

Wetland Rehabilitation

Study Phase II

2019



OSSGA Wetland Rehabilitation Study of Surrendered Aggregate Sites in Ontario's Provincial Plan Areas, Phase II

This document entitled Wetland Rehabilitation Study of Surrendered Aggregate Sites in Ontario's Provincial Plan Areas, Phase II was prepared by Stantec Consulting Ltd. ("Stantec") for the account of Ontario Stone, Sand and Gravel Association (OSSGA) (the "Client"). Any reliance on this document by any third party is strictly prohibited. The material in it reflects Stantec's professional judgment in light of the scope, schedule and other limitations stated in the document and in the contract between Stantec and the Client. The opinions in the document are based on conditions and information existing at the time the document was published and do not take into account any subsequent changes. In preparing the document, Stantec did not verify information supplied to it by others. Any use which a third party makes of this document is the responsibility of such third party. Such third party agrees that Stantec shall not be responsible for costs or damages of any kind, if any, suffered by it or any other third party as a result of decisions made or actions taken based on this document.

Melin Camer Prepared by

(signature)

Melissa Cameron, M.Sc, M.LA, OALA Ecologist / Landscape Architect

Reviewed by ____

and hast'

(signature)

Daniel Eusebi, BES, MCIP, RPP Senior Environmental Planner

The authors would like to thank the following Stantec employees for their contributions to the report, through data collection, analysis and interpretation, and photography: Brandon Holden, Dan Harvey, Kim Zupfer, Andrew Taylor, Mitch Ellah, Janice Ball, Jordan Brooks, Andrea Squires, Laura Walter and David Waverman. All photographs in this report were taken on the study sites during field investigations. Stantec and OSSGA would also like to sincerely thank all the landowners who participated in this study.

Introduction

Wetlands are defined as lands that are seasonally or permanently covered by shallow water, or lands where the water table is close to the surface. In either case the presence of abundant water has caused the formation of hydric soils and has favoured the dominance of either hydrophytic or water tolerant plants.

They are habitats forming the interface between aquatic and terrestrial systems and are among the most productive and biologically diverse habitats in the world, performing a number of important ecological and hydrological functions and providing an array of social and economic benefits. The preservation and restoration of wetlands remains an environmental and conservation priority in Ontario.

Creation of new wetland habitat is possible through progressive rehabilitation of aggregate sites, which is regulated by the Aggregate Resources Act (ARA), the Provincial Policy Statement (PPS) and Municipal planning documents with the intent to mitigate negative ecological impacts and, in some jurisdictions, maintain or improve long-term ecological integrity of a site. The Ontario Stone Sand and Gravel Association (OSSGA) is taking a proactive approach to assess the quantity and quality of wetland habitat created at surrendered aggregate sites in some of the province's key policy areas, specifically the Greenbelt Plan, the Niagara Escarpment Plan and Oak Ridges Moraine Conservation Plan areas.

To this effect, OSSGA initiated a Wetland Rehabilitation Study of Surrendered Aggregate Sites in Ontario's Provincial Plan Areas (the Study). Phase I, completed in 2017, involved the development of a Geographic Information System (GIS) database of 123 surrendered aggregate licences and air photo interpretation to determine if wetland features were present¹. Remarkably, 68 sites (55%) contained a total of 173 distinct wetland features.

Where Phase I determined the quantity of wetlands created through aggregate rehabilitation, the goal of Phase II is to study the quality of these wetlands. This report represents Phase II of the Wetland Rehabilitation Study in which a representative subset of wetland features within surrendered aggregate sites were investigated in the field to better classify and assess the ecological and social attributes of these sites.



```
Eaton Property
```

Methods

Our study assessed the ecological and cultural characteristics of aquatic habitat (wetland or pond) features at seven surrendered aggregate sites using a combination of field-collected and publicly-available background data. Specific objectives were to:

- · Classify and delineate the existing vegetation communities
- · Identify the presence and extent of wetlands
- Document fish and wildlife occurrences, including Species at Risk (SAR)
- Evaluate the potential wildlife habitat functions through a significant wildlife habitat assessment
- · Assess the cultural value of these wetlands

