species (i.e. frogs and toads). The protocol for monitoring these amphibian species is largely based upon earlier work conducted in Wisconsin and Ontario and is now being used throughout North America. Be sure to read the instructions in this booklet carefully and listen to the amphibian Training CD prior to doing your first survey. In addition, we recommend that you visit the USGS Frog Quiz at http://www.pwrc.usgs.gov/frogquiz/ and conduct the "Ontario" self quiz available by clicking the Public tab.

Amphibians In The Great Lakes Basin

Each frog and toad species has a distinctive call that can be used in species identification. In the Great Lakes basin, there are 13 species of frogs and toads, several of which are widely distributed. Depending on your location, you will encounter some of the following species:

Common Name	Species Code	Latin Name
American Toad	AMTO	*Bufo amricanus*
Fowler's Toad	FOTO	*Bufo woodhousei fowleri*
Gray (Tetraploid) Treefrog	GRTR	*Hyla versicolor*
Cope's (Diploid) Gray Treefrog	CGTR	*Hyla chrysoscelis*
Spring Peeper	SPPE	*Pseudacris crucifer*
Chorus Frog	CHFR	*P. triseriata & P. maculata*
Blanchard's Cricket Frog	BCFR	*Acris crepitans blanchardi*
Wood Frog	WOFR	*Rana sylvatica*
Northern Leopard Frog	NLFR	*Rana pipiens*
Pickerel Frog	PIFR	*Rana palustris*
Green Frog	GRFR	*Rana clamitan s melanota*
Mink Frog	MIFR	*Rana septentrion alis*
Bullfrog	BULL	*Rana catesbeiana*

American Toad
The American Toad is common throughout the basin in a variety of habitats. **Call Description**: Long, drawn-out, high-pitched, musical trill lasting up to 30 seconds.

Fowler's Toad
While similar to the American Toad in appearance, the Fowler's Toad is restricted to sandy shoreline areas along Lake Erie and Lake Michigan. **Call Description**: High-pitched, nasal, non-musical trill ("wh-a-a-a-ah") lasting two to five seconds.

Gray Treefrog
The Gray Treefrog is most easily distinguished from Cope's Gray Treefrog by its call. The Gray Treefrog occurs throughout the basin and is more common than Cope's Gray Treefrog. **Call Description**: Musical, slow, bird-like trill, lasting up to 30 seconds. The call is slower and more musical than Cope's Gray Treefrog.

Cope's Gray Treefrog
Although identical in appearance to the Gray Treefrog, Cope's Gray Treefrog is found only in the southern and western regions of the basin in the United States. In Ontario, it is found only in the Lake-of-the-Woods area. **Call Description**: Faster, shorter, and higher-pitched trill than the Gray Treefrog's call, lasting up to 30 seconds.

Spring Peeper
The Spring Peeper is common and widespread throughout the basin. **Call Description**: Advertisement call is a short, loud, high-pitched peep, repeated every second. The peeper's aggressive call is a short, trill "purrreeek," usually rising in pitch at the end. This call can be confused with the call of the Chorus Frog, but can be distinguished by its trill-like quality.

Chorus Frog
Due to their similar calls, the Boreal Chorus Frog (*Pseudacris maculata*) and the Western Chorus Frog (*P. triseriata*) will be considered as a single species (Chorus Frog) for the purposes of this study. Chorus frogs are commonly found throughout the basin except for parts of northern Lakes Huron, Michigan and Superior. **Call Description:** Short, ascending trill-like "cr-r-e-e-e," resembling the sound of a thumb drawn along the teeth of a comb, repeated every couple of seconds.

Blanchard's (Northern) Cricket Frog
Blanchard 's Cricket Frog is a highly localized species, found at the southwestern end of Lake Erie and the southern half of Lake Michigan in the United States. In Canada, historically, it has only been found on Pelee Island in Lake Erie. **Call Description:** A fast, repeated clicking, like two pebbles being struck together, increasing in speed then decreasing, over a few seconds.

Wood Frog
The Wood Frog is common throughout the basin but can only be heard for a short time very early in spring calling in wet wooded areas. **Call Description**: Short, subtle chuckle, like ducks quacking in the distance.

Northern Leopard Frog
The Northern Leopard Frog is common and widespread throughout the basin. **Call Description**: Short, rattling "snore" followed by guttural chuckling ("chuck-chuck-chuck"), sounding like wet hands rubbing a balloon. Although shorter in length, its snore can be mistaken for that of a Pickerel Frog.

Pickerel Frog
Similar to Northern Leopard Frogs in appearance, Pickerel Frogs have a smaller range around the Great Lakes. Though widespread throughout most of the basin, they are quite localized, and are often found in association with cold-water streams. **Call Description**: Low-pitched, drawn-out snore, increasing in loudness over a couple of seconds.

Green Frog
The Green Frog is common throughout the Great Lakes. **Call Description**: The advertisement and territorial call is a short, throaty "gunk" or "boink," like the pluck of a loose banjo string, usually given as a single note. It may also give several stuttering, guttural calls of "ru-u-u-ng," followed by a single staccato "gunk!" The stuttering call can be mistaken for that of a Bullfrog, although the Green Frog's call is shorter and not as rhythmic nor as deep.

Mink Frog
The Mink Frog is primarily a northern species found around Lake Superior and the northern parts of Lakes Michigan and Huron, although its range does extend east to the St. Lawrence River. **Call Description**: Rapid, muffled "cut-cut-cut," like a hammer striking wood; the chorus sounds like horses' hooves running over cobblestone.

Bullfrog
The Bullfrog is common and widespread in the basin except for northern Lake Superior. **Call Description**: Deep bass, two syllable "rrr-uum" or "jug-o-rum."

Spring Peeper
- by Christine Friedrichsmeier

Gray Treefrog
- by Christine Friedrichsmeier

Pickerel Frog
- by Christine Friedrichsmeier

When Should I Do My Amphibian Surveys?

In order to be assured that frogs and toads are actually going to be calling, you need to pay close attention to weather conditions and choose an appropriate time to survey. If it is too cold, dry or windy, calling activity will be greatly suppressed. Collection of the data under the proper conditions is quite important to ensure a measure of standardization between surveys.

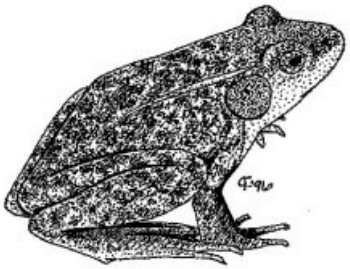
- Each route is to be surveyed for calling amphibians **three times** during the spring and early summer. Surveys should be conducted **at least 15 days apart**. By conducting three surveys, you should be able to detect all species present. The first survey is timed to monitor species that breed very early (e.g. Chorus Frog, Wood Frog and Spring Peeper). The second survey should coincide with "optimum" breeding for Spring Peeper, American Toad, Northern Leopard Frog, Pickerel Frog and, where they occur, Fowler's Toad and Blanchard's Cricket Frog. The third survey will monitor late-season breeders, Gray Treefrog, Cope's Gray Treefrog, Mink Frog, Green Frog and Bullfrog (see the chart on page 4).

- An amphibian's body temperature changes as its environment's (e.g. air and water) temperature changes. Frogs and toads always require an air temperature **greater than 5°C (41°F**) to elicit calling activity. "Late-season" frogs (e.g. Bullfrogs and Green Frogs) don't begin their calling activity until temperatures are even higher. Therefore **night-time air temperature should be greater than 5°C (41°F) for the first survey, 10°C (50°F) for the second survey and 17°C (63°F) for the third survey.**

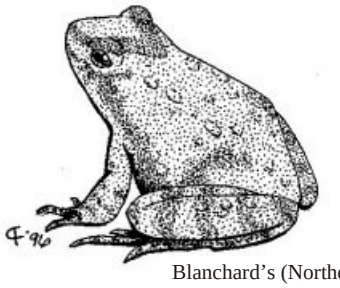
- **Each station is surveyed for 3 minutes**. Routes are to be surveyed in their entirety, in the same station sequence, starting at about the same time, on all visits.

- In **southern and central regions** of the Great Lakes basin, surveys can begin **one half hour after sunset and end before midnight**. Because of "longer days" during the summer months in the northern regions of the basin, surveys that begin one half hour after sunset could continue beyond midnight! Therefore, in **northern regions**, surveys can start at **2200 h** in the summer even if it isn't dark then.

- Because dry air or strong wind dries out an amphibian's skin, calling activity is reduced. Strong winds also interfere with your ability to hear. Do your survey only when the wind strength is Code 0, 1, 2, or 3 on the Beaufort Scale (see Appendix 2). If the wind is strong enough to raise dust or loose paper and move small tree branches, then you should wait for a calmer evening. Ideally, there should be no wind.



Mink Frog
- by Christine Friedrichsmeier

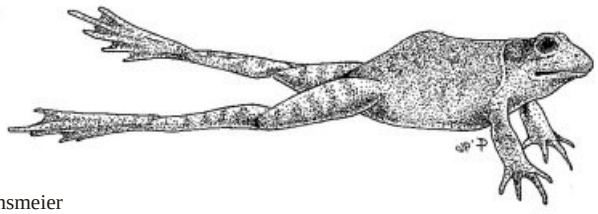


Blanchard's (Northern) Cricket Frog
- by Christine Friedrichsmeier

Amphibian Survey Guidelines

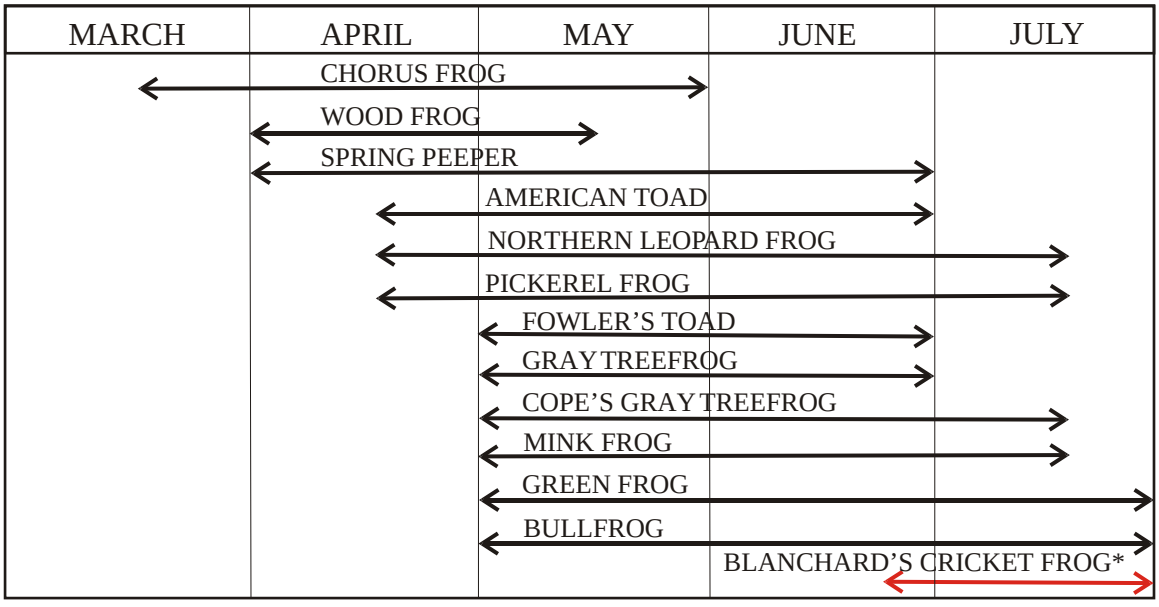
You may conduct your survey before the dates given below if weather conditions are right. These dates are provided **only** as a **guideline**. Remember, **air temperature and lack of wind are the most important factors** to pay attention to when deciding when to conduct your surveys.

	Survey #1	Survey #2	Survey #3
South (south of the 43rd parallel)	1 - 15 April	1 - 15 May	1 - 15 June
Central (between the 43rd and 47th parallels)	15 - 30 April	15 - 30 May	15 - 30 June
North (north of the 47th parallel)	1 - 15 May	1 - 15 June	1 - 15 July



Bullfrog
- by Christine Friedrichsmeier

General Breeding Period for Frogs and Toads in the Great Lakes Basin

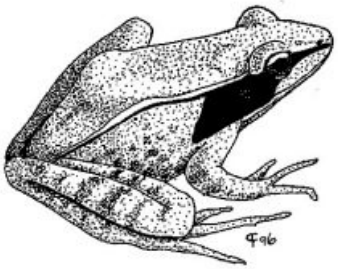


* Historic calling dates for Pelee Island, Ontario

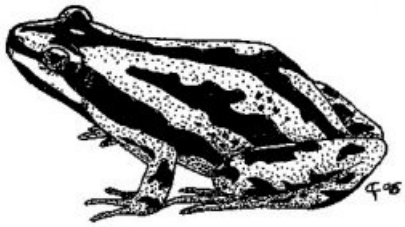
Other Considerations

Nights that are damp, foggy or have light rain falling are ideal, especially for your first survey. Avoid persistent or heavy rainfall. Early in the season, it is best to survey shortly after the first or second **warm** spring shower. Later, choose a night with a warm temperature. Watch the local news or weather channel, or phone your local airport weather office to get weather forecasts. Ideally, you should be prepared to go out on any evening that is suitable. Plan ahead!

Early in the season, weather conditions are unpredictable. Nights can cool off quickly to temperatures that are below optimal for calling frogs. If conditions deteriorate during your survey, cancel the survey and repeat it on the next suitable night.



Wood Frog
- by Christine Friedrichsmeier



Chorus Frog
- by Christine Friedrichsmeier

"Explosive Breeders"

Amphibians take their cues from the environment as to when to start migrating to breeding sites and when to initiate breeding. Some species (e.g., Wood Frogs) are known as "explosive" breeders. Among these species, most males are apt to migrate all on one night to breeding ponds as soon as conditions are right. Males may call for only a few nights and most breeding is done in one evening. It is best to survey on one of the first few suitable evenings during the allotted time, since frog and toad activity begins as soon as the weather permits. If you delay too long, you could miss some species.

Doing the Survey

Getting Started

Check to make sure that you have your **Amphibian Data Forms,** a small **flashlight or headlamp** that allows you to keep your hands free, a **pen or pencil, watch or timer** (preferably one with an alarm), and a **clipboard** (if desired). If you have previous years Habitat Description Forms, bring along a **copy** to help you relocate your stations. A thermometer, compass, spare pens, mosquito repellent and this instruction booklet are other useful items. It's best to be prepared!

See the Spring Refresher on the inside back cover for a checklist. Since you will be conducting these surveys in the dark, you should bring an assistant along for safety, company and to share in the experience! This person can help you find the stations, document some kinds of information (such as weather conditions) and hold your flashlight. **However, your assistant is not to help you identify or tally amphibians!** More than one observer will bias the results.

Before you start the survey, fill in the information required in the top section of the Amphibian Data Form Set (see example on page 8). Please use the format specified in the sample form to minimize data entry errors. Record the route number and observer number (may not be available during your first survey season), route name, observer name, the date, the visit number (#1, 2 or 3).

All weather information can be easily estimated. Determine the wind speed according to the Beaufort Scale (Appendix 4). Cloud cover is estimated as covering so many 10ths of the sky (e.g. if it's completely starry with no cloud cover, 0/10 of the sky will be covered). If possible, carry a thermometer and record the air temperature at the start of your survey. Because this program spans two different countries with two different scales of measure, be sure to **specify** whether you are recording the temperature in degrees Fahrenheit or degrees Celsius. If you don't have a thermometer, record the air temperature from a reliable source (e.g. the local weather station or an outdoor thermometer at your home).

Use the Remarks section to record any assistants' names, problems encountered (e.g. "I heard a call I couldn't identify"), and other comments you might think useful (e.g. "Lots of activity tonight!").

Please fill in all of the blanks at the top of the form without this information we may not be able to use your data!

Counting Amphibian Calls

Before going into the field, it is important that you are familiar with the calls of all amphbian species found in the Great Lakes basin, not just the ones normally found in your region. The distribution of some amphibian species is still not very well known. The amphibian track of the Training CD describes how to identify each species' call and instructs you on how to measure the intensity and number of individuals calling using the **Call Level Code** and **Abundance Count**.

Call Level Code and Abundance Count

The amphibian survey uses three **Call Level Codes** to categorize the intensity of calling activity. For two of these categories, we also ask that you count or estimate the number of calling amphibians; this is an **Abundance Count**. Use the following Call Level Codes for **each species** detected during your surveys (see sample Amphibian Data Form on page 27):

Code 1 - Individuals can be counted; calls not simultaneous. Assign this number when individual males can be counted, and when the calls of individuals of the same species do not **start at the same time**. For the Abundance Count, record the number of **individual frogs** of each species calling beside the Code.

Code 2 - Calls distinguishable; some simultaneous calling. This code is assigned when there are a few males of the same species calling **simultaneously**. However, with a little work, individual males can still be distinguished. In this case, an exact Abundance Count can't be tallied, but you are able to **reliably estimate** the number of individuals present, based on their locations and/or by the differences in their voices.

Code 3 - Full chorus; calls continuous and overlapping. This value is assigned when you encounter a full chorus. When there are so many males of one species calling that all the calls sound like they are overlapping and continuous (like a blur of sound), then you are hearing a full chorus! There are too many overlapping calls to allow for any reasonable count or estimate. Hence, there is no need to record an Abundance Count.

Mapping and Recording Amphibians

Amphibian surveyors use their best judgment to distinguish whether each species detected is calling from inside the 100-metre (110 yard) sample area, from outside the sample area, or from both inside and outside. We recognize that the 100-metre (110 yard) radius sample area cannot be accurately determined at night. Don't worry about not knowing exactly where the station boundary is; make the best estimate you can.

A separate Data Form set is used for each visit to your route. Each data form set includes visit information, a handy look-up section on the last page and 8 station maps. Each station map represents the semi-circular sample area of a station with a mid-point and arc drawn inside for reference. At each station, record what direction you are facing in the small box on the map of the sample area (e.g. "23 NNE," or just "NNE" if you can't take a compass bearing), and record the time you start your station's survey (24 hour time) in the top right-hand box.

At each station, once you have everything ready, wait quietly for at least 1 minute to allow the frogs and toads to start calling again after being disturbed by your presence. While waiting, listen to your surroundings and assess the level of background noise. Assign a **Background Noise Code** to that station and record it in the box beside the station map (see **Appendix 3** for background noise codes). Background noise can affect your ability to detect and identify species, so it is important this is recorded for each station on your route.

After this initial settle-down period, set your timer, and **survey for 3 minutes**. Record on the map all species heard calling within a semicircle in front of you. Using the appropriate four-letter species code (see page 1), map the relative position of **each** individual or chorus on the Amphibian Data Form (see the sample Data Form). Under each species code, record the Call Level Code. For Codes 1 and 2, also record the number of individuals that you count or estimate are calling, using a dash to separate the two measures of abundance (e.g. "AMTO/1-3" indicates a Call Level Code of 1 and that you heard 3 different American Toads calling). Recall that you do not need to record an Abundance Count beside Code 3 since this code means that there are too many individuals calling to accurately estimate numbers.

Using the table to the left of the station diagram on the data form, enter a checkmark in the “In” column if any individuals of a species is calling from *inside* the station boundary. If any individuals of a species is calling from *outside* the station boundary, check the “Out” column. If a species is calling from *inside and outside* the station boundary, check both “In” and “Out” columns for that species

Summarizing Amphibian Data

Transcribe your data from the **Amphibian Data Forms** to the **Amphibian Route Summary Form** as soon as possible after completing your survey. Don't let this additional paperwork wait too long; it is best done while everything is fresh in your mind. The sample Route Summary Sheet (see page 10) shows how the data from the sample Data Form (on page 8) would be recorded. Please study both of these sample sheets. Call us if you have any questions!

One Route Summary Form is used to summarize the information from all three visits to your route. First, fill in the top part of the sheet with your name, observer number, and route number. Your observer number and route number are printed on the address label on the MMP Contact Sheet. If your route number or observer number are not printed on the Contact Sheet, or if you are surveying a different route than indicated, please contact the MMP office. If it is your first year surveying, or you are surveying a new route, these numbers will be assigned during data processing at the end of the first season. Fill in the appropriate circle next to the “Has the habitat on your route changed from previous years?” question . Choose “N/A” if this is the first year you have surveyed this route.

Marsh Monitoring Program - Amphibian Data Form

Return by 31 July

Please write legibly (in pen).

MARSH MONITORING PROGRAM

VISIT INFORMATION

Route #: ON499 Route Name: Mud Lake Marsh

Observer #: 18649 Observer Name: Kathy Jones

Visit #: 1 Day: 15 Month: 04 Year: 2008

Cloud Cover (10th): 7 Temperature (°C or °F): 15C Beaufort Wind Scale (0-6): 1

Precipitation (check one): ◯ None/Dry ✓ Damp/Haze/Fog ◯ Drizzle ◯ Rain

CALL LEVEL CODES

Code 1: Calls not simultaneous, number of individuals can be accurately counted

Code 2: Some calls simultaneous, number of individuals can be reliably estimated

Code 3: Full chorus, calls continuous and overlapping, number of individuals cannot be reliably estimated

Amphdfrm2008.cdr, rev 02/2008

Species	In*	Out**
AMTO		
BCFR		
BULL		
CHFR	✓	
CGTR		
FOTO		
GRTR		
GRFR		
MIFR		
NLFR		✓
PIFR		
SPPE	✓	✓
WOFR	✓	

* Check if species is calling from inside 100-metre station area.
** Check if species is calling from outside 100-metre station area.

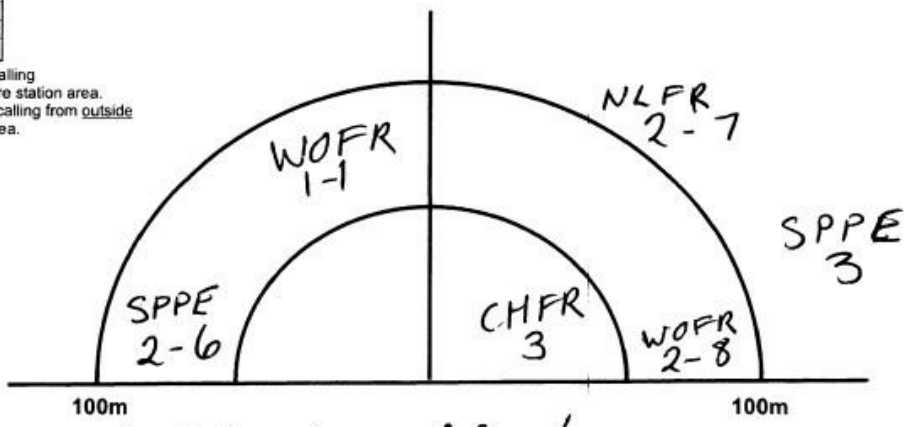
Station A

NNE

23°

Station Start Time (24 hr): 2245

Background Noise Code (1-4): 3



Near Road - lots of traffic!

Below the route information there are boxes for visit inforamtion, background noise codes and visit data. In the summary box for noise codes enter the background noise codes you recorded during your survey visits in the appropriate station and visit number. Please only fill in boxes for stations that you surveyed, and leave all others blank.

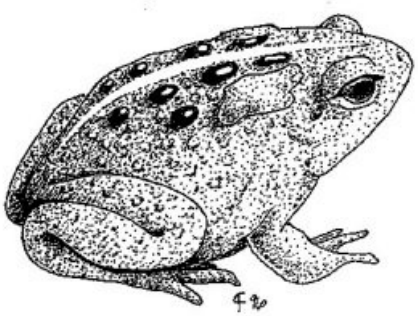
In the visit information table, for each visit, please record the date it was conducted, wind scale number, your estimate of cloud cover and air temperature. In the main visit table there is a column for each potential station on your route. Fill in the circle below the station letter of each station you surveyed during that visit and record the station start time even if you did not observed any frogs or toads. If this circle is not filled in, the scanner will not read the data associated with that station.

The remainder of the Route Summary Form is devoted to yoursurvey data from each of the three visits. For each station and visit, study your mapped observations and determine the **highest** Call Level Code for each species. Enter this code beside the species name in the column labelled **CC** (for "Calling Code"). Next, add up **all** the individuals counted (inside + outside) for each species and enter this number in the adjacent column labelled **Count**. For example, if you heard two groups of American Toads (1-3 and 2-6), you would enter a Code of 2 and a Count of 9. Remember, if you enter a Code 3 then there is no count to record since there are too many to count. If a species was calling only from inside the station boundary, **or** if a species was calling from both inside *and* outside the station boundary, completely fill in the circle in the "In" column. If a species was calling only from outside the boundary, leave the "In" column empty.

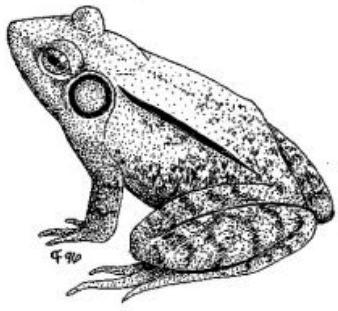
You'll find it very useful to tick off the Mapped Observations on your Amphibian Data Forms as you transfer them to your Route Summary Form. This helps ensure that you haven't counted the same observation twice or forgotten to transcribe a record. Since we will be scanning in your data directly from your Route Summary Form, it is important that you **double-check** to be sure that your form is complete and correct!

Returning your data to Bird Studies Canada

You should return all original copies of your MMP data forms (contact/route, bird, amphibian and habitat) in a single package by July 31st of the survey year to the address listed at the back of this booklet. It is very important that you keep a photocopy **all** of your forms for your future reference and to guard against them getting lost in the mail.



Fowler's Toad
- by Christine Friedrichsmeier



Green Frog
- by Christine Friedrichsmeier

Marsh Monitoring Program - Amphibian Route Summary Form

Route # 0,N,4,9,9 | Observer # 1,8,6,4,9 | Observer Name Kathy Jones | Year 2,0,0,8

*Please print with BLOCK CAPITALS, and mark each individual choice by filling in the corresponding circle. Please use pen (not felt tip).

**Has the habitat on your route changed from previous years? ○ Yes ● No ○ N/A

Visit Information:

	Day	Month	Wind Scale	Cloud Cover (10ths)	Temp	
Visit 1	1,5	0,4	1	,7	1,5	● °C ○ °F
Visit 2	0,7	0,5	2	1,0	1,6	● °C ○ °F
Visit 3	1,0	0,6	2	,0	2,0	● °C ○ °F

Precipitation (fill in one per visit)

	None/Dry	Damp/Haze/Fog	Drizzle	Rain
Visit 1	○	●	○	○
Visit 2	○	○	●	○
Visit 3	●	○	○	○

Background Noise Code (0-4)

Station Letter	A	B	C	D	E	F	G	H
Visit 1	3	1	0					
Visit 2	2	1	1					
Visit 3	2	0	0					

Notes: Please fill the "**Yes**" circle for each station surveyed during the visit, please leave blank for any station not surveyed.
If no species were heard place a "0" in the count field for "No Calls Heard".
In column "**CC**" please print the maximum **Calling Code** (1-3) for the species.
For **CC** 1 and 2, please print the total combined number of individuals heard under **Count**.
Fill in the "**In**" circle if an individual of the species was calling within 100m.

Visit 1

Station Letter	A			B			C			D			E			F			G			H		
Station Surveyed	● Yes			● Yes			● Yes			○ Yes			○ Yes			○ Yes			○ Yes			○ Yes		
Station Start Time (24 hr)	2,2,4,5			2,2,5,5			2,3,0,5																	
Species Name	CC	Count	In	CC	Count	In	CC	Count	In	CC	Count	In	CC	Count	In	CC	Count	In	CC	Count	In	CC	Count	In
No Calls Heard (Code 0)			○			○			○			○			○			○			○			○
American Toad			○			○			○			○			○			○			○			○
Blanchard's Cricket Frog			○			○			○			○			○			○			○			○
Bullfrog			○			○			○			○			○			○			○			○
Chorus Frog	3		●	2	,6	●	3		○			○			○			○			○			○
Cope's Gray Treefrog			○			○			○			○			○			○			○			○
Fowler's Toad			○			○			○			○			○			○			○			○
Gray Treefrog			○			○			○			○			○			○			○			○
Green Frog			○			○			○			○			○			○			○			○
Mink Frog			○			○			○			○			○			○			○			○
Northern Leopard Frog	2	,7	○			○			○			○			○			○			○			○
Pickerel Frog	3		●			○			○			○			○			○			○			○
Spring Peeper			○	2	1,0	○	3		●			○			○			○			○			○
Wood Frog	2	,9	●	2	,7	●	1	,3	○			○			○			○			○			○

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APPENDIX 1: Safety First!

Your surveys should be an enjoyable experience, which also means a safe experience. Ultimately, safety is your responsibility, and if you are ever concerned about your safety, **don't survey**. But, to assist you, keep the following guidelines in mind.

General Survey Safety:

Carry a flashlight, whistle, cell phone, bug repellent, and spare batteries
Bring a Partner!

Site Safety:

Make sure your site is accessible in low light conditions.
Avoid local 'hang-out' spots or unsafe neighbourhoods

Road Routes:

Wear bright or reflective clothing
Be aware of traffic
Park safely off-road or use reflective cones
Follow all traffic laws

Boat Routes:

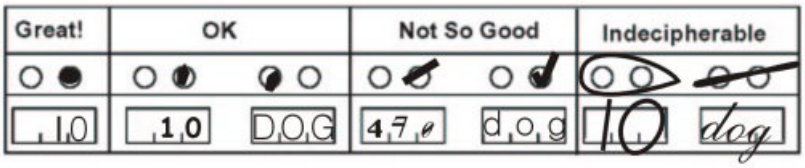
Wear a lifejacket!
Bring bailer(s)
Have lights for the bow and stern of your boat
Follow all marine regulations
Be aware of boat traffic

BRING A PARTNER & IF IN DOUBT, DON'T SURVEY

APPENDIX 2: Tips For Filling In Scannable Form

Using scannable forms decreases data entry time,; thereby decreasing program cost and allowing more time for other important aspects. Although the computer scanning program used can decipher most writing, following the simple guidelines provided below will ensure accurate and efficient data processing.

- **PLEASE USE PEN;** please don't use pencil or felt tip pen, these are poorly read by the scanner
- **PLEASE PRINT;** preferably using block letters. The scanner does not easily decipher stylised writing
- **NUMBERS AND TEXT;** place one character in each box and keep within the box lines/ticks. Close 0's and O's
- **PLEASE FILL IN CHOICE CIRCLES;** avoid using checkmarks and fill in all applicable choices individually
- **MISTAKES HAPPEN;** you can mark an error with an "X" and fill in the correct value or use correction fluid. If your mistake is large and you run out of space, place your correction in the nearest comment box, BUT include the section number to which the correction relates (e.g., "I messed up on Visit 1, Station A: there were 10 Barn Swallows not 100").
- **LEGIBILITY;** if you think your form is no longer legible, contact us and we will mail you a second copy or email you an Adobe Acrobat version.



Some Frequently Asked Questions:

Can the forms be stapled? YES. The four reference marks (four corners of this page) and bar code or a scanning form identification number (lower right corner) must remain undamaged (don't staple through them).

Can I photocopy the forms? YES. Teleform works best with the original document. Please send original forms to BSC and keep copies for yourself. **Do not** increase or decrease the size of the document when you photocopy them, this may prevent them from being scannable.

Can I use an Adobe Acrobat version of the form? YES. Before printing, ensure that the "fit to page" printer option is **not** checked. The "fit to page" option may shrink the form enough that it cannot be scanned.

APPENDIX 3: Background Noise Codes*

Index	Description
0	No appreciable effect (e.g., owl calling)
1	Slightly affecting sampling (e.g., distant traffic, dog barking, car passing)
2	Moderately affecting sampling (e.g., distant traffic, 2-5 cars passing)
3	Seriously affecting sampling (e.g., continuous traffic nearby, 6-10 cars passing)
4	Profoundly affecting sampling (e.g., continuous traffic passing, construction noise)

* Based on the Massachusetts Noise Disturbance Index

APPENDIX 4: Beaufort Wind Scale

Number	Wind Speed		Indicators
	Kilometers per hour	Miles per hour	
0	0-2	0-1	**Calm**, smoke rises vertically
1	3-5	2-3	**Light air movement**, smoke drifts
2	6-11	4-7	**Slight breeze**, wind felt on face
3	12-19	8-12	**Gentle breeze**, leaves and small twigs in constant motion
4*	20-30	13-18	**Moderate breeze**, small branches are moving, raising dust and loose paper
5*	31-39	19-24	**Fresh breeze**, small trees in leaf beginning to sway, crested wavelets form
6*	40-50	25-31	**Strong breeze**, large branches in motion

* Unacceptable wind strengths for birds and amphibians.

When to do Your Surveys

Birds

- Two visits between May 20 and July 5 at least 10 days apart
- Survey time (morning or evening) is determined at the time of route creation and cannot be changed
- Morning surveys begin as early as 30 minutes before sunrise and end no later than 10:00 h
- Evening surveys begin no earlier than 4 hours before sunset and must be completed by dark
- Weather guidelines: good visibility, warm temperatures (at least 16 °C or 60 °F), no precipitation and little wind.

Amphibians

- Three visits between April and June at least 15 days apart
- In most of the Great Lakes basin, surveys begin no earlier than one half hour after sunset and end before midnight. In northern regions, surveys can start at 22:00 h (10:00 p.m.)
- Temperature guidelines: greater than 5 °C (41 °F), 10 °C (50 °F) and 17 °C (63 °F) for surveys 1, 2 and 3 respectively.
- Weather guidelines: little wind, damp nights with no or little rain (avoid persistent or heavy rainfall)

Field Checklist

Both Survey Types

- Data forms
- Pen
- Watch or timer (preferably one with an alarm)
- Habitat Description Forms (to fill in or to help relocate your sites)

Bird Surveys Only

- Marsh bird broadcast CD (2008 version or newer)
- Binoculars
- Portable call broadcast unit (e.g., portable CD player with amplified speakers)

Amphibians Only

- Small flashlight or headlamp

Optional

- Compass or G.P.S. unit
- Clip board (if desired)
- Thermometer
- Spare batteries
- Spare pen
- Instruction booklet or Bird Handy Card
- Insect repellant
- Cell phone

Return to Bird Studies Canada:

Marsh Bird Surveys

Originals of …

- MMP Contact and Route Information form - 1 per route
- MMP Bird Survey Form - 2 per station (1 for each survey visit)
- MMP Habitat Description Form - 1 per station

Amphibian Surveys

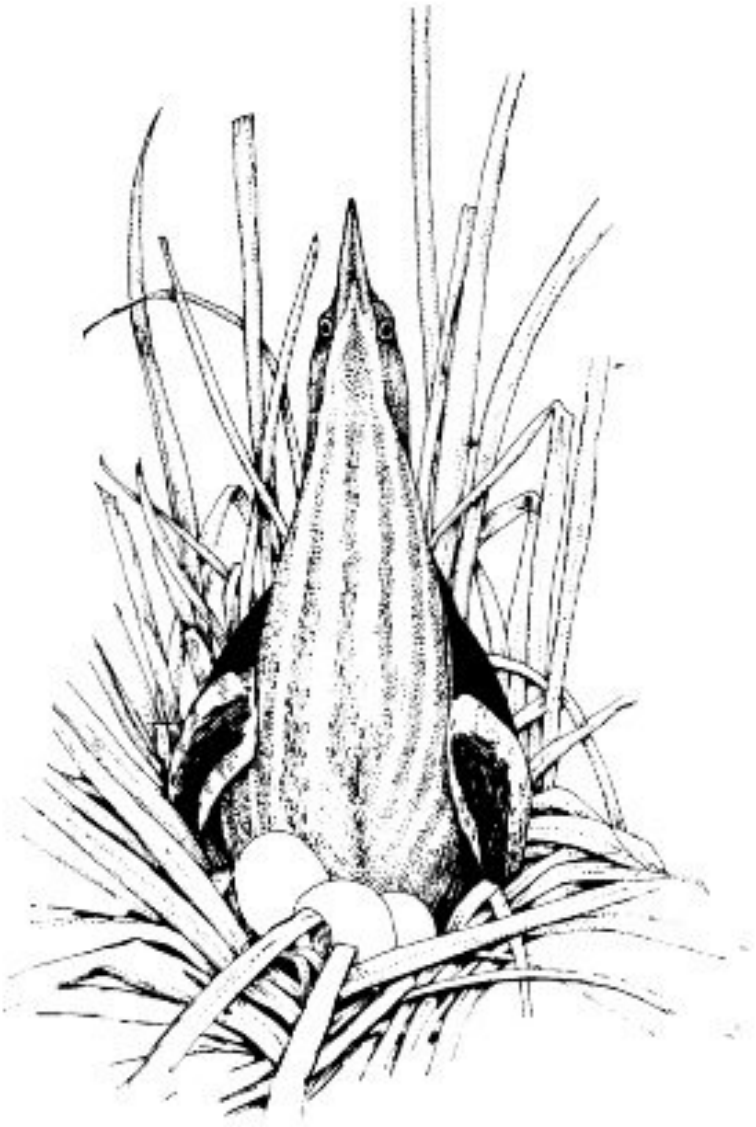
Originals of …

- MMP Contact and Route Information form - 1 per route
- MMP Amphibian Route Summary form 1 per route
- MMP Amphibian Data Form Set - 3 per route (1 for each survey visit)
- MMP Habitat Description Form - 1 per station

By July 31. Contact us if you have any questions of comments.