A field program was developed to target organisms indicative of wetland productivity and biodiversity, and which are readily detectible by visual and auditory surveys. This includes regularly studied groups such as birds, bats, butterflies, dragonflies, fish and plants. Surveys were undertaken by specialists in vegetation, wildlife and aquatic ecology throughout June and July, 2018. To increase data collection efficiency and broaden our detection range, automated recording devices were placed at each wetland and programmed to record calling amphibians (frogs and toads), birds and bats. Recordings were then analyzed by skilled biologists using audio processing software for frogs and birds (Adobe Audition) and ultrasonic frequency identification software (Kaleidoscope by Wildlife Acoustic), controlling for variables such as temperature, precipitation and wind. More difficult-to-detect wildlife, such as snakes and turtles, were recorded as incidental observations. Wetlands were mapped in the field using a combination of hand-held GPS and air photo interpretation following standardized methods for vegetation and wetland community delineation and classification. Fish habitat was characterized by aquatic ecologists using water quality parameters and fish sampling. Wildlife habitat functions were assessed with reference to provincial guidelines for the evaluation of natural heritage features. The recent history and cultural attributes, such as the use of the former licence area for recreation, were also documented.

Background data sources were also reviewed for records of wildlife and plant species. These sources included Conservation Area Master Plan documents, and the public databases eBird.org and iNaturalist.org. Where substantial records were available, these were pooled with field observations to provide a more comprehensive list of species at the study sites.

The Phase II Study also mirrors previous studies prepared for the Aggregate Resources Section of the Ontario Ministry of Natural Resources (MNR, now MNRF) which evaluated the use of rehabilitated aggregate pits in Ontario for fish and wildlife². In this study and its accompanying appendices³, the authors reviewed rehabilitation practices in North America and the United Kingdom, and identified steps for successful aggregate pit rehabilitation in the context of providing fish and wildlife habitat; fourteen sites were selected for more detailed evaluation of biophysical characteristics which could support waterfowl and small game hunting, fishing or protected habitat for wildlife. This allowed for a comparison of data after thirty additional years of vegetation establishment and growth.

Due to the significant amount of information collected, a technical data report (Volume 2) has been prepared to detail the methods for field investigations, site selection process and in-depth results for the Phase II Study Sites. This report is available for review under separate cover. A summary of these findings is provided in the following pages.





Sonogram: American Robin

Minnow Trap

Site Selection

 \bigcirc

8

•

8

0

• •

•

%

0

0 0

 $\odot \odot$

•

 \bigcirc

5 (•

 $\mathbf{\bullet}$

0

 \odot

00-0



Site Selection

Seven surrendered aggregate extraction sites (Study Sites) with aquatic features (ponds or wetlands) were selected for the Phase II study, including six sites from the Phase I study and one site from the MNRF investigations^{2,3}. These sites were selected to provide a representative sample from the Phase I study based on type of aquatic feature (pond or wetland), method of aggregate extraction (pit or quarry), and location within the provincial plan areas (Greenbelt, Niagara Escarpment or Oak Ridges Moraine). Consideration was also given to sites in proximity to areas with public access or existing published data to facilitate gathering of supporting natural heritage data from publicly-available sources.

| Study Site Name | Extraction Type | Dominant Aquatic Feature (#) | Policy Area | Current Use |
|--------------------|--------------------|---------------------------------------|--------------------------------------|--|
| Anderson | Gravel pit | Wetland (3) | Greenbelt | Private property |
| Eagles Nest | Gravel pit | Pond (2) and wetland | Oak Ridges Moraine | Private golf course, open to public for a fee |
| Eaton | Gravel pit | Pond (2) | Niagara Escarpment Plan | Private property |
| Heber Down | Sand pit | Pond (1) and wetland (1) | Greenbelt | Conservation area |
| Kelso | Quarry | Lake (1) and wetland (2) | Niagara Escarpment Plan | Conservation authority property (not currently open to public) |
| Spray Lake | Gravel pit | Lake (1), pond (1) and wetland (1) | Greenbelt | Private watersports park, open to public for a fee |
| Puslinch | Gravel pit | Pond (2) and wetland (3) | Greenbelt Expansion Study Area | Conservation area |

 Table 1:
 Seven Study Sites in OSSGA Phase II Wetland Rehabilitation Study



Results

A total of 85 ha of wetland (e.g. marsh, swamp) and open aquatic (e.g. pond, lake) communities was delineated on the seven Study Sites. Two Study Sites, Kelso Quarry Park and Spray Lake, accounted for nearly 80% of aquatic habitats: Kelso Quarry contained an 18 ha lake, while Spray Lake contained a 20 ha lake and 24 ha swamp forest. On average, wetlands covered approximately 20% of the former licence area of the Study Sites.