MAJOR SUPPORTERS AND PARTNERS OF THE MARSH MONITORING PROGRAM:

Bird Studies Canada
Environment Canada – Canadian Wildlife Service
U.S. Environmental Protection Agency



For more information about the Marsh Monitoring Program contact:

Aquatic Surveys Volunteer and Data Coordinator
Bird Studies Canada, P.O Box 160, Port Rowan, Ontario, Canada, N0E 1M0
Phone: (519) 586-3531 Toll Free: 1-888-448-BIRD (2473)
Fax: (519) 586-3532 Email: aqsurvey@birdscanada.org

Draft Western Chorus Frog Detection Survey Protocol for Ontario

Note: This protocol is a modified version of the draft protocol created by David Seburn; Auditory Detection and Habitat Survey Methodology for the western chorus frog (Pseudacris triseriata) in Ontario (Seburn 2017). This survey protocol was modified to achieve the specific objectives outlined in the newly developed draft survey framework to detect western chorus frogs.

Purpose

This draft detection protocol was developed for use in range-wide long-term monitoring for western chorus frog in Ontario. It can be used in other applications and may need to be adapted to suit specific project objectives (including the number of surveys, specific data to be collected, etc.). The methods outlined should be considered minimum recommendations to detect chorus frogs.

The western chorus frog (*Pseudacris triseriata*) is a small frog, approximately 2.5 cm in length, with three dark stripes that run down its back. The Great Lakes / St. Lawrence - Canadian Shield (GLSLCS) population of western chorus frog was designated threatened by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) in 2008 and is listed as threatened on Schedule 1 of the Species at Risk Act (SARA). This detection protocol will enable surveyors to identify potential breeding sites, collect basic habitat information around breeding sites, and conduct the number of auditory surveys to have some confidence that the species is or isn't present.

Surveyor requirements

Before conducting frog call surveys, surveyors should learn the breeding calls of the western chorus frog and other spring breeding frogs. The call of the western chorus frog is a trill, like the sound produced by a thumb nail running over the teeth of a comb. This is distinct from the other usual calls of the spring breeding frogs. However, spring peepers can also sometimes produce a trill-like call. The western chorus frog trill is more mechanical-sounding while the spring peeper trill is more musical-sounding, but it can take practice to distinguish the two calls. In addition, spring peeper trills are usually heard with typical spring peeper calls. Great care must be taken with

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species identification at any site where both western chorus frogs and spring peepers appear to be calling. Both species may be present, but it may also only be the spring peeper. If there is any doubt about which species is calling, a recording of the call should be made. When recording potential western chorus frog calls, aim to record as much call variation as possible (e.g. single calling frogs, multiple calling frogs, more than one species) to aid species identification.

Familiarize yourself with the calls of all the early spring breeding frogs before conducting surveys by visiting the FrogWatch and SoundCloud websites (note that the SoundCloud website is used for the spring peeper as the usual "peep" call and the "trill" can be heard).

Western chorus frog (*Pseudacris triseriata*):
https://www.naturewatch.ca/frogwatch/westernstriped-chorus-frog/

Wood frog (*Lithobates sylvaticus*):
https://www.naturewatch.ca/frogwatch/wood-frog/

Spring peeper (*Pseudacris crucifer*):
https://soundcloud.com/user-134530242/pseudacris-crucifer-spring-peeper

Northern leopard frog (*Lithobates pipiens*):
https://www.naturewatch.ca/frogwatch/leopard-frog-3/

Western Chorus Frog Range and Habitat

There are 2 western chorus frog populations in Ontario (Figure 1). The GLSLCS population of western chorus frog was designated threatened by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) in 2008 and is listed as threatened on Schedule 1 of the Species at Risk Act (SARA). The Carolinian Population in southwestern Ontario is not designated as at risk.

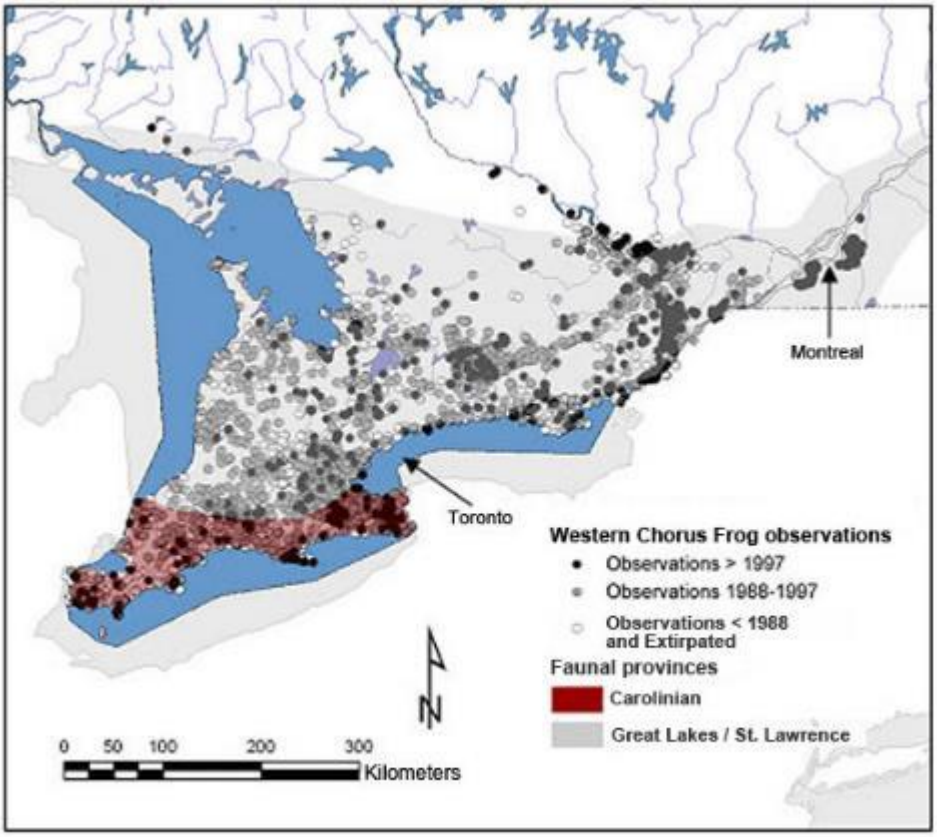

Figure 1. Range of western chorus frog populations including the Great Lakes St. Lawrence Canadian Shield population (grey) and the not at-risk Carolinian population (red) (COSEWIC 2008).

Western chorus frog breeding habitat is variable and ranges in size from <100 m^2 to 5-6 ha and the water level is often <15 cm deep. Deep water bodies containing fish are NOT suitable western chorus frog breeding habitat. Survey sites can be in suitable habitat next to a road (roadside) or within suitable habitat (interior) away from a road.

Examples of western chorus frog breeding habitat:

- **A** Drainage ditches
- **B** Flooded fields, pastures, temporary ponds
- **C** Marshes
- **D** Swamps
- **E** Woodland ponds (typically open-canopied in spring with some open terrestrial habitat adjacent to the ponds).

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A

B

C

D

E

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Survey timing

The western chorus frog is one of the first frogs to begin calling in Ontario, along with the wood frog and spring peeper. Western chorus frog calling can last for 2-3 weeks at a given site. The onset of calling varies widely among seasons and across the range. Observations of these other species calling is a sign that the western chorus frog season has begun or is about to begin. The earliest calling of the western chorus frog in Ontario to date is late-February. Most years, calling begins in mid-March in southern latitudes and early April in more northern latitudes, but can start as late as early May.

It is critical to ensure that western chorus frogs have begun calling in your area before conducting surveys. Regularly check the Ontario Reptile and Amphibian Atlas (ORAA) and Canadian Herpetological Society (CHS) Facebook pages beginning in early March for posts related to early spring frog calls. Consider using a local reference site where a reliable chorus is known to occur, if available, as an indication that calling has started in your area. If western chorus frogs have started calling in your area and weather conditions are suitable, surveys conducted are valid, even if western chorus frogs are not heard at the site.

Ontario Reptile and Amphibian Atlas Facebook Page:
https://www.facebook.com/groups/75392295750/

Canadian Herpetological Society Facebook Page:
https://www.facebook.com/groups/CanadianHerpetologicalSociety/

Surveys should be conducted:

- When western chorus frogs are calling in the area being surveyed
- During the day, between 10 AM and 6 PM

Chorus frogs have been shown to be most detectable during the daytime (Bird Studies Canada, unpublished data). Listening during the day reduces the chance that other frog calls will interfere with hearing western chorus frogs.

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Number of surveys

Over the course of the western chorus frog breeding season, all sites should be surveyed a minimum of 3 times to increase the probability that western chorus frogs are detected if present. The minimum number of survey visits will be project-specific, so consult experts and permitting authorities for specific requirements. Western chorus frogs call for approximately 2-3 weeks in the spring at a given site. Surveys should only be conducted in suitable weather conditions while frogs are calling in your area.

Suitable weather conditions

Surveys should be conducted during the following conditions when frog calls are most likely to be detected:

- Air temperature at least 10°C. Calling is more consistent above air temperatures of 10°C. A period of cold weather can halt calling for a few days. Once warmer temperatures return, males will resume calling.
- Light or no wind (Beaufort scale 3 or lower, Appendix 2). Western chorus frogs may not call or be heard during moderate to heavy winds.
- No rain or light rain. Avoid moderate or heavy rain as western chorus frogs may not call, or the calls may not be heard over the sound of the rain.

Auditory survey instructions

Note that if multiple observers are present, a single most experienced observer should be designated as the primary observer. This person should make all decisions on the data sheets including species identification, call code, wind speed, etc. (Appendix 1).

1. Before travelling to your first site, ensure you have all required equipment and that everything works (Appendix 3).
2. Record the date of survey.
3. Record name and experience level of the primary surveyor. Use the pre-defined experience level scale (Appendix 4).

4. Record name(s) of anyone else present for the survey.
5. If surveying from a road, ensure you are at the closest point to the wetland, but not closer than 10 m. Standing too close to the pond can disturb frogs and inhibit calling. Estimate the distance between the road and the wetland. If you are more than 75 m from the site, do not conduct the survey and choose a site where you can get closer to suitable breeding habitat.
6. If surveying at a potential breeding pond away from a road, approach the site quietly. Stand approximately 10-20 m away from the edge of the water feature (pond, wetland etc.).
7. Listen until western chorus frogs are detected or until 5 minutes has elapsed. If western chorus frogs are detected, listen for at least 3 additional minutes from the time of initial detection, to assign an appropriate calling code, as calling may increase after the first minute or so. Record the highest calling code detected. Also, record the calling code of other frog species heard while listening for the western chorus frog but do not extend the survey as a result of hearing these species.
8. At the site, record the following:
    a. Site ID you have assigned.
    b. Enter the survey number for each site in the survey number column (ex: circle 1 for the first survey of the year, 2 for the second and 3 for the third).
    c. Location of the observer listening station (O) and breeding pond location (B). Use a GPS set to the datum NAD83, when possible. If not possible, datum should be recorded. Location should be provided in Latitude and Longitude using decimal degrees, with at least 5 decimals places recorded (e.g. 45.12345° N). If possible, report accuracy in m. Accuracy is found on the satellite status screen of a GPS. If a GPS unit is unavailable, provide a detailed written description of the station location (O) and breeding pond location (B). If there is more than one breeding pond location (B), put each location in a new row on the Acoustic Monitoring Data Sheet.

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d. Distance to breeding pond location (B) from observer listening station location (O; Appendix 5).
e. Cardinal direction of the location of the calling western chorus frogs from observer listening station location– O.
f. Start time using 24-hour time (ex: 2:00 pm = 14:00).
g. Weather conditions including air temperature (°C), wind speed (Beaufort Scale, Appendix 2), wind direction, and precipitation.
h. Background noise (Appendix 6). If continuous loud noise from highway traffic, etc., that severely compromises the ability to hear frogs (Index 5) is likely to subside, survey should be completed when the noise subsides. If it is not likely to subside, survey should be completed to the best of surveyor ability.
i. Record if a data habitat sheet was filled out during site visit. The habitat data sheet should be filled out after the first survey of each site, regardless of whether western chorus frogs are detected at the site.
j. Call code for each species of frog heard (Appendix 7).

Habitat survey instructions

For each observer listening station location (O) where surveys for western chorus frogs were conducted, a habitat data sheet should be filled out (Appendix 1), regardless of whether they were detected. Recording habitat data at all sites will improve our understanding of the habitat types selected by western chorus frogs for breeding.

Please complete all fields on the habitat data sheet, including accurate locations of the observer listening station (O) and breeding pond or ponds (B) determined by a GPS unit if possible. Include a sketch map of the site that includes the approximate size and location of the breeding habitat, as well as the location of all types of surrounding habitat. Place the observer listening station (O) at the centre of the sketch. The habitat details can come from observations in the field, but also assisted by resources such as Google Earth imagery. The types of terrestrial habitat can be described in general terms such as old field, deciduous woods, or shrublands. Habitat data sheets should be filled

out after the call code assessment has been completed at the end of the first survey. If several sites are being sampled by the same observer, the habitat assessments can be divided among first, second and third surveys to allow the same number of surveys to be sampled each survey day.
Identify land ownership when possible, as well as potential threats that could affect the population. Anything that could affect the habitat or individuals (e.g. construction occurring nearby, invasive species, or roads) should be included. In addition, provide any other information that is deemed to be relevant. Examples could include indication of the degree of isolation of the breeding site, recent changes to land use, known future plans for land development, etc.

Literature Cited

Committee on the Status of Endangered Wildlife in Canada (COSEWIC). 2008. COSEWIC assessment and update status report on the Western Chorus Frog *Pseudacris triseriata* Carolinian population and Great Lakes/St. Lawrence – Canadian Shield population in Canada. Ottawa. vii + 47 pp.

Seburn, D. 2017. Auditory Detection and Habitat Survey Methodology for the Western Chorus Frog (*Pseudacris triseriata*) in Ontario. Draft.

United States Environmental Protection Agency. 2002. Methods for Evaluating Wetland Condition: Using Amphibians in Bioassessments of Wetlands. Office of Water, U.S. Environmental Protection Agency, Washington, DC. EPA-822-R-02-02.

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Appendix 1. Survey data sheets

Western Chorus Frog Acoustic Monitoring Data Sheet

Date:	
Primary Surveyor	**Experience**
Other Surveyors	

Primary Surveyor Experience: Novice (**N**) - No frog call survey experience, Beginner (**B**) - 1 season of surveys, Intermediate (**I**) - 1-5 seasons of surveys, Expert (**E**) - More than 5 seasons of surveys

Latitude/Longitude: O: observer listening station location, B: breeding pond location. Record location and accuracy for both for each site.

Distance: To B from O **0-20** m, **20-75** m, **75-125** m, **125-175** m, or **>175** m from O

Direction: Cardinal direction of the sound of frogs calling (B) from O (**N, E, S, W**)

Wind Speed: **0** - smoke rises vertically, **1** - smoke drifts, **2** - leaves rustle, **3** - light branches sway, **4** - branches move *Do not survey in >3

Wind Direction: Towards listening station **(T)**, away from listening station **(A)**, across (perpendicular) from the listening station **(X)**

Precipitation: none (**N**), light rain (**LR**), moderate rain (**MR**), heavy rain (**HR**) *Do not survey in MR or HR

Background Noise: 0 - No noise, **1** - Distant (traffic or animal calls including other frogs in distance), **2** - Faint (few cars pass nearby, periodic animal calls, wind rustling grass or cattails), **3** - Moderate (fairly consistent noise from cars passing, birds calling, wind rustling vegetation - frogs still heard well), **4** - Consistent (continuous noise from animals, traffic or wind - frogs can be heard but not easily), **5** - Loud (Continuous loud noise from highway traffic etc. - ability to hear frogs is severely compromised)

Call Codes: **1** - Calls not overlapping and number of calling males can be accurately counted, **2** - Some calls overlapping but number of calling males can be reliably counted, **3** - Full chorus with continuous overlapping calls indistinguishable from one another

Site ID	Survey #	Latitude (5 decimal places)	Longitude (5 decimal places)	Accuracy (m)	Western Chorus Frog		Start Time	Air Temp ©	Wind Speed	Wind Direction	Precipitation	Background Noise:	Habitat form (Y/N)	Western Chorus Frog Call Code	Other Species Call Code			
					Distance	Direction									Spring Peeper	Wood Frog	Northern Leopard Frog	American Toad
		O:																
		B:																
		O:																
		B:																
		O:																
		B:																
		O:																
		B:																
		O:																
		B:																
		O:																
		B:																

Notes (other frogs calling from different focal pond, presence of predators or invasive species, etc.). Include Site ID with note:

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Western Chorus Frog Acoustic Monitoring Data Sheet

Date:	March 28, 2017
Primary Surveyor	**Experience**
Sarah Smith	E
Other Surveyors	Bob Jones

Primary Surveyor Experience: Novice (**N**) - No frog call survey experience, Beginner (**B**) - 1 season of surveys, Intermediate (**I**) - 1-5 seasons of surveys, Expert (**E**) - More than 5 seasons of surveys

Latitude/Longitude: O: observer listening station location, B: breeding pond location. Record location and accuracy for both for each site.

Distance: To B from O **0-20** m, **20-75** m, **75-125** m, **125-175** m, or **>175** m from O

Direction: Cardinal direction of the sound of frogs calling (B) from O (**N, E, S, W**)

Wind Speed: **0** - smoke rises vertically, **1** - smoke drifts, **2** - leaves rustle, **3** - light branches sway, **4** - branches move *Do not survey in >3

Wind Direction: Towards listening station (**T**), away from listening station (**A**), across (perpendicular) from the listening station (**X**)

Precipitation: none (**N**), light rain (**LR**), moderate rain (**MR**), heavy rain (**HR**) *Do not survey in MR or HR

Background Noise: **0** - No noise, **1** - Distant (traffic or animal calls including other frogs in distance), **2** - Faint (few cars pass nearby, periodic animal calls, wind rustling grass or cattails), **3** - Moderate (fairly consistent noise from cars passing, birds calling, wind rustling vegetation - frogs still heard well), **4** - Consistent (continuous noise from animals, traffic or wind - frogs can be heard but not easily), **5** - Loud (Continuous loud noise from highway traffic etc. - ability to hear frogs is severely compromised)

Call Codes: **1** - Calls not overlapping and number of calling males can be accurately counted, **2** - Some calls overlapping but number of calling males can be reliably counted, **3** - Full chorus with continuous overlapping calls indistinguishable from one another

Site ID	Survey #	Latitude (5 decimal places)	Longitude (5 decimal places)	Accuracy (m)	Western Chorus Frog: Distance	Western Chorus Frog: Direction	Start Time	Air Temp ©	Wind Speed	Wind Direction	Precipitation	Background Noise:	Habitat form (Y/N)	Western Chorus Frog Call Code	Other Species Call Code: Spring Peeper	Other Species Call Code: Wood Frog	Other Species Call Code: Northern Leopard Frog	Other Species Call Code: American Toad
1	1	O: 45.12345	-75.12345	5	0-20	N	11:15	11	2	W	N	2	Y	2	0	1	0	0
		B: "	"	"														
2	1	O: 45.22334	-75.23456	4	20-75	E	11:32	11	2	W	LR	1	Y	0	0	0	2	0
		B: 45.22506	-75.23381	3														
		O:																
		B:																
		O:																
		B:																
		O:																
		B:																
		O:																
		B:																

Notes (other frogs calling from different focal pond, presence of predators or invasive species, etc.). Include Site ID with note:

Site ID 1: Wood Frogs 0-20m S

Site ID 2: Northern Leopard Frogs 75-125m NW

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BLAZING STAR ENVIRONMENTAL

Western Chorus Frog Habitat Data Sheet

Site	

Latitude	
Longitude	

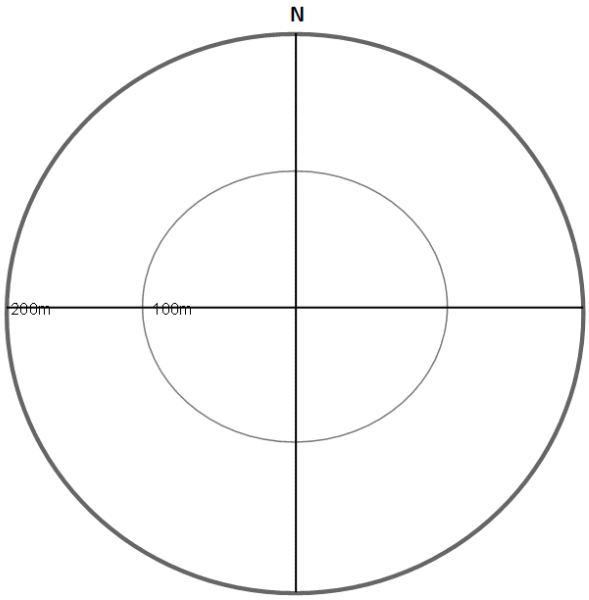
Ownership	

Surveyor	

Date:	DD	MM	20__

Sketch map of area

Please include approximate size and location of wetland, roads, and all habitat types. Place listening station in the centre of the sketch. Include significant site factors within 200 m.



Wetland type (circle one)
- Flooded field
- Marsh
- Swamp
- Roadside ditch

Other:_____

Dominant wetland plant species

Terrestrial habitat types
- Old field/meadow
- Deciduous woods
- Mixed woods
- Coniferous woods
- Shrublands

Other:_____

Potential threats to the suitable habitat (circle all that apply)

Cropland Railway Roads Other:_____

Types of habitat development in the area (please list all that apply)

Specify:_____

Invasive species observed (please list all that apply)

Specify:_____

Other Notes:

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BLAZING STAR ENVIRONMENTAL

BLAZING STAR ENVIRONMENTAL

Western Chorus Frog Habitat Data Sheet

Site	2

Latitude	45.22334
Longitude	-75.23456

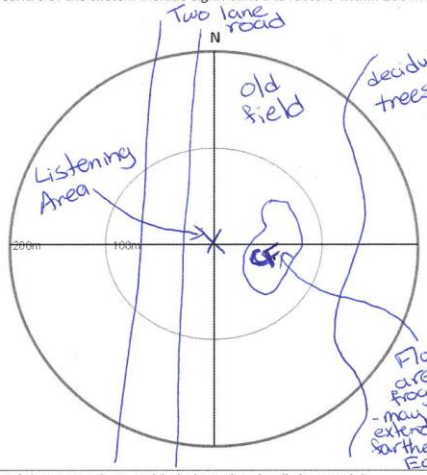
Ownership	PRIVATE

Surveyor: Sarah Smith, Bob Jones

Date: 28 03 2017

Sketch map of area

Please include approximate size and location of wetland, roads, and all habitat types. Place listening station in the centre of the sketch. Include significant site factors within 200 m.



Wetland type (circle one)
- (Flooded field)
- Marsh
- Swamp
- Roadside ditch
- Other:

Dominant wetland plant species
- grasses
- a few cattails

Terrestrial habitat types
- (Old field/meadow)
- (Deciduous woods)
- Mixed woods
- Coniferous woods
- Shrublands
- Other:

Potential threats to the suitable habitat (circle all that apply)

Cropland Railway (Roads) Other:

Types of habitat development in the area (please list all that apply)

Specify: Houses to north

Invasive species observed (please list all that apply)

Specify: None

Other Notes:

Old field is large, but no other obvious ponds

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Appendix 2. Beaufort wind scale

Beaufort Scale	Wind speed (km/h)	Description	Visual Cues
0	0-2	Calm	Smoke rises vertically
1	3-5	Light	Smoke drifts
2	6-11	Slight breeze	Leaves rustle
3	12-19	Gentle breeze	Lighter branches sway
4	20-30	Moderate breeze	Dust rises, branches move
5	31-39	Fresh breeze	Small trees sway

Do not survey if wind is >3

Appendix 3. Equipment for western chorus frog auditory surveys

- Map(s) of study area, including boundaries of the 1 x 1 km NHIC squares, if participating in long-term monitoring program
- Data sheets and pencils
- GPS
- Compass
- Device with timer function (stopwatch, smartphone, etc.)
- Thermometer
- Digital camera (optional)
- Recording device (optional)

Appendix 4. Surveyor experience scale

Experience Level	Description of frog call survey experience
Novice (N)	None
Beginner (B)	1 season of frog call surveys completed
Intermediate (I)	1-5 seasons of frog call surveys completed
Expert (E)	More than 5 seasons of frog call surveys completed

Appendix 5: Distance to breeding pond location from observer listening station location

Distance (m)
0-20
20-75
75-125
125-175
>100

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Appendix 6: Background noise index

Index	Description
0	No noise (e.g. owl calling)
1	Distant noise (e.g. distant traffic, single car passing, animal calls, including other frogs in distance)
2	Faint noise (e.g. few cars pass nearby, periodic animal calls, wind rustling grass or cattails)
3	Moderate noise (e.g. fairly consistent noise from cars passing, birds calling, wind rustling vegetation – frogs still heard well)
4	Consistent noise (e.g. continuous noise from animals, traffic or wind – frogs can be heard, but not easily)
5	Loud noise (e.g. continuous loud noise from highway traffic etc. –ability to hear frogs is severely compromised)

Appendix 7. Call index for frogs and toads

Call code	Description
1	Calls not overlapping and number of calling males can be accurately counted.
2	Some calls overlapping, but number of calling males can be reliably estimated.
3	Full chorus, calls continuous and overlapping, number of calling males cannot be reliably estimated.

Survey Protocol

for

Blanding's Turtle (*Emydoidea blandingii*)

in Ontario

May 2012

Ontario Ministry of Natural Resources
Policy Division
Species at Risk Branch

Citation: OMNR. 2012. Survey Protocol for Blanding's Turtle (*Emydoidea blandingii*) in Ontario. Ontario Ministry of Natural Resources, Peterborough, Ontario. ii + 14 pp.

Cover illustration: Photograph by Joe Crowley, Herpetology Species at Risk Specialist, Species at Risk Branch, Ontario Ministry of Natural Resources.

CONTENTS

1. Introduction 1
1.1. Rationale 1
1.2. Objectives..... 1
1.3. Authorizations 2
2. Species Information 2
2.1. Identification 2
2.2. Distribution..... 3
2.3. Timing of Behaviours..... 4
2.4. Habitat..... 4
3. Survey Protocol..... 6
3.1. Qualifications..... 6
3.2. Records Review..... 6
3.3. Identification of Suitable Habitat..... 7
3.4. Basking Surveys..... 7
3.5. Hoop Net Traps..... 9
3.6. Nesting Surveys..... 9
4. Documentation and Reporting..... 11
4.1. Documentation..... 11
4.2. Reporting..... 11
5. References..... 12

FIGURES

Figure 1. Ontario Blanding's Turtle Occurrence Map..... 3

APPENDICES

Appendix 1. Examples of Blanding's Turtle Habitat in Ontario..... 13
Appendix 2. Hoop Net Trapping Methodology..... 14

1. BACKGROUND

1.1 Rationale

When a species is listed on the *Species at Risk in Ontario List* as an extirpated, endangered or threatened species, it receives protection under section 9 of the *Endangered Species Act*, 2007 (ESA). A species that is listed as an endangered or threatened species also receives habitat protection under section 10 of the ESA. If specific conditions are met, the Minister of Natural Resources may issue a permit to a proponent that authorizes an activity that would otherwise be prohibited by section 9 or 10 of the ESA. In order to assess the potential impact of an activity on a species at risk or its habitat, it is essential to know which species occur at the site of a proposed activity. Knowing where species at risk populations occur throughout the province is also important for a number of other reasons, including:

- Identification and protection of habitat under the ESA
- Filling knowledge gaps identified in Recovery Strategies and Government Response Statements.
- Informing local stewardship and conservation efforts
- Assessing the status of species

Systematic, province-wide surveys or inventories have not been conducted for many of Ontario's species at risk. The occurrence data that are available for these species are often from opportunistic observations or site-specific surveys. Although existing occurrence data can be useful in identifying sites that may be occupied, the lack of occurrence data at a particular site does not indicate that the species is absent from the site; it may simply mean that surveys have not occurred, previous surveys were not adequate to detect the species or no one has reported occurrences, even if the species has been encountered.

In the absence of detailed occurrence data throughout the province, field surveys are necessary to determine if a species is present or absent from a particular site. However, many species at risk are inherently rare, occur at low densities and are very cryptic, making detection of these species difficult. Furthermore, the detection probability of some species varies considerably with time of year, weather, search method, etc. As a result, surveys should be carried out according to a very specific set of conditions in order to avoid false absence. This Species at Risk Survey Protocol was developed in response to the need for systematic, detailed surveys for species at risk in Ontario.

1.2. Objective

The objective of this survey protocol is to provide a methodology for conducting a presence/absence survey for Blanding's Turtle.

This protocol does not provide methodology to determine population abundance or monitor changes over time. For information about determining species abundance, population monitoring and other field methodology for reptiles, see McDiarmid et al. 2012. In some cases, delineation of the extent of the species' habitat may be required. If these requirements are related to a specific project or application with the MNR, these details should be discussed with your local MNR Species at Risk biologist.

1.3. Authorizations

Species at Risk
Under some circumstances, surveys and monitoring for threatened or endangered species in Ontario may require a permit under the *Endangered Species Act* (ESA), 2007. For example, some activities that would require a permit under the ESA:

- The collection of voucher specimens
- Capturing and handling an animal
- Repeatedly searching under the same cover object(s)
- Any activity that damages the habitat

Applications for permits should be initiated at least five months in advance of a proposed survey start date.

A permit under the federal *Species at Risk Act* (SARA), 2002 is not required for reptiles and amphibians unless work is being carried out on federal lands.

Specially Protected Wildlife
A permit is required under the Ontario *Fish and Wildlife Conservation Act* (FWCA) for work with a Specially Protected Species (as defined in that Act) if the species is handled or harassed.

Work in Provincial or National Parks
A permit from Ontario Parks and Parks Canada is required to carry out work in a provincial or national park, respectively, regardless of other authorizations that have been obtained. Applications to conduct research in Ontario provincial parks usually take up to two months for review and approval.

Animal Care Protocol
An MNR approved animal care protocol is required to obtain a permit under the ESA or FWCA.

Landowner Authorization
Permission to carry out work on private property should be obtained from the property owner prior to accessing the property, regardless of other authorizations that have been obtained.

2. SPECIES INFORMATION

2.1. Identification

Appearance

- Bright yellow chin and throat
- Smooth, highly domed black carapace (upper shell) with small, irregular tan or yellow flecks, which may be absent or faded on older individuals
- Hinged plastron (lower shell) that is yellow with a large dark blotch in the corner of each scute (scales on the shell), but may be almost entirely black
- Carapace can be up to 28 centimetres in length
- Juveniles may lack the bright yellow throat and the domed shell is not as pronounced

Similar Species

Blanding's Turtles (especially juveniles) may be confused with Spotted or Wood Turtles. Spotted Turtles have large, distinct yellow spots rather than flecking. The scutes on a Wood Turtle's shell are pyramidal and ridged while a Blanding's Turtle shell is smooth.

2.2. Distribution

Blanding's Turtles occur throughout southern and central Ontario but appear to be largely absent from the northern potion of south-western Ontario, including most of Grey and Bruce counties, as well as extreme eastern Ontario. As is the case with most reptile species, the known distribution of the species within Ontario (Figure 1) is based largely on opportunistic occurrence data and is not well documented. This is especially true of the northern limit of the species' range where populations have recently been documented as far North as Timmins and Chapleau (these populations have not yet been incorporated into the map below). As a result, Figure 1 is only intended to provide a snapshot of where the species has been observed and is not an indication of the exact distribution/presence of the species within the province.

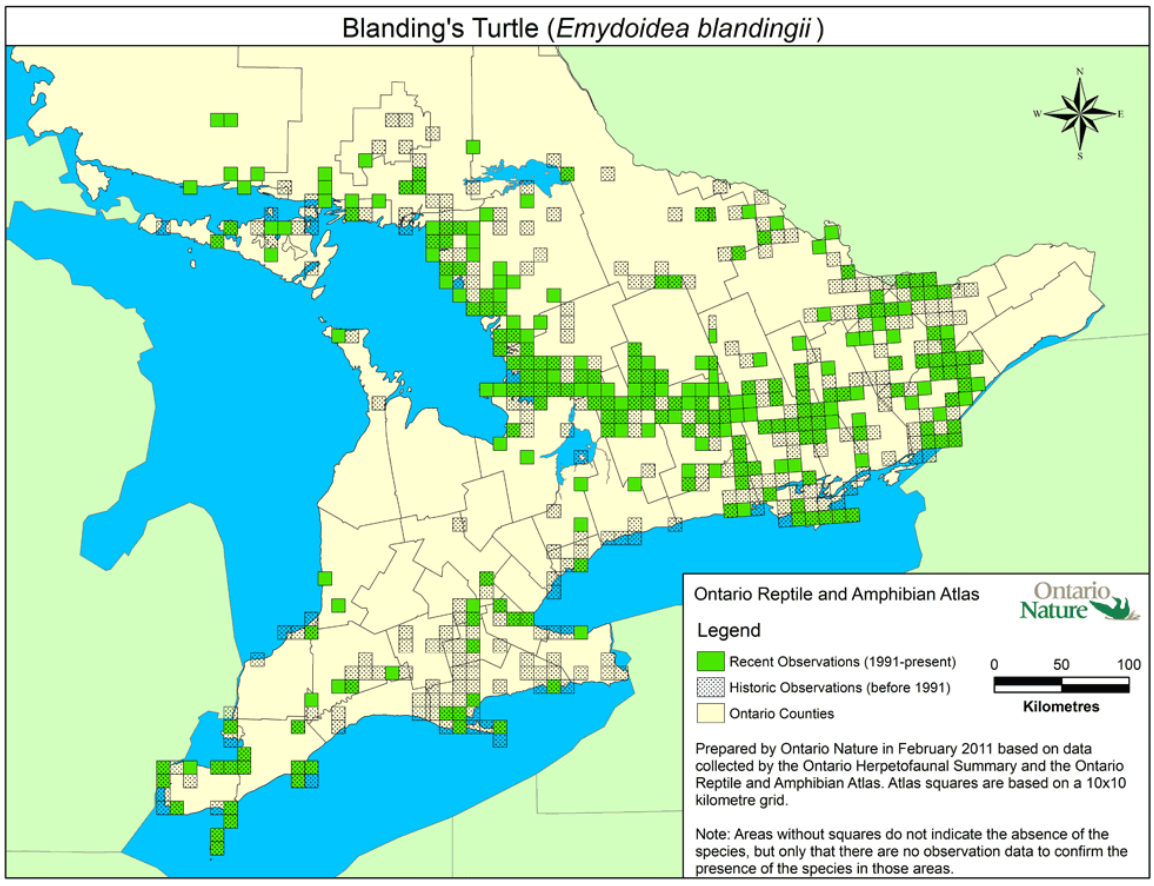

Figure 1. Known distribution of the Blanding's Turtle in Ontario based on data from the Ontario Ministry of Natural Resources and the Ontario Reptile and Amphibian Atlas (Ontario Nature 2012). Although not depicted in the map, Blanding's Turtles have recently been observed as far north as Chapleau and Timmins.