One hundred and seventy-one (171) wildlife species were observed during field investigations. An additional 120 species were documented on the Study Sites in background data, for a total of 291 species. Wildlife observations are summarized below and in Table 2.

33 butterfly and **34** dragonfly species were observed during field investigations. An additional 8 butterfly and 14 dragonfly species were documented in background data. Seven provincially-rare and/or SAR were recorded at the Study Sites: Monarch (SC), Spatterdock Darner (S1), Unicorn Clubtail (S3), Azure Bluet (S3), Giant Swallowtail (S3), Black Dash (S3) and Common Sootywing (S3).

4 frog species were recorded during field investigations and an additional three species were documented in background data. The data collection period was outside the core breeding season of early calling species such as Western Chorus Frog and Spring Peeper; however, the Study Sites are anticipated to support populations of these species where suitable habitat was present.

81 bird species were recorded during field investigations, including seven provincially-rare species or SAR: Caspian Tern (S3B), Barn Swallow (THR), Chimney Swift (THR), Eastern Meadowlark (THR), Bobolink (THR), Eastern Wood-pewee (SC) and Wood Thrush (SC). An additional 82 species were documented in background data.

7 bat species were recorded across the six Study Sites, including three SAR: Northern Myotis (END), Little Brown Myotis (END) and Tri-colored Bat (END). A fourth endangered bat species was documented in background data. Nearly 13,000 bat calls were recorded over 19 nights. While ultrasonic recorders do not provide an indication of the number of individuals, the number of calls recorded can provide a relative indicator of bat abundance in the area and, in turn, an indication of wetland quality. A high number of recorded calls suggests active foraging over the wetland, sustained by an abundance of insect prey for aeriallyforaging bats.

18 types of key wildlife habitat were identified on the seven Study Sites using provincial criteria for southern Ontario ecoregions, including: bat maternity roost habitat, turtle wintering and nesting areas, waterfowl nesting areas, osprey foraging habitat, amphibian breeding habitat, early-successional bird breeding habitat and habitat for several species of conservation concern.



Chalk-fronted Corporal, Heber Down Conservation Area

| Taxonomic Group | Total |
|-----------------|-----------|
| Dragonflies | 34 (48) |
| Butterflies | 33 (41) |
| Amphibians | 4 (7) |
| Reptiles | 3 (3) |
| Birds | 81 (163) |
| Mammals | 16 (29) |
| All taxa | 171 (291) |

Table 2: Wildlife Species Recorded for all Study Sites

Number in brackets represents a combined total of species recorded during field investigations and documented in background data.

Suitable fish habitat was observed at all Study Sites based on water quality parameters, presence of aquatic vegetation and underwater cover, and substrates suitable for fish spawning. Fish species captured by minnow trap or observed in the former pit ponds included: Pumpkinseed, Fathead Minnow, Brown Bullhead, Bluegill, and Largemouth Bass. Background data from Spray Lake and Puslinch Tract included gamefish such as Northern Pike, Black Crappie, Rock Bass and Yellow Perch in the former aggregate pit ponds.

A summary of results for each of the seven Study Sites is presented on the following pages.



Anderson Property

Town of East Gwillimbury, ON

Greenbelt Plan Area

Licence Surrender: 1988 Licence Area: 3.4 ha Wetland Area: 0.4 ha

Species Recorded

Dragonflies: 10 Butterflies: 11 Fish: 3 Amphibians: 1 Birds: 36 Bats: 6 The Anderson Site is a 4.5 ha private property located within the Greenbelt planning area. The former aggregate pit associated with a family haulage company has been rehabilitated to include two shallow marsh and pond features.

In addition to wetland features, the property sustains a variety of natural vegetation communities, including mixed forest, thicket and meadow. The provincially-significant Black River Wetland Complex #1 crosses the Anderson Site, outside the limits of disturbance of the former aggregate pit but within the licence boundary.

This site has the potential to provide habitat for wildlife under the provincial categories of seasonal concentration areas (e.g. bat maternity roost), specialized habitats for wildlife (e.g. amphibian breeding), habitat for special concern and rare wildlife (e.g. marsh breeding birds) and animal movement corridors. Three species of conservation concern or SAR were recorded on the property during field investigations.