2.3 Timing of Behaviours

Timing of behaviours/movements are based on data from Edge et al 2009; Edge et al 2010; J. Urquhart pers. comm. 2011; C. Davy unpublished data 2011; C. Edge pers. comm. 2011; J. Patterson pers. comm. 2011; NHIC unpublished data 2011. The exact timing of behaviours and activities will depend on the latitude of the population as well as seasonal variation.

Timing windows are provided for populations in south-central/eastern Ontario and populations in south-western Ontario. The dividing line between these regions is roughly a line from Toronto to Stratford to Kincardine and is based on growing degree days. The area around Prince Edward County has a similar climate to south-western Ontario.

The date ranges provided will shift from year-to-year depending on seasonal weather variation, such as an early spring (e.g. spring of 2012 with temperatures of + 28 C in mid-March) or a warm fall. If surveys are being carried out close to the beginning or end of one of these periods, timing of surveys should account for seasonal variation.

South-central/eastern Ontario

- Active season: Ice-off (usually around early April) to late October
- Hibernation: Late October to ice-off (usually early-April)
- Mating: April, September and October but may occur at any time of year, including during hibernation
- Nesting: mid May to the end of June; lasts about 3 weeks each year but most activity occurs in one week
- Hatching: Mid-August to the end of September
- Adult dispersal/migration: April and September

South-western Ontario

- Active season: Ice-off (usually mid-March) to early November
- Hibernation: Early November to ice-off (usually mid-March)
- Mating: April, September and October but may occur at any time of year, including during hibernation
- Nesting: Late May to mid-July; lasts about 3 weeks each year
- Hatching: Mid-August to late September
- Adult dispersal/migration: mid-March-April; mid-September to mid-October

2.4. Habitat

This summary of typical habitat is intended to help inform surveys for Blanding's Turtles and is not a description of "General Habitat" under the ESA, 2007. Appendix 1 provides examples of Blanding's Turtle habitats throughout Ontario.

Active Season (foraging/mating/basking) Habitat

Blanding's Turtles are primarily aquatic and occupy a variety of eutrophic wetlands such as swamps, ponds, fens, bogs as well as slow-flowing streams and shallow bays of lakes or rivers (Congdon et al. 2008; Edge et al 2010). These sites often have an abundance of vegetation and a soft substrate made up of decomposing materials. They prefer stagnant or slow moving shallow water and are unlikely to be found in deep

portions of rivers or lakes or in fast-flowing streams. In Ontario, Blanding's Turtles are well-known for inhabiting wetland complexes throughout forest ecosystems. Blanding's Turtles are not restricted to a single wetland over the active season and make frequent overland movements between wetlands in search of foraging opportunities, mates or different habitat characteristics (thermal qualities, water level, etc; Edge et al. 2010). These movements typically range from a few hundred meters to kilometres and movements of over 10 km have been documented in some cases (Congdon et al. 2008; Edge et al., 2010). Terrestrial travel corridors linking wetlands are important to allow these dispersal and foraging movements.

In the spring, Blanding's Turtles bask on submerged logs, hummocks, rocks and vegetated shorelines. Important characteristics of basking structures include exposure to sunlight, vegetation that helps to obscure the turtle from a distance and ease of escape into the water. In the summer and fall when the water has warmed, Blanding's Turtles will often bask at the surface of the water, especially where aquatic vegetation helps to obscure them from view.

Overwintering Habitat

Blanding's Turtles typically overwinter in bogs, fens, marshes or other water with free (unfrozen) water depths between 10 cm and 1 m. Blanding's Turtles studied in Algonquin Provincial park overwintered in wetlands with free water depths of 7 cm - 50 cm (Edge et al. 2009). Recent studies have found Blanding's Turtle's overwintering in small roadside ditches with standing water (J. Rouse unpublished data 2011). All of these habitats tend to have low levels of dissolved oxygen and Blanding's Turtles are anoxia tolerant. Blanding's Turtles also select sites with water temperatures close to 0 C to lower metabolic rates and oxygen requirements, which assist them in tolerating anoxic conditions (Edge et al 2009). Blanding's Turtle's show fidelity to overwintering sites and communal overwintering may be common in some populations (Congdon et al. 2008; Edge et al. 2009).

Nesting Habitat

Blanding's Turtles typically nest in areas that are close (within 250m) to wetlands and have low vegetation cover, high sun exposure and well-drained soils. Blanding's Turtles often nest in open areas with disturbed soils or exposed sand and gravel, such as edges of wetlands, gravel roads, road shoulders, sand and gravel piles, farm fields, gardens and driveways (Congdon et al. 2008; J. Patterson pers. comm. 2011; J. Crowley pers. obs. 2012). However, Blanding's Turtles may nest in areas that are not well defined, such as small forest clearings or earth-filled crevices in rock outcrops. The shoulders of roads, especially those bisecting wetlands, attract high numbers of nesting turtles. These roadside nest sites often result in high mortality of adult females from vehicle collisions and predation of nests and juveniles by subsidized predators.

In a study in Algonquin Provincial Park, Blanding's Turtles were observed nesting within 25 to 250 m of a wetland (J. Paterson pers. comm. 2011). However, female Blanding's Turtles may travel considerable distances over land during nesting migrations, with movements of 6 km documented in Ontario populations (Edge et al. 2010). In addition to being considerable distances from the adult's summer habitat, nest sites can also be more than 1 km from the nearest water (Congdon et al. 2008). Nesting migrations may take longer than a week, during which time Blanding's Turtles move throughout upland habitat and may also utilize wetlands or ponds along the way (Congdon et al. 2008).

3. SURVEY PROTOCOL

3.1. Qualifications

Whenever possible, surveys for species at risk should be carried out by a qualified professional who has received field training from species experts or has prior experience surveying for Blanding's Turtles.

If the surveyor does not have prior experience surveying for the species and is not able to receive field training from a species expert, at a minimum the surveyor should:

- Have experience in wildlife biology and species inventories,
- Have a thorough understanding of Blanding's Turtle biology and ecology (gained through literature review or discussions with species experts),
- Have an expert review the proposed approach to surveying the site.

3.2. Records Review

A records review should be carried out prior to a field survey. Existing occurrence records may help to better scope the field survey or, if extensive data is already available for a site, existing records may eliminate the need for a field survey. The absence of occurrence records from an area does not indicate that the species is absent; suitable habitat must be adequately surveyed before concluding that the species is unlikely to be present.

The following sources can be consulted for information on Blanding's Turtle occurrence:

- Biodiversity Explorer - Natural Heritage Information Centre (NHIC) Database https://www.biodiversityexplorer.mnr.gov.on.ca/nhicWEB/mainSubmit.do
- Natural Heritage Information Centre (NHIC) http://nhic.mnr.gov.on.ca/
- MNR district offices http://www.mnr.gov.on.ca/en/ContactUs/2ColumnSubPage/STEL02_179002.html
- Ontario Reptile and Amphibian Atlas (ORAA) http://ontarionature.org/protect/species/herpetofaunal_atlas.php
- Local Conservation Authorities http://www.conservationontario.ca
- Status reports from the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) http://www.sararegistry.gc.ca/default_e.cfm
- Other information sources such as, but not limited to:
    - species experts
    - site-related environmental impact or screening reports
    - published scientific literature
    - natural history inventories

For more information on how to conduct a records review, see "*Information Gathering Form for Activities that may affect Species or Habitat Protected under the ESA*" http://www.mnr.gov.on.ca/stdprodconsume/groups/lr/@mnr/@species/documents/document/stdprod_085649.pdf

3.3. Identification of Suitable Habitat

Blanding's Turtle habitat, as described in section 2.4 of this document, should be identified using a two-step process:

- Prior to site visits, identify potential habitat using aerial photographs, orthophotos or other available land cover information (such as Ecological Land Classification maps). Small wetlands, swamps and some other classes of wetlands may be difficult to identify using maps, depending on the scale and resolution of the map. For this reason, lowland areas that may contain wetland habitat should also be included.

- A site visit should be carried out to assess potential habitat identified in step 1 and to confirm the presence of suitable habitat. If detailed maps or other habitat information is not available for a site, the entire site should be thoroughly searched to identify suitable Blanding's Turtle habitat. All potential basking sites, nesting sites and suitable summer and winter habitat should be described or mapped and this information should inform the survey design.

3.4. Basking Surveys

Blanding's Turtles bask, sometimes communally, on logs, rocks or hummocks and along the edges of shorelines. Searching for basking turtles is the most effective method of confirming the presences of this species within suitable habitat. Turtles seen basking in the early spring (late March-early April) or late fall are likely in or near their overwintering habitat.

Survey Technique

In cases where wetland vegetation does not obstruct your view of the shorelines and other available basking sites (such as floating logs or hummocks), use binoculars with a minimum magnification of 10x to scan the entire perimeter of the shoreline and all potential basking sites (a high power spotting scope may be required to accurately identify the species in some situations). This will usually require the surveyor to access the wetland from several different locations or walk part of the shoreline. Basking sites, including hummocks, should be viewed from the sunlit side.

In cases where tall shrubs or other vegetation along the shoreline or throughout the wetland make it impossible to survey potential basking sites (especially hummocks) from the shore, wade through the wetland or use a canoe or boat to navigate deeper wetlands. It is essential that hummocks and other potential basking sites are approached from the sunlit side; if the surveyor approaches hummocks from the shaded side, Blanding's Turtles may dive into the water before they can be detected.

Blanding's Turtles are easily startled and will quickly dive into the water if disturbed. As such, it is imperative to be very quite and remain hidden from view while scanning ahead with binoculars. Listen for sounds that may indicate that a turtle has entered the water and be sure to check that spot on future visits.

Blanding's Turtles select very specific sites for basking and will not be encountered evenly throughout a wetland; they may all be clustered in only a few spots. As such, all potential basking sites within a wetland must be checked.

Survey Period

Blanding's Turtles are dormant under the ice and do not bask during the overwintering period. Blanding's Turtles bask frequently in the spring, often beginning as soon as ice cover recedes. By mid-late June, the water temperature has warmed considerably and Blanding's Turtles bask infrequently. In the fall, turtles may resume low levels of basking activity.

Basking surveys should occur after the ice cover has at least partially melted (often around mid-April in south-central/eastern Ontario and mid-March in south-western Ontario) and no later than June 15th.

Later in the season (late may and early June) turtles are less reliably found on basking structure (logs, hummocks, etc) as the day progresses.

Survey Conditions

If air temperature is between 5 C and 15 C, surveys should take place during sunny periods between 10am-5pm when basking sites are receiving full sunlight.

If air temperature is between 15 C and 25 C, surveys should take place during sunny periods between 8am and noon when basking sites are receiving full sunlight or surveys should take place during overcast periods from 9am until 4pm if air temperature is higher than water temperature.

Search Effort Required to Determine Probable Absence

The detectability of Blanding's Turtles varies with the type and quality of the habitat, the abundance of the population and the experience of the surveyor. Although it is not uncommon to detect this species during the first survey, eight or more surveys have been required to detect the presence of some populations in Ontario (J. Urquhart pers. comm. 2011; C. Davy pers. comm. 2011; C. Edge pers. comm. 2011). Casper and Hecnar (2011) recommend a minimum of 10 surveys to avoid false absence when carrying out basking surveys for turtles in the Great Lakes Basin.

Based on the above, a minimum of five surveys spread over at least 3 weeks are recommended at sites with no previous documentation of the species. For the purposes of this section, one survey is the amount of effort required to thoroughly search all suitable habitat. If the site is large, several site visits or trips may be required to adequately cover the entire area and complete one survey. If Blanding's Turtles are not observed with this search effort and all conditions of this protocol have been followed, the species is unlikely to be present. In some cases where populations are expected to be small and more difficult to detect (such as at some sites in south-western Ontario) more than five surveys may be necessary to conclude that the species is unlikely to be present.

The search effort outlined above is intended only for sites where the species has not been previously detected. A search effort of five surveys is not adequate to infer that the species is absent from previously occupied habitat (areas with recent or historic observations). This species demonstrates high site fidelity and individuals can live up to 80 years (or more); sites where Blanding's Turtles have been previously documented should be considered occupied unless the habitat is no longer suitable or the population (eg. an EO in the NHIC database) is known to be extirpated. For example, an EO ranking of "extirpated" in the NHIC database indicates that a population is believed to no longer occur. Conversely, an NHIC EO ranking of "historic" indicates that a population may still be extant (it is not known to be extirpated).

It is not appropriate to draw conclusions about the absence of the species from a site if basking surveys do not occur within the survey period and conditions outlined above.

Required Authorizations and Approvals
No authorization is required under the *Ontario Endangered Species Act, 2007 or the Ontario Fish and Wildlife Conservation Act* to carry out basking surveys for Blanding's Turtles as long as the turtles are not captured or harassed. Care must be taken not to disturb individual turtles during surveys.

3.5. Hoop Net Traps

Hoop net traps are less effective for determining presence/probable absence than basking surveys. They are also more invasive, require several MNR authorizations and result in by-catch of other turtle species, including Snapping Turtles. For these reasons, hoop net traps are not recommended for determining the presence/probable absence of Blanding's Turtles. However, since hoop net traps may be beneficial or necessary under some circumstances, Appendix 2 provides a basic methodology for hoop net traps.

3.6. Nesting Surveys

Nesting surreys with positive results can be helpful in identifying the occurrence of the species in a particular area (for example, a few road cruises at the right time of year may be sufficient to confirm the occurrence of the species).

Since Blanding's Turtles may nest several hundred meters from aquatic habitat and nest sites can occur at low densities across the landscape, it is difficult to determine if a particular terrestrial area is used as nesting habitat by Blanding's Turtles without the use of radio-telemetry. Radio-telemetry should be used when it is necessary to identify the nesting habitat of a particular population.

Survey Technique:
Nests are very difficult to detect unless they have been depredated and it is difficult to identify the species from evidence of depredated nests. As such, nest surveys should focus on detecting females during the nesting season.

Visually inspect suitable nesting areas (see section 2.4) from a distance. If females are startled, they will likely abandon nesting activity for the evening and this could constitute

harassment under the ESA 2007. As such, appropriate precautions should be taken to avoid startling nesting females: stay as far away from the nesting site as possible while maintaining a good line of sight, use binoculars when possible, try to remain inconspicuous and do not make any noise. To maximize detection probability, it is recommended that suitable nesting habitat is surveyed at least twice per evening and that surveys are separated by two hours.

Search suitable nesting habitat for evidence of depredated nests and hatched nests immediately after the nesting and hatching periods, respectively (see section 2.3 for timing of these periods). It can be difficult to identify the species from evidence of a depredated or successful nest. However, evidence of nests can be used to identify potential nesting habitat and inform future surveys.

Survey Period:
The nesting period lasts about three weeks but varies between years and regions. It usually occurs between May 15th to June 30th in south-central/eastern Ontario and June 1st to July 15th in south-western Ontario. Although nesting activity can last a few weeks, peak activity can occur over just a few nights. Observations of turtles (any species) nesting along roads can be a useful indicator of the onset of nesting activity in a particular area. Discussions with local experts can also be helpful in identifying the beginning of the nesting period.

Time: Survey potential nest sites between 7 pm and 11 pm (ideally once around 8pm and once around 10 pm).

Survey Conditions:
Nesting activity can take place in most weather conditions but may peak after rainfall or during periods of light rain. The presence of other nesting turtles is an indication of good nesting conditions for Blanding's Turtle.

Search Effort Required to Determine Probable Absence:
Blanding's Turtles do not always nest in close proximity to their aquatic habitat (see section 2.4). As such, nest surveys are not an appropriate method to determine if Blanding's Turtles are absent from nearby aquatic habitat.

Required Authorizations and Approvals:
No authorization is required under the *Ontario Endangered Species Act, 2007 or the Ontario Fish and Wildlife Conservation Act* to carry out nesting surveys for Blanding's Turtles as long as the turtles are not captured or harassed. The disturbance of a female turtle that results in the abandonment of nesting activities could constitute a contravention under the ESA or FWCA unless the surveyor has the appropriate authorizations.

4. DOCUMENTATION AND REPORTING

4.1. Documentation

When a Blanding's Turtle is observed, the following information should be collected:

- Name of observer and contact information,
- Time and date of observation,
- Number of individuals observed,
- Photograph of the turtle (with scale reference if possible) to confirm identification
- GPS coordinates, including accuracy. If multiple individuals of the same species are observed and are more than 10 m away from each other, separate GPS coordinates should be submitted for each individual. If you do not have a GPS, you can use Google Maps or Google Earth to obtain the coordinates. For example, in Google Maps, zoom into the area where you observed the turtle, click "what's here" and the latitude and longitude will appear in the location bar (in decimal degrees). Be sure to provide an estimate of the accuracy.
- Location description and directions to the site,
- A description of the habitat, including habitat type, approximate water depth, type/density of aquatic/emergent vegetation, distance to shoreline, etc.

For each Blanding's Turtle survey that is carried out as part of a project or application with the Ministry of Natural Resources, the following information should documented:

- Date, time and duration of Blanding's Turtle survey (beginning and end),
- Number of surveyors and relevant experience with Blanding's Turtle,
- A map that delineates survey locations or routes as well as vantage points from which basking sites were scanned,
- Photographs of the habitat,
- Weather conditions (cloud cover, wind, air temperature, water temperature; record at the beginning and end of survey effort in each wetland)
- Result (positive, negative, number of turtles, etc)

An MNR Species at Risk Biologist should be contacted prior to surveys to determine if additional information is required.

4.2. Reporting

Species at risk occurrence data (described in section 4.1) should be submitted to the Ministry of Natural Resources district Species at Risk Biologist. This data will be forwarded to the Ontario Ministry of Natural Resources Natural Heritage Information Centre (NHIC; http://nhic.mnr.gov.on.ca). The NHIC is Ontario's conservation data centre and maintains the provincial record of Ontario's species at risk occurrences.

Observations of other reptile and amphibian species at risk should also be reported to the MNR. Observations of reptiles and amphibians that are not at-risk can be submitted to the Ontario Reptile and Amphibian Atlas (www.ontarionature.org/atlas).

5. REFERENCES

Casper, G.S. and S.J. Hecnar. 2011. Standard operating procedure for: visual basking surveys for turtles in the Lake Superior Basin. Version 1, 5 pp. Available at http://flash.lakeheadu.ca/~shecnar/?display=page&pageid=21

Congdon J.E., T.E. Graham, T.B. Herman, J.W. Lang, M.J. Pappas, B.J. Brecke. 2008. *Emydoidea Blandingii* (Holbrook 1838) – Blanding's turtle. In: Rhodin, A.G., P.C.H. Pritchard, P.P. van Dijk, R.A. Saumure, K.A Buhlmann and J.B. Iverson (Eds). Conservation Biology of Freshwater Turtles and Tortoises: A Compilation Project of the IUCN/SSC Tortoise and Freshwater Turtle Specialist Group. Chelonian Research Monograph No. 5, pp. 015.1-015.12. http://www.iucn-tftsg.org/cbftt

Edge, C.B., B.D. Steinberg, R.J. Brooks and J.D. Litzgus. 2009. Temperature and site selection by Blanding's turtles (*Emydoidea Blandingii*) during hibernation near the species' northern range limit. Canadian Journal of Zoology 87: 825-834

Edge, C.B., B.D. Steinberg, R.J. Brooks and J.D. Litzgus. 2010. Habitat selection by Blanding's turtles (*Emydoidea Blandingii*) in a relatively pristine landscape. Ecoscience 17(1): 90-99

McDiarmid, R.W., M.S. Foster, C. Guyer, J.W. Gibbons, and N. Chernoff (Eds.). 2012. Reptile Biodiversity: Standard Methods for Inventory and Monitoring. Berkeley: University of California Press.

Natural Heritage Information Centre (NHIC). 2011. Biodiversity Explorer: Species Lists, Element Occurrence and Natural Areas databases. Natural Heritage Information Centre, Ontario Ministry of Natural Resources, Peterborough, Ontario.

Ontario Nature. 2012. Ontario Reptile and Amphibian Atlas. Web application, updated February, 2012. Available at: www.ontarionature.org/atlas

APPENDIX 1:
Examples of Blanding's Turtle Habitat in Ontario

APPENDIX 2:
Hoop Net Trap Methodology

Hoop net traps consist of a mesh that is fit over several (usually three) hoops and a funnel opening at one end that guides turtles into the trap but prevents them from escaping. A hoop net trap can be purchased for approximately $100.

This is not a standard method to determine presence-absence and should only be used under certain circumstances in consultation with a district Species at Risk Biologist.

Survey Technique:
Blanding's Turtles rarely occur evenly throughout potential aquatic habitat; rather, they may be concentrated in specific parts of a wetland or a particular bay of a lake. All potential habitat should be trapped, with traps spaced no more than 100 m apart and a minimum of 3 traps per water body (wetland, pond, stream, etc).

To set the hoop net trap:

- Use wooden stakes or T-bars to anchor both ends of the trap. The funnel end should be at least 60% submerged to allow turtles to swim into the trap.
- It is critical that the trap is not fully submerged and at least 30 cm of the mesh is above water to allow the turtles to breath. Be sure to take into account possible changes in water level due to beaver activity, dams, precipitation, etc.
- Bait must be used with hoop net traps and canned sardines are ideal. Wild fish bait should not be used. Place the sardines in a perforated plastic container, hang it from the top of the centre hoop and ensure that at least part of the container is submerged. Bait should be changed daily when traps are checked.
- Traps should be labelled appropriately to avoid public interference or removal.

Checking traps twice daily will yield the best results. At a minimum, traps must be checked daily and all turtles removed from the traps and released at that time. If traps are left for longer than 24 hours and become submerged, there is a high risk of mortality of any turtles in the traps. When checking traps, it is recommended that potential basking sites are also surveyed while moving through the wetland between traps.

Survey Period:
In south-central/eastern Ontario, hoop net traps should be used between April and late June. In south-western Ontario, hoop net traps should be used between mid-March and mid-June

Hoop net traps are very effective at catching Blanding's Turtles during the spring when they are actively feeding. However, by the end of June natural food sources become abundant and these traps do not reliably capture Blanding's Turtles.

Survey Conditions: N/A

Required Authorizations and Approvals:
A permit is required under the *Ontario Fish and Wildlife Conservation Act* and the *Ontario Endangered Species Act*, *2007* to trap Blanding's Turtles. If you intend to trap Blanding's Turtles, contact your district MNR office to initiate an application for these permits at least five months in advance of a proposed start date.

ONTARIO BREEDING BIRD ATLAS

GUIDE FOR PARTICIPANTS

March 2001

Ontario Breeding Bird Atlas
A project sponsored by:

Federation of Ontario Naturalists

Bird Studies Canada / Études d'Oiseaux Canada

OFO

Environment Canada / Environnement Canada
Canadian Wildlife Service / Service canadien de la faune

Ontario Ministry of Natural Resources

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Ontario Ministry of Natural Resources: Species at Risk Project, Ontario Parks

Government of Ontario through the Ministry of Citizenship, Culture and Recreation, Volunteer @ction.online Program

Human Resources Development Canada

Volunteer Action / Bénévole

ESRI Canada

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Email: atlas@uoguelph.ca
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TABLE OF CONTENTS

PROJECT OVERVIEW 1
PURPOSE AND APPROACH 3
SCOPE 3
GETTING STARTED 4
Registration forms 4
Obtaining materials 4
MAPS 5
Zone Line Areas 5
Boundary squares 5
COLLECTING ATLAS DATA 7
Submitting data 7
About Scannable Forms 7
BREEDING EVIDENCE 7
Breeding Evidence Data Forms 8
Notes/Other Observers 10
1st Visit 11
Recording Breeding Evidence 11
Strengthening the evidence for breeding 12
Casual observations 12
HOW MUCH EFFORT? 12
HOW MANY SPECIES? 13
POINT COUNTS 13
Information for less experienced birders 14
How many Point Counts, and where? 15
Off-road Point Counts: squares with road access 16
Off-road Point Counts: squares with little or no road access 16
How to do a Point Count 16
When to do Point Counts 18
How to record habitat 18
Completing the Point Count Data Form 19
DETERMINING UTM EASTINGS AND NORTHINGS 21
ATLASSING IN NORTHERN ONTARIO 22
COVERAGE PRIORITY 23
RARE OR COLONIAL SPECIES 23
Rare Species 25
Colonial Species 25
SURVEYING PUBLIC AND PRIVATE PROPERTY 25
SAFETY 26
ONTARIO NEST RECORDS SCHEME (ONRS) 26
APPENDIX A: GLOSSARY 28
APPENDIX B: ATLAS REGIONAL COORDINATORS 29
APPENDIX C: SPECIES 4-LETTER CODES 31
APPENDIX D: POINT COUNT METHODOLOGY SUMMARY 33
APPENDIX E: ATLAS COMMITTEE STRUCTURE AND MEMBERSHIP. 34
APPENDIX F: SOME EXAMPLES OF BREEDING CODES. 35

PROJECT OVERVIEW

Welcome to Ontario's second Breeding Bird Atlas, scheduled to run from 2001- 2005. It follows on the highly successful first atlas that was carried out from 1981-1985. The Atlas's goal is to provide an up-to-date assessment of the distribution, relative

abundance and status of the birds that breed in the province.

The basic field work for this atlas is similar to that in the first atlas. The province is divided up into 10-km squares and 100-km blocks based on the Universal Transverse Mercator (UTM) grid. Atlassers are asked to do field work in selected squares or blocks to find as many breeding species as possible in each, and to record the evidence of breeding for each species. In addition, those atlassers who are willing and able are asked to carry out a series of Point Counts in each square, to estimate the relative abundance of species. If any rare or colonial species are found, details are requested so they can be entered into the rare breeding bird data base. Ontario Nest Records Scheme cards are also requested for any nests found, especially for nests that can be visited multiple times (to estimate nesting success) or for poorly known species.

For administration, the province is divided into 47 regions, each with a Regional Coordinator (RC) who organizes volunteers and provides information and data packages, and to whom results should be sent. Details on region boundaries and RCs are available on the atlas web page. Data can be submitted either on paper or through on-line entry via the web page. The web page can also be used to download maps of each square, and will present details of data from the atlas as they become available, including comparisons of maps with those from the previous atlas.

This manual contains the details on how to collect data for the atlas. Don't be deterred by what may at first seem like a rather involved procedure. Reading through the manual carefully should clarify things for you. It really isn't complicated once you begin. Thousands of people around the world are taking part in similar ventures and having a good time in the process. Your RC or the atlas office can help with any problems you may encounter.

Data should be submitted by August 31 each year.

Anyone can participate

Although most atlas data will be provided by experienced birders, less-experienced observers can make a valuable contribution so long as they submit only records of which they are certain. During the first atlas, many new birders got involved and developed their skills over the project's 5 years. It is not necessary to take on an entire square; you can help out in a square, and/or participate as a "casual observer", submitting records from anywhere in the province. Again, during the first atlas, some avid atlassers submitted records from dozens and even hundreds of squares over the 5-year period. Atlas workshops will be given in many regions across the province, and will include training on data collection, song identification, use of GPS, how to read atlas maps and use UTMs. See our web site (**www.birdsontario.org**) for details on workshops and for links to training web pages.

Thanks very much for your participation in the atlas project! Good luck in your square(s)! Have fun, and tell your birder friends to get involved!

PURPOSE AND APPROACH

The first atlas contributed significantly to our understanding of bird status and distribution in Ontario, and has been used for numerous conservation and protection purposes province-wide. The objectives of the second atlas are to:

1. Repeat the coverage of the first atlas and provide detailed maps of each species' current distribution for comparison to the first atlas.
2. Collect abundance data to allow contour mapping of the relative abundance of each species, and provide a baseline for comparison to future atlases.
3. Record specific information on the location of breeding sites of rare species.
4. Produce a published book and database available for research and conservation purposes.
5. Get people out into the field where they can enjoy themselves birding and contribute to an important conservation project.

In terms of its scientific merit, the atlas project will:

1. Provide data on current distribution, and new baseline data on relative densities, which will allow changes in bird populations to be tracked over time.
2. Provide information useful in assessing the conservation needs of particular species.
3. Serve as reference information for environmental impact assessments.
4. Help select species which may serve as indicators of changing environmental quality.
5. Help determine the relative value of individual parks and other protected areas for maintaining biotic diversity.
6. Compile extensive data on the breeding locations and status of rare species.
7. Facilitate an evaluation of the effects of forest management on birds in Crown Forests of Ontario.

SCOPE

For the purpose of the project, Ontario has been divided into 10-km "squares"and 100-km "blocks" (Figure 1). Our goal is to provide adequate coverage of every 10-km square in southern Ontario, and of every 100-km block in northern Ontario. Data will be recorded on a 10-km basis wherever possible in the north.

The province has also been divided into 47 regions (see Figure 2). Each region has a Regional Coordinator (RC), often assisted by a Regional Coordinating Committee, and most of your contact with the project will be through your RC. Regional boundaries correspond very roughly to municipal boundaries. A list of RCs is provided in Appendix B and on the web page, or is available from the atlas office.

Briefly, volunteer participants are asked to spend time in at least one 10-km square, listing bird species present and recording evidence for breeding on a preprinted data form. They are also given the option of collecting information on the relative abundance of species in their square by doing Point Count surveys. The atlas will be the summation of the information collected in thousands of such squares over a five-year period.

Atlassers can take responsibility for covering one or more particular squares, but are also encouraged to provide data from any squares anywhere in the province, even if visited only briefly.

Atlassers often comment on the pleasure of gaining intimate knowledge of the birds and habitats in their assigned squares, and may gain insight into bird behaviour and the composition of bird communities. The thorough coverage of squares required by atlassing may reveal rare species or extensions and retractions of range that would otherwise go undetected.

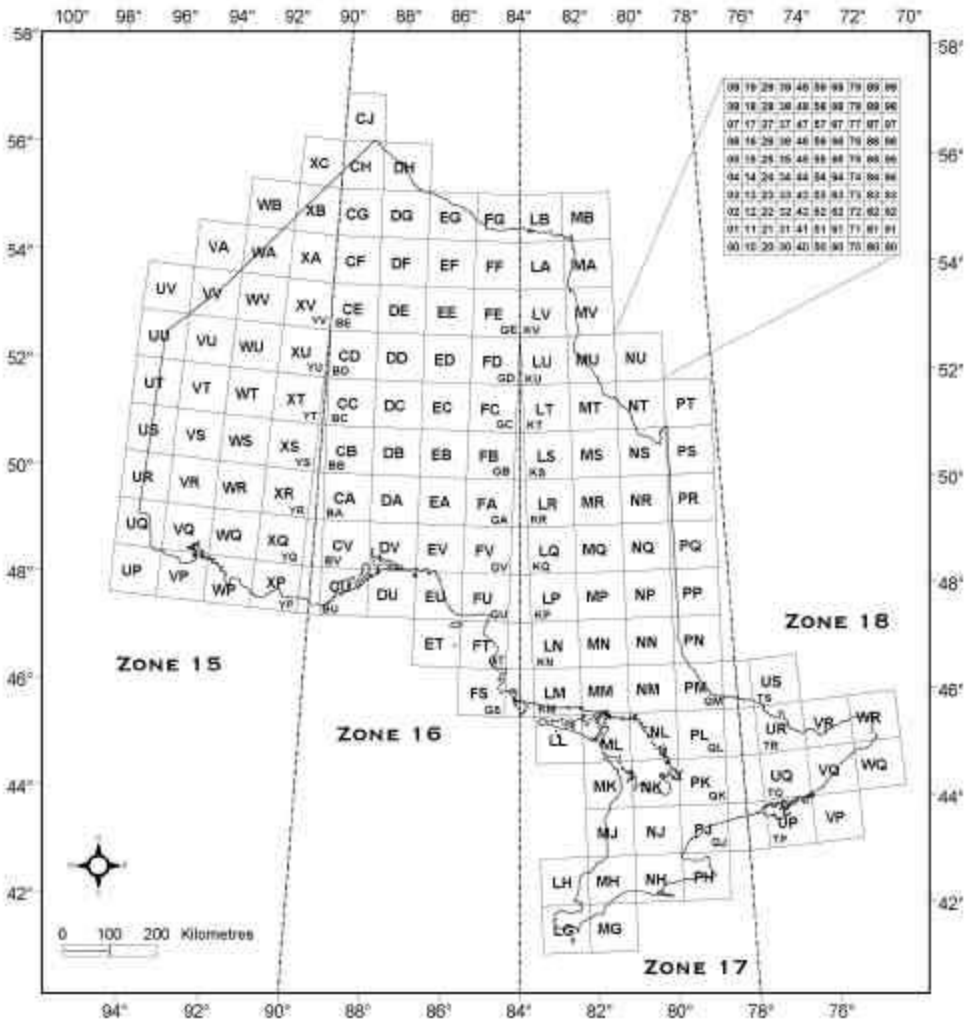

Figure 1. Atlas zones, blocks and squares.

GETTING STARTED

Registration forms

To submit data to the project, you will need an Atlasser ID number. If you have already registered on the atlas web page, you will receive a completed Registration form containing your Atlasser ID number. If you aren't yet registered, you will get a blank Registration form from your RC. You should either register on the web page or complete the form and mail it to the atlas office, and we'll provide you with an Atlasser ID number.

Obtaining materials

Atlassing will be greatly simplified by contacting your RC. Your RC can:

1. Explain more about the project to you, and suggest ways in which you can contribute, given your skills and the time you have available.

2. Direct you to squares which have not been assigned, or in which additional help is needed.

3. Provide you with an Atlasser's Kit containing:

- Map of the square(s)
- Regional map
- Participant's guide
- Breeding Evidence Data Forms
- Point Count Data Forms (optional completion)
- Rare/Colonial Species Data Forms (for use if needed)
- A Regional/Square Summary Sheet
- Atlasser registration form
- Atlasser ID card
- Atlasser notice for car dashboard
- Ontario Nest Records Scheme (ONRS) Cards (optional completion)
- ONRS Coding Card (for habitats and 4-letter species codes)

Atlassers will need to have their Atlasser's kit, plus a pencil and eraser, binoculars and compass with them in the field. A Global Positioning System (GPS) Unit will also be very useful, but is not required. See the web page for more on GPS units.

All participants will receive a **Regional/Square Summary Sheet** that includes:

- The list of species reported in the square and region during the first atlas.
- Breeding dates for each species: a guideline as to when the species most frequently breeds in the region.
- The number of roadside and off-road Point Counts that should be done for the square (in case Point Counts are going to be done).
- For squares with few or no roads, a habitat breakdown of the square to help you select representative Point Count locations.

MAPS

You will receive a map of your adopted 10-km square and a map of your atlas region. It is also feasible to print a colour map of every square in the province from the Atlas web page. If you wish to use other topographic maps, please use the more recent North American Datum (NAD) 83 and not the old NAD 27 maps because the square boundaries have shifted since the last atlas, and the block names have changed. The NAD is always provided on topographic maps, usually in small print at the bottom of the map.

Your square code is determined by ZONE, BLOCK and SQUARE (see Figure 1). For example, the square 17MH42 is in ZONE 17, BLOCK MH and SQUARE 42.

Zone Line Areas

The Universal Transverse Mercator (UTM) grid system for Ontario is shown in Figure 1. On the UTM grid, three zone lines divide the province of Ontario. Zone lines are the boundaries of the zones that occur every 6 degrees across Canada. The area immediately to either side of a zone line is called the zone line area and makes the designation of some squares slightly more complicated. Atlassers in zone line areas will have odd-shaped "squares". Coverage targets in these odd-shaped squares are the same as other squares. If you have any questions, ask your RC.

Boundary squares

If your square crosses a border into an adjacent state or province, you should cover only the Ontario portion of the square.