Eagles Nest Golf Club

City of Vaughan, ON

Oak Ridges Moraine Plan Area

Licence Surrender: 2003 Licence Area: 75.7 ha Wetland Area: 4.9 ha

Species Recorded

Dragonflies: 16 Butterflies: 8 Fish: 1 Amphibians: 2 Birds: 48 Bats: 3 The Eagles Nest Golf Club is a high-end golf course constructed on a former sand and gravel pit operation. Two rehabilitated ponds add a natural element to the course and provide a significant view from the adjacent club house.

The property is a mix of manicured turf, naturalized meadow and forest communities. This site has the potential to provide habitat for wildlife under the provincial categories of seasonal concentration areas (e.g. waterfowl stopover and staging), specialized habitats for wildlife (e.g. turtle nesting), and habitat for special concern and rare wildlife (e.g. early-successional breeding birds). Four species of conservation concern or SAR were recorded on the property during field investigations.

A nesting pair of Red-necked Grebe was observed in the larger rehabilitated pond. The pair was first observed on June 8, 2018 attempting to build a floating nest of cattail and other emergent vegetation in a shallow area of the pond. This nest was later flooded, and it is assumed the nest failed, however the pair were still present on the July 24, 2018 site visit.



Eaton Property

Town of Caledon

Niagara Escarpment Plan Area

Licence Surrender: 1989 Licence Area: 8.5 ha Wetland Area: 1.2 ha

Species Recorded

Dragonflies: 13 Butterflies: 8 Amphibians: 3 Birds: 36 Bats: 7 The Eaton Property is part of a private residential estate, acquired from owner-operator Standard Paving Ltd. in 1969. Aggregate extracted from the licence area was used at one time to rebuild Heart Lake Rd.

Two ponds on the property were created through aggregate extraction and rehabilitated with meadow seeding and planting of a variety of native trees and shrubs. Metal windmills were formerly used to aerate the ponds however these are no longer in use. The licence area is set within a densely forested landscape and adjacent to the provincially-significant Caldwell Woods Wetland.

Although no fish were captured by minnow trapping, both ponds had good water quality and contained underwater structures that provide suitable fish habitat. Several male Carolina Saddlebags, an unranked species in Ontario, were observed patrolling the ponds indicating that this rarely encountered species may be breeding or a permanent resident. This site has the potential to provide habitat for wildlife under the provincial categories of seasonal concentration areas (e.g. turtle wintering area), specialized habitats for wildlife (e.g. waterfowl nesting), habitat for special concern and rare wildlife (e.g. early-successional breeding birds) and animal movement corridors. Eight species of conservation concern or SAR were recorded on the property during field investigations.



Heber Down Conservation Area

Town of Whitby, ON

Greenbelt Plan Area

Licence Surrender: 1985 Licence Area: 34.8 ha Wetland Area: 0.1 ha

Species Recorded*

Dragonflies: 20 Butterflies: 21 Fish: 2 Amphibians: 7 Birds: 158 Bats: 3

*combined field and background data⁴

The Study Site at Heber Down Conservation Area is comprised of two surrendered aggregate licences which were acquired by the Central Lake Ontario Conservation Authority, in 1969 and 1978.

Two shallow wetland features were created by extraction which have become densely vegetated and support a high diversity of wetlanddependent wildlife such as dragonflies and frogs. Two provincially-rare dragonflies (Azure Bluet and Unicorn Clubtail) were recorded at the southernmost pond which also contained an exceptional abundance of tadpoles. Both ponds are set in a mosaic of coniferous woods, thicket and meadow and only accessible by unmarked, informal trails within the Conservation Area.

This Heber Down site provides habitat for wildlife under the provincial categories of seasonal concentration areas (e.g. turtle wintering area), specialized habitats for wildlife (e.g. amphibian breeding), habitat for special concern and rare wildlife (e.g. open country breeding birds) and animal movement corridors. Five species of conservation concern or SAR were recorded on the property during field investigations.



Kelso Quarry Park Town of Milton, ON

Niagara Escarpment Plan Area

Licence Surrender: 2006 Licence Area: 93.7 ha Wetland Area: 19.4 ha

Species Recorded

Dragonflies: 12 Butterflies: 16 Fish: 3 Amphibians: 2 Birds: 42 Bats: 6 Kelso Quarry Park received the prestigious OSSGA Bronze Plaque Award in 2017 as an outstanding example of the state of the art in quarry rehabilitation.

Kelso Quarry was established in 1958 to provide material for the construction of Highway 401. Progressive rehabilitation of the site began in the 1970s. Conservation Halton took over ownership of the property in 2006 and has since been restoring the landscape into a park setting with considerable fish and wildlife habitat enhancements.

The central aquatic feature is a 19 ha lake which is bordered by limestone cliff along the west side, beach and shallow marsh. Kelso Quarry Park provides habitat for wildlife under the provincial categories of seasonal concentration areas (e.g. shorebird migratory stopover), specialized habitats for wildlife (e.g. cliff and talus slopes), habitat for special concern and rare wildlife (e.g. early-successional breeding birds) and animal movement corridors. Eight species of conservation concern were recorded on the property during field investigations.



Spray Lake

Watersports Park

King Township, ON

Greenbelt Plan Area

Licence Surrender: unknown Property Area: 77.8 Licence Area: 77.8 ha Wetland Area: 42.4 ha

Species Recorded Dragonflies: 12 Butterflies: 17 Fish: 7* Amphibians: 3 Birds: 42 Bats: 5

*combined field and background data⁵

Spray Lake Watersports Park was founded in 2014 to provide a unique waterski and wakeboard experience on a former aggregate site.

The former aggregate pit licence area contains one large lake with one smaller pond to the east and an extensive swamp forest to the west which is part of the provincially-significant Ansnorveldt Wetland Complex. The facility includes picnic benches, washrooms, an office building, beach area, waterski jumps, cable park for boat-less wakeboarding, docks, walking trails and naturalized recreational areas. Fishing is a popular activity at the lake for humans and Osprey.

This site has the potential to provide habitat for wildlife under the provincial categories of seasonal concentration areas (e.g. waterfowl stopover and staging), specialized habitats for wildlife (e.g. osprey nesting, foraging and perching), habitat for special concern and rare wildlife (e.g. Monarch) and animal movement corridors. Five species of conservation concern were recorded on the property during field investigations.



Puslinch Tract Puslinch Township, ON

Future Greenbelt Plan Study Area

Licence Surrender: unknown Licence Area: unknown Wetland Area: 11.7 ha

Species Recorded*

Dragonflies: 33 Butterflies: 34 Fish: 8 Amphibians: 6 Birds: 98 Bats: 2

*combined field and background data⁶

Puslinch Tract is owned by the Grand River Conservation Authority and is a popular site for hiking and cross-country skiing.

An aggregate licence was acquired by the Department of Highways to use the Puslinch Tract as an aggregate source for the construction of Highway 401. The Puslinch Tract was included in a 1987 study of the use of rehabilitated aggregate pits in Ontario for fish and wildlife prepared for the Aggregate Resources Section of MNRF². A comparison between the previous and current study is provided in the Key Findings, below.

Multiple wetlands are within the former extraction area; field investigations focused on the two largest ponds which were also evaluated in 1987. The provincially-significant Puslinch Lake Irish Creek Wetland Complex overlaps the licence boundary. The Puslinch Tract provides habitat for wildlife under the provincial categories of seasonal concentration areas (e.g. snake hibernacula), specialized habitats for wildlife (e.g. turtle nesting), habitat for special concern and rare wildlife (e.g. early-successional breeding birds) and animal movement corridors. Six species of conservation concern were recorded on the property during field investigations.

Key Findings

Field verification of wetland communities helped to refine feature boundaries and identify additional wetlands which could not be readily detected using air photo interpretation, such as small pockets of marsh or swamp forest communities. The potential limitation of using air photo interpretation to identify swamp forest was discussed in the Phase I study, as areas of standing water are not visible through the forest canopy and may not be present year-round. At the Spray Lake site, a 24 ha forested swamp, which forms part of the provincially-significant Ansnorveldt wetland complex, was present in the licence boundary but not accounted for in the Phase I study. When this feature is removed from calculations, wetland delineation in the field vielded an increase in total wetland area compared with air photo estimation by an average of 0.3 ha or 3% of the licence area for the six sites in common among Phase I and II studies. The total increase in wetland area across the six sites, and including the Spray Lake swamp forest, was 26 ha (increasing from 47 ha to 73 ha). In general, the estimation of wetland area from air photos was accurate, if slightly underestimated, for aquatic features formed through aggregate extraction, as these have fairly defined boundaries, and unforested wetlands which can be distinguished from upland communities.