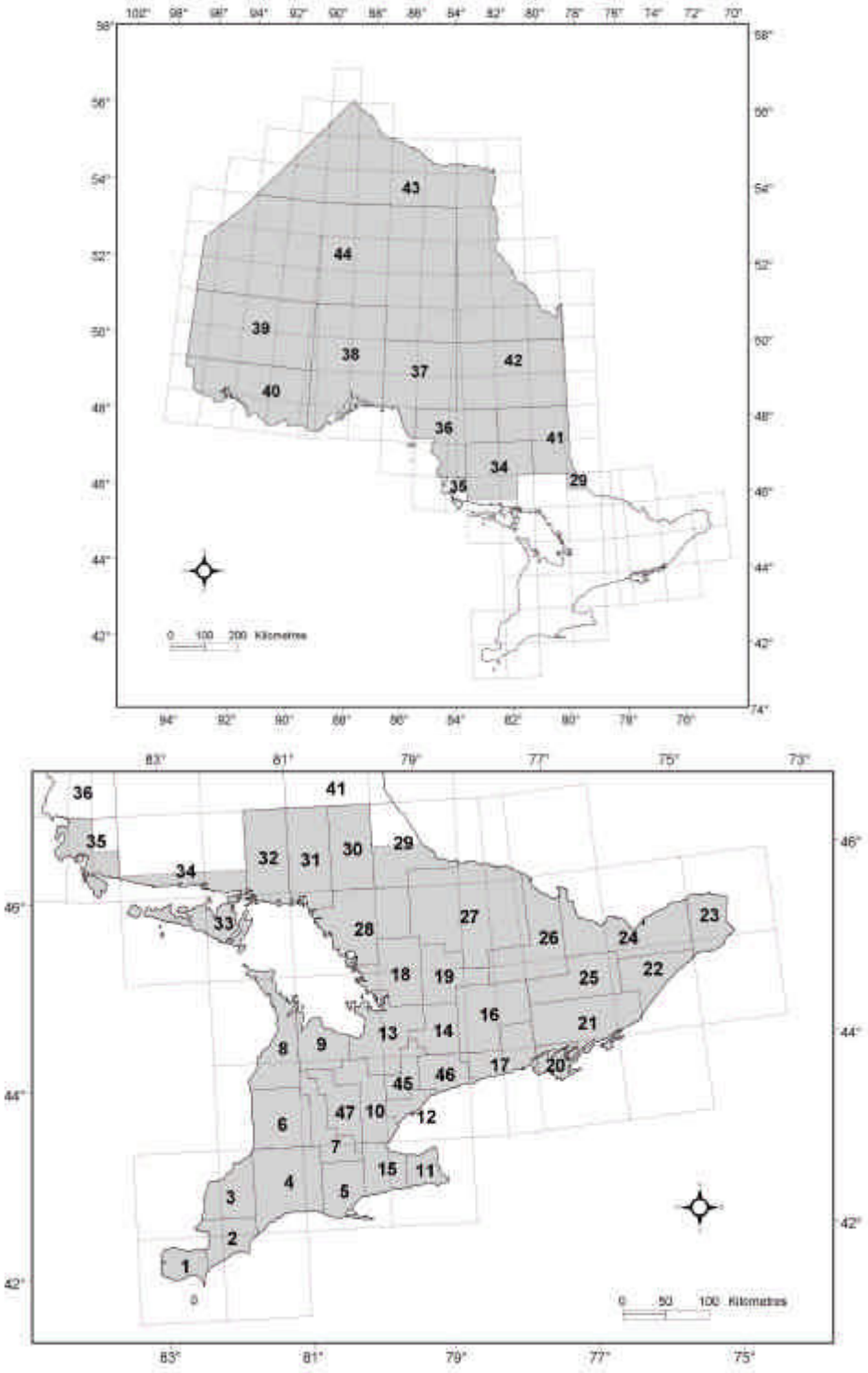

Figure 2. Atlas regions in southern and northern Ontario.
See Appendix B for a list of Regional Coordinators.

COLLECTING ATLAS DATA

It is best to familiarize yourself with the square by studying the square map and noting the different habitat types before making detailed observations. You can obtain adequate coverage most quickly by sampling all of the different habitats rather than by trying to cover the entire area of your square. Atlassing visits should be carried out primarily during the main breeding season of late-May to early July, but also outside of this period for certain species (e.g. February-March for Great Horned Owls) and by making dusk and night visits for twilight and nocturnal species. More details on when and how to look for the more elusive species will be provided in the newsletter and on the web site.

Submitting data

There are two options for submitting data to the atlas:

1. Submit your completed scannable data forms. See instructions below.
2. Enter your data on-line via the web page. Even if you plan to enter your data via the web page, we recommend that you use the computer "scannable" forms provided to record your field data. The forms closely resemble the data entry page, so it will be easier to input data from the form than directly from your notebook. To enter data online, see the instructions on the web page. If you are entering data on-line, you do not need to submit the paper data forms, but you should keep them for reference, at least until the atlas project is completed.

Completed data forms should be sent to RCs by August 31 each year, and entry of data to the web page should be complete by the same date.

About Scannable Forms

All of the atlas data forms are designed to be "scanned" and "read" by computer. Although computer technology has come a long way since the first atlas, computers are still not as good at reading handwriting as people are, so it is especially important that you fill out the forms neatly and follow the instructions – otherwise your data may be incorrectly read. It is best to use one copy of each form as a "field" form on which you can spill your coffee, squash mosquitoes, etc, and on which you don't have to be as neat. It is best to use pencil for field forms to facilitate erasing. At home, transcribe your field form onto a clean version to be submitted for scanning. On the version to be submitted, use a dark pencil, or pen, and write neatly and clearly with all numbers completely inside the boxes (without touching the edges). Use block capitals, with one character per space. Atlas staff will review input to ensure that the computer has correctly read all data, but your care in recording will greatly reduce errors, their workload, and atlas costs.

BREEDING EVIDENCE

One of your main objectives as an atlasser is to obtain the strongest evidence of breeding for as many species as possible within your square(s). There are four levels of evidence:

1. Species observed in breeding season (no indication of breeding).
2. Possible breeding.
3. Probable breeding.
4. Confirmed breeding.

See the box for details on the kind of evidence required for each of these levels.

CODE	BREEDING EVIDENCE
	OBSERVED
X	Species observed in its breeding season (no evidence of breeding). Presumed migrants should not be recorded.
	POSSIBLE BREEDING
H	Species observed in its breeding season in suitable nesting habitat.
S	Singing male present, or breeding calls heard, in its breeding season in suitable nesting habitat.
	PROBABLE BREEDING
P	Pair observed in their breeding season in suitable nesting habitat.
T	Permanent territory presumed through registration of territorial song on at least 2 days, a week or more apart, at the same place.
D	Courtship or display between a male and a female or 2 males, including courtship feeding or copulation.
V	Visiting probable nest site.
A	Agitated behaviour or anxiety calls of an adult.
B	Brood patch on adult female or cloacal protuberance on adult male.
N	Nest-building or excavation of nest hole.
	CONFIRMED BREEDING
DD	Distraction display or injury feigning.
NU	Used nest or egg shell found (occupied or laid within the period of the study).
FY	Recently fledged young or downy young, including young incapable of sustained flight.
AE	Adults leaving or entering nest site in circumstances indicating occupied nest.
FS	Adult carrying faecal sac.
CF	Adult carrying food for young.
NE	Nest containing eggs.
NY	Nest with young seen or heard.

Breeding Evidence Data Forms

There are separate Breeding Evidence Data Forms for southern Ontario, northern Ontario and the Hudson Bay Lowlands. Your RC will provide you with the form appropriate for your region.

Each atlasser will receive scannable Breeding Evidence Data Forms for each square he/she is allocated, and additional forms for observations in squares other than those allocated. Additional forms can be obtained from your RC as needed.

An example of a completed data form is shown in Figure 3. Breeding evidence should be recorded in **pencil** on the field form, because when upgrading breeding evidence you may need to erase the previously recorded code. All other information can be entered in pen.

Ontario Breeding Bird Atlas

Breeding Evidence Form - North

Zone	Block	Square	Region	Year
15	VP	58		2001

Atlasser Name: PAT JONES — Atlasser Number: 76882

Additional Observers: BOB BLACK — Atlasser Number (if available): 66315

Visit	Mon	Day	Start Time	End Time	Party Hours*
1	5	29	08:00	10:00	2:00
2	6	02	05:30	10:30	5:00
3	6	07	06:00	09:30	3:30
4	6	10	19:00	21:30	2:30
5	6	15	08:00	11:00	3:00
6	7	02	07:00	10:00	5:00
7	7	03	07:15	10:00	2:45
8	7	05	06:40	09:40	3:00
9			:	:	:
10			:	:	:

* Use 24-hr clock. See manual for calculation of party-hours. Record extra visits in notes or on separate sheet. For each species, record visit number when **first** found (use 0 if **only** recorded on casual visits).

Notes/Other Observers:

Rare species forms were completed for the Bufflehead and Bohemian Waxwing.

0887551666

Species	1st Visit	Ob.	Po.	Pr.	Conf.
Common Loon	0,2				F,Y
Pied-billed Grebe					
Red-necked Grebe †					
American White Pelican †					
Double-crested Cormorant §					
American Bittern	0,2			T	
Least Bittern †					
Great Blue Heron §	0,3	X			
Green Heron §					
Turkey Vulture					
Canada Goose	0,2				N,E
Mute Swan					
Trumpeter Swan †					
Wood Duck	0,3		H		
Gadwall					
American Wigeon					
American Black Duck					
Mallard	0,1				N,E
Blue-winged Teal					
Northern Shoveler					
Northern Pintail					
Amer Green-winged Teal					
Redhead †					
Ring-necked Duck					
Greater Scaup †					
Lesser Scaup					
White-winged Scoter †					
Bufflehead †	0,2				F,Y
Common Goldeneye					
Hooded Merganser					
Common Merganser					
Red-breasted Merganser					
Ruddy Duck †					
Osprey					

Species	1st Visit	Ob.	Po.	Pr.	Conf.
White-winged Crossbill					
Common Redpoll					
Pine Siskin					
American Goldfinch	0,2				F,S
Evening Grosbeak	0,1		S		
House Sparrow					

Additional Species Name	Code	1st Visit	Ob.	Po.	Pr.	Conf.
BOH. WAXWING	BOWA	0,3			T	

Status Codes

† - Rare species § - Colonial Species

(Please complete relevant sections of rare/colonial species form)

Breeding Codes

OBSERVED:
X - Species observed in its breeding season (no evidence of breeding)

POSSIBLE:
H - Species observed in breeding season in suitable nesting habitat
S - Singing male present or breeding calls heard in breeding season in suitable nesting habitat

PROBABLE:
P - Pair observed in their breeding season in suitable nesting habitat
T - Permanent territory presumed through registration of territorial song on at least 2 days, one week or more apart at the same place.
D - Courtship or display between a male and a female or 2 males including courtship feeding or copulation
V - Visiting probable nest site
A - Agitated behaviour or anxiety calls of an adult
B - Brood Patch on adult female or cloacal protuberance on adult male
N - Nest building or excavation of nest hole

CONFIRMED:
DD - Distraction display or injury feigning
NU - Used nest or egg shell found (occupied/laid during atlas period)
FY - Recently fledged young or downy young
AE - Adults leaving or entereing nest site in circumstances indicating occupied nest
FS - Adult carrying faecal sac
CF - Adult carrying food for young
NE - Nest containing eggs
NY - Nest with young seen or heard

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Figure 3. Three panels of a completed Breeding Evidence Data Form. There was a total of 8 visits to the square in 2001. The 5 Party Hours on Visit 6 resulted from the two observers working together for the first hour and separately for the next two hours. Great Blue Heron was observed in the square, but not at a breeding colony, so was recorded as "X". Breeding evidence for Mallard was first observed on Visit 1 (May 29), and for Canada Goose on Visit 2 (June 2). Note that these were the dates that breeding evidence was first observed – not necessarily the Visits on which breeding was confirmed. Bohemian Waxwing was added to the data form, and Rare/Colonial Species Report Forms were completed for it and the Bufflehead.

Atlassers should have at least 2 copies of the breeding evidence form for each square being atlassed. One should be used as a "field" form and carried with you while atlassing the square. After your last visit to the square each year, all information from the field form should be transcribed onto a clean form (the "record" form). The "record" form is the form that will be submitted to your RC, or from which you enter data via the web page.

Optionally, you may also want to complete a third copy of this form to keep from one year to the next (a "master" form), so you can see what species still need to be found and can track your progress (these data can also be obtained from the web page, once your data have been submitted and entered). Note that the record form that you send in at the end of each breeding season should have the information for ONE BREEDING SEASON only. However, your personally-retained copy of the "master" form may contain data from several years.

At the top of each data form, fill in the square identification (zone, block, square), the region number and the year. Fill in your name and Atlasser Number as well as those of any additional atlassers who worked with you in the square (use the 'Notes' section if more than two people worked with you). Please ask any other atlassers working with you to register, so that we can include their names in the acknowledgements and include them on our mailing list if they'd like to receive newsletters.

Make sure that you record the date of each visit in the appropriate columns, including the start time. Please record these at the **beginning** of each visit to the field, so you don't forget. Time should be recorded using a 24-hour clock (e.g., 14:45 instead of 2:45 PM), and can be rounded to the nearest 10 or 15 minutes. "Party Hours" is calculated for each visit by adding the number of hours that each party spends actively birding in the square (a party is either an individual or a group of individuals birding separately). For example, if two people are atlassing together for four hours, and they then split up for the next two hours, the total entered in the column headed "Party Hours" is 8, because (1 party x 4 hrs)+(2 parties x 2 hrs)=8. If more than 10 visits are made to the square, please list the visit number, start time, end time, and party hours in the Notes section of the data form, or on a separate sheet of paper to be sent in with your data form.

Do not report time spent in the square which is spent on activities other than atlassing, even though you may happen to record a few bird species at the same time. For example, if you were driving to work through your square and saw a Tree Swallow enter a nesting hole, you would enter the observation on the data form but would not fill out date, start time, end time or Party Hours.

Notes/Other Observers

A space has been left on the data form in which you can enter additional information relevant to the atlassing of the square, such as extra visits, reference to supplemental data forms submitted, factors affecting the quality of data collected, or records from other observers. Here are some examples of relevant comments:

- Rare/Colonial Species Report forms (see below) were sent to RC re Orchard Oriole and Cerulean Warbler in this square.
- 13 visits were made to this square. Details of the final three visits are recorded on the enclosed sheet of paper.
- Heavy fog encountered on 3 of the 4 visits to this square, severely reducing observation.
- Data on this form do not represent all habitat types – lakes were not visited though there were several of them in the square.
- John Smith provided the record of confirmed Baltimore Oriole (NU).

1st Visit

Record, in the "1st Visit" column, the number of the visit on which you first record breeding evidence for every species in the square. The visit number is taken from the "Visit" column on the front of the data form.

If you first record the species as a casual observation (e.g. while driving through the square), record the visit number as '0', using pencil. If you later see the species during a regular atlassing visit, then change this to the appropriate visit number. Do NOT change the visit number if you later upgrade the breeding evidence.

With this information, we can estimate how fast the species list grows with increasing effort. We do not expect everybody to find all of the species in each square, and these data will allow us to compare squares with different amounts of effort. This is especially important for comparison with the previous (or next) atlas, as it is unlikely that all squares will receive exactly the same amount of effort every time.

Please record the visit numbers for all observations on the same day that you first record the species, preferably while you are still in the field. If you wait even one or two days, it becomes much harder to remember which species was recorded on which day.

When visiting the square in subsequent years, you need only record visit number for species you have not previously recorded in the square. Simply enter the number of the visit (starting again at 1 each year) on which each of these species is reported.

Recording Breeding Evidence

There are several categories of breeding evidence within each breeding level (see box). You should familiarize yourself with the codes, categories and levels because you will be using the codes on the data form. The codes are listed in order of breeding evidence, from lowest to highest. The breeding evidence codes are entered on the data form. Some examples of codes are provided in Appendix F. If you have doubts about the appropriate code for a particular observation, ask your RC.

There are separate breeding evidence forms for each of three areas of Ontario: southern Ontario, northern Ontario, and the Hudson Bay Lowlands. Each form lists all of the breeding species that are normally expected in that area. Your RC will supply you with the appropriate form for your region. If you find any species that are not listed on the form, there is space at the end of the list to write those in. The four-letter species codes are provided in Appendix C. (You should complete a Rare/Colonial Species Form for each of the species you write in.)

The four columns following the "1st Visit" column are those in which you record the codes. Each of the four columns is used to record a code from a different level of evidence. The first column, headed **"Ob."** (for species **Observed**) is used to record the code "X" for the level "Species Observed". For example, you would put an "X" in the column headed "Obs" next to the names of species observed in your square which are using your square in the summer, but are probably not nesting there because of a lack of suitable habitat (e.g. foraging gulls or herons). Probable migrants should not be recorded. Only record species detected in their migration period if you observe a higher level of breeding evidence.

The next column, headed **"Po."**, is where you record codes from the "**Possible Breeding**" level of breeding evidence. If you observe a bluebird in an orchard, you would record the code "H" next to the Eastern Bluebird, in the column headed "Po".

The next column, headed "**Pr."**, is one column wide to allow you to enter a one-letter code from the "**Probable Breeding**" level of breeding evidence. If you were to find a Robin building a nest in your square,

you would record the one-letter code “N” in the column headed “Pr.”, next to Robin.

The next column is headed “**Conf.**”, and is two spaces wide so that you can record a two-letter code from the “**Confirmed Breeding**” level of breeding evidence. If, for example, you see a Spotted Sandpiper feigning injury in your square, you would record the code “DD”, next to Spotted Sandpiper.

Strengthening the evidence for breeding

During the course of the 5-year survey, while looking for previously unrecorded species, you should also look for stronger evidence of breeding for previously recorded species.

For example, on your first visit to a square, you may observe a singing Song Sparrow, which you record as 'S' under Possible. If you observe this bird singing in the same location on several subsequent occasions during the breeding season, you would now have 'Probable' evidence, and enter “T” in the Pr column. (You do not have to erase the ‘S’ already recorded in the Possible column.) If later you were to find a Song Sparrow nest with eggs in it, you would fill in “NE” in the column headed “Conf.”. You would then have upgraded the Song Sparrow from "Possible" to “Probable” to the “Confirmed” level of breeding evidence. You should attempt to obtain probable or confirmed breeding evidence for as many species as possible, especially those that are unusual in your region, or were not recorded there on the previous atlas. A species needs to be confirmed as breeding only once in the five years of the atlas for any 10-km square.

You should also upgrade within a level. The categories within each level of breeding evidence are listed in order of their importance. For example, if you had evidence for a “T” for Chipping Sparrow and then found a Chipping Sparrow displaying to another, you would upgrade the evidence by erasing “T” and filling in “D” next to Chipping Sparrow. Make sure that your data form shows the highest breeding evidence observed for each species.

Observers from the first atlas found that it was easier to obtain confirmed breeding records late in the season by observing adults carrying food or seeing fledged young. However, it is still important to do most atlassing early in the season, especially in early June, because many more species are singing and easier to find at that time.

Casual observations

If you happen to casually or incidentally observe breeding evidence for a species in someone else’s square, you can either complete a form (then enter it via the web page or send it to the RC for that region) or you can provide the information directly to the principal atlasser for the square (if you know them) so they can add the record to their own data form. However, if you spend time atlassing in someone else’s square, you should complete a form yourself, detailing dates, times of visits, party hours of atlassing, visit number and breeding evidence. This will ensure we have a complete record of atlassing effort in that square for comparison to future and previous atlases.

HOW MUCH EFFORT?

A visit to any 10-km square by an experienced observer in early June will likely yield 30 to 40 species during the first two hours of observation. From then on the number of additional species discovered during more hours of observation drops quickly.

During the first atlas, experienced observers found about 75% of the species in a square in about 16-20 hours - but 100% of the species were not found in even 200 hours. We have therefore set the minimum effort

for “adequate” coverage at 20 hours per square over the 5 years. This, however, is the **minimum** number of hours that should be spent surveying a square. If you do not know bird songs well, or travel within your square is difficult, you will need additional time to cover the square adequately. During the first atlas, squares in southern Ontario averaged over 50 hours of coverage. It is important that you spend at least 20 hours actively atlassing your square, and ensure that all habitats within the square are properly covered. If you do Point Counts (see below), you can include the time doing them in your total hours of coverage.

Some squares have relatively little land in them to be atlassed, because much of the square is water, or land that is outside the province. However, unless the available land area is less than 10% of a square, you should spend the full minimum of 20 hours atlassing the square. If the available land area is less than 10% of the square, you can reduce the number of hours, as long as all habitat types in the area are covered. Be sure to note that the square is a partial square, and the size of the area available for atlassing on the “Notes” section of the data form.

Since a minimum of only 20 hours is normally required to reasonably cover a 10-km square, a number of squares could be surveyed by one atlasser over the 5 years of the project, or even in one season. As our aim is to atlas all squares and blocks in the province, please consider covering a different square each year rather than duplicating effort within any one square. Your RC, the web page, and the quarterly newsletter will provide you with information on which squares are yet to be covered. Experience from the first atlas indicates that regions on the Canadian Shield will need considerable outside help.

HOW MANY SPECIES?

The number of species breeding in a square will vary considerably, depending upon the variety and extent of habitats in the square. On average, most squares in southern Ontario tend to support about 100 breeding species, so you should expect to find 75-100 species. Fewer species may be expected in areas where little natural habitat remains (e.g., Essex and Kent) and in the far north (Hudson Bay Lowlands). However, these numbers should be taken only as rough guidelines -- one of the objectives of the atlas is to find out how many species are supported in each square.

POINT COUNTS

One of the objectives of the atlas is to generate maps showing the relative abundance of each species across its range. These data will add greatly to the value of the atlas. Along with numerous conservation and research applications, the data will provide a basis for comparison to future atlases. Examples of the types of maps we are aiming for, in this case from Britain, can be seen on the atlas web page (www.birdsontario.org).

After considering methods tried by other atlases around the world, and testing methods during a pilot season in 2000, we decided that Point Counts would be the best method of collecting abundance information for Ontario.

Appendix D provides a summary of the point count methodology. A more thorough explanation of the methodology is provided below.

The Point Count is very simple. You stand at an appointed location (known as a “station”) for a specified time period (5 minutes for the atlas) and record all the birds seen and heard during that interval. In normal atlassing, you will often stand

quietly in the woods listening for several minutes, and the Point Count is really just a standardized way of doing that.

The majority of birds are usually heard rather than seen, especially in forested sites, so people who do Point Counts need to know the songs of most birds in their square. Because many people are not experienced doing Point Counts, and therefore may at first be intimidated by them, **doing Point Counts is not required in all squares and is completely optional for all volunteer atlassers**. However, we encourage all atlassers who know birds by song reasonably well to try doing at least a few (see information for less-experienced birders, below). Even if you couldn't do them in the first year of the atlas, you may find that with study of bird songs and more time in the field, you will be able to do Point Counts before the end of the atlas period.

In southern Ontario, we are aiming to get at least 25 Point Counts in a minimum of 25% of the squares in each region, and in some regions we are aiming for 50% or 100% of the squares (see Figure 4). In squares where 25 Point Counts will not be feasible, even a few Point Counts will add to the value of the data in the region. Your RC will contact you to see if you are willing and able to undertake Point Counts to help meet regional targets. If you agree to do Point Counts and later find that you cannot, be sure to let your RC know right away so the Point Counts in the square can be reassigned.

Getting the required number of Point Counts done in so many squares will be a big job. Once you have completed 25 Point Counts in your square(s) and your square is adequately covered, please consider helping out elsewhere in your region or in other regions with fewer atlassers. Some RCs will be forming special teams of people to ensure that sufficient Point Counts are done in their region. If you're interested in this, let your RC know.

Information for less experienced birders

We hope that less-experienced birders who know birds by song reasonably well will try some Point Counts to test their skill level. If you hear a bird you don't know during your Point Count, you can track it down and identify it at the end of the 5 minute count period. If you often find there is more than one bird song per station that you don't know and must chase, you should not submit your data, and should consider learning more bird songs before doing further Point Counts.

RCs and the atlas web page have lists of training materials to help you learn bird songs. We recommend attending any of the atlas workshops where training on Point Count methods will be provided – check the workshop schedule in the newsletter and the web page. The best method of all is to go out in the field with someone who knows their bird songs and ask a lot of questions. Otherwise, it's a matter of studying recordings, practice, building on the birds you know, and chasing down the ones you don't. It's rewarding to learn bird songs, and will help you become a better birder and a more efficient atlasser.

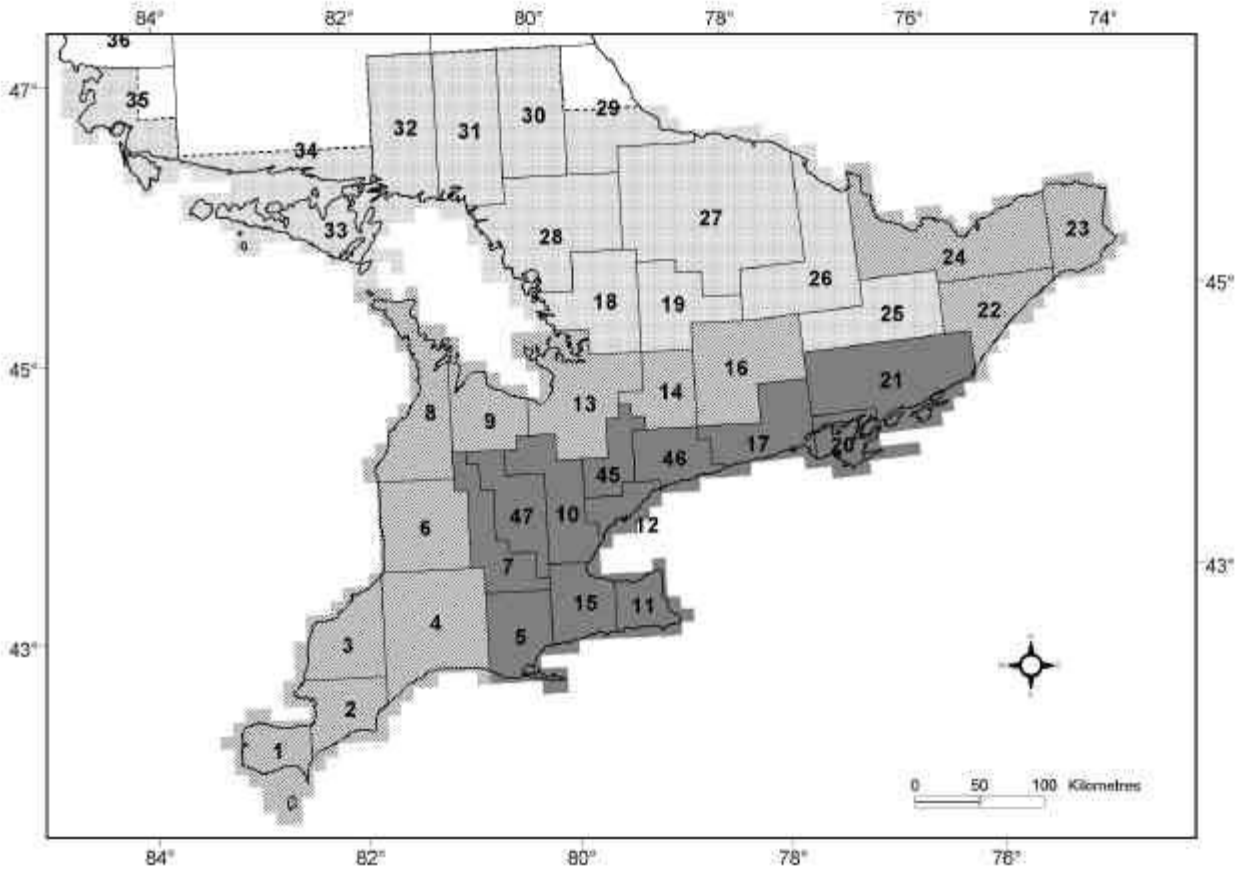


Figure 4. The atlas' goal is to get at least 25 point counts done in all squares in the shaded regions of the "Golden Horseshoe", in at least 50% of squares in the darkly shaded area and in at least 25% of squares in the lightly shaded area. See text for northern targets.

How many Point Counts, and where?

Although any number of Point Counts in a square will be useful, 25 Point Counts is the target minimum number to be done in each square. (In the north, the target minimum is 25 Point Counts in one 10-km square plus a further 25 Point Counts elsewhere in the 100-km block.) In the south, most of the 25 count stations will be along roads, but some will be off-road (see below).

To find out how many road-side and off-road Point Counts should be done in your square, look at the Regional/Square Summary Sheet.

Your atlas map shows 50 randomly located points on roadsides in your square, from which you choose the lowest numbered stations up to the required number. (E.g. if you are to do 20 on-road counts, choose numbers 1-20). In some cases, points may be on busy roads or in other locations unsuited to Point Counts. You should eliminate these from consideration, preferably before you start doing any Point Counts, and add locations with higher numbers to make up your total. For example, if your initial set of points is 1-20, but stations 15 and 18 are unsuitable, add numbers 21 and 22 to make up your total to 20. Remember that some locations which are unsuitable for much of the day may be fine in the early morning, especially on weekends, before traffic noise builds up.

Although there are 50 Point Count locations marked on your map, it is important to follow the procedure given here to ensure that count stations are randomly distributed, and not biased towards especially productive habitats or a particular portion of the square. The extra stations on the maps are provided to ensure there are enough to replace unsuitable stations, and because some atlassers may wish to do more than the minimum number. If you decide to do extra stations, use the same procedure as above to choose them (e.g. if you decide to do 30 instead of 20, select stations 1-30.)

Once you have selected your on-road stations, you can cover them in any sequence that seems efficient. For example, you may wish to cover all those in one corner of the square on a day when you are doing general atlassing in that area. Doing the Point Counts early in your atlassing is a good way to get an overview of the birds and habitats in your square.

Because each Point Count lasts 5 minutes, it may be possible to do all 25 in one morning in a square with good road access. However, it isn't necessary to do them all at once. In fact, we would prefer to have them spread out a little over the season, and even over several years if you are going to keep returning to a square.

Off-road Point Counts: squares with road access

To find the minimum number of off-road counts needed in your square, see the Regional/Square Summary Sheet. Most off-road counts are to be done in forest interior habitat, i.e., at least 100m from the edge of the woodland. In a few squares with large amounts of other habitat (e.g. marsh or swamp), you may be asked to do a small number of off-road Point Counts in those other habitats.

Within each specified habitat, you choose the location of the off-road Point Counts. Please select these locations ahead of time so you are not tempted to put in a station simply because there is an interesting bird in a particular spot. You could preselect the approximate location for your Point Count on your map, or could decide to walk a preselected distance from a landmark that you can easily recognize (e.g. 150m down the path from the edge of the woodland). Try to spread off-road stations around the square. There can be more than one station in a single woodlot, but make sure all points are at least 300 m apart. If you can't access interior forest in the square, pick the largest woodland available and put the station(s) as far from the forest edge as possible.

Off-road Point Counts: squares with little or no road access

In squares with little or no road access, you will be provided with information on the proportion of the square (and, in the north, the 100-km block) made up by each major habitat (e.g. 75% forest, 15% bog, 10% coastal marsh). You should attempt to spread Point Counts throughout the square as access allows, and should try to sample the habitats proportionately to their availability (e.g. 75% of Point Counts in forest if 75% of the square is forested). You can ignore habitats making up less than 10% of the square. We recognize, of course, that limitations of access may make it impossible to follow these guidelines. It is more important to complete the target number of Point Counts than it is to sample all habitats and portions of the square, but do try to meet the sampling goals to the extent feasible.

How to do a Point Count

Before heading into the field, be sure you have Point Count forms. The Point Count forms will be read by computer, so have to be filled in neatly. So it is best to transcribe data from your field form to a clean form that will be submitted for scanning, or you can enter the data directly from the field form via the web page. While these forms may at first seem awkward to use in the field, they help remind you of the data that

must be recorded, and you will save a lot of time in not having to write species names into a field notebook. If you do want to use a notebook, be certain to record date, time, point location and habitat (for off-road points) as we cannot process your data without them.

Once you arrive at your Point Count station, make sure the weather is suitable for doing a Point Count before proceeding (see guidelines in next section). Double check that you are as close as possible to the location marked on the map. The UTM Easting and Northing of the roadside stations is provided in a table on the 10-km square map, so people with GPS units can ensure they are very close to the specified location. If you are doing an off-road station, you will have to record UTM (see below), so either use a GPS to do this while you are on the spot, or mark the location on your map as closely as possible for later look-up of the UTM. You might give each off-road station a number for your own use in keeping track of which station is which. (If you use a number, use one greater than 50, to avoid confusion with on-road stations.)

The Point Count consists of standing at a specific point and counting all birds seen and heard during a 5 minute period. You should turn occasionally to look in all directions, but should stand at the same spot throughout the count. The 5 minute period should be adhered to exactly (to the second). We recommend using an egg-timer or other device that can be set to beep after 5 minutes. A watch with a second hand is less satisfactory because it requires frequent checking, which distracts from your birding, and you are more likely to go over 5 minutes. While it may be tempting to add a new species to your Point Count list that was detected moments after the end of the count, please do not succumb. Point Counts are certain to miss a lot of species, and their absence is a true indicator that those species are relatively uncommon in your area.

When you detect a bird, record it on your field sheet as being less than 100m ("<100m" on form) or more than 100m (>100m) from the Point Count station. Every bird you see or hear, including birds flying over the station, should be allocated to one or other of these two categories. If a bird moves from over 100m away to less than 100m away (or vice versa), record the bird only in the "<100m" category. Recording the distance provides information important to data analysis, but often worries counters because of concern that they have misclassified their observations. The rule of thumb is to simply do the best you can--and that will be fine. We recommend that, prior to doing Point Counts, you measure 100m distances in various locations/habitats to get a good feel for what 100m actually looks like. For roadside situations, you might measure the distance between telephone poles and use this distance in your determinations. Most birds are clearly less than or more than 100m away, so it is easy to categorize them. If you are unsure which category particular birds are in, feel free to note the location and check out the distance after the 5 minute count is over. If you are unsure of the distance to a particular bird, it is OK to simply guess. It is more important that every bird observed during a Point Count is recorded than it is that every one is perfectly categorized by distance.

You should record every bird you see or hear, even if at a great distance. This is so that we get a sufficient sample of birds such as raptors, which are not frequently detected by Point Counts. The only exception is for a bird seen or heard from more than one station - do not record it on both. Usually you should record it only for the station at which it was first observed. However, if it was first observed more than 100m away, and at the next station it came within 100m, record it at the second station only.

Count all birds observed during the Point Count, including fledged young and birds flying over, regardless of distance. This includes birds that you don't think are

breeding in the square. If you encounter a flock too large for counting all individuals, simply estimate the number of birds and, if you have the chance, count them more precisely after the 5 minute period is over. To quickly estimate the size of a flock, we suggest counting off groups of 5 birds for a flock of less than about 40, by 10s for a flock of less than 100, and by 25s for less than 250.

Before you leave the Point Count station, be sure you have recorded all the relevant information (location, date, start time) and, if you are doing an off-road station, that you have recorded the habitat (see details below).

When to do Point Counts

Season: Point Counts should be done in the peak breeding season for the bulk of species. This is largely June in southern Ontario, but counts are acceptable between May 24 and July 10 in southern Ontario, and between June 1 and July 10 in northern Ontario as far north as the Hudson Bay Lowlands. For 2001, the dates for the Hudson Bay Lowlands will be June 1 through July 17. Those dates will be reviewed after the first year.

Because different species breed on different schedules, you are encouraged to spread out Point Counts throughout the peak season in each square. However, if you don't have the luxury of doing so, because you are doing a blitz or can only do Point Counts on a few occasions, it is quite acceptable to do all the Point Counts in a square on one day or on two consecutive days.

Time of Day: Point Counts can be done anytime between dawn and 5 hours after dawn. Dawn is at about 5am in southern Ontario. It is not necessary that counts be done only in the very early morning – in fact some birds aren't active until an hour or two after dawn. In the peak season of early June, most species are quite active until about 5 hours after dawn.

Weather: Counts should **not** be done if it is raining, there is thick fog, or if winds are greater than 19 km/hr (i.e. >3 of the Beaufort scale, which is enough to constantly move leaves or small twigs and to extend a light flag).

How to record habitat

You are asked to record habitat at all off-road stations, using the simple coding system shown in the box on page 18. You are not required to do this for on-road counts, but if you are willing to do so, the data will be useful. Although we can often evaluate the habitat based on satellite maps, your information is important so that we can check their accuracy (as they are often imperfect, especially where habitat has changed).