Although treed wetlands observed in this Study are unlikely to have been created through aggregate rehabilitation, due to community age, their presence on the site of former aggregate operations increases the diversity and complexity of the rehabilitated landscape, providing cover or breeding habitat for wildlife that may also use adjacent open aquatic features. Other significant vegetation communities, including cliff and savannah, were created through aggregate extraction and subsequent rehabilitation on the Kelso and Heber Down study sites. The presence of these unique habitats on a former aggregate site demonstrates that aggregate extraction is not incompatible with the creation, enhancement or protection of nearby significant natural features.

Phase II field investigations focused on butterflies, dragonflies, birds, frogs and bats as they are highly visual or auditory species that are easily detected using appropriate field protocols and equipment. For example, male songbirds reliably sing on their breeding territories in the month of June. Comparing results of June breeding surveys with background data from all seasons for well-studied sites such as Heber Down Conservation Area or the Puslinch Tract then allows us to extrapolate how local breeding diversity could be indicative of avian use throughout a given year. At Puslinch and Heber Down we recorded calls of 31 and 39 bird species respectively, while publicly-available records from eBird, which includes migratory or wintering species, show that 98 and 154 species have been documented on these sites in the previous ten or more years. The pattern of data indicates that acoustic surveys at the right time of year can provide significant insight into the total avian richness on a site. This approach holds true for the other taxa surveyed and results indicate healthy and diverse aquatic ecosystems at all sites surveyed.

Puslinch Tract 30 Years Later

Since MNRF published their study of fish and wildlife use on rehabilitated aggregate sites², each of their 14 study sites has likely undergone considerable change. Included in both the MNRF and current Study was Puslinch Tract, where previously minimal shoreline vegetation is now extensive along the perimeter of the two primary ponds. Whereas the earlier study noted good water quality in both ponds but concluded that they would not sustain viable fish populations due to warm water temperature in summer and ice cover in winter, the ponds today support a healthy fish population. Along with a change in ownership from MNRF to the GRCA, there have been some change in recreational opportunities. Hunting and swimming are no longer permitted, while on-leash dog-walking is a new use. Hiking and wildlife viewing remain regular and popular uses of the property.



Nesting Red-necked Grebe pair, Eagles Nest Golf Club

Select Significant Observations

Wetland and aquatic habitats vary in size, type and function throughout the landscape. While we cannot extrapolate data on site variability to all surrendered aggregate sites, this diversity was evident within our subset. Biodiversity itself is a measure of unique life forms that take advantage of a given habitat. Rare dragonfly species adapted to shallow waterbodies were present at the small wetland pools of Heber Down. A provincially rare nesting bird occurred at Eagles Nest, where a large wetland feature sustaining gamefish provided suitable breeding habitat. Through our subset of surrendered aggregate licences, we can infer that significant diversity among wetland communities is serving a strong ecological purpose in preserving Ontario's biodiversity. Some highlights are presented on the following pages.



Dragonflies (Order Odonata) are considered indicators of wetland quality. A high diversity of dragonflies at a restored wetland demonstrates that the system has reached an ecologically-functional state.⁷

Two provincially rare dragonflies were observed in rehabilitated aggregate ponds at Heber Down Conservation Area. Unicorn Clubtail is a highly local species, restricted in Canada to roughly 35 locations in southern Ontario⁸. Azure Bluet was previously known from a only few locations on the Canadian Shield but more recently found in aggregate pit ponds and man-made ponds in southern Ontario⁸.

Unicorn Clubtail

Amphibian breeding habitat consists of rich swamps, thickets and marshes, areas of vernal or seasonal pooling, and riparian edges of waterbodies.

Wetlands supporting a diversity of breeding amphibians are extremely important and fairly rare within Central Ontario⁹. Amphibian breeding was confirmed at wetlands in all seven Study Sites, five of which supported a diversity of species indicative of significance according to provincial criteria for evaluating wildlife habitat.



Tadpoles, Heber Down Conservation



Ultrasonic call of Little Brown Bat

Ultrasonic detectors placed beside wetlands confirmed the presence of seven bat species across the Study Sites.

Three endangered species were recorded: Little Brown Myotis, Northern Myotis and Tri-coloured Bat. A fourth endangered bat, Eastern Small-footed Myotis, was documented in background data. The high number of calls recorded for all species indicates that they were actively foraging over the wetland, likely sustained by an abundance of aquatic insect prey.

The Red-necked Grebe may be seen around the Great Lakes region during migration, but in southern Ontario it is only known to nest along the western end of Lake Ontario¹⁰.

The North American breeding range of Red-necked Grebe extends from Alaska to western Quebec and, generally, as far south as the northern Great Lakes. Nesting occurs in shallow lakes and bays larger than 2 ha. Red-necked Grebes nested in Luther Marsh from the 1950's and 1980's, but in the most recent Ontario breeding bird atlas nesting was only confirmed along Lake Ontario. A nesting pair was observed at Eagle's Nest Golf Club.



Red-necked Grebe, Eagles Nest Golf Club



Monarch, Puslinch Tract

Four rare butterflies were recorded during this Study: Monarch (SC), Giant Swallowtail (S3), Common Sootywing (S3) and Black Dash (S3).

Monarch is listed as Special Concern in Ontario and Endangered in Canada. This butterfly, which relies on milkweed as its larval host plant, was observed at six of seven Study Sites. The Giant Swallowtail is Canada's largest Butterfly and a resident of southwestern Ontario. Common Sootywing is uncommon in most of its range, but can be locally common where its host plant, lamb's quarters or other members of the *Amaranthaceae* family, occurs. Black Dash is an uncommon and very local species in Ontario, reported to be restricted to wet sedge meadows and ranging only as far north as Waterloo Region¹¹.

Limestone cliffs are the most prominent ecological features of the Niagara Escarpment; however they are also among the most rare¹².

Cliffs are vertical rock faces with an abundance of ledges, cracks and small caves which provide refuge for diverse wildlife. Where soil is able to accumulate, grasses, ferns and woody plants are present, while a variety of lichen species grow on the exposed rock faces. This key wildlife habitat can be created through quarrying, as demonstrated at the Kelso Quarry.



Limestone cliff at Kelso Quarry Park



Barn Swallow, Puslinch Tract

Bird Species at Risk: Bobolink, Eastern Meadowlark, Barn Swallow, Chimney Swift, Wood Thrush and Eastern Wood-Pewee.

Seven bird Species at Risk were observed during field investigations. Barn Swallow and Chimney Swift are aerial insectivores which often forage near wetlands due to the abundance of insect prey. Bobolink and Eastern Meadowlark nest in large, open grasslands which may be present in early phases of aggregate site rehabilitation or where soils are not suited to forest establishment. Wood Thrush and Eastern Wood-Pewee are woodland nesting birds, which may be found in woodland patches adjacent to former extraction areas and may use habitat available on rehabilitated aggregate sites for foraging, bathing, etc.

291 wildlife species were documented on the seven Study Sites.

Biodiversity can be measured at multiple levels, such as habitat or species. The former aggregate sites in this Study supported a variety of habitat types, from grassland to swamp to open water, which have been established through active and passive restoration. In turn, these habitats supported a richness of dragonflies, butterflies, fish, amphibians, birds and mammals. When compared with public records¹³ from the previous five years or more at nearby natural areas, field investigations at several of the Study Sites yielded comparable diversity in only two months of data collection.



Yellow Lady's Slipper, Spray Lake Watersports Park

Cultural Value of Wetlands

Wetlands created through aggregate extraction can provide cultural benefits while sustaining ecological value.

Cultural uses of constructed wetlands in this study included nature photography, birdwatching, hiking, golf, fishing and water-skiing which were enhanced by the natural setting and undertaken in a manner that protected the aquatic features for ecological and social benefit. While the historic or current significance of several sites within this study may not apply all 123 surrendered licences documented in Phase I, they demonstrate a range of possibilities to provide cultural and recreational activities on rehabilitated aggregate sites while also maintaining ecological value.

There are additional ways in which wetlands and other aquatic features created through aggregate extraction can provide value to society. The calming aesthetic of water and the private nature of many sites presents an opportunity for people to connect with nature. In contrast, larger waterbodies may be suitable facilities for hosting community and sporting events. Providing outdoor recreation opportunities on rehabilitated aggregate sites could be used as a strategy to protect sensitive ecosystems by directing active or consumptive human uses away from existing natural areas. The sites within this study also present an opportunity to increase public awareness of the role of aggregates in the development of significant public infrastructure, such as provincial Highway 401.