Please record the dominant 1 or 2 habitats within the 100m circle around the sample point. The main habitats can be recorded on your form using a 2-character code, of which the most important for Point Counts are listed in the box on page 18. The first character is the "Class", and consists of a single capital letter (A-H), corresponding to the major habitat classes. The second character is the subclass ("Sub." on the data form), consisting of a single number (1-7). As most off-road Point Counts will be in woodland, you may need to use only the woodland categories, A1, A2 or A3. For on-road counts you may want to record 2 categories (e.g. if habitat is different on each side of the road). However, do not record a second category unless the second habitat covers at least 25% of the area within the 100m circle (excluding the road itself). If the habitat does not fit within one of the category codes shown below, or if you would like to record additional detail (such as whether the forest has been recently burned or logged) you may do so in the "Structure" and "Modification" boxes on the data form. These boxes will allow you to fill in up to four additional codes. Please see the ONRS Coding Card for additional habitat codes and instructions.

HABITAT CODES: Habitat class is shown by letters A-H, and subclass is shown by numbers 1-7.

A Woodland
- 1 Deciduous
- 2 Coniferous
- 3 Mixed (>10% of each A1 and A2)

B Grassland, Agriculture and Shrubland
- 1 Grassland
- 2 Shrubland
- 3 Planted grass
- 4 Tilled crop
- 5 Overgrown/old field
- 6 Orchard
- 7 Vineyard

C Tundra
- 1 Dry vegetated tundra/meadow
- 2 Wet vegetated tundra/meadow
- 3 Mix of wet and dry tundra
- 4 Rock/gravel
- 5 Polygonal tundra

D Human Sites
- 1 Urban
- 2 Rural

E Wetlands
- 1 Sedge/grass
- 2 Reeds/cattail
- 3 Shrubs/bog/fen

F Wetlands with mainly open water
- 1 Sheet water (shallow/impermanent)
- 2 Pond/dugout (<0.25 ha)
- 3 Small lake (0.25-5 ha)
- 4 Lake (>5 ha)
- 5 Stream (< 3 m wide)
- 6 River (> 3 m wide)
- 7 Ditch/canal with water

G Saltwater coastal sites
- 1 Marine shore
- 2 Estuarine shore
- 3 Brackish lagoon shore

H Rock
- 1 Cliff
- 2 Scree/boulder slope
- 3 Rock outcrop
- 4 Quarry
- 5 Mine spoil/slag heap

Completing the Point Count Data Form

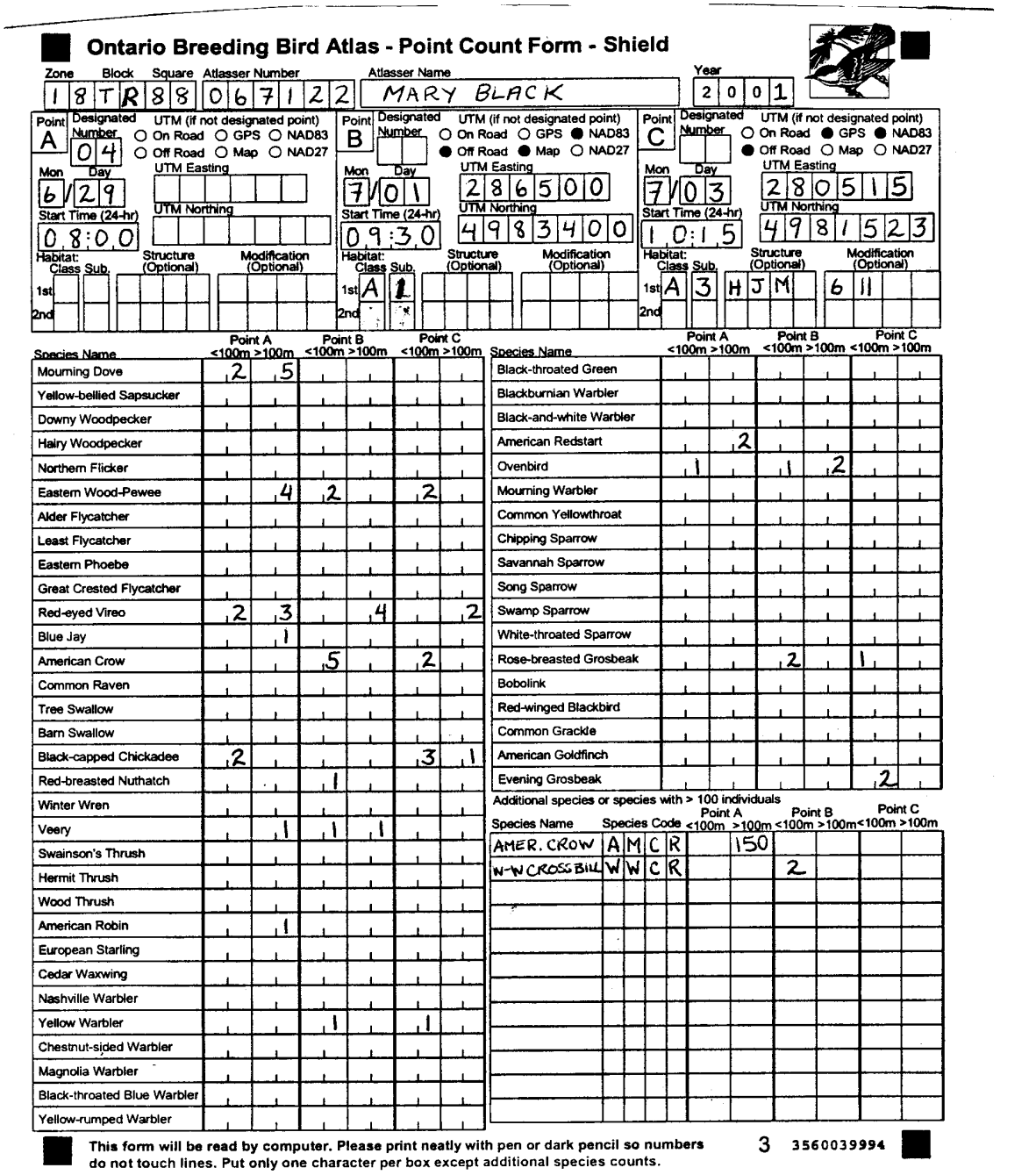
Separate Point Count forms have been prepared for different areas of Ontario, listing the species most likely to be detected on Point Counts in that area. Make sure that you have the most appropriate form for the region, or you may find that you need to write in most of the species at the end.

Area	**Atlas Region Number**
Carolinian	1-5, 11, 15
South-central	6-10, 12-14, 16,17, 20-24, 45-47
Shield	18, 19, 25-35
Boreal	36-42, 44
Hudson Bay	43

Although the Point Count Data Forms may look intimidating (Fig. 5), they are actually fairly simple to fill out. Each side of the form has space for 3 Point Counts (labelled A,B,C on the front, and D,E,F on the back), with the boxes at the top matching the columns below.

If you are surveying one of the numbered road-side points marked on your map, all you need to fill out at the top of the form is the “Designated number” (1 to 50), the date, and the start time (use a 24-hour clock). You are not required to record habitat for on-road stations (although we welcome the data if you do so).

If you are doing an off-road Point Count, or had to make up your own point locations because your square did not have a map of designated points, you should not record a Point Count number here (even if you used a number to keep track of it for yourself). Instead, you must fill in the off-road/on-road bubble, as appropriate, and the complete



Ontario Breeding Bird Atlas - Point Count Form - Shield

Zone 18 Block TR Square 88 Atlasser Number 067122 Atlasser Name MARY BLACK Year 2001

	Point A	Point B	Point C
Designated Number	04		
UTM (if not designated point)	On Road ○ GPS ○ NAD83 ○ Off Road ○ Map ○ NAD27	On Road ○ GPS ● NAD83 ● Off Road ● Map ○ NAD27	On Road ○ GPS ○ NAD83 ● Off Road ○ Map ○ NAD27
Mon / Day	6 / 29	7 / 01	7 / 03
UTM Easting		286500	280515
UTM Northing		4983400	4981523
Start Time (24-hr)	08:00	09:30	10:15
Habitat: Class Sub. 1st		A 1	A 3
Habitat: Class Sub. 2nd			
Structure (Optional)			H J M
Modification (Optional)			6 11

Species Name	Point A <100m	Point A >100m	Point B <100m	Point B >100m	Point C <100m	Point C >100m
Mourning Dove	2	5				
Yellow-bellied Sapsucker						
Downy Woodpecker						
Hairy Woodpecker						
Northern Flicker						
Eastern Wood-Pewee		4	2		2	
Alder Flycatcher						
Least Flycatcher						
Eastern Phoebe						
Great Crested Flycatcher						
Red-eyed Vireo	2	3		4		2
Blue Jay		1				
American Crow			5		2	
Common Raven						
Tree Swallow						
Barn Swallow						
Black-capped Chickadee	2				3	1
Red-breasted Nuthatch			1			
Winter Wren						
Veery		1	1	1		
Swainson's Thrush						
Hermit Thrush						
Wood Thrush						
American Robin		1				
European Starling						
Cedar Waxwing						
Nashville Warbler						
Yellow Warbler			1		1	
Chestnut-sided Warbler						
Magnolia Warbler						
Black-throated Blue Warbler						
Yellow-rumped Warbler						

Species Name	Point A <100m	Point A >100m	Point B <100m	Point B >100m	Point C <100m	Point C >100m
Black-throated Green						
Blackburnian Warbler						
Black-and-white Warbler						
American Redstart		2				
Ovenbird	1		1	2		
Mourning Warbler						
Common Yellowthroat						
Chipping Sparrow						
Savannah Sparrow						
Song Sparrow						
Swamp Sparrow						
White-throated Sparrow						
Rose-breasted Grosbeak			2		1	
Bobolink						
Red-winged Blackbird						
Common Grackle						
American Goldfinch						
Evening Grosbeak					2	

Additional species or species with > 100 individuals

Species Name	Species Code	Point A <100m	Point A >100m	Point B <100m	Point B >100m	Point C <100m	Point C >100m
AMER. CROW	AMCR		150				
W-W CROSSBILL	WWCR			2			

This form will be read by computer. Please print neatly with pen or dark pencil so numbers do not touch lines. Put only one character per box except additional species counts.

3 3560039994

Figure 5. An example of a completed Point Count Data Form. Station A is at designated Point Count number 4, so UTM and habitat information are not required. Station B is off-road, and the atlas map was used to designate UTM (so UTM is precise to 100m, and NAD83 is indicated). Station B is in deciduous woodland (Habitat Class A, subclass 1). Station C is off-road, and a GPS was used to designate UTM (so it is precise to 1m). The habitat at C is mixed woodland, and the atlasser has opted to provide additional detail on the mixed woodland in the Structure and Modification sections. The Additional species section is used for records of 150 American Crows (observed at >100m) on Point A, and 2 White-winged Crossbills (observed at <100m) on Point B. Four-letter species codes are from Appendix C or the ONRS Coding Card .

UTM Easting and Northing coordinates. These are most easily determined using a GPS unit while you are on site (please try to use NAD83 if possible), but you can also work out the coordinates from your map (see details below). If you use a GPS unit to determine the UTM coordinates, fill in the "GPS" bubble. If you get the UTM coordinates from the map, fill in the "Map" bubble. Fill in the "NAD 27" or "NAD 83" bubble as appropriate. Your atlas map is in NAD 83. If you are using a 1:50,000 topographic map to determine UTM, check whether the map is NAD 27 or NAD 83 in the text in the margin of the map.

Remember to complete the habitat section for off-road stations (see pages 17-18, or the ONRS Coding Card for codes and instructions).

Next, record your count for each bird species in the appropriate rows and columns. Please enter only one digit in each space--which allows recording of a maximum of 99 birds at each point. If you saw more than 99 of any species (e.g., a large flock flew by, or you were near a colony), or if you record any species that are not on the form, record these in the 'Additional Species' section. Here, you can write as many digits as you need in the larger boxes provided (but make sure the digits are separated from one another and don't overlap edges of the box). Fill in the 4-letter code for these additional species (check your ONRS Coding Card or the web page. Otherwise, write in the full name, and we will supply the code later. If you require space to add more species, please provide the details on a separate piece of paper to be sent in with the form.

For any Point Count station that was not marked with a number on your map (including all off-road stations), you will have to provide UTM Eastings and Northings, precise to at least 100 m (see below).

DETERMINING UTM EASTINGS AND NORTHINGS

You will need to record UTM Eastings and Northings for off-road Point Counts and for the locations of Rare or Colonial species (see below).

If you have a GPS unit, record the location while you are on site. Set the device to NAD83, and record all 6 digits of the Easting and all 7 digits of Northing. (If your GPS unit gives you 7 digits for Easting, do not record the initial "0".) If you do not have a GPS unit, mark your location on the map as accurately as possible and figure out the UTM designation later, following the instructions below.

Look at Figure 6 for an example of how to designate UTM Eastings and Northings. The 1-km and 500m "Northings" are shown along the left border of the map, and 1-km and 500m "Eastings" are shown along the bottom. The 1-km designations always end in "000", and 500m designations end in "500". There are 100m "tick" marks between the 500m and 1-km grid lines, but these are not numbered. If they were, they would end in "100", "200", "300", "400", and "600" to "900". To get the closest 100m Easting for a location, place a ruler from top to bottom on the map to determine which 100m tick mark on the bottom of the map is closest to the location. Record the 6 digit Easting of that 100m tick mark. To get the closest 100m Northing, place the ruler horizontally across the map in the same manner. On Figure 6, the "X" is at Easting 560700, and Northing 4811800.

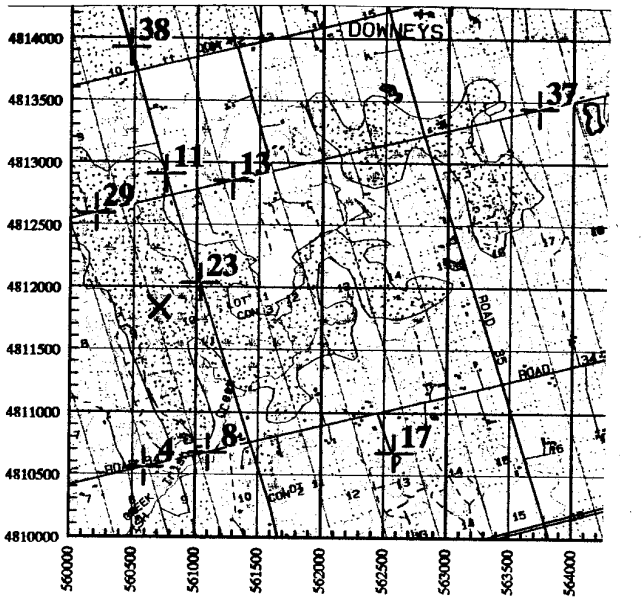


Figure 6. Part of an atlas 10-km square map. The "X" is at Easting 560700 and Northing 4811800.

ATLASSING IN NORTHERN ONTARIO

Northern Ontario will be covered on the basis of 100-km blocks (see Figs 1 and 2). Within each block, data should be recorded on a 10-km square basis whenever possible. Therefore, you should still fill in a single data form for every 10-km square in which you have observations. However, if you cannot pinpoint some of your sightings to a 10-km square, a data form for the 100-km block can be completed. To do this, enter only the zone and block codes in the square designation on the data form.

100-km blocks provide a vast area to cover, necessitating detailed planning prior to a visit. Habitats of interest may be much farther apart, bird life more thinly distributed, and travel conditions more primitive, all necessitating a far longer period of atlassing in order to obtain adequate coverage.

Adequate coverage of a 100-km block in the north is defined as:

- 50 hours of data collection, **and**
- 50 Point Counts within the block, **and**
- adequate coverage of at least one 10-km square (i.e., 20 hours of coverage and 25 Point Counts). The 25 Point Counts and 20 hours of atlassing in the 10-km square are included in the 50 of each required for the block.

These are the minimal criteria for adequate coverage. However, we hope to collect considerably more data than this in most blocks – particularly those with road access. The more data the better, because so little is known of northern bird distribution and abundance. Where feasible, RCs will be trying to have more than one 10-km square per block covered adequately.

To best represent the birds in a block, survey locations must be carefully selected to include the greatest variety of habitats present. This increases the likelihood of finding those species with specific habitat

requirements. RCs in northern regions will have habitat maps and habitat breakdowns for each block and square to help them organize coverage in each block.

A booklet entitled "Atlassing in remote northern Ontario" is available from northern RCs or from the atlas office. Anyone interested in data collection in remote northern Ontario should obtain a copy of this booklet, which will provide more information on northern habitats, and on working in remote areas.

COVERAGE PRIORITY

Because we are asking atlassers to carry out several tasks, we provide the following guidance on the priority you should place on each activity.

1. Find breeding evidence for as many species as possible in the square.
2. Do 25 Point Counts (if you are doing them)
3. Upgrade breeding evidence for as many species as possible to Probable Breeding
4. Upgrade breeding evidence for as many species as possible to Confirmed Breeding
5. Conduct extra Point Counts if desired.

For northern Ontario, the priority should be:

1. Adequately cover one 10-km square within the 100-km block (20 hours and 25 Point Counts).
2. Find breeding evidence for as many species as possible in the 100-km block.
3. Do 25 Point Counts in other portions of the block.
4. Upgrade breeding evidence for as many species as possible to Probable Breeding.
5. Upgrade breeding evidence for as many species as possible to Confirmed Breeding.

RARE OR COLONIAL SPECIES

Provincially rare breeding species are marked with a "†", and Colonial species are marked with a "§", on your Regional/Square Summary Sheet, on your Breeding Evidence data form, and in Appendix C. Regionally rare species are marked with a "‡" only on your Regional/Square Summary Sheet. **You are asked to complete a Rare/Colonial Species Report Form for all records of "†" and "‡" birds and for nesting colonies of colonial species.**

The Rare/Colonial Species Report Form (Figure 7) used to report data for these species will be scanned into the computer, so please print neatly with a dark pen or pencil and put one character in each box so that the characters do not touch the lines. The rest of the form will be read by RCs and the atlas' Rare Species committee, so please write neatly for them too!

Please report the location of rare and colonial species as precisely as possible. See instructions above for completing the UTM Eastings and Northings. Be sure to fill in the bubbles to indicate whether you used a GPS unit or a map to determine UTM, and whether you used NAD27 or NAD83. If possible, please use NAD83. Provide a complete written description and map of the location, stating as precisely as possible the exact location of the observation and how to reach it.

If you find more than one site for a particular rare or colonial species in a 10-km square, you can document all of them on the same form. There is space in the table to report 6 sites. If you find more than 6 sites in the square, simply list the relevant information for each additional site in the "Additional Comments" section on the back of the form (or attach additional sheets).

Ontario Breeding Bird Atlas
Rare/Colonial Species Form

Please complete one form for each rare or colonial species in each square

Species Name: HOODED WARBLER | Species Code: HOWA | Zone: 17 | Block: NJ | Square: 61 | Region: 47 | Year: 2001

Atlasser Number: 32880 | Atlasser Name: Arnold Jones | Additional Observers: John Smith | Atlasser Number (if known): 56612

Observation Details ● NAD83 ○ NAD27 ● GPS ○ Map

Site	Mon	Day	UTM Easting	UTM Northing	Rare Species: Breeding Evidence	Rare Species: # of Birds	Colonial Species: # Active Nests/Pairs	Colonial Species: Total # Nests
1	6	23	569325	4813533	FS	1		
2	6	25	569325	4813211	H	1		
3								
4								
5								
6								

Species Description (for Rare Species only)

Distance from Bird(s): 15-20 m. Optical Equipment: Zeiss 7x42 binoculars

Observer Experience (in general and with this species): I have observed this species on many occasions on trips to Long Point over the past 10 yrs.

DESCRIPTION: Please provide detailed account of circumstances surrounding these observations. Include a description of size, shape, colour pattern, song, call notes, behaviour and other diagnostic characters of species. Indicate only what was actually observed, and how similar species were eliminated. Include field sketches, copies of field notes, and photos, if available.

I was atlassing in early morning. I first heard the males song: "whitty-whitty-whitty-o". The male bird was singing from various heights (2-25 m) in forest over a period of 15 min. He disappeared. I waited for 10 minutes then saw the male flying with a faecal sac.
The male bird was small, approx. 6" long. Yellow with a distinctive black hood covering his head + neck. He had white outer tail feathers.

Eliminated other yellow warblers due to black hood.

#2 Saw male hooded warbler. He stayed very localized, flying within a 20m radius from branch to branch, singing.

9323488153

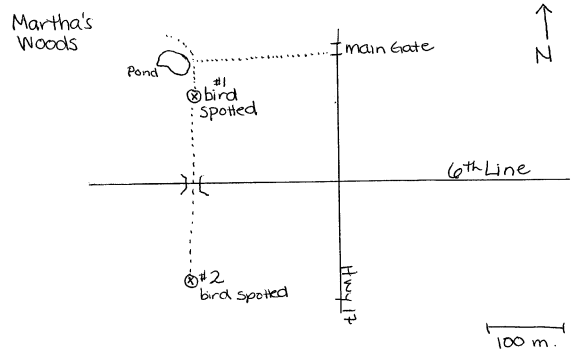
Ontario Breeding Bird Atlas -- Rare/Colonial Species Form -- page 2

Site Description

Description of Habitat: mature oak-maple forest

Description of how to access the site(s): Enter Martha's Woods through the main gate - located on Hwy. 17, 200m north of 6th Line. Follow the main trail west 150 m. to the pond. The trail splits. Turn left (south). The bird was located 45 m. down the trail. #2, 300m S. across 6th Line.

SKETCH MAP OF LOCATION (to assist in relocating breeding territory/colony). For multiple breeding sites or colonies, sketch each location separately in space provided or on a separate sheet.



Additional Comments (e.g. land ownership, nest contents)

Site #1 The land is owned by Wellington Conservation Authority.

Site #2 The land is owned by Eva Rhubur, who gave me permission to atlas. Tel. number 519-555-1026.

OFFICIAL USE ONLY: Accept as is ____; Reject record ____; Change breeding code to ____; Accept as released/escaped ____

Remarks

0327488158

Figure 7. An example of a completed Rare/Colonial Species Report Form. Note that the same form was used for Hooded Warblers found at two sites within the square. The "Description" section is required only for rare species, and only for the first site of each rare species in the square.

Rare Species

If you find breeding evidence for a rare species, please contact your RC right away. The RC might help in verifying the sighting or in completing the data form. You should use the Rare/Colonial Species Report Form if you find breeding evidence for any species not listed on your Regional/Square Summary Sheet or Breeding Evidence Data Form, or for any species marked with a "†" or a "‡"**.**

In order to safeguard species at risk, any sensitive information (e.g., precise locations of rare species) will be kept strictly confidential, according to the policies of MNR's Natural Heritage Information Centre, which houses Ontario's data on species at risk.

If the atlas is to reach its full potential as a conservation tool, it is extremely important that you report all occurrences of rare species. If you are particularly concerned about protecting information for a species you have found, contact the Atlas Coordinator at the Atlas office, who can discuss the situation with you to determine how to proceed.

Colonial Species

Colonial species are marked with a "§" on the Regional/Square Summary Sheet, on your Breeding Evidence Data Form and in Appendix C. Breeding colonies of colonial species (but not reports of colonial breeders seen away from colonies) should also be documented on Rare/Colonial Species Report Forms. Fill in one form per species, including multiple sites for a species on the same form. Colonial species are sensitive to disturbance at the colony, so you should estimate the number of nests from a distance without entering the colony.

You do not need to record Cliff Swallow colonies of fewer than 8 nests, or Bank Swallow colonies of fewer than 100 nests.

For colonial species, you do not need to complete the "Description" portion of the form.

These numbers will be used in producing maps of relative abundance of these colonial species.

SURVEYING PUBLIC AND PRIVATE PROPERTY

In your Atlasser Kit, is an atlasser I.D. card, which will identify you as a volunteer collecting data for the atlas. The card has contact information for the atlas office. Please fill in the name and phone number of your RC.

The card will give you free access to Provincial Parks for day trips to collect atlas data, and, if you make arrangements with the park ahead of time, will also allow you to camp free of charge. See the web site for more information. Similar arrangements are being sought for Conservation Areas and national parks -- see the web site for updates if you plan to visit such areas.

Before entering private property, you must ask permission from the landowner. The Atlasser Kit also has a flyer explaining the atlas. If you show the flyer and explain to the landowner the nature of the project and who is sponsoring it, in most cases permission to enter onto the property will be granted. During the first atlas, we experienced few problems in this regard. In fact, many landowners were quite interested and were very cooperative. Remember that access during the early morning should be arranged ahead of time.

Your Atlasser Kit also contains a sign you can put on the dash of your car. It states that you are collecting data for the atlas and gives contact information for the atlas office in case people have questions.

The Ontario Provincial Police have been advised that atlassers will be active for the

years 2001-2005, and have been provided with an example of the Atlas ID card. If the OPP should question you on your activities, please show them the atlasser ID card. They can contact the atlas office for further details.

SAFETY

It is always wise to inform people of where you will be working each day, and that is especially true if you will be working off-road. If you will be working in remote areas, or expect to be off-road for much of the time, we recommend that you work with a friend. Taking along a less experienced birder is a good safety measure, and it can be a valuable learning experience for that person. Take along a compass and your map, and a GPS unit if you have one.

If atlassing in "Bear Country", contact the local MNR office for advice, or see the pamphlet "Living with Black Bears in Ontario: a guide to co-existing" available at: http://www.mnr.gov.on.ca/MNR/pubs/pubmenu.html

Remember that atlassing season is also bug season, so always go prepared. For information on Lyme disease see http://www.cma.ca/cmaj/vol-162/issue-11/1567.htm.

For more on West Nile Virus, see web site: http://www.hcsc.gc.ca/hpb/lcdc/publicat/info/wnv_e.html.

ONTARIO NEST RECORDS SCHEME (ONRS)

Information about the nests of birds is useful for studies of breeding success, nesting biology and breeding distribution. Such studies are complementary to the objectives of the Atlas program. Information about all nests discovered should be recorded on ONRS cards.

By using care and judgement a brief nest examination is not likely to cause any harm or lead to nest desertion. However, the value of any nest record is greatly enhanced by the knowledge of nest contents.

Nest record cards are provided in your Atlasser's Kit, and additional copies are available from your RC or from George Peck or Mark Peck, Ontario Nest Records Scheme, Ornithology/CBCB, Royal Ontario Museum, 100 Queen's Park, Toronto, Ontario, M5S 2C6. Telephone 416-586-5523, Email address: markp@rom.on.ca . In southern Ontario, for Tree Swallow (in boxes), Barn Swallow, American Robin, Eastern Bluebird (in boxes), European Starling, Red-winged Blackbird and Common Grackle there are now more than 2,000 cards per species on file. For these species, cards need not be filled out unless multiple visits to nests are possible. Multiple visit cards for all species are extremely valuable as they allow researchers to track breeding success. Cards filled out on poorly known or rare species are also requested. Observations of breeding (e.g. a brood of ducklings with a female) may also be recorded on nest cards.

A simple system of designating habitat has been developed for Nest Record Schemes and the Atlas project. The ONRS Coding Card, which explains the method, will be provided in your Atlasser's Kit. That system is to be used to designate habitat for Point Counts, as explained above (pages 17-18).

THANKS VERY MUCH FOR YOUR PARTICIPATION. YOUR CONTRIBUTION IS ESSENTIAL TO THE SUCCESS OF THE PROJECT. GOOD LUCK IN YOUR SQUARE(S) AND HAVE FUN!

APPENDIX A: GLOSSARY

DATUM - Mathematical model used to describe the size and shape of the earth and to reference points on the earth's surface. In North America, two commonly used datums are NAD83 and NAD27. Atlas squares from the first atlas were referenced to NAD27, while the squares and maps for the new atlas are referenced to the new and improved NAD83. As a result, UTM coordinates for points on the ground have generally shifted by about 200m to the north and by about 10m to the east. In addition, the change from NAD27 to NAD83 has brought about a change in the two-letter block names. For these reasons, if you are not using one of the supplied atlas maps, it is imperative that you take note of which datum (NAD83 or NAD27) your map employs.

GPS – Global Positioning System. Hand held navigational device that can pin point locations precise to about 2 m.

MNR – Ontario Ministry of Natural Resources.

NAD83/NAD27 - see entry for datum.

ONRS – Ontario Nest Records Scheme. Run by the Royal Ontario Museum.

RC – Regional Coordinator

UTM – Universal Transverse Mercator System. A coordinate system used to reference points on the earth's surface. The UTM system divides the earth into 60 zones, each 6 degrees longitude in width. There are 4 UTM zones in Ontario (zones 15-18). An extension of the UTM system is the Military Grid Reference System - this is the system of alphanumeric codes used to define 100km blocks and 10km squares for the atlas. Within any given UTM zone, Easting and Northing coordinates are used to designate the precise location of a point.

APPENDIX B: ATLAS REGIONAL COORDINATORS

This list may change over time. Check the atlas web page or contact the Atlas office for a current list.

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Mark Gawn, Chris Harris and Paul Jones

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APPENDIX C: SPECIES 4-LETTER CODES

RTLO	Red-throated Loon †
PALO	Pacific Loon
COLO	Common Loon
PBGR	Pied-billed Grebe
HOGR	Horned Grebe †
RNGR	Red-necked Grebe †
EAGR	Eared Grebe †
AWPE	Amer. White Pelican †
DCCO	Double-crested Cormorant §
AMBI	American Bittern
LEBI	Least Bittern †
GBHE	Great Blue Heron §
GREG	Great Egret †
SNEG	Snowy Egret †
CAEG	Cattle Egret †
GRHE	Green Heron §
BCNH	Black-crowned Night-Heron †
YCNH	Yellow-crowned Night-Heron †
TUVU	Turkey Vulture
SNGO	Snow Goose §
ROGO	Ross's Goose †
CAGO	Canada Goose
MUSW	Mute Swan
TRUS	Trumpeter Swan †
TUSW	Tundra Swan †
WODU	Wood Duck
GADW	Gadwall
AMWI	American Wigeon
ABDU	American Black Duck
MALL	Mallard
BWTE	Blue-winged Teal
CITE	Cinnamon Teal †
NSHO	Northern Shoveler
NOPI	Northern Pintail
AGWT	Amer. Green-winged Teal
CANV	Canvasback †
REDH	Redhead †
RNDU	Ring-necked Duck
GRSC	Greater Scaup †
LESC	Lesser Scaup
KIEI	King Eider †
COEI	Common Eider †
SUSC	Surf Scoter †
WWSC	White-winged Scoter †
LTDU	Long-tailed Duck †
BUFF	Bufflehead †
COGO	Common Goldeneye
HOME	Hooded Merganser
COME	Common Merganser
RBME	Red-breasted Merganser
RUDU	Ruddy Duck †
OSPR	Osprey
BAEA	Bald Eagle †
NOHA	Northern Harrier
SSHA	Sharp-shinned Hawk
COHA	Cooper's Hawk
NOGO	Northern Goshawk
RSHA	Red-shouldered Hawk †
BWHA	Broad-winged Hawk
RTHA	Red-tailed Hawk
RLHA	Rough-legged Hawk †
GOEA	Golden Eagle †
AMKE	American Kestrel
MERL	Merlin
PEFA	Peregrine Falcon †
GRPA	Gray Partridge
RIPH	Ring-necked Pheasant
RUGR	Ruffed Grouse
SPGR	Spruce Grouse
WIPT	Willow Ptarmigan
STGR	Sharp-tailed Grouse †
WITU	Wild Turkey
NOBO	Northern Bobwhite †
YERA	Yellow Rail †
KIRA	King Rail †
VIRA	Virginia Rail
SORA	Sora
COMO	Common Moorhen
AMCO	American Coot
SACR	Sandhill Crane
AMGP	Amer. Golden-Plover †
SEPL	Semipalmated Plover
PIPL	Piping Plover †
KILL	Killdeer
AMAV	American Avocet †
GRYE	Greater Yellowlegs
LEYE	Lesser Yellowlegs
SOSA	Solitary Sandpiper
SPSA	Spotted Sandpiper
UPSA	Upland Sandpiper
WHIM	Whimbrel †
HUGO	Hudsonian Godwit †
MAGO	Marbled Godwit †
SESA	Semipalmated Sandpiper
LESA	Least Sandpiper
PESA	Pectoral Sandpiper †
DUNL	Dunlin †
STSA	Stilt Sandpiper †
SBDO	Short-billed Dowitcher †
COSN	Common Snipe
AMWO	American Woodcock
WIPH	Wilson's Phalarope †
RNPH	Red-necked Phalarope †
PAJA	Parasitic Jaeger †
LIGU	Little Gull †
BOGU	Bonaparte's Gull
RBGU	Ring-billed Gull §
CAGU	California Gull †
HERG	Herring Gull §
GBBG	Great Black-backed Gull †
CATE	Caspian Tern †
COTE	Common Tern §
ARTE	Arctic Tern †
FOTE	Forster's Tern †§
BLTE	Black Tern †§
BLGU	Black Guillemot †
RODO	Rock Dove
MODO	Mourning Dove
BBCU	Black-billed Cuckoo
YBCU	Yellow-billed Cuckoo
BNOW	Barn Owl †
EASO	Eastern Screech-Owl
GHOW	Great Horned Owl
NHOW	Northern Hawk Owl
BDOW	Barred Owl
GGOW	Great Gray Owl †
LEOW	Long-eared Owl
SEOW	Short-eared Owl †
BOOW	Boreal Owl
NSWO	Northern Saw-whet Owl
CONI	Common Nighthawk
CWWI	Chuck-will's-widow †
WPWI	Whip-poor-will
CHSW	Chimney Swift
RTHU	Ruby-throated Hummingbird
BEKI	Belted Kingfisher
RHWO	Red-headed Woodpecker †
RBWO	Red-bellied Woodpecker
YBSA	Yellow-bellied Sapsucker
DOWO	Downy Woodpecker
HAWO	Hairy Woodpecker
TTWO	Three-toed Woodpecker
BBWO	Black-backed Woodpecker
NOFL	Northern Flicker
PIWO	Pileated Woodpecker
OSFL	Olive-sided Flycatcher
EAWP	Eastern Wood-Pewee
YBFL	Yellow-bellied Flycatcher
ACFL	Acadian Flycatcher †
ALFL	Alder Flycatcher
WIFL	Willow Flycatcher
LEFL	Least Flycatcher
EAPH	Eastern Phoebe
GCFL	Great Crested Flycatcher
WEKI	Western Kingbird †

EAKI	Eastern Kingbird
LOSH	Loggerhead Shrike †
NSHR	Northern Shrike †
WEVI	White-eyed Vireo †
YTVI	Yellow-throated Vireo
BHVI	Blue-headed Vireo
WAVI	Warbling Vireo
PHVI	Philadelphia Vireo
REVI	Red-eyed Vireo
GRAJ	Gray Jay
BLJA	Blue Jay
BBMA	Black-billed Magpie †
AMCR	American Crow
CORA	Common Raven
HOLA	Horned Lark
PUMA	Purple Martin
TRES	Tree Swallow
NRWS	North Rough-wing Swallow
BANS	Bank Swallow §
CLSW	Cliff Swallow §
BARS	Barn Swallow
BCCH	Black-capped Chickadee
BOCH	Boreal Chickadee
TUTI	Tufted Titmouse †
RBNU	Red-breasted Nuthatch
WBNU	White-breasted Nuthatch
BRCR	Brown Creeper
CARW	Carolina Wren
BEWR	Bewick's Wren †
HOWR	House Wren
WIWR	Winter Wren
SEWR	Sedge Wren
MAWR	Marsh Wren
GCKI	Golden-crowned Kinglet
RCKI	Ruby-crowned Kinglet
BGGN	Blue-gray Gnatcatcher
EABL	Eastern Bluebird
MOBL	Mountain Bluebird †
VEER	Veery
GCTH	Gray-cheeked Thrush †
SWTH	Swainson's Thrush
HETH	Hermit Thrush
WOTH	Wood Thrush
AMRO	American Robin
GRCA	Gray Catbird
NOMO	Northern Mockingbird
BRTH	Brown Thrasher
EUST	European Starling
AMPI	American Pipit
BOWA	Bohemian Waxwing †
CEDW	Cedar Waxwing
BWWA	Blue-winged Warbler
GWWA	Golden-winged Warbler
LAWA	Lawrence's Warbler †
BRWA	Brewster's Warbler †
TEWA	Tennessee Warbler
OCWA	Orange-crowned Warbler
NAWA	Nashville Warbler
NOPA	Northern Parula
YWAR	Yellow Warbler
CSWA	Chestnut-sided Warbler
MAWA	Magnolia Warbler
CMWA	Cape May Warbler
BTBW	Black-throated Blue Warbler
YRWA	Yellow-rumped Warbler
BTNW	Black-throated Green Warbler
BLBW	Blackburnian Warbler
PIWA	Pine Warbler
KIWA	Kirtland's Warbler †
PRAW	Prairie Warbler †
PAWA	Palm Warbler
BBWA	Bay-breasted Warbler
BLPW	Blackpoll Warbler
CERW	Cerulean Warbler †
BAWW	Black-and-white Warbler
AMRE	American Redstart
PROW	Prothonotary Warbler †
OVEN	Ovenbird
NOWA	Northern Waterthrush
LOWA	Louisiana Waterthrush †
KEWA	Kentucky Warbler †
CONW	Connecticut Warbler
MOWA	Mourning Warbler
COYE	Common Yellowthroat
HOWA	Hooded Warbler †
WIWA	Wilson's Warbler
CAWA	Canada Warbler
YBCH	Yellow-breasted Chat †
SUTA	Summer Tanager
SCTA	Scarlet Tanager
EATO	Eastern Towhee
ATSP	American Tree Sparrow
CHSP	Chipping Sparrow
CCSP	Clay-colored Sparrow
FISP	Field Sparrow
VESP	Vesper Sparrow
LASP	Lark Sparrow †
SAVS	Savannah Sparrow
GRSP	Grasshopper Sparrow
HESP	Henslow's Sparrow †
LCSP	Le Conte's Sparrow
NSTS	Nelson's Sh.-tailed Sparrow
FOSP	Fox Sparrow
SOSP	Song Sparrow
LISP	Lincoln's Sparrow
SWSP	Swamp Sparrow
WTSP	White-throated Sparrow
HASP	Harris's Sparrow †
WCSP	White-crowned Sparrow
DEJU	Dark-eyed Junco
LALO	Lapland Longspur
SMLO	Smith's Longspur
SNBU	Snow Bunting †
NOCA	Northern Cardinal
RBGR	Rose-breasted Grosbeak
INBU	Indigo Bunting
DICK	Dickcissel †
BOBO	Bobolink
RWBL	Red-winged Blackbird
EAME	Eastern Meadowlark
WEME	Western Meadowlark
YHBL	Yellow-headed Blackbird †
RUBL	Rusty Blackbird
BRBL	Brewer's Blackbird
COGR	Common Grackle
BHCO	Brown-headed Cowbird
OROR	Orchard Oriole
BAOR	Baltimore Oriole
PIGR	Pine Grosbeak
PUFI	Purple Finch
HOFI	House Finch
RECR	Red Crossbill
WWCR	White-winged Crossbill
CORE	Common Redpoll
HORE	Hoary Redpoll
PISI	Pine Siskin
AMGO	American Goldfinch
EVGR	Evening Grosbeak
HOSP	House Sparrow

§ - Colonial species
† - Provincially rare species

APPENDIX D: POINT COUNT METHODOLOGY SUMMARY

Doing a Point Count is as simple as standing in one place for 5 minutes and recording all of the birds that you see or hear. If you are able to identify most of the birds in your square by song, we hope that you will try doing some Point Counts, because these will provide valuable data on the relative abundance of birds. However, Point Counts are completely optional for all volunteer atlassers.

How?
The Point Count consists of standing at a "station" and counting all birds seen and heard during a 5 minute period. Record birds as less than or more than 100m from the station.

When?
Counts should be done between dawn and 5 hours after dawn between May 24 and July 10 in good weather.

How Many?
Any number of point counts in a square is useful. In southern Ontario, our target is at least 25 Point Counts in a minimum of 25% of the squares in each region, and in some regions we are aiming for 50% or 100%. In the north, the minimum target is 25 Point Counts in one 10-km square in each 100-km block, plus a further 25 Point Counts elsewhere in the block.

Roadside Point Counts:
Most Point Counts will be along roads. The Regional/Square Summary sheet shows how many road-side and off-road counts should be done in the square. Up to 50 random "designated" roadside point locations are shown on your atlas square map. If you are to do 20 on-road counts, choose numbers 1-20, unless some of these are in unsuitable locations (e.g. too busy), in which case add number 21, 22, etc, as required. Cover them in any sequence.

Off-road Point Counts:
Some habitats, especially forest interior (>100m from an edge), are not well covered on roadsides. The Regional/Square Summary sheet shows the target minimum number of off-road Point Counts in each habitat for your square. Within each habitat, you decide where to put off-road Point Counts, but please select these locations ahead of time, so you are not biased by choosing points based on the birds you find there. Count stations should be at least 300m apart.

Squares with limited road access:
In squares with few or no roads, or squares where roads are not shown on standard maps, you will be provided with information on the proportion of the square (and, in the north, the 100-km block) made up by each major habitat (e.g. 75% forest, 15% bog, 10% coastal marsh). You should try to select Point Counts throughout the square as access allows, and to sample the habitats proportionately to their availability in the square.

Data Recording:
You may record field data on the point count form or in your notebook, but be sure you record all the information. You need to record the date, time, location, and numbers of each species less than or more than 100m from the station. For designated roadside Point Counts, record the Point Count number from the map. For all other points, record the UTM and indicate the habitat type using the simple coding system on the ONRS Coding card. Recording habitat is optional for on-road counts.

Data Submission:
Data should be copied to a clean scannable form for submission, or entered via the atlas web page: <www.birdsontario.org>.

APPENDIX E: ATLAS COMMITTEE STRUCTURE AND MEMBERSHIP

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Thanks also to the many other people who provided input to these committees and subcommittees.

APPENDIX F: SOME EXAMPLES OF BREEDING CODES.

Below are some examples to serve as guidelines for using breeding evidence codes. The fact that a species has not been know to breed in your region before is not a valid reason for omitting a Possible or Probable. Summering, non-breeding birds should be included, provided there is suitable breeding habitat.

1. Common Loon in basic (winter/subadult) plumage spending the whole summer on a lake or other waters: Observed- X.

2. Common Loon or ducks in alternate (breeding/adult) plumage spending the whole summer on a lake or other waters, but no song, display or broods: Possible-H

3. Double-crested Comorant spending whole summer on a lake with wooded islands or other suitable breeding habitat: Possible-H.

4. Great Blue Heron or similar species seen in a wooded square but where no heronry is known, even if there is a known heronry in a nearby square: Observed- X.

5. Grouse heard drumming: Possible-S. (Probable-T if heard on more than one date in the same place. Probable-D only if actual courtship and display are seen).

6. Rails heard in a marsh on a visit in early breeding season, but not on subsequent visits: Possible-S.

7. American Woodcock “peenting”/ nuptial flights, or Common Snipe “winnowing”/ flights, for three weeks, but then no further signs: Probable-T. (Possible-S if seen or heard only once; Probable-D if actual courtship and display to females seen).

8. Gulls frequenting dumps, ploughed fields, drive-ins, park lakes etc. throughout summer in unsuitable breeding habitat: Observed- X.

9. Woodpeckers drumming: Possible- S if heard in breeding season; Probable-T if heard a week or more apart in same place. (Note: Pileated and Sapsucker can be safely identified by sound alone; other species should be seen).

10. Single Clay-colored Sparrow seen, heard singing or building or occupying a nest (but no second bird ever seen): Probable-N.

Examples were adapted from the New York State Breeding Bird Atlas Handbook for Workers, February 2000.

SOME KEY POINTS

1. Familiarize yourself with your square by travelling through it and noting all the different habitat types.

2. The first priority is to find breeding evidence for as many species as possible in the square.

3. Squares should be surveyed for at least 20 hours over the 5-year period, and longer if possible.

4. Make early- and late-season visits and evening and morning visits in your square.

5. Try to visit all habitats in the square, but be sure to get permission before going on private property.

6. Record all times, dates and number of hours you survey.

7. The second priority, if you are able and willing, is to carry out at least 25 Point Counts in your square. If you know most of your local birds by song, try some Point Counts – any number would be useful.

8. If you don't know your birds well by song, work on that aspect of your skills so you may be able to do Point Counts later in the project. Use the list of materials on the web page or go out with experts whenever you can.

9. The third priority is to upgrade sightings to the highest level of breeding evidence for as many species as possible, especially rare species or species near the edge of their range.

10. Familiarize yourself with all the atlas breeding codes and species codes, and use the appropriate codes when completing forms.

11. Please complete all scannable data forms as neatly as possible, following instructions to be sure your hard-earned data are correctly interpreted.

12. Check to make sure your data are complete and accurate before submitting them to your Regional Coordinator or entering them onto the web page.

13. Rare or unusual sightings should be fully documented on a Rare/Colonial Species Report Form, and the Regional Coordinator should be notified right away.

14. Fill out Ontario Nest Records Cards for all nests, especially those you can visit multiple times, and submit them to the Nest Records Scheme at the Royal Ontario Museum.

15. Please attempt to cover more than one square within the 5-year period.

16. Have fun and get your birder friends involved.

THANKS VERY MUCH FOR YOUR INVOLVEMENT IN THE PROJECT.

ONTARIO BREEDING BIRD ATLAS
GUIDE FOR PARTICIPANTS
ADDENDUM

February 2003

Page 7, Definition of "T"

Replace the current definition of "T" with:

> "Permanent territory presumed through registration of territorial song, or the occurrence of an adult bird, at the same place, in breeding habitat, on at least two days a week or more apart, during its breeding season."

Use discretion when using this code. "T" is not to be used for colonial birds, or species that might forage or loaf a long distance from their nesting site e.g. Kingfisher, Turkey Vulture, and male waterfowl.

Page 7, Breeding Evidence Data Forms

A few changes have been made to the Breeding Evidence data forms.

1. *Square name:* We have included a space for you to record a square name on your breeding evidence card. Fill in the name that you use to refer to that square. You are not required to fill in this space, but if you are atlassing a number of different squares you may find it helpful to record a name that will help you quickly identify which square that breeding evidence form is for.

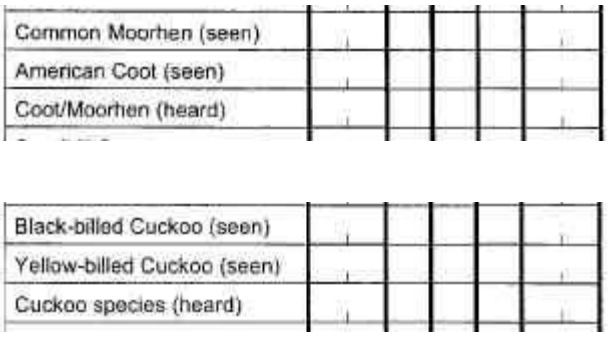
2. *Golden-winged and Blue-winged warbler, Yellow-billed and Black-billed Cuckoo, Common Moorhen and American Coot.* It has become increasingly evident that each of these pairs of species will sing the others' song. This means that song is not a reliable indicator of the presence of these species. This presents a problem for the Atlas. For example, if you were to record any one of these six species based on song this may or may not indicate the presence of this bird. The resulting species distribution maps could then depict nothing more that the distribution of the song-types, rather than the actual species distribution.

As this problem was first identified with Golden-winged and Blue-winged Warblers we modified the 2002 breeding evidence form so that Golden-winged Warbler and Blue-winged Warbler had "(seen)" beside them. Brewster's Warbler was removed and replaced with Blue/Golden-winged Warbler. Note that if you find a Brewster's Warbler you should record it in the Additional Species section at the end of your breeding evidence form and fill out a Rare/Colonial Species report form.

In 2003 the breeding evidence form has been further modified to address the same problem with the Cuckoo species and the Common Moorhen/American Coot. After each of these species "(seen)" has been added, and an additional line has been added to record the species when you only hear the bird. See Figure 1. For the Black-billed/Yellow-billed Cuckoo if you only hear the bird, you should record it under the line that reads "Cuckoo species (heard)". If you were to only hear either a Common Moorhen or American Coot, you should record it under the line that

reads " Coot/Moorhen (heard)". For a more detailed explanation, please see the example provided below.

Figure 1: Modified breeding evidence form, 2003

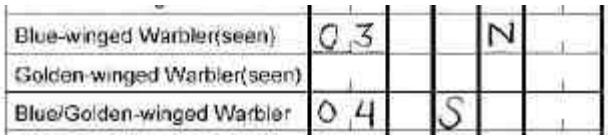


Common Moorhen (seen)					
American Coot (seen)					
Coot/Moorhen (heard)					
Black-billed Cuckoo (seen)					
Yellow-billed Cuckoo (seen)					
Cuckoo species (heard)					

Example

If you only hear either a Blue-winged or a Golden-winged Warbler song, but do not see the bird, mark the breeding evidence code in the line that says "Blue/Golden-winged Warbler". Presumably only the codes "S" and "T" should be used for this line. If you see the bird, record the appropriate breeding evidence code in either the "Golden-winged Warbler (seen)" line or the "Blue-winged Warbler (seen)" line as applicable.

Figure 2:



Blue-winged Warbler(seen)	0 3			N	
Golden-winged Warbler(seen)					
Blue/Golden-winged Warbler	0 4		S		

In this example, the atlasser saw a Blue-winged Warbler nest building on their 3rd visit to the square. On the 4th visit to the square while atlassing a different area, the atlasser heard a Golden-winged song, but did not see the bird.

For each of the six species mentioned, it is preferable to actually see the bird, if you can. Pishing can be an effective way of drawing the bird from cover.

Page 11, Casual Observations

If you happen to casually or incidentally observe breeding evidence for species in a square other than the one you regularly atlas in, you should record your observation(s) on a Casual Observation card (see Figure 3). If you do spend some time actually atlassing in a different square, complete a regular breeding evidence card, recording effort and 1st visit as you would for your own square. For example, if you are on your way to your cottage and see a Redstart carrying food on your lunch stop, note this observation on your casual observation card. If you decide to go for a hike to atlas and spend a few hours or find more than, say, 10 species, record your observations on a breeding evidence card and include the party hours information.

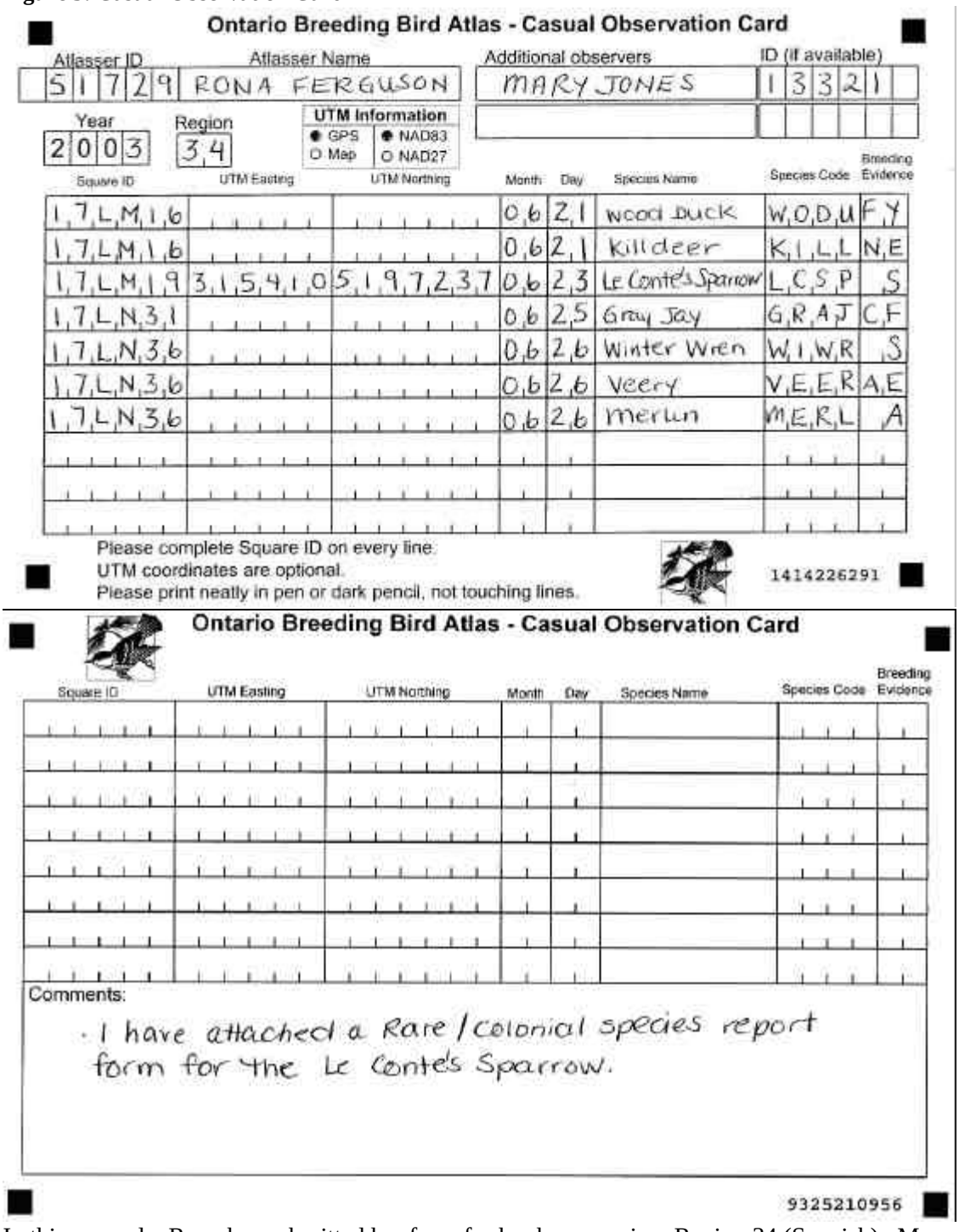
Keep Casual Observation Cards in your car so that they are always ready for you to record observations. If you also keep the Atlas regional map for your region in the car, you will be ready to identify the square, wherever you are in the region. Of course, keep cards handy for when you are on a road trip anywhere in the province.

Once completed, submit this card to the Regional Coordinator for that region (see Appendix for RC changes or see the web page for a current listing). If you prefer, you can enter the observations on-line.

At the top of the card, fill in your name, your atlasser ID number, the year, and the region. If you are atlassing with other people, add their names and atlasser numbers under "Additional Observers". If you provided UTM information, fill in the bubbles to indicate whether you used a GPS unit or a map to determine UTM, and whether you used NAD27 or NAD83. If possible, please use NAD83.

You must fill out the square ID for each record, even if it is the same as the record above. Each complete square ID is made up of a zone, a block and a square number. For example a square that is in zone 17, in block NK and is square 23 will be referred to by the complete square ID 17NK23. If you are submitting casual observations for other squares within your home region, use your region map to determine the square ID. If you are outside of your home region, you can download region maps from the web page (Atlas Data & Maps/Printable PDF Maps). Alternatively, you can determine the zone and block designations by referring to Figure 1 of your Guide for Participants, and determine your square number using a GPS unit. To do this, use the 2nd number of the easting as the first digit of the square number, and the 3rd number of the northing as the second digit. For example, a GPS reading of 2**8**0515 (easting) and 49**7**1503 (northing) will be in the square number 87.

Figure 3: Casual Observation Card



Ontario Breeding Bird Atlas - Casual Observation Card

Atlasser ID: 51729 — Atlasser Name: RONA FERGUSON — Additional observers: MARY JONES — ID (if available): 13321

Year: 2003 — Region: 34 — UTM Information: ● GPS ○ Map — ● NAD83 ○ NAD27

Square ID	UTM Easting	UTM Northing	Month	Day	Species Name	Species Code	Breeding Evidence
17LM16			06	21	Wood Duck	WODU	FY
17LM16			06	21	Killdeer	KILL	NE
17LM19	315410	5197237	06	23	Le Conte's Sparrow	LCSP	S
17LN31			06	25	Gray Jay	GRAJ	CF
17LN36			06	26	Winter Wren	WIWR	S
17LN36			06	26	Veery	VEER	AE
17LN36			06	26	Merlin	MERL	A

Please complete Square ID on every line.
UTM coordinates are optional.
Please print neatly in pen or dark pencil, not touching lines.

1414226291

Ontario Breeding Bird Atlas - Casual Observation Card

Square ID	UTM Easting	UTM Northing	Month	Day	Species Name	Species Code	Breeding Evidence

Comments:
- I have attached a Rare / Colonial species report form for the Le Conte's Sparrow.

9325210956

In this example, Rona has submitted her form for her home region, Region 34 (Spanish). Mary Jones was with her when she made these observations, so Rona has filled in Mary's name and ID number. She has recorded breeding evidence for seven different species in four different squares. She has recorded the square ID and date for each observation. For the observation of the Le Conte's Sparrow she also opted to provide the UTM coordinates. As Le Conte's Sparrow is a regionally rare species, she has also filled out and submitted a Rare/Colonial species report form for this observation.

Page 12, Point Counts

Note: All species that are detected on point counts that are in breeding habitat, in their breeding season, should also be recorded on your breeding evidence form for that square with the appropriate breeding evidence code listed.

Page 22, Rare or Colonial Species

A number of changes have been made to the Rare/Colonial Species report form.

1. *Site*: Fill in a site number, e.g. 1, 2, 3. Use the same Site number for all observations that refer to the same general location, the same colony, or, for birds with large territories, the same pair of birds. For example, if you find 4 singing male Hooded Warblers in the same woods, you can provide a single UTM central to the part of the woods occupied by the birds and write in "4" under "# of adults". Or, you can provide a UTM for each territory, but provide the same site number for each, and write "1" under "# of Adults" on each line. If you see a Red-shouldered Hawk soaring over two different woodlots, provide a UTM for each woodlot, but use the same site number for each record. If you make multiple visits to a site, use the same site number to record the results of each visit.

2. *Rare species, # adults*: Please record the number of adult birds present at the site. Do not include numbers of young/ fledglings. If you do see fledged young on-site, include the number in the description or comments section.

3. *Breeding Evidence Code*: Please ensure that you report the breeding evidence code. A breeding evidence code should be recorded for all records of rare species as well as all reports of breeding colonies.

Page 24, Colonial Species

There is strong evidence that the Chimney Swift is declining in the province. Therefore, it is important to document the locations of swift nesting colonies. For locations where **5 or more** Chimney Swifts are entering a site and exhibiting breeding behaviour, please submit a Rare/Colonial Species Form. The best way to determine if a site is being used for nesting rather than roosting is to monitor when it is being used. If birds are seen flying in and out of the structure throughout the day, nesting is probably occurring. If several birds enter or leave the site only at dusk and dawn, it is likely a roost. The "safe dates" for recording breeding evidence for Chimney Swifts are from May 24- August 5th.

New: Owl Survey Protocol

For the second season of the Atlas we introduced an optional, standardized, approach to owling that we hope will allow us to map the relative abundance of the commoner species across the province. We encourage everyone to give it a try.

We have developed an owl survey manual, owl data cards and a survey and training tape/CD. If you are interested in participating in owl surveys, you can get these materials from your Regional Coordinator.

APPENDIX: CHANGES TO ATLAS REGIONAL COORDINATORS

Please check the atlas web page, or contact the Atlas office for a complete and current list.

Region 6 Huron-Perth
Rob Ridley
c/o Scouts Canada
844 Frederick Street
Kitchener ON N2B 2B8
Tel: 519-742-8325 x.24
ridley@scouts.ca

Region 15 Hamilton
Rob Dobos
21 Sunrise Crescent
Dundas, ON L9H 3S1
(h): 905-628-0297
(w): 905-336-4953
rob.dobos@ec.gc.ca

Region 22 Thousand Islands
Gary Nielsen , Stew Hamill
and Laurie Consaul

Stew Hamill
RR#2
Merrickville, ON K0G 1N0
613-269-3415
shamill@istar.ca

Laurie Consaul
47 Smith Rd.
RR#1
Oxford Station, ON K0G 1T0
613-258-5661
lconsaul@cyberus.ca

Gary Nielsen
Leeds County Stewardship
Council
PO Box 605, Oxford Ave.
Brockville, ON K6V 5Y8
613-342-8526
gary.nielsen@mnr.gov.on.ca

The Federation of Ontario Naturalists (FON) protects Ontario's nature through research, education, and conservation action. FON champions woodlands, wetlands and wildlife, and preserves essential habitat through its own system of nature reserves. FON is a charitable organization representing 15,000 members and over 100 member groups across Ontario. For more information, contact: Federation of Ontario Naturalists, 355 Lesmill Rd., Don Mills Ontario, M3B 2W8, Tel: 1-800-440-2366, Web: www.ontarionature.org.

As in the first Ontario Breeding Bird Atlas, Bird Studies Canada (formerly Long Point Bird Observatory) is a proud partner in the delivery of the second Atlas project. BSC is Canada's largest non-government organization dedicated to the study of wild birds and their habitats, drawing upon the skills and enthusiasm of volunteers who are engaged in meaningful "citizen science." For more information, contact: Bird Studies Canada, P.O. Box 160, Port Rowan, ON, N0E 1M0. Toll free: 1-888-448-BIRD, fax: 519-586-3532, email:generalinfo@bsc-eoc.org. Web: www.bsc-eoc.org.

The Ontario Field Ornithologists (OFO) is a provincial organization dedicated to the study of birds in Ontario. It publishes *Ontario Birds* and *OFO News*, operates the listserv *Ontbirds*, hosts field trips, holds an Annual General Meeting, oversees the Ontario Bird Records Committee (OBRC), and maintains the official provincial bird checklist.
Web: www.interlog.com/~ofo.

The Ontario Ministry of Natural Resources (MNR) is supporting the atlas financially, through species at risk and monitoring programs, and through the provision of logistical support, especially in remote areas in Northern Ontario. MNR is also playing a leadership role through involvement on the Management Board and Technical Committee. Web: www.mnr.gov.on.ca

The Canadian Wildlife Service is Canada's national wildlife agency, handling wildlife matters that are the responsibility of the federal government. This includes the protection and management of migratory birds and nationally important wildlife habitat, endangered species, research on nationally important wildlife issues, control of international trade in endangered species, and international treaties. As such, Canadian Wildlife Service Ontario Region is pleased to support the Ontario Breeding Bird Atlas.
Web: www.on.ec.gc.ca/wildlife.

Appendix B: Ontario Wetland Evaluation System Assessment for the Site, 2019

WETLAND EVALUATION DATA AND SCORING RECORD

i) Wetland Name: _____

ii) MNR Administrative Region: _____
MNR District: _____
MNR Area Office: _____

iii) Conservation Authority Jurisdiction: _____

iv) County of Regional Municipality: _____

v) Township/Geographic Twp and/or Local Municipality: _____

vi) Lots and Concessions: _____

vii) Ecodistrict/Ecoregion: _____

viii) Map and Air Photo References:

a) Latitude: _____ Longitude: _____

b) UTM grid reference:
Zone: _____ Block: _____ E: _____ N: _____

c) National Topographic Series:
Map name(s): _____
_____
Map number(s): _____
_____
Edition: _____
Scale: _____

d) Aerial photographs:
Date(s) photo taken: _____ Scale: _____
Flight & plate numbers: _____
_____

e) Ontario Base Map numbers & scale: _____
_____
_____

ix) Wetland Size

(circle appropriate category, a or b)

a) Single contiguous wetland area

Total wetland size = 1.979 hectares

b) Wetland complexed comprised of _____ individual wetlands:

Wetland Unit No. 1 = _____ hectares
Wetland Unit No. 2 = _____ hectares
Wetland Unit No. 3 = _____ hectares
Wetland Unit No. 4 = _____ hectares
Wetland Unit No. 5 = _____ hectares
Wetland Unit No. 6 = _____ hectares
Wetland Unit No. 7 = _____ hectares
Wetland Unit No. 8 = _____ hectares
Wetland Unit No. 9 = _____ hectares
Wetland Unit No.10 = _____ hectares

(Attach additional sheet if necessary)

Total wetland size = 1.979 hectares *(add together size of each unit)*

Documentation requirements for evaluated wetland complexes (attach additional sheet if necessary):

- a statement of rationale for identifying a wetland complex;
- a statement of rationale for identifying any wetland complex less than 2 ha in total size;
- a statement of rationale for any vegetation community less than 0.5 ha in size;
- adherence to the wetland complexing rules (750 m; "watershed rule"; lacustrine wetlands); and
- written documentation of the reasons for including wetland units smaller than 2 ha.

1.0 BIOLOGICAL COMPONENT

1.1 PRODUCTIVITY

1.1.1 Growing Degree-Days/Soils *(max: 30 pts)*

Refer to page 43 of manual for further explanation.

1. Determine the correct GDD value for your wetland (use Figure 5).
2. Circle the appropriate GDD value from the evaluation table below.
3. Determine the Fractional Area (FA) of the wetland for each soil type.
4. Multiply the fractional area of each soil type by the applicable score-factor in the evaluation table.
5. Sum the scores for each soil type to obtain the final score (maximum score is 30 points).

NOTE: *In wetland complexes the evaluator should aim at determining the fractional area occupied by the categories for the complex as a whole.*

Fractional area = site type area / wetland area.

FA = 1

Growing Degree-Days	Clay-Loam	Silt-Marl	Lime-stone	Sand	Humic-Mesic	Fibric	Granite
<2800	15	13	11	9	8	7	5
2800-3200	18	15	13	11	9	8	7
3200-3600	22	18	15	13	11	9	7
3600-4000	26	21	18	15	13	10	8
>4000	30	25	20	18	15	12	8

Soil Type	FA of wetland in soil type		Enter appropriate score-factor from above table		
Clay/Loam		X		=	
Silt/Marl:		X		=	
Limestone:		X		=	
Sand:	1	X	13	=	13
Humic/Mesic:		X		=	
Fibric:		X		=	
Granite:		X		=	
Total					

GDD/Soils score *(maximum 30 points)* 13

1.1.2 Wetland Type

(Fractional Areas = area of wetland type/total wetland area)

	Fractional Area		Score
Bog		x 3 =	
Fen		x 6 =	
Swamp		x 8 =	
Marsh	1	x 15 =	15
Total		=	

Wetland type score *(maximum 15 points)* 15

1.1.3 Site Type

(Fractional Area = area of site type/total wetland area)

	Fractional Area		Score
Isolated	1	x 1 =	1
Palustrine (permanent or intermittent flow)		x 2 =	
Riverine		x 4 =	
Riverine (at rivermouth)		x 5 =	
Lacustrine (at rivermouth)		x 5 =	
Lacustrine (with barrier beach)		x 3 =	
Lacustrine (exposed to lake)		x 2 =	
Total		=	

Site Type Score *(maximum 5 points)* 1

1.2 BIODIVERSITY

1.2.1 Number of Wetland Types

(Check only one)

	One	=	9 points
	Two	=	13
	Three	=	20
	Four	=	30

Number of Wetland Types Score
(maximum 30 points) 9

1.2.2. Vegetation Communities

Use the data sheet provided in Appendix 4 to record and score vegetation communities (the completed form must be attached to this data record)

Only one comm. Shrub/ground cover/Phrag comms are < 0.5 ha and < 25% and not "interesting enough" to make them their own comm.

Scoring *(circle only one option for each of the columns below):*

Total # of communities with 1-3 forms	
1 =	1.5 pts
2 =	2.5
3 =	3.5
4 =	4.5
5 =	5
6 =	5.5
7 =	6
8 =	6.5
9 =	7
10 =	7.5
11 =	8
+ 0.5 *for each additional community*	
=	

Total # of communities with 4-5 forms	
1 =	2 pts
2 =	3.5
3 =	5
4 =	6.5
5 =	7.5
6 =	8.5
7 =	9.5
8 =	10.5
9 =	11.5
10 =	12.5
11 =	13
+ 0.5 *for each additional community*	
=	

Total # of communities with 6 or more forms	
1 =	3 pts
2 =	5
3 =	7
4 =	9
5 =	10.5
6 =	12
7 =	13.5
8 =	15
9 =	16.5
10 =	18
11 =	19
+ 1.0 *for each additional community*	
=	

1.5 → round to 2.

Vegetation Communities Score
(maximum 45 points) 2

1.2.3 Diversity of Surrounding Habitat

Check all appropriate items. Only habitat within 1.5 km of the wetland boundary and at least 0.5 ha in size are to be scored.

	row crop
	pasture
✓	abandoned agricultural land
	deciduous forest → wooded area too small to be a forest
	coniferous forest
	mixed forest*
	abandoned pits and quarries
	open lake or deep river
	fence rows with deep cover, or shelterbelts
	terrain appreciably undulating, hilly or with ravines
	creek flood plain

* *"Mixed forest" is defined as either 25% coniferous trees distributed singly or in clumps in deciduous forest, or 25% deciduous trees distributed singly or in clumps in coniferous forest. Note that Forest Resource Inventory (FRI) maps can be misleading since 25% conifer within a unit could be entirely concentrated around a lake.*

- road, hydro plant, cemetary, industrial businesses.

Score 1 point for each feature checked, up to a maximum of 7 points.

Diversity of Surrounding Habitat Score
(maximum 7 points) 1

1.2.4 Proximity to Other Wetlands

Check highest appropriate category. (Note: if the wetland is lacustrine, score option #1 at 8 points).

✓		Points
	Hydrologically connected by surface water to other wetlands different dominant wetland type), or to open lake or deep river within 1.5 km	8
	Hydrologically connected by surface water to other wetlands (same dominant wetland type) within 0.5 km	8
	Hydrologically connected by surface water to other wetlands (different dominant wetland type), or to open lake or deep river from 1.5 to 4 km away	5
	Hydrologically connected by surface water to other wetlands (same dominant wetland type) from 0.5 to 1.5 km away	5
✓	Within 0.75 km of other wetlands (different dominant wetland type) or open water body, but not hydrologically connected by surface water	5
	Within 1 km of other wetlands, but not hydrologically connected by surface water	2
	No wetland within 1 km	0

Name and distance (from wetland) of wetlands/waterbodies scored above:

Proximity to other Wetlands Score
(maximum 8 points) 5

1.2.5 Interspersion

Number of Intersections = _____

✓	Number of Intersections *(Check one only)*	Points
	26 or less	= 3
√	27 to 40	= 6
	41 to 60	= 9
	61 to 80	= 12
	81 to 100	= 15
	101 to 125	= 18
	126 to 150	= 21
	151 to 175	= 24
	176 to 200	= 27
	>200	= 30

= 38

Interspersion Score *(maximum 30 points)* 6

1.2.6 Open Water Types

NOTE: *this attribute is only to be scored for permanently flooded open water within the wetland (adjacent lakes do not count). Check one option only.*

✓	Open Water Type	Characteristic	Points
	Type 1	Open water occupies < 5 % of wetland area	= 8
	Type 2	Open water occupies 5-25% of wetland (occurring in central area)	= 8
	Type 3	Open water occupies 5-25% (occurring in various-sized ponds, dense patches of vegetation or vegetation in diffuse stands)	= 14
	Type 4	Open water occupies 26-75% of wetland (occurring in a central area)	= 20
	Type 5	Open water occupies 26-75% of wetlands (small ponds and embayments are common)	= 30
	Type 6	Open water occupies 76%-95% of wetland (occurring in large central area; vegetation is peripheral)	= 8
	Type 7	Open water occupies 76-95% of wetland (vegetation in patches or diffuse open stands)	= 14
	Type 8	Open water occupies more than 95% of wetland area	= 3
√	No open water		= 0

Open Water Type Score *(maximum 30 points)* 0

1.3 SIZE (BIOLOGICAL COMPONENT)

Total Size of Wetland = 1.979 ha

Sum of scores from Biodiversity Subcomponent

	1.2.1	9
+	1.2.2	2
+	1.2.3	1
+	1.2.4	5
→ +	1.2.5	6
+	1.2.6	0

= 23

Circle the appropriate score from the table below.