Wind mill formerly used to aerate pond, Eaton Property

Eagles Nest Golf Club

Closing

Wetlands are among the most productive and diverse habitats on Earth and play a significant role in preserving Ontario's biodiversity, providing essential ecosystem services, and supporting our individual health and well-being. The Province of Ontario is working to ultimately achieve a net gain of wetland habitat, encouraged through a program of awareness, knowledge, partnership and conservation. The goals identified in the Ontario Wetland Conservation Stategy are supported through surrendered aggregate sites where wetland habitat now exists, or could exist, on the landscape.

Aggregates are literally the "foundation" of our economy and society, with Phase II study sites contributing to some of the largest and most important infastructure projects in Ontario's history. Likewise, we need aggregate to meet our basic daily needs as Ontarians, in our homes and office buildings, bridges, roads, institutions, consumer goods and even for environmental protection purposes.

Significant economic and environmental costs are incurred when aggregate is transported great distances to meet the consumption needs of the Ontario population. The opportunity to extract aggregate in proximity to our largest population centres can lead to positive outcomes for the economy, the well-being of Ontario citizens and for the environment when post extraction conditions provide high quality and biologically diverse wetland habitats, which are capable of supporting rare and at-risk species.

Citations

1 - OSSGA, 2017. Wetland Rehabilitation – Surrendered Aggregate Sites in Ontario's Provincial Plan Areas. Available online at: <u>https://ossga.com/multimedia/2017-10-13-132232-60935/aquatic_rehabilitation_august_15_2017_new_oct13.pdf</u>

2 – Michalski, M.F.P. et al. 1987. Rehabilitation of Pits and Quarries for Fish and Wildlife, Volume 1; Ontario Ministry of Natural resources, Land Branch Management. 59pp. Ministry of Natural Resources and Forestry (MNRF). 2014. Ontario Wetland Evaluation System, Southern Manual. 284 pp.

3 – Michael Michalski Associates, Anthony Usher Planning Consultant, UMA
 Engineering Ltd., J.E. Hanna Associates Inc. and Hough, Stansbury & Associates Ltd.
 1986. Rehabilitation of Pits and Quarries for Fish and Wildlife, Volume 2: Appendixes.

4 – Central Lake Ontario Conservation Authority (CLOCA). 2010. Heber Down Conservation Area Management Plan. Central Lake Ontario Conservation Authority. December 2010.

5 – Ontario Fishing Forums. 2018. Posting August 11, 2016, by Phylykx555 "If you like bass then Spray Lake is for you". Accessed online at: <u>https://www.ontariofishingforums.com/forum/topic/27005-if-you-like-bass-then-spray-lake-is-for-you/</u>

6 – Grand River Conservation Authority (GRCA). 2004. Puslinch Tract Conservation Area Master Plan. Grand River Conservation Authority. June 2004.

7 - Domsic, K. 2009. Odonata as Indicators of Wetland Restoration. Unpublished manuscript. University of Waterloo. Accessed online at: <u>https://uwaterloo.ca/environment-resources-and-sustainability/sites/ca.environment-resources-and-sustainability/files/uploads/files/2009Domsic490.pdf</u>

8 – Catling, P.M., and V.R. Brownell. 2000. Damselflies and Dragonflies (Odonata) of Ontario. Resource Guide and Annotate List. ProResources Metcalfe, Ontario. 200pp.

9 – Ministry of Natural Resources and Forestry (MNRF). 2015a. Significant Wildlife Habitat Criteria Schedules for Ecoregion 6E. January 2015. Ontario Ministry of Natural Resources and Forestry, Peterborough.

10 – Cadman, M. D., D. A. Sutherland, G. G. Beck, D. Lepage and A. R. Couturier (eds.). 2007. Atlas of the Breeding Birds of Ontario, 2001-2005. Bird Studies Canada, Environment Canada, Ontario Field Ornithologists, Ontario Ministry of Natural Resources, and Ontario Nature, Toronto. Xxii + 706 pp.

11 – Layberry, R.A., P.W. Hall and J.D. Lafontaine. 1998. The butterflies of Canada. University of Toronto Press, Toronto. 280pp.

12 – Ministry of Natural Resources and Forestry (MNRF). 2015b. Significant Wildlife Habitat Criteria Schedules for Ecoregion 7E. January 2015. Ontario Ministry of Natural Resources and Forestry, Peterborough

13 – eBird. 2018. An online database of bird distribution and abundance [web application]. eBird, Ithaca, New York. Available: <u>http://www.ebird.org</u> (Accessed June-December 2018).

Northern Leopard Frog, Spray Lake Watersports Park

a series

SE S