Total Score for Biodiversity Subcomponent

Wetland size (ha)	<37	37-47	48-60	61-72	73-84	85-96	97-108	109-120	121-132	>132
<20 ha	1	5	7	8	9	17	25	34	43	50
20-40	5	7	8	9	10	19	28	37	46	50
41-60	6	8	9	10	11	21	31	40	49	50
61-80	7	9	10	11	13	23	34	43	50	50
81-100	8	10	11	13	15	25	37	46	50	50
101-120	9	11	13	15	18	28	40	49	50	50
121-140	10	13	15	17	21	31	43	50	50	50
141-160	11	15	17	19	23	34	46	50	50	50
161-180	13	17	19	21	25	37	49	50	50	50
181-200	15	19	21	23	28	40	50	50	50	50
201-400	17	21	23	25	31	43	50	50	50	50
401-600	19	23	25	28	34	46	50	50	50	50
601-800	21	25	28	31	37	49	50	50	50	50
801-1000	23	28	31	34	40	50	50	50	50	50
1001-1200	25	31	34	37	43	50	50	50	50	50
1201-1400	28	34	37	40	46	50	50	50	50	50
1401-1600	31	37	40	43	49	50	50	50	50	50
1601-1800	34	40	43	46	50	50	50	50	50	50
1801-2000	37	43	47	49	50	50	50	50	50	50
>2000	40	46	50	50	50	50	50	50	50	50

Size Score (Biological Component)
(maximum 50 points) 1

Interpersion

15.7cm ÷ 12 = 1.308 cm

vert intersections: 12

hor. intersections: 26

total = 38

11 x 2
+ 4

2.0 SOCIAL COMPONENT

2.1 ECONOMICALLY VALUABLE PRODUCTS

2.1.1 Wood Products

Check the option that best reflects the total area (ha) of forested wetland (i.e., areas where the dominant vegetation form is h or c). Note that this is the area of all the forested vegetation communities, not total wetland size. Do not include areas where harvest is not permitted. Check only one option.

Area of wetland used for scoring 2.1.1: _____

	< 5 ha	=	0 pts
	5 - 25 ha	=	3
	26 – 50 ha	=	6
	51 – 100 ha	=	9
	101 – 200 ha	=	12
	> 200 ha	=	18

Source of information:

_____

_____

Wood Products Score *(maximum 18 points)* Ø

2.1.2 Wild Rice

Check only one.

	Present (min. size 0.5 ha)	=	6 pts
	Absent	=	0
	Harvest not permitted	=	0

Source of information:

_____

_____

Wild Rice Score *(maximum 6 points)* Ø

2.1.3 Commercial Bait Fish

Check only one.

	Present	=	12 pts
	Absent	=	0
	Fishing not permitted	=	0

Source of information:

Commercial Fish Score *(maximum 12 points)* Ø

2.1.4 Furbearers

Only species recognized as furbearers under the Fish & Wildlife Conservation Act may be scored here. Score 3 ***points for each furbearer species listed, up to a maximum of 12 points.***

	Name of furbearer	Source of information
1.	No evidence of furbearers.	
2.		
3.		
4.		
5.		
6.		

Furbearer Score *(maximum 12 points)* Ø

2.2 RECREATIONAL ACTIVITIES

Sources of information and reasons for scoring a wetland under high or moderate use below, must be included below.

Circle one score for each of the activities listed. Score is cumulative – add score for hunting, nature enjoyment and fishing together for final score.

Intensity of Use	Type of Wetland-Associated Use: Hunting	Nature Enjoyment/ Ecosystem Study	Fishing
High	40 points	40 points	40 points
Moderate	20	20	20
Low	8	8	8
Not Possible/ No evidence	(0)	(0)	(0)

Sources of information (include evidence/criteria forming basis for score and any relevant reference used to obtain that information):
- e.g., Hunting scored at 20 points: 5 hunting blinds observed; hunters using area frequently monitored for compliance (source: D. Black, MNR Conservation Officer)

Hunting: _____

Nature: _____

Fishing: _____

Recreational Activities Score
(maximum 80 points) 0

2.3 LANDSCAPE AESTHETICS

2.3.1 Distinctness

Check only one.

	Clearly Distinct	=	3 pts
	Indistinct	=	0

Landscape Distinctness Score
(maximum 3 points) 3

2.3.2 Absence of Human Disturbance

Check only one.

	Human disturbances absent or nearly so	=	7 pts
✓	One or several localized disturbances	=	4
	Moderate disturbance; localized water pollution	=	2
	Wetland intact but impairment of ecosystem quality intense in some areas	=	1
	Extreme ecological degradation, or water pollution severe and widespread	=	0

Details regarding type, extent and location of disturbance scored:
Road on western edge + southern edge, but most of road isn't going through what was once wetland. Northern tip may have lost a very small area to hydro plant.

Source of information:
geoOttawa

Absence of Human Disturbance Score
(maximum 7 points) 4

2.4 EDUCATION AND PUBLIC AWARENESS

2.4.1 Educational Uses

Check highest appropriate category.

	Frequent	=	20 pts
	Infrequent	=	12
✓	No visits	=	0

Details regarding the type and frequency of education uses scored above:

Source of information:

Educational Uses Score *(maximum 20 points)* 0

2.4.2 Facilities and Programs

Check all appropriate options, score highest category checked.

	Staffed interpretation centre	=	8 pts
	No interpretation centre or staff, but a system of self-guiding trails or brochures available	=	4
	Facilities such as maintained paths (e.g., woodchips), boardwalks, boat launches or observation towers, but no brochures or other interpretation	=	2
✓	No facilities or programs	=	0

Additional Notes/Comments:

Source of information:

Facilities and Programs Score *(maximum 8 points)* 0

2.4.3 Research and Studies

Check all that apply; score highest category checked.

	Long term research has been done	=	12 pts
	Research papers published in refereed scientific journal or as a thesis	=	10
	One or more (non-research) reports have been written on some aspect of the wetland's flora, fauna, hydrology, etc.	=	5
	No research or reports	=	0

List of reports, publications, research studies etc. scored above:

Research and Studies Score
(maximum 12 points) 0

2.5 PROXIMITY TO AREAS OF HUMAN SETTLEMENT

Name of Settlement: _____

Distance of wetland from settlement: _____

Population of settlement: _____ (Source: _____)

Circle only the highest score applicable

Distance of wetland to settlement	population >10,000	population 2,500-10,000	population <2,500 or cottage community
within or adjoining settlement	40 points	26 points	16 points
0.5 to 10 km from settlement	26	16	10
10 to 60 km from settlement	12	8	4
>60 km from nearest settlement	5	2	0

Proximity to Human Settlement Score
(maximum 40 points) 26

2.6 OWNERSHIP

owned by NCC

FA of wetland held by or held under a legal contract by a conservation body (as defined by the *Conservation Land Act*) for wetland protection	____ x 10 = ____
FA of wetland occurring in provincially or nationally protected areas (e.g., parks and conservation reserves)	____ x 10 = ____
FA of wetland area in Crown/public ownership, not as above	1 x 8 = 8
FA of wetland area in private ownership, not as above	____ x 4 = ____

Source of information:

_____

Ownership Score *(maximum 10 points)* 8

2.7 SIZE (SOCIAL COMPONENT)

Total Size of Wetland = 1.979 ha Sum of scores from Subcomponents 2.1, 2.2, and 2.5 = ~~0~~ ~~0~~ ~~26~~ 26

Circle the appropriate score from the table below.

Total for Size Dependent Social Features

	<31	31-45	46-60	61-75	76-90	91-105	106-120	121-135	136-150	>150
<2 ha	1	2	4	8	10	12	14	14	14	15
2-4	1	2	4	8	12	13	14	14	15	16
5-8	2	2	5	9	13	14	15	15	16	16
9-12	3	3	6	10	14	15	15	16	17	17
13-17	3	4	7	10	14	15	16	16	17	17
18-28	4	5	8	11	15	16	16	17	17	18
29-37	5	7	10	13	16	17	18	18	19	19
38-49	5	7	10	13	16	17	18	18	19	20
50-62	5	8	11	14	17	17	18	19	20	20
63-81	5	8	11	15	17	18	19	20	20	20
82-105	6	9	11	15	18	18	19	20	20	20
106-137	6	9	12	16	18	19	20	20	20	20
138-178	6	9	13	16	18	19	20	20	20	20
179-233	6	9	13	16	18	20	20	20	20	20
234-302	7	9	13	16	18	20	20	20	20	20
303-393	7	9	14	17	18	20	20	20	20	20
394-511	7	10	14	17	18	20	20	20	20	20
512-665	7	10	14	17	18	20	20	20	20	20
666-863	7	10	14	17	19	20	20	20	20	20
864-1123	8	12	15	17	19	20	20	20	20	20
1124-1460	8	12	15	17	19	20	20	20	20	20
1461-1898	8	13	15	18	19	20	20	20	20	20
1899-2467	8	14	16	18	20	20	20	20	20	20
>2467	8	14	16	18	20	20	20	20	20	20

Total Size Score (Social Component) 1

2.8 ABORIGINAL VALUES AND CULTURAL HERITAGE

Either or both Aboriginal or Cultural Values may be scored. However, the maximum score permitted for 2.8 is 30 points.

Full documentation of sources must be attached to the data record.

2.8.1 Aboriginal Values

	Significant	=	30 pts
	Not Significant	=	0
	Unknown	=	0

Additional Comments/Notes:

2.8.2 Cultural Heritage

	Significant	=	30 pts
	Not Significant	=	0
	Unknown	=	0

Additional Comments/Notes:

Aboriginal Values/Cultural Heritage Score
(maximum 30 points) 0

3.0 HYDROLOGICAL COMPONENT

3.1 FLOOD ATTENUATION

Check one of the following four options.

- [ ] If wetland is a single contiguous coastal wetland, ➡ score 0 points for this section.
- [ ] If all wetland units of a wetland complex are coastal wetland units, ➡ score 0 points for this section.
- [✓] If wetland or wetland complex is entirely isolated in site type, ➡ score 100 points automatically.
- [ ] Wetland not as above – proceed through 'steps' A through L below.

(A) Total wetland area = _____ ha

(B) Size of wetland's catchment = _____ ha

(C) Size of other detention areas in catchment = _____ ha

(D) Size of 'isolated' portions of wetland = _____ ha (FA = _____)

(E) Size of coastal units of wetland complex = _____ ha (FA = _____)

Points for Isolated Portion of Wetland (If not applicable, enter '0'):
(F) (FA of D) x 100 pts = _____ pts

Points for Coastal Portion(s) of Wetland (if not applicable, enter '0')
(G) (FA of E) x 100 pts = _____ pts

(H) Size of wetland minus the isolated and coastal portions = {A – D – E} = _____ ha

(I) Number of points available to score 'rest' of wetland = {100 – F – G} = _____ pts

(J) Total area of upstream detention areas = {A + C } = _____ ha

(K) Upstream Detention Factor = {(H/J) x 2} = _____ (maximum 1.0)

(L) Attenuation Factor = {(H/B) x 10} = _____ (maximum 1.0)

Flood Attenuation Final Score = {[((K + L) /2) x I] + F} = _____

Flood Attenuation Score *(maximum 100 points)* 100

3.2 WATER QUALITY IMPROVEMENT

3.2.1 Short Term Water Quality Improvement

Step 1: Determination of maximum initial score

	Wetland on one of the 5 defined large lakes or 5 major rivers (Go to Step 5A)
✓	All other wetlands (Go through Steps 2, 3, 4, and 5B)

Step 2: Determination of Watershed Improvement Factor (WIF)

Calculation of WIF is based on the fractional area (FA) of each site type that makes up the total area of the wetland.

(FA = area of site type/total area of wetland)

FA of isolated wetland	=	x 0.5 =	0.5
FA of riverine wetland	=	x 1.0 =	
FA of palustrine wetland with no inflow	=	x 0.7 =	
FA of palustrine wetland with inflows	=	x 1.0 =	
FA of lacustrine on lake shoreline	=	x 0.2 =	
FA of lacustrine at lake inflow or outflow	=	x 1.0 =	

Sum (*WIF cannot exceed 1.0*) 0.5

Step 3: Determination of catchment Land Use Factor (LUF)

(Choose the first category that fits upstream land use in the catchment.)

✓	Over 50% agricultural and/or urban	= 1.0
	Between 30 and 50% agricultural and/or urban	= 0.8
	Over 50% forested or other natural vegetation	= 0.6

LUF *(maximum 1.0)* 1.0

Step 4: Determination of Pollutant Uptake Factor (PUF)

Calculation of PUF is based on the fractional area (FA) of each vegetation type that makes up the total area of the wetland. Base assessment on the dominant vegetation form for each community except where dead trees or shrubs dominate. In that case base assessment on the dominant live vegetation type.

(FA = area of vegetation type/total area of wetland)

FA of wetland with live trees, shrubs, herbs or mosses (c, h, ts, ls, gc, m)	= x 0.75 =	
FA of wetland with emergent, submergent or floating vegetation (re, be, ne, su, f, ff)	= x 1.0 =	1
FA of wetland with little or no vegetation (u)	= x 0.5 =	

Sum *(PUF cannot exceed 1.0)* 1

Step 5: Calculation of final score

☐	Wetland on defined 5 major lakes or 5 major rivers	0
☐	All other wetlands – calculate as follows	
	Initial score	60
	Watershed Improvement Factor (WIF)	0.5
	Land Use Factor (LUF)	1
	Pollutant Uptake Factor (PUF)	
	Final score: 60 x WIF x LUF x PUF =	30

Short Term Water Quality Improvement Score
(maximum 60 points) 30

3.2.2 Long Term Nutrient Trap

Step 1:

☐	Wetland on defined 5 major lakes or 5 major rivers = 0 points
✓	All other wetlands (Proceed to Step 2)

Step 2: Choose only one of the following settings that best describes the wetland being evaluated

	Wetland located in a river mouth	=	10 pts
	Wetland is a bog, fen, or swamp with more than 50% of the wetland being covered with organic soil	=	10
	Wetland is a bog, fen, or swamp with less than 50% of the wetland being covered with organic soil	=	3
	Wetland is a marsh with more than 50% of the wetland covered with organic soil	=	3
✓	None of the above	=	0

Long Term Nutrient Trap Score
(maximum 10 points) 8

3.2.3 Groundwater Discharge

Circle the characteristics that best describe the wetland being evaluated and then sum the scores. If the sum exceeds 30 points, assign the maximum score of 30). Note: for wetland type, wetland type scored does not have to the dominant type in the wetland.

Wetland Characteristics	Potential for Discharge		
	None to Little	Some	High
Wetland type	Bog = 0	Swamp/Marsh = 2	Fen = 5
Topography	Flat/rolling = 0	Hilly = 2	Steep = 5
Wetland area: Upslope catchment area	Large (>50%) = 0	Moderate (5-50%) = 2	Small (<5%) = 5
Lagg development	None found = 0	Minor = 2	Extensive = 5
Seeps	None = 0	≤ 3 seeps = 2	> 3 seeps = 5
Surface marl deposits	None = 0	≤ 3 sites = 2	> 3 sites = 5
Iron precipitates	None = 0	≤ 3 sites = 2	> 3 sites = 5
Located within 1 km of a major aquifer	N/A = 0	N/A = 0	Yes = 10 No = 0

Additional Comments/Notes:

No catchment area U/S of wetland → it is a source of water @ top of catchment; no catchment area above it ∴ wetland area (even though it's small) is larger than U/S catchment.

Groundwater Discharge Score
(maximum 30 points) 9

3.3 CARBON SINK

Check only one of the following:

	Bog, fen or swamp with more than 50% coverage by organic soil	=	5 pts
	Bog, fen or swamp with between 10 to 50% coverage by organic soil	=	2
	Marsh with more than 50% coverage by organic soil	=	3
✓	Wetlands not in one of the above categories	=	0

Source of information:

_____

_____

Carbon Sink Score
(maximum 5 points) 0

3.4 SHORELINE EROSION CONTROL

From the wetland vegetation map determine the dominant vegetatino type within the erosion zone for lacustrine and riverine site type areas only. Score according to the factors listed below.

Step 1:

✓	Wetland entirely isolated or palustrine	=	0 pts
	Any part of the wetland is riverine or lacustrine	=	Go to step 2

Step 2: *Choose the one characteristic that best describes the shoreline vegetation (see page 109 for description of "shoreline".)*

	Trees and shrubs	=	15 pts
	Emergent vegetation	=	8
	Submergent vegetation	=	6
	Other shoreline vegetation	=	3
	No vegetation	=	0

Shoreline Erosion Control Score
(maximum 15 points) 0

3.5 GROUNDWATER RECHARGE

3.5.1 Site Type

Wetland > 50% lacustrine (by area) or located on one of the five major rivers		= 0 pts	
Wetland not as above. Calculate final score as follows:			
■ FA of isolated or palustrine wetland	=	x 50 =	50
■ FA of riverine wetland	=	x 20 =	
■ FA of lacustrine wetland (not dominant site type)	=	x 0 =	

Groundwater Recharge/Wetland Site Type Score
(maximum 50 points) 50

3.5.2 Soil Recharge Potential

*Circle only one choice that **best** describes the soils in **the area surrounding the wetland** being evaluated (the soils within the wetland are not scored here).*

Dominant Wetland Type	Group A, B, C (sands, gravels, loams)	Group D (clays, substrates in high water tables, shallow substrates over impervious materials such as bedrock)
Lacustrine or major river	0	0
Isolated	(10)	5
Palustrine	7	4
Riverine (not on a major river)	5	2

Groundwater Recharge/Wetland Soil Recharge Potential Score *(maximum 10 points)* 10

4.0 SPECIAL FEATURES COMPONENT

4.1 RARITY

4.1.1 Wetland Types

Ecodistrict	Rarity within the Landscape (4.1.1.1)	Rarity of Wetland Type (4.1.1.2)			
		Marsh	Swamp	Fen	Bog
6E-1	60	40	0	80	80
6E -2	60	40	0	80	80
6E-4	60	40	0	80	80
6E-5	20	40	0	80	80
6E-6	40	20	0	80	80
6E-7	60	10	0	80	80
6E-8	20	20	0	80	80
6E-9	0	20	0	80	80
6E-10	20	0	20	80	80
6E-11	0	30	0	80	80
6E-12	0	30	0	60	80
6E-13	60	10	0	80	80
6E-14	40	20	0	40	80
6E-15	40	0	0	80	80
6E-16	60	20	0	80	60
6E-17	40	10	0	30	80
7E-1	60	0	60	80	80
7E-2	60	0	0	80	80
7E-3	60	00	0	80	80
7E-4	80	0	0	80	80
7E-5	60	20	0	80	80
7E-6	80	30	0	80	80

4.1.1.1 Rarity within the Landscape

Choose appropriate score from 2nd column above.

Score *(maximum 80 points)* 0

4.1.1.2 Rarity of Wetland Type

Score is cumulative, based on presence/absence. Circle all appropriate scores from above table and sum.

Score *(maximum 80 points)* 30

4.1.2 Species

4.1.2.1 Reproductive Habitat for an Endangered or Threatened Species

Under the "Activity" column, when scoring animal species, record what the animal was doing when observed (e.g., nesting, courtship, singing, etc).

Common Name	Scientific Name	Activity	Date Observed	Info Source

For each species score 250 points. (Score is cumulative, no maximum score)

Additional Notes/Comments:

Reproductive Habitat for Endangered or Threatened Species *(no maximum)* ___Ø___

4.1.2.2 Traditional Migration or Feeding Habitat for an Endangered or Threatened Species

Under the "Activity" column, when scoring animal species, record what the animal was doing when observed (e.g., nesting, courtship, singing, feeding, resting etc). Dates that species has been recorded using the wetland must be included in the table below.

Common Name	Scientific Name	Activity	Dates Observed	Info Source

For one species score 150 points; for each additional species score 75 points. (Score is cumulative)

Additional Notes/Comments:

KB & KA saw a single BAPS feeding over the wetland, however, species must be recorded using the wetland on at least 2 diff yrs in a 10yr period

Traditional Habitat for Endangered or Threatened Species *(no maximum)* 0

↗ generate list using NHIC.

4.1.2.3 Provincially Significant Animal Species

Common Name	Scientific Name	Activity	Dates Observed	Info Source
Monarch	Danaus plexippus	Flying over wetland, landed on wildflowers on wetland margin. Monarchs don't use wetlands in life cycle so can't be counted.	June 3/19	KB + KA observed in field

lichens

Additional Notes/Comments:
Several species of lichens are found within 1 km sq grid on NHIC, but all species grow on deciduous trees. Since this wetland is a marsh (no woody material in marshes), they are to be excluded from this section.

One species =	50 pts	9 species =	140 pts	17 species =	160 pts
2 species =	80	10 species =	143	18 species =	162
3 species =	95	11 species =	146	19 species =	164
4 species =	105	12 species =	149	20 species =	166
5 species =	115	13 species =	152	21 species =	168
6 species =	125	14 species =	154	22 species =	170
7 species =	130	15 species =	156	23 species =	172
8 species =	135	16 species =	158	24 species =	174
				25 species =	176

Add one point for every species past 25 (for example, 26 species = 177 points, 27 species = 178 points etc.)

Provincially Significant Animal Species *(no maximum)* 0

4.1.2.4 Provincially Significant Plant Species

Common Name	Scientific Name	Activity	Dates Observed	Info Source

Additional Notes/Comments:
See comments on previous pg.

One species = 50 pts	9 species = 140 pts	17 species = 160 pts
2 species = 80	10 species = 143	18 species = 162
3 species = 95	11 species = 146	19 species = 164
4 species = 105	12 species = 149	20 species = 166
5 species = 115	13 species = 152	21 species = 168
6 species = 125	14 species = 154	22 species = 170
7 species = 130	15 species = 156	23 species = 172
8 species = 135	16 species = 158	24 species = 174
		25 species = 176

Add one point for every species past 25 (for example, 26 species = 177 points, 27 species = 178 points etc.)

Provincially Significant Plant Species
(no maximum) 0

4.1.2.5 Regionally Significant Species

Common Name	Scientific Name	Activity	Dates Observed	Info Source
Tennessee Warbler				
↳ observed during breeding season @ BBS3 (not near wetland) ↳ no evidence of breeding; can't be counted				
Dark-eyed juncos observed by KB & PH outside of breeding season (April 9) → can't be counted				

One species= 20 pts	4 species = 45 pts	7 species = 58 pts
2 species = 30	5 species = 50	8 species = 61
3 species = 40	6 species = 55	9 species = 64
		10 species = 67

For each significant species over 10 in wetland, add 1 point.

Regionally Significant Species Score
(no maximum score) 0

4.1.2.6 Locally Significant Species

Common Name	Scientific Name	Activity	Dates Observed	Info Source
Some rare plant species observed on site but not in wetland.				

One species= 10 pts	4 species = 31 pts	7 species = 43 pts
2 species = 17	5 species = 38	8 species = 45
3 species = 24	6 species = 41	9 species = 47
		10 species = 49

For each significant species over 10 in wetland, add 1 point.

Locally Significant Species Score
(no maximum score) 0

4.2 SIGNIFICANT FEATURES AND HABITATS

4.2.1 Colonial Waterbirds

Record all available information. Score the highest applicable category. Include additional information as possible (e.g., nest locations, etc).

Activity	Species	Info Source	Points
Currently nesting			= 50
Known to have nested within the past 5 years			= 25
Active feeding area (great blue heron excluded)			= 15
None known			= 0

Additional Notes/Comments:

Colonial Waterbird Nesting Score
(maximum 50 points) 0

4.2.2 Winter Cover for Wildlife

Score highest appropriate category. Include rationale/sources of information.

	Provincially significant	= 100 pts
	Significant in Ecoregion	= 50
	Significant in Ecodistrict	= 25
	Locally significant	= 10
✓	Little or poor winter cover	= 0

Species/habitat/vegetation community scored *(e.g., winter deer cover in hemlock swamp, S3 and S4b)*:
Cattail marsh bordered by road on one side and small wooded area on the other

Source of information:

Winter Cover for Wildlife Score
(maximum 100 points) 0

4.2.3 Waterfowl Staging and/or Moulting Areas

Check highest level of significance for both staging and moulting; add scores for staging and for moulting together for final score. However, maximum score for evaluation under this section is 150 points.

	Staging	Moulting
Nationally/internationally significant	= 150 pts	= 150 pts
Provincially significant	= 100	= 100
Significant in the Ecoregion	= 50	= 50
Significant in Ecodistrict	= 25	= 25
Known to occur	= 10	= 10
~~Not possible/Unknown~~	= 0	= 0

Species/habitat/vegetation community scored *(e.g., approx 20 mallards in W3)*:

Source of information:

Waterfowl Staging/Moulting Score
(maximum 150 points) 20

4.2.4 Waterfowl Breeding

Check highest level of significance.

	Nationally/internationally significant	= 150 pts
	Provincially significant	= 100
	Significant in the Ecoregion	= 50
	Significant in Ecodistrict	= 25
	Habitat Suitable	= 5
	~~Habitat not suitable~~	= 0

Species/habitat/vegetation community scored *(e.g., mallard in W3)*:

Source of information:

Waterfowl Breeding Score
(maximum 100 points) 0

4.2.5 Migratory Passerine, Shorebird or Raptor Stopover Area

Check highest level of significance.

	Nationally / internationally significant	= 150 pts
	Provincially significant	= 100
	Significant in Ecoregion	= 50
	Significant in Ecodistrict	= 25
	Known to occur	= 10
	~~Not possible / Unknown~~	= 0

Species/habitat/vegetation community scored:

Source of information:

Passerine, Shorebird or Raptor Stopover Score
(maximum 100 points) 0

4.2.6 Fish Habitat

4.2.6.1 Spawning and Nursery Habitat

Area Factors for Low Marsh, High Marsh and Swamp Communities.

No. of ha of Fish Habitat	Area Factor
< 0.5 ha	0.1
0.5 – 4.9	0.2
5.0 – 9.9	0.4
10.0 – 14.9	0.6
15.0 – 19.9	0.8
20.0 +	1.0

Step 1:

	Fish habitat is not present within the wetland	Go to Step 7, Score 0 points
✓	Fish habitat is present within the wetland	Go to Step 2

Step 2: *Choose only one option*

	Significance of the spawning and nursery habitat within the wetland is known	Go to Step 3
✓	Significance of the spawning and nursery habitat within the wetland is not known	Go through Steps 4, 5 and 6

Step 3: *Select the highest appropriate category below, attach documentation:*

	Significant in Ecoregion	Go to Step 7, Score 100 points
	Significant in Ecodistrict	Go to Step 7, Score 50 points
	Locally Significant Habitat (5.0+ ha)	Go to Step 7, Score 25 points
	Locally Significant Habitat (<5.0 ha)	Go to Step 7, Score 15 points

Source of information:

_____

Step 4: Low Marsh = the 'permanent' marsh area, from the existing water line out to the outer boundary of the wetland.

✓	Low marsh not present	Go to Step 5
	Low marsh present	Continue through Step 4, scoring as noted below

Scoring of Low Marsh:

1. Check the appropriate **Vegetation Group** (see Appendix 7) for each Low Marsh community. (Based on the one most clearly dominant plant species of the dominant form in each Low Marsh vegetation community.)
2. Sum the areas (ha) of the vegetation communities assigned to each **Vegetation Group**.
3. Use these areas to assign an **Area Factor** for each checked **Vegetation Group**.
4. Multiply the **Area Factor** by the **Multiplication Factor** for each row to calculate **Score**.
5. Sum all numbers in Score column to get **Total Score for Low Marsh**.

Scoring for Presence of Key Vegetation Groups – Low Marsh

Vegetation Group Number	Vegetation Group Name	Present as a Dominant Form (check)	Total Area (ha)	Area Factor (from Table 8)	Multiplication Factor	Score
1	Tallgrass				6	
2	Shortgrass-Sedge				11	
3	Cattail-Bulrush-Burreed				5	
4	Arrowhead-Pickerelweed				5	
5	Duckweed				2	
6	Smartweed-Waterwillow				6	
7	Waterlily-Lotus				11	
8	Waterweed-Watercress				9	
9	Ribbongrass				10	
10	Coontail-Naiad-Watermilfoil				13	
11	Narrowleaf Pondweed				5	
12	Broadleaf Pondweed				8	

Total Score for Low Marsh (*maximum 75 points*)

Continue to Step 5

Step 5: High Marsh = the 'seasonal' marsh area, from the water line to the inland boundary of marsh wetland type. This is essentially what is commonly referred to as a wet meadow, in that there is insufficient standing water to provide fisheries habitat except during flood or high water conditions.

☐	High marsh not present	Go to Step 6
☑	High marsh present	Continue through Step 5, scoring as noted below

Scoring of High Marsh:

1. Check the appropriate **Vegetation Group** (see Appendix 7) for each High Marsh community. (Based on the one most clearly dominant plant species of the dominant form in each High Marsh vegetation community.)
2. Sum the areas (ha) of the vegetation communities assigned to each **Vegetation Group**.
3. Use these areas to assign an **Area Factor** (from Table 8) for each checked **Vegetation Group**.
4. Multiply the **Area Factor** by the **Multiplication Factor** for each row to calculate **Score**.
5. Sum all numbers in Score column to get **Total Score for High Marsh**.

Scoring for Presence of Key Vegetation Groups – High Marsh

Vegetation Group Number	Vegetation Group Name	Present as a Dominant Form (check)	Total Area (ha)	Area Factor (from Table 8)	Multiplication Factor	Score
1	Tallgrass				6	
2	Shortgrass-Sedge				11	
3	Cattail-Bulrush-Burreed	✓	~2ha	0.2	5	1
4	Arrowhead-Pickerelweed				5	
	Total Score for High Marsh (*maximum 25 points*)					

Continue to Step 6

Step 6:

✓	Swamp containing fish habitat not present	Go to Step 7
	Swamp containing fish habitat present	Continue through Step 6, scoring as follows

Scoring of Swamp:

1. Determine the total area (ha) of seasonally flooded swamp communities within the wetland containing fish habitat and record below.
2. Determine the total area (ha) of permanently flooded swamp communities within the wetland containing fish habitat and record below.
3. Use these areas to assign an **Area Factor** (from Table 8).
4. Multiply the Area Factor by the **Multiplication Factor** for each row to calculate **Score**.
5. Sum all numbers in Score column to get **Total Score for Swamp**.

Scoring Swamps for Fish Habitat (Seasonally flooded; Permanently flooded)

Swamp Containing Fish Habitat	Present (check)	Total Area (ha)	Area Factor (from Table 8)	Multiplication Factor	Score
Seasonally Flooded Swamp				10	
Permanently Flooded Swamp				10	
			Total Score for Swamp (*maximum 20 points*)		

Continue to Step 7

Step 7: CALCULATION OF FINAL SCORE

NOTE: Scores for Steps 4, 5 and 6 are only recorded if Steps 1 and 3 have not been scored.

A. Score from Step 1 (fish habitat not present) = _____
B. Score from Step 3 (significance known) = _____
C. Score from Step 4 (Low Marsh) = _____
D. Score from Step 5 (High Marsh) = 1
E. Score from Step 6 (Swamp) = _____

Calculation of Final Score for Spawning and Nursery Habitat = A or B or Sum of C, D, and E

Score for Spawning and Nursery Habitat *(maximum 100 points)* 1

4.2.6.2 Migration and Staging Habitat

Step 1:

✓	Staging or Migration Habitat is not present in the wetland	Go to Step 4, Score 0 points
	Staging or Migration Habitat is present in the wetland, significance of the habitat is known	Go to Step 2
	Staging or Migration Habitat is present in the wetland, significance of the habitat is not known	Go to Step 3

Step 2: Select the highest appropriate category below. Ensure that documentation is attached to the data record.

	Significant in Ecoregion	Score 25 points in Step 4
	Significant in Ecodistrict	Score 15 points in Step 4
	Locally Significant	Score 10 points in Step 4
	Fish staging and/or migration habitat present, but not as above	Score 5 points in Step 4

Source of information:

Step 3: Select the highest appropriate category below based on presence of the designated site type (i.e. does not have to be the dominant site type). Refer to Site Types recorded earlier (section 1.1.3). Attach documentation.

	Wetland is riverine at rivermouth or lacustrine at rivermouth	Score 25 points in Step 4
	Wetland is riverine, within 0.75 km of rivermouth	Score 15 points in Step 4
	Wetland is lacustrine, within 0.75 km of rivermouth	Score 10 points in Step 4
	Fish staging and/or migration habitat present, but not as above	Score 5 points in Step 4

Step 4: Enter a score from only one of the three above Steps.

Score for Staging and Migration Habitat
(maximum 25 points) 0

4.3 ECOSYSTEM AGE

		Fractional Area		Score
Bog	=		x 25 =	
Fen, on deeper soils; floating mats or marl	=		x 20 =	
Fen, on limestone rock	=		x 5 =	
Swamp	=		x 3 =	
Marsh	=		x 0 =	0
	Total		=	0

Ecosystem Age Score *(maximum 25 points)* 0

4.4 GREAT LAKES COASTAL WETLANDS

Choose one only. Only coastal wetland units may be scored.

	Wetland < 10 ha	=	10 pts
	Wetland 10-50 ha	=	25
	Wetland 51-100 ha	=	50
	Wetland > 100 ha	=	75

If the wetland is a complex, identify which wetlands units or wetland communities are being scored as coastal:

Great Lakes Coastal Wetland Score *(maximum 75 points)* 0

5.0 DOCUMENTATION OF WETLAND FEATURES NOT INCLUDED IN THE EVALUATION

5.1 INVASIVE SPECIES

Attach documentation of invasive species found in wetland (include location information and a coarse estimate of abundance [F = few, C = fairly common, A = abundant]):

Purple loosestrife - C
Common Reed (invasive Phragmites) - C

5.2 VERNAL POOLS

Documentation of information on vernal pools encountered during the wetland evaluation but not included as part of the evaluated wetland.

N/A

5.3 SPECIES OF SPECIAL INTEREST

5.3.1 Osprey

Check all that apply:

- [ ] Present and nesting
- [ ] Known to have nested in last 5 years
- [ ] Feeding area for Osprey
- [x] Not as above

5.3.2 Common Loon

Check all that apply:

- [ ] Nesting in wetland
- [ ] Feeding at edge of wetland
- [ ] Observed or heard on lake or river adjoining the wetland
- [x] Not as above

5.4 IMPORTANT DRINKING WATER AREA

N/A

Wetland located within: *(check all that apply)*

- [ ] Wellhead Protection Area
- [ ] Intake Protection Zone
- [ ] Significant Recharge Area
- [ ] Vulnerable Aquifer Area

Source of information:

Additional Comments:

5.5 AREA OF WETLAND RESTORATION POTENTIAL

Check all that apply. Attach additional pages if necessary.

	Area of wetland restoration potential adjacent to evaluated wetland unit(s)
	Area of wetland restoration potential within 750m of evaluated wetland unit(s), but not adjacent
	Area of wetland restoration potential encountered elsewhere
	Area currently functioning as wetland (e.g., showing signs of degradation but still mapped as wetland).
	Adjacent Wetland Unit (if applicable): _____
	GPS Coordinates of Site: _____

Description of site (e.g., current land use, wetland characteristics of site, etc) and why it is identified as an area of restoration potential:

Additional Notes/Comments (e.g., adjacent lands, etc)

General Information

Wetland Evaluator(s)

Name: Katherine Black Affiliation: Kilgour + Associates Ltd.

Name: _____ Affiliation: _____

Name: _____ Affiliation: _____

Name: _____ Affiliation: _____

Name: _____ Affiliation: _____

Date(s) wetland visited (in field): April 9, June 31, July 10 (209)

Date evaluation completed: July 11, 16, + 18

Estimated time devoted to completing the field survey in person hours: _____

Weather Conditions

i) at time of field work: Mild w snow on ground (April), hot + dry (June 31 + July 10)

ii) summer conditions in general: Late spring ; muggy, hot, humid summer

WETLAND EVALUATION SCORING RECORD

WETLAND NAME: _____

1.0 BIOLOGICAL COMPONENT

1.1 PRODUCTIVITY

13	1.1.1	Growing Degree-Days/Soils
15	1.1.2	Wetland Type
1	1.1.3	Site Type

1.2 BIODIVERSITY

9	1.2.1	Number of Wetland Types
2	1.2.2	Vegetation Communities
1	1.2.3	Diversity of Surrounding Habitat
5	1.2.4	Proximity to Other Wetlands
6	1.2.5	Interspersion
8	1.2.6	Open Water Type

1	1.3 SIZE (Biological Component)
53	TOTAL (Biological Component)

2.0 SOCIAL COMPONENT

2.1 ECONOMICALLY VALUABLE PRODUCTS

_____ 2.1.1 Wood Products
_____ 2.1.2 Wild Rice
_____ 2.1.3 Commerical Fish (Bait Fish and/or Coarse Fish)
_____ 2.1.4 Furbearers

_____ 2.2 RECREATIONAL ACTIVITIES

2.3 LANDSCAPE AESTHETICS

3 2.3.1 Distinctness
4 2.3.2 Absence of Human Disturbance

2.4 EDUCATION AND PUBLIC AWARENESS

_____ 2.4.1 Educational Uses
_____ 2.4.2 Facilities and Programs
_____ 2.4.3 Research and Studies

26 2.5 PROXIMITY TO AREAS OF HUMAN SETTLEMENT

8 2.6 OWNERSHIP

1 2.7 SIZE (Social Component)

_____ 2.8 ABORIGINAL VALUES AND CULTURAL HERITAGE

_____ 2.8.1 Aboriginal Values
_____ 2.8.2 Cultural Heritage

42 TOTAL (Social Component)

3.0 HYDROLOGICAL COMPONENT

100 3.1 FLOOD ATTENUATION

3.2 WATER QUALITY IMPROVEMENT

30 3.2.1 Short Term Water Quality Improvement

8 3.2.2 Long Term Nutrient Trap

9 3.2.3 Groundwater Discharge

0 3.3 CARBON SINK

0 3.4 SHORELINE EROSION CONTROL

3.5 GROUNDWATER RECHARGE

50 3.5.1 Site Type

10 3.5.2 Soil Recharge Potential

199 TOTAL (Hydrological Component)

4.0 SPECIAL FEATURES COMPONENT

4.1 RARITY

_____ 4.1.1 Wetland Types

_____ 4.1.1.1 Rarity within the Landscape

30 4.1.1.2 Rarity of Wetland Type

_____ 4.1.2 Species

_____ 4.1.2.1 Reproductive Habitat for an Endangered or Threatened Species

_____ 4.1.2.2 Traditional Migration or Feeding Habitat for an Endangered or Threatened Species

_____ 4.1.2.3 Provincially Significant Animal Species

_____ 4.1.2.4 Provincially Significant Plant Species

_____ 4.1.2.5 Regionally Significant Species

_____ 4.1.2.6 Locally Significant Species

4.2 SIGNIFICANT FEATURES AND HABITATS

_____ 4.2.1 Colonial Waterbirds

_____ 4.2.2 Winter Cover for Wildlife

_____ 4.2.3 Waterfowl Staging and/or Moulting Areas

_____ 4.2.4 Waterfowl Breeding

_____ 4.2.5 Migratory Passerine, Shorebird or Raptor Stopover Area

_____ 4.2.6 Fish Habitat

1 4.2.6.1 Spawning and Nursery Habitat

4.2.6.2 Migration and Staging Habitat

_____ 4.3 ECOSYSTEM AGE

_____ 4.4 GREAT LAKES COASTAL WETLANDS

31 TOTAL (Special Features Component)

SUMMARY OF EVALUATION RESULT

Wetland _____

53 1.0 TOTAL FOR BIOLOGICAL COMPONENT

42 2.0 TOTAL FOR SOCIAL COMPONENT

199 3.0 TOTAL FOR HYDROLOGICAL COMPONENT

31 4.0 TOTAL FOR SPECIAL FEATURES COMPONENT

325 TOTAL WETLAND SCORE

FOR MNR USE ONLY

MNR Reviewer (Name & Position) _____

Reviewer Comments _____

MNR Approver (Name & Position) _____

Approval Date _____

Appendix C: Federal Wetland Functions Assessment for the Non-Wetland Depression on Site, 2020

AVE 866
Federal-style evaluation/checklist for wet depression at 4120 Russell Rd

2020/03/05

Appendix A

Information that should be included in an assessment of wetland functions. Adapted from Wisconsin Rapid Assessment Methodology.

GENERAL INFORMATION

Project Name: EIS for 4055 + 4120 Russell Rd, Ottawa.

Project Proponent: Michel Pilon, AVENUES

Evaluator(s), Affiliation and Contact Information: K. Black, KAL; kblack@kilgourassociates.com (647) 202-8725

Date(s) and Duration of Site Visit(s): see EIS.

Description of seasonal limitations of inspection: Inspected during spring freshet + throughout growing season.
(*e.g.*, hydrologic and climatologic conditions, after heavy rains, presence of snow or ice cover, during drought year, during spring flood, during bird migration, before/after growing season)

Detailed Wetland Functions Assessment Method(s) Used and Why: OWES + this appendix

Name of Wetland: Unnamed

Owners: NCC (federal lands).
Is any part of the wetland in public, Aboriginal or conservation ownership? If so name:

Location: County, ¼ Section, Township, Parish, Range. 4120 Russell Rd, Ottawa and parcel = unknown civic address
Property Identification Data Feature spans 2 parcels
Geographic Coordinates ↳ PINs: 041610168 and 041610158.
National Topographic Series 1:50,000 Map Sheet
Wetland Identifier, Wetland Map Sheet
Air Photo Number and Year (Attached) → See geoOttawa

Is the wetland part of a monitoring or research project where relevant data exists? No, data used here were collected by KAL for EIS.

WETLAND DESCRIPTION

Wetlands Class based on Published Inventory:
Based on various inventory sources such as national (Canadian Wetland inventory), regional (Maritime Wetland Inventory), provincial (Prince Edward Island), municipal (Saint John):

Wetland Class (subclasses, types) based on Field Work: Meadow marsh
Based on Canadian Wetland Classification System and/or regional, provincial or territorial classification system:

Size of wetland: 0.49 ha

To nearest 0.1 ha as reported in wetland inventory and/or estimated using aerial photographs, and/or delineated in the field. → used a combo of imagery + field delineation

SITE DESCRIPTION

I. HYDROLOGIC SETTING

A. Describe the geomorphology of the wetland:
- Depressional (includes slopes, potholes, small lakes, kettles, etc.)
- Riverine ↳ depression @ base of hill slope
- Lake Fringe
- Extensive Peatland
- Coastal Marine
- Other
- Extensive Peatland

B. (Y) N Has the wetland hydrology been altered by ditching, tiles, dams, culverts, well pumping, diversion of surface flow, dikes, water control structures, beaver activity, industrial effluent additions or changes to runoff within the watershed? Circle those that apply and provide narrative details. Feature drains into culvert under Hunt Club Rd + out into small channel that feeds into HDF of McEwan Creek. Feature altered by agriculture for several yrs until ~2012.

C. (Y) N Does the wetland have an inlet, outlet, or both (circle those that apply)? Include these features on site map. Source of H_2O likely from surface + sub-surface run-off from hillslope
No inlet →

D. Y (N) Is there any field evidence of wetland hydrology such as buttressed tree trunks, adventitious roots, drift lines, water marks, water stained leaves, soil mottling/reduced matrix, organic soils layer, or oxidized rhizospheres (circle those that apply)? H_2O table only briefly above substrate surface during spring freshet. No soil mottling/gley, likely a result of soil mixing in agriculture

E. Y (N) Does the wetland have standing water, and if so what is the approximate depth (cm)? Provide a map / GPS coordinates of where water depth measurements were recorded. Approximately how much of the wetland has surface water (*e.g.*, percentage) Soil surface was damp in the spring + then quickly dried in summer

Soil mainly loam.

F. How is the hydroperiod (seasonal water level pattern) of the wetland classified?
- Permanently Flooded
- Seasonally Flooded (*e.g.*, spring freshet, snowmelt,)
- Ephemeral Vernal Pools, Sheetwater
- Saturated Soils (surface water seldom present) → only during spring freshet
- Tidal
- Artificially Flooded
- Artificially Drained

G. Y (N) Is the wetland a navigable body of water or is a portion of the wetland below the ordinary highwater mark of a navigable water body?

Identify and list any surface waters associated with the wetland or in proximity to the wetland (note approximate distance from the wetland and navigability determination). See above. Associated a small channel that feeds into an HDF of McEwan Creek. Not sure if small channel or HDF meet def'n of navigable.

Note if there is a surface water connection to other wetlands. N/A.

II. VEGETATION

A. Identify the vegetation communities present. Identify dominant plant species. Attach a list of plant species present. If applicable identify wetland indicator status of each plant species.

1. Floating leaved community dominated by:
2. Submerged aquatic community dominated by:
3. Emergent community dominated by:
4. Shrub community dominated by:
5. Deciduous broad-leaved tree community dominated by:
6. Coniferous tree community dominated by:
7. Open sphagnum mat or bog:
8. (8) Sedge meadow / wet prairie community dominated by:
9. Other (explain): Meadow marsh

Dom veg:
'Reed Canary Grass
Purple Loosestrife
Willow spp.
Broad and narrow-leaf cattail

B. List other plant species identified during site visit: See EIS.

C. Identify any plant 'species or communities of special status' that have the potential to occur on or near the site, and identify the source of this listing and information: See section 3.3.2 of EIS.
No federally, provincially, or regionally sig plant species in feature. Potential for Hard-stemmed Bulrush to occur in feature b/c occurs elsewhere on site → this species is considered regionally sig. per Brunton (2005)

D. Identify any plant 'species or communities of special status' that were observed in the field: (See above. Broom Sedge could also occur in feature b/c occurs elsewhere on site → this species is considered reg. sig. (Brunton, 2005).

III. SOILS

A. Identify Federal or Provincial soil map used, soil association or soil series:
Marshall et al. (1997) → see EIS for full citation.

B. Field description:
Identify and describe soil sampling locations. Indicate dominant surface vegetation and landscape position at each location. Attach site maps showing sampling locations and GPS coordinates. 2 soil cores were sampled towards centre of feature: 1 in area dominated by Reed canary grass, 1 dominated by cattails.

1. Organic soil? Y (N)
2. Indicate depth of organic layer (cm): N/A
3. von Post scale: N/A
4. Indicate: Fibrisol / Mesisol / Humisol N/A
5. Marl present? Y (N)
6. Mineral soil present ? (Y) N
7. Circle all those present: mottles, reduced matrix, iron / manganese concretions, organic streaking N/A
8. Depth of mottling within mineral surface if present (cm): N/A
9. Munsell color of matrix and mottles: N/A
10. Depth of reduced matrix within mineral surface if present (cm): Entire soil profile was homogenous loam.
11. Munsell color of reduced matrix:
12. Depth of A Horizon:
13. Soil classification according to the Canadian System of Soil Classification (indicate Soil Order, Soil, Great Group, Soil Subgroup):

IV. ANTHROPOGENIC IMPACTS ON WETLAND

A. Is the wetland itself relatively free of obvious human influences (current and historical), such as:

1. (Y) N Buildings?
2. (Y) N Roads?
3. (Y) N Other structures?
4. Y (N) Trash?
5. (Y) N Pollution?
6. (Y) N Filling?
7. (Y) N Dredging/draining?
8. Y (N) Domination by non-native vegetation?
9. Y (N) Farming and Agriculture?
10. (Y) N Forestry?
11. (Y) N Mining / Resource Extraction?

History of agriculture. Lots of non-native veg.

V. SURROUNDING LAND USES AND VEGETATIVE COMMUNITIES

A. What is the estimated area of the wetland catchment (watershed) in ha?

B. In measured area (ha) or estimated as percentage of catchment (watershed) provide detail and describe the surrounding land uses, such as:

1. (1.) Developed (Industrial/Commercial/Residential)
2. Agricultural/cropland
3. Agricultural/grazing
4. Forested
5. Grassland
6. Grassed recreation areas/parks
7. (7.) Old field
8. Oil and gas
9. Highways or roads
10. Other (specify)

Mainly surrounded by old field and industrial plaza.
"Watershed" likely only incorporates hillslope based on surrounding topography.

C. Describe the regulated buffer area (if applicable) immediately adjacent to the wetland (*e.g.*, disturbance, vegetation, erosion): N/A.

VI. SITE MAPS

A. If applicable attach the wetland delineation report including dates and delineator name(s) as per jurisdictional standards.

See EZC map in EIS.

B. Provide information on wetland location in watershed, surrounding land use, special features at 1:50,000 scale.

C. Provide wetland map using several maps and/or different data layers if necessary. Map to scale, using GIS or hand drawn. Also include file with GPS coordinates of data.

Include on Map:

1. All sampling locations
2. Location of permanent photo stations
3. Spatial extent of this assessment
4. Project footprint and impact locations
5. Property boundaries
6. Wetland boundary
7. Inflow(s) /outflow(s)
8. Depth to water table (if available)
9. Vegetative communities
10. Wetland subclasses
11. Legend with north arrow, scale, etc

} see EIS.

VII. FIELD BASED OBLIQUE PHOTOS

Provide digital photos with GPS coordinates and direction of photos and date → see EIS (EL C/HDFA)

VIII. WETLAND FUNCTIONS PRESENT

The following requires the assessor to examine site conditions that provide evidence that a given function or value is present/absent and to assess the significance of the wetland to perform those functions. Narrative and quantitative justifications should be provided as appropriate. Positive answers to questions indicate the presence of factors important for the function. The questions are not definitive or all-inclusive, and are only provided to guide the assessment.

A) Special Features and "Red Flags"

1). Is the wetland in or adjacent to an area of special natural resource interest?
Answer "YES" or "NO". For all "YES" answers provide details.
Examples:

- Salmonid streams, their tributaries, and lakes (cold water communities)
- Provincial, territorial, or federal designated wild and scenic rivers
- Designated riverway
- Designated scenic urban waterway
- Environmentally sensitive area or environmental corridor identified in an area-wide water quality management plan, special area management plan, special wetland inventory study, or an advanced delineation and identification study.
- Calcareous fen
- Park, forest, trail or recreation area
- Fish and wildlife refuges and fish and wildlife management areas
- Designated wilderness area
- Designated wetland (*e.g.*, Ramsar, WHSRN)
- Wilderness area
- Lands acquired for wildlife conservation (*e.g.*, North American Waterfowl Management Plan)
- Designated or dedicated natural area, (*e.g.*, NB Protected Natural Area)
- Surface water/Ground water identified or designated as an important source of water

2). Y (N) According to the Conservation Data Centre, federal / provincial / territorial data and expertise, local Environmental Non-Government Agencies, naturalists or direct observations, are there any rare, endangered, threatened, or special concern species in, near, or using the wetland or adjacent lands? If so, list the species of concern.

None in feature. See 1) 2a) C) other area. See EIS: Barn Swallow (THR), Dark-eyed Junco (reg. rare), Tennessee Warbler (reg. rare), Monarch (SC), Eastern Meadowlark (THR) observed in vicinity.

B) Vegetation Diversity

1. Y N Does the wetland support a variety of native plant species or is it dominated by a limited number of species? Dominated by non native species.

2. Y (N) **Unknown** Is the wetland plant community regionally scarce or rare?

3. (Y) N Are there exotic species present (*e.g.*, reed canary grass, flowering rush, buckthorn, purple loosestrife)? Provide location (GPS or map) and amount (*e.g.*, number of plants or m^2).

C) Wildlife and Fish Habitat → many of these questions are ill-defined + subjective...

1. List species of fish and wildlife observed, evidenced, or expected, to utilize the wetland: Does not support fish. No wildlife observed in or directly adjacent to feature.

2. Y (N) Does the wetland contain a number of major vegetative cover types? If so, is there a high degree of interspersion of those vegetation types? Y N

3. Y (N) Is the estimated ratio of open water to vegetative cover between 30 and 70 %? What is the estimated percentage? 100% vegetative cover

4. Y (N) **Unknown** Does the surrounding upland habitat support a variety of wildlife species?

5. Y (N) Is the wetland part of or associated with a wildlife corridor or designated environmental corridor?

6. Y (N) Is the surrounding habitat and/or the wetland itself a large tract of undeveloped land important for wildlife that require large home ranges (*e.g.*, bear, woodland passerines)?

7. Y (N) Is the surrounding habitat and/or the wetland itself a relatively large tract of undeveloped land within an urbanized environment that is important for wildlife?

8. Y (N) Are there other wetland areas near the subject wetland that may be important to wildlife?

9. Y (N) Is the wetland contiguous with a permanent waterbody or periodically inundated for sufficient periods of time to provide spawning/nursery habitat for fish?

10. Y (N) Can the wetland provide significant food base for fish and wildlife (*e.g.*, insects, crustaceans, voles, forage fish, amphibians, reptiles, shrews, wild rice, wild celery, duckweed, pondweeds, watermeal, bulrushes, bur reeds, arrowhead, smartweeds, millets)?

11. (Y) N Is the wetland in or near any urban centers?

12. Y (N) Is the wetland located in a priority watershed/township as identified in Habitat Joint Ventures Plans of the North American Waterfowl Management Plan or Bird Conservation Region Plans?

13. Y (N) Is the wetland providing habitat that is scarce to the region?

D) Flood and Stormwater Storage/Attenuation

1. (Y) N Are there steep slopes (b/w 9 × 15%), large impervious areas, moderate slopes with (historical) row cropping, or areas with severe overgrazing within the watershed (circle those that apply)? (Watershed likely only encompasses hillslope.

2. Y (N) Does the wetland significantly reduce run-off velocity due to its size, configuration, braided flow patterns, or vegetation type and density?

3. Y (N) Does the wetland show evidence of flashy water level responses to storm events (*e.g.*, debris marks, erosion lines, stormwater inputs, channelized inflow)? No clear inflow.

4. Y (N) Is there a natural feature or human-made structure impeding drainage from the wetland that causes backwater conditions?

5. (Y) N Considering the size of the wetland area in relation to the size of its watershed, at any time during the year is water likely to reach the wetland's storage capacity (i.e., the level of easily observable wetland vegetation)? In cases where greater documentation is required, one should determine the wetland's capacity to hold 25% of the run-off from a 1 in 100 year, 24 hour storm event.
→ Area is flooded (surface-damp) beyond spatial extent of wetland veg during spring freshet.

6. Y (N) Considering the location of the wetland in relation to the associated surface water watershed, is the wetland important for attenuating or storing flood, or stormwater peaks, or spring snowmelt events (i.e., is the wetland located in the mid or lower reaches of the watershed)? Provides minimal hydrological function in the spring.

E) Water Quality Protection

1. (Y) N Does the wetland receive overland flow or direct discharge of stormwater as a primary source of water (circle that which applies)?

2. (Y) N Do the surrounding land uses have the potential to deliver significant nutrient and/or sediment loads to the wetland? Potential nutrient loading from agriculture.

3. Y (N) Based on the answers to the flood/stormwater section above, does the wetland perform significant flood/stormwater attenuation (residence time to allow settling)? If yes, more quantitative details are required.

4. Y N Does the wetland have significant vegetative density? to decrease water energy and allow settling of suspended materials? Some settling likely occurs during freshet, but no major flows occur in/adjacent to feature. Also likely would be very minimal sediment b/c surrounded by oldfield.

5. (Y) N Is the position of the wetland in the landscape such that run-off is held or filtered before entering a surface water? Only during spring freshet (minimal function).

6. Y (N) Are algal blooms, extensive macrophyte growth, or other signs of excess nutrient loading to the wetland apparent (or historically reported)?

F) Shoreline Protection

1. Y (N) Is the wetland in a lake fringe, riverine or coastal setting?

If YES to above question, then answer the following questions.

2. **Y N** Is the shoreline exposed to constant wave action caused by long wind fetch or boat traffic?

3. **Y N** Is the shoreline and shallow littoral zone vegetated with submerged or emergent vegetation in the swash zone that decrease wave energy or perennial wetland species that form dense root mats and/or species that have strong stems that are resistant to erosive forces?

4. **Y N** Is the stream bank prone to erosion due to unstable soils, land uses, or ice floes?

5. **Y N** Is the stream bank vegetated with densely rooted shrubs that provide upper bank stability?

G) Groundwater Recharge and Discharge

1. Y (N) Related to discharge, are there observable (or reported) springs located in the wetland, physical indicators of springs such as marl soil, or vegetation indicators such as watercress or marsh marigold present that tend to indicate the presence of groundwater springs?

2. **Y N** Related to discharge, may the wetland contribute to the maintenance of base flow in a stream? May only contribute during spring freshet only.

3. **Y N** Related to recharge, is the wetland located on or near a groundwater divide (*e.g.* an elevational highpoint)? Located near slope but unknown if groundH$_2$O divide occurs here. Unlikely since depression was dry outside of spring freshet

Appendix D: Vascular Plant List for the Site, 2019

Scientific Name	Common Name	Brunton (2005)
EQUISETACEAE (Horsetail Family)		
Equisetum arvense L.	Field Horsetail	Common
OSMUNDACEAE (Flowering-fern Family)		
Osmunda cinnamomea L.	Cinnamon Fern	Common
THELYPTERIDACEAE (Marsh Fern Family)		
Phegopteris connectilis (Michx.) Watt	Northern Beech Fern	Common
Thelypteris palustris Schott	Marsh Fern	Common
DRYOPTERIDACEAE (Woodfern Family)		
Dryopteris carthusiana (Vill.) H.P.Fuchs	Spinulose Woodfern	Common
Matteuccia struthiopteris (L.) Tod.	Ostrich Fern	Common
Onoclea sensibilis L.	Sensitive Fern	Common
PINACEAE (Pine Family)		
Larix laricina (Du Roi) K.Koch	Tamarack	Common
Picea glauca (Moench) Voss	White Spruce	Common
Picea pungens Engelm.	Blue Spruce	-
Pinus strobus L.	White Pine	Common
Pinus sylvestris L.	Scots Pine	Rare (frequently planted)
CUPRESSACEAE (Cypress Family)		
Juniperus communis L.	Common Juniper	Common
Juniperus virginiana L.	Red Cedar	Uncommon
Thuja occidentalis L.	White Cedar	Common
ALISMATACEAE (Water-plantain Family)		
Alisma triviale Pursh	Northern Water-plantain	Common
TYPHACEAE (Cat-tail Family)		
Typha angustifolia L.	Narrow-leaved Cat-tail	Common
Typha latifolia L.	Common Cat-tail	Common
POACEAE (Grass Family)		
Alopecurus pratensis L.	Meadow Foxtail Grass	Uncommon
Bromus inermis Leyss.	Common Brome Grass	Common
Dactylis glomerata L.	Orchard Grass	Common
Elymus repens (L.) Gould	Quack Grass	Common
Festuca brevipila R.Tracey	Sheep Fescue	Uncommon
Festuca rubra L.	Red Fescue	Uncommon
Hordeum jubatum L.	Foxtail Barley	Common
Lolium arundinaceum (Schreb.) Darbysh.	Tall Fescue	Uncommon
Lolium pratense (Huds.) Darbysh.	Meadow Fescue	Common
Phalaris arundinacea L.	Reed Canary Grass	Common
Phleum pratense L.	Timothy	Common
Phragmites australis (Cav.) Trin. ex Steud. subsp. *australis*	European Reed Grass	Uncommon (locally abundant adventive)
Poa annua L.	Annual Bluegrass	Common
Poa compressa L.	Canada Bluegrass	Common
Poa pratensis L.	Kentucky Bluegrass	Common
Sporobolus neglectus Nash	Overlooked Dropseed	Common
CYPERACEAE (Sedge Family)		

Scientific Name	Common Name	Brunton (2005)
Carex crinita Lam.	Fringed Sedge	Common
Carex scoparia Schkuhr exWilld.	Broom Sedge	Regionally significant
Carex vesicaria L.	Inflated Sedge	Uncommon
Carex vulpinoidea Michx.	Fox Sedge	Common
Schoenoplectus acutus (Muhl. ex Bigel.) Love & Love	Hard-stemmed Bulrush	Regionally significant
LEMNACEAE (Duckweed Family)		
Lemna minor L.	Small Duckweed	Common
LILIACEAE (Lily Family)		
Asparagus officinalis L.	Asparagus	Common
Convallaria majalis L.	Lily-of-the-valley	Uncommon (locally abundant invasive)
Erythronium americanum Ker Gawl.	Trout-lily	Common
Hemerocallis fulva (L.) L.	Day Lily	Common
Maianthemum canadense Desf. var. *canadense*	Canada Mayflower	Common
SALICACEAE (Willow Family)		
Populus alba L.	White Poplar	Common
Populus balsamifera L.	Balsam Poplar	Common
Populus deltoides W.Bartram ex Marsh.	Eastern Cottonwood	Common
Populus nigra L.	Lombardy Poplar	Rare (commonly cultivated)
Populus tremuloides Michx.	Trembling Aspen	Common
Salix alba L.	White Willow	Uncommon
Salix amygdaloides Andersson	Peach-leaved Willow	Uncommon
Salix bebbiana Sargent	Bebb's Willow	Common
Salix discolor Muhl.	Pussy Willow	Common
Salix exigua Nutt. subsp. *interior* (Rowlee) Cronq.	Sandbar Willow	Common
BETULACEAE (Birch Family)		
Alnus incana (L.) Moench subsp. *rugosa* (Du Roi) R.T.Clausen	Speckled Alder	Common
Betula alleghaniensis Britton	Yellow Birch	Common
Betula nigra L.	River Birch	-
Betula papyrifera Marsh.	White Birch	Common
Betula populifolia Marsh.	Gray Birch	Common
Corylus cornuta Marsh.	Beaked Hazel	Common
Ostrya virginiana (Mill.) K.Koch	Ironwood	Common
FAGACEAE (Oak Family)		
Fagus grandifolia Ehrh.	American Beech	Common
Quercus macrocarpa Michx.	Bur Oak	Common
ULMACEAE (Elm Family)		
Ulmus americana L.	American Elm	Common
Ulmus pumila L.	Siberian Elm	Rare
URTICACEAE (Nettle Family)		
Urtica dioica L. subsp. *gracilis* (Aiton) Selander	Slender Stinging Nettle	Common
POLYGONACEAE (Knotweed Family)		
Fallopia cilinodis (Michx.) Holub	Fringed Black Bindweed	Common
Persicaria hydropiper (L.) Delarbre	Water-pepper	Common
Rumex crispus L.	Curled Dock	Common

Scientific Name	Common Name	Brunton (2005)
CHENOPODIACEAE (Goosefoot Family)		
Chenopodium album L.	Lamb's-quarters	Common
AMARANTHACEAE (Amaranth Family)		
Amaranthus retroflexus L.	Redroot Pigweed	Common
CARYOPHYLLACEAE (Pink Family)		
Cerastium fontanum Baumg.	Mouse-ear Chickweed	Common
Silene latifolia Poir.	White Cockle	Uncommon
Stellaria graminea L.	Lesser Stitchwort	Common
RANUNCULACEAE (Crowfoot Family)		
Actaea rubra (Aiton) Willd.	Red Baneberry	Common
Ranunculus acris L.	Tall Buttercup	Common
BRASSICACEAE (Mustard Family)		
Alliaria petiolata (M. Bieb.) Cavara & Grande	Garlic-mustard	Common
Barbarea vulgaris W.T.Aiton	Yellow-rocket	Common
Berteroa incana (L.) DC.	Hoary-alyssum	Common
Capsella bursa-pastoris (L.) Medik.	Shepherd's-purse	Common
Erysimum cheiranthoides L.	Wormseed Mustard	Common
Hesperis matronalis L.	Dame's Rocket	Uncommon (spreading invasive)
Lepidium campestre (L.) W.T.Aiton	Cow Cress	Uncommon
Rorippa palustris (L.) Besser subsp. *fernaldiana* (Butters & Abbe) Jonsell	Yellow Cress	Common
Thlaspi arvense L.	Field Penny-cress	Common
CRASSULACEAE (Stonecrop Family)		
Sedum telephium L.	Live-forever	Uncommon
GROSSULARIACAEAE (Currant Family)		
Ribes cynosbati L.	Wild Gooseberry	Common
Ribes lacustre (Pers.) Poir.	Swamp Currant	Uncommon
ROSACEAE (Rose Family)		
Amelanchier arborea (F.Michx.) Fernald subsp. *laevis* (Wiegand) S.M.McKay ex P.Landry	Smooth Serviceberry	Common
Crataegus spp.	Hawthorn	-
Fragaria virginiana Mill.	Common Strawberry	Common
Geum aleppicum Jacq.	Yellow Avens	Common
Malus baccata (L.) Borkh.	Siberian Crab Apple	Rare
Malus floribunda Siebold ex Van Houtte	Flowering Crab Apple	Rare
Malus sylvestris (L.) Mill.	Domestic Apple	Common
Potentilla argentea L.	Silvery Cinquefoil	Common
Potentilla norvegica L.	Rough Cinquefoil	Common
Potentilla recta L.	Rough-fruited Cinquefoil	Common
Prunus nigra Aiton	Canada Plum	Common
Prunus pensylvanica L.f.	Fire Cherry	Common
Prunus serotina Ehrh.	Black Cherry	Common
Prunus virginiana L.	Choke Cherry	Common
Rosa sp.	Rose	-
Rubus allegheniensis Porter	Blackberry	Common
Rubus strigosus Michx.	Common Raspberry	Common

Scientific Name	Common Name	Brunton (2005)
Sorbus aucuparia L.	European Mountain-ash	Common
Spiraea alba Du Roi	Meadowsweet	Common
FABACEAE (Bean Family)		
Caragana arborescens Lam.	Siberian-pea	Rare
Galega officinalis L.	Goat's-rue	Rare
Lotus corniculatus L.	Bird's-foot Trefoil	Common
Melilotus officinalis (L.) Pall.	Yellow Sweet-clover	Common
Trifolium hybridum L.	Alsike Clover	Common
Trifolium pratense L.	Red Clover	Common
Trifolium repens L.	White Clover	Common
Vicia cracca L.	Cow Vetch	Common
OXALIDACEAE (Wood-sorrel Family)		
Oxalis stricta L.	Yellow Wood-sorrel	Common
SAPINDALES		
ANACARDIACEAE (Cashew Family)		
Rhus hirta (L.) Sudworth	Staghorn Sumac	Common
Toxicodendron rydbergii (Rydb.) Greene	Poison-ivy	Common
ACERACAE (Maple Family)		
Acer ginnala Maxim.	Amur Maple	Uncommon (spreading invasive)
Acer negundo L.	Manitoba Maple	Common
Acer rubrum L.	Red Maple	Common
Acer saccharinum L.	Silver Maple	Common
BALSAMINACEAE (Touch-me-not Family)		
Impatiens capensis Meerb.	Spotted Touch-me-not	Common
RHAMNACEAE (Buckthorn Family)		
Rhamnus cathartica L.	Black Buckthorn	Common
Rhamnus frangula L.	Glossy Buckthorn	
Current name: *Frangula alnus* Mill.		Common
VITACEAE (Grape Family)		
Parthenocissus vitacea (Knerr) Hitchc.	Virginia Creeper	Common
Vitis riparia Michx.	River Grape	Common
TILIACEAE (Linden Family)		
Tilia americana L.	Basswood	Common
MALVACEAE (Mallow Family)		
Abutilon theophrasti Medik.	Velvet-leaf	Rare
LYTHRACEAE (Loosestrife Family)		
Lythrum salicaria L.	Purple Loosestrife	Common
ONAGRACEAE (Evening-primrose Family)		
Circaea lutetiana L. subsp. *canadensis* (L.) Asch. & Magnus	Enchanter's-nightshade	Common
Oenothera biennis L.	Evening-primrose	Common? [taxonomic problem]
APIACEAE (Carrot Family)		
Aegopodium podagraria L.	Goutweed	Common
Daucus carota L.	Wild Carrot	Common

Scientific Name	Common Name	Brunton (2005)
Pastinaca sativa L.	Wild Parsnip	Common
CORNACEAE (Dogwood Family)		
Cornus alternifolia L.f.	Alternate-leaved Dogwood	Common
Cornus sericea L.	Red-osier Dogwood	Common
PYROLACEAE (Wintergreen Family)		
Pyrola elliptica Nutt.	Shinleaf	Common
OLEACEAE (Olive Family)		
Fraxinus pennsylvanica Marsh.	Green Ash	Common
Syringa vulgaris L.	Lilac	Common
ASCLEPIADACEAE (Milkweed Family)		
Asclepias syriaca L.	Common Milkweed	Common
Cynanchum rossicum Kleopow	Dog-strangling Vine	Uncommon (locally abundant invasive)
BORAGINACEAE (Borage Family)		
Cynoglossum officinale L.	Sheep-bur	Common
Lithospermum officinale L.	Gromwell	Common
LAMIACEAE (Mint Family)		
Glechoma hederacea L.	Ground-ivy	Common
Leonurus cardiaca L.	Motherwort	Common
Nepeta cataria L.	Catnip	Common
SOLANACEAE (Nightshade Family)		
Solanum dulcamara L.	Deadly Nightshade	Common
SCROPHULARIACEAE (Figwort Family)		
Linaria vulgaris Mill.	Toadflax	Common
Verbascum thapsus L.	Mullein	Common
Veronica peregrina L. subsp. *peregrina*	Purslane Speedwell	Uncommon [adentive?]
Veronica serpyllifolia L.	Thyme-leaved Speedwell	Common
PLANTAGINACEAE (Plantain Family)		
Plantago major L.	Common Plantain	Common
RUBIACEAE (Bedstraw Family)		
Galium mollugo L.	White Bedstraw	Common
Galium palustre L.	Marsh Bedstraw	Common
CAPRIFOLIACEAE (Honeysuckle Family)		
Lonicera tatarica L.	Tartarian Honeysuckle	Common
Sambucus racemosa L. subsp. *pubens* (Michx.) Hultén	Red Elderberry	Common
Viburnum acerifolium L.	Maple-leaf Viburnum	Common
Viburnum lentago L.	Southern Wild-raisin	Common
Viburnum rafinesquianum Schult.	Northern Arrow-wood	Common
Viburnum trilobum Marsh.	Highbush-cranberry	Uncommon
CUCURBITACEAE (Gourd Family)		
Echinocystis lobata (Michx.) Torr. & A.Gray	Wild Cucumber	Common
ASTERACEAE (Aster Family)		
Anthemis cotula L.	Mayweed	Common
Arctium lappa L.	Great Burdock	Uncommon
Arctium minus (Hill) Bernh.	Common Burdock	Common

Scientific Name	Common Name	Brunton (2005)
Artemisia vulgaris L.	Mugwort	Common
Bidens cernuus L.	Nodding Beggarticks	Common
Bidens frondosa L.	Large-leaved Beggarticks	Common
Centaurea nigra L.	Black Knapweed	Rare
Cichorium intybus L.	Chickory	Common
Cirsium arvense (L.) Scop.	Canada Thistle	Common
Cirsium vulgare (Savi) Ten.	Bull Thistle	Common
Crepis tectorum L.	Hawk's-beard	Uncommon
Erigeron annuus (L.) Pers.	Daisy Fleabane	Common
Gnaphalium uliginosum L.	Mud Cudweed	Uncommon
Hieracium aurantiacum L.	Orange Hawkweed	Common
Lactuca scariola L.	Prickly-lettuce	Common
Leucanthemum vulgare Lam.	Ox-eye Daisy	Common
Senecio vulgaris L.	Common Groundsel	Uncommon
Solidago canadensis L.	Canada Goldenrod	Common
Solidago rugosa Mill.	Rough Goldenrod	Common
Tanacetum vulgare L.	Tansy	Uncommon
Taraxacum officinale F.H.Wiggers	Common Dandelion	Common
Tragopogon pratensis L.	Goat's-beard	Common

Appendix E: Qualifications of Report Authors

Katherine Black, MSc

Ms. Black is a Biologist with a background in vegetation ecology; she has performed vegetation surveys in a variety of natural and disturbed environments, including wetland, tundra, and forest environments. She has also worked on projects in aquatic ecology, ecohydrology, and biostatistics. Ms. Black has worked in a variety of research settings, including technical laboratories, greenhouses, construction sites, and remote fly-in field sites. Since joining Kilgour & Associates Ltd., she has provided technical field and logistical support for Environmental Impact Statements, Tree Conservation Reports, Headwater Drainage Features Assessments, Integrated Environmental Reviews, Constraints Analyses, Existing Conditions Reports, species at risk monitoring, and sorting and identification of aquatic macroinvertebrates. Ms. Black is certified in the Ontario Wetland Evaluation System protocol, Ontario Reptile and Amphibian Survey methods, and Butternut Health Assessment (BHA #731).

Anthony Francis, PhD

Dr. Francis is a Senior Ecologist with 20 years' consulting experience to both government agencies and private industry. He has worked on a diversity of projects relating to species at risk, invasive species, terrestrial and aquatic habitat, environmental effects monitoring and mitigation, and fate/effects of contaminants. Within each of these subject areas, Dr. Francis has completed projects addressing specific site concerns and broader policy initiatives.

In the Ottawa area Dr. Francis helps clients work their way through the land development process by producing key supporting studies such Environmental Impact Statements, Integrated Environmental Reviews, and by obtaining various permits and approvals from local regulatory agencies including the conservation authorities and Ministries of Environment and Natural Resources. Dr. Francis is our local in-house geomatics specialist, capable of carrying out detailed and complex analyses of geospatial data of plant and animal distribution. He often utilizes his skills to carry out constraint studies prior to a client purchasing or planning a development for a property